UTAH BIG GAME RANGE TREND STUDIES

2005 Volume 2

Northeastern-Southeastern Region

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REPORT FOR FEDERAL AID PROJECT W-82-R-50

STATE OF UTAH
DEPARTMENT OF NATURAL RESOURCES
DIVISION OF WILDLIFE RESOURCES

UTAH BIG GAME
RANGE TREND STUDIES
2005 VOLUME 2

Written and Edited by

Daniel Eddington	Asst. Range Trend Program Leader
Bracken Davis	Asst. Range Trend Program Leader
Daniel Summers	Asst. Range Trend Program Leader
James Davis	Range Trend Program Coordinator

Tables and Maps prepared by

Daniel Summers	Asst. Range Trend Program Leader
Daniel Eddington	Asst. Range Trend Program Leader
Bracken Davis	Asst. Range Trend Program Leader
Debbie Hobart	Range Technician
Christina Juran	Range Technician

Field Work

Ammon Bailey	Daniel Eddington
Jason Baker	Mark Ewell
Chris Balzotti	Debbie Hobart
Aprille Bennett	Christina Juran
Lexie Carroll	Robert Sabin
Bracken Davis	Daniel Summers

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UTAH DEPARTMENT OF NATURAL RESOURCES
DIVISION OF WILDLIFE RESOURCES
1596 West North Temple
Salt Lake City, Utah 84114

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*Indicates study was not monitored in 2005, because it was suspended, replaced by another study, or was not accessible. Maps, discussion, and tables for these studies are available in 2000 Volume 2 report or at http://www.wildlife.utah.gov/range/.

PROGRAM NARRATIVE

State: UTAH Project Number: W-82-R

Grant Title: Wildlife Habitat Research and Monitoring

Project Title: Wildlife Habitat Monitoring/Range Trend Studies

Need:

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

Objective:

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

Expected Results or Benefits:

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

REMARKS

The work completed during the 2005 field season and reported in this publication involves the reading of interagency range trend studies in the DWR Northeast and Southeastern Regions. Most trend studies surveyed in these management units were established in the 1980's with rereads at 5 year intervals.

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

Bureau of Land Management
- Price Field Office
- Vernal Field Office
- Moab Field Office

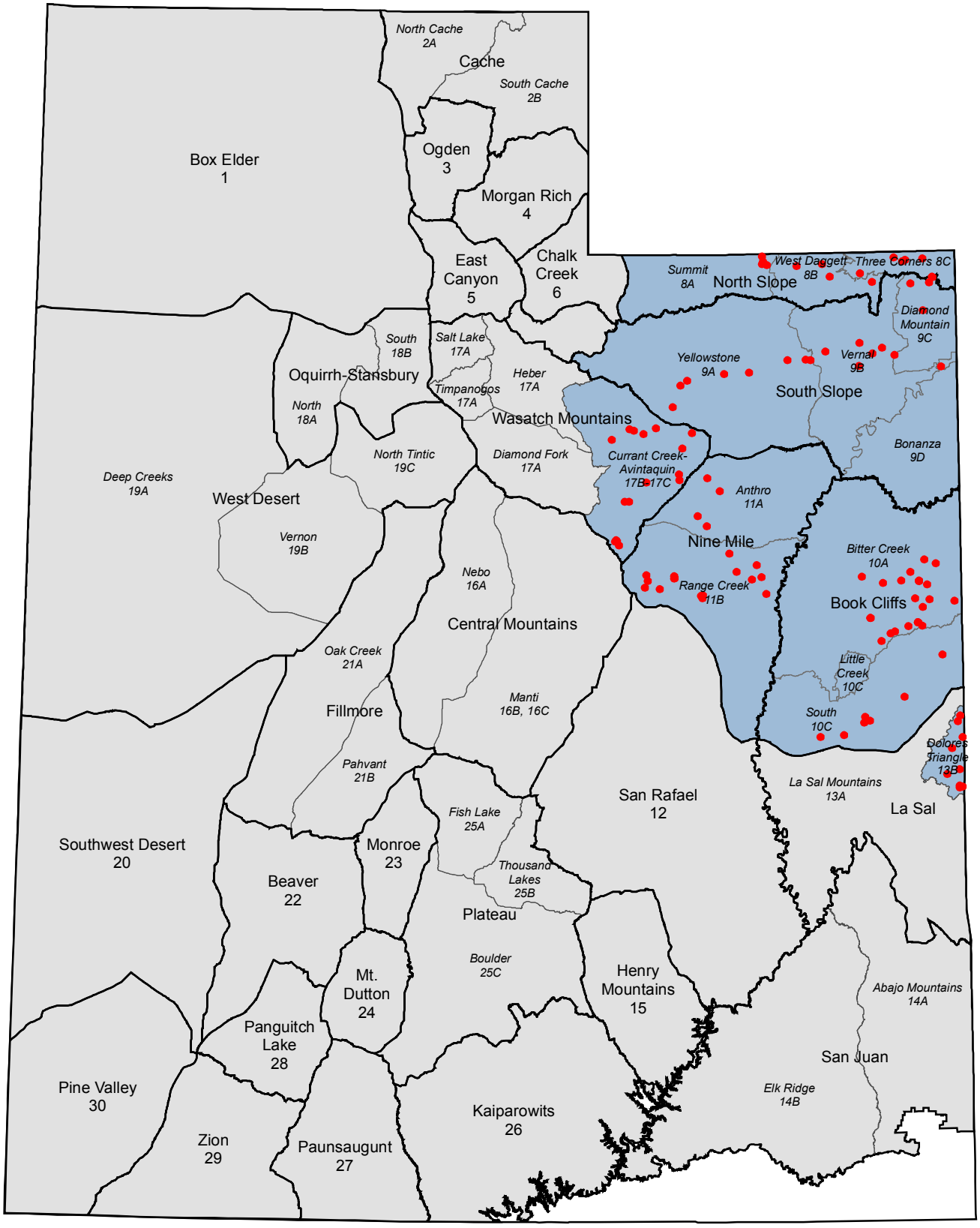
Ashley National Forest
- Vernal Ranger District
- Roosevelt Ranger District
- Duchesne Ranger District
- Flaming Gorge National Recreation Area

Wasatch-Cache National Forest
- Mountain View Ranger District

Ute Indian Tribe Natural Resources
- Fort Duchesne, Utah

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

Utah Management Units Surveyed in 2005



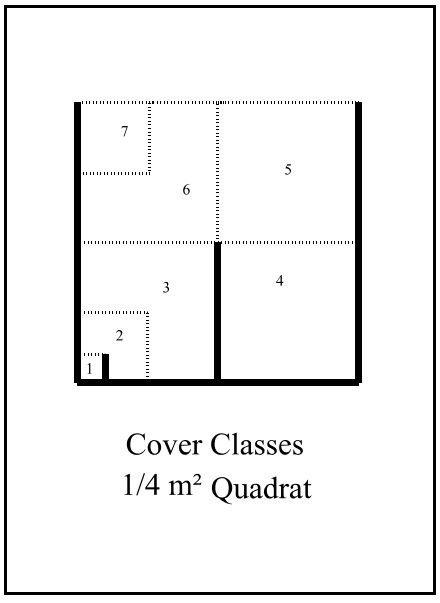
RANGE TREND STUDY METHODS

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

Vegetative composition

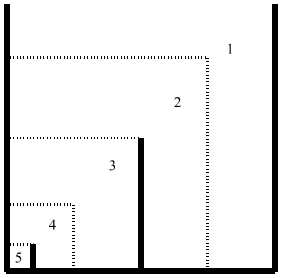
Determining vegetational characteristics for each “key” area is determined by setting up 5 consecutive 100 foot baseline transects in the area of interest. This 500 foot line is the baseline and one, 100 foot belt is placed perpendicular to each 100 foot section of the baseline at random foot marks and centered on the 50 foot mark. The beginning of each belt is marked by a rebar stake to ensure a more precise alignment of the originally sampled belt. A 1/4 m^2 quadrat is centered every 5 feet along the same side of the belt, starting at the 5 foot mark. Cover and nested frequency values are determined for vegetation, litter, rock, pavement, cryptogams, and bare ground. Cover and nested frequency values are also estimated for all plant species occurring within a quadrat, including annual species.

Cover is determined using an ocular cover estimation procedure using 7 cover classes (Bailey and Poulton, 1968, Daubenmire 1969). The seven cover classes are: 1) .01-1%, 2) 1.1-5%, 3) 5.1-25%, 4) 25.1-50%, 5) 50.1-75%, 6) 75.1-95%, and 7) 95.1-100%. For example, to estimate vegetative cover with this method, an observer would visualize which cover class all the vegetation would fit into if the plants were moved together until they were touching. To quantify percent cover for bare ground, litter, rock, pavement, and cryptogams, the observer would visually estimate which cover class could accommodate all of the specified cover type within the quadrat. These numbers are then recorded. To determine percent cover for each belt, the midpoint for each cover class value observed is summed and divided by the number of sampling quadrats (20). The mean for the five belts is the average for a given site.



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

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



Nested Frequency
1/4 m² Quadrat

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

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

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

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

Young: Larger with more complex branching. Does not show signs of maturity. Usually between 1/8 and 1/4-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 their availability and the amount of use they display, and placed in one of 9 form classes.

1. All available, lightly hedged.

2. All available, moderately hedged.

3. All available, heavily hedged.

4. Largely available, lightly hedged.

5. Largely available, moderately hedged.

6. Largely available, heavily hedged.

7. Mostly unavailable.

8. Unavailable due to height.

9. Unavailable due to hedging.

Lightly hedged: 0 to 40 percent of twigs browsed.

Moderately hedged: 41 to 60 percent of twigs browsed.

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

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

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

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

Shrubs are also rated on their health and placed into one of 4 vigor classes.

1. Normal and vigorous.

2. Insect infested or diseased.

3. Poor vigor - chlorotic or discolored leaves, smaller than normal stems or leaves, flowering restricted, partially trampled, pulled up, or otherwise damaged. Stunted growth, partial crown death.

4. Dying - substantial portion of crown dead (more than 50%), more extreme than 3 above. Probably an irreversible condition.

In addition, each mature shrub species closest to every 10 foot mark along a sampling belt is measured to determine average height and crown. This allows a maximum sample of 50 plants per species to be measured at a given site depending on their respective densities. Annual leader growth is estimated for key browse species at each study site. This is done by measuring five leaders on the closest mature shrub in each quarter (similar to point-center quarter method) from 3 stakes along the study site baseline (0', 200' and 400' stakes).

These numbers are then averaged. Tree density is determined using the point-center quarter method at two hundred foot intervals along the baseline. Three hundred feet are added to the end of the transect so that five, 200 foot point-quarter centers can be read. This allows sampling trees on a much larger scale. The strip method that is used to estimate shrub density, can in most cases, effectively inventory seedling and young tree densities. However, the strip method is less effective at estimating densities of mature trees that are often widely disbursed.

Prior to 1992, shrub frequency was determined using the nested frequency method that was previously described. It was found that nested frequency of shrubs did not usually reflect accurate trends in shrub populations which had particularly low or high densities. Therefore, beginning in mid-1992, each 1/100th acre shrub strip is divided into 20, five foot segments. To give a more accurate measure of shrub frequency, presence or absence of shrub species is determined within these strip segments, and this measurement is termed strip frequency. For example, if a species was rooted in 25 of the 100 shrub strips, strip frequency for this species would be 25%. This larger sample will better reflect changing trends in shrub populations. This data along with shrub cover is recorded in the "Browse Trends" table.

TREND DETERMINATION

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

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

Trends in herbaceous plants as a group or as a single "key" species can be determined by comparing the sum of nested frequency values between readings. Attention is also given to changes in species composition of grasses and forbs through time. A non-parametric statistical test (Friedman test which is analogous to analysis of variance) (Conover 1980) is conducted on nested frequencies of each species to determine significant changes at alpha = .10. Ground cover parameters are analyzed and compared in the discussions of the reread studies. Trends for soil are determined by comparing basic ground cover measurements and cover composition (herbs vs shrubs) between years as well as comparing photos and observer observations between readings. A ratio of the nested frequency values of protective cover types (vegetation, litter, and cryptogams) to bare soil can also be used to help determine changes in soil trend. Beginning in 2002, an erosion condition class assessment adapted from the Bureau of Land Management is also completed on each study site to provide additional qualitative information on soil condition. On newly established studies, a more subjective or apparent assessment is made from qualitative comparisons.

The following tables and partial tables are taken from study number 23-1 to help illustrate some basic comparisons that can be made with the data. The "Herbaceous Trends" table summarizes average cover and nested frequency data for individual grass and forb species. The table contains all the grass and forb species that have been sampled on study 23-1. Readings prior to mid-1992 include only nested frequency data for *perennial* species. Beginning in mid-1992, all trend studies have data for perennial and annual species as well as cover estimates for individual species.

In the following example, grasses had a combined total cover value of 11.39% in 1998 and 7.08% in 2003. In 1985 and 1991, bluebunch wheatgrass (*Agropyron spicatum*) had a nested frequency value of 227 out of a possible nested frequency score of 400. By 1998, nested frequency declined to 183. The subscript letters indicate that the nested frequency value for *A. spicatum* between 1991 and 1998 declined significantly. Nested frequency declined to 160 in 2003, but the subscript letters indicate that this was not a significant change. Cover was estimated at 7.78% for *A. spicatum* in 1998 declining to 5.59% in 2003. Trend for this grass is down over the life of the transect due to a significant decline in sum of nested frequency since 1991.

HERBACEOUS TRENDS --
Management unit 23 , Study no: 1

Type	Species	Nested Frequency				Average Cover %	
		'85	'91	'98	'03	'98	'03
G	Agropyron spicatum	$_{b}$227	$_{b}$227	$_{a}$183	$_{a}$160	7.78	5.59
G	Bromus tectorum (a)	-	-	$_{b}$42	$_{a}$15	.43	.03
G	Oryzopsis hymenoides	4	12	12	5	.17	.04
G	Poa fendleriana	$_{a}$6	$_{bc}$36	$_{c}$49	$_{ab}$24	.98	.46
G	Poa secunda	$_{a}$3	$_{a}$18	$_{b}$94	$_{b}$80	2.00	.94
G	Sitanion hystrix	$_{c}$25	$_{bc}$20	$_{ab}$6	$_{a}$2	.01	.01
Total for Annual Grasses		0	0	42	15	0.43	0.03
Total for Perennial Grasses		265	313	344	271	10.95	7.05
Total for Grasses		265	313	386	286	11.39	7.08
F	Agoseris glauca	$_{a}$-	$_{a}$10	$_{ab}$1	$_{a}$-	.00	-
F	Arabis spp.	$_{a}$-	$_{b}$18	$_{a}$1	$_{a}$1	.00	.00
F	Astragalus convallarius	2	4	6	6	.15	.10
F	Calochortus nuttallii	4	8	-	-	-	-
F	Crepis acuminata	-	6	7	-	.06	-
F	Eriogonum racemosum	-	-	4	-	.03	-
F	Eriogonum umbellatum	$_{a}$-	$_{a}$1	$_{b}$9	$_{ab}$5	.16	.07
F	Phlox austromontana	-	6	4	6	.16	.15
F	Physaria chambersii	1	4	-	-	-	-
F	Phlox longifolia	$_{a}$8	$_{b}$27	$_{a}$16	$_{a}$6	.20	.02
Total for Annual Forbs		0	0	0	0	0.00	0
Total for Perennial Forbs		15	84	48	24	0.83	0.35
Total for Forbs		15	84	48	24	0.83	0.35

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

In 1985, perennial grasses had a sum of nested frequency value of 265. This value steadily increased to 313 in 1991 and 344 in 1998 before declining to 271 in 2003. These changes would indicate a slightly upward perennial grass trend from 1985 to 1998 and a stable trend overall for the life of the transect. The forb trend can be determined in a similar manner. The herbaceous understory trend is determined using both the grass and forb sum of nested frequency values. For example, total herbaceous cover was 12.23% in 1998 with grasses providing the bulk of the cover. Therefore, when determining herbaceous trend, the grass proportion should be weighted more heavily then the forb proportion in this example.

The following "Browse Trends" table summarizes strip frequency and cover for all shrub species occurring on this site. All of the shrubs encountered at study number 23-1 are listed. For example, mountain big sagebrush (*Artemisia tridentata vaseyana)* had a strip frequency of 40 out of a possible 100 in 1998, declining to 26 in 2003. Average cover is determined using cover classes in conjunction with the 1/4m^2 quadrat and estimating the percent of the quadrat covered. In this case, mountain big sagebrush cover was estimated to be 2.54% in 1998, declining to only 0.76% in 2003.

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

Type	Species	Strip Frequency		Average Cover %	
		'98	'03	'98	'03
B	Artemisia nova	35	26	2.24	2.41
B	Artemisia tridentata vaseyana	40	26	2.54	.76
B	Gutierrezia sarothrae	2	0	-	-
B	Juniperus osteosperma	4	5	5.51	9.29
B	Opuntia spp.	1	2	.15	-
B	Pinus edulis	4	6	5.99	8.81
B	Purshia tridentata	18	15	3.20	4.31
Total for Browse		104	80	19.63	25.58

To more accurately estimate canopy cover of trees and shrubs, the line-intercept method is used along each 100 foot belt. This data is reported in the "Canopy Cover, Line Intercept" table. For example, Utah juniper (*Juniperus osteosperma*) had an estimated average cover of 23.31% in 2003. Prior to 2002, only trees species were sampled in the line-intercept transect. Beginning in 2002, all woody species are included in the line-intercept transect and a canopy cover value for each is determined.

CANOPY COVER, LINE INTERCEPT --
Management unit 23 , Study no: 1

Species	Percent Cover	
	'98	'03
Artemisia nova	-	1.85
Artemisia tridentata vaseyana	-	.55
Juniperus osteosperma	7.19	23.31

Beginning in 2002, annual leader growth of the key browse species is measured to get an idea of shrub production and vigor. This data is displayed in the "Key Browse Annual Leader Growth" table. For example, annual leaders on bitterbrush (*Purshia tridentata*) averaged 4 inches in length while mountain big sagebrush leaders averaged only 1.1 inches in 2003.

KEY BROWSE ANNUAL LEADER GROWTH --
Management unit 23 , Study no: 1

Species	Average leader growth (in)
	'03
Artemisia tridentata vaseyana	1.1
Purshia tridentata	4.0

The following "Point-Quarter Tree Data" table displays tree density estimates using the point-center quarter method which better estimates density of widely disbursed trees than the shrub density strips. Average basal diameter is also listed in inches. Data from 2003 estimated 197 juniper and 119 pinyon trees/acre with average basal diameters of 7.0 inches and 5.3 inches respectively.

POINT-QUARTER TREE DATA --
Management unit 23 , Study no: 1

Species	Trees per Acre		Average diameter (in)	
	'98	'03	'98	'03
Juniperus osteosperma	213	197	8.8	7.0
Pinus edulis	115	119	4.8	5.3

The "Basic Cover" table summarizes average cover of vegetation, rock, pavement, litter, cryptogams, and bare ground. Average cover prior to mid-1992 adds up to only 100%, while cover with the current method (post mid-1992) estimates several layers of plant and ground cover and will usually exceed 100%. For vegetation cover, the previous method only determined basal vegetative cover (2.0 and 5.75), while the new method estimates the vertical projection of the crown, or aerial cover (30.04 and 32.5%). Therefore, comparisons can be made for all cover measurements except for general vegetation cover.

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

Cover Type	Average Cover %			
	'85	'91	'98	'03
Vegetation	2.00	5.75	30.04	32.50
Rock	6.00	5.25	11.18	13.20
Pavement	30.50	24.25	26.32	19.74
Litter	46.50	46.50	42.49	37.44
Cryptogams	5.00	3.00	.93	3.45
Bare Ground	10.00	15.25	21.42	13.10

A summary of the soil data is found in the "Soil Analysis Data" table. Effective rooting depth is an average of 25 soil penetrometer readings, 5 of the deepest probes possible near each of the 5 baseline starting stakes. The effective rooting depth is a relative index that can be used for site comparisons with regard to individual species differences, site preferences, and abundance. Average soil temperature is taken from the deepest probe, one at each of the 5 baseline starting stakes. The temperature is listed in the table as the top measurement (e.g., 62.3°F), with the average depth (in inches) as the lower measurement (12.7). Average soil temperature is re-measured with each reading and the most current soil temperature and depth is listed in the soil analysis table. Chemical and textural (Day 1965) characteristics are also listed and were determined by laboratory analysis of a composite soil sample taken near each of the 5 baseline starting stakes.

SOIL ANALYSIS DATA --
Management unit 23, Study # 01, Study Name: Bear Ridge

Effective rooting depth (in)	Temp °F (depth)	pH	%sand	%silt	%clay	%OM	PPM P	PPM K	ds/m
11.2	62.3 (12.7)	7.3	40.0	33.4	26.6	3.4	9.0	57.6	0.5

The descriptive terms used for ranges in pH (Rhodes 1982) are as follows:

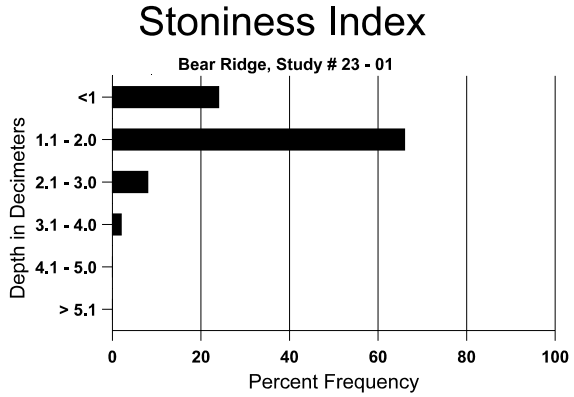
Ultra acid	< 3.5
Extremely acid	3.5-4.4
Very strongly acid	4.5-5.0
Strongly acid	5.1-5.5
Moderately acid	5.6-6.0
Slightly acid	6.1-6.5
Neutral	6.6-7.3
Slightly alkaline	7.4-7.8
Moderately alkaline	7.9-8.4
Strongly alkaline	8.5-9.0
Very strongly alkaline	> 9.1

Percent organic matter (% OM) refers to the amount of organic matter in the top 12 inches of the soil profile. Parts per million (ppm) of phosphorus (P) (Olsen et al. 1954) and potassium (K) (Schoenau and Karamonos 1993) are also included. Values for phosphorus and potassium less than 10 ppm and 70 ppm respectively may be limiting to plant growth and development (Tiedemann and Lopez 2004).

The electrical conductivity (Rhodes 1982) 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 determine how rock is distributed throughout the upper soil profile, a stoniness index (Richard and Murdock 1963) is determined for each study site. Depth to the nearest rock is estimated on the first 10 feet (at one-foot intervals) along each of the 5 baselines, which allows 50 measurements. These data are then analyzed for each of the 5 incremental decimeter measurements, making it possible to visually determine the proportion (relative percent of rock at each depth) of rock from <1 decimeter to >5 decimeters. In the following example, most of the rock in the soil profile (~65%) was encountered in the 1 to 2 decimeter (4 to 8 inch) depth range. The distribution of rock in the soil profile can be an important factor for what is growing on the site.



The "Pellet Group Data" table summarizes the frequency of animal pellets sampled within the 100 quadrats placed along the sampling belts as well as data from a pellet group transect read parallel to the study site baseline. Quadrat frequency of wildlife and livestock droppings is included in reports done prior to mid-1992. For example in 1998, rabbit pellets were found in 25% of the quadrats placed on study 23-1, increasing to 32% in 2003. Quadrat frequency of rabbit or big game pellets indicate a relative amount of use by that particular animal. This data can help characterize changes in wildlife use patterns on the site.

PELLET GROUP DATA --
Management unit 23 , Study no: 1

Type	Quadrat Frequency		Days use/acre (ha)	
	'98	'03	'98	'03
Rabbit	25	32	-	-
Elk	4	-	7 (17)	1 (3)
Deer	36	20	51 (125)	54 (134)

It was determined that additional information on pellet groups was necessary. Therefore, a pellet group transect is now sampled in conjunction with the vegetative transects. The pellet group transect utilizes 50, 100ft^2 circular plots which are placed through the study area. These are usually two parallel transects of 25 plots on each side of the vegetative transect which runs 500 feet in length. The number of recent pellet groups for wildlife (usually deer and elk) and pats for cattle are recorded. That number is then converted to days use per acre. In the above example, deer days use/acre was estimated at 51 in 1998 increasing slightly to 54 in 2003. If a trend study needs to be read annually and more precision is required, the pellet group transect is marked permanently (rebar) and the pellet groups within the circular plots are removed or marked after being counted.

The “Browse Characteristics” table summarizes characteristics of the shrub community on study 23-1. Only mountain big sagebrush is included in this example. The sagebrush population is characterized by age class, vigor, utilization, and average height and crown for mature plants. Total density in plants/acre for mountain big sagebrush, excluding seedlings, was 1,400 in 1985, 1,065 in 1991, 1,100 in 1998, and 840 plants/acre in 2003. Seedlings are excluded from the population estimate because with summer drought, many will die by late fall causing great fluctuations in population estimates between sampling dates. Since mid-1992, a larger shrub sample (more than three times larger) is used to better characterize the shrub populations. Therefore, changes in density (before and after 1992) may not necessarily indicate changes in trend, especially shrub populations that characteristically are clumped and/or have discontinuous distributions. The earlier smaller sample could easily either overestimate or underestimate shrub populations. Other characteristics like percent of the population classified as dying, percent decadence, percent of the population displaying poor vigor, percent heavy hedging, young recruitment, etc. should be given more weight in determining shrub trend when comparing survey years where sample sizes are different.

BROWSE CHARACTERISTICS --
Management unit 23 , Study no: 1

		Age class distribution (plants per acre)					Utilization					
Year	Plants per Acre (excluding seedlings)	Seedling	Young	Mature	Decadent	Dead	% moderate	% heavy	% decadent	% dying	% poor vigor	Average Height Crown (in)
Artemisia tridentata vaseyana												
85	**1400**	266	200	400	800	-	67	24	57	-	14	13/15
91	**1065**	333	333	66	666	-	19	6	63	11	38	12/13
98	**1100**	-	100	260	740	2300	56	2	67	27	40	15/23
03	**840**	-	120	140	580	1740	29	0	69	40	40	14/21

The data on mountain big sagebrush shows the proportion of decadent shrubs in the population has steadily increased from 57% in 1985 to 69% by 2003. Plants classified as dying had also increased to 40% by 2003. More seedlings were encountered in 1985 and 1991, with slight fluctuations in the number of young plants. Dead plants, included in sampling after 1992, are abundant at 2,300 plants/acre in 1998 and 1,740 in 2003, and outnumber live plants by a ratio of 2:1 in both years. The percentage of plants displaying poor vigor has increased from 14% in 1985 to 40% in 1998 and 2003. The proportion of shrubs displaying heavy hedging declined from 24% in 1985, to 6% in 1991, and 0% by 2003. The proportion of shrubs displaying moderate use has ranged from 67% in 1985 to 19% in 1991. The average height of mature sagebrush has remained similar in all readings and averaged 14 inches in 2003. Average crown diameter has fluctuated from 13 inches in 1991 to 23 inches in 1998.

Considering all these factors, trend for sagebrush in 2003 is slightly downward due to a decline in density, increased decadence, and an higher proportion of plants classified as dying. No seedlings were encountered in 1998 or 2003 and young plants are only moderately abundant.

Management background information, photographs, and knowledgeable plant identification add to the database for each site. Management and background information for each site is obtained from the administering agency. Permanently located photographs are taken including a general view down and back up the baseline. A close-up of each half-high baseline post further characterizes 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.

The desirable components index (DCI) was created by Range Trend Program personnel as a tool to address condition and/or value of winter ranges for mule deer. This index is meant to be a companion to, not a replacement for, the site specific range trend assessments that are found in the annual Utah Big Game Range Trend Studies report. This index was designed to score mule deer winter range based upon several important vegetative components (ie., preferred browse cover, shrub decadence and young recruitment, cover of perennial grasses and forbs and annual grasses, etc.). Although the index may be useful for assessing habitat for other species (ie. sage grouse and elk), the rating system was devised to specifically address mule deer winter range requirements.

This index is used primarily to determine if a particular site has the vegetation components necessary to be a good winter range for mule deer. It can also be used to identify areas where habitat restoration projects may be needed and assist land managers in determining possible rehabilitation options. Because it does not take into account factors such as soil stability, hydrologic function, and other environmental factors, it should not be used to assess a sites function and/or condition as typically used by the Federal land management agencies. The Desirable Components Index Ratings are divided into three categories because of different ecological potential, these include: Wyoming Big Sagebrush – Cliffrose – Desert shrubs, Mountain Big Sagebrush, and Mountain Brush. Desirable mule deer winter range provides 12-20% of preferred browse cover, 20% or less shrub decadency, and 10% or more of the shrub population is young. The herbaceous understory contains 8-15% perennial grasses cover, 5% perennial forb cover, and less than 5% annual grass cover.

Desirable Components Index Ratings

Lower potential sites (Wyoming Big Sagebrush and Desert Shrub Communities)

> 65 points =	Excellent
45 – 64	Good
25 – 44	Fair
10 – 24	Poor
< 10	Very poor

Mid level potential sites (Mountain Big Sagebrush)

> 80 points =	Excellent
79 – 65	Good
64 – 50	Fair
49 – 35	Poor
< 35	Very poor

Higher potential sites (Mountain Brush Communities)

> 90 points =	Excellent
89 – 70	Good
69 – 55	Fair
54 – 40	Poor
< 39	Very poor

(Black sagebrush and Basin big sagebrush will be placed in Wyoming or Mountain big sagebrush scales based on precipitation and elevation).

Desirable Components Index Scoring

Preferred Browse (60 points)

(Preferred Browse species are favorable or critical to deer)

Preferred Browse Cover (30 pts. possible)
1.5 points for each 1% of preferred browse cover (maximum is 20% or 30 points)

Percent Decadence (15 points possible)
-0.3 points for each 1% decadence (do not exceed 15 points)

Percent Young (15 points possible)
0.5 points for each 1% of young

Herbaceous Understory (40 points)

Perennial Grass Cover (30 points possible)
2 points for each 1% cover

Perennial Forb Cover (10 points possible)
2 points for each 1% cover

Annual Grass Cover (-20 points possible)
-0.75 points for each 1%cover

Noxious Weeds (State List)
-2 points for each species present

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REPORT FORMAT

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

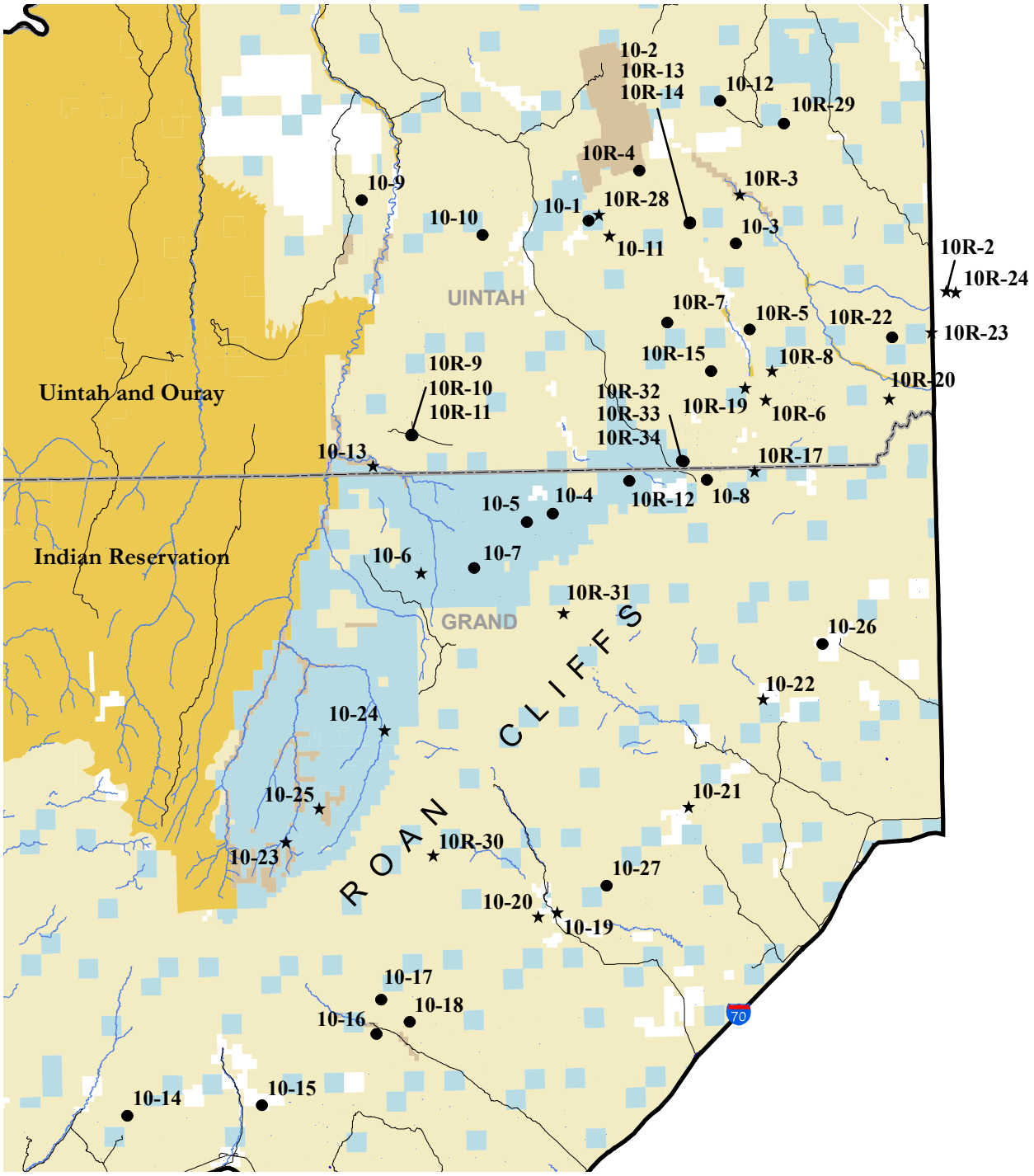
The name of the site and directions for locating the site are given on the location page. Also included on this page are the vegetation type, arrangement and diagrammatic sketch of the baseline, and the location on a topographical map. The 7.5 minute topographical map name and public land survey description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

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

Tables with the compiled data follow the study discussions. A computer-generated data summary presents the pooled data for nested frequency, quadrat frequency, basic ground cover, soil characterization, shrub density, and shrub characterization. A nonparametric statistical analysis, the 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 changes are indicated in the herbaceous trends table with subscript letters.

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

Management Unit 10

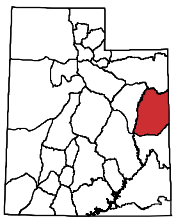


Map Scale 1:500,000 (1 inch = 7.9 miles)

N

- Transect location
- Suspended site
- BLM
- State of Utah
- Native American
- Private
- State Wildlife Reserve
- Water body
- River or stream
- Road

Unit Location



WILDLIFE MANAGEMENT UNIT - 10 BOOK CLIFFS

Boundary Description

Uintah and Grand Counties - Boundary begins at Interstate 70 and the Green River in Green River; northeast along the Green River to the White River; east along the White River to the Utah-Colorado state line; south along the Utah-Colorado state line to I-70; southwest along I-70 to the Green River and beginning point.

Management Unit Description

This management unit includes both the North Book Cliffs and the South Book Cliffs. Of the entire land area of the Book Cliffs, about 2.1 million acres are classified as deer range. Of this 2.1 million acres, 66% is classified as deer winter range, 23% as deer summer range, and 11% as year-long range. Approximately 1.7 million acres in the Book Cliffs are classified as elk range with 50% of this being elk winter range, 27% elk summer range, and 23% year-long range. The Bureau of Land Management manages 58% of all the area classified as mule deer ranges, and 56% of all the area classified as elk ranges. State of Utah Trust Lands and Native American Trust Lands make up most of the remainder of deer and elk ranges on the Book Cliffs.

Key Areas

On the North Book Cliffs, areas such as Lower McCook Ridge, Big Park, the Crows Roost, Sunday School Canyon, Indian Ridge, and Atchee Ridge all support concentrations of wintering deer. Elk utilize many of the same areas, especially McCook Ridge. The winter range is composed of several main vegetation types including: pinyon-juniper, salt desert shrub, and Wyoming big sagebrush. The consensus is that the quantity and quality of the summer range are the most limiting factors on this unit. Vegetation composition on the summer range is principally sagebrush-grass and mountain brush with isolated patches of conifer and aspen. During the late 1990's, the BLM completed several thousand acres of prescribed burning in the mountain big sagebrush and mountain brush zones to help improve herbaceous vegetation on summer ranges.

The South Book Cliffs is valuable mainly as deer winter range. With a maximum elevation of just over 9,000 feet, the unit contains only small amounts of fawning areas and summer range with few deer residing in the unit year-round. However, many deer that spend the summer on higher ranges in the northern portion of the unit, migrate annually to winter ranges in the southern portion of the unit. Terrain between the higher summer ranges and lower winter ranges in the south is steep and rugged and is used primarily as a travel corridor with limited migration occurring over a short period of time. The upper limits of the normal winter range are found normally between 8,000 and 8,500 feet, depending on the slope and exposure. During severe winters the upper limits are usually lowered to about the 7,000 feet. The lower limits of the winter range are bordered by the salt desert type at approximately 5,000 feet. There are concentrations of wintering deer at Horse Pasture, Nash Wash, Cottonwood Ranch, and the Pear Park area. Due to the steep, rough terrain at the upper elevations of the winter range, these lower critical areas have been historically over-utilized by livestock and game for a long period of time.

Livestock Grazing

Pictographs and petroglyphs found in the unit historically indicate the presence of bighorn sheep, deer, buffalo, and elk in the area before settlement by Europeans. Large herds of cattle and sheep were brought into the area around Moab in the mid-1870's and the 1890's, livestock use on the South Book Cliffs was limited to the stock of local settlers. This changed in the 1920's when Colorado sheepman began wintering large herds on the South Book Cliffs. During this period, as many as 200,000 sheep were using the range each winter (Carter 1983). Wild horses are also found in the Winter Ridge and Hill Creek areas. In cooperation with local

ranchers, the BLM has been working on fences, water developments, and other improvements to encourage more uniform use of the range by livestock (Carter 1983).

The North Book Cliffs is broken up into several allotments including: Atchee Ridge, Sweetwater, Winter Ridge, Sunday School, and Book Cliffs Pasture. The Atchee Ridge and Sweetwater allotments are summer allotments with a deferred rest rotation grazing system for 1,500 to 1,800 cattle. The Winter Ridge and Book Cliffs Pasture allotments are summer allotments with a deferred grazing system. The Sunday School allotment is a winter allotment with a deferred rotation grazing system.

Trend studies on the South Book Cliffs occur in 3 allotments, the Cisco, Floy Creek and Cisco Mesa allotments. Most of the trend studies occur within the Cisco allotment. It is grazed by sheep from December 1 through May 10. Cattle grazing occurs from November 1 through May 10. The Cisco Mesa allotment is a sheep allotment which is used from November 15 through May 15 for 2,628 AUM's. The Floy Creek allotment was a sheep allotment which was converted to cattle about 5 years ago to avoid disease problems with bighorn sheep. It currently is used from November 15 through May 15 for 958 AUM's on a 4-pasture deferred rotation.

Big Game Management Objectives

Following the liberal hunting regulations of the late 1950's and 1960's, deer numbers were low and recovery has been slow. The buck only (1974-77) and 4-point-or-better (1978-84) restrictions have played a role in increases in deer numbers and hunter success. Between 1986 and 1993 however, the harvest of bucks slowly declined. Drought conditions and the harsh winter of 1992-93 had detrimental effects upon the deer population in the Book Cliffs and throughout the state. Deer hunting was closed in the mid-1990's due to low population numbers, and re-opened again in 1999 as a limited entry hunting area. Currently, both deer and elk hunting are on a limited entry basis. Pronghorn are also hunted on the Book Cliffs unit.

The most current deer herd management objectives for the Book Cliffs call for a target population of 15,000 wintering deer distributed in the following way: 10,000 wintering deer on the North Book Cliffs, and 5,000 wintering deer on the South Book Cliffs. Management objectives also call for a post-season buck to doe ratio of 25-30:100. The wintering population should result in an expected harvest of 1,000 bucks on the Bitter Creek and Little Creek portions of the unit (north), and 450 bucks on the southern portion of the unit.

Management objectives for elk herds call for 7,500 wintering animals with 6,500 of these being distributed in the north and 1,000 in the south. These population objectives will be evaluated on an ongoing basis as the population is allowed to grow. Range monitoring and elk utilization impacts will be used to determine the proper population level. Objectives established in the 2005 statewide elk plan revision call for harvested bull elk to be maintained in the 4 to 5 year-old interval on the Bitter Creek portion of the unit and in the 5 to 6 year-old interval for the Little Creek subunit.

Management concerns on Unit 10 principally revolve around low fawn production, summer range condition and/or quality (especially fawn rearing habitat), drought impacts on winter range browse species, and the increasing demands for oil and gas development with its associated habitat fragmentation. There is also the possibility at some later date that oil shale and tar sands will be developed.

Study Site Description

Permanent range trend studies were initially established in the North Book Cliffs in 1982, with five studies established. Seven additional studies were established in 1998, and one more in 1995. At a local interagency meeting in Moab in May 1986, interagency personnel selected nine range trend study sites for the South Book Cliffs. Three additional studies were established in the Book Cliffs roadless area in 1990. The transects on the

North Book Cliffs were re-read during 1988, 1995, 2000, and 2005. Transects on the South Book Cliffs were re-read in 1995, 2000, and 2005. Most of these initial studies were placed on what was considered important winter ranges.

In addition to these regularly established trend studies, 31 additional range trend studies were established between 1997 and 1999 to address conflicts over elk and livestock use in the Book Cliffs. These sites were primarily placed on summer range areas to monitor use by both elk and livestock. Of the 56 total range trend studies in the Book Cliffs unit, 42 were re-read in 2000. Twenty-five of these occur on winter ranges, nine on transitional ranges, and eight on summer ranges.

Three studies were established in 2002 at a new exclosure near PR Spring to monitor use of a mountain brush community. In the south Book Cliff area a new study was established in 2000 near the Colorado border and in 2005 another new study was established near Cottonwood Canyon to have a more representative winter range site. The number of studies monitored in the north Book Cliff area was reduced in 2005 because the elk and livestock litigation had been resolved. All of the studies were evaluated and 32 studies were monitored in 2005, 7 in the south and 25 in the north. Suspended studies may be monitored again in the future, should the need arise. Site descriptions, maps, trend discussion, and data tables for each of the studies follows.

Trend Study 10-1-05

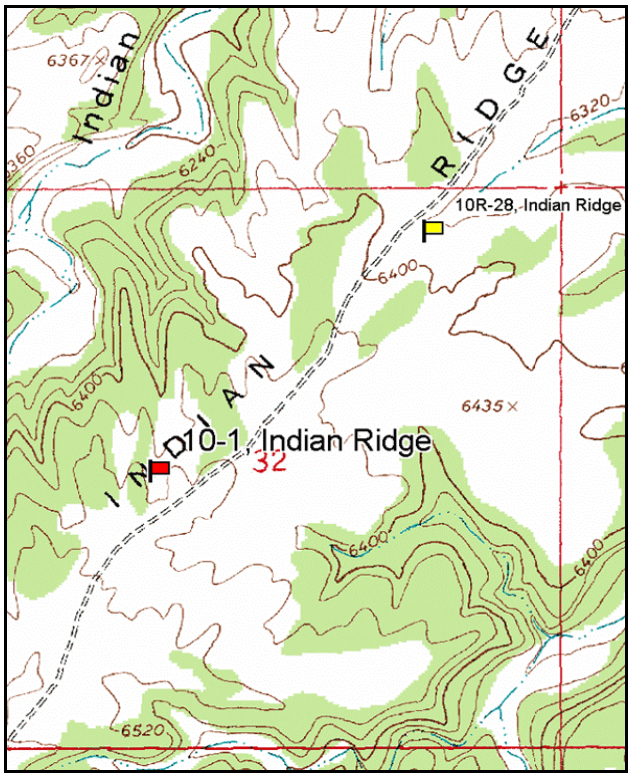
Study site name: Indian Ridge . Vegetation type: Desert Shrub .

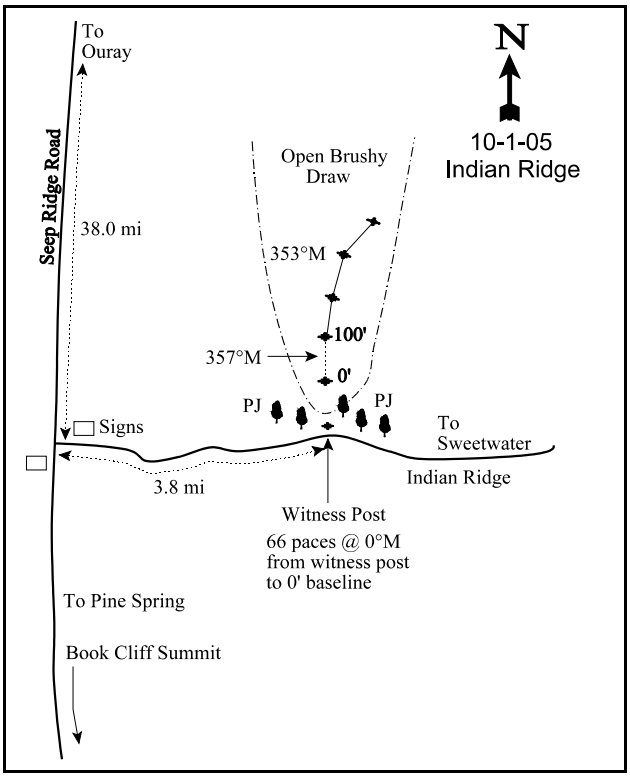
Compass bearing: frequency baseline 357 degrees magnetic.

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

LOCATION DESCRIPTION

From Ouray, go 38 miles south to the McCook Ridge-Indian Ridge turnoff. Turn left (east) and travel on the Indian Ridge road towards Sweetwater Canyon and McCook Ridge for 3.8 miles. Stop by the head of a small sagebrush-saltbrush draw, marked by a 20 inch tall fencepost on the left. Walk down the draw 60 paces to the 0-foot baseline stake. The frequency baseline is marked by red steel fenceposts, 12 to 18 inches in height. The 0-foot baseline stake is marked by a red browse tag.





Map Name: Cooper Canyon . Diagrammatic Sketch

Township 13S , Range 23E , Section 32 GPS: NAD 27, UTM 12S 4389176 N, 639914 E

DISCUSSION

Indian Ridge Trend Study No. 10-1

This study is located in a shallow draw on the north side of Indian Ridge. The area is principally deer winter range. The site elevation is 6,450 feet with a northern aspect and a slope of 5-6%. The vegetation type is desert shrub dominated by fourwing saltbush, winterfat, and black sagebrush with and understory of cheatgrass. Juniper and pinyon woodlands surround the draws and provide thermal and escape cover. Cattle grazing occurs in the winter and spring from November 1 to April 30 on a rotational deferment grazing system in the BLM Sunday School allotment. Pellet group transect data from 2000 estimated 23 cow days use/acre (57 cdu/ha), 28 elk days use/acre (69 edu/ha), and 27 deer days use/acre (67 ddu/ha). In 2005, cattle and elk use declined to 9 cow days use/acre (23 cdu/ha) and 10 elk days use/acre (25 edu/ha). Deer use was higher at 52 deer days use/acre (129 ddu/ha). Bones from a deer carcass were found on the site in 2005.

Soils are alluvially deposited from limestone parent material and are moderately deep with an estimated effective rooting depth of nearly 23 inches. Soil depth progressively becomes more shallow toward the ridges. Soils have a loam texture and a slightly alkaline soil reaction (7.8 pH). A profile stoniness index estimated from penetrometer readings shows rockiness in the profile to be quite uniform down to 20-25 inches below the surface. There are dense pockets of soil in the shrub interspaces. Erosion is generally outweighed by soil sedimentation coming from the surrounding woodland slopes. Protective ground cover is adequate to limit erosion due to the abundance of thickspike wheatgrass and cheatgrass. An erosion class assessment rated erosion as stable in 2005. Phosphorus could be a limiting factor in growth at only 2.4 ppm, which is very low for even wildland soils (Tiedemann and Lopez 2004).

The key browse species at this site are fourwing saltbush, winterfat, and black sagebrush. Fourwing saltbush has provided over 50% of the browse cover in each reading with 5-8% cover. Young age class recruitment was high in 1995 at 57%, good at 19% in 2000 and 16% in 2005. Decadence increased from 3% in 1995 to 15% in 2000 and 30% in 2005. Drought conditions have been a factor in the increased decadence and decreased recruitment of fourwing saltbush. Utilization increased from light to moderate to moderate to heavy in 2005.

Winterfat has had between 1-3% cover since 1995. It is a preferred browse species, but is low growing and during severe winters could be covered by snow and largely unavailable. Winterfat density was fairly stable from 1982 (7,133 plants/acre) to 1995 (6,240 plants/acre), but decreased substantially in 2000 to an estimated 3,980 plants/acre. In 2005, it declined another 29% to 2,820 plants/acre. Use was mostly light in 1995, increased to mostly moderate in 2000, and increased again in 2005 to mostly heavy. Utilization is difficult to determine on these shrubs due to abundant annual leader growth. Winterfat displayed excellent leader growth in 2000 and 2005 with leaders averaging nearly 5 inches in length. Decadence has been low and vigor has been good, but recruitment has been low since 1995.

Black sagebrush was picked up with the increased sample size used after 1992, a population of 960 plants/acre was estimated in 1995. This decreased slightly to 820 plants/acre in 2000 and 780 plants/acre in 2005. Recruitment has been low and decadency increased to 36% by 2005. Twenty-eight percent of the population was classified as dying in 2005. Increased decadency and a higher proportion of plants displaying poor vigor can be attributed in part to drought conditions and the high amount of cheatgrass. Fringed sagebrush, a "sub" shrub, was moderately abundant in 1995 (6,000 plants/acre). This decreased dramatically to 420 plants/acre in 2000 and 300 plants/acre in 2005. This decline may be due to drought conditions. This low-growing species has only been lightly utilized, but it can provide good winter forage for big game when snows are not too deep. Other browse species encountered on the site include basin big sagebrush and broom snakeweed.

Cheatgrass is by far the most abundant understory species found at this site. Photos from 1982, 1988, and 1995 indicate that cheatgrass steadily increased in abundance. Prior to 1991, data for annual species were not collected so it is unknown exactly how abundant it was then. In 1995, nested frequency was highest and cover was over 50%. This decreased in 2000 with drought conditions, but increased again in 2005 to 49%. Seven perennial grass species have been sampled, with thickspike wheatgrass, blue grama, and sand dropseed being the most abundant. Sum of nested frequency of perennial grasses decreased from 1988-2000, but increased 21% in 2005. Forb composition is depleted. Perennial species are few with no more than four species being sampled in any year. Scarlet globemallow is the most commonly occurring perennial, but decreased in 2000 due to drought.

1982 APPARENT TREND ASSESSMENT

Soil trend appears stable but is influenced strongly by the surrounding pinyon-juniper type. Concurrent sedimentation and erosion result in a nearly continuous turnover or soil disturbance, which allows an abundant growth of annuals and inhibits, to a degree, perennial establishment. Vegetation trend may be slightly improving. The shrub stand, especially fringed sagebrush and winterfat, appear to be thickening. Management should strive towards encouraging the expansion of fourwing saltbush and other shrubs that can provide needed forage diversity.

1988 TREND ASSESSMENT

The reread of this 1982 range trend study demonstrated that very little change has occurred in this desert shrub type. The density and age structure of the key browse species, winterfat and fourwing saltbush, are basically unchanged. These browse species are very vigorous, with abundant seed heads and new growth. In 1988, 28% of the mature winterfat had a moderate to heavily hedged growth form, but the majority are still lightly used. There was a significant decrease in the number of fringed sagebrush encountered. Trend for the herbaceous understory is up but still in poor condition. Quadrat frequency for western wheatgrass and sand dropseed increased although perennial grasses are lacking on the site. Forb frequency is very low and slightly down since 1982. The soil trend showed slight improvement, but not enough to warrant a change in trend. There was a slight decline in bare ground combined with an increase in litter and basal vegetation cover. Soil trend is considered stable.

TREND ASSESSMENT
soil - stable (0)
browse - stable (0)
herbaceous understory -slightly up (+1)

1995 TREND ASSESSMENT

The soil trend appears stable. Erosion is minimal, mainly due to the dense cover of cheatgrass. Trend for browse has improved since the last reading. Fourwing saltbush densities have increased, while winterfat has slightly decreased due to a decline in number of young plants (3,266 to 500 plants/acre). The majority of the fourwing are young plants which make up 57% of the total population. Due to the large amounts of current annual growth on winterfat and fourwing, utilization was difficult to determine. Use appears light for fourwing and winterfat. The dominant vegetation on the site is cheatgrass which is very vigorous this year due to the unusually wet spring. Cheatgrass has a sum of nested frequency of 379 out of a possible 400 and a quadrat frequency of 97%. The plants are 20 to 30 inches height and cover 52% of the ground surface. Perennial grasses consisting of sand dropseed, mutton bluegrass, and blue grama are present under the cheatgrass canopy while thickspike wheatgrass occurs in small scattered patches. Sum of nested frequency for perennial grasses has declined since 1988 indicating a downward trend. Forbs are uncommon on the site and consist of mostly annuals. Scarlet globemallow is the only common perennial forb. The Desirable Components Index (see methods) rated this site as fair. The high amount of cheatgrass and the potential for fire lowers the score.

TREND ASSESSMENT
soil - stable (0)
browse - up (+2)
herbaceous understory - down (-2)
winter range condition (DC Index) - fair (37) Lower potential scale

2000 TREND ASSESSMENT

Trend for soil appears stable. There is adequate ground cover from grasses and litter to minimize erosion. The ratio of bare ground to protective ground cover (vegetation, litter, and cryptogams) is unchanged since the last reading. Trend for browse is slightly down. The key species, fourwing saltbush, winterfat, and black sagebrush show declines in density and increases in decadence. Also, the proportion of plants classified as dying is high for the key species. Recruitment (proportion of young plants in the population) is low for black sagebrush and winterfat, and moderate for fourwing saltbush. Increased poor vigor, decreases in density, and increases in decadence for browse can be attributed to drought. Dry conditions make it difficult for seedling and young plants to become established and persist. Cheatgrass decreased significantly with the drier conditions, but is still the major component of the understory. Despite the decrease in cheatgrass the trend for the herbaceous understory is slightly down as the weighted sum of nested frequency for perennial grasses and forbs decreased by 17% from 1995. The DCI score remained fair.

TREND ASSESSMENT
soil - stable (0)
browse - slightly down (-1)
herbaceous understory - slightly down (-1)
winter range condition (DC Index) - fair (35) Lower potential scale

2005 TREND ASSESSMENT

The soil trend is slightly down. Relative percent bare ground increased from 10% to 16%, while relative percent litter cover decreased from 48% to 23%. This may be due to lower amounts of cheatgrass during preceding drought years. The ratio of bare ground to protective ground cover (vegetation, litter, and cryptogams) decreased from 1:3.5 in 2000 and 2005 to 1:3.0. The browse trend is slightly down. Fourwing saltbush increased in density by 15%, but decadence increased from 15% to 30%. The number of plants classified as dying increased from 8% to 18%. Utilization increased to moderate to heavy. Winterfat density has decreased 29% since 2000 and 55% since 1995. Black sagebrush density declined only slightly since 2000, but percent decadence has remained at about 35%. The herbaceous understory trend is slightly up. Cheatgrass sum of nested frequency increased significantly since 2000, but is not as high as it was in 1995. Cover of cheatgrass returned to about the same level as it was in 1995. The high amount of cheatgrass is detrimental to perennial species and also young and seedling shrubs. The nested frequency for perennial grasses increased since 2000. Perennial forbs decreased, but they contribute very little to the herbaceous understory. Lower amounts of cheatgrass during recent drought years may have allowed these perennials to increase. The DCI rating declined to poor due to increased decadency and lower recruitment for the key browse species. Cheatgrass cover also increased.

TREND ASSESSMENT
soil - slightly down (-1)
browse - slightly down (-1)
herbaceous understory - slightly up (+1)
winter range condition (DC Index) - poor (16) Lower potential scale

HERBACEOUS TRENDS --
Management unit 10 , Study no: 1

Type	Species	Nested Frequency				Average Cover %		
		'88	'95	'00	'05	'95	'00	'05
G	Agropyron dasystachyum	$_{b}$75	$_{a}$38	$_{b}$77	$_{b}$83	1.29	6.28	1.87
G	Bouteloua gracilis	$_{a}$8	$_{ab}$26	$_{ab}$25	$_{b}$38	1.01	.76	1.23
G	Bromus tectorum (a)	-	$_{c}$379	$_{a}$302	$_{b}$344	51.80	22.05	49.03
G	Oryzopsis hymenoides	-	10	4	7	.09	.04	.07
G	Poa fendleriana	9	16	14	4	.21	.07	.06
G	Sitanion hystrix	$_{a}$-	$_{b}$10	$_{ab}$7	$_{b}$14	.10	.19	.18
G	Sporobolus cryptandrus	$_{c}$161	$_{b}$94	$_{a}$37	$_{ab}$53	1.04	.66	.35
G	Stipa comata	-	1	-	-	.00	-	-
Total for Annual Grasses		0	379	302	344	51.80	22.05	49.03
Total for Perennial Grasses		253	195	164	199	3.76	8.03	3.77
Total for Grasses		253	574	466	543	55.57	30.08	52.81
F	Astragalus sp.	-	1	-	-	.00	-	-
F	Cryptantha sp.	-	-	-	3	-	-	.00
F	Descurainia pinnata (a)	-	$_{a}$4	$_{a}$-	$_{b}$14	.01	-	.09
F	Draba sp. (a)	-	3	-	1	.00	-	.00
F	Lappula occidentalis (a)	-	$_{b}$57	$_{a}$5	$_{b}$81	.48	.07	.87
F	Schoencrambe linifolia	-	6	1	6	.04	.00	.01
F	Sphaeralcea coccinea	$_{a}$20	$_{b}$48	$_{a}$19	$_{ab}$30	.58	.23	.82
F	Tragopogon dubius	5	-	5	-	-	.07	-
F	Trifolium dubium	6	-	-	-	-	-	-
F	Unknown forb-perennial	1	-	-	-	-	-	-
Total for Annual Forbs		0	64	5	96	0.50	0.07	0.97
Total for Perennial Forbs		32	55	25	39	0.62	0.31	0.83
Total for Forbs		32	119	30	135	1.12	0.37	1.80

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

BROWSE TRENDS --
Management unit 10 , Study no: 1

Type	Species	Strip Frequency			Average Cover %		
		'95	'00	'05	'95	'00	'05
B	Artemisia frigida	75	9	9	1.36	.09	.04
B	Artemisia nova	11	9	9	2.27	2.53	3.11
B	Artemisia tridentata tridentata	1	1	1	.01	-	-
B	Atriplex canescens	56	51	58	7.87	7.57	5.21
B	Ceratoides lanata	86	73	58	3.09	1.86	1.23
B	Gutierrezia sarothrae	10	15	11	.12	1.01	.13
B	Pinus edulis	0	1	0	-	.00	-
Total for Browse		239	159	146	14.73	13.08	9.72

CANOPY COVER, LINE INTERCEPT --
Management unit 10 , Study no: 1

Species	Percent Cover '05
Artemisia nova	3.40
Atriplex canescens	5.91
Ceratoides lanata	.28
Gutierrezia sarothrae	.06

KEY BROWSE ANNUAL LEADER GROWTH --
Management unit 10 , Study no: 1

Species	Average leader growth (in) '05
Atriplex canescens	4.5
Ceratoides lanata	4.5

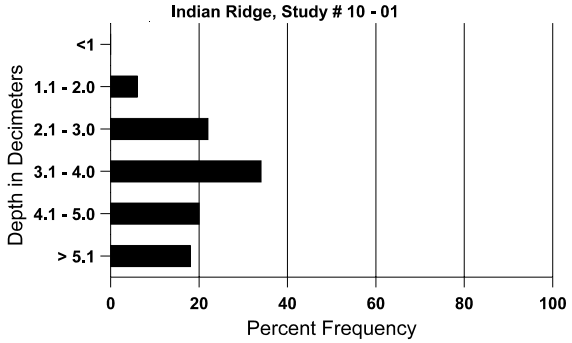
BASIC COVER --
Management unit 10 , Study no: 1

Cover Type	Average Cover %				
	'82	'88	'95	'00	'05
Vegetation	0	8.75	65.86	46.86	58.90
Rock	0	.50	1.08	.32	.76
Pavement	0	4.75	3.41	3.65	8.00
Litter	0	79.50	62.46	60.58	25.20
Cryptogams	0	0	.39	1.19	.06
Bare Ground	10.00	6.50	8.80	12.56	17.90

SOIL ANALYSIS DATA --
Herd Unit 10, Study # 1, Study Name: Indian Ridge

Effective rooting depth (in)	Temp °F (depth)	pH	%sand	%silt	%clay	%0M	ppm P	ppm K	dS/m
22.8	58.4 (18.1)	7.8	36.0	38.0	26.0	1.7	2.4	275.2	0.6

Stoniness Index



PELLET GROUP DATA --
Management unit 10 , Study no: 1

Type	Quadrat Frequency		
	'95	'00	'05
Rabbit	6	21	48
Elk	2	11	14
Deer	9	6	36
Cattle	6	3	4

Days use per acre (ha)	
'00	'05
-	-
28 (70)	10 (25)
27 (68)	52 (129)
23 (56)	9 (23)

BROWSE CHARACTERISTICS --
Management unit 10 , Study no: 1

		Age class distribution (plants per acre)					Utilization					
Year	Plants per Acre (excluding seedlings)	Seedling	Young	Mature	Decadent	Dead	% moderate	% heavy	% decadent	% dying	% poor vigor	Average Height Crown (in)
Artemisia frigida												
82	**3799**	733	1266	2533	-	-	0	0	-	-	0	9/9
88	**266**	266	133	133	-	-	0	0	-	-	0	13/5
95	**6000**	520	940	5060	-	-	0	0	-	-	0	14/7
00	**420**	160	80	340	-	-	33	5	-	-	0	4/5
05	**300**	-	120	180	-	-	27	7	-	-	0	5/5
Artemisia nova												
82	**0**	-	-	-	-	-	0	0	0	-	0	-/-
88	**0**	-	-	-	-	-	0	0	0	-	0	-/-
95	**960**	80	120	660	180	20	31	52	19	-	0	9/17
00	**820**	-	40	500	280	20	15	0	34	22	22	10/23
05	**780**	-	40	460	280	140	44	5	36	28	28	12/25
Artemisia tridentata tridentata												
82	**0**	-	-	-	-	-	0	0	-	-	0	-/-
88	**0**	-	-	-	-	-	0	0	-	-	0	-/-
95	**40**	20	40	-	-	-	0	0	-	-	0	41/69
00	**20**	-	-	20	-	-	0	100	-	-	0	15/16
05	**20**	-	-	20	-	-	0	100	-	-	0	30/60
Atriplex canescens												
82	**400**	-	-	400	-	-	50	0	0	-	0	30/31
88	**599**	-	66	533	-	-	0	0	0	-	0	49/70
95	**2180**	320	1240	880	60	20	.91	0	3	-	0	38/46
00	**1780**	-	340	1180	260	60	13	1	15	8	8	33/44
05	**2100**	40	340	1140	620	160	31	50	30	18	18	29/35
Ceratoides lanata												
82	**7133**	400	1200	5933	-	-	2	0	0	-	0	12/9
88	**7932**	66	3266	4600	66	-	24	7	1	-	0	15/10
95	**6240**	100	500	5700	40	-	.32	0	1	.32	1	13/9
00	**3980**	120	200	3620	160	60	62	3	4	3	3	10/11
05	**2820**	-	160	2560	100	-	15	78	4	3	3	8/8

		Age class distribution (plants per acre)					Utilization					
Year	Plants per Acre (excluding seedlings)	Seedling	Young	Mature	Decadent	Dead	% moderate	% heavy	% decadent	% dying	% poor vigor	Average Height Crown (in)
Gutierrezia sarothrae												
82	**66**	-	-	66	-	-	0	0	0	-	0	7/11
88	**0**	-	-	-	-	-	0	0	0	-	0	-/-
95	**380**	20	60	320	-	-	0	0	0	-	0	10/6
00	**1440**	-	60	1220	160	40	0	0	11	8	15	6/8
05	**680**	60	260	420	-	-	0	0	0	-	0	8/7
Pinus edulis												
82	**0**	-	-	-	-	-	0	0	-	-	0	-/-
88	**0**	-	-	-	-	-	0	0	-	-	0	-/-
95	**0**	-	-	-	-	-	0	0	-	-	0	-/-
00	**20**	40	20	-	-	-	0	0	-	-	0	-/-
05	**0**	-	-	-	-	-	0	0	-	-	0	-/-

Trend Study 10-2-05

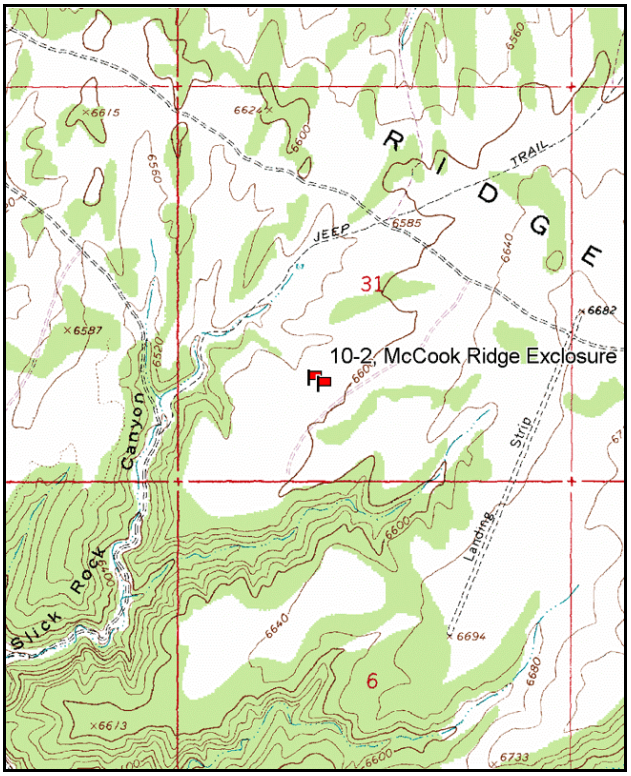
Study site name: Lower McCook Ridge Exclosure . Vegetation type: Desert Shrub .

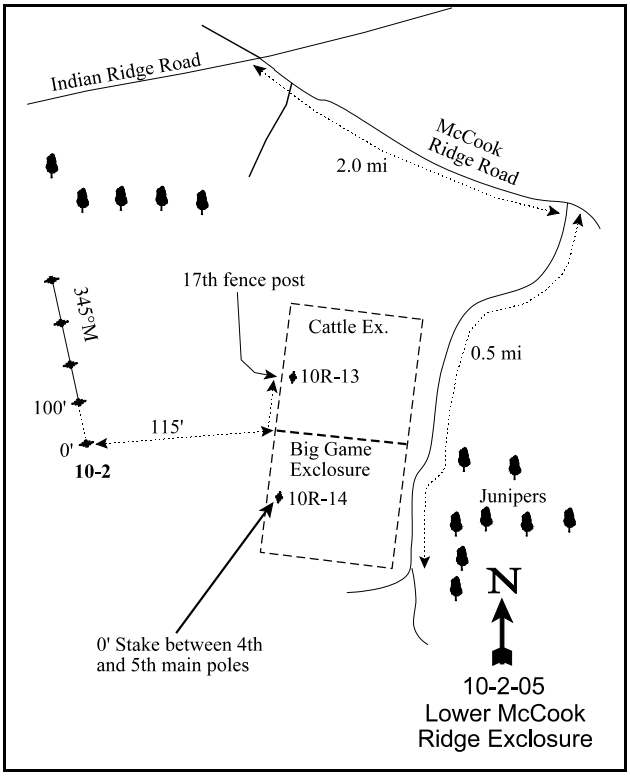
Compass bearing: frequency baseline 345 degrees magnetic.

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

LOCATION DESCRIPTION

From Ouray, go 38 miles south to the McCook Ridge-Indian Ridge turnoff. Turn left (east) and travel on the Indian Ridge road towards Sweetwater Canyon and McCook Ridge 9.1 miles to the intersection of Cooper Canyon, Indian Ridge and McCook Ridge. From Indian Ridge road, turn southeast and proceed up McCook Ridge approximately 2 miles to road on the right (A large exclosure can be seen off the south side of the road.). Turn right and drive approximately 0.5 miles to the exclosure. From the northwest side of the deer fence on the lower McCook Ridge Exclosure, the 0-foot baseline stake is approximately 40 paces away bearing 263°M. The frequency baseline is marked by green fenceposts, 12-18 inches tall.





Map Name: Cooper Canyon . Diagrammatic Sketch

Township 13S , Range 24E , Section 31 GPS: NAD 27, UTM 12S 4388971 N, 647998 E

DISCUSSION

Lower McCook Ridge Exclosure - Trend Study No. 10-2

This study was established in 1982 and is found outside of the exclosure complex on Lower McCook Ridge. The exclosure was constructed in 1964. In addition to the regular monitoring schedule, this site was monitored in 1997 as part of the special studies designed to study perceived conflicts between elk and livestock use in the North Book Cliffs. Studies in the livestock (10R-13) and total exclosures (10R-14) were established in 1997. The site is on a broad swale that slopes gently to the northwest at an elevation of 6,600 feet. Vegetation composition is dominated by a mixed stand of basin big sagebrush, fourwing saltbush, winterfat, and fringed sagebrush. This is thought to be an important wintering area for elk and mule deer. Pellet group data from 2000 showed moderate use by wildlife with an estimated 27 deer days use/acre (67 ddu/ha) and 27 elk days use/acre (67 edu/ha). In 2000, only older cattle pats were sampled. Cattle use (800 AUM's) in this area is in the Lower McCook allotment on a rotational deferred system between fall and spring, allowing some periods of rest. In early June of 2005 cattle were on the site as it was monitored. Cattle use was estimated at 7 cow days use/acre (18 cdu/ha). Deer use was quite a bit higher in 2005 at 86 deer days use/acre (212 ddu/ha). Elk use was lower at 8 elk days use/acre (20 edu/ha). Rabbit use was high in 2005 with 68% of quadrats containing pellets.

The soil is light brown in color, alluvially deposited, and has a loam texture. Soils are slightly alkaline (pH of 7.6). Phosphorus is low (5.5 ppm), which could limit plant growth (Tiedemann and Lopez 2004). The effective rooting depth averages 18 inches overall, but varies over the length of the transect. Effective rooting depth is 26 inches at the beginning of the transect and decreases to 12 inches at the end of the transect. Contradictory to conventional thought, a higher density of basin big sagebrush exists where the soils are more shallow, and more cheatgrass where the soils are deeper. There is a small wash that runs through the end of the baseline and plant pedestaling is associated with the area. An erosion condition class assessment rated erosion as slight in 2005. The ratio of bare ground to protective ground cover (vegetation, litter, and cryptogams) decreased from 1:3.3 in 1997 to 1:2.6 in 2000 and 1:2.2 in 2005. Relative percent bare ground increased from 29% in 2000 to 44% in 2005. Much of this decrease can be attributed to reduced litter cover from a lack of cheatgrass during previous drought years.

Several key browse species exist on the site including: basin big sagebrush, winterfat, fringed sagebrush, and fourwing saltbush. Basin big sagebrush is the most abundant species. This is likely a hybrid between basin big sagebrush (*Artemisia tridentata tridentata)* and Wyoming big sagebrush (*A. tridentata wyomingensis*), but they were all classified as basin big sagebrush. Sagebrush cover has averaged 10-12% since 1995. Since 1995, when new methods and a larger sample size were used, population density was stable at about 3,900 plants/acre through 2000, but declined 12% to 3,500 plants/acre in 2005. Decadence has increased with each reading since 1995 from 11% to 35% in 2005. Twenty-four percent of the population was classified as dying in 2005. Recruitment was also lower in 2005 as only 5% of the population was classified as young, compared to about 31% in 1995 and 2005. The amount of seedlings has also declined with each reading and none were found in 2005. Drought during the early part of the decade has been detrimental to this population. Utilization also increased and was considered moderate to heavy in 2005.

Fourwing saltbush is a good quality forage, but is less abundant. Density has been slowly decreasing since 1995. Decadence has increased from 0% in 1988 to 66% in 2005, while a quarter of the population was classified as dying. Photos in 1988 show vigorous plants, compared to 2005 with decadent skeletons. Use on fourwing saltbush has been light to moderate except for 1995 and 2005, which had heavier use. Recruitment has been poor with each reading since 1988 when 29% of the population was classified as young.

Winterfat density estimates in 1982 and 1988 were comparable at around 3,500 plants/acre. Population estimates increased beginning in 1995 due to a larger sampling area instituted in 1992 which provided better

population estimates for species having clumped or discontinuous distributions. Data from 1995 indicated a much larger population of 10,420 plants/acre. Since then, density dropped to 7,020 plants/acre in 2000 and to 4,860 plants/acre in 2005. Utilization is difficult to determine due to the abundant annual growth. Use was classified as heavy in 2005. Use was classified as light to moderate in prior years. Vigor has been generally good. Recruitment was good in 1988 and 1995, but was low in 2000 and 2005. Drought conditions have caused the declines in this population. Other browse species encountered on the site include fringed sagebrush, broom snakeweed, and prickly pear cactus. Fringed sagebrush density and cover declined significantly in 2005 with the drought between 2000 and 2005.

Perennial grasses are deficient and consist mostly of Sandberg bluegrass, bottlebrush squirreltail, and Indian ricegrass. All grasses had 30% to 60% of their growth removed during the 1988 reading. Sandberg bluegrass has remained at a nearly constant frequency since 1995. It has been the most abundant perennial grass with each reading. Bottlebrush squirreltail significantly increased in nested frequency in 2000, but decreased again in 2005. Most perennial grasses were found under the crown of shrubs. Cheatgrass is also abundant. Cheatgrass was lowest in 2000, which had a dry spring. It significantly increased in 2005. Cover was high in 1995 and 2005 at 16% and 14%, respectively. Scarlet globemallow is the most common perennial forb and frequency has been stable through all readings. Annual stickseed was quite common in 2005.

1982 APPARENT TREND ASSESSMENT

Soil trend appears to be stable to declining. To a large degree, the soil surface is barren of vegetation or effective litter cover. Vegetation trend is perhaps slightly more stable but still declining. With the exception of fourwing saltbush, the shrub populations appear to be expanding with mostly light use. Perhaps the most serious concern is an apparent rapid increase of broom snakeweed. Perennial herbs are nearly absent from the site and show no evidence of increasing.

1988 TREND ASSESSMENT

Changes on the Lower McCook Ridge Exclosure study since establishment in 1982 include an increase in both sagebrush density and use. Density of big sagebrush has increased from 3,966 plants/acre to 5,865 plants/acre. A majority of the big sagebrush have a moderately hedged growth form, with 14% appearing heavily hedged. Other browse are only lightly used. In 1988, 30% of the big sagebrush were classified as decadent, as opposed to 6% in 1982. Still, there is an adequate number of young shrubs in the population. There are differences and difficulties in the identification of big sagebrush on this site. The 1982 study reported Wyoming big sagebrush on the base line. The sagebrush was all called basin big sagebrush in 1988. There is a great deal of hybridization between these two subspecies on this site. A few more young fourwing saltbush were found in 1988, but populations of saltbush and winterfat are basically unchanged. Fringed sagebrush has increased, along with the snakeweed, which is currently the most abundant woody species. The density estimate for snakeweed was 6,766 plants/acre in 1988, while there were only 2,999 plants/acre in 1982. With a large number of seedlings, snakeweed continues to increase. Although cheatgrass still provides much of the ground cover, Sandberg bluegrass has increased in frequency. There continues to be a low diversity of forbs. Ground cover, in the form of mostly litter, has increased slightly. Total protective ground cover in 1988 was 64%, as opposed to 51% in 1982. Vegetation basal cover was low at 2.5%, due to a lack of understory herbaceous vegetation. Still, there was little evidence of erosion problems due to the level terrain.

TREND ASSESSMENT
soil - slightly up (+1)
browse - up (+2)
herbaceous understory - slightly up (+1)

1995 TREND ASSESSMENT

The soil trend has improved slightly due to increased protective ground cover provided by herbaceous vegetation, litter, and cryptogamic crusts. Percent bare ground declined in 1995 as well. Browse trend is stable. Winterfat is abundant and lightly utilized. Fourwing saltbush is more heavily utilized but appears to have a stable mature population. Basin big sagebrush has declined in density from 5,865 plants/acre in 1988 to 3,860 plants/acre in 1995. The sample size was greatly enlarged in 1995, which gives much better population estimates for browse species. The decrease may be attributed to a better population estimate than actual losses, as few dead plants are present to explain this decline. Decadence has decreased from 30% to 11%. The density of broom snakeweed has shown a 53% decrease since the 1988 reading as well. Due to the drought, this trend is consistent throughout most of the state. The herbaceous understory is in poor condition, produces little forage and is dominated by cheatgrass. Sandberg bluegrass is the most numerous perennial species. Forbs are not an important aspect of this site due to low frequencies, but they have shown increased sum of nested and quadrat frequency values on each successive reading. The most common forb is still scarlet globemallow. Overall, the perennial herbaceous trend is up, but it is still in very poor condition because of its weedy composition. The Desirable Components Index (see methods) rated this site as fair to good.

TREND ASSESSMENT
soil - slightly up (+1)
browse - stable (0)
herbaceous understory - up (+2)
winter range condition (DC Index) - fair to good (46) Lower potential scale

1997 TREND ASSESSMENT

Rock and pavement cover have increased since 1995 to nearly 19%. This is likely a result of the decrease in litter and vegetation cover due to drought. Percent bare ground has stayed nearly the same at 25%. Erosion on the site does not appear to be increasing at this time and the soil trend appears stable. Winterfat shows higher utilization in 1997 compared to 1995. The plants show good vigor with no decadent or dead plants reported. Fourwing saltbush vigor has declined and percent decadence has increased. The basin big sagebrush population has shifted to a more mature age structure with more decadent and dead plants reported. Basin big sagebrush contributes to 60% of the total browse cover. Broom snakeweed density has decreased by nearly 50% with a mostly mature age structure. The browse trend appears to be slightly down with the consideration of drought. Herbaceous understory has changed very little since 1995. Nested and quadrat frequencies have remained nearly the same. The herbaceous understory trend is stable, and as reported in 1995, still in very poor condition. The DCI score declined to fair due to less preferred browse cover, increased decadence, and lower recruitment.

TREND ASSESSMENT
soil - stable (0)
browse - slightly down (-1)
herbaceous understory - stable (0)
winter range condition (DC Index) - fair (37) Lower potential scale

2000 TREND ASSESSMENT

Trend for soil is stable. Since 1997, cover of vegetation and litter have increased. The ratio of bare ground to protective ground cover (vegetation, litter, and cryptogams) has decreased, but remains high enough not to warrant a downward trend. Erosion is currently minimal. Trend for browse is stable. Basin big sagebrush, which makes up half of the browse cover, shows increases in density and recruitment as well as decreased use. Percent decadency, the proportion of plants classified as dying, and plants displaying poor vigor all increased

in 2000. These parameters are likely caused, at least in part, to drought and should improve with normal precipitation. Fourwing saltbush shows improved vigor from the 1997 reading, and a slight decrease in decadency. Winterfat shows increases in use and decadency, but this species only contributes 9% of the browse cover. Trend for the herbaceous understory is up. Even with drought, sum of nested frequency for perennial species increased significantly since 1997. Also, cheatgrass decreased in nested and quadrat frequencies in 2000 due to the lack of moisture in the fall, winter, and spring. Composition is still weedy in nature, but perennials appear to be on the increase overall. The DCI score improved to good to excellent with increased browse cover, lower cheatgrass cover, and increased perennial grass and forb cover.

TREND ASSESSMENT
soil - stable (0)
browse - stable (0)
herbaceous understory - up (+2)
winter range condition (DC Index) - good to excellent (64) Lower potential scale

2005 TREND ASSESSMENT

The trend for soil is slightly down as the ratio of bare ground to protective ground cover (vegetation, litter, and cryptogams) has decreased from 1:2.6 to 1:2.2. Bare ground has also increased, while litter cover has decreased. Erosion was rated as slight in 2005. The browse trend is down. Basin big sagebrush density declined 12% since 2000, while decadence increased to 35%, with 24% of the population classified as dying. Recruitment is also very low. Fourwing saltbush density only slightly declined, but two-thirds of the population were classified as decadent. A quarter of the plants were classified as dying. Hopefully, with a return to better precipitation patterns these plants can recover back to better condition. Recruitment has also been poor. Winterfat density declined 31% from 2000 and recruitment was very low, while use was heavy. Fringed sagebrush density also declined 75%, while cover decreased from 6% in 2000 to less than 1% in 2005. This is indicative of drought conditions during the past five years. The herbaceous understory trend is slightly down. The nested frequency of perennial grasses decreased slightly. Perennial forbs, which consist of fewer important forage species, decreased as well. Perennial grass and forb abundance is similar to 1995 and 1997. Cheatgrass also increased significantly compared to 2000. The DCI score was lower in 2005 and rated as fair due to lower browse cover, increased decadence, lower recruitment, low perennial grass and forb cover, and higher amounts of cheatgrass.

TREND ASSESSMENT
soil - slightly down (-1)
browse - down (-2)
herbaceous understory - slightly down (-1)
winter range condition (DC Index) - fair (28) Lower potential scale

HERBACEOUS TRENDS --
Management unit 10 , Study no: 2

Type	Species	Nested Frequency					Average Cover %			
		'88	'95	'97	'00	'05	'95	'97	'00	'05
G	Agropyron dasystachyum	a-	a-	a-	a4	b15	-	-	.38	.22
G	Bromus tectorum (a)	-	c288	c263	a171	b191	15.91	5.44	4.17	13.75
G	Festuca ovina	4	-	-	1	-	-	-	.00	-
G	Oryzopsis hymenoides	1	7	15	10	10	.24	.22	.62	.06

Type	Species	Nested Frequency					Average Cover %			
		'88	'95	'97	'00	'05	'95	'97	'00	'05
G	Poa secunda	$_{a}$30	$_{b}$106	$_{b}$120	$_{b}$118	$_{b}$128	2.04	1.35	4.42	1.79
G	Sitanion hystrix	$_{a}$17	$_{b}$52	$_{ab}$42	$_{c}$114	$_{b}$72	.50	.70	2.50	1.39
Total for Annual Grasses		0	288	263	171	191	15.91	5.44	4.17	13.75
Total for Perennial Grasses		52	165	177	247	225	2.79	2.29	7.93	3.47
Total for Grasses		52	453	440	418	416	18.71	7.73	12.11	17.22
F	Allium sp.	-	2	-	2	-	.00	-	.00	-
F	Calochortus nuttallii	-	2	-	-	-	.00	-	-	-
F	Chaenactis douglasii	-	-	-	-	1	-	-	-	.00
F	Chenopodium leptophyllum(a)	-	-	-	-	1	-	-	-	.00
F	Cymopterus sp.	-	-	-	-	2	-	-	-	.00
F	Delphinium nuttallianum	-	2	2	-	-	.00	.00	-	-
F	Descurainia pinnata (a)	-	$_{bc}$32	$_{ab}$13	$_{a}$-	$_{c}$30	.29	.08	.00	.29
F	Draba sp. (a)	-	$_{b}$11	$_{a}$-	$_{a}$-	$_{ab}$7	.02	-	-	.02
F	Erigeron flagellaris	-	1	-	-	-	.01	-	-	-
F	Erigeron pumilus	$_{b}$32	$_{b}$40	$_{b}$42	$_{b}$33	$_{a}$-	.25	.40	.29	-
F	Lappula occidentalis (a)	-	$_{b}$55	$_{ab}$38	$_{a}$21	$_{c}$108	.27	.29	.20	1.46
F	Penstemon sp.	-	-	2	-	-	-	.03	-	-
F	Schoencrambe linifolia	$_{a}$-	$_{b}$25	$_{a}$2	$_{a}$-	$_{a}$-	.05	.00	-	-
F	Sisymbrium altissimum (a)	-	6	-	-	-	.07	-	-	-
F	Sphaeralcea coccinea	98	100	105	119	96	.75	.95	2.24	1.03
F	Tragopogon dubius	$_{a}$-	$_{a}$2	$_{a}$-	$_{b}$21	$_{a}$-	.01	-	.18	-
Total for Annual Forbs		0	104	51	21	146	0.66	0.38	0.20	1.78
Total for Perennial Forbs		130	174	153	175	99	1.09	1.39	2.71	1.04
Total for Forbs		130	278	204	196	245	1.75	1.77	2.92	2.82

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

BROWSE TRENDS --
Management unit 10 , Study no: 2

Type	Species	Strip Frequency				Average Cover %			
		'95	'97	'00	'05	'95	'97	'00	'05
B	Artemisia frigida	69	53	70	46	3.04	2.94	6.44	.48
B	Artemisia tridentata tridentata	56	57	58	54	10.39	9.15	12.00	10.66
B	Atriplex canescens	27	10	24	25	1.99	.73	2.55	1.04
B	Ceratoides lanata	71	62	61	66	4.31	2.08	2.20	2.25
B	Gutierrezia sarothrae	39	31	40	20	1.41	.38	.95	.25
B	Opuntia sp.	3	0	4	2	.18	-	.03	.03
Total for Browse		265	213	257	213	21.34	15.30	24.19	14.73

CANOPY COVER, LINE INTERCEPT --
Management unit 10 , Study no: 2

Species	Percent Cover '05
Artemisia frigida	.28
Artemisia tridentata tridentata	10.51
Atriplex canescens	.95
Ceratoides lanata	2.40
Opuntia sp.	.06

KEY BROWSE ANNUAL LEADER GROWTH --
Management unit 10 , Study no: 2

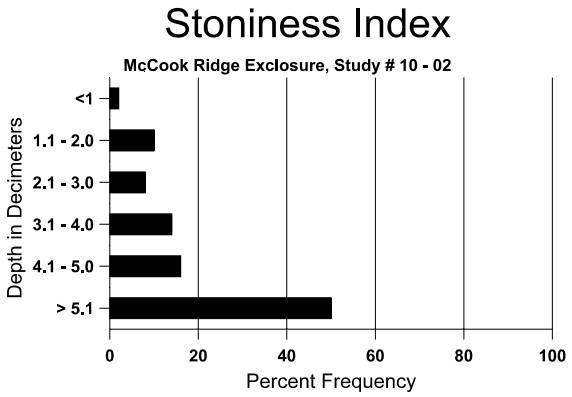
Species	Average leader growth (in) '05
Artemisia tridentata tridentata	3.3
Ceratoides lanata	4.1

BASIC COVER --
Management unit 10 , Study no: 2

Cover Type	Average Cover %					
	'82	'88	'95	'97	'00	'05
Vegetation	0	2.50	41.63	23.80	39.90	34.58
Rock	0	0	1.49	.56	.21	.24
Pavement	0	0	3.29	18.23	3.52	3.09
Litter	0	60.75	40.01	25.04	38.48	20.53
Cryptogams	0	.50	3.93	4.90	3.13	4.77
Bare Ground	49.25	36.25	26.30	25.04	35.13	50.37

SOIL ANALYSIS DATA --
Herd Unit 10, Study # 2, Study Name: McCook Ridge Exclosure

Effective rooting depth (in)	Temp °F (depth)	pH	%sand	%silt	%clay	%0M	ppm P	ppm K	dS/m
18.4	61.0 (17.5)	7.6	35.0	38.8	26.2	1.9	5.46	185.6	0.5



PELLET GROUP DATA --
Management unit 10 , Study no: 2

Type	Quadrat Frequency			
	'95	'97	'00	'05
Rabbit	11	3	15	68
Elk	18	26	24	26
Deer	17	21	18	37
Cattle	-	1	-	4

Days use per acre (ha)	
'00	'05
-	-
28 (68)	8 (20)
27 (67)	86 (212)
-	7 (18)

BROWSE CHARACTERISTICS --
Management unit 10 , Study no: 2

		Age class distribution (plants per acre)					Utilization					
Year	Plants per Acre (excluding seedlings)	Seedling	Young	Mature	Decadent	Dead	% moderate	% heavy	% decadent	% dying	% poor vigor	Average Height Crown (in)
Artemisia frigida												
82	**300**	33	-	300	-	-	0	0	0	-	0	7/3
88	**1199**	233	233	966	-	-	0	0	0	-	0	7/5
95	**9680**	2520	3040	6640	-	-	.82	.82	0	-	0	12/10
97	**7900**	80	1080	6820	-	-	0	0	0	-	0	10/8
00	**9800**	8040	1000	8560	240	20	17	7	2	.40	.40	4/7
05	**2420**	380	580	1820	20	20	5	0	1	.82	.82	5/6
Artemisia tridentata tridentata												
82	**3966**	166	600	3133	233	-	5	0	6	-	6	24/33
88	**5865**	1766	2566	1533	1766	-	47	14	30	-	2	24/30
95	**3860**	1720	1200	2220	440	180	53	3	11	2	3	22/30
97	**3040**	160	420	2020	600	360	55	9	20	4	4	21/28
00	**3980**	20	1260	1700	1020	180	26	13	26	9	9	19/29
05	**3500**	-	180	2080	1240	500	41	37	35	24	24	24/31
Atriplex canescens												
82	**400**	-	-	400	-	-	0	0	0	-	0	27/21
88	**700**	-	200	500	-	-	0	0	0	-	0	26/29
95	**980**	20	120	760	100	60	27	12	10	-	0	26/33
97	**240**	-	20	120	100	40	8	8	42	17	17	29/28
00	**700**	-	-	420	280	-	29	3	40	-	0	31/35
05	**640**	20	40	180	420	-	28	56	66	25	25	23/36
Ceratoides lanata												
82	**3466**	-	733	2733	-	-	0	0	0	-	0	5/5
88	**3698**	-	1066	1766	866	-	2	0	23	-	3	7/4
95	**10220**	-	1440	8760	20	-	7	.58	0	-	0	10/10
97	**7620**	-	760	6860	-	-	42	0	0	-	0	8/9
00	**7020**	20	200	6100	720	-	43	21	10	.56	.56	8/9
05	**4860**	20	280	4460	120	40	18	77	2	.41	.41	6/7
Gutierrezia sarothrae												
82	**2999**	700	1333	1666	-	-	0	0	0	-	0	10/7
88	**6766**	5066	1633	5033	100	-	.49	.49	1	-	0	5/5
95	**3200**	200	1140	2000	60	40	0	0	2	-	0	9/9
97	**1740**	-	80	1640	20	80	0	0	1	1	1	7/7
00	**3020**	100	600	2280	140	60	0	0	5	1	1	5/7
05	**740**	-	80	660	-	-	3	0	0	-	0	6/7

		Age class distribution (plants per acre)					Utilization					
Year	Plants per Acre (excluding seedlings)	Seedling	Young	Mature	Decadent	Dead	% moderate	% heavy	% decadent	% dying	% poor vigor	Average Height Crown (in)
Opuntia sp.												
82	**233**	-	-	233	-	-	0	0	0	-	0	3/4
88	**266**	-	166	100	-	-	0	0	0	-	0	4/9
95	**80**	-	-	80	-	-	0	0	0	-	0	4/12
97	**0**	-	-	-	-	-	0	0	0	-	0	-/-
00	**100**	-	20	60	20	-	20	0	20	-	0	4/11
05	**60**	-	-	20	40	-	0	0	67	-	0	3/10
Pinus edulis												
82	**0**	-	-	-	-	-	0	0	-	-	0	-/-
88	**33**	33	33	-	-	-	0	0	-	-	0	-/-
95	**0**	-	-	-	-	-	0	0	-	-	0	-/-
97	**0**	-	-	-	-	-	0	0	-	-	0	-/-
00	**0**	-	-	-	-	-	0	0	-	-	0	-/-
05	**0**	-	-	-	-	-	0	0	-	-	0	-/-

Trend Study 10-3-05

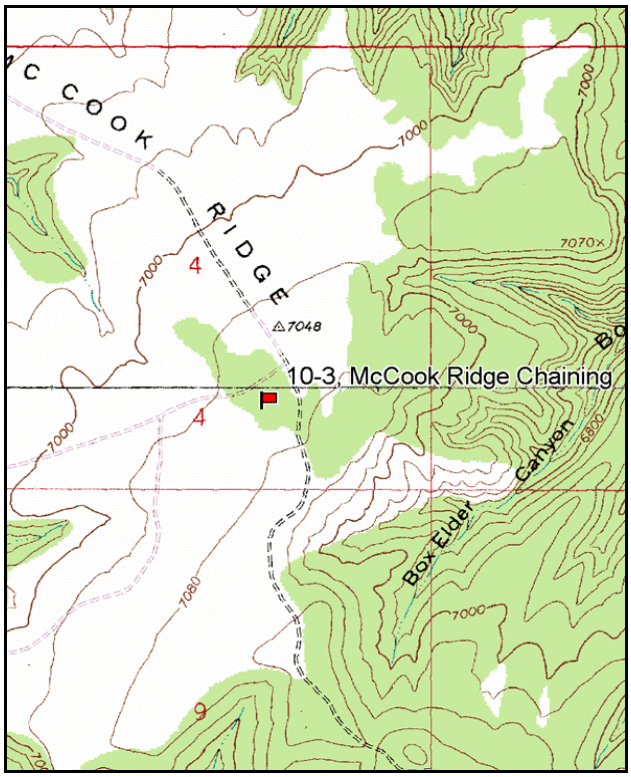
Study site name: Lower McCook Ridge Chaining . Vegetation type: Chained, Seeded PJ .

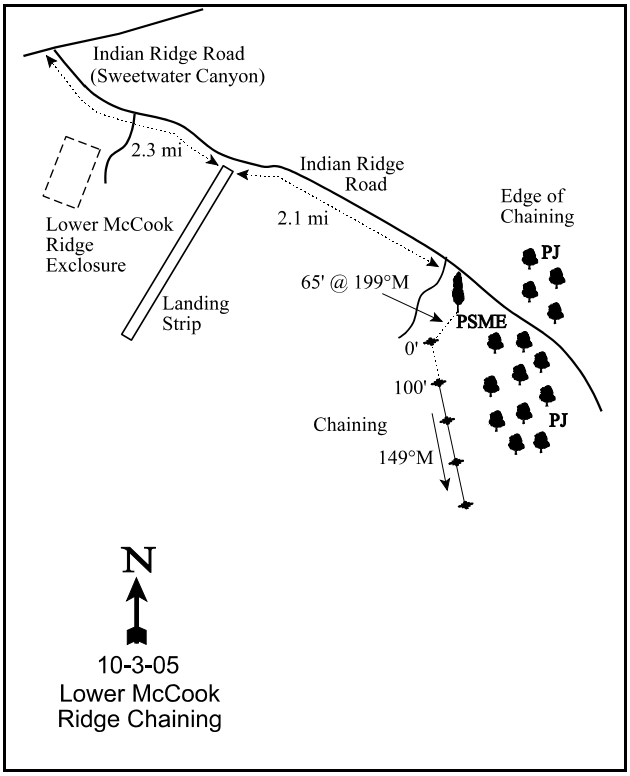
Compass bearing: frequency baseline 149 degrees magnetic.

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

LOCATION DESCRIPTION

From the intersection of the Indian Ridge and McCook Ridge roads, go southeast on McCook Ridge for 2.3 miles to a landing strip on the right side of the road (just past exclosure). Proceed an aditiona1 2.1 miles up McCook Ridge into a chained area. Turn right off the main road before the edge of the chaining, and proceed over to a large, lone douglas fir. The 0-foot baseline stake, marked by browse tag # 9036, is 13 paces from the tree at a bearing of 199°M. The frequency baseline is marked by a green, 12-18 inch tall fenceposts.





Map Name: Burnt Timber Canyon . Diagrammatic Sketch

Township 14S , Range 24E , Section 4 GPS: NAD 27, UTM 12S 4387337 N, 651731 E

DISCUSSION

Lower McCook Ridge Chaining - Trend Study No. 10-3

The Lower McCook Ridge Chaining study is located on a pinyon-juniper chaining that was chained in the 1960's. This chaining was retreated in April of 2005 by a bullhog to remove much of the pinyon and juniper. A total of 600 acres were bullhogged and no seeding took place. The study site is located about 2 miles southeast of the Lower McCook Ridge exclosure at approximately 7,030 feet in elevation. The terrain is a broad, flat (5% slope) ridge. The study monitors important deer and elk winter range that is also grazed by livestock in the Sweetwater allotment from May 1 to October 31. Cattle use the area on a rotational deferred management system, with selective periods for rest. Wildlife use was light in 2000 with an estimated 25 deer days use/acre (62 ddu/ha) and 19 elk days use/acre (47 edu/ha) from the pellet group transect data. Use was similar in 2005 with 24 deer days use/acre (60 ddu/ha) and 20 elk days use/acre (50 edu/ha). Cattle use was 2 cow days use/acre (4cdu/ha). A large wildfire started in the area in late May of 2000. The firefighters were finishing putting the fire out when the site was read during the first week of June 2000. The edge of the fire came within a thousand feet of the study area to the east. In 2005, grasses were abundant in the burned area.

Soils are intermediate in texture on the surface, but increasing in clay content a few inches below the surface. Texture is a clay loam with an estimated effective rooting depth of nearly 16 inches. Soil reaction is neutral (pH of 7.1). Penetrometer readings estimate the majority of the rockiness to be between 5 and 15 inches below the surface. Phosphorus levels (7.8 ppm) are marginal (Tiedemann and Lopez 2004). Organic matter is moderately high at 4%. There is evidence of shrinking clays in the soil with surface cracks present. Mountain big sagebrush occupies areas of deeper soils (15 inches) with dwarf rabbitbrush occupying areas with more shallow soils (11 inches). Erosion is minimal because of level terrain, a fair vegetation cover, and the presence of large amounts of persistent, well distributed litter and chaining debris.

Pinyon and juniper trees that survived the chaining were increasing in size. Photos indicate that juniper and pinyon trees increased considerably in size from 1982 to 2000. Point-center quarter data from 1995 estimated 106 pinyon trees/acre. This increased to 127 pinyon trees/acre in 2000. Juniper density was 89 trees/acre in 1995 and 147 trees/acre in 2000. Line-intercept data estimated an average of 4% overhead canopy cover from pinyon and juniper trees in 2000. Two months after the bullhog treatment in 2005, pinyon density was reduced to 42 trees/acre, while juniper density was 65 trees/acre. This density may decline as 64% of the pinyon trees and 68% of the juniper trees sampled in 2005 were trees that had been treated by the bullhog, but still had live green branches near the base of the tree.

Mountain big sagebrush is the key browse species. There are some individual sagebrush plants that appear to be hybrids between mountain big sagebrush (*Artemisia tridentata vaseyana*) and basin big sagebrush (*Artemisia tridentata tridentata*) or black sagebrush (*Artemisia nova*), but all sagebrush was classified as mountain big sagebrush. In 1995, the sample size was increased to get a better sample of shrub density. Sagebrush density was 3,160 plants/acre in 1995. This declined to 2,980 plants/acre in 2000 and declined another 30% in 2005 to 2,080 plants/acre. Some of the decline in 2005 may be due to trampling from the bullhog treatment. Twelve percent of the population was classified as trampled in addition to the 20% that were classified as dying. Percent decadence and percent of the population dying remained constant in 2000 and 2005. Recruitment was poor in 2000 and 2005. There have not been enough young plants to replace those that have been dying. The reduction of pinyon and juniper may reduce competition enough for sagebrush to increase in the future.

Other preferred species include: rubber rabbitbrush, winterfat, and fourwing saltbush. However, these species are infrequent and in low densities. If more preferred shrubs such as antelope bitterbrush, true mountain mahogany or fourwing saltbush were a part of the original seed mixture, they have failed to become established.

Dwarf rabbitbrush is a very abundant browse species. This small prostate shrub numbered 6,266 plants/acre in 1982 and 27,266 by 1988. Densities then dropped to 13,660 plants/acre in 1995 and 15,500 plants/acre in 2000. In 2005, density were much lower at only 3,280 plants/acre. Cover has remained constant at about 5% from 1995 to 2005. Use on dwarf rabbitbrush was light to moderate prior to 2005 and was moderate to heavy in 2005.

Grass composition consists of 13 perennial species. The most common is crested wheatgrass, however sum of nested frequency significantly declined in 2005. Cover was down to 6% in 2005 from 10% in 2000. Blue grama and Sandberg bluegrass are the only other species which have had more than 1% average cover. Sum of nested frequency for all grasses decreased considerably in 2000 then again slightly in 2005, most likely due to drought. Grasses were reportedly heavily grazed in the past. Smooth brome decreased with each sampling and was not found at all in 2005. Forb composition is diverse, but not abundant. The only seeded forb encountered was alfalfa which had a quadrat frequency of only 6% in 1995, 4% in 2000, and 2% in 2005. Sum of nested frequency for perennial forbs decreased in 2000 and again in 2005.

1982 APPARENT TREND ASSESSMENT

Soil trend appears stable with little evidence of soil loss. Vegetation trend also appears stable. The nearly total lack of forbs and the heavy use of grasses are negative factors which could result in rapid reinvasion of pinyon and juniper and increase in density of sagebrush.

1988 TREND ASSESSMENT

Soil trend is slightly up with basal vegetation cover more than doubling and percent bare ground decreasing from 20% in 1982 to only 10% this year. The browse trend is slightly down. The sagebrush population shows high levels of utilization and decadence. Dwarf rabbitbrush and broom snakeweed have increased dramatically since the last reading and appear to have expanding populations. Juniper has increased in density and both pinyon and juniper have increased considerably in size since the last reading. They appear to be regaining dominance of the treatment area. Trend for grasses is up due to increased quadrat frequencies. Forbs are still lacking and of little importance on this site.

TREND ASSESSMENT
soil - slightly up (+1)
browse - slightly down (-1)
herbaceous understory - up (+2)

1995 TREND ASSESSMENT

The soil trend is stable overall. Ground cover characteristics are slightly down due to increased bare ground and decreased litter values. Erosion is not currently a problem on the site due to the level terrain and adequate vegetation and litter cover. The decline in litter cover is primarily due to the decomposition of debris from the chaining. The browse trend has improved. The mountain big sagebrush density has nearly doubled since 1988. Vigor is good, percent decadence is low, and most are only lightly hedged. Dwarf rabbitbrush dropped in density by 50% and broom snakeweed declined 68% since 1988. Trend for the herbaceous understory is up with increased sum of nested frequencies for grasses and forbs. Nested frequency of crested wheatgrass, intermediate wheatgrass, and smooth brome declined significantly while frequency of prairie junegrass and mutton grass increased significantly. Alfalfa, the only seeded forb encountered, increased in nested frequency. The Desirable Components Index (see methods) rated this site as good. Sagebrush is not overly abundant, but recruitment is high and percent decadence is low.

TREND ASSESSMENT
soil - stable (0)
browse - up (+2)
herbaceous understory - up (+2)
winter range condition (DC Index) - good (70) Mid-level potential scale

2000 TREND ASSESSMENT

Trend for soil is stable. Ground cover characteristics are similar to 1995. Percent cover of bare soil increased in 2000, but percent cover of vegetation and litter remained nearly stable. Trend for browse is slightly down due to downward trends in many key factors for mountain big sagebrush. The mountain big sagebrush population shows increases in percent decadence, poor vigor, and utilization. Also, there is a high proportion of plants classified as dying (<1% to 19%). Currently, there are not enough young plants to replace the decadent and dying plants in the population. Many of these downward factors for sagebrush could improve with a return to normal precipitation patterns. Trend for the herbaceous understory is down. Sum of nested frequency for perennial grasses and forbs decreased by nearly 30% in 2000 due to drought. The DCI score declined to poor to fair due to increased percent decadence of sagebrush and lower recruitment.

TREND ASSESSMENT
soil - stable (0)
browse - slightly down (-1)
herbaceous understory - down (-2)
winter range condition (DC Index) - poor to fair (51) Mid-level potential scale

2005 TREND ASSESSMENT

The soil trend is stable. Bare ground is similar to 2000, while vegetation cover is down and litter cover is up due to the bullhog treatment. The reduction of pinyon and juniper from the treatment should positively effect the browse and herbaceous understory. The browse trend is slightly down in 2005 due to the lower numbers of mountain big sagebrush. Density was 30% lower than in 2000 and strip frequency declined from 54% in 2000 to 46% in 2005. Decadence remained at about 30%, while 20% of the population was classified as dying. Recruitment has been poor with the last two readings. Reduction of competition with pinyon and juniper should benefit sagebrush. The trend for the herbaceous understory is slightly down. The sum of nested frequency for perennial grasses and forbs declined 12% since 2000. Crested wheatgrass, which is the most abundant species, declined significantly in sum of nested frequency. The DCI score declined to poor. Sagebrush cover is low, while decadence is high, and recruitment is low. Perennial forb cover has also declined with each reading since 1995.

TREND ASSESSMENT
soil - stable (0)
browse - slightly down (-1)
herbaceous understory - slightly down (-1)
winter range condition (DC Index) - poor (41) Mid-level potential scale

HERBACEOUS TRENDS --
Management unit 10 , Study no: 3

Type	Species	Nested Frequency				Average Cover %		
		'88	'95	'00	'05	'95	'00	'05
G	Agropyron cristatum	$_{c}$257	$_{ab}$168	$_{b}$196	$_{a}$143	6.43	10.21	5.64
G	Agropyron dasystachyum	$_{a}$2	$_{b}$132	$_{b}$104	$_{a}$41	.56	.64	.37
G	Agropyron intermedium	$_{c}$67	$_{b}$21	$_{a}$-	$_{b}$14	.16	-	.24
G	Agropyron spicatum	$_{b}$13	$_{b}$16	$_{a}$-	$_{ab}$4	.16	-	.03
G	Bouteloua gracilis	$_{a}$6	$_{c}$106	$_{b}$86	$_{b}$58	1.25	1.59	1.49
G	Bromus inermis	$_{c}$52	$_{b}$22	$_{ab}$3	$_{a}$-	.28	.03	-
G	Carex sp.	$_{b}$33	$_{a}$11	$_{a}$3	$_{a}$10	.36	.30	.12
G	Elymus junceus	16	12	3	6	.33	.15	.33
G	Koeleria cristata	$_{a}$11	$_{c}$54	$_{ab}$28	$_{bc}$43	.48	.14	.77
G	Oryzopsis hymenoides	$_{ab}$6	$_{b}$6	$_{a}$-	$_{ab}$7	.07	-	.19
G	Poa secunda	$_{a}$18	$_{b}$81	$_{b}$73	$_{b}$90	2.02	1.40	2.41
G	Sitanion hystrix	$_{b}$8	$_{ab}$4	$_{a}$-	$_{ab}$4	.01	-	.06
G	Stipa comata	$_{a}$1	$_{a}$9	$_{a}$-	$_{b}$31	.01	-	.71
Total for Annual Grasses		0	0	0	0	0	0	0
Total for Perennial Grasses		490	642	496	451	12.16	14.48	12.39
Total for Grasses		490	642	496	451	12.16	14.48	12.39
F	Antennaria rosea	$_{a}$-	$_{c}$30	$_{b}$12	$_{bc}$19	.17	.03	.11
F	Arabis sp.	$_{a}$7	$_{b}$29	$_{a}$5	$_{a}$2	.87	.01	.03
F	Arenaria fendleri	14	3	5	11	.03	.04	.02
F	Astragalus spatulatus	$_{b}$34	$_{a}$-	$_{a}$5	$_{a}$-	-	.03	-
F	Caulanthus crassicaulis	2	-	-	-	-	-	-
F	Calochortus nuttallii	-	6	-	2	.01	-	.00
F	Castilleja sp.	-	22	-	-	.11	-	-
F	Crepis acuminata	-	6	-	-	.01	-	-
F	Cymopterus sp.	-	-	-	5	-	-	.01
F	Delphinium sp.	-	2	-	-	.00	-	-
F	Erigeron sp.	-	-	5	-	-	.01	-
F	Erigeron pumilus	-	3	6	1	.04	.02	.00
F	Haplopappus acaulis	$_{a}$11	$_{b}$8	$_{ab}$15	$_{ab}$8	.33	.54	.21
F	Hymenoxys acaulis	-	12	1	3	.80	.00	.03
F	Lappula occidentalis (a)	-	2	-	2	.00	-	.00
F	Machaeranthera grindelioides	$_{b}$62	$_{a}$13	$_{a}$23	$_{a}$8	.14	.17	.08
F	Medicago sativa	$_{a}$1	$_{b}$14	$_{ab}$8	$_{ab}$5	1.24	.39	.06
F	Oenothera caespitosa	-	-	1	-	-	.00	-
F	Orthocarpus sp. (a)	-	4	-	-	.01	-	-

Type	Species	Nested Frequency				Average Cover %		
		'88	'95	'00	'05	'95	'00	'05
F	Penstemon pachyphyllus	-	3	-	4	.02	-	.06
F	Physaria acutifolia	-	-	1	-	-	.00	-
F	Phlox austromontana	2	-	-	-	-	-	-
F	Phlox longifolia	$_{a}$-	$_{c}$41	$_{b}$13	$_{ab}$2	.08	.03	.00
F	Physaria sp.	9	-	-	-	-	-	-
F	Polygonum douglasii (a)	-	7	-	-	.02	-	-
F	Sphaeralcea coccinea	$_{a}$-	$_{b}$28	$_{b}$19	$_{b}$18	.08	.04	.22
F	Streptanthus cordatus	-	1	-	1	.00	-	.03
F	Taraxacum officinale	-	6	-	-	.01	-	-
Total for Annual Forbs		0	13	0	2	0.03	0	0.00
Total for Perennial Forbs		142	227	119	89	3.99	1.34	0.89
Total for Forbs		142	240	119	91	4.02	1.34	0.89

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

BROWSE TRENDS --
Management unit 10 , Study no: 3

Type	Species	Strip Frequency			Average Cover %		
		'95	'00	'05	'95	'00	'05
B	Artemisia frigida	1	1	1	-	.15	.03
B	Artemisia tridentata vaseyana	52	54	46	5.73	7.76	4.46
B	Ceratoides lanata	5	7	3	.09	.01	-
B	Chrysothamnus depressus	47	48	43	5.34	4.88	4.76
B	Chrysothamnus nauseosus hololeucus	1	1	2	-	.00	.00
B	Gutierrezia sarothrae	31	29	30	.35	.36	.42
B	Juniperus osteosperma	0	7	4	1.62	1.14	.18
B	Leptodactylon pungens	0	3	1	-	.15	-
B	Opuntia fragilis	1	0	0	.01	-	-
B	Pediocactus simpsonii	0	0	5	-	-	-
B	Pinus edulis	0	4	3	1.79	3.83	.78
Total for Browse		138	154	138	14.95	18.32	10.67

CANOPY COVER, LINE INTERCEPT --
Management unit 10 , Study no: 3

Species	Percent Cover	
	'00	'05
Artemisia tridentata vaseyana	-	4.88
Chrysothamnus depressus	-	3.40
Gutierrezia sarothrae	-	.25
Juniperus osteosperma	-	.61
Pinus edulis	4.40	.35

KEY BROWSE ANNUAL LEADER GROWTH --
Management unit 10 , Study no: 3

Species	Average leader growth (in)
	'05
Artemisia tridentata vaseyana	1.9

POINT-QUARTER TREE DATA --
Management unit 10 , Study no: 3

Species	Trees per Acre	
	'00	'05
Juniperus osteosperma	147	65
Pinus edulis	127	42

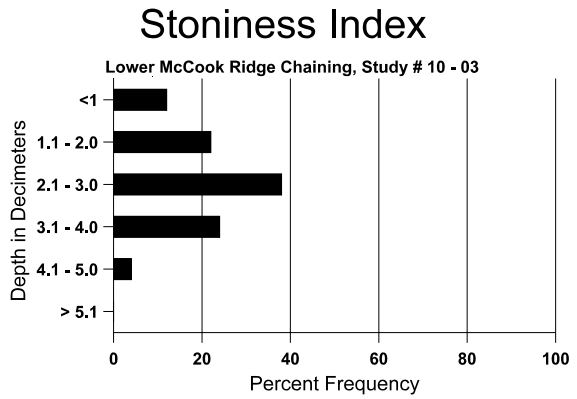
Average diameter (in)	
'00	'05
2.5	3.4
4.2	3.2

BASIC COVER --
Management unit 10 , Study no: 3

Cover Type	Average Cover %				
	'82	'88	'95	'00	'05
Vegetation	5.25	12.50	32.93	34.54	21.94
Rock	1.00	2.50	2.11	1.52	.46
Pavement	.75	5.25	2.95	1.11	1.33
Litter	73.25	69.00	36.46	34.29	46.71
Cryptogams	0	.50	6.62	5.81	2.19
Bare Ground	19.75	10.25	26.86	37.16	36.87

SOIL ANALYSIS DATA --
Herd Unit 10, Study # 3, Study Name: Lower McCook Ridge Chaining

Effective rooting depth (in)	Temp °F (depth)	pH	%sand	%silt	%clay	%0M	ppm P	ppm K	dS/m
15.7	56.6 (16.1)	7.1	34.0	31.4	34.6	4.0	7.8	144.0	0.8



PELLET GROUP DATA --
Management unit 10 , Study no: 3

Type	Quadrat Frequency		
	'95	'00	'05
Rabbit	16	33	47
Elk	24	5	11
Deer	13	6	18
Cattle	2	1	1

Days use per acre (ha)	
'00	'05
-	-
19 (48)	20 (50)
25 (62)	24 (60)
-	2 (4)

BROWSE CHARACTERISTICS --
Management unit 10 , Study no: 3

		Age class distribution (plants per acre)					Utilization					
Year	Plants per Acre (excluding seedlings)	Seedling	Young	Mature	Decadent	Dead	% moderate	% heavy	% decadent	% dying	% poor vigor	Average Height Crown (in)
Artemisia frigida												
82	**0**	-	-	-	-	-	0	0	-	-	0	-/-
88	**0**	-	-	-	-	-	0	0	-	-	0	-/-
95	**60**	-	-	60	-	-	0	0	-	-	0	9/11
00	**80**	-	-	80	-	-	0	0	-	-	0	7/5
05	**20**	-	-	20	-	-	0	0	-	-	0	2/4
Artemisia tridentata vaseyana												
82	**1932**	400	666	1266	-	-	48	17	0	-	0	22/25
88	**1532**	266	266	866	400	-	57	13	26	-	9	24/29
95	**3160**	40	1580	1480	100	-	27	0	3	.63	.63	24/31
00	**2980**	-	160	1800	1020	100	40	9	34	19	19	23/26
05	**2080**	-	60	1400	620	160	42	37	30	20	32	19/24

		Age class distribution (plants per acre)					Utilization					
Year	Plants per Acre (excluding seedlings)	Seedling	Young	Mature	Decadent	Dead	% moderate	% heavy	% decadent	% dying	% poor vigor	Average Height Crown (in)
Atriplex canescens												
82	**0**	-	-	-	-	-	0	0	-	-	0	-/-
88	**0**	-	-	-	-	-	0	0	-	-	0	-/-
95	**0**	-	-	-	-	-	0	0	-	-	0	-/-
00	**0**	-	-	-	-	-	0	0	-	-	0	26/24
05	**0**	-	-	-	-	-	0	0	-	-	0	-/-
Ceratoides lanata												
82	**0**	-	-	-	-	-	0	0	0	-	0	-/-
88	**199**	-	133	66	-	-	0	0	0	-	0	15/5
95	**120**	-	-	120	-	-	0	0	0	-	0	6/8
00	**160**	-	-	140	20	-	38	0	13	13	13	9/8
05	**100**	-	20	60	20	-	20	60	20	20	20	5/6
Chrysothamnus depressus												
82	**6266**	-	-	6266	-	-	0	100	0	-	0	3/9
88	**27266**	1266	12200	14533	533	-	40	.48	2	-	.24	4/9
95	**13660**	60	860	12800	-	-	0	0	0	-	0	5/11
00	**15500**	-	1620	11320	2560	160	54	.25	17	3	3	3/10
05	**3280**	-	320	2360	600	180	48	26	18	7	9	4/8
Chrysothamnus nauseosus hololeucus												
82	**0**	-	-	-	-	-	0	0	0	-	0	-/-
88	**0**	-	-	-	-	-	0	0	0	-	0	-/-
95	**60**	60	40	20	-	-	0	0	0	-	0	36/43
00	**20**	-	20	-	-	-	0	0	0	-	0	37/38
05	**40**	-	20	-	20	-	50	0	50	50	50	18/9
Gutierrezia sarothrae												
82	**66**	-	-	66	-	-	0	0	0	-	0	4/1
88	**4598**	-	1066	3466	66	-	0	0	1	-	0	8/5
95	**1480**	40	340	1140	-	-	0	0	0	-	0	7/7
00	**1380**	-	360	900	120	-	0	0	9	1	1	4/5
05	**1120**	40	140	980	-	-	0	0	0	-	0	6/7
Juniperus osteosperma												
82	**66**	-	66	-	-	-	0	0	0	-	0	-/-
88	**132**	66	66	66	-	-	50	0	0	-	0	118/79
95	**0**	-	-	-	-	-	0	0	0	-	0	-/-
00	**140**	-	100	40	-	-	0	0	0	-	0	-/-
05	**80**	20	60	-	20	-	0	0	25	-	25	-/-

		Age class distribution (plants per acre)					Utilization					
Year	Plants per Acre (excluding seedlings)	Seedling	Young	Mature	Decadent	Dead	% moderate	% heavy	% decadent	% dying	% poor vigor	Average Height Crown (in)
Leptodactylon pungens												
82	**0**	-	-	-	-	-	0	0	-	-	0	-/-
88	**0**	-	-	-	-	-	0	0	-	-	0	-/-
95	**0**	-	-	-	-	-	0	0	-	-	0	-/-
00	**80**	-	-	80	-	-	0	0	-	-	0	8/11
05	**20**	-	-	20	-	-	0	0	-	-	0	4/9
Opuntia fragilis												
82	**0**	-	-	-	-	-	0	0	-	-	0	-/-
88	**66**	-	66	-	-	-	0	0	-	-	0	-/-
95	**20**	-	20	-	-	-	0	0	-	-	0	4/14
00	**0**	-	-	-	-	-	0	0	-	-	0	-/-
05	**0**	-	-	-	-	-	0	0	-	-	0	3/12
Pediocactus simpsonii												
82	**66**	-	-	66	-	-	0	0	-	-	0	1/4
88	**0**	-	-	-	-	-	0	0	-	-	0	-/-
95	**0**	-	-	-	-	-	0	0	-	-	0	-/-
00	**0**	-	-	-	-	-	0	0	-	-	0	0/1
05	**120**	-	-	120	-	-	0	0	-	-	0	1/2
Pinus edulis												
82	**400**	-	-	400	-	-	0	0	-	-	0	33/18
88	**399**	-	266	133	-	-	0	0	-	-	0	94/73
95	**0**	-	-	-	-	-	0	0	-	-	0	-/-
00	**80**	40	40	40	-	-	0	0	-	-	0	-/-
05	**60**	20	60	-	-	-	0	0	-	-	0	-/-

Trend Study 10-4-05

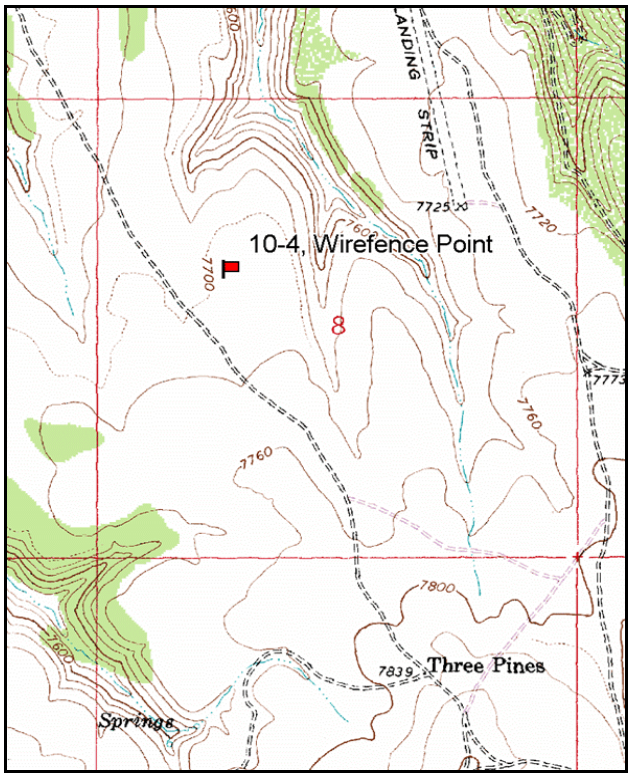
Study site name: Wirefence Point . Vegetation type: Mountain Brush .

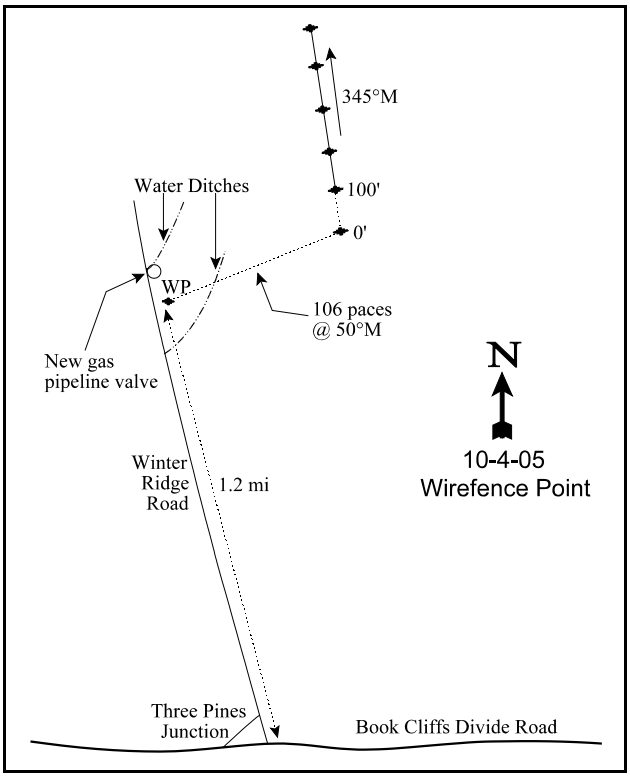
Compass bearing: frequency baseline 345 degrees magnetic.

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

LOCATION DESCRIPTION

From the Book Cliffs Divide road near Three Pines, turn right on the Winter Ridge Road. Travel 1.2 miles towards Winter Ridge to a witness point. There may be an old drainage ditch or faint fork on the right hand side of the road. From the witness post, walk out 106 paces bearing 50°M to the 0-foot baseline stake. The frequency baseline is marked by green fenceposts 12-18 inches in height.





Map Name: Cedar Camp Canyon

Diagrammatic Sketch

Township 16S , Range 23E , Section 8

GPS: NAD 27, UTM 12S 4365700 N, 637050 E

DISCUSSION

Wirefence Point - Trend Study No. 10-4

The Wirefence Point study is located on summer range near the head of Wirefence Canyon near the Three Pines intersection. Elevation is 7,700 feet on nearly level terrain. In addition to the regular rotation schedule, this site was monitored in 1997 as a special study to monitor perceived conflicts over elk and livestock use in the North Book Cliffs. The vegetation composition of the site is sagebrush-grass. A 2,4-D spray treatment was done in the 1980's to thin sagebrush; however, sagebrush is again the dominant overstory species. As of fall 2005, the permittee of this area on State Trust Lands has proposed to retreat the area by spraying or perhaps harrowing, but is still awaiting funding. This area is grazed by cattle on a rotation deferred system between spring and summer. Elk use this area during mild winters. Pellet group data from 2000 estimated 33 deer days use/acre (82 ddu/ha), 19 elk days use/acre (47 edu/ha), and 5 cow days use/acre (12 cdu/ha). The 2005 pellet group data estimated 20 deer days use/acre (50 ddu/ha), 8 elk days use/acre (20 edu/ha), and 2 cow days use/acre (5 cdu/ha). Wild horses are also found in the area and were observed in 2005.

Soils are moderately deep with an average effective rooting depth of 18 inches. Texture analysis indicates the soil to be a clay loam with a neutral soil reaction (pH of 6.7). The soil surface is cracked from drying, indicating the abundance of clay in the soil. Relative percent bare soil increased in 2000 and again in 2005. Relative litter cover decreased from 36% in 2000 to 25% in 2005. The ratio of bare ground to protective ground cover (vegetation, litter, and cryptogams) decreased from 1:3.9 in 1997 to 1:2.6 in 2000 and decreased again in 2005 to 1:2.3. This is due to drought which has caused a decrease in the sum of nested frequency for herbaceous species and an increase in nested frequency of bare soil. In 2000 and 2005, there was some evidence of overland flow and slight pedestaling around shrubs. An erosion class assessment rated erosion as stable in 2005.

In 1988, there was little evidence of the thinning 2,4-D spray treatment of browse on this state-owned rangeland as only a few sagebrush skeletons or sprouting serviceberry were observed. Mountain big sagebrush is again the dominant species and most abundant browse species on the site in both density and cover. The initial reading of this transect in 1982 estimated the sagebrush population to be 4,666 plants/acre. Thirty-one percent of the population was classified as young, while seedlings numbered 6,666 plants/acre. Hedging was very light and vigor was good. In 1988, the site had a slightly larger population (7,732 plants/acre) with an increase in percent decadence and fewer seedlings, yet a large proportion of young plants (60%). The number of mature plants declined from 3,200 to 2,266 plants/acre. Study site stakes could not be located in 1995, so new posts were placed as close as possible to the old baseline using photographs from previous readings, but trends can still be determined by examining age class composition, form class, vigor, and percent decadence, with less emphasis placed on population densities. Data from 1995 estimated 5,180 plants/acre for sagebrush, which was lower than the 1988 estimate. A much larger sample size was implemented beginning in mid-1992 which lengthened the baseline which more effectively estimates shrub populations using shrub strips. The decrease in density between 1988 and 1995 can be attributed in part to the change in sample size giving better estimates for shrubs with clumped and/or discontinuous distributions. In 1995, the number of seedlings was high with 40% of the population consisting of young plants. Utilization was light and vigor was good with a low number of decadent plants (6%). In 1997 decadence was low at 9%. Utilization was light to moderate with mostly good vigor. In 2000, the density of sagebrush was estimated at 5,640 plants/acre, of which many were young plants (29%). Use was light to moderate use, and vigor was good. Percent decadence slightly increased to 14%. In 2005, density was 5,000 plants/acre. Seedlings were abundant and twelve percent of the population was young, which is higher than the percent dying (9%). Decadence increased slightly to 18%.

Other browse species present in the area include: squaw apple, snowberry, serviceberry, bitterbrush, and gray horsebrush. These species occur in low densities and some were not sampled in the shrub density strips, but were measured for height/crown. Squaw apple is the second most abundant preferred browse after sagebrush. Utilization was moderate to heavy in 2005. Dwarf rabbitbrush appears to be stable with the majority of the population consisting of mature plants.

The dominant herbaceous species are thickspike wheatgrass, muttongrass, prairie junegrass, Sandberg bluegrass, and Kentucky blue grass. Grass cover was 8-9% from 1995-2000, but increased to 13% in 2005. This increase comes from the Kentucky bluegrass, which is an increaser species under heavy grazing. Kentucky bluegrass was sampled in 2% of quadrats in 1997. It increased to 27% of quadrats in 2005. Forbs are also diverse and have accounted for more than half of the herbaceous cover with each reading. Unfortunately, low growing increasers such as pussytoes, mat penstemon, desert phlox, and lance-leaved sedum make up a large proportion of the forb cover. Drought and continual use have caused the sum of nested frequency for perennial grasses and forbs to decline in 2000 and 2005.

1982 APPARENT TREND ASSESSMENT

Soil trend appears stable. There is minimal soil movement even though there is a significant amount of bare ground. Vegetation trend depends mostly upon the management objectives. If a high level of livestock forage (i.e., grasses) is desired, trend is probably stable to slightly declining. The browse population, especially mountain big sagebrush, is increasing and will provide considerably more browse forage in the future. However, the forb-grass component is more important for summer range and should be enhanced if possible, even if shrub growth is inhibited.

1988 TREND ASSESSMENT

Due to a slight increase in vegetation "basal" cover from 7% to 12%, and an apparent increase in cryptogamic cover (from 0% in 1982 to 8% ground cover in 1988), the amount of bare soil decreased from 39% to 23%. Trend for soil is slightly up. The browse trend is up for the key species, mountain big sagebrush, which has increased by 40% since 1982. Reproductive potential is still high at 22% with 60% of the population consisting of young plants. Trend for the herbaceous understory is up due to increased quadrat frequency of both grasses and forbs.

TREND ASSESSMENT
soil - slightly up (+1)
browse - up (+2)
herbaceous understory - up (+2)

1995 TREND ASSESSMENT

Even though the original study stakes could not be located, the new study is very close to the old one and trends can still be determined. The soil trend is considered stable. Relative cover values for litter and cryptogamic cover have declined, but values for percent bare ground are similar. Erosion is not a problem because herbaceous cover is abundant. Trend for sagebrush is stable. The number of estimated mature plants/acre has remained relatively stable. The difference in density between 1988 and 1995 is due to the reduced number of young plants which declined from 4,666 plants/acre to 2,060, as well as the increased sample sized used in 1995. This is still a more than adequate number of young. Percent decadence has declined, vigor is good, and proportion of individuals showing heavy use has declined from 16% to less than 1%. Trend for the herbaceous understory is stable. Sum of nested frequency for grasses and forbs have declined slightly, but not enough to warrant a downward trend. This has most likely been the result of drought. Carex and needle-and-thread have declined significantly in nested frequency, while prairie junegrass

and muttongrass increased significantly. Although this site is primarily summer range it can be used by elk in mild winters. The Desirable Components Index (see methods) rated this site as good to excellent with good shrub and understory components.

TREND ASSESSMENT
soil - stable (0)
browse - stable (0)
herbaceous understory - stable (0)
winter range condition (DC Index) - good to excellent (81) Mid-level potential scale

1997 TREND ASSESSMENT

As in 1995, the soil trend is stable with a decrease in bare ground cover. Vegetation and litter are still abundant and provide protection from wind and water erosion. The mountain big sagebrush population has slightly declined since 1995, but not significantly. The age class structure has stayed nearly the same with a decrease in the number of seedlings encountered this year. Decadence has slightly increased as has the ratio of dead to live plants. There is an adequate number of young plants to replace those individuals that may die-off. Trend for browse is slightly down. Nested frequency for muttongrass has steadily increased since 1988, while Sandberg bluegrass has steadily decreased. Thickspike wheatgrass and needle-and-thread grass have significantly increased since 1995. Trend for the herbaceous understory is stable. The DC index rating is good.

TREND ASSESSMENT
soil - stable (0)
browse - slightly down (-1)
herbaceous understory - stable (0)
winter range condition (DC Index) - good (73) Mid-level potential scale

2000 TREND ASSESSMENT

Trend for soil is slightly down. Relative percent cover of bare soil increased coupled with a decrease in relative percent cover of vegetation. The ratio of protective ground cover to bare soil also decreased as nested frequency values for herbaceous species are down due to drought. There was some evidence of overland flow and pedestaling around the base of shrubs. Trend for browse is stable. Mountain big sagebrush density appears stable and recruitment remains high at 29%. Although percent decadence slightly increased in 2000 (from 9% to 14%). Also, the ratio of dead to live plants improved from 1:6 to 1:10 in 2000. Vigor remains generally good, and use is light to moderate. Trend for the herbaceous understory is slightly down. Sum of nested frequency values for perennial grasses and forbs decreased in 2000 due to drought. The DC index rating is good.

TREND ASSESSMENT
soil - slightly down (-1)
browse - stable (0)
herbaceous understory - slightly down (-1)
winter range condition (DC Index) - good (75) Mid-level potential scale

2005 TREND ASSESSMENT

The soil trend is slightly down. Relative percent bare ground increased and the ratio of bare ground to protective ground cover (vegetation, litter, and cryptogams) decreased from 1:2.6 to 1:2.3. An erosion condition class assessment rated erosion as stable in 2005. The browse trend is stable. Mountain big

sagebrush density declined by 11%, but the decline is likely due to fewer younger plants in the population. Young plants decreased from 29% of the population to 12%. Strip frequency remained stable at 88% of the strips. Sagebrush cover increased to 17%. Squaw apple density increased from 220 plants/acre to 400 plants/acre. The herbaceous understory trend is down. Sum of nested frequency for perennial grasses and forbs declined 20%. Muttongrass nested frequency significantly decreased, while Kentucky bluegrass, an increaser species, increased significantly. Although this site is primarily summer range it can be used by elk in mild winters. The DC index rates this site as excellent.

TREND ASSESSMENT
soil - slightly down (-1)
browse - stable (0)
herbaceous understory - down (-2)
winter range condition (DC Index) - excellent (85) Mid-level potential scale

HERBACEOUS TRENDS --
Management unit 10 , Study no: 4

Type	Species	Nested Frequency					Average Cover %			
		'88	'95	'97	'00	'05	'95	'97	'00	'05
G	Agropyron dasystachyum	$_{b}$195	$_{b}$174	$_{c}$271	$_{a}$74	$_{a}$47	1.58	2.80	.48	.31
G	Bouteloua gracilis	$_{b}$25	$_{a}$-	$_{a}$1	$_{a}$-	$_{a}$-	-	.00	-	-
G	Carex sp.	$_{b}$53	$_{a}$22	$_{ab}$33	$_{ab}$33	$_{a}$16	.05	.06	.39	.05
G	Koeleria cristata	$_{a}$92	$_{c}$172	$_{ab}$106	$_{c}$168	$_{bc}$143	2.52	.86	2.50	3.34
G	Oryzopsis hymenoides	-	-	-	1	1	-	-	.00	.00
G	Poa fendleriana	$_{a}$-	$_{b}$84	$_{c}$214	$_{c}$182	$_{b}$118	1.37	2.53	4.40	2.84
G	Poa pratensis	-	-	6	-	81	-	.18	-	4.25
G	Poa secunda	$_{c}$133	$_{c}$137	$_{a}$34	$_{b}$85	$_{a}$10	2.75	.66	.69	.12
G	Sitanion hystrix	-	-	-	2	1	-	-	.01	.00
G	Stipa comata	$_{c}$225	$_{a}$42	$_{b}$94	$_{a}$37	$_{a}$60	.58	1.14	.50	1.91
Total for Annual Grasses		0	0	0	0	0	0	0	0	0
Total for Perennial Grasses		723	631	759	582	477	8.89	8.26	9.00	12.86
Total for Grasses		723	631	759	582	477	8.89	8.26	9.00	12.86
F	Agoseris glauca	$_{a}$-	$_{b}$25	$_{b}$39	$_{b}$35	$_{b}$21	.11	.13	.18	.19
F	Antennaria rosea	$_{b}$196	$_{a}$99	$_{a}$112	$_{a}$103	$_{a}$95	2.40	2.34	3.19	2.44
F	Androsace septentrionalis (a)	-	$_{b}$65	$_{a}$9	$_{a}$16	$_{b}$52	.18	.05	.05	.39
F	Arabis sp.	$_{b}$47	$_{a}$5	$_{a}$6	$_{a}$1	$_{a}$-	.01	.01	.00	-
F	Arenaria congesta	$_{c}$256	$_{ab}$66	$_{a}$54	$_{b}$96	$_{ab}$74	.82	.48	1.68	1.12
F	Astragalus convallarius	$_{a}$1	$_{ab}$19	$_{ab}$21	$_{b}$33	$_{b}$21	.07	.09	.42	.41
F	Astragalus spatulatus	-	1	6	5	-	.03	.21	.06	-
F	Aster sp.	$_{a}$-	$_{b}$11	$_{c}$43	$_{b}$10	$_{b}$11	.08	.14	.08	.07
F	Astragalus sp.	5	11	4	1	4	.59	.03	.03	.01
F	Castilleja flava	$_{ab}$8	$_{c}$41	$_{bc}$29	$_{abc}$22	$_{a}$5	.31	.24	.19	.04

Type	Species	Nested Frequency					Average Cover %			
		'88	'95	'97	'00	'05	'95	'97	'00	'05
F	Castilleja linariaefolia	-	-	-	-	1	-	-	-	.00
F	Calochortus nuttallii	$_{a}$-	$_{b}$9	$_{a}$-	$_{a}$-	$_{ab}$1	.02	-	-	.00
F	Chaenactis douglasii	$_{a}$-	$_{a}$4	$_{a}$-	$_{a}$4	$_{b}$15	.00	-	.01	.43
F	Cirsium sp.	3	-	-	-	-	-	-	-	-
F	Comandra pallida	$_{c}$222	$_{ab}$97	$_{b}$107	$_{b}$127	$_{a}$62	.45	.48	1.39	.61
F	Collinsia parviflora (a)	-	$_{b}$30	$_{a}$-	$_{a}$-	$_{b}$16	.12	-	-	.03
F	Crepis acuminata	$_{a}$6	$_{b}$56	$_{b}$54	$_{b}$45	$_{b}$56	.36	.23	.54	.54
F	Cryptantha sp.	7	-	-	-	8	-	-	-	.01
F	Cymopterus sp.	$_{a}$-	$_{a}$1	$_{b}$21	$_{a}$-	$_{ab}$8	.01	.04	-	.03
F	Delphinium nuttallianum	$_{a}$-	$_{ab}$6	$_{b}$10	$_{a}$-	$_{ab}$5	.01	.03	-	.01
F	Eriogonum alatum	$_{a}$-	$_{b}$17	$_{a}$-	$_{b}$10	$_{ab}$9	.15	-	.05	.05
F	Erigeron eatonii	$_{a}$-	$_{a}$-	$_{a}$-	$_{b}$31	$_{b}$36	-	-	.18	.42
F	Erigeron pumilus	$_{d}$174	$_{c}$109	$_{c}$83	$_{b}$35	$_{a}$3	.58	.28	.25	.00
F	Eriogonum racemosum	-	-	-	4	-	-	-	.01	-
F	Eriogonum umbellatum	$_{ab}$41	$_{b}$55	$_{ab}$41	$_{ab}$30	$_{a}$22	.98	.28	.25	.36
F	Gayophytum ramosissimum(a)	-	1	-	-	4	.00	-	-	.01
F	Hymenopappus filifolius	$_{a}$-	$_{b}$31	$_{c}$47	$_{b}$31	$_{a}$-	.71	.33	.47	-
F	Hymenoxys richardsonii	-	-	-	2	5	-	-	.03	.01
F	Lesquerella ludoviciana	$_{a}$-	$_{c}$39	$_{b}$10	$_{bc}$21	$_{bc}$33	.23	.08	.05	.57
F	Linum lewisii	$_{a}$-	$_{d}$40	$_{cd}$27	$_{ab}$9	$_{bc}$17	.18	.11	.05	.10
F	Lithospermum sp.	-	6	-	-	-	.01	-	-	-
F	Lupinus argenteus	$_{a}$31	$_{b}$59	$_{b}$55	$_{ab}$45	$_{a}$19	1.80	1.85	.92	.08
F	Orthocarpus sp. (a)	-	1	-	3	1	.00	-	.00	.00
F	Penstemon caespitosus	$_{a}$30	$_{b}$99	$_{b}$75	$_{b}$70	$_{ab}$65	3.32	.72	1.24	2.04
F	Penstemon sp.	$_{a}$-	$_{a}$2	$_{a}$-	$_{b}$12	$_{a}$-	.00	-	.36	-
F	Phlox austromontana	$_{a}$58	$_{b}$137	$_{b}$107	$_{b}$124	$_{b}$110	1.89	.81	3.11	2.36
F	Phlox longifolia	36	47	44	29	26	.19	.20	.07	.17
F	Polygonum douglasii (a)	-	$_{b}$85	$_{b}$57	$_{a}$3	$_{b}$61	.25	.11	.00	.22
F	Senecio integerrimus	$_{a}$-	$_{bc}$17	$_{d}$41	$_{ab}$1	$_{cd}$21	.06	.14	.00	.38
F	Sedum lanceolatum	$_{b}$164	$_{a}$111	$_{a}$112	$_{a}$113	$_{a}$80	2.38	.72	1.13	.83
F	Senecio multilobatus	$_{a}$-	$_{b}$15	$_{a}$-	$_{a}$-	$_{a}$-	.22	-	-	-
F	Sphaeralcea coccinea	-	4	2	-	-	.01	.00	-	-
F	Taraxacum officinale	$_{ab}$1	$_{b}$14	$_{b}$13	$_{ab}$4	$_{a}$-	.05	.03	.01	-
F	Unknown forb-annual (a)	-	-	1	-	-	-	.00	-	-
F	Zigadenus paniculatus	-	3	4	-	6	.01	.01	-	.04
Total for Annual Forbs		0	182	67	22	134	0.57	0.17	0.06	0.67

Type	Species	Nested Frequency					Average Cover %			
		'88	'95	'97	'00	'05	'95	'97	'00	'05
Total for Perennial Forbs		1286	1256	1167	1053	839	18.17	10.09	16.05	13.42
Total for Forbs		1286	1438	1234	1075	973	18.74	10.27	16.12	14.09

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

BROWSE TRENDS --
Management unit 10 , Study no: 4

Type	Species	Strip Frequency				Average Cover %			
		'95	'97	'00	'05	'95	'97	'00	'05
B	Artemisia tridentata vaseyana	84	83	87	88	13.93	11.59	13.30	16.91
B	Ceratoides lanata	3	0	0	0	-	-	-	-
B	Chrysothamnus depressus	66	56	65	65	1.72	1.55	1.26	2.71
B	Chrysothamnus viscidiflorus viscidiflorus	57	47	44	36	.82	.42	.65	.79
B	Gutierrezia sarothrae	10	4	2	10	.51	.01	-	.33
B	Juniperus scopulorum	0	1	1	1	.03	.63	.15	.15
B	Peraphyllum ramosissimum	9	13	10	13	2.31	1.15	1.95	3.00
B	Pediocactus simpsonii	0	2	2	4	.03	.03	.03	.00
B	Pinus edulis	0	1	1	1	-	-	-	-
B	Symphoricarpos oreophilus	1	1	1	1	-	-	-	-
B	Tetradymia canescens	4	4	9	4	-	.03	.07	.21
Total for Browse		234	212	222	223	19.38	15.42	17.41	24.12

CANOPY COVER, LINE INTERCEPT --
Management unit 10 , Study no: 4

Species	Percent Cover '05
Artemisia tridentata vaseyana	24.66
Chrysothamnus depressus	2.90
Chrysothamnus viscidiflorus viscidiflorus	.93
Gutierrezia sarothrae	.33
Juniperus scopulorum	.40
Peraphyllum ramosissimum	2.09
Pinus edulis	.08
Tetradymia canescens	.06

KEY BROWSE ANNUAL LEADER GROWTH --
Management unit 10 , Study no: 4

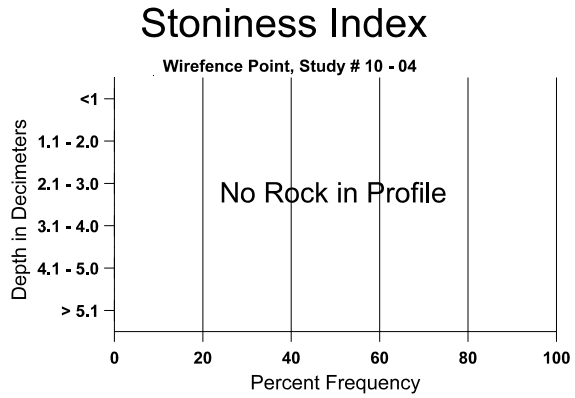
Species	Average leader growth (in) '05
Artemisia tridentata vaseyana	1.6
Peraphyllum ramosissimum	3.5

BASIC COVER --
Management unit 10 , Study no: 4

Cover Type	Average Cover %					
	'82	'88	'95	'97	'00	'05
Vegetation	7.25	12.25	47.23	38.17	43.97	41.97
Rock	0	0	.16	.15	.04	.03
Pavement	0	0	.56	2.65	.85	.23
Litter	61.50	56.75	44.75	33.25	46.00	28.64
Cryptogams	0	8.00	1.20	1.98	2.07	1.21
Bare Ground	39.00	23.00	26.94	18.45	35.99	41.28

SOIL ANALYSIS DATA --
Herd Unit 10, Study # 4, Study Name: Wirefence Point

Effective rooting depth (in)	Temp °F (depth)	pH	%sand	%silt	%clay	%0M	ppm P	ppm K	dS/m
18.6	57.2 (16.0)	6.7	31.8	32.4	35.8	2.4	6.9	124.8	0.5



PELLET GROUP DATA --
Management unit 10 , Study no: 4

Type	Quadrat Frequency			
	'95	'97	'00	'05
Rabbit	1	1	19	12
Horse	-	-	-	1
Elk	4	9	13	6
Deer	18	11	21	25
Cattle	4	5	1	-

Days use per acre (ha)	
'00	'05
-	-
-	-
19 (47)	8 (20)
33 (82)	20 (50)
5 (13)	2 (5)

BROWSE CHARACTERISTICS --
Management unit 10 , Study no: 4

		Age class distribution (plants per acre)					Utilization					
Year	Plants per Acre (excluding seedlings)	Seedling	Young	Mature	Decadent	Dead	% moderate	% heavy	% decadent	% dying	% poor vigor	Average Height Crown (in)
Amelanchier utahensis												
82	**66**	-	-	66	-	-	100	0	-	-	0	26/10
88	**66**	-	66	-	-	-	0	100	-	-	100	-/-
95	**0**	-	-	-	-	-	0	0	-	-	0	-/-
97	**0**	-	-	-	-	-	0	0	-	-	0	-/-
00	**0**	-	-	-	-	-	0	0	-	-	0	-/-
05	**0**	-	-	-	-	-	0	0	-	-	0	-/-
Artemisia tridentata vaseyana												
82	**4666**	6666	1466	3200	-	-	0	0	0	-	0	29/29
88	**7732**	1666	4666	2266	800	-	35	16	10	-	0	27/24
95	**5180**	1680	2060	2820	300	720	20	.77	6	-	1	30/35
97	**4440**	520	1440	2620	380	760	25	2	9	4	5	39/48
00	**5640**	300	1620	3220	800	560	26	1	14	4	8	31/34
05	**5000**	840	580	3520	900	880	14	4	18	9	9	28/35
Ceratoides lanata												
82	**0**	-	-	-	-	-	0	0	0	-	0	-/-
88	**0**	-	-	-	-	-	0	0	0	-	0	-/-
95	**100**	-	20	60	20	-	60	0	20	20	20	-/-
97	**0**	-	-	-	-	-	0	0	0	-	0	-/-
00	**0**	-	-	-	-	-	0	0	0	-	0	-/-
05	**0**	-	-	-	-	-	0	0	0	-	0	-/-

		Age class distribution (plants per acre)					Utilization					
Year	Plants per Acre (excluding seedlings)	Seedling	Young	Mature	Decadent	Dead	% moderate	% heavy	% decadent	% dying	% poor vigor	Average Height Crown (in)
Chrysothamnus depressus												
82	**11666**	-	-	11666	-	-	0	0	0	-	0	3/8
88	**3666**	66	1400	1733	533	-	20	4	15	.54	5	4/5
95	**5780**	-	360	5320	100	20	0	0	2	.69	.69	5/8
97	**3720**	-	100	3580	40	20	1	0	1	-	0	4/6
00	**4680**	-	480	4080	120	-	.42	0	3	3	3	4/7
05	**4180**	-	260	3860	60	80	4	.47	1	.95	.95	4/8
Chrysothamnus viscidiflorus viscidiflorus												
82	**0**	-	-	-	-	-	0	0	0	-	0	-/-
88	**0**	-	-	-	-	-	0	0	0	-	0	-/-
95	**2700**	-	980	1720	-	-	0	0	0	-	0	9/11
97	**1600**	-	240	1360	-	-	0	0	0	-	0	8/11
00	**1780**	-	700	1040	40	-	0	0	2	-	1	9/10
05	**1240**	-	140	1060	40	-	2	0	3	-	0	8/11
Gutierrezia sarothrae												
82	**0**	-	-	-	-	-	0	0	-	-	0	-/-
88	**0**	-	-	-	-	-	0	0	-	-	0	-/-
95	**500**	-	20	480	-	-	0	0	-	-	0	6/7
97	**120**	-	-	120	-	-	0	0	-	-	0	4/5
00	**80**	-	-	80	-	-	0	0	-	-	0	3/6
05	**420**	-	40	380	-	-	0	0	-	-	0	5/8
Juniperus osteosperma												
82	**66**	-	66	-	-	-	0	0	-	-	0	-/-
88	**66**	-	66	-	-	-	0	0	-	-	0	-/-
95	**0**	-	-	-	-	-	0	0	-	-	0	-/-
97	**0**	-	-	-	-	-	0	0	-	-	0	-/-
00	**0**	20	-	-	-	-	0	0	-	-	0	-/-
05	**0**	-	-	-	-	-	0	0	-	-	0	-/-
Juniperus scopulorum												
82	**0**	-	-	-	-	-	0	0	-	-	0	-/-
88	**0**	-	-	-	-	-	0	0	-	-	0	-/-
95	**0**	-	-	-	-	-	0	0	-	-	0	-/-
97	**20**	-	-	20	-	-	0	0	-	-	0	-/-
00	**20**	-	20	-	-	-	0	0	-	-	0	-/-
05	**20**	-	20	-	-	-	0	0	-	-	0	-/-

		Age class distribution (plants per acre)					Utilization					
Year	Plants per Acre (excluding seedlings)	Seedling	Young	Mature	Decadent	Dead	% moderate	% heavy	% decadent	% dying	% poor vigor	Average Height Crown (in)
Peraphyllum ramosissimum												
82	**466**	-	-	133	333	-	0	0	71	-	0	31/28
88	**598**	-	266	266	66	-	22	11	11	-	0	26/25
95	**220**	-	20	200	-	-	45	9	0	-	0	24/30
97	**300**	-	60	220	20	-	33	33	7	-	0	23/34
00	**220**	-	40	120	60	-	45	0	27	18	18	26/34
05	**400**	-	200	180	20	-	40	35	5	-	0	21/32
Pediocactus simpsonii												
82	**0**	-	-	-	-	-	0	0	-	-	0	-/-
88	**0**	-	-	-	-	-	0	0	-	-	0	-/-
95	**0**	-	-	-	-	-	0	0	-	-	0	-/-
97	**60**	-	-	60	-	-	0	0	-	-	0	2/4
00	**40**	-	20	20	-	-	0	0	-	-	0	2/4
05	**100**	-	20	80	-	-	0	0	-	-	0	2/4
Pinus edulis												
82	**0**	-	-	-	-	-	0	0	-	-	0	-/-
88	**0**	-	-	-	-	-	0	0	-	-	0	-/-
95	**0**	-	-	-	-	-	0	0	-	-	0	-/-
97	**20**	20	20	-	-	-	0	0	-	-	0	-/-
00	**20**	-	20	-	-	-	0	0	-	-	0	-/-
05	**20**	-	20	-	-	-	0	0	-	-	0	-/-
Purshia tridentata												
82	**0**	66	-	-	-	-	0	0	-	-	0	-/-
88	**0**	-	-	-	-	-	0	0	-	-	0	-/-
95	**0**	-	-	-	-	-	0	0	-	-	0	14/20
97	**0**	-	-	-	-	-	0	0	-	-	0	-/-
00	**0**	-	-	-	-	-	0	0	-	-	0	11/24
05	**0**	-	-	-	-	-	0	0	-	-	0	-/-
Symphoricarpos oreophilus												
82	**200**	-	-	200	-	-	0	0	-	-	0	8/12
88	**800**	-	600	200	-	-	25	0	-	-	8	20/12
95	**20**	-	-	20	-	-	0	0	-	-	0	7/10
97	**20**	-	-	20	-	-	0	0	-	-	0	-/-
00	**20**	-	-	20	-	-	0	0	-	-	0	13/19
05	**20**	-	20	-	-	-	0	0	-	-	0	8/10

		Age class distribution (plants per acre)					Utilization					
Year	Plants per Acre (excluding seedlings)	Seedling	Young	Mature	Decadent	Dead	% moderate	% heavy	% decadent	% dying	% poor vigor	Average Height Crown (in)
Tetradymia canescens												
82	**0**	-	-	-	-	-	0	0	-	-	0	-/-
88	**0**	-	-	-	-	-	0	0	-	-	0	-/-
95	**120**	-	40	80	-	-	0	17	-	-	0	7/13
97	**140**	-	20	120	-	-	14	0	-	-	0	7/10
00	**260**	-	20	240	-	-	0	0	-	-	0	7/10
05	**160**	-	-	160	-	-	0	0	-	-	0	7/9

Trend Study 10-5-05

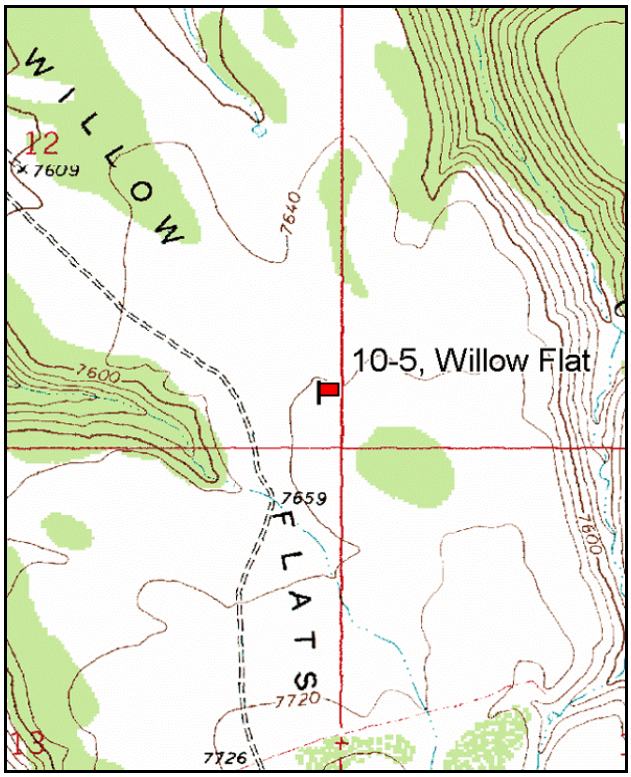
Study site name: Willow Flat . Vegetation type: Mountain Big Sagebrush .

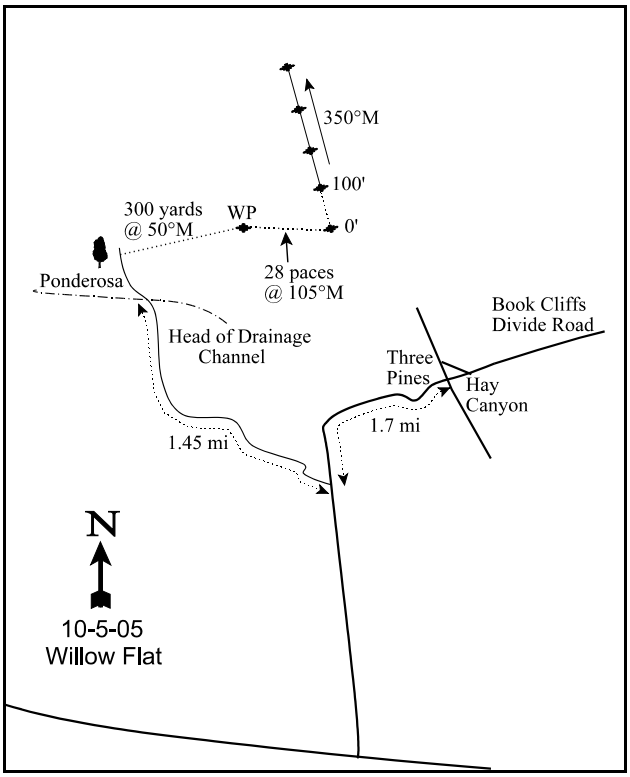
Compass bearing: frequency baseline 350 degrees magnetic.

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

LOCATION DESCRIPTION

From the intersection of the Seep Ridge and Book Cliff Divide road, proceed west along the divide for 9.4 miles to the major Three Pines - Hay Canyon intersection. Continue straight for 1.7 miles to a road to the right to Willow Flat. Turn right here and go 1.45 miles until you see a large ponderosa pine (with other conifers at the head of a small canyon) on the left side of the road. From the ponderosa, walk 300 yards at 50°M to a full high witness post. From the witness post walk 28 paces at 105°M to the 0-foot baseline stake. The frequency baseline is marked by green steel fenceposts, 12 to 18 inches in height.





Map Name: Cedar Camp Canyon Diagrammatic Sketch

Township 16S , Range 22E , Section 12 GPS: NAD 27, UTM 12S 4364798 N, 635034 E

DISCUSSION

Willow Flat - Trend Study No. 10-5

The Willow Flat trend study samples state owned land and is similar to study number 10-4, Wirefence Point. The elevation is 7,700 feet with a slight westerly aspect on nearly level terrain. This area was sprayed to kill sagebrush sometime prior to 1982. As of fall 2005, the permittee of this area on State Trust Lands has proposed to retreat the area by spraying or perhaps harrowing, but is still awaiting funding. This site is used by deer, elk and livestock during the summer. Elk may use this area during mild winters. A pellet group transect data from 2000 estimated 6 deer days use/acre (15 ddu/ha), 32 elk days use/acre (79 edu/ha), and 8 cow days use/acre (20 cdu/ha). In 2005, elk use was estimated at 31 elk days use/acre (76 edu/ha) and deer use was 4 deer days use/acre (10 ddu/ha). Some cow pats from previous years were noted. Wild horses also use this area.

Soils at the site are of clay loam texture. Effective rooting depth is estimated at nearly 13 inches. Soil pH is neutral at 7.1. Phosphorus is very low at 1.8 ppm (Tiedemann and Lopez 2004). The soil appears to be fairly uniform in depth down to 13 inches with a hard pan being present below that. This layer may be restrictive to roots. Erosion appeared to be light with some evidence of pedestaling and overland flow being noted in 2000. Most of the shrub interspaces are bare while the majority of the preferred herbaceous species are protected under shrub crowns. A small gully exists near the site, but appeared to be healing with grasses and forbs becoming established in 2000. In 2005, an erosion condition class assessment rated erosion as slight. Pedestaling and rills up to one inch deep were evident.

Mountain big sagebrush is the dominant species on the Willow Flat site, even after being sprayed in the early 1980's. When the study was established in 1982, there was a high percentage of dead sagebrush from the original spraying treatment, especially along the baseline, but there were many “safe sites” for shrub establishment as evidenced by a very large number of sagebrush seedlings (5,200 per/acre) in 1982. Density was estimated at 2,533 plants/acre, with 87% of these being mature. In 1988, estimated sagebrush density increased sharply to 16,800 plants/acre, due to an sudden increase in the number of young plants (15,200 plants/acre). There were only 1,400 mature plants/acre in 1988. Estimated sagebrush cover in 1988 was 8%. Density in 1995 was 8,840 plants/acre, 43% of which were classified as young. The number of mature plants increased to 4,920 plants/acre, indicating a more stable population. This change in sagebrush density and age class composition from 1988 to 1995 can be attributed in part to the much larger sample size utilized in 1995 which better estimates browse populations with clumped and/or discontinuous distributions. In 1995, decadence remained low, vigor was good, and use on sagebrush was mostly light. In 2000, the sagebrush population was estimated at 10,060 plants/acre, with continued high recruitment from the young age class (29%). Although decadence increased from 1% to 15%, vigor remained good, and use remained light to moderate. Density, in 2005, declined to 7,580 plants/acre. Mature and decadent plant density did not change from 2000. The number of young plants/acre decreased from 2,940 in 2000 to 560 in 2005. This decline of young plants is probably due to drought conditions and competition with the mature plants. As this population has matured after the spray treatment, cover has increased with each reading. Cover was 16% in 1995, 20 % in 2000, and 25% in 2005.

Dwarf rabbitbrush is also abundant. These short prostrate shrubs have declined from a high of 10,599 plants/acre in 1982 to 4,240 in 2005. This large change in density could be because of the much larger sample size, especially better for species that have clumped distributions. Use remains light to moderate on dwarf rabbitbrush as was the case in 1995. Other browse encountered on the site include rubber rabbitbrush, low rabbitbrush, broom snakeweed, and snowberry, but none of these are particularly abundant.

Pinyon and juniper trees appear to be encroaching into the sagebrush flat, with trees still relatively sparse. This can be seen by comparing photos from 1988 and 2005. Point-center quarter data from 2000 estimated 7

pinyon and 27 juniper trees/acre. Most of these were 5-6 feet in height. In 2005, tree density increased to 21 pinyons/acre and 55 junipers/acre. Sixty-one percent of the junipers sampled were between 4 and 8 feet tall. Average juniper diameter decreased from 6.0 inches in 2000 to 3.9 inches in 2005, which indicates a younger encroaching population.

The most abundant grasses include: thickspike wheatgrass, mutton bluegrass, Sandberg bluegrass, and prairie junegrass. Sum of nested frequency for perennial grasses declined 27% in 2005. Forbs have been numerous and diverse at the Willow Flat site. Thirty-nine species, most of which are perennial, have been sampled in at least one reading since 1988. However, due to drought, forbs declined in both 2000 and 2005. This is a concern as these herbaceous species are important on this summer range. The abundance of forbs should increase with the return to normal precipitation patterns.

1982 APPARENT TREND ASSESSMENT

Soil trend appears stable but somewhat precarious. The heavy rains that occurred throughout the summer of 1982 may have resulted in above normal erosion. The site appears to be returning to sagebrush dominance at a fairly rapid rate. To a point, this is desirable, but hopefully density can be curtailed enough that good grass cover can be maintained and a variety of desirable forbs can develop.

1988 TREND ASSESSMENT

Basal vegetation cover increased in 1988 which is consistent with the change in the herbaceous understory composition. Percent litter cover declined slightly, but percent bare soil has remained about the same. Trend for soil is considered stable even with the increase in frequency of grasses and forbs. The browse trend is up for the key species mountain big sagebrush. The number of mature shrubs actually declined from 2,200 plants/acre to 1,400. However, the number of young increased from 333 plants/acre to 15,200 indicating a young expanding population. Dwarf and low rabbitbrush populations follow the same general trend. Trend for herbaceous species is also up. Quadrat frequency of grasses and forbs has doubled since 1982.

TREND ASSESSMENT
soil - stable (0)
browse - up (+2)
herbaceous understory - up (+2)

1995 TREND ASSESSMENT

Ground cover characteristics have remained similar to those of 1988. The biggest difference is in the decline in percent litter cover, which has occurred statewide with the drought. Trend for soil is stable. Trend for browse is still up for the key species, mountain big sagebrush. Total density has declined since 1988, however the number of mature plants has increased from 1,400 to 4,920 plants/acre. Seedlings and young are still abundant while percent decadence is only 1%. Use is light and vigor is good. Dwarf rabbitbrush displays a similar trend. Quadrat frequency of grasses and forbs doubled between 1982 and 1988. Since 1988, sum of nested frequency of grasses has declined while that of forbs has increased. Overall, sum of nested frequency of grasses and forbs combined has remained stable. Although this site is primarily summer range it can be used by elk in mild winters. The Desirable Components Index (see methods) rated this site as good winter range due to good shrub cover and a healthy herbaceous understory.

TREND ASSESSMENT
soil - stable (0)
browse - up (+2)
herbaceous understory - stable (0)
winter range condition (DC Index) - good (78) Mid-level potential scale

2000 TREND ASSESSMENT

Trend for soil is slightly down with the relative percent cover of bare ground increasing from 31% to 41% in 2000. Also, the ratio of protective ground cover to bare soil decreased due to a decline in nested frequency of herbaceous plants and an increase in nested frequency for bare soil. There is also evidence of overland water flow occurring with many of the shrub interspaces being bare. Trend for browse is slightly up with more than a 13% increase in number of mature plants in the population. The key species, mountain big sagebrush, increased in decadence from 1% to 15%, however this increase is within reasonable limits for sagebrush. Recruitment remains high at 29%, vigor is good, and use remains light to moderate. Trend for grasses is stable, but down for forbs with the large decrease in sum of nested frequency for perennials forbs due to drought. Overall, trend is slightly down for the herbaceous understory. The Desirable Components Index (see methods) rated this site as good winter range due to good shrub cover and a healthy herbaceous understory.

TREND ASSESSMENT
soil - slightly down (-1)
browse - slightly up (+1)
herbaceous understory - slightly down (-1)
winter range condition (DC Index) - good (79) Mid-level potential scale

2005 TREND ASSESSMENT

The soil trend is considered stable. Relative percent bare ground increased from 41% to 45%. Relative litter cover decreased from 26% to 20%. The erosion condition class rating was slight, with pedestaling and rills present on the site. These slight changes are not enough to warrant a change in soil trend. The browse trend is stable for mountain big sagebrush, the key species. The number of mature and decadent plants remained stable, while young plants declined. Recruitment was 7%, while seedlings were abundant with 1,040/acre. Sagebrush cover increased from 20% to 25%. Utilization has been light to moderate. The herbaceous understory trend is down due to drought. Sum of nested frequency for both grasses and forbs decreased by 27%. The Desirable Components Index (see methods) rated this site as good winter range due to good shrub cover and a healthy herbaceous understory.

TREND ASSESSMENT
soil - stable (0)
browse - stable (0)
herbaceous understory - down (-2)
winter range condition (DC Index) - good (73) Mid-level potential scale

HERBACEOUS TRENDS --
Management unit 10 , Study no: 5

Type	Species	Nested Frequency				Average Cover %		
		'88	'95	'00	'05	'95	'00	'05
G	Agropyron dasystachyum	$_{c}$195	$_{b}$131	$_{b}$147	$_{a}$69	.78	.84	.29
G	Carex sp.	$_{b}$52	$_{a}$11	$_{a}$4	$_{a}$3	.05	.00	.00
G	Koeleria cristata	$_{b}$159	$_{ab}$115	$_{a}$79	$_{ab}$122	1.95	.84	3.05
G	Poa fendleriana	$_{b}$126	$_{b}$135	$_{b}$154	$_{a}$78	1.93	2.50	2.10
G	Poa nevadensis	$_{a}$-	$_{a}$-	$_{b}$25	$_{c}$52	-	.35	1.26

Type	Species	Nested Frequency				Average Cover %		
		'88	'95	'00	'05	'95	'00	'05
G	Poa pratensis	-	1	-	-	.00	-	-
G	Poa secunda	142	120	130	100	1.89	1.56	3.06
G	Stipa comata	$_{b}$73	$_{b}$75	$_{ab}$55	$_{a}$29	.60	.64	.57
Total for Annual Grasses		0	0	0	0	0	0	0
Total for Perennial Grasses		747	588	594	453	7.23	6.75	10.37
Total for Grasses		747	588	594	453	7.23	6.75	10.37
F	Agoseris glauca	$_{a}$-	$_{ab}$6	$_{ab}$2	$_{b}$8	.02	.04	.03
F	Allium sp.	-	2	-	-	.00	-	.00
F	Antennaria rosea	$_{c}$203	$_{c}$163	$_{b}$102	$_{a}$46	4.20	1.38	.32
F	Androsace septentrionalis (a)	-	$_{c}$79	$_{a}$10	$_{b}$39	.23	.20	.20
F	Arabis drummondi	$_{a}$-	$_{b}$10	$_{ab}$2	$_{ab}$8	.02	.00	.01
F	Astragalus convallarius	5	15	15	4	.18	.10	.04
F	Astragalus miser	12	23	28	8	.39	.42	.06
F	Astragalus spatulatus	-	8	2	5	.21	.03	.03
F	Aster sp.	$_{b}$92	$_{b}$77	$_{a}$41	$_{a}$10	.87	.27	.09
F	Astragalus utahensis	-	-	7	3	-	.04	.03
F	Castilleja flava	$_{bc}$58	$_{c}$85	$_{b}$39	$_{a}$-	.63	.34	-
F	Calochortus nuttallii	$_{a}$-	$_{b}$17	$_{a}$-	$_{b}$17	.03	-	.08
F	Crepis acuminata	$_{a}$-	$_{b}$37	$_{b}$33	$_{b}$24	.28	.30	.23
F	Cruciferae	-	3	-	-	.01	-	-
F	Cryptantha sp.	$_{b}$57	$_{a}$-	$_{a}$-	$_{a}$-	-	-	-
F	Delphinium nuttallianum	$_{a}$-	$_{c}$61	$_{a}$1	$_{b}$30	.19	.00	.11
F	Eriogonum alatum	$_{a}$-	$_{b}$14	$_{b}$21	$_{b}$9	.08	.11	.05
F	Erigeron eatonii	$_{c}$145	$_{ab}$84	$_{b}$88	$_{a}$48	1.25	.60	.35
F	Eriogonum racemosum	1	-	-	3	-	-	.03
F	Eriogonum umbellatum	18	24	27	34	.39	.26	.56
F	Gayophytum ramosissimum(a)	-	-	-	8	-	-	.02
F	Ipomopsis aggregata	1	5	-	9	.06	-	.02
F	Lappula occidentalis (a)	-	-	3	-	-	.00	-
F	Lesquerella ludoviciana	$_{a}$19	$_{b}$62	$_{b}$65	$_{b}$88	.83	.29	1.25
F	Linum lewisii	7	5	12	4	.04	.08	.00
F	Lomatium sp.	-	6	-	1	.01	-	.01
F	Lupinus argenteus	$_{b}$49	$_{b}$60	$_{ab}$43	$_{a}$22	1.40	.74	.09
F	Lygodesmia sp.	-	-	1	-	-	.00	-
F	Orthocarpus sp. (a)	-	1	1	-	.00	.03	-
F	Penstemon caespitosus	3	3	6	7	.09	.15	.16

Type	Species	Nested Frequency				Average Cover %		
		'88	'95	'00	'05	'95	'00	'05
F	Penstemon sp.	15	6	10	2	.04	.10	.04
F	Phlox austromontana	$_{b}$52	$_{b}$60	$_{a}$-	$_{b}$45	1.10	-	.94
F	Phlox longifolia	$_{b}$44	$_{b}$50	$_{b}$101	$_{a}$14	.18	1.68	.11
F	Polygonum douglasii (a)	-	$_{c}$227	$_{a}$-	$_{b}$70	.80	-	.21
F	Potentilla gracilis	-	3	4	3	.18	.06	.15
F	Senecio integerrimus	$_{a}$-	$_{b}$29	$_{a}$1	$_{b}$32	.07	.00	.48
F	Sedum lanceolatum	4	5	11	5	.03	.02	.06
F	Senecio multilobatus	-	5	2	-	.01	.00	-
F	Sphaeralcea coccinea	7	2	-	-	.00	-	-
F	Taraxacum officinale	$_{b}$20	$_{a}$12	$_{a}$4	$_{a}$2	.42	.04	.00
F	Tragopogon dubius	-	-	3	-	-	.03	-
Total for Annual Forbs		0	307	14	117	1.04	0.23	0.43
Total for Perennial Forbs		812	942	671	491	13.27	7.19	5.39
Total for Forbs		812	1249	685	608	14.32	7.42	5.82

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

BROWSE TRENDS --
Management unit 10 , Study no: 5

Type	Species	Strip Frequency			Average Cover %		
		'95	'00	'05	'95	'00	'05
B	Artemisia tridentata vaseyana	95	99	94	16.11	20.49	25.01
B	Chrysothamnus depressus	60	66	51	3.34	1.88	2.56
B	Chrysothamnus nauseosus	1	0	1	-	-	-
B	Chrysothamnus viscidiflorus	17	11	11	.02	.18	.36
B	Gutierrezia sarothrae	8	5	6	.21	.03	.18
B	Juniperus osteosperma	0	2	1	.48	.94	.56
B	Pediocactus simpsonii	1	3	7	.00	-	.03
B	Pinus edulis	0	2	1	-	.03	.00
B	Symphoricarpos oreophilus	1	2	2	.38	.30	.18
Total for Browse		183	190	174	20.54	23.87	28.89

CANOPY COVER, LINE INTERCEPT --
Management unit 10 , Study no: 5

Species	Percent Cover '05
Artemisia tridentata vaseyana	27.58
Chrysothamnus depressus	1.63
Gutierrezia sarothrae	.10
Juniperus osteosperma	.73
Symphoricarpos oreophilus	.01

KEY BROWSE ANNUAL LEADER GROWTH --
Management unit 10 , Study no: 5

Species	Average leader growth (in) '05
Artemisia tridentata vaseyana	1.4
Chrysothamnus depressus	1.5

POINT-QUARTER TREE DATA --
Management unit 10 , Study no: 5

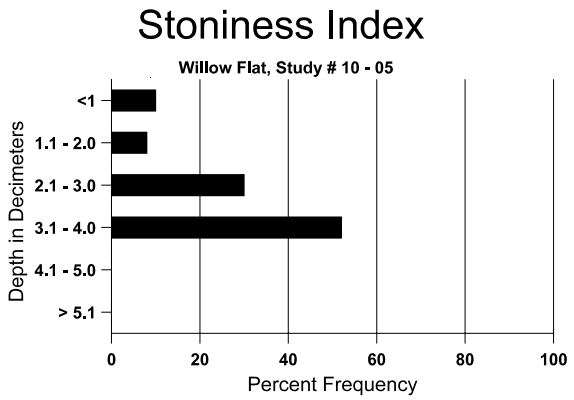
Species	Trees per Acre		Average diameter (in)	
	'00	'05	'00	'05
Juniperus osteosperma	27	55	6.0	3.9
Pinus edulis	7	21	2.7	3.5

BASIC COVER --
Management unit 10 , Study no: 5

Cover Type	Average Cover %				
	'82	'88	'95	'00	'05
Vegetation	7.50	16.75	40.15	39.23	39.87
Rock	0	0	.66	.04	.11
Pavement	0	0	.34	.66	1.11
Litter	53.50	46.75	34.04	34.51	22.88
Cryptogams	.75	1.50	3.01	3.45	.38
Bare Ground	38.25	35.00	34.59	53.58	51.52

SOIL ANALYSIS DATA --
Herd Unit 10, Study # 5, Study Name: Willow Flat

Effective rooting depth (in)	Temp °F (depth)	pH	%sand	%silt	%clay	%0M	ppm P	ppm K	dS/m
12.8	52.4 (15.0)	7.1	30.0	40.0	30.0	2.3	1.8	204.8	0.8



PELLET GROUP DATA --
Management unit 10 , Study no: 5

Type	Quadrat Frequency		
	'95	'00	'05
Rabbit	3	9	14
Horse	-	-	1
Elk	14	20	33
Deer	7	6	10
Cattle	-	2	2

Days use per acre (ha)	
'00	'05
-	-
-	-
32 (79)	31 (76)
6 (15)	4 (10)
8 (20)	-

BROWSE CHARACTERISTICS --
Management unit 10 , Study no: 5

		Age class distribution (plants per acre)					Utilization					
Year	Plants per Acre (excluding seedlings)	Seedling	Young	Mature	Decadent	Dead	% moderate	% heavy	% decadent	% dying	% poor vigor	Average Height Crown (in)
Artemisia tridentata vaseyana												
82	**2533**	5200	333	2200	-	-	26	0	0	-	0	24/17
88	**16800**	1333	15200	1400	200	-	4	0	1	-	1	30/22
95	**8840**	1620	3820	4920	100	260	9	.45	1	.22	.22	25/28
00	**10060**	600	2940	5580	1540	300	22	.39	15	.19	.39	24/28
05	**7580**	1040	560	5520	1500	520	26	3	20	9	9	24/28
Chrysothamnus depressus												
82	**10599**	-	866	9733	-	-	14	3	0	-	0	4/9
88	**9599**	533	4600	3133	1866	-	27	16	19	.41	7	4/6
95	**5400**	-	680	4700	20	60	0	0	0	-	0	5/7
00	**5340**	60	540	4380	420	160	12	0	8	3	3	3/8
05	**4240**	20	160	3920	160	40	44	0	4	2	2	4/9

		Age class distribution (plants per acre)					Utilization					
Year	Plants per Acre (excluding seedlings)	Seedling	Young	Mature	Decadent	Dead	% moderate	% heavy	% decadent	% dying	% poor vigor	Average Height Crown (in)
Chrysothamnus nauseosus												
82	**0**	-	-	-	-	-	0	0	-	-	0	-/-
88	**0**	-	-	-	-	-	0	0	-	-	0	-/-
95	**20**	-	20	-	-	-	0	0	-	-	0	-/-
00	**0**	-	-	-	-	-	0	0	-	-	0	-/-
05	**20**	-	-	20	-	-	0	0	-	-	0	7/7
Chrysothamnus viscidiflorus												
82	**1200**	-	-	1200	-	-	56	0	0	-	0	9/12
88	**799**	-	466	200	133	-	33	33	17	-	0	8/6
95	**500**	-	40	460	-	-	0	0	0	-	0	8/11
00	**320**	-	20	240	60	-	0	0	19	-	0	7/8
05	**300**	-	40	240	20	-	0	0	7	-	0	8/9
Gutierrezia sarothrae												
82	**0**	-	-	-	-	-	0	0	-	-	0	-/-
88	**133**	-	-	133	-	-	0	0	-	-	0	5/1
95	**360**	-	60	300	-	-	0	0	-	-	0	6/7
00	**120**	-	20	100	-	-	0	0	-	-	0	4/3
05	**220**	-	-	220	-	-	0	0	-	-	0	5/8
Juniperus osteosperma												
82	**0**	-	-	-	-	-	0	0	-	-	0	-/-
88	**0**	-	-	-	-	-	0	0	-	-	0	-/-
95	**0**	-	-	-	-	-	0	0	-	-	0	-/-
00	**40**	-	40	-	-	-	0	0	-	-	0	-/-
05	**20**	-	20	-	-	-	0	0	-	-	0	-/-
Peraphyllum ramosissimum												
82	**133**	-	-	133	-	-	0	0	-	-	0	30/32
88	**66**	-	-	66	-	-	0	100	-	-	0	28/37
95	**0**	-	-	-	-	-	0	0	-	-	0	19/21
00	**0**	-	-	-	-	-	0	0	-	-	0	19/24
05	**0**	-	-	-	-	-	0	0	-	-	0	-/-
Pediocactus simpsonii												
82	**66**	-	-	66	-	-	0	0	-	-	0	1/2
88	**0**	-	-	-	-	-	0	0	-	-	0	-/-
95	**20**	-	-	20	-	-	0	0	-	-	0	-/-
00	**60**	-	40	20	-	-	0	0	-	-	0	-/-
05	**140**	-	-	140	-	-	0	0	-	-	0	1/2

		Age class distribution (plants per acre)					Utilization					
Year	Plants per Acre (excluding seedlings)	Seedling	Young	Mature	Decadent	Dead	% moderate	% heavy	% decadent	% dying	% poor vigor	Average Height Crown (in)
Pinus edulis												
82	**0**	-	-	-	-	-	0	0	-	-	0	-/-
88	**0**	-	-	-	-	-	0	0	-	-	0	-/-
95	**0**	-	-	-	-	-	0	0	-	-	0	-/-
00	**40**	-	40	-	-	-	0	0	-	-	0	-/-
05	**20**	40	20	-	-	-	0	0	-	-	0	-/-
Symphoricarpos oreophilus												
82	**0**	-	-	-	-	-	0	0	-	-	0	-/-
88	**0**	-	-	-	-	-	0	0	-	-	0	-/-
95	**20**	-	-	20	-	-	0	0	-	-	0	14/35
00	**60**	-	-	60	-	-	0	0	-	-	0	-/-
05	**60**	-	-	60	-	-	0	0	-	-	0	12/23
Tetradymia canescens												
82	**0**	-	-	-	-	-	0	0	0	-	0	-/-
88	**66**	-	-	-	66	-	0	100	100	-	0	-/-
95	**0**	-	-	-	-	-	0	0	0	-	0	-/-
00	**0**	-	-	-	-	-	0	0	0	-	0	-/-
05	**0**	-	-	-	-	-	0	0	0	-	0	-/-

Trend Study 10-7-05

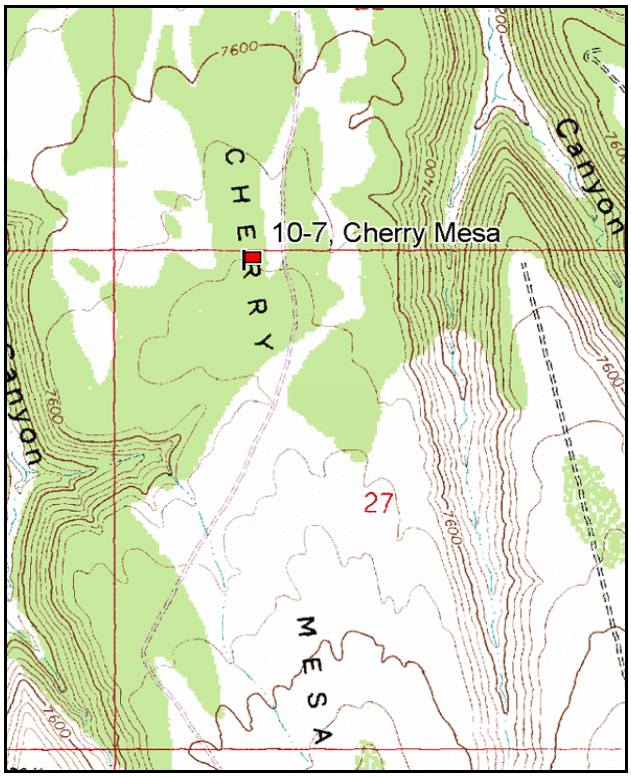
Study site name: Cherry Mesa . Vegetation type: Chained, Seeded PJ .

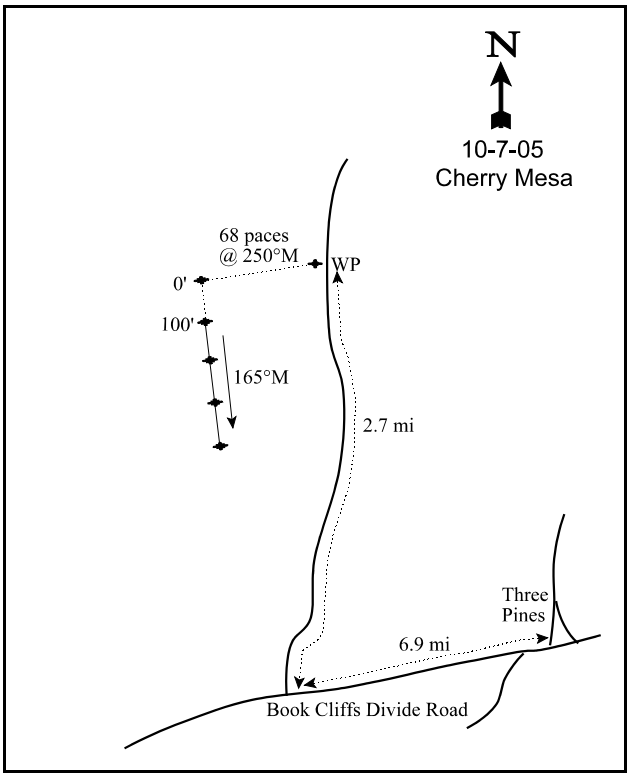
Compass bearing: frequency baseline 165 degrees magnetic.

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

LOCATION DESCRIPTION

From the major intersection at Three Pines, continue southwest along the Book Cliff Divide for 6.9 miles. Turn right off the main road onto the Cherry Mesa road. Go down through the spraying 2.7 miles to a witness post on the left side of the road. Stop, then walk to the west up the ridge, 68 paces at 250°M to the 0-foot baseline stake. It is marked by browse tag #9097. The rest of the 18" green fenceposts marking the study are found to the south at 100 foot intervals.





Map Name: Cedar Camp Canyon

Diagrammatic Sketch

Township 16S , Range 22E , Section 27

GPS: NAD 27, UTM 12S 4361326 N, 630726 E

DISCUSSION

Cherry Mesa - Trend Study No. 10-7

The Cherry Mesa trend study samples an extensive pinyon-juniper chaining on a large block of state land. Elevation at the site is 7,650 feet with a northerly aspect and a gentle slope ranging from 3-7%. This site was monitored in 1997 as a special study to address perceived conflicts over elk and livestock use on the North Book Cliffs. Cattle graze this area on a rotational, deferred system from June through September. Water is a limiting factor on this mesa. There was fresh deer sign and also evidence of winter use during the 1988 reading. Elk were also seen in the general area in 1988 and 30-40 elk were seen in June of 2005. Pellet group data from 1997 indicated 7 deer days use/acre (17ddu/ha), 29 elk days use/acre (72 edu/ha), and 21 cow days use/acre (52 cdu/ha). In 2000, pellet group transect data estimated 21 deer days use/acre (52 ddu/ha), 15 elk days use/acre (37 edu/ha), and 6 cow days use/acre (15 cdu/ha). Pellet group data from 2005 estimated 22 deer days use/acre (55 ddu/ha), 19 elk days use/acre (48 edu/ha), and 4 cow days use/acre (9 cdu/ha).

The fine-textured loam soil is moderately shallow with an average effective rooting depth of just over 11 inches. The surface horizon is extremely gravelly with many of the rocks located in the upper 6 inches. There is a fair amount of litter associated with the plants and also debris and litter left from the chaining. Many plants are slightly pedestalled and there has been obvious soil movement following high intensity rainstorms in the past. Soils are relatively high in organic matter (5.2%) and are neutral in reactivity (pH of 7.3). An erosion class assessment rated erosion as stable in 2005.

Mountain big sagebrush is the dominant species on the site. Some of the sagebrush have characteristics of basin big sagebrush, indicating hybridization between the two subspecies. From 1988 to 2005 the age structure of this sagebrush stand has changed from mostly young to mostly mature and decadent. In 1988, density was estimated at 1,866 mature and 4,400 young plants/acre. In 1995, the density declined due to a reduced number of young (4,400 to 1,540). The number of mature plants increased to 2,620 plants/acre. Much of this change is associated with the greatly increased sample size and better sampling distribution implemented in 1992, which provides more reliable estimates for shrub densities. Density in 2000 was similar to 1995 at 4,200 plants/acre with the young plants making up 16% of the population. In 1995 young plants were 37% of the population. Density declined to 3,400 plants/acre in 2005. The number of young plants decreased to 8% of the population in 2005, but 2,000 seedlings/acre were present. Decadence increased from around 3% from 1988 to 1995, to 10% in 2000, and up to 28% in 2005. The percent of the population classified as dying was 3% in 2000 and 9% in 2005. Utilization has been light to moderate with each reading, with a few plants showing heavy use. These heavier utilized plants would be the ones expressing more characteristics of mountain big sagebrush which is more preferred than basin big sagebrush. Sagebrush cover has been between 10-12% with each reading. The line intercept method estimated 18% cover in 2005.

The small dwarf rabbitbrush has been fairly numerous with an estimated 2,200 plants/acre in 1995, a similar density was estimated (2,240 plants/acre) in 1997, this increased to 3,240 plants/acre in 2000. In 2005, density was back to 2,200 plants/acre. Use was mostly light in 1995 and 1997, but use increased in 2000 and again in 2005. Utilization of this species appears to be primarily from rabbits. The percentage of decadency has been high for dwarf rabbitbrush with each reading.

Preferred species like bitterbrush and true mountain mahogany are scattered throughout the site in low numbers. Bitterbrush density was estimated between 240 and 280 plants/acre since 1997. Use is moderate to heavy as evidenced by the “clubbed” appearance on the majority of the population. Even with this appearance, vigor has been good.

Pinyon and juniper trees are present, but at relatively moderate densities. Point-center quarter estimated Utah juniper density at 87 trees/acre in 1995, 86 trees/acre in 2000, and 78 trees/acre in 2005. Mean juniper

diameter was 2.8 inches in 1995, 5.0 inches in 2000, and 6.5 inches in 2005. Pinyon density was 28 trees/acre in 1995, 41 trees/acre in 2000, and 33 trees/acre in 2005. Diameter has increased from 3.3 inches in 1995, to 4.5 inches in 2000, and to 5.4 inches in 2005. Pinyon trees are large and mature as 67% of the trees sampled were over 12 feet tall and 20% were 8-12 feet tall in 2005. Pinyon cover was 9% and juniper was 3% in 2005.

Herbaceous vegetation has not been as abundant as would be desired for a higher elevation chaining in the mountain big sagebrush type. Grass composition is mainly from native perennial species. The most abundant species are thickspike wheatgrass, mutton bluegrass, a Carex, and blue grama. Sum of nested frequency for grasses has been relatively stable between 1995 and 2005. Grass cover was slightly higher in 2005 at 8%. Forbs have been diverse, but not very abundant. Perennial forb cover has been 2-4% from 1995-2005. The most abundant species includes pussy toes, desert phlox, long leaf phlox, and tapertip hawksbeard. Forb sum of nested frequency substantially decreased in 1997 and again in 2000.

1988 APPARENT TREND ASSESSMENT

Although vegetation cover appears better on this site than at the Little Jim Canyon site (#10-6), basal vegetation cover was estimated to be lower at 3.3%. Pavement (20%) constitutes a large portion of the highly variable surface terrain. Litter covers an additional 65% of the ground surface leaving 11% bare soil. The key browse species, mountain big sagebrush, is vigorous and moderately utilized. A majority of the population consists of young plants (68%) and seedlings are common. The trend appears up. The herbaceous understory is diverse and fairly abundant. The most common grasses include thickspike wheatgrass, a sedge, and mutton grass.

1995 TREND ASSESSMENT

Basic ground cover characteristics have changed somewhat since 1988. Litter cover has declined from 65% to 41%. This is likely a reflection of the effects of drought combined with the decomposition of litter from the original chaining. Percent bare ground declined slightly but not enough to warrant an improving trend. In addition, grasses and forbs contribute 37% of the total vegetation cover. Therefore, trend for soil is considered stable. Trend for mountain big sagebrush is up slightly even though total density has declined. However, with no evidence of die-off, the change is more reflective of the much larger sample size giving more accurate population estimates for shrub species. The number of mature plants has increased from 1,866 plants/acre to 2,620. The proportion of young plants declined from 68% to 37% but this is still high. Percent decadence is low and average height/crown measurements have increased considerably. However, this upward trend in the number of mature plants and increases in size could have a depressing effect on the herbaceous understory. Trend for the herbaceous understory is slightly down, but composition has changed since the last reading. Sum of nested frequency for grasses declined considerably while that of forbs increased slightly. All perennial grasses encountered in 1988 have declined significantly. The Desirable Components Index (see methods) rated this site as fair to good winter range due to good shrub cover and a healthy herbaceous understory.

TREND ASSESSMENT
soil - stable (0)
browse - slightly up (+1)
herbaceous understory - down (-1)
winter range condition (DC Index) - fair to good (64) Mid-level potential scale

1997 TREND ASSESSMENT

Total vegetation cover has decreased to 21% from 32% in 1995. In contrast, pavement cover has increased to 28% since 1995 when it was estimated at 18%. Percent bare ground has also increased slightly from 9% in 1995 to 15% in 1997. Cover is still adequate to protect from erosion, although there is some evidence of

recent soil movement. Soil trend is stable. Mountain big sagebrush density continues to decline with 3,360 plants/acre estimated in 1997. Percent decadence is still low with few dead plants in the area. Browse trend is stable. The nested frequencies for grasses changed little and forbs decreased slightly since 1995. Perennial grasses provide the majority of forage on this winter range and forbs provide little, therefore the trend is effected less by the decrease in forbs. Trend for herbaceous understory is stable. The Desirable Components Index (see methods) rated this site as fair winter range due to fair shrub cover and a fair herbaceous understory.

TREND ASSESSMENT
soil - stable (0)
browse - stable (0)
herbaceous understory - stable (0)
winter range condition (DC Index) - fair (57) Mid-level potential scale

2000 TREND ASSESSMENT

Trend for soil is slightly down. Ground cover characteristics are mixed with vegetation and bare soil both increasing, litter cover remaining stable, and pavement decreasing. The ratio of protective ground cover to bare soil decreased in 2000 but may still be adequate to limit high erosive events, and erosion appears minimal at the present time. Trend for browse is stable. The key species, mountain big sagebrush, has increased in density, and the population still has moderate recruitment from the young age class (16%). Use has increased slightly since 1997, with moderate use remaining the same, but heavy use increasing from 3% to 17% of the population. Percent decadency increased from 1% to 10%, however, this is within the reasonable range for sagebrush. Poor vigor increased to 17% of the population, due most likely to the drought experienced in spring and summer of 2000. Trend for the herbaceous understory is slightly down due to drought. With the dry conditions of 2000, sum of nested frequency decreased for perennial grasses and forbs. Herbaceous species provide little usable forage compared to other chained sites at this elevation. The Desirable Components Index (see methods) rated this site as fair winter range due to fair shrub cover and a fair herbaceous understory.

TREND ASSESSMENT
soil - slightly down (-1)
browse - stable (0)
herbaceous understory - slightly down (-1)
winter range condition (DC Index) - fair (57) Mid-level potential scale

2005 TREND ASSESSMENT

The soil trend is stable. Percent bare ground and the ratio of bare ground to protective ground cover (vegetation, litter, and cryptogams) are unchanged. An erosion condition class assessment rated erosion as stable in 2005. The browse trend is down. Mountain big sagebrush density has declined 20% and percent decadence had increased to 28% from only 10% in 2000. The mature portion of the population has decreased by 32% since 2000. Percent young declined from 16% to 8%, which is about equal to the 9% of the population that were classified as dying. Seedlings were very abundant in 2005. Cover has remained stable at about 12%. The herbaceous understory trend is stable. Sum of nested frequency declined slightly, but cover for grasses increased and forb cover was stable. The herbaceous understory is not as abundant as would be desired at this elevation. The Desirable Components Index (see methods) rated this site as fair winter range due to fair shrub cover and a fair herbaceous understory.

TREND ASSESSMENT
soil - stable (0)
browse - down (-2)
herbaceous understory - stable (0)
winter range condition (DC Index) - fair (53) Mid-level potential scale

HERBACEOUS TRENDS --
Management unit 10 , Study no: 7

Type	Species	Nested Frequency					Average Cover %			
		'88	'95	'97	'00	'05	'95	'97	'00	'05
G	Agropyron dasystachyum	$_{b}$180	$_{b}$158	$_{b}$179	$_{a}$86	$_{a}$55	1.16	1.32	.52	.77
G	Bouteloua gracilis	74	54	42	53	52	.83	.39	.72	1.36
G	Bromus tectorum (a)	-	2	3	-	3	.00	.00	-	.03
G	Carex sp.	$_{b}$139	$_{a}$83	$_{a}$66	$_{b}$148	$_{b}$133	.39	.48	2.16	1.57
G	Koeleria cristata	$_{a}$-	$_{c}$80	$_{b}$37	$_{a}$3	$_{b}$42	1.11	.58	.03	.58
G	Oryzopsis hymenoides	$_{b}$33	$_{a}$11	$_{a}$2	$_{a}$-	$_{a}$-	.07	.03	-	.00
G	Poa fendleriana	$_{b}$116	$_{a}$67	$_{bc}$131	$_{c}$177	$_{ab}$119	1.71	1.29	3.17	3.55
G	Poa secunda	$_{a}$-	$_{a}$-	$_{ab}$8	$_{a}$1	$_{b}$15	-	.21	.00	.34
G	Sitanion hystrix	$_{b}$82	$_{a}$16	$_{a}$11	$_{a}$1	$_{a}$7	.07	.05	.03	.10
G	Stipa comata	$_{b}$79	$_{a}$1	$_{a}$6	$_{a}$3	$_{a}$9	.00	.01	.03	.13
Total for Annual Grasses		0	2	3	0	3	0.00	0.00	0	0.03
Total for Perennial Grasses		703	470	482	472	432	5.35	4.38	6.68	8.43
Total for Grasses		703	472	485	472	435	5.36	4.39	6.68	8.46
F	Antennaria rosea	$_{a}$11	$_{a}$23	$_{ab}$30	$_{b}$40	$_{ab}$27	.10	.45	.39	.38
F	Androsace septentrionalis (a)	-	$_{a}$-	$_{b}$40	$_{a}$6	$_{b}$29	-	.09	.04	.14
F	Arabis sp.	$_{b}$29	$_{a}$1	$_{a}$4	$_{a}$-	$_{a}$4	.03	.01	-	.01
F	Arenaria kingii	-	-	4	-	-	-	.01	-	-
F	Astragalus argophyllus	$_{a}$3	$_{b}$32	$_{a}$-	$_{a}$5	$_{a}$-	.70	-	.07	-
F	Aster sp.	12	3	1	5	-	.00	.00	.04	-
F	Astragalus sp.	$_{a}$-	$_{a}$-	$_{b}$13	$_{a}$3	$_{a}$3	-	.09	.00	.01
F	Calochortus flexuosus	-	-	3	-	-	-	.00	-	-
F	Castilleja flava	9	12	9	4	4	.16	.08	.03	.01
F	Chaenactis douglasii	$_{b}$51	$_{ab}$20	$_{ab}$10	$_{a}$-	$_{ab}$4	.04	.02	-	.01
F	Chenopodium leptophyllum(a)	-	$_{a}$-	$_{a}$-	$_{a}$-	$_{b}$10	-	-	-	.02
F	Comandra pallida	$_{ab}$36	$_{b}$53	$_{ab}$38	$_{ab}$36	$_{a}$20	.38	.22	.33	.11
F	Crepis acuminata	$_{a}$-	$_{bc}$53	$_{c}$59	$_{bc}$35	$_{b}$30	.30	.53	.22	.18
F	Cryptantha sp.	3	6	2	1	-	.04	.00	.00	-
F	Delphinium nuttallianum	-	2	-	-	-	.01	-	-	-
F	Eriogonum alatum	-	-	-	2	7	-	-	.03	.04
F	Erigeron eatonii	47	38	21	23	22	.45	.14	.12	.11

Type	Species	Nested Frequency					Average Cover %			
		'88	'95	'97	'00	'05	'95	'97	'00	'05
F	Eriogonum umbellatum	$_{a}$19	$_{a}$15	$_{a}$14	$_{b}$34	$_{ab}$20	.22	.16	.24	.25
F	Gayophytum ramosissimum(a)	-	$_{b}$54	$_{a}$-	$_{a}$2	$_{b}$70	.42	-	.00	.34
F	Gilia sp. (a)	-	$_{b}$111	$_{a}$-	$_{a}$3	$_{a}$-	.27	-	.01	-
F	Lappula occidentalis (a)	-	$_{ab}$8	$_{b}$10	$_{a}$-	$_{ab}$7	.02	.02	-	.01
F	Lesquerella sp.	$_{bc}$50	$_{abc}$41	$_{ab}$35	$_{a}$18	$_{c}$58	.19	.22	.10	.48
F	Linum lewisii	2	-	2	5	-	-	.00	.01	-
F	Machaeranthera grindelioides	15	17	12	6	5	.37	.10	.04	.01
F	Orthocarpus purpureo-albus (a)	3	-	-	-	-	-	-	-	-
F	Penstemon caespitosus	$_{a}$3	$_{b}$26	$_{ab}$11	$_{a}$1	$_{a}$4	.59	.19	.00	.04
F	Pedicularis centranthera	-	-	1	-	-	-	.00	-	-
F	Penstemon pachyphyllus	-	1	2	1	-	.00	.00	.00	-
F	Phlox austromontana	$_{a}$-	$_{b}$26	$_{b}$26	$_{b}$23	$_{b}$18	.29	.32	.41	.53
F	Phlox longifolia	$_{a}$12	$_{b}$104	$_{b}$69	$_{a}$37	$_{a}$32	.34	.25	.11	.10
F	Polygonum douglasii (a)	-	$_{b}$91	$_{b}$62	$_{a}$1	$_{b}$62	.25	.14	.00	.15
F	Senecio integerrimus	-	-	-	-	6	-	-	-	.06
F	Senecio multilobatus	3	3	-	-	3	.01	-	-	.03
F	Tragopogon dubius	2	-	-	-	-	-	-	-	-
Total for Annual Forbs		3	264	112	12	178	0.97	0.25	0.06	0.67
Total for Perennial Forbs		307	476	366	279	267	4.27	2.88	2.20	2.39
Total for Forbs		310	740	478	291	445	5.25	3.14	2.26	3.07

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

BROWSE TRENDS --
Management unit 10 , Study no: 7

Type	Species	Strip Frequency				Average Cover %			
		'95	'97	'00	'05	'95	'97	'00	'05
B	Artemisia tridentata vaseyana	77	81	80	77	9.96	8.26	11.78	11.56
B	Cercocarpus montanus	1	1	3	3	.18	.00	.38	.63
B	Chrysothamnus depressus	35	26	39	38	1.00	.84	.80	.42
B	Chrysothamnus viscidiflorus viscidiflorus	0	10	8	7	-	.42	.00	.06
B	Gutierrezia sarothrae	7	9	1	5	.18	.08	.00	.00
B	Juniperus osteosperma	0	6	6	7	.93	1.48	2.32	2.99
B	Opuntia sp.	2	2	6	6	.00	-	-	.15
B	Pinus edulis	0	4	4	3	3.03	3.23	4.15	5.84
B	Purshia tridentata	5	11	8	10	.03	.12	.15	.33
B	Symphoricarpos oreophilus	20	22	25	26	3.01	1.63	1.62	1.81
Total for Browse		147	172	180	182	18.37	16.07	21.22	23.81

CANOPY COVER, LINE INTERCEPT --
Management unit 10 , Study no: 7

Species	Percent Cover	
	'00	'05
Artemisia tridentata vaseyana	-	17.54
Cercocarpus montanus	-	.08
Chrysothamnus depressus	-	.33
Chrysothamnus viscidiflorus viscidiflorus	-	.25
Gutierrezia sarothrae	-	.05
Juniperus osteosperma	-	3.38
Opuntia sp.	-	.16
Pinus edulis	5.59	9.10
Purshia tridentata	-	.36
Symphoricarpos oreophilus	-	2.26

KEY BROWSE ANNUAL LEADER GROWTH --
Management unit 10 , Study no: 7

Species	Average leader growth (in) '05
Artemisia tridentata vaseyana	1.7
Cercocarpus montanus	2.0
Purshia tridentata	1.7

POINT-QUARTER TREE DATA --
Management unit 10 , Study no: 7

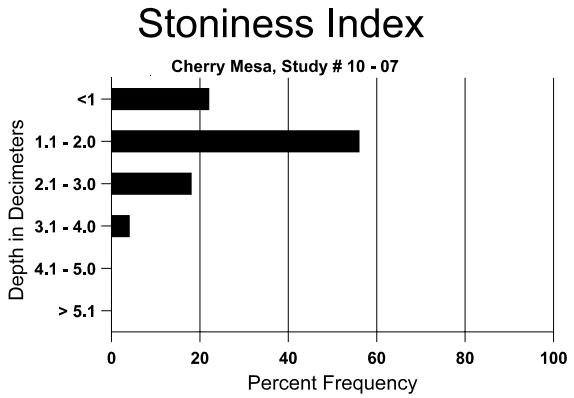
Species	Trees per Acre '00	Trees per Acre '05	Average diameter (in) '00	Average diameter (in) '05
Juniperus osteosperma	86	78	5.0	6.5
Pinus edulis	41	33	4.5	5.4

BASIC COVER --
Management unit 10 , Study no: 7

Cover Type	Average Cover % '88	'95	'97	'00	'05
Vegetation	3.25	31.70	21.11	29.38	31.99
Rock	0	.88	.16	.00	.04
Pavement	20.00	18.21	27.87	18.42	20.90
Litter	65.25	41.33	41.40	41.26	36.90
Cryptogams	.25	.20	1.19	.42	.30
Bare Ground	11.25	9.14	15.18	25.53	27.02

SOIL ANALYSIS DATA --
Herd Unit 10, Study # 7, Study Name: Cherry Mesa

Effective rooting depth (in)	Temp °F (depth)	pH	%sand	%silt	%clay	%0M	ppm P	ppm K	dS/m
11.2	55.0 (12.8)	6.8	48.0	30.0	22.0	4.1	9.4	89.6	0.8



PELLET GROUP DATA --
Management unit 10 , Study no: 7

Type	Quadrat Frequency			
	'95	'97	'00	'05
Rabbit	12	11	48	58
Elk	4	8	9	13
Deer	4	7	10	22
Cattle	1	7	2	-

Days use per acre (ha)	
'00	'05
-	-
15 (37)	19 (48)
21 (53)	22 (55)
6 (15)	4 (9)

BROWSE CHARACTERISTICS --
Management unit 10 , Study no: 7

		Age class distribution (plants per acre)					Utilization					
Year	Plants per Acre (excluding seedlings)	Seedling	Young	Mature	Decadent	Dead	% moderate	% heavy	% decadent	% dying	% poor vigor	Average Height Crown (in)
Artemisia tridentata vaseyana												
88	**6466**	800	4400	1866	200	-	18	1	3	-	1	21/19
95	**4180**	760	1540	2620	20	20	2	.95	0	-	0	26/31
97	**3360**	80	1120	2200	40	60	23	3	1	.59	4	28/34
00	**4240**	60	660	3160	420	160	24	17	10	3	17	27/31
05	**3400**	2000	280	2160	960	760	24	11	28	9	9	26/31
Cercocarpus montanus												
88	**0**	-	-	-	-	-	0	0	-	-	0	-/-
95	**20**	-	20	-	-	-	0	0	-	-	0	35/27
97	**20**	-	-	20	-	-	0	0	-	-	0	22/14
00	**60**	-	40	20	-	-	0	33	-	-	0	33/38
05	**60**	-	40	20	-	-	0	67	-	-	0	39/45

		Age class distribution (plants per acre)					Utilization					
Year	Plants per Acre (excluding seedlings)	Seedling	Young	Mature	Decadent	Dead	% moderate	% heavy	% decadent	% dying	% poor vigor	Average Height Crown (in)
Chrysothamnus depressus												
88	**5265**	66	533	4266	466	-	23	0	9	.37	1	6/8
95	**2200**	20	-	1240	960	-	2	0	44	-	0	6/12
97	**2240**	-	-	1120	1120	-	2	0	50	-	0	5/10
00	**3240**	20	240	1500	1500	-	21	10	46	7	15	3/5
05	**2200**	-	80	1060	1060	80	45	22	48	6	13	4/7
Chrysothamnus viscidiflorus viscidiflorus												
88	**399**	-	133	133	133	-	0	0	33	-	0	7/8
95	**0**	-	-	-	-	-	0	0	0	-	0	17/25
97	**340**	-	-	340	-	-	0	0	0	-	0	10/12
00	**320**	-	40	260	20	-	56	0	6	6	6	11/8
05	**200**	80	60	100	40	-	30	0	20	-	0	10/10
Gutierrezia sarothrae												
88	**266**	-	-	266	-	-	0	0	-	-	0	6/7
95	**200**	-	-	200	-	-	0	0	-	-	0	7/12
97	**220**	-	-	220	-	-	0	0	-	-	0	6/7
00	**20**	-	20	-	-	-	0	0	-	-	0	-/-
05	**120**	-	-	120	-	-	17	0	-	-	0	5/6
Juniperus osteosperma												
88	**0**	66	-	-	-	-	0	0	0	-	0	-/-
95	**0**	-	-	-	-	-	0	0	0	-	0	-/-
97	**120**	-	20	100	-	-	0	0	0	-	0	-/-
00	**120**	-	-	120	-	-	0	0	0	-	17	-/-
05	**200**	-	20	160	20	20	0	0	10	-	0	-/-
Opuntia sp.												
88	**0**	-	-	-	-	-	0	0	0	-	0	-/-
95	**40**	-	40	-	-	-	0	0	0	-	0	1/6
97	**40**	-	-	40	-	-	0	0	0	-	0	4/8
00	**140**	-	20	100	20	-	0	0	14	-	14	4/11
05	**160**	-	-	160	-	-	0	0	0	-	0	3/11
Pinus edulis												
88	**0**	-	-	-	-	-	0	0	-	-	0	-/-
95	**0**	-	-	-	-	-	0	0	-	-	0	-/-
97	**80**	-	-	80	-	-	0	0	-	-	0	-/-
00	**100**	-	20	80	-	-	20	0	-	-	0	-/-
05	**60**	-	-	60	-	-	0	0	-	-	0	-/-

		Age class distribution (plants per acre)					Utilization					
Year	Plants per Acre (excluding seedlings)	Seedling	Young	Mature	Decadent	Dead	% moderate	% heavy	% decadent	% dying	% poor vigor	Average Height Crown (in)
Purshia tridentata												
88	**400**	-	-	400	-	-	50	50	0	-	0	9/26
95	**100**	-	-	100	-	-	0	0	0	-	0	13/34
97	**280**	-	60	220	-	-	36	14	0	-	0	14/27
00	**240**	-	-	240	-	-	33	25	0	-	0	12/33
05	**280**	-	20	240	20	20	29	21	7	-	0	9/21
Symphoricarpos oreophilus												
88	**0**	-	-	-	-	-	0	0	0	-	0	-/-
95	**500**	-	40	460	-	-	8	0	0	-	0	20/34
97	**700**	40	160	540	-	-	20	6	0	-	0	15/27
00	**1040**	-	420	580	40	-	12	2	4	-	0	17/27
05	**1260**	-	400	660	200	20	3	3	16	3	5	12/20

Trend Study 10-8-05

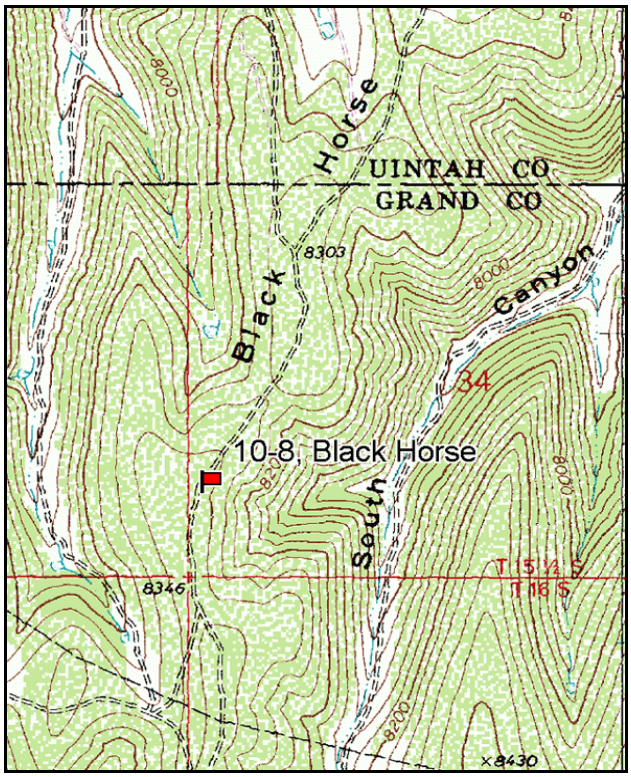
Study site name: Black Horse . Vegetation type: Mountain Brush .

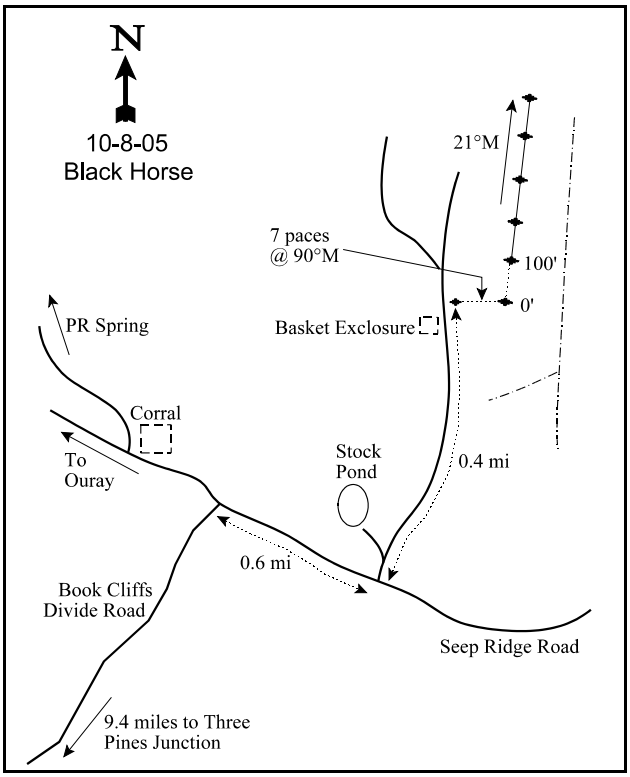
Compass bearing: frequency baseline 21 degrees magnetic.

Frequency belt placement: line 1 (11ft*), line 2 (34ft), line 3 (59ft), line 4 (71ft), line 5 (95ft). **Belt 1 centered at 40 feet.

LOCATION DESCRIPTION

At 0.6 miles southeast of the intersection of the Seep Ridge road and the Book Cliff Divide road, a road turns north off the divide road and heads up Black Horse Ridge. Go up this road 0.4 miles to a witness post on the right side of the road. The study site is on the east slope of the ridge. From the witness post, walk 7 paces bearing 90°M to the 0-foot baseline stake. The baseline stake has browse tag #9039 attached. The frequency baseline runs parallel to the road. Study markers are 18" green metal fenceposts.





Map Name: PR Spring

Diagrammatic Sketch

Township 15 1/2S , Range 24E , Section 34

GPS: NAD 27, UTM 12S 4368401 N, 649407 E

DISCUSSION

Black Horse - Trend Study No. 10-8

The Black Horse trend study is located near the Book Cliffs summit in the mountain brush type which is used by deer and elk as summer range. The study is just below the ridge, on an east-facing, 11% slope at an elevation of 8,300 feet. This is the highest elevation trend study on the unit. There are small stands of aspen and conifers in the drainages, but the dominant vegetation is scrub oak and associated mountain brush. Deer are commonly observed in the area. Cattle graze the ridge on a rotational deferred system in the Sweetwater allotment between May 1 and October 31. Pellet group transect data in 2000 estimated moderate use by deer (57 deer days use/acre, 141 ddu/ha), light use by elk (22 elk days use/acre, 54 edu/ha), and light use by cattle (4 cow days use/acre, 10 cdu/ha). Pellet group data from 2005 estimated high deer use at 86 deer days/acre (212 ddu/ha). Elk and cow use was light (5 edu/ac (13/ha), 11 cdu/ac (29/ha)). In 2005, a deer fawn carcass was found on the site.

The soils are in the Seeprid-Utso loam complex. These soils typically are moderately deep and well-drained. On the study site, there appears to be a compacted clay horizon under 4-6 inches of loose, stony surface loam. This clay layer is quite variable as it was sampled as deep as 15 inches below the surface. Run-off and pedestaling occurs in open grazed areas and on steeper areas, but overall the vegetation cover is adequate to control most excessive erosion. This soil is grouped into the Mountain Stony Loam (Browse) ecological site, indicating a potential plant community of 30% grass, 10% forbs and 60% shrubs (composition by air-dry weight). Effective rooting depth is estimated at just over 13 inches. Organic matter is moderately high at 4.4% with soil reaction being neutral (pH of 6.8). An erosion condition class assessment rated erosion as slight in 2005.

This mixed mountain brush community is composed of a variety of valuable shrubs. Large serviceberry and clones of Gambel oak are the primary overstory species. Mature serviceberry average over 4 feet in height with some individuals being over 5 feet in height. The majority of the plants showed only light to moderate hedging in all years sampled. Some plants show heavier use on the lower half of the plant. The prevalence of rust on the leaves led to a poor vigor classification for 22% of the plants in 1988. Vigor has since improved on most of the population. Density has remained fairly stable over all sampling years. Recruitment from the young age class was high in 1988 (94% of the population) and 1995 (65% of the population). Recruitment was moderately high at 26% in 2000 and even higher in 2005 at 42%. In 2000, oak density was estimated at 4,580 stems/acre. The difference in 1995 and 2000 density estimates may be that individual patches were counted in 1995, whereas individual stems were counted in 2000. Young recruitment has been high with each reading. Use is mostly light and vigor is good, with mature plants averaging nearly 5 feet in height.

Other preferred browse species include: mountain big sagebrush, bitterbrush, and true mountain mahogany. Mahogany and bitterbrush are more heavily utilized. In 1988, only one mahogany was sampled. It was classified as decadent and heavily utilized. The new, much larger sample design used in 1995 estimated an average of 1,140 plants/acre in 1995, 1,160 plants/acre in 2000, and 1,140 plants/acre in 2005. The larger sampling design gives much better estimates for species with discontinuous and/or clumped distributions. In 2000, use was mostly moderate (40%) with an additional 19% displaying heavy use. In 2005, 98% of the shrubs sampled showed heavy use. Vigor has been good for each reading, but decadence increased to 19% in 2005. Recruitment was high (45%) in 2000, but decreased to only 7% in 2005. Bitterbrush is less abundant. Half of the population showed moderate or heavy use in 2000, with good vigor and no decadence. In 2005, 83% showed signs of heavy use but no plants were classified as decadent.

Mountain big sagebrush density increased from 1,160 plants/acre in 1995 to 1,980 plants/acre in 2000. This remained fairly stable in 2005 at 2,040 plants/acre. Cover has remained at about 9%. Percent decadence was low until 2005, when it increased to 26% due to drought conditions. Utilization has been light. Snowberry

has been one of the most prominent shrubs on this site. Cover has been 10-15%. Snowberry density increased 23% in 2005 to 7,440 plants/acre. Young plants made up 15% of the population. Utilization has been light for all readings.

Since the area is primarily summer range, herbaceous forage is especially important. Herbaceous vegetation is fairly abundant with grasses providing 16-18% average cover. Forbs are also moderately abundant and contribute about 10% average cover. Most grasses were at least moderately utilized by cattle during the 1988 reading. The most numerous species are thickspike wheatgrass, a sedge, Kentucky bluegrass, Lettermen needlegrass, and mutton bluegrass. The sedge is the most abundant averaging about 8-9% cover. Sum of nested frequency for grasses increased slightly with each reading up to 2000, then declined about 8% in 2005.

Thirty-four species of forbs were encountered in 1995, 28 in 2000, and 27 in 2005. Perennial forb sum of nested frequency declined 24% in 2000 and increased 5% in 2005. Weedy milkvetch, ballhead sandwort, mat penstemon, and Eaton fleabane are the most abundant species. Several valuable forb species occur on the site including Pacific aster, arrowleaf balsamroot, penstemon, Indian paintbrush, and sulfur buckwheat.

1988 APPARENT TREND ASSESSMENT

Basal vegetation cover accounts for 12% of the basic ground cover. Litter cover (56%) was found only in association with the shrubs. Rock and pavement cover combined for about 10%. Percent bare ground was at almost 23%. Soil trend appears stable. Browse trend also appears stable. The most preferred browse species including true mountain mahogany and antelope bitterbrush occur in low numbers and are heavily utilized. Snowberry, mountain big sagebrush, and serviceberry showed light to moderate hedging and appear to have stable to expanding populations. The herbaceous trend appears stable.

1995 TREND ASSESSMENT

Percent bare ground has declined considerably since the last reading from almost 23% to 11%. Soil trend is considered slightly improving. The browse trend is slightly up with many of the preferred species displaying lighter utilization, improved vigor, and low decadency rates. Density numbers for many of the shrubs are different due to the larger sample size giving much better population estimates for the shrubs. Trend for grasses and forbs is stable. Sum of nested frequency of grasses increased slightly with significant increases for sedge and Kentucky bluegrass. Sum of nested frequency of forbs remained about the same. The Desirable Components Index (see methods) rated this site as excellent winter range due to excellent shrub cover and a excellent herbaceous understory.

TREND ASSESSMENT
soil - slightly up (+1)
browse - slightly up (+1)
herbaceous understory - stable (0)
winter range condition (DC Index) - excellent (97) Higher potential scale

2000 TREND ASSESSMENT

Trend for soil is stable. Ground cover characteristics remain relatively stable compared to 1995 estimates. The ratio of protective ground cover to bare soil is very good with minimal erosion. Trend for the key browse species, serviceberry and true mountain mahogany, is stable. Serviceberry and mahogany show stable densities, high recruitment, low decadency, and good vigor. Use on these preferred species is not as extreme as is sometimes the case. Mountain big sagebrush provides additional palatable forage, although this species is not considered the key species on summer range, and is less preferred compared to mahogany, serviceberry, and low densities of bitterbrush on the site. Trend for the herbaceous understory is stable. Sum of nested

frequency of perennial grasses slightly increased while forbs decreased. Combined, sum of nested frequency of perennial species slightly decreased, but not enough to warrant a downward trend. The Desirable Components Index (see methods) rated this site as excellent winter range due to excellent shrub cover and a excellent herbaceous understory.

TREND ASSESSMENT
soil - stable (0)
browse - stable (0)
herbaceous understory - stable (0)
winter range condition (DC Index) - excellent (95) Higher potential scale

2005 TREND ASSESSMENT

The soil trend is considered stable as there are not significant changes in percent bare soil and the ratio of protecting ground cover to bare soil are still very good. Relative litter cover decreased from 41% to 33%, while relative percent bare ground increased from 9 to 12%. An erosion condition class assessment rated erosion as slight, with signs of pedestaling, flow patterns, and soil movement. The browse trend is stable for the key species, but decadence did increase substantially for true mountain mahogany and mountain big sagebrush. Recruitment was also lower for these two species. Utah serviceberry density is stable, recruitment good, and decadence low. Use did increase to heavy for mahogany and bitterbrush, but remained moderate for serviceberry and light for sagebrush. The herbaceous understory trend is stable. There was a slight decrease of about 8% for the sum of nested frequency of grasses. Nested frequency for Kentucky bluegrass, which is an increaser species, significantly increased. Perennial forb nested frequency increased about 5%, while cover increased from 9 to nearly 12%. The DCI score decreased to good, due to higher decadence in key browse and lower recruitment.

TREND ASSESSMENT
soil - stable (0)
browse - stable (0)
herbaceous understory - stable (0)
winter range condition (DC Index) - good (81) Higher potential scale

HERBACEOUS TRENDS --
Management unit 10 , Study no: 8

Type	Species	Nested Frequency				Average Cover %		
		'88	'95	'00	'05	'95	'00	'05
G	Agropyron cristatum	-	-	6	-	-	.03	-
G	Agropyron dasystachyum	108	103	128	135	1.58	1.92	2.40
G	Bromus anomalus	$_{c}$71	$_{c}$67	$_{b}$27	$_{a}$-	.95	.23	-
G	Bromus tectorum (a)	-	3	-	-	.00	-	-
G	Carex sp.	$_{b}$215	$_{b}$234	$_{b}$235	$_{a}$146	9.30	9.65	7.62
G	Koeleria cristata	$_{a}$-	$_{ab}$3	$_{b}$15	$_{b}$16	.00	.27	.51
G	Phleum pratense	-	-	7	-	-	.30	-
G	Poa fendleriana	$_{a}$35	$_{a}$29	$_{a}$40	$_{b}$85	1.18	.46	2.63
G	Poa pratensis	$_{a}$39	$_{a}$54	$_{a}$63	$_{b}$123	1.74	2.42	3.65

Type	Species	Nested Frequency				Average Cover %		
		'88	'95	'00	'05	'95	'00	'05
G	Sitanion hystrix	$_{a}$3	$_{b}$13	$_{ab}$6	$_{a}$-	.28	.03	-
G	Stipa columbiana	-	-	-	9	-	-	.19
G	Stipa comata	-	-	-	5	-	-	.36
G	Stipa lettermani	$_{a}$4	$_{a}$23	$_{b}$62	$_{a}$22	.70	1.13	.48
Total for Annual Grasses		0	3	0	0	0.00	0	0
Total for Perennial Grasses		475	526	589	541	15.76	16.47	17.85
Total for Grasses		475	529	589	541	15.76	16.47	17.85
F	Achillea millefolium	$_{a}$15	$_{b}$44	$_{ab}$30	$_{ab}$26	.60	.19	.45
F	Agoseris glauca	$_{a}$-	$_{a}$3	$_{b}$26	$_{b}$32	.00	.19	.72
F	Androsace septentrionalis (a)	-	1	3	2	.00	.00	.00
F	Arabis sp.	-	-	6	-	-	.21	-
F	Arenaria congesta	$_{b}$141	$_{ab}$104	$_{a}$74	$_{ab}$108	1.27	.65	1.93
F	Artemisia ludoviciana	4	-	-	-	-	-	-
F	Aster chilensis	$_{b}$89	$_{a}$51	$_{a}$29	$_{a}$23	.45	.21	.36
F	Astragalus miser	78	95	112	96	3.54	4.46	3.11
F	Balsamorhiza sagittata	$_{b}$79	$_{a}$18	$_{a}$21	$_{a}$14	.73	.66	.86
F	Castilleja flava	$_{b}$27	$_{a}$6	$_{ab}$17	$_{a}$1	.01	.09	.03
F	Calochortus nuttallii	-	7	3	-	.05	.00	-
F	Chenopodium sp. (a)	-	3	-	-	.00	-	-
F	Cirsium sp.	$_{b}$28	$_{b}$23	$_{ab}$11	$_{a}$2	.41	.37	.18
F	Comandra pallida	$_{b}$120	$_{a}$37	$_{a}$18	$_{a}$39	.17	.09	.20
F	Collinsia parviflora (a)	-	4	-	-	.01	-	-
F	Crepis acuminata	$_{a}$3	$_{c}$48	$_{bc}$29	$_{ab}$9	.26	.26	.10
F	Cymopterus sp.	-	-	8	3	-	.09	.00
F	Delphinium nuttallianum	$_{a}$-	$_{ab}$8	$_{a}$-	$_{b}$16	.03	-	.07
F	Eriogonum alatum	-	-	1	1	-	.00	.03
F	Erigeron eatonii	$_{a}$-	$_{c}$101	$_{b}$47	$_{bc}$79	.67	.28	.91
F	Erigeron flagellaris	$_{c}$53	$_{a}$-	$_{b}$25	$_{a}$-	-	.32	-
F	Eriogonum umbellatum	$_{ab}$20	$_{b}$36	$_{a}$6	$_{a}$15	.24	.03	.47
F	Gayophytum ramosissimum(a)	-	8	-	-	.04	-	-
F	Gilia sp. (a)	-	2	-	-	.00	-	-
F	Hymenoxys acaulis	-	8	1	-	.04	.03	-
F	Ipomopsis aggregata	2	-	-	-	-	-	-
F	Lathyrus brachycalyx	$_{a}$-	$_{b}$14	$_{b}$21	$_{b}$17	.60	.34	.31
F	Linum lewisii	-	3	7	7	.01	.04	.21
F	Lithospermum sp.	-	-	-	1	-	-	.00

Type	Species	Nested Frequency				Average Cover %		
		'88	'95	'00	'05	'95	'00	'05
F	Lomatium sp.	-	7	4	2	.02	.06	.04
F	Lupinus argenteus	$_{ab}$3	$_{b}$11	$_{a}$-	$_{ab}$6	.12	-	.04
F	Oenothera sp.	2	-	-	-	-	-	-
F	Penstemon caespitosus	61	43	57	29	.21	.47	.57
F	Pedicularis centranthera	-	8	-	-	.10	-	-
F	Penstemon pachyphyllus	3	6	2	-	.04	.00	-
F	Phlox longifolia	$_{ab}$37	$_{ab}$41	$_{a}$20	$_{b}$61	.15	.04	.36
F	Polygonum douglasii (a)	-	$_{b}$28	$_{a}$-	$_{b}$38	.14	-	.11
F	Senecio integerrimus	$_{a}$-	$_{ab}$3	$_{a}$2	$_{b}$10	.03	.00	.18
F	Taraxacum officinale	$_{a}$1	$_{c}$36	$_{ab}$12	$_{bc}$21	.26	.09	.19
F	Tragopogon dubius	3	-	-	-	-	-	-
F	Unknown forb-annual (a)	-	3	-	-	.00	-	-
F	Unknown forb-perennial	5	8	-	2	.04	-	.15
F	Viguiera multiflora	$_{ab}$3	$_{b}$15	$_{ab}$4	$_{a}$-	.13	.01	-
Total for Annual Forbs		0	49	3	40	0.21	0.00	0.11
Total for Perennial Forbs		777	784	593	620	10.28	9.26	11.51
Total for Forbs		777	833	596	660	10.49	9.27	11.63

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

BROWSE TRENDS --
Management unit 10 , Study no: 8

Type	Species	Strip Frequency			Average Cover %		
		'95	'00	'05	'95	'00	'05
B	Amelanchier utahensis	43	55	58	3.55	4.26	3.67
B	Artemisia tridentata vaseyana	31	56	60	9.49	8.51	8.46
B	Cercocarpus montanus	27	30	30	4.30	4.50	3.99
B	Chrysothamnus depressus	5	4	3	.01	-	.18
B	Chrysothamnus nauseosus	0	1	0	-	-	-
B	Chrysothamnus viscidiflorus lanceolatus	68	71	67	3.51	2.12	4.13
B	Gutierrezia sarothrae	4	8	11	.19	.10	1.01
B	Mahonia repens	25	43	36	1.05	2.43	1.97
B	Opuntia sp.	2	2	2	-	-	-
B	Prunus virginiana	8	9	12	.51	.33	.62
B	Purshia tridentata	3	8	5	.68	1.03	.24
B	Quercus gambelii	10	44	33	2.83	6.07	3.07
B	Rosa woodsii	2	1	0	.18	.00	-
B	Symphoricarpos oreophilus	75	86	84	13.24	10.39	15.38
B	Tetradymia canescens	3	4	3	.00	.15	.03
Total for Browse		306	422	404	39.60	39.93	42.78

CANOPY COVER, LINE INTERCEPT --
Management unit 10 , Study no: 8

Species	Percent Cover	
	'00	'05
Amelanchier utahensis	2.40	7.48
Artemisia tridentata vaseyana	-	9.46
Cercocarpus montanus	-	6.83
Chrysothamnus depressus	-	.06
Chrysothamnus viscidiflorus lanceolatus	-	4.48
Gutierrezia sarothrae	-	.20
Juniperus osteosperma	-	.01
Mahonia repens	-	1.06
Opuntia sp.	-	.06
Prunus virginiana	-	.20
Purshia tridentata	-	.15
Quercus gambelii	2.40	4.55
Symphoricarpos oreophilus	-	17.43
Tetradymia canescens	-	.18

KEY BROWSE ANNUAL LEADER GROWTH --
Management unit 10 , Study no: 8

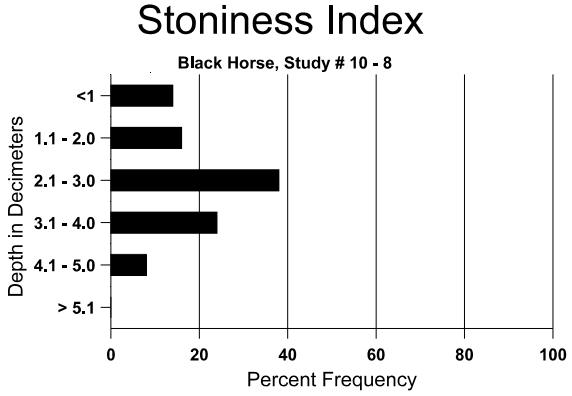
Species	Average leader growth (in)
	'05
Amelanchier utahensis	2.4
Artemisia tridentata vaseyana	2.0

BASIC COVER --
Management unit 10 , Study no: 8

Cover Type	Average Cover %			
	'88	'95	'00	'05
Vegetation	11.75	55.30	61.88	57.64
Rock	4.25	6.09	4.62	4.90
Pavement	6.00	.51	1.54	3.79
Litter	55.50	53.79	56.37	39.45
Cryptogams	0	.07	.00	.07
Bare Ground	22.50	10.82	12.18	14.80

SOIL ANALYSIS DATA --
Herd Unit 10, Study # 8, Study Name: Black Horse

Effective rooting depth (in)	Temp °F (depth)	pH	%sand	%silt	%clay	%0M	ppm P	ppm K	dS/m
13.2	48.6 (14.8)	6.8	26.0	33.4	40.6	4.4	10.8	252.8	0.8



PELLET GROUP DATA --
Management unit 10 , Study no: 8

Type	Quadrat Frequency		
	'95	'00	'05
Rabbit	5	13	14
Elk	-	4	1
Deer	19	16	35
Cattle	6	-	4

Days use per acre (ha)	
'00	'05
-	-
22 (54)	5 (13)
57 (141)	86 (212)
4 (10)	12 (29)

BROWSE CHARACTERISTICS --
Management unit 10 , Study no: 8

		Age class distribution (plants per acre)					Utilization					
Year	Plants per Acre (excluding seedlings)	Seedling	Young	Mature	Decadent	Dead	% moderate	% heavy	% decadent	% dying	% poor vigor	Average Height Crown (in)
Amelanchier utahensis												
88	**3599**	466	3400	66	133	-	9	9	4	-	22	54/55
95	**2400**	-	1560	780	60	60	28	3	3	.83	.83	44/34
00	**2660**	160	700	1720	240	100	13	14	9	.75	4	51/36
05	**2720**	40	1140	1260	320	80	18	30	12	1	1	47/30
Artemisia tridentata vaseyana												
88	**1332**	133	133	466	733	-	0	0	55	-	0	34/31
95	**1160**	120	260	880	20	60	19	0	2	-	3	29/40
00	**1980**	240	320	1440	220	100	22	8	11	1	1	29/36
05	**2040**	200	140	1360	540	80	16	4	26	9	12	21/28

		Age class distribution (plants per acre)					Utilization					
Year	Plants per Acre (excluding seedlings)	Seedling	Young	Mature	Decadent	Dead	% moderate	% heavy	% decadent	% dying	% poor vigor	Average Height Crown (in)
Cercocarpus montanus												
88	**66**	-	-	-	66	-	0	100	100	-	0	-/-
95	**1140**	-	420	720	-	20	54	11	0	-	0	44/49
00	**1160**	20	520	600	40	20	40	19	3	-	0	41/37
05	**1140**	20	80	840	220	80	2	98	19	4	4	54/46
Chrysothamnus depressus												
88	**0**	-	-	-	-	-	0	0	-	-	0	-/-
95	**120**	-	20	100	-	-	17	0	-	-	0	4/7
00	**160**	-	60	100	-	-	0	0	-	-	0	14/5
05	**100**	-	-	100	-	-	0	0	-	-	0	4/10
Chrysothamnus nauseosus												
88	**0**	-	-	-	-	-	0	0	-	-	0	-/-
95	**0**	-	-	-	-	-	0	0	-	-	0	-/-
00	**20**	-	-	20	-	-	100	0	-	-	0	-/-
05	**0**	-	-	-	-	-	0	0	-	-	0	-/-
Chrysothamnus viscidiflorus lanceolatus												
88	**4133**	-	1200	2933	-	-	0	0	0	-	0	14/9
95	**4660**	40	1320	3340	-	-	0	0	0	-	0	12/14
00	**5000**	40	320	4600	80	-	8	0	2	.40	.40	15/16
05	**3500**	-	-	3300	200	-	2	0	6	2	2	11/14
Gutierrezia sarothrae												
88	**0**	-	-	-	-	-	0	0	-	-	0	-/-
95	**300**	-	100	200	-	-	0	0	-	-	0	6/7
00	**1020**	-	280	740	-	-	0	0	-	-	0	6/6
05	**880**	-	60	820	-	-	0	0	-	-	0	5/10
Juniperus osteosperma												
88	**0**	-	-	-	-	-	0	0	-	-	0	-/-
95	**0**	-	-	-	-	-	0	0	-	-	0	-/-
00	**0**	20	-	-	-	-	0	0	-	-	0	-/-
05	**0**	-	-	-	-	-	0	0	-	-	0	-/-
Mahonia repens												
88	**2199**	-	1666	533	-	-	0	0	0	-	0	10/6
95	**3220**	-	1760	1460	-	-	2	0	0	-	0	3/5
00	**6280**	-	380	5900	-	-	0	0	0	-	8	3/6
05	**2300**	-	160	2120	20	-	0	0	1	.86	.86	4/5

		Age class distribution (plants per acre)					Utilization					
Year	Plants per Acre (excluding seedlings)	Seedling	Young	Mature	Decadent	Dead	% moderate	% heavy	% decadent	% dying	% poor vigor	Average Height Crown (in)
Opuntia sp.												
88	**0**	-	-	-	-	-	0	0	-	-	0	-/-
95	**60**	-	-	60	-	-	0	0	-	-	0	5/9
00	**40**	-	-	40	-	-	0	0	-	-	0	4/8
05	**60**	-	-	60	-	-	0	0	-	-	0	4/11
Prunus virginiana												
88	**800**	-	800	-	-	-	17	0	0	-	0	-/-
95	**720**	-	660	60	-	-	0	0	0	-	0	10/11
00	**760**	260	760	-	-	-	0	0	0	-	0	18/19
05	**420**	-	300	100	20	-	5	0	5	5	5	9/9
Purshia tridentata												
88	**199**	-	66	133	-	-	0	67	-	-	0	7/15
95	**80**	-	-	80	-	-	0	0	-	-	0	8/23
00	**240**	-	20	220	-	-	25	25	-	-	0	10/29
05	**120**	-	-	120	-	-	0	83	-	-	0	8/19
Quercus gambelii												
88	**5066**	266	4400	600	66	-	17	0	1	-	1	70/56
95	**480**	-	200	280	-	-	38	4	0	-	0	57/64
00	**4580**	-	3320	1100	160	280	6	0	3	.87	1	59/41
05	**3020**	180	1900	820	300	120	17	1	10	9	11	55/34
Rosa woodsii												
88	**1332**	-	1066	266	-	-	0	0	-	-	10	16/10
95	**40**	-	20	20	-	-	0	0	-	-	0	7/5
00	**20**	-	20	-	-	-	0	0	-	-	0	-/-
05	**0**	-	-	-	-	-	0	0	-	-	0	8/6
Symphoricarpos oreophilus												
88	**6265**	333	4266	1866	133	-	0	0	2	-	49	15/12
95	**5480**	160	1480	4000	-	20	11	.72	0	-	0	17/27
00	**5720**	200	280	5420	20	-	15	0	0	-	0	14/23
05	**7440**	-	1140	6260	40	60	.80	0	1	-	0	14/19
Tetradymia canescens												
88	**66**	-	66	-	-	-	0	0	0	-	0	-/-
95	**80**	-	-	80	-	-	25	0	0	-	0	14/12
00	**120**	-	20	100	-	-	0	0	0	-	0	15/9
05	**80**	-	-	60	20	-	50	25	25	-	0	19/13

Trend Study 10-9-05

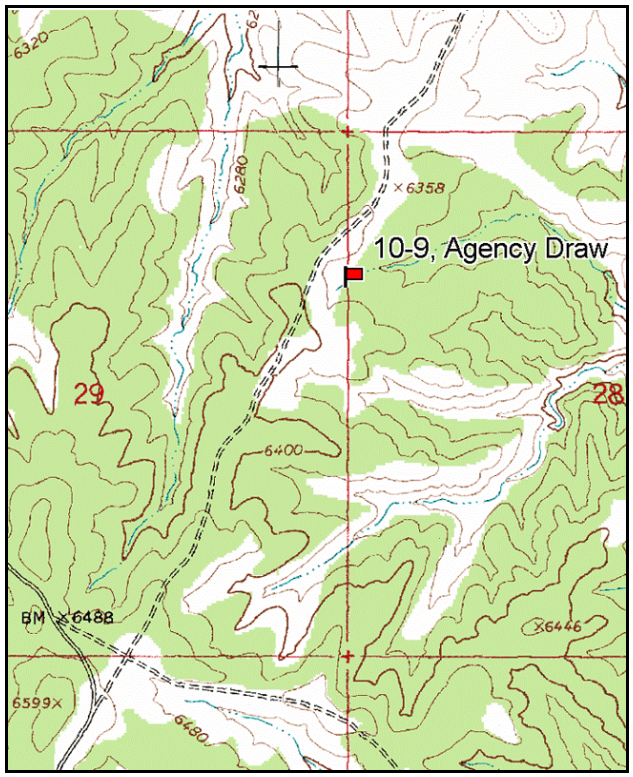
Study site name: Agency Draw . Vegetation type: Desert Shrub .

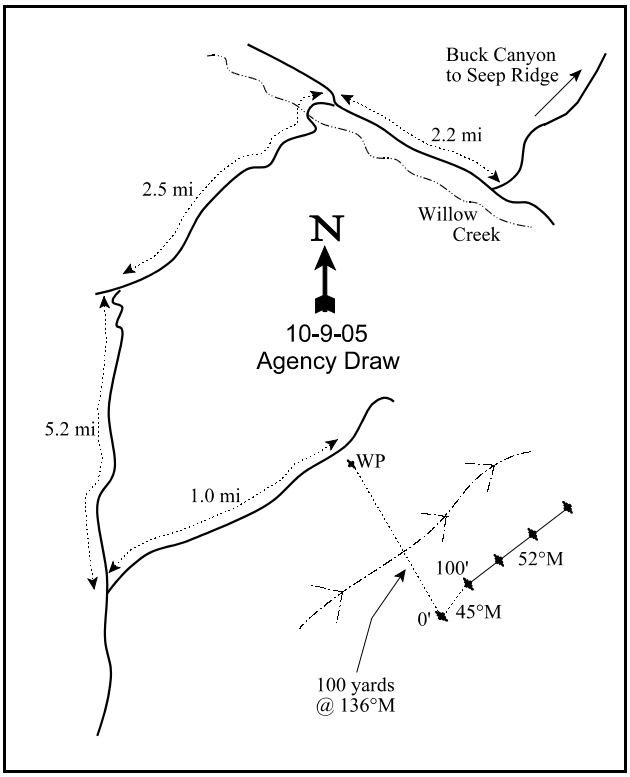
Compass bearing: frequency baseline 45 degrees magnetic.

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

LOCATION DESCRIPTION

From the Seep Ridge Road, go down Buck Canyon to Willow Creek. Travel north on Willow Creek 2.2 miles to a fork. Bear left, cross Willow Creek then drive up out of the canyon 2.5 miles to a fork. Bear left. Continue 5.2 miles to an intersection. Turn left off the main road. Go down 0.1 miles to a small flat. Continue going straight (NE) down the ridge 0.9 miles to a witness post on the right side of the road. Walk 100 yards down into the draw, at a bearing of 136°. The 0-foot baseline stake is marked with a red browse tag, #9040. The frequency baseline is marked by green fenceposts, 12-18 inches in height.





Map Name: Agency Draw NE

Diagrammatic Sketch

Township 13S , Range 21E , Section 28

GPS: NAD 27, UTM 12S 4390832 N, 621735 E

DISCUSSION

Agency Draw - Trend Study No. 10-9

The Agency Draw study is actually located in the Willow Creek drainage and is representative of the big sagebrush and desert shrub communities found throughout the area. At 6,300 feet in elevation, Agency Draw is the lowest trend study on the northern end of the Book Cliffs management unit and is managed by the BLM. The study site is located in the relatively flat bottom at the head of a draw. Drainage, via a three-foot deep gullied wash, is to the northeast on a 7% slope. Tall black greasewood and basin big sagebrush grow along the wash. The surrounding low ridges are occupied by pinyon- juniper, and black sagebrush. The area has been grazed in the winter by cattle from January 1 to March 31. This is important winter range for deer judging by the abundance of pellet groups. There has been abundant sign of winter use by sage grouse in the past, with a few birds being observed on an adjacent ridge at the time of study establishment in 1988. A small herd of elk has also been observed in the area. Wild horses also frequent the area and were seen in 2000 and 2005. Pellet group transect data from 2000 estimated 49 deer days use/acre (121 ddu/ha), 11 elk days use/acre (27 edu/ha), and 22 horse days use/acre (54 hdu/ha). No cattle pats were sampled in 2000. The pellet transect in 2005 estimated 23 deer days use/acre (58 ddu/ha), 13 elk days use/acre (31 edu/ha), 12 cow days use/acre (29 cdu/ha), and 23 horse days use/acre (57 hdu/ha).

The site occurs between the deep saline soil along the wash and the shallow, very rocky soil on the ridges. The soil on the study site is a shallow, stony clay loam. The shallow, rocky soils allow rapid runoff. Soil loss from the slopes and wash were evident with moderate pedestaling being noted around base of shrubs in 2000. Over most of the study site the vegetation cover helps keep erosion at low levels. The soil is light brown in color and quite variable in depth. Effective rooting depth was estimated at 16 inches, with a hard pan at about 9 inches in depth. A profile stoniness index estimated from penetrometer readings shows the majority of rock to be in the upper portion of the profile, but a few readings were near 36 inches in depth. The soil is slightly alkaline (pH of 7.7) and low in phosphorus (4.1 ppm) (Tiedemann and Lopez 2004).

The key browse species are Wyoming big sagebrush, black sagebrush, and shadscale. Fourwing saltbush and winterfat are both present, but each provide less than one percent average cover. All key species combined provided over 60% of the total browse cover in both 1995 and 2000. All provide winter forage, although winterfat may be unavailable due to snow depth in some years. With drought conditions, Wyoming big sagebrush density has been declining. Density was 3,866 plants/acre in 1988. The 1995 estimate was 2,620 plants/acre. The difference in these two estimates may be due to the increased sample size that gives much better estimates for species with discontinuous and/or clumped distributions. Density remained stable in 2000 at 2,760 plants/acre. The 2005 reading showed a 42% decline to 1,600 plants/acre. Decadence increased from 10% in 1995 to 25% in 2000, and to a very high 53% in 2005. Thirty-eight percent of the population was also classified as dying in 2005. Young recruitment has also declined with each reading. Only 13% of the population was classified as young in 2005. Utilization has been moderate, until the 2005 reading when it was classified as moderate to heavy.

Black sagebrush has been similarly effected by drought. Density declined 13% in both 2000 and 2005, to 980 plants/acre in 2005. Decadence increased from 9% in 1995, to 32% in 2000, and to 45% in 2005. Young recruitment has also declined. No young plants were found in 2005, but 100 seedlings/acre were sampled. Utilization has been mostly moderate on black sagebrush. Black sagebrush cover has averaged from 1-2%.

Shadscale density declined at each reading from 2,200 plants/acre in 1988 to 1,180 plants/acre in 2005. Cover has been ranged from 2-4% since 1995. Utilization has been light each time this site was sampled. Winterfat density appears stable with only a slight increase from 1,780 plants/acre in 1995 to 1,860 plants/acre in 2005. Vigor and recruitment have been good. Utilization was heavy in 2005. The density of mature black greasewood plants was stable from 1995 to 2005. There was a very high number of young plants in 2000.

Prostrate kochia was sampled for the first time in 2005. Density was 700 plants/acre. Sixty-three percent of the plants showed signs of heavy use. Kochia is a very palatable species and is very tolerant of grazing. It is unknown how or when kochia was seeded in this area.

Cheatgrass cover was nearly 12% in 1995. In 2000, cheatgrass declined significantly to less than 1% cover. Cheatgrass nested frequency was unchanged in 2005, but cover was almost 2%. Perennial grasses have not been highly abundant on this site. Thickspike wheatgrass and Sandberg bluegrass have been the most abundant perennial grasses. Sandberg bluegrass significantly increased in 2005. Thickspike wheatgrass and bluebunch wheatgrass may have been lumped together prior to 2005. Other species include: Indian ricegrass, squirreltail, and needle-and-thread. Sum of nested frequency slightly declined in 2000 for perennial grasses, but increased in 2005. Forbs are fairly diverse, but none are abundant.

1988 APPARENT TREND ASSESSMENT

Cheatgrass was counted as litter in 1988 leading to the high value of 60%. Basal vegetation cover was low at 2.5%. Pavement cover was 2.5% and variable over the site. Percent bare ground was 33%. Erosion does not currently appear to be a problem on the site. The key browse species, black sagebrush and Wyoming big sagebrush, appear to have stable populations. Use is mostly moderate, but percent decadence is low and vigor is generally good. Composition of the understory is poor and dominated by annuals. Only 5 species of perennial grasses and 4 species of perennial forbs were encountered.

1995 TREND ASSESSMENT

Litter cover values are lower because cheatgrass was classified as litter during the 1988 reading. Percent cover for pavement has increased while percent bare ground declined slightly. Some surface erosion is evident where bare ground occurs, but it is not a major problem due to the gentle terrain and the abundance of cheatgrass cover. Trend for soil is slightly improved. Trend for black sagebrush and Wyoming big sagebrush is slightly improved. Utilization of black sagebrush is lower and density has increased. Wyoming big sagebrush density has declined slightly but so has percent decadence, and utilization is not as heavy. Reproductive potential and the proportion of the population that are young plants has increased. The herbaceous understory is in poor condition and composition is far from ideal. Cheatgrass dominates the understory by providing 61% of the herbaceous cover. Annual forbs account for 63% of the forb cover with halogeton being the most common. Sum of nested frequency of perennial grasses increased due to a significant increase in frequency of thickspike. Nested frequency of perennial forbs also increased. Trend is slightly up as some of the change may be due to change in sampling methods. The Desirable Components Index (see methods) rated this site as good winter range due to good shrub cover and a fair herbaceous understory.

TREND ASSESSMENT
soil - slightly up (+1)
browse - slightly up (+1)
herbaceous understory - slightly up (+1)
winter range condition (DC Index) - good (47) Lower potential scale

2000 TREND ASSESSMENT

Trend for soil is stable. Ground cover characteristics appear stable with slight increases in both percent litter and bare ground, and a decrease in percent cover of vegetation. Most of the decrease in vegetation cover is a result the drastic decrease in cheatgrass due to drought. Erosion is not severe due to the gentle slope, although some pedestaling was observed. The ratio of protective ground cover to bare soil is still high enough to warrant a stable trend for soil at this time. Trend for browse is slightly down. The key species, Wyoming big

sagebrush, black sagebrush, and shadscale all show increases in percent decadence and the proportion of plants displaying poor vigor. Heavy use slightly increased on Wyoming big sagebrush in 2000. Young recruitment is moderate for shadscale (8%), moderately high for black sagebrush (16%), and very high for Wyoming big sagebrush (35%). Increases in poor vigor and decadence are likely a result of drought and should improve with normal precipitation patterns. Trend for the herbaceous understory is stable. Sum of nested frequency of perennial species decreased slightly in 2000, but cheatgrass also declined significantly. The Desirable Components Index (see methods) rated this site as good winter range due to good shrub cover and a fair herbaceous understory.

TREND ASSESSMENT
soil - stable (0)
browse - slightly down (-1)
herbaceous understory - stable (0)
winter range condition (DC Index) - good (47) Lower potential scale

2005 TREND ASSESSMENT

The soil trend is slightly down as percent bare ground increased from 32% in 2000 to 41% in 2005 and litter cover decreased from 39% to 26%. The ratio of bare ground to protective ground cover (vegetation, litter, and cryptogams) decreased. The browse trend is down. Density declined for black sagebrush, Wyoming big sagebrush, and shadscale. Percent decadence increased and is very high for both sagebrush species. Use has also increased for these two species. Winterfat density has remained fairly stable with good vigor. The trend for the herbaceous understory is up. Nested frequency for perennial grasses increased by 23%, while cover of perennial grasses increased from 6% to 9%. Although not significant, cheatgrass nested frequency was slightly lower in 2005, despite the fact that 2005 was a wet year. Forbs are sparse and only contribute a minimal amount to the total herbaceous cover. The Desirable Components Index (see methods) rated this site as fair to good winter range due to good shrub cover and a fair herbaceous understory.

TREND ASSESSMENT
soil - slightly down (-1)
browse - down (-2)
herbaceous understory - up (+2)
winter range condition (DC Index) - fair to good (42) Lower potential scale

HERBACEOUS TRENDS --
Management unit 10 , Study no: 9

Type	Species	Nested Frequency				Average Cover %		
		'88	'95	'00	'05	'95	'00	'05
G	Agropyron dasystachyum	$_{a}$7	$_{bc}$110	$_{c}$132	$_{b}$96	1.83	3.28	4.09
G	Agropyron spicatum	$_{a}$-	$_{a}$-	$_{a}$-	$_{b}$20	-	-	.34
G	Bromus tectorum (a)	-	$_{b}$209	$_{a}$97	$_{a}$81	11.78	.77	1.77
G	Carex sp.	-	3	-	-	.01	-	-
G	Oryzopsis hymenoides	$_{b}$114	$_{a}$54	$_{a}$46	$_{a}$48	.84	.39	.36
G	Poa secunda	$_{a}$31	$_{c}$125	$_{b}$88	$_{c}$157	1.75	.81	2.70
G	Sitanion hystrix	$_{b}$85	$_{a}$56	$_{a}$46	$_{ab}$55	1.13	.63	.71
G	Stipa comata	22	23	22	33	.34	.66	.62

Type	Species	Nested Frequency				Average Cover %		
		'88	'95	'00	'05	'95	'00	'05
Total for Annual Grasses		0	209	97	81	11.78	0.77	1.77
Total for Perennial Grasses		259	371	334	409	5.93	5.79	8.84
Total for Grasses		259	580	431	490	17.71	6.57	10.61
F	Allium sp.	-	-	-	2	-	-	.01
F	Antennaria rosea	-	-	-	-	-	-	.00
F	Arenaria fendleri	-	-	3	5	.00	.00	.01
F	Astragalus sp.	$_{a}$-	$_{b}$13	$_{a}$1	$_{a}$-	.06	.00	-
F	Astragalus utahensis	-	-	1	2	-	.00	.03
F	Chorispora tenella (a)	-	-	-	4	-	-	.03
F	Cordylanthus kingii (a)	-	5	-	-	.01	-	.00
F	Cryptantha sp.	2	5	-	-	.03	-	-
F	Cymopterus sp.	-	-	-	1	-	-	.00
F	Descurainia pinnata (a)	-	$_{b}$48	$_{a}$18	$_{a}$14	.14	.15	.06
F	Erigeron pumilus	-	4	4	-	.01	.01	-
F	Haplopappus acaulis	$_{a}$-	$_{ab}$2	$_{b}$9	$_{ab}$2	.00	.05	.00
F	Halogeton glomeratus (a)	-	$_{b}$13	$_{a}$-	$_{ab}$8	.71	-	.16
F	Lappula occidentalis (a)	-	$_{a}$25	$_{a}$5	$_{b}$82	.12	.06	2.30
F	Lepidium sp. (a)	$_{c}$31	$_{bc}$26	$_{a}$-	$_{ab}$7	.11	-	.05
F	Machaeranthera canescens	6	2	-	-	.01	-	-
F	Machaeranthera grindelioides	-	7	4	4	.04	.02	.01
F	Penstemon sp.	-	-	4	-	-	.01	-
F	Petradoria pumila	-	1	-	-	.00	-	-
F	Phlox austromontana	-	8	6	3	.04	.16	.00
F	Phlox longifolia	$_{a}$-	$_{b}$41	$_{b}$37	$_{a}$8	.11	.10	.04
F	Polygonum douglasii (a)	-	4	-	-	.00	-	-
F	Salsola iberica (a)	-	-	-	1	-	-	.00
F	Schoencrambe linifolia	-	-	-	3	-	-	.01
F	Sphaeralcea coccinea	6	4	11	12	.03	.09	.08
F	Streptanthus cordatus	-	1	-	-	.00	-	-
F	Townsendia incana	$_{a}$-	$_{bc}$12	$_{c}$14	$_{ab}$5	.05	.04	.01
Total for Annual Forbs		31	121	23	116	1.11	0.21	2.62
Total for Perennial Forbs		14	100	94	47	0.41	0.50	0.24
Total for Forbs		45	221	117	163	1.52	0.71	2.87

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

BROWSE TRENDS --
Management unit 10 , Study no: 9

Type	Species	Strip Frequency			Average Cover %		
		'95	'00	'05	'95	'00	'05
B	Artemisia frigida	33	22	12	.15	.17	.01
B	Artemisia nova	24	20	19	2.13	1.35	1.00
B	Artemisia tridentata wyomingensis	44	50	42	5.95	5.68	5.13
B	Atriplex canescens	0	0	0	.00	-	-
B	Atriplex confertifolia	54	49	36	3.14	3.50	2.54
B	Ceratoides lanata	40	36	36	.69	.22	.90
B	Gutierrezia sarothrae	11	12	5	.02	.01	.03
B	Juniperus osteosperma	0	1	2	-	-	.15
B	Kochia prostrata	0	0	8	-	-	.56
B	Opuntia sp.	2	2	2	-	.03	-
B	Pediocactus simpsonii	0	0	1	-	-	-
B	Pinus edulis	0	1	2	-	.03	.03
B	Sarcobatus vermiculatus	19	20	20	6.06	6.24	4.31
Total for Browse		227	213	185	18.17	17.24	14.68

CANOPY COVER, LINE INTERCEPT --
Management unit 10 , Study no: 9

Species	Percent Cover	
	'00	'05
Artemisia frigida	-	.10
Artemisia nova	-	1.04
Artemisia tridentata wyomingensis	-	4.31
Atriplex confertifolia	-	1.45
Ceratoides lanata	-	.75
Juniperus osteosperma	.20	-
Kochia prostrata	-	.13
Opuntia sp.	-	.03
Sarcobatus vermiculatus	-	4.33

KEY BROWSE ANNUAL LEADER GROWTH --
Management unit 10 , Study no: 9

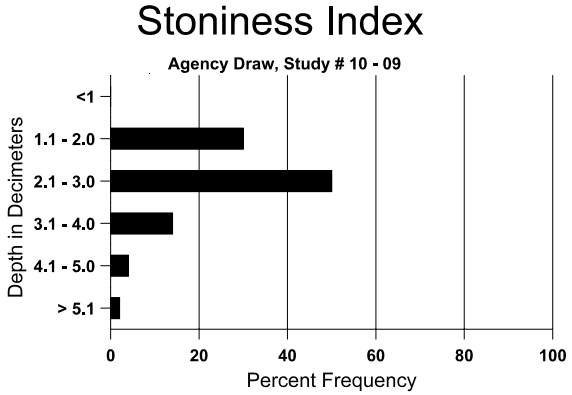
Species	Average leader growth (in) '05
Artemisia nova	1.1
Artemisia tridentata wyomingensis	2.2
Ceratoides lanata	2.4

BASIC COVER --
Management unit 10 , Study no: 9

Cover Type	Average Cover % '88	'95	'00	'05
Vegetation	2.50	36.44	26.27	25.42
Rock	.50	3.76	1.76	2.25
Pavement	2.50	8.98	11.08	14.17
Litter	60.00	33.42	39.20	25.56
Cryptogams	1.50	2.37	5.07	2.11
Bare Ground	33.00	25.00	32.34	40.70

SOIL ANALYSIS DATA --
Herd Unit 10, Study # 9, Study Name: Agency Draw

Effective rooting depth (in)	Temp °F (depth)	pH	%sand	%silt	%clay	%0M	ppm P	ppm K	dS/m
16.2	58.8 (17.5)	7.7	29.0	40.4	30.6	1.4	4.1	329.6	0.9



PELLET GROUP DATA --
Management unit 10 , Study no: 9

Type	Quadrat Frequency		
	'95	'00	'05
Rabbit	4	10	28
Horse	5	8	10
Elk	1	3	3
Deer	19	29	45
Cattle	1	-	1

Days use per acre (ha)	
'00	'05
-	-
-	23 (57)
11 (29)	13 (31)
49 (121)	23 (58)
-	12 (29)

BROWSE CHARACTERISTICS --
Management unit 10 , Study no: 9

		Age class distribution (plants per acre)					Utilization					
Year	Plants per Acre (excluding seedlings)	Seedling	Young	Mature	Decadent	Dead	% moderate	% heavy	% decadent	% dying	% poor vigor	Average Height Crown (in)
Artemisia frigida												
88	**5200**	866	1400	3800	-	-	0	0	0	-	0	8/3
95	**1060**	180	120	940	-	-	0	0	0	-	0	11/7
00	**660**	60	160	480	20	-	9	3	3	-	0	5/7
05	**360**	-	40	320	-	-	6	0	0	-	0	7/6
Artemisia nova												
88	**666**	66	400	266	-	-	10	40	0	-	0	11/21
95	**1280**	200	180	980	120	100	64	6	9	6	6	15/18
00	**1120**	20	180	580	360	120	38	2	32	11	11	13/20
05	**980**	100	-	540	440	440	27	27	45	8	10	8/13
Artemisia tridentata wyomingensis												
88	**3866**	66	1400	1733	733	-	31	16	19	-	5	21/25
95	**2620**	980	1140	1220	260	160	34	2	10	.76	2	21/29
00	**2760**	180	960	1100	700	340	41	17	25	9	12	23/30
05	**1600**	140	200	560	840	600	34	53	53	38	38	20/26
Atriplex canescens												
88	**0**	-	-	-	-	-	0	0	-	-	0	-/-
95	**0**	40	-	-	-	-	0	0	-	-	0	-/-
00	**0**	-	-	-	-	-	0	0	-	-	0	-/-
05	**0**	-	-	-	-	-	0	0	-	-	0	-/-
Atriplex confertifolia												
88	**2200**	-	200	1600	400	-	6	0	18	-	0	16/18
95	**1840**	-	180	1200	460	60	11	0	25	5	11	14/21
00	**1600**	-	120	960	520	40	9	10	33	13	13	15/20
05	**1180**	200	220	700	260	140	8	2	22	10	10	16/22

		Age class distribution (plants per acre)					Utilization					
Year	Plants per Acre (excluding seedlings)	Seedling	Young	Mature	Decadent	Dead	% moderate	% heavy	% decadent	% dying	% poor vigor	Average Height Crown (in)
Ceratoides lanata												
88	**1266**	66	933	200	133	-	5	0	11	-	5	6/6
95	**1780**	100	340	1420	20	-	4	0	1	-	0	10/9
00	**1740**	-	520	1120	100	-	13	17	6	3	3	11/9
05	**1860**	80	240	1580	40	-	8	77	2	2	2	9/10
Gutierrezia sarothrae												
88	**800**	66	-	800	-	-	0	0	0	-	0	7/5
95	**340**	240	180	160	-	-	0	0	0	-	0	9/11
00	**560**	-	80	320	160	20	0	0	29	25	25	5/8
05	**180**	20	40	140	-	-	0	0	0	-	0	8/9
Juniperus osteosperma												
88	**0**	-	-	-	-	-	0	0	0	-	0	-/-
95	**0**	-	-	-	-	-	0	0	0	-	0	-/-
00	**20**	20	20	-	-	-	0	0	0	-	0	-/-
05	**40**	-	20	-	20	-	0	0	50	-	0	-/-
Kochia prostrata												
88	**0**	-	-	-	-	-	0	0	-	-	0	-/-
95	**0**	-	-	-	-	-	0	0	-	-	0	-/-
00	**0**	-	-	-	-	-	0	0	-	-	0	-/-
05	**700**	-	-	700	-	-	0	63	-	-	0	11/13
Opuntia sp.												
88	**66**	-	-	66	-	-	0	0	0	-	0	2/3
95	**40**	-	-	20	20	-	0	0	50	-	0	5/14
00	**40**	20	-	20	20	-	0	0	50	50	50	2/9
05	**40**	-	-	40	-	-	0	0	0	-	0	5/16
Pediocactus simpsonii												
88	**0**	-	-	-	-	-	0	0	-	-	0	-/-
95	**0**	-	-	-	-	-	0	0	-	-	0	-/-
00	**0**	-	-	-	-	-	0	0	-	-	0	-/-
05	**20**	-	-	20	-	-	0	0	-	-	0	3/5
Pinus edulis												
88	**0**	-	-	-	-	-	0	0	-	-	0	-/-
95	**0**	-	-	-	-	-	0	0	-	-	0	-/-
00	**20**	-	20	-	-	-	0	0	-	-	0	-/-
05	**40**	-	40	-	-	-	0	50	-	-	0	-/-

		Age class distribution (plants per acre)					Utilization					
Year	Plants per Acre (excluding seedlings)	Seedling	Young	Mature	Decadent	Dead	% moderate	% heavy	% decadent	% dying	% poor vigor	Average Height Crown (in)
Sarcobatus vermiculatus												
88	**66**	-	-	66	-	-	0	0	0	-	0	54/63
95	**680**	-	120	520	40	20	0	0	6	-	0	34/49
00	**1680**	-	1080	560	40	-	0	0	2	1	1	37/54
05	**660**	40	20	560	80	-	15	3	12	3	3	29/44
Sclerocactus sp.												
88	**0**	-	-	-	-	-	0	0	-	-	0	-/-
95	**0**	-	-	-	-	-	0	0	-	-	0	-/-
00	**0**	-	-	-	-	-	0	0	-	-	0	3/3
05	**0**	-	-	-	-	-	0	0	-	-	0	-/-
Tetradymia spinosa												
88	**0**	-	-	-	-	-	0	0	-	-	0	-/-
95	**0**	-	-	-	-	-	0	0	-	-	0	-/-
00	**0**	-	-	-	-	-	0	0	-	-	0	-/-
05	**0**	-	-	-	-	-	0	0	-	-	0	23/31

Trend Study 10-10-05

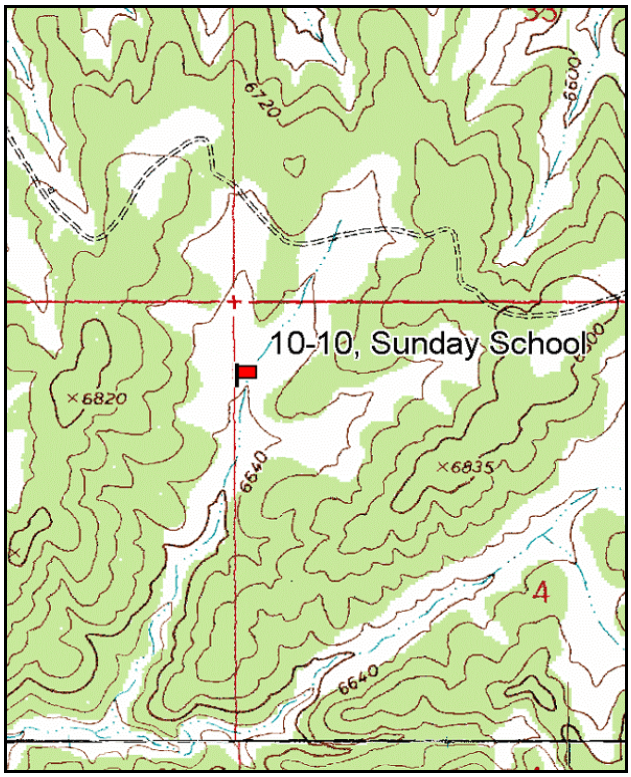
Study site name: Sunday School . Vegetation type: Fourwing Saltbush .

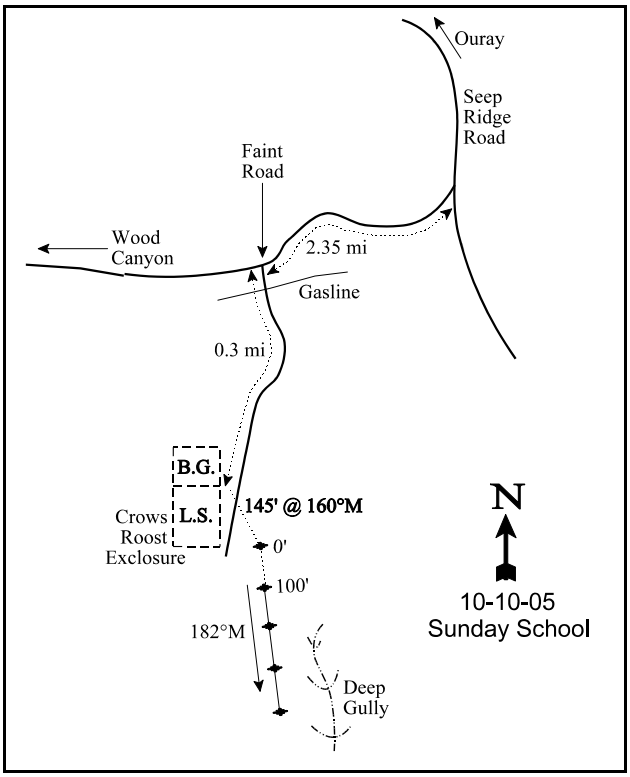
Compass bearing: frequency base line 182 degrees magnetic.

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

LOCATION DESCRIPTION

From the Seep Ridge Road, turn onto the Wood Canyon/Willow Creek road and proceed west 2.35 miles. Turn left onto a jeep trail and go 0.3 miles to the Crows Roost Exclosure. The study site is on the east side of the exclosure. The 0-foot baseline stake is 29 paces from the SE corner of the big game exclosure, at a bearing of 160°. The frequency baseline runs south from there, parallel to the livestock exclosure fence. The study is marked by 2-foot tall green metal fenceposts.





Map Name: Bates Knolls

Diagrammatic Sketch

Township 14S , Range 22E , Section 5

GPS: NAD 27, UTM 12S 4388018 N, 631434 E

DISCUSSION

Sunday School - Trend Study No. 10-10

The Sunday School trend study is located in a draw adjacent to the Crows Roost Exclosure on BLM land. The study site is at an elevation of 6,650 feet with a southeast aspect. The wide draw drains to the south, although the bottom of the draw is relatively flat. The dominant vegetation type is fourwing saltbush and big sagebrush. The Sunday School Canyon allotment is used by cattle each winter with a rotational deferred system of grazing from November 1 through April 30. Few deer and elk pellet groups were encountered in 1988 and no pellet groups were found in 1995. Pellet group transect data from 2000 indicated light use by wildlife with an estimated 3 deer days use/acre (8 ddu/ha) and 20 elk days use/acre (49 edu/ha). Livestock use was estimated at 19 cow days use/acre (47 cdu/ha). In 2005, use was light at 10 deer days use/acre (25 ddu/ha), 15 elk days use/acre (38 edu/ha), and 14 cow days use/acre (34 cdu/ha). Rabbit sign was very high in 2005 with an 86% quadrat frequency.

The clay loam soil on the site is moderately deep and well-drained. Soil reaction is slightly alkaline (pH of 7.7). Effective rooting depth is estimated at almost 18 inches. A stoniness profile estimated from penetrometer readings shows the majority of rock to occur 12 inches or deeper in the profile. There is an active gully in the middle of the draw. It was reported to be 10 feet deep in 1988 with steep banks. In 1995, it was only about 4 feet deep with vegetation growing in the bottom. In 2000 and 2005 the gully appeared to be actively head cutting the erodible soil and had steep bank 15-20 feet deep. An erosion condition class rated this area as critical in 2005 due to the gully, pedestaling, and soil movement. Ground cover characteristics have been trending downward as bare ground increased in 2000 and in 2005. Vegetation and litter cover decreased in this period.

Fourwing saltbush, Wyoming big sagebrush, basin big sagebrush, winterfat, and fringed sagebrush are all abundant browse species on this site. The majority of the big sagebrush on the site is Wyoming big sagebrush. Basin big sagebrush is found near the bottom of the draw where soil is deeper. The larger sample size implemented in 1995 began sampling basin big sagebrush. In 1988, only 200 young sagebrush plants were sampled. In 1995, Wyoming big sagebrush density was 1,940 plants/acre. This declined to 1,120 plants/acre in 2000, and to 980 plants/acre in 2005. Young plants were very abundant in 1995 as they made up 39% of the population. Only 4% of the population were young in 2000 and this increased to 10% in 2005. Decadence increased from about 3% in both 1995 and 2000 to 45% in 2005. Thirty-one percent of the population was classified as dying in 2005. Use increased from light in earlier years to moderate in 2005. Basin big sagebrush has remained stable since 1995 at about 740 plants/acre, but decadence increased to 41% in 2005. No young plants were sampled in 2005.

Fourwing saltbush density was 1,860 plants/acre in 1995. This increased to 2,200 plants/acre in 2000. In 2005, 1,740 plant/acre were sampled. Cover was about 3% in 1995, this increased to 5% in 2000, and was 2% in 2005. The stand appeared to be moving to an increasingly decadent condition in 1995 when 80% of the population was classified as decadent with 47% of the population classified as dying. However in 2000, the condition of fourwing improved as decadence decreased to 27% and no plants were classified as dying. The high amount of decadence in 1995 could be explained by the fact that fourwing saltbush is susceptible to winter injury and there was an extremely harsh winter during 1992-93. Decadence was 32% in 2005, while 18% of the population was classified as dying. Utilization was light to moderate in 2000 and increased to moderate to heavy in 2005. Young plants have not been very abundant during any sampling year. Photos from 1988 show fourwing to be abundant and very vigorous, while in 2005 plants show poor vigor and very little usable forage.

Winterfat and fringed sagebrush are very abundant on this site. Winterfat density has declined from 9,399 plants/acre in 1988 to 4,720 plants/acre in 2005. Young plants were very abundant in 2005 with 20% of the population classified as young. Winterfat cover has remained stable at about 3% from 1995-2005. Fringed sagebrush density has been variable, but cover has been 2-4% from 1995-2005.

The herbaceous understory was dominated by annual species in 1995 as cheatgrass and tansy mustard made up 88% of the herbaceous cover and 64% of the total vegetation cover. Due to the unusually wet spring of 1995, tansy mustard was 2 to 3 feet tall and cheatgrass cover was nearly 11%. Cheatgrass decreased significantly in 2000 and again in 2005. Cover was less than 1% in 2000 and 2005. Tansy mustard was not sampled in 2000 and was insignificant in 2005. This drastic decrease in annuals is due to the drought conditions and timing of moisture events. Annual stickseed increased from less than 1% cover in 1995 and 2000 to nearly 8% cover in 2005. Thickspike wheatgrass and blue grama are the most abundant perennial grasses. Scarlet globemallow is the only abundant perennial forb. Thickspike significantly increased in 2000 as did globemallow. Perennial grasses and forbs significantly increased in sum of nested frequency in 2000 and remained stable in 2005.

1988 APPARENT TREND ASSESSMENT

Basal vegetation cover is relatively high for this type of site at 7%. Litter cover is also fairly high at 55% and found mostly under the shrubs. The site is dominated by annual species with percent bare ground moderately high at 28%. Rock fragments are exposed as pavement (9.5%), although they are not concentrated. The key browse, big sagebrush, fourwing saltbush, and winterfat have low decadency rates, light utilization, and good vigor. The herbaceous understory consists mostly of annuals, but thickspike wheatgrass, blue grama, and Sandberg bluegrass are moderately abundant. Perennial forbs are lacking and consist primarily of one species, scarlet globemallow.

1995 TREND ASSESSMENT

Soil trend appears stable. Percent bare ground has declined from 28% to 21%. Litter cover also declined, but this has been the general trend with the drought. Due to the abundant herbaceous cover (mostly annuals), erosion is minimal. Overall, the browse trend is considered stable. Fourwing saltbush has a high percentage of decadent plants (80%) and nearly half of the population displays poor vigor (47%). In the nearby Crow's Roost Exclosure, decadent fourwing were also noted in both the total and livestock exclosure. This increased decadence is not related to use, as only 13% of the mature plants show moderate to heavy use. Fourwing saltbush can be damaged by severe drought in association with a severe winter (cold with heavy snow) which took place in 1992-93. It should also be noted that even under ideal conditions fourwing saltbush has a fairly short life span of 20 to 30 years. The replacement of the older plants with younger ones is almost impossible when they are competing against a very dense population of winter annuals. Trend for winterfat appears stable, with only a small increase in moderate to heavy use than was reported in 1988 (0% vs 8%). Winterfat within the exclosure were larger and more vigorous than those sampled outside. Big sagebrush now provides 37% of the browse cover with good vigor, good reproductive potential, and a robust percentage of young plants. The great change in density for fringed sagebrush is most likely a reflection of the much larger, better distributed sample used in 1995. The herbaceous understory trend is down and in poor condition. The fairly numerous perennial grasses, thickspike wheatgrass and blue grama, have sum of nested frequency values that have declined significantly. The most numerous perennial forb, scarlet globemallow, has also decreased significantly. Sum of nested frequency of perennial grasses declined 59%, while frequency of perennial forbs decreased 42%. Cheatgrass and annual forbs dominate the understory by providing 91% of the total herbaceous cover. Due to the wet spring, tansy mustard was very robust and abundant even within the exclosure. The Desirable Components Index (see methods) rated this site as fair. The high amount of cheatgrass and the potential for fire lowers the score.

TREND ASSESSMENT
soil - stable (0)
browse - stable (0)
herbaceous understory - down (-2)
winter range condition (DC Index) - fair (32) Lower potential scale

2000 TREND ASSESSMENT

Trend for soil is down. Percent cover for bare ground increased from 21% to almost 36% in 2000. Percent cover of vegetation also decreased while litter cover remained nearly stable. Although the increase in bare ground and decrease in vegetation cover is due to the drastic decrease in annuals, cheatgrass is fairly good at holding soils and is better than having bare soil. Gully erosion is also a problem. Trend for browse is stable overall. Fourwing saltbush shows increased use, but greatly improved vigor. Percent decadency decreased from a high of 80% in 1995 to a moderate level in 2000 at 27%. Recruitment (young plants) remains low at 6%. Big sagebrush was split into basin big sagebrush and Wyoming big sagebrush in 2000. Use on both subspecies is mostly light with low decadency. However, poor vigor occurred in 33% of the basin big sagebrush population and 12% of the Wyoming big sagebrush population. Trend for the herbaceous understory is up. Annual species decreased in 2000 due to drought, with sum of nested frequency for perennial species increasing. The DCI score increased to excellent as cheatgrass decreased, perennial grass increased, and browse increased.

TREND ASSESSMENT
soil - down (-2)
browse - stable (0)
herbaceous understory - up (+2)
winter range condition (DC Index) - excellent (71) Lower potential scale

2005 TREND ASSESSMENT

The soil trend is down. Bare ground increased from 36% in 2000 to 50% in 2005. Litter cover decreased from 42% to 23% and vegetation cover decreased from 37% to 29%. The ratio of bare ground to protective ground cover (vegetation, litter, and cryptogams) decreased further. The bottom of the draw is currently eroding into a gully and head cutting up the draw. Erosion is a problem in this area. The browse trend is slightly down. The number of decadent and dying sagebrush plants increased, while few young plants were found to replace those that are dying. Fourwing saltbush vigor in poor, but density has only decreased very slightly. Utilization increased in 2005. Winterfat density declined, but young plants were abundant and strip frequency was higher in 2005. The herbaceous understory is stable. Sum of nested frequency for perennial grasses and forbs remained stable and cheatgrass declined. Thickspike wheatgrass, blue grama, and scarlet globe mallow are all stable. The DCI score decreased to good as perennial grass cover decreased, shrub recruitment decreased, and browse cover decreased slightly.

TREND ASSESSMENT
soil - down (-2)
browse - slightly down (-1)
herbaceous understory - stable (0)
winter range condition (DC Index) - good (53) Lower potential scale

HERBACEOUS TRENDS --
Management unit 10 , Study no: 10

Type	Species	Nested Frequency				Average Cover %		
		'88	'95	'00	'05	'95	'00	'05
G	Agropyron dasystachyum	$_{b}$208	$_{a}$119	$_{b}$247	$_{b}$245	1.43	10.67	5.08
G	Agropyron spicatum	-	9	-	2	.09	-	.00
G	Bouteloua gracilis	$_{c}$177	$_{a}$22	$_{b}$97	$_{b}$129	.18	1.68	3.79
G	Bromus tectorum (a)	-	$_{c}$252	$_{b}$82	$_{a}$43	10.79	.53	.19
G	Oryzopsis hymenoides	-	-	-	1	-	-	.00
G	Poa secunda	20	16	26	24	.10	.21	.64
G	Sitanion hystrix	-	-	-	3	-	-	.00
Total for Annual Grasses		0	252	82	43	10.79	0.53	0.19
Total for Perennial Grasses		405	166	370	404	1.81	12.57	9.53
Total for Grasses		405	418	452	447	12.61	13.10	9.73
F	Chenopodium fremontii (a)	-	-	-	5	-	-	.01
F	Delphinium sp.	-	1	-	-	.00	-	-
F	Descurainia pinnata (a)	-	$_{b}$302	$_{a}$-	$_{a}$6	19.10	-	.04
F	Erigeron eatonii	$_{a}$1	$_{b}$18	$_{a}$-	$_{a}$-	.54	-	-
F	Lappula occidentalis (a)	-	$_{b}$88	$_{a}$44	$_{c}$245	.39	.16	7.76
F	Machaeranthera canescens	$_{b}$9	$_{a}$-	$_{a}$-	$_{a}$-	-	-	-
F	Phlox longifolia	15	28	13	16	.11	.10	.04
F	Ranunculus testiculatus (a)	-	$_{b}$84	$_{a}$21	$_{a}$23	.70	.10	.08
F	Schoencrambe linifolia	-	-	-	-	-	-	.00
F	Sphaeralcea coccinea	$_{c}$202	$_{a}$84	$_{b}$142	$_{ab}$107	.63	3.08	1.75
Total for Annual Forbs		0	474	65	279	20.20	0.27	7.90
Total for Perennial Forbs		227	131	155	123	1.28	3.18	1.80
Total for Forbs		227	605	220	402	21.48	3.45	9.71

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

BROWSE TRENDS --
Management unit 10 , Study no: 10

Type	Species	Strip Frequency			Average Cover %		
		'95	'00	'05	'95	'00	'05
B	Artemisia frigida	44	79	79	1.78	3.60	3.02
B	Artemisia tridentata tridentata	11	15	11	.71	2.84	3.12
B	Artemisia tridentata wyomingensis	36	27	27	3.84	5.17	4.18
B	Atriplex canescens	55	53	49	2.83	5.23	2.46
B	Ceratoides lanata	55	61	68	3.23	2.85	3.28
Total for Browse		201	235	234	12.39	19.71	16.09

CANOPY COVER, LINE INTERCEPT --
Management unit 10 , Study no: 10

Species	Percent Cover '05
Artemisia frigida	1.38
Artemisia tridentata tridentata	2.73
Artemisia tridentata wyomingensis	3.36
Atriplex canescens	1.86
Ceratoides lanata	3.16

KEY BROWSE ANNUAL LEADER GROWTH --
Management unit 10 , Study no: 10

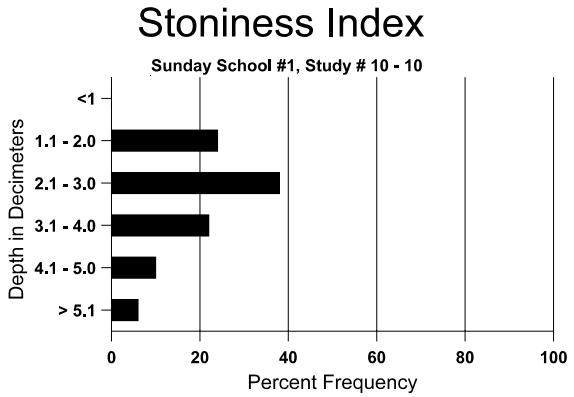
Species	Average leader growth (in) '05
Artemisia tridentata wyomingensis	1.9
Ceratoides lanata	4.2

BASIC COVER --
Management unit 10 , Study no: 10

Cover Type	Average Cover %			
	'88	'95	'00	'05
Vegetation	7.00	49.70	36.77	29.32
Rock	.25	.27	.06	.62
Pavement	9.50	2.63	3.00	7.91
Litter	55.00	40.40	42.09	22.85
Cryptogams	.50	.03	.36	.06
Bare Ground	27.75	21.33	35.75	49.85

SOIL ANALYSIS DATA --
Herd Unit 10, Study # 10, Study Name: Sunday School #1

Effective rooting depth (in)	Temp °F (depth)	pH	%sand	%silt	%clay	%0M	ppm P	ppm K	dS/m
17.8	58.4 (18.1)	7.7	28.0	39.4	32.6	2.4	10.1	409.6	0.6



PELLET GROUP DATA --
Management unit 10 , Study no: 10

Type	Quadrat Frequency		
	'95	'00	'05
Rabbit	3	38	86
Elk	-	11	22
Deer	-	6	10
Cattle	3	6	10

Days use per acre (ha)	
'00	'05
-	-
20 (50)	15 (38)
3 (9)	10 (25)
19 (47)	14 (34)

BROWSE CHARACTERISTICS --
Management unit 10 , Study no: 10

		Age class distribution (plants per acre)					Utilization					
Year	Plants per Acre (excluding seedlings)	Seedling	Young	Mature	Decadent	Dead	% moderate	% heavy	% decadent	% dying	% poor vigor	Average Height Crown (in)
Artemisia frigida												
88	**94599**	132333	62666	31933	-	-	0	0	0	-	0	7/5
95	**2040**	8880	680	1340	20	-	0	0	1	.98	.98	7/5
00	**9660**	340	1340	8300	20	-	0	0	0	.20	.20	5/8
05	**5700**	160	820	4880	-	-	24	5	0	-	0	5/7
Artemisia tridentata tridentata												
88	**0**	-	-	-	-	-	0	0	0	-	0	-/-
95	**760**	160	400	360	-	-	11	0	0	-	0	24/33
00	**660**	-	120	520	20	20	3	0	3	-	27	72/65
05	**740**	-	-	440	300	60	32	24	41	22	22	34/41
Artemisia tridentata wyomingensis												
88	**200**	1733	200	-	-	-	0	0	0	-	0	-/-
95	**1940**	260	760	1120	60	-	11	5	3	1	1	19/24
00	**1120**	60	40	1040	40	80	7	0	4	2	9	24/30
05	**980**	-	100	440	440	280	39	31	45	31	31	21/29
Atriplex canescens												
88	**1333**	-	133	1200	-	-	0	0	0	-	0	31/28
95	**1860**	-	60	320	1480	20	5	8	80	47	47	18/26
00	**2200**	-	140	1460	600	40	43	5	27	-	0	18/24
05	**1740**	-	120	1060	560	120	20	60	32	18	18	11/16
Ceratoides lanata												
88	**9399**	66	2866	6533	-	-	0	0	0	-	0	9/3
95	**8320**	40	580	7140	600	-	3	4	7	-	0	10/10
00	**7380**	120	420	6920	40	-	18	1	1	-	0	7/8
05	**4720**	20	940	3720	60	-	10	73	1	1	1	7/7
Gutierrezia sarothrae												
88	**0**	-	-	-	-	-	0	0	-	-	0	-/-
95	**0**	-	-	-	-	-	0	0	-	-	0	-/-
00	**0**	-	-	-	-	-	0	0	-	-	0	-/-
05	**0**	-	-	-	-	-	0	0	-	-	0	6/8
Opuntia sp.												
88	**0**	-	-	-	-	-	0	0	-	-	0	-/-
95	**0**	-	-	-	-	-	0	0	-	-	0	1/3
00	**0**	-	-	-	-	-	0	0	-	-	0	-/-
05	**0**	-	-	-	-	-	0	0	-	-	0	-/-

Trend Study 10-12-05

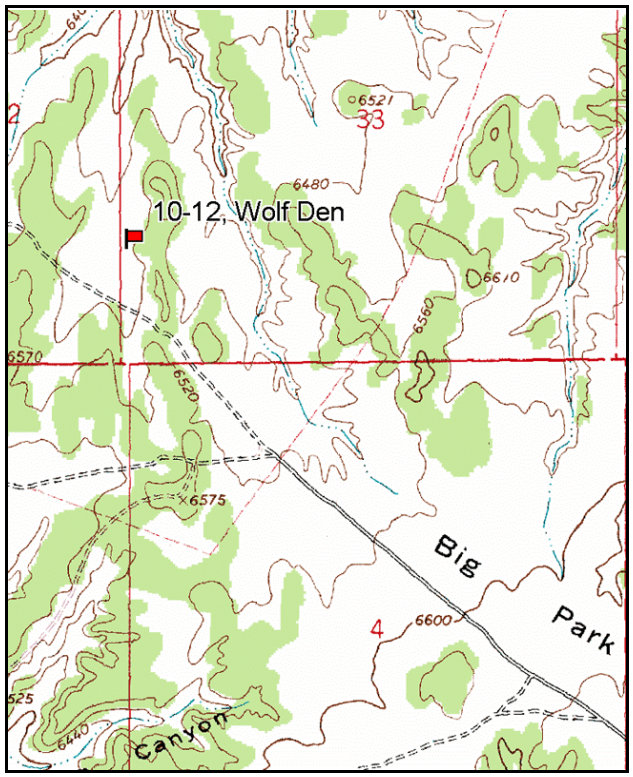
Study site name: Wolf Den . Vegetation type: Wyoming Big Sagebrush .

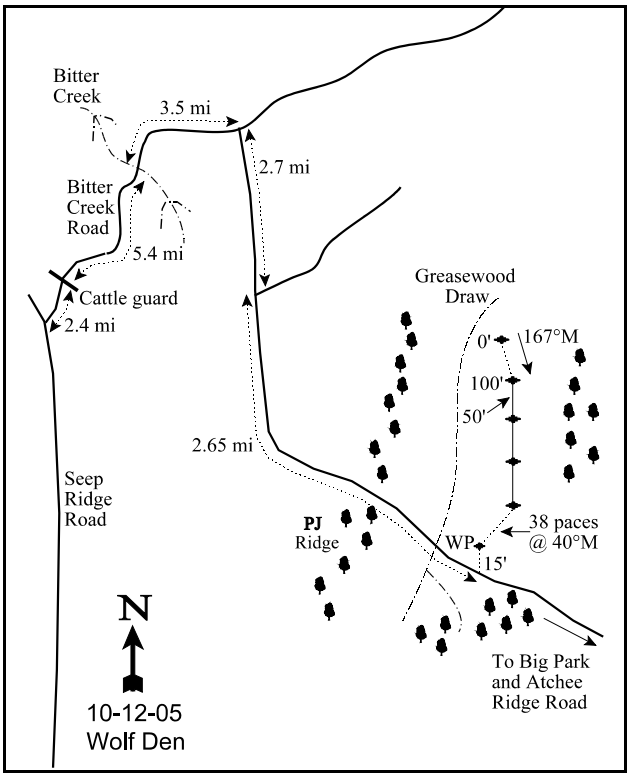
Compass bearing: frequency baseline 167 degrees magnetic.

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

LOCATION DESCRIPTION

From the Seep Ridge Road, about 10 miles north of Pine Spring, turn onto the Bitter Creek Road near McCoy Reservoir. Drive easterly on this road for 2.4 miles to a cattle guard. Continue 5.4 miles to a corral in the bottom of Bitter Creek. Drive up out of the Bitter Creek canyon 3.5 miles. Where the road tops out, turn right off the main road. Go 2.7 miles to a minor fork. Continue straight on the main road for 2.65 miles to the east edge of a sagebrush/greasewood draw. There is a witness post 15 feet off the north side of the road. From the witness post walk 38 paces bearing 40° to the 400 ft. baseline stake. The 0-foot baseline stake, tagged #9098, is 400 feet north.
Alternate route: From the intersection of Atchee Ridge Road and Big Park Road travel north toward Big Park 3.45 miles to a fork. Stay left and continue 0.15 to another fork. Go straight to Big Park for 5.7 miles to a cattle guard and a fork. Proceed right for 0.4 miles to the witness post.





Map Name: Burnt Timber Canyon . Diagrammatic Sketch

Township 12S , Range 24E , Section 33 GPS: NAD 27, UTM 12S 4398777 N, 650483 E

DISCUSSION

Wolf Den - Trend Study No. 10-12

The Wolf Den trend study is located in a very dense stand of Wyoming big sagebrush along a wide swale between low ridges of pinyon and juniper. The study site slopes gently to the northwest at an elevation of 6,500 feet. This area, near Big Park, is considered critical deer winter range, and also has some light use by elk. Pellet group estimates have been very high on this study site. Pellet group transect data in 2000 indicated heavy use by deer with an estimated 116 deer days use/acre (287 ddu/ha) and light use by elk, estimated at 3 elk days use/acre (7 edu/ha). No cattle pats were sampled in 2000, although cows were in the general area surrounding the Wolf Den transect when the site was read in June 2000. This area is used by cattle on a rotational deferment system anytime from November through April, depending on amounts of snow and other management considerations. Pellet group data in 2005 estimated 261 deer days use/acre (645 ddu/ha).

The dense sagebrush provides excellent cover, but the understory is very limited (less than 5% of total vegetation cover) and the low amounts of litter are easily displaced. Cryptogamic crusts exist almost entirely underneath the sagebrush crowns. The soil is relatively deep with an estimated effective rooting depth of over 26 inches. A stoniness index determined from penetrometer readings illustrates the deepness of the soil with nearly all measurements being over 20 inches in depth. Very little rock was sampled in the profile and the index at this site is more a measure of a restrictive layers of soil than actual rockiness. The soil is a loam that is low in phosphorus at 3.5 ppm (Tiedemann and Lopez 2004). The soil reaction is moderately alkaline (pH of 8). An erosion condition class assessment rated erosion as slight in 2005.

This study is located on a site dominated by Wyoming big sagebrush. Shadscale is found on the upper, more shallow portions of the swale, while greasewood grows along the lower reaches of the depression. The sagebrush on the site is so dense that it is difficult to walk through it. Sagebrush cover was 32% in both 1995 and 2000. It was estimated at 27% in 2005 using quadrats and 33% using the line intercept method. On average sagebrush has made up three quarters of the total vegetation cover. Shrub density estimates for 1988 indicated a population of 18,133 plants/acre. Density of sagebrush was estimated at 7,580 plants/acre in 1995, 7,260 plants/acre in 2000, and 7,740 plants/acre in 2005. The difference in population estimates is primarily the result of the increased sample size and better sampling distribution used after mid-1992. These modifications enlarge the sampling area and give much better estimates for shrubs with discontinuous and/or clumped distributions. This old sagebrush stand contained 78% mature and 19% decadent individuals in 1995. Decadence increased in 2000 to 42% and to 45% in 2005. Thirteen percent of the population was classified as dying in 2000 and 9% in 2005. Recruitment from the young age class has been low, but seedlings were very abundant in 2005. Use has been moderate to heavy from 1995 to 2005. This population has remained stable for a number of years, but shows no sign of decline. This condition of high decadence is probably due to intraspecific competition combined with drought and use by wintering deer.

Greasewood density was 800 plants/acre in 2000 and increased to 940 plants/acre in 2005. Greasewood has averaged 2-5% cover, which is about 12% of the total vegetation cover at the site. Decadence increased from 11% in 1995, to 30% in 2000, and to 34% in 2005. High to moderate use was noted in 2005.

The high sagebrush density and cover severely limits understory plants. Only four or five species of perennial grass were sampled in any year. Total grass cover was less than one half of one percent in 1995 and 2005. In 2000 it was just over 2% in 2000. Grasses and forbs combined, including annuals, have only accounted for about 5% of the total vegetation cover in any sampling year. Perennial forbs are nearly non-existent with only one perennial forb sampled in 1988, 1995, and 2005. No perennial forbs were sampled in 2000, and only one annual was encountered. Without some type of sagebrush thinning treatment, the herbaceous understory will continue to be extremely poor.

1988 APPARENT TREND ASSESSMENT

Under the shrubs, there is an almost complete cover of pavement-sized fragments, estimated at 32% of the ground cover. Litter cover from the shrubs is almost 50% and basal vegetation cover is low at 6%. The amount of bare soil exposed is also low at 7%, due to very high amounts of pavement. The sagebrush population appears stable with enough young and seedlings to replace dying individuals. The herbaceous understory is in extremely poor condition due to the dominance of sagebrush.

1995 TREND ASSESSMENT

The soil is adequately covered by sagebrush cover to protect it from high intensity summer storm impacts, but there is little protection of the soil from erosion caused from the associated runoff. However, due to the gentle slope, erosion does not appear to be a major problem. Trend is considered stable, yet in poor condition. Browse trend is stable and fairly stagnant. There is a change in the proportion of individuals in the younger age classes which have declined, yet there are not an inordinately large number of dead plants in the population. Utilization is heavier with 20% of the sagebrush displaying heavy use. Percent decadence has declined and vigor is good on all but 3% of the population. There may be some fluctuations in population density in the future associated with prolonged drought, but the sagebrush will continue to dominate this site without some sort of mechanical or chemical manipulation. The herbaceous understory is severely suppressed and nearly non-existent at this time. This will remain the case until the sagebrush canopy is reduced. Trend for the herbaceous understory is stable, but in very poor condition. The Desirable Components Index (see methods) rated this site as fair. The browse cover is excellent, but the herbaceous understory is very poor.

TREND ASSESSMENT
soil - stable (0)
browse - stable (0)
herbaceous understory - stable (0)
winter range condition (DC Index) - fair (42) Lower potential scale

2000 TREND ASSESSMENT

Trend for soil is slightly down and is in poor condition with very little herbaceous cover and an increase in bare ground. The ratio of bare ground to protective ground cover (vegetation, litter, and cryptogams) decreased from 1:4.1 in 1995 to 1:2.9 in 2000. Trend for browse is stable. The Wyoming big sagebrush population increased in decadence from 19% to 42%, but due to the abundance of sagebrush at the site, this increase is not detrimental. It appears that the sagebrush population may enter a self-thinning period with the extended drought and high intraspecific competition for resources. Trend for the herbaceous understory is slightly up due to increases in mutton bluegrass and bottlebrush squirreltail. However, the understory is severely depleted due to high sagebrush density and cover. The Desirable Components Index (see methods) rated this site as fair. The decadence of sagebrush increased, lowering the DCI score.

TREND ASSESSMENT
soil - slightly down (-1)
browse - stable (0)
herbaceous understory - slightly up (+1)
winter range condition (DC Index) - fair (40) Lower potential scale

2005 TREND ASSESSMENT

The soil trend is stable. The ratio of bare ground to protective ground cover (vegetation, litter, and cryptogams) has slightly improved from 1:2.9 to 1:3.4. The amount of bare ground (on a relative scale)

remained stable at 14%. Erosion is slight. The browse trend is stable. This mature sagebrush stand has remained in a decadent state throughout the drought. There has been very little change in age structure and density. The herbaceous understory is slightly down and is similar to conditions in 1995. Perennial grasses are sparse and perennial forbs are nearly non-existent. The DCI score continued to be fair, but decreased due to increased decadence, decrease in number of young, and a decrease in the herbaceous understory.

TREND ASSESSMENT
soil - stable (0)
browse - stable (0)
herbaceous understory -slightly down (-1)
winter range condition (DC Index) - fair (33) Lower potential scale

HERBACEOUS TRENDS --
Management unit 10 , Study no: 12

Type	Species	Nested Frequency				Average Cover %		
		'88	'95	'00	'05	'95	'00	'05
G	Agropyron dasystachyum	$_{c}$59	$_{b}$35	$_{a}$1	$_{a}$-	.22	.00	-
G	Agropyron spicatum	$_{a}$-	$_{a}$-	$_{a}$-	$_{b}$26	-	-	.08
G	Bromus tectorum (a)	-	3	-	-	.01	-	-
G	Oryzopsis hymenoides	3	2	5	6	.03	.06	.02
G	Poa fendleriana	$_{a}$1	$_{a}$3	$_{b}$51	$_{a}$4	.00	.66	.01
G	Sitanion hystrix	$_{a}$24	$_{ab}$52	$_{b}$76	$_{a}$30	.18	1.35	.08
Total for Annual Grasses		0	3	0	0	0.00	0	0
Total for Perennial Grasses		87	92	133	66	0.43	2.08	0.19
Total for Grasses		87	95	133	66	0.44	2.08	0.19
F	Chenopodium fremontii (a)	-	$_{a}$-	$_{a}$-	$_{b}$20	-	-	.36
F	Chenopodium leptophyllum(a)	-	$_{b}$84	$_{a}$-	$_{b}$76	.34	-	.22
F	Cryptantha sp.	1	2	-	-	.00	-	-
F	Descurainia pinnata (a)	-	$_{c}$148	$_{a}$3	$_{b}$56	1.46	.00	.77
F	Lappula occidentalis (a)	-	$_{ab}$11	$_{a}$-	$_{b}$14	.07	-	.06
F	Schoencrambe linifolia	$_{a}$-	$_{a}$-	$_{a}$-	$_{b}$8	-	-	.06
F	Unknown forb-annual (a)	-	4	-	-	.01	-	-
Total for Annual Forbs		0	247	3	166	1.88	0.00	1.42
Total for Perennial Forbs		1	2	0	8	0.00	0	0.06
Total for Forbs		1	249	3	174	1.89	0.00	1.49

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

BROWSE TRENDS --
Management unit 10 , Study no: 12

Type	Species	Strip Frequency			Average Cover %		
		'95	'00	'05	'95	'00	'05
B	Artemisia frigida	36	46	33	1.85	3.03	.22
B	Artemisia tridentata wyomingensis	97	98	97	32.26	32.55	26.90
B	Atriplex canescens	1	0	2	-	-	-
B	Atriplex confertifolia	16	18	8	1.69	.97	.03
B	Gutierrezia sarothrae	2	14	3	.01	.07	-
B	Juniperus osteosperma	0	7	8	.15	.18	.38
B	Opuntia sp.	4	3	1	-	.03	-
B	Pinus edulis	0	0	1	-	-	-
B	Sarcobatus vermiculatus	17	19	17	2.62	5.28	3.64
Total for Browse		173	205	170	38.59	42.13	31.18

CANOPY COVER, LINE INTERCEPT --
Management unit 10 , Study no: 12

Species	Percent Cover '05
Artemisia frigida	.11
Artemisia tridentata wyomingensis	32.84
Atriplex confertifolia	.03
Juniperus osteosperma	.75
Sarcobatus vermiculatus	3.43

KEY BROWSE ANNUAL LEADER GROWTH --
Management unit 10 , Study no: 12

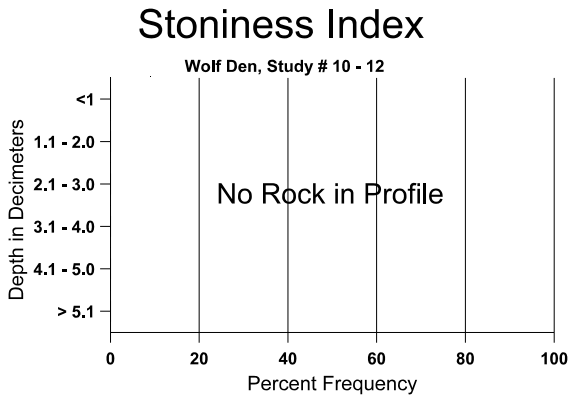
Species	Average leader growth (in) '05
Artemisia tridentata wyomingensis	2.0

BASIC COVER --
Management unit 10 , Study no: 12

Cover Type	Average Cover %			
	'88	'95	'00	'05
Vegetation	5.75	43.86	41.80	31.92
Rock	.75	.74	.02	.02
Pavement	32.25	19.73	15.25	18.66
Litter	49.50	43.14	45.29	40.06
Cryptogams	5.00	6.84	9.23	9.01
Bare Ground	6.75	8.53	19.11	16.12

SOIL ANALYSIS DATA --
Herd Unit 10, Study # 12, Study Name: Wolf Den

Effective rooting depth (in)	Temp °F (depth)	pH	%sand	%silt	%clay	%0M	ppm P	ppm K	dS/m
26.1	56.0 (18.1)	8.0	46.0	33.4	20.6	1.8	3.5	115.2	0.6



PELLET GROUP DATA --
Management unit 10 , Study no: 12

Type	Quadrat Frequency		
	'95	'00	'05
Rabbit	7	6	70
Elk	3	4	8
Deer	52	47	77

Days use per acre (ha)	
'00	'05
-	-
3 (9)	-
116 (287)	261 (645)

BROWSE CHARACTERISTICS --
Management unit 10 , Study no: 12

		Age class distribution (plants per acre)					Utilization					
Year	Plants per Acre (excluding seedlings)	Seedling	Young	Mature	Decadent	Dead	% moderate	% heavy	% decadent	% dying	% poor vigor	Average Height Crown (in)
Artemisia frigida												
88	**4532**	866	666	3733	133	-	4	10	3	-	0	7/5
95	**2040**	600	400	1640	-	-	0	0	0	-	0	11/11
00	**3700**	40	540	3160	-	-	1	0	0	-	0	5/9
05	**1300**	840	400	740	160	20	8	0	12	11	11	5/5
Artemisia tridentata wyomingensis												
88	**18133**	1066	1533	11800	4800	-	25	6	26	1	10	21/16
95	**7580**	240	240	5920	1420	1080	65	20	19	3	3	27/32
00	**7260**	60	420	3820	3020	1280	38	18	42	13	13	26/33
05	**7740**	1880	80	4160	3500	2340	54	22	45	9	9	29/34
Atriplex canescens												
88	**0**	-	-	-	-	-	0	0	0	-	0	-/-
95	**20**	-	-	-	20	-	100	0	100	-	0	43/22
00	**0**	-	-	-	-	-	0	0	0	-	0	-/-
05	**40**	-	-	-	40	-	50	0	100	50	50	-/-
Atriplex confertifolia												
88	**465**	-	133	266	66	-	0	0	14	-	0	22/18
95	**380**	160	40	280	60	-	0	0	16	-	0	20/23
00	**520**	-	100	320	100	20	12	8	19	15	15	19/26
05	**160**	20	20	60	80	-	25	38	50	50	50	26/20
Gutierrezia sarothrae												
88	**866**	133	266	600	-	-	0	0	-	-	0	7/6
95	**60**	180	-	60	-	-	0	0	-	-	0	12/8
00	**900**	-	180	720	-	-	0	0	-	-	0	5/6
05	**60**	140	20	40	-	20	0	33	-	-	0	3/2
Juniperus osteosperma												
88	**0**	-	-	-	-	-	0	0	0	-	0	-/-
95	**0**	-	-	-	-	-	0	0	0	-	0	-/-
00	**140**	20	60	80	-	20	0	0	0	-	0	-/-
05	**160**	-	80	-	80	-	13	0	50	25	50	-/-
Opuntia sp.												
88	**66**	-	66	-	-	-	0	0	-	-	0	-/-
95	**80**	-	-	80	-	-	0	0	-	-	0	3/4
00	**60**	-	-	60	-	-	0	0	-	-	0	5/9
05	**20**	-	-	20	-	-	0	0	-	-	0	2/4

		Age class distribution (plants per acre)					Utilization					
Year	Plants per Acre (excluding seedlings)	Seedling	Young	Mature	Decadent	Dead	% moderate	% heavy	% decadent	% dying	% poor vigor	Average Height Crown (in)
Pinus edulis												
88	**0**	66	-	-	-	-	0	0	-	-	0	-/-
95	**0**	-	-	-	-	-	0	0	-	-	0	-/-
00	**0**	-	-	-	-	-	0	0	-	-	0	-/-
05	**20**	-	20	-	-	-	0	0	-	-	0	-/-
Sarcobatus vermiculatus												
88	**266**	-	-	266	-	-	0	0	0	-	0	33/26
95	**3860**	-	-	3440	420	-	0	0	11	-	0	37/50
00	**800**	-	60	500	240	60	15	10	30	13	13	40/54
05	**940**	20	20	600	320	20	72	28	34	9	9	35/49

Trend Study 10-14-05

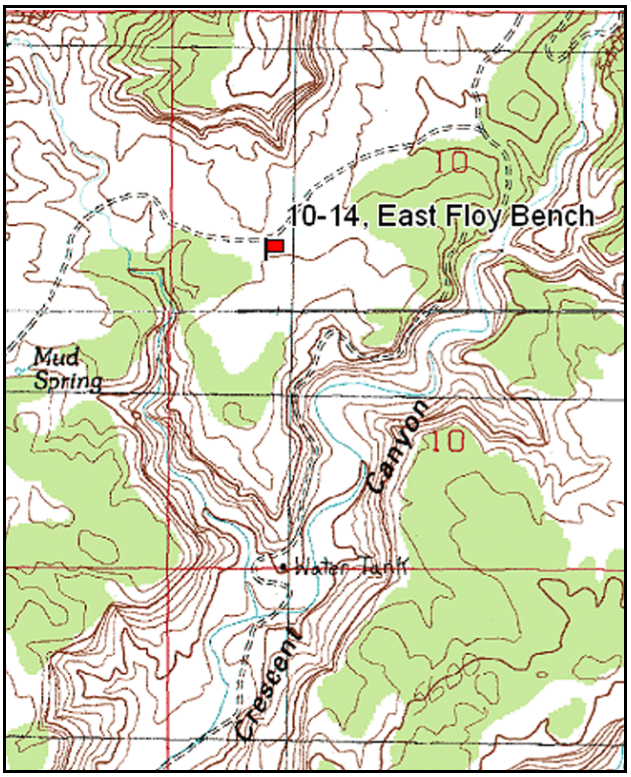
Study site name: East Floy Bench . Vegetation type: Wyoming Big Sagebrush .

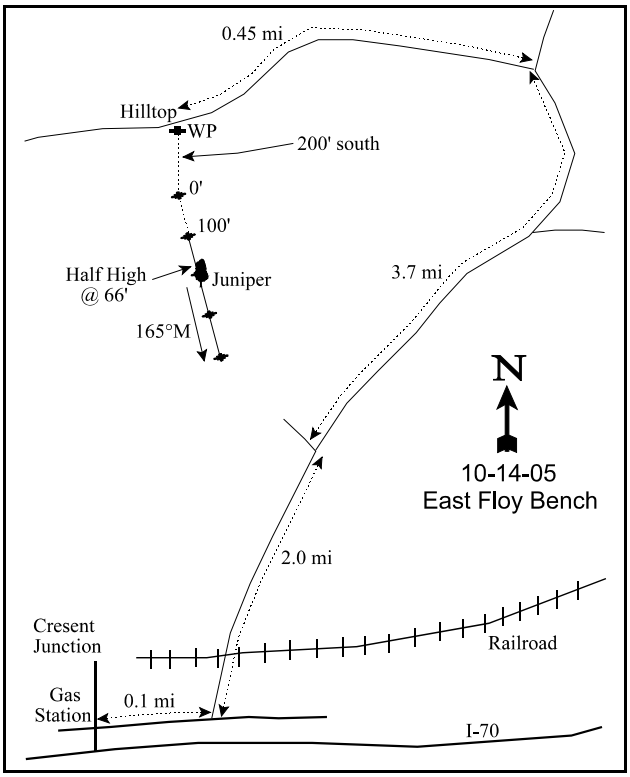
Compass bearing: frequency baseline 165 degrees magnetic.

Frequency belt placement: line 1 (11 & 95ft), line 2 (34ft), line 3 (59ft), line 4 (71ft). Belt 3 rebar at 15ft.

LOCATION DESCRIPTION

Go to Crescent Junction, off of I-70 east of Green River. From the dirt road 0.1 miles east of the gas station and SR 163 junction, cross the east-west running tracks and go north 2 miles on the main dirt road to a fork. Bear right and go 3.7 miles to a fork on top of a hill, stay left and climb out of the wash and up the west side of the canyon. Turn left. Continue 0.45 miles to the crest of a small hill. There is a rebar witness post 10 feet to the left. The 0-foot baseline stake, marked with a browse tag, is 200 feet south of the witness post.





Map Name: Crescent Junction Diagrammatic Sketch

Township 21S , Range l9E , Section 10 GPS: NAD 27, UTM 12S 4317389 N, 602929 E

DISCUSSION

East Floy Bench - Trend Study No. 10-14

The East Floy Bench transect is located on a low lying bench running along the south end of the Book Cliffs. The bench slopes to the north with a 3-5% slope at an elevation of 5,500 feet. This sagebrush/pinyon-juniper flat drops off abruptly at the southern edge to the salt desert below. This study is located on BLM administered land in the Crescent Canyon Allotment. In 1986, it was grazed by 1,208 sheep from mid-November to mid-April. This allotment was converted to cattle use after 1995. Grazing is permitted from November 1st through April 20 for cows at 958 AUM's on a 4 pasture deferred rotation system. Pellet group transect data from 2000 estimated 27 deer days use/acre (67 ddu/ha), 7 elk days use/acre (17 edu/ha), and 18 cow days use/acre (44 cdu/ha). Pellet group data in 2005 estimated 27 deer days use/acre (66 ddu/ha), 5 elk days use/acre (12 edu/ha), and 23 cow days use/acre (57 cdu/ha). Most cattle pats were found under the shade of juniper trees. Rabbit use was also very high in 2005 with rabbit pellets in 83% of the quadrats.

The sandy loam soil is moderately deep, although there are large areas of exposed and shallow covered sandstone bedrock. Chemical analysis indicates the soil is low in phosphorus at 4.3 ppm (Tiedemann and Lopez 2004). The soil is neutral in reactivity (pH of 7.0) and organic matter is low at less than 1%. A profile stoniness index estimated from penetrometer readings show the majority of the rockiness to occur between 8 and 12 inches in depth. Effective rooting depth is nearly 13 inches. Bare ground is abundant on this site. In 1995, bare ground cover was estimated at 39%. It increased to over 55% in 2000 and 2005. Average cover from vegetation and litter both decreased in 2000. Litter decreased again in 2005. Some soil movement is evident in plant interspaces, but due to the gentle slope, erosion is minimal. An erosion condition class assessment rated erosion as slight in 2005.

Wyoming big sagebrush is the key browse species. Estimated density was 2,700 plants/acre in 1986, then declined to 1,060 plants/acre in 1995, and 940 plant/acre in 2000. This increased slightly in 2005 to 1,100 plants/acre. The decrease in density after 1986 is likely due to the increased sample size used beginning in mid-1992. The number of mature and young plants did not change between 2000 and 2005. In 2005, the number of decadent plants increased from 260 plants/acre (28% of population) in 2000 to 420 plants/acre (38% of population) in 2005. Decadence was only 2% in 1995. Sagebrush cover has averaged 3-4% from 1995-2005. Recruitment from young plants was moderately high in 1995 at 23%, but decreased to only 4% in 2000 and 2005. Utilization has been moderate to heavy for each reading. A sample of sagebrush annual leader growth measured in 2000 showed an average of about 7 inches. In 2005, leader growth was measured at only 2.7 inches. The population appeared to be naturally thinning itself in response to drought with one out of every five plants sampled classified as dead in 1995. Increased decadence, decreased recruitment, and reduced vigor since 1995 is most likely due to the drought and the abundance of winter annuals.

Due to the larger sample size and better sample distribution used in 1995, considerably more browse species were sampled. These species include: fourwing saltbush, winterfat, spiny hopsage, green ephedra, shadscale, rubber rabbitbrush, low rabbitbrush, slenderbush eriogonum, broom snakeweed, and pricklypear cactus. Many of these species are preferred by wildlife and livestock, but most occur in low densities. In 2005, shadscale was not sampled. Broom snakeweed density has varied and has been reflective of drought conditions. Point center-quarter data estimated 16 juniper trees/acre in both 1995 and 2000; this increased to 32 trees/acre in 2005.

Perennial grasses that are abundant on this site include galleta, bottlebrush squirreltail, sand dropseed, and needle-and-thread. Sum of nested frequency for perennials declined between 1986 and 1995. In 2000, nested frequency for each perennial species was stable, except for sand dropseed which increased. In 2005, sand dropseed and Salina wildrye significantly declined. In 1995, cheatgrass was very abundant. It was sampled in 97% of the quadrats and had nearly 7% cover. It declined significantly in 2000, which was a dry year, and

was only sampled in 25% of the quadrats. In 2005, cheatgrass nested frequency increased significantly, but was not as high as in 1995. Cheatgrass cover was robust in 2005 with over 8% cover. Forbs are sparse and mostly comprised of annuals. Annual stickseed was very abundant in 2005.

1986 APPARENT TREND ASSESSMENT

The palatable shrubs are moderately to heavily hedged and generally declining in vigor and reproductive success. The Wyoming big sagebrush population has an encouraging amount of young plants, however, broom snakeweed and juniper appear to be increasing. Of particular concern is the fact that unless the new grazing plan includes a reduction in sheep AUM's, excessive shrub utilization will result in pastures that are not rested. This sagebrush range gradually gives way to the more traditional salt desert shrub sheep winter range at lower elevations. Management strategies should strive to minimize sheep use on critical big game winter range and limit winter use to the lower elevational areas. The soil is stable, but would benefit from less disturbance.

1995 TREND ASSESSMENT

Although this area had early spring precipitation, the rest of the summer was drier than usual. The early spring precipitation likely did not benefit the perennial grasses due to the abundance of cheatgrass. Perennial grass species compete poorly for soil moisture with cheatgrass when moisture only comes in the winter and spring, especially when cheatgrass is abundant. Although grasses provide 50% of the total vegetation cover on the site, the sum of nested frequency for perennial grass has declined by nearly 50% since 1986. For this reason, the herbaceous understory trend is downward with a notably poor forb component. The browse trend for this site appears to be stable. The Wyoming big sagebrush population has many seedlings with nearly one-fourth of the population classified as young plants. Also, the intensity of hedging has shifted from heavy to moderate with a decline in decadence. Some soil movement is evident, but due to the gentle slope, vegetation cover, and good cryptogamic crust cover, the movement is slight. Therefore, soil trend is considered stable. The Desirable Components Index (see methods) rated this site as fair. Browse cover is low, decadence and young recruitment are good, and perennial grass cover is moderate.

TREND ASSESSMENT
soil - stable (0)
browse - stable (0)
herbaceous understory - down (-2)
winter range condition (DC Index) - fair (38) Lower potential scale

2000 TREND ASSESSMENT

Trend for soil is slightly down with a large increase in bare ground cover and decreases in cover from herbaceous vegetation and litter. The ratio of bare soil to protective ground cover is low at 1:2.2. Trend for browse is slightly down. Wyoming big sagebrush has increased decadence and poor vigor, as well as decreased recruitment from 23% in 1995 to 4% in 2000. Other less abundant palatable species such as fourwing saltbush, spiny hopsage, and shadscale have high rates of decadence. Trend for the herbaceous understory is up with an increase in sum of nested frequency for perennial grasses and decreases in annual grasses. The DCI score decreased to poor, because of an increase in decadence, a decrease in browse cover, and a decrease in young.

TREND ASSESSMENT
soil - slightly down (-1)
browse - slightly down (-1)
herbaceous understory - up (+2)
winter range condition (DC Index) - poor (22) Lower potential scale

2005 TREND ASSESSMENT

The trend for soil is stable. The ratio of bare ground to protective ground cover (vegetation, litter, and cryptogams) improved very slightly. The amount of bare ground is unchanged since 2000 and litter cover decreased from 25% to 18%. The browse trend is stable. Wyoming big sagebrush density is slightly higher, but percent decadence is also higher. Sagebrush cover has remained at about 3%. Shadscale has declined, but winterfat has increased and young plants were abundant. The herbaceous understory trend is slightly down and is similar to conditions in 1995. Cheatgrass has increased since 2000 and perennial nested frequency declined slightly. Forbs are sparse. The DCI score continued to be poor, because of a decrease in perennial grass cover and an increase in annual forb cover.

TREND ASSESSMENT
soil - stable (0)
browse - stable (0)
herbaceous understory - slightly down (-1)
winter range condition (DC Index) - poor (17) Lower potential scale

HERBACEOUS TRENDS --
Management unit 10 , Study no: 14

Type	Species	Nested Frequency				Average Cover %		
		'86	'95	'00	'05	'95	'00	'05
G	Aristida purpurea	-	1	7	4	.03	.07	.30
G	Bromus tectorum (a)	-	c318	a56	b161	6.72	1.10	8.11
G	Elymus salina	a-	b15	b13	a-	1.10	.18	-
G	Hilaria jamesii	b156	a65	a76	a80	1.10	2.01	1.71
G	Oryzopsis hymenoides	b36	ab37	a17	b57	1.91	.30	.50
G	Poa secunda	-	-	-	6	-	-	.04
G	Sitanion hystrix	b40	a7	a2	a10	.07	.03	.19
G	Sporobolus cryptandrus	a-	ab5	c63	ab9	.03	1.58	.05
G	Stipa comata	b92	a40	a39	a20	.92	.93	.47
G	Vulpia octoflora (a)	-	b75	a4	c114	.21	.01	.92
Total for Annual Grasses		0	393	60	275	6.93	1.11	9.03
Total for Perennial Grasses		324	170	217	186	5.18	5.12	3.27
Total for Grasses		324	563	277	461	12.11	6.23	12.31
F	Arabis sp.	-	-	-	-	-	-	.03
F	Chenopodium fremontii (a)	-	-	-	3	-	-	.00
F	Chenopodium leptophyllum(a)	-	a2	a-	b14	.00	-	.06
F	Chaenactis stevioides	-	-	-	1	-	-	.00
F	Cryptantha sp.	-	-	-	3	-	-	.00
F	Descurainia pinnata (a)	-	a3	a-	b13	.00	-	.31
F	Draba sp. (a)	-	b17	a-	c50	.02	-	.22
F	Eriogonum cernuum (a)	-	10	-	1	.02	-	.01

Type	Species	Nested Frequency				Average Cover %		
		'86	'95	'00	'05	'95	'00	'05
F	Erigeron pumilus	-	5	-	2	.01	-	.00
F	Gilia sp. (a)	-	$_{a}$-	$_{a}$-	$_{b}$73	-	-	.38
F	Lappula occidentalis (a)	-	$_{b}$67	$_{a}$-	$_{c}$118	.12	-	1.68
F	Lepidium sp. (a)	-	-	-	3	-	-	.03
F	Machaeranthera grindelioides	-	-	-	1	-	-	.03
F	Mentzelia sp.	-	-	-	5	-	-	.04
F	Navarretia intertexta (a)	-	$_{a}$-	$_{a}$-	$_{b}$35	-	-	1.08
F	Oenothera sp.	-	-	-	3	-	-	.00
F	Plantago patagonica (a)	-	$_{b}$42	$_{a}$-	$_{c}$58	.09	-	.21
F	Ranunculus testiculatus (a)	-	$_{a}$-	$_{a}$1	$_{b}$20	-	.00	.06
F	Salsola iberica (a)	-	$_{a}$-	$_{a}$2	$_{b}$11	-	.00	.03
F	Sphaeralcea coccinea	-	-	-	5	-	-	.09
F	Tragopogon dubius	3	-	-	-	-	-	-
Total for Annual Forbs		0	141	3	399	0.26	0.00	4.09
Total for Perennial Forbs		3	5	0	20	0.01	0	0.22
Total for Forbs		3	146	3	419	0.28	0.00	4.31

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

BROWSE TRENDS --
Management unit 10 , Study no: 14

Type	Species	Strip Frequency			Average Cover %		
		'95	'00	'05	'95	'00	'05
B	Artemisia tridentata wyomingensis	24	21	21	4.20	3.29	3.37
B	Atriplex canescens	7	7	10	.56	.15	.82
B	Atriplex confertifolia	4	5	0	.03	.88	-
B	Ceratoides lanata	6	2	7	.45	.15	.48
B	Chrysothamnus nauseosus consimilis	1	0	0	-	-	-
B	Chrysothamnus viscidiflorus stenophyllus	9	7	4	.15	.44	.33
B	Ephedra viridis	1	4	4	-	1.50	1.32
B	Eriogonum microthecum	2	0	3	.00	-	-
B	Grayia spinosa	5	2	5	.33	.15	.63
B	Gutierrezia sarothrae	80	27	51	3.82	.32	1.93
B	Juniperus osteosperma	0	0	1	2.25	3.11	4.48
B	Opuntia sp.	1	4	4	-	.03	.00
Total for Browse		140	79	110	11.82	10.05	13.39

CANOPY COVER, LINE INTERCEPT --
Management unit 10 , Study no: 14

Species	Percent Cover	
	'00	'05
Artemisia tridentata wyomingensis	-	3.88
Atriplex canescens	-	1.39
Ceratoides lanata	-	.30
Ephedra viridis	-	1.95
Grayia spinosa	-	.88
Gutierrezia sarothrae	-	2.58
Juniperus osteosperma	4.40	6.59
Opuntia sp.	-	.01

KEY BROWSE ANNUAL LEADER GROWTH --
Management unit 10 , Study no: 14

Species	Average leader growth (in)
	'05
Artemisia tridentata wyomingensis	2.9
Atriplex canescens	4.5
Ceratoides lanata	6.2

POINT-QUARTER TREE DATA --
Management unit 10 , Study no: 14

Species	Trees per Acre	
	'00	'05
Juniperus osteosperma	16	32

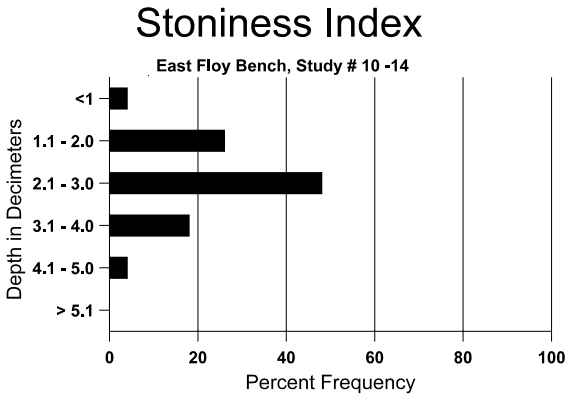
Average diameter (in)	
'00	'05
4.9	10.0

BASIC COVER --
Management unit 10 , Study no: 14

Cover Type	Average Cover %			
	'86	'95	'00	'05
Vegetation	2.25	23.38	17.85	25.43
Rock	0	1.45	1.17	.84
Pavement	0	.44	.42	.41
Litter	35.75	31.51	24.85	18.26
Cryptogams	2.50	10.39	10.03	11.91
Bare Ground	59.50	39.23	57.54	54.95

SOIL ANALYSIS DATA --
Herd Unit 10, Study # 14, Study Name: East Floy Bench

Effective rooting depth (in)	Temp °F (depth)	pH	%sand	%silt	%clay	%0M	ppm P	ppm K	dS/m
12.8	62.0 (11.0)	7.0	60.0	23.4	16.6	0.6	4.3	185.6	0.5



PELLET GROUP DATA --
Management unit 10 , Study no: 14

Type	Quadrat Frequency		
	'95	'00	'05
Sheep	7	4	-
Rabbit	58	42	83
Elk	5	3	1
Deer	20	15	10
Cattle	-	2	12

Days use per acre (ha)	
'00	'05
-	-
-	-
7 (17)	5 (12)
27 (67)	27 (66)
18 (44)	23 (57)

BROWSE CHARACTERISTICS --
Management unit 10 , Study no: 14

		Age class distribution (plants per acre)					Utilization					
Year	Plants per Acre (excluding seedlings)	Seedling	Young	Mature	Decadent	Dead	% moderate	% heavy	% decadent	% dying	% poor vigor	Average Height Crown (in)
Artemisia tridentata wyomingensis												
86	**2700**	66	1000	1200	500	-	31	41	19	-	6	15/14
95	**1060**	140	240	800	20	220	58	4	2	2	13	23/39
00	**940**	-	40	640	260	60	68	11	28	19	19	24/41
05	**1100**	-	40	640	420	180	49	45	38	7	7	26/39
Atriplex canescens												
86	**333**	-	-	-	333	-	20	50	100	12	40	-/-
95	**140**	-	20	120	-	-	0	0	0	-	0	27/37
00	**300**	20	-	20	280	-	33	0	93	73	73	23/28
05	**260**	-	40	200	20	-	31	38	8	-	0	25/33
Atriplex confertifolia												
86	**0**	-	-	-	-	-	0	0	0	-	0	-/-
95	**100**	-	-	100	-	-	60	20	0	-	0	22/32
00	**160**	80	20	20	120	-	63	0	75	-	0	21/44
05	**0**	-	-	-	-	-	0	0	0	-	0	-/-
Ceratoides lanata												
86	**0**	-	-	-	-	-	0	0	-	-	0	-/-
95	**260**	-	20	240	-	-	77	0	-	-	0	15/17
00	**180**	-	-	180	-	-	33	0	-	-	0	13/22
05	**360**	300	120	240	-	-	6	67	-	-	0	13/12
Chrysothamnus nauseosus consimilis												
86	**0**	-	-	-	-	-	0	0	0	-	0	-/-
95	**20**	-	-	-	20	-	0	0	100	-	0	21/20
00	**0**	-	-	-	-	-	0	0	0	-	0	-/-
05	**0**	-	-	-	-	-	0	0	0	-	0	19/20

		Age class distribution (plants per acre)					Utilization					
Year	Plants per Acre (excluding seedlings)	Seedling	Young	Mature	Decadent	Dead	% moderate	% heavy	% decadent	% dying	% poor vigor	Average Height Crown (in)
Chrysothamnus viscidiflorus stenophyllus												
86	**0**	-	-	-	-	-	0	0	0	-	0	-/-
95	**200**	-	60	100	40	-	0	0	20	10	10	16/34
00	**200**	20	20	160	20	80	0	10	10	10	10	13/28
05	**100**	-	-	100	-	-	0	0	0	-	0	13/19
Ephedra viridis												
86	**0**	-	-	-	-	-	0	0	0	-	0	-/-
95	**20**	-	20	-	-	-	0	0	0	-	0	63/97
00	**200**	-	80	100	20	20	60	20	10	-	0	25/25
05	**380**	-	80	300	-	-	79	0	0	-	0	31/46
Eriogonum microthecum												
86	**0**	-	-	-	-	-	0	0	-	-	0	-/-
95	**140**	-	20	120	-	-	0	0	-	-	0	-/-
00	**0**	-	-	-	-	-	0	0	-	-	0	-/-
05	**80**	-	-	80	-	-	50	50	-	-	0	6/8
Grayia spinosa												
86	**0**	-	-	-	-	-	0	0	0	-	0	-/-
95	**120**	-	-	60	60	-	0	0	50	-	0	25/44
00	**40**	-	-	-	40	-	100	0	100	100	100	23/44
05	**120**	-	-	80	40	-	0	83	33	33	33	25/45
Gutierrezia sarothrae												
86	**8199**	333	3733	4300	166	-	0	0	2	-	0	8/7
95	**6140**	40	100	6040	-	-	0	0	0	-	0	9/11
00	**960**	-	-	660	300	1500	2	0	31	15	17	6/8
05	**3020**	240	220	2800	-	-	2	0	0	-	0	10/12
Juniperus osteosperma												
86	**66**	-	33	33	-	-	0	0	-	-	0	71/71
95	**0**	-	-	-	-	-	0	0	-	-	0	-/-
00	**0**	-	-	-	-	-	0	0	-	-	0	-/-
05	**20**	-	-	20	-	-	0	0	-	-	0	-/-
Opuntia sp.												
86	**33**	-	-	33	-	-	0	0	0	-	0	7/1
95	**20**	-	-	20	-	-	0	0	0	-	0	5/21
00	**80**	-	-	60	20	-	0	0	25	-	0	6/21
05	**80**	-	-	80	-	-	0	0	0	-	25	7/20

Trend Study 10-15-05

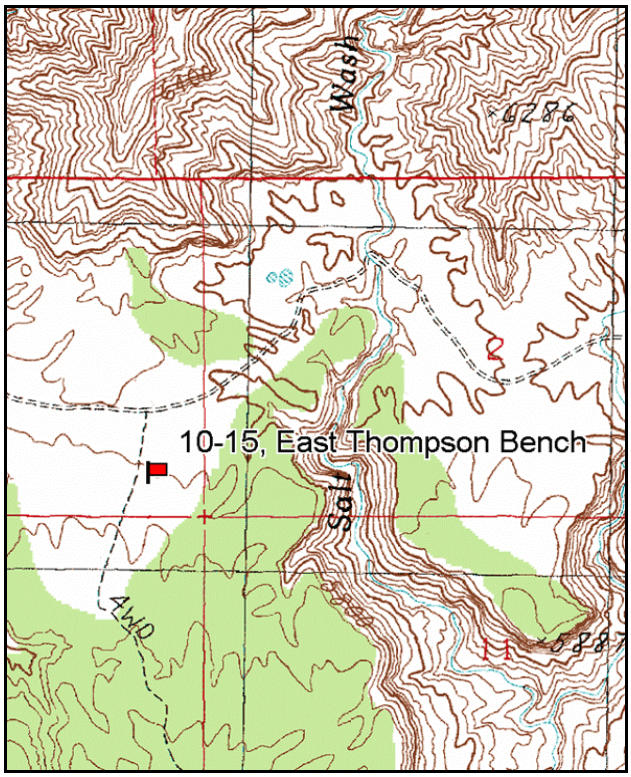
Study site name: East Thompson Bench . Vegetation type: Pinyon-Juniper .

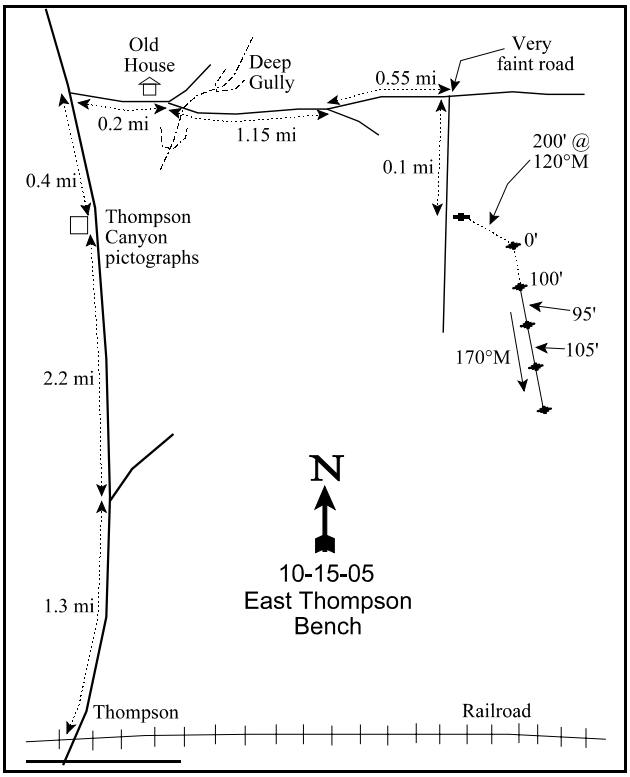
Compass bearing: frequency baseline 170 degrees magnetic.

Frequency belt placement: line 1 (11 & 95ft), line 2 (34ft), line 3 (59ft), line 4 (71ft). No rebar marking belt placement on belts 1 and 4.

LOCATION DESCRIPTION

From the railroad crossing in the town of Thompson, travel 1.3 miles north up the main road to a fork. Stay left and go 2.2 miles to the Thompson Canyon pictographs. Continue 0.4 miles. Make a sharp right turn and go 0.2 miles past an old house and a railroad cut to a fork. Turn right across a deep gully and go 1.15 miles to a fork. Stay left and continue 0.55 miles to a very faint road on the right. Turn on this road and go 0.1 mile to a witness post (a steel rebar) on the left side of the road. The first baseline post is 200 feet away at a bearing of 120°M from the witness post.





Map Name Sego Canyon

Diagrammatic Sketch

Township: 21S , Range 20E ,Section 3

GPS: NAD 27, UTM 12S 4318244 N, 613733 E

DISCUSSION

East Thompson Bench - Trend Study No. 10-15

The East Thompson Bench transect is located on a low lying bench east of Thompson Canyon at an elevation of 5,800 feet. This broad flat bench is dominated by junipers and intermixed with small openings of Wyoming big sagebrush. The bench has a gentle slope with a northern aspect. Water is limited in the area, but spring runoff flows through most of the intermittent washes in late winter or early spring. This site is located within the large Cisco Allotment which is grazed from November 1 to May 10 by 3 cattle permittees. Two sheep permittees also use the allotment from December through early May. In 1986, the BLM reported 61% use in the Thompson Bench area by sheep. In the past, the area was thought to be used heavily by deer, but data from 1995 and 2000 indicate this is not the case in recent years. In 2000, pellet group transect data estimated 35 deer days use/acre (86 ddu/ha) and 1 elk day use/acre (2 edu/ha). Two-thirds of the deer pellet groups were sampled on the first 200 feet of the transect where the area is in a sagebrush opening. Pellet groups decrease in frequency as you move into the pinyon-juniper further down the transect baseline. Pellet group data from 2005 estimated 46 deer days use/acre (112 ddu/ha) and 5 elk days use/acre (12 edu/ha).

Soil texture is a sandy clay loam and is reddish in color. The soil has moderate depth as indicated by the estimated effective rooting depth of over 17 inches. The soil is slightly alkaline (pH of 7.5) with low levels of phosphorus (1.7 ppm) and potassium (48 ppm) (Tiedemann and Lopez 2004). Organic matter is very low at less than 1%. There is little soil protection from vegetation and litter in the shrub interspaces. Several small active gullies are present, but due to the gentle terrain, erosion is not severe. Soil movement is most evident on trails or where the soil has been disturbed. Most of the litter and cryptogams are located directly beneath the canopy of the Wyoming big sagebrush. An erosion condition class assessment in 2005 rated erosion as slight.

Utah juniper is the predominant species. Canopy cover was 14% in 2000 and increased to 16% in 2005. Density was estimated at 84 trees/acre from point-centered quarter data in 2000. This increased to 136 junipers/acre in 2005. Fifty-five percent of the junipers sampled in 2005 were estimated to be taller than 8 feet. Pinyon pine are present, but are much less abundant than juniper.

The preferred key browse species is Wyoming big sagebrush. In 1986, the small openings were not sampled very well and a lower plant density was estimated. With the increased sample size used beginning in mid-1992, a much better estimate was determined. Estimated density was 1,680 plants/acre in 1995 and 1,960 plants/acre in 2000. However, the mature portion of the population decreased by 51% in 2000, while young plnats made up a large portion of the population. Unfortunately, it appears that most of these young plants did not survive through drought years. Sagebrush density actually decreased by 53% and dropped down to only 920 plants/acre in 2005. Fifty-two percent of the population was decadent in 1986, this decreased to 42% in 1995 and 45% in 2000. After many years of drought, by 2005 95% of the population was classified as decadent with 89% of the population categorized as dying. Drought, winter injury, utilization, and competition with juniper trees have caused a major decline in this sagebrush population. Recruitment from young plants was high in 2000 at 34% of the population, but was very low (2%) in 2005. No seedlings were sampled in 2005. Sagebrush cover declined from 6% in 2000 to 2% in 2005. Other browse at this site include green ephedra and broom snakeweed.

The herbaceous understory is meager. Cheatgrass and sixweeks fescue were abundant in 1995. Cheatgrass was sampled in 73% of the quadrats in 1995. With drought conditions quadrat frequency was only 14% in 2000 and increased to 32% in 2005. Galleta grass is the most abundant perennial grass followed by bottlebrush squirreltail. Perennial grasses occur sporadically throughout the site and are in low abundance. Sum of nested frequency for perennial grasses has slowly declined with each reading. This would be expected with the associated increases in juniper canopy cover. This site shows similar characteristics to the findings of

Tausch and West (1994), which showed that increased pinyon and juniper cover negatively effects understory cover.

Forbs are sparse and not significant on this site. The most abundant perennial forb is timber poisonvetch. Although considered palatable by all classes of livestock, this plant is in some instances is toxic, and in others, a highly nutritious plant (high protein content). Other perennial forbs encountered include: longleaf phlox, low fleabane, and sego lily. Annual species dominated the scant forb understory in 1995 and 2005 due to the wet spring weather. Common pepperweed was very abundant in 2005.

1986 APPARENT TREND ASSESSMENT

Due to a declining Wyoming big sagebrush population and apparent invasion of junipers and broom snakeweed, the vegetation trend appears to be declining. A treatment for the juniper and/or rest from winter sheep use would be desirable, but neither is called for in the management plan. The soil appears stable.

1995 TREND ASSESSMENT

The Wyoming big sagebrush population is showing slight improvement. Seventy-four percent of the plants were heavily hedged in 1986, then decreased to 24% in 1995. There are nearly as many dead as there are living plants with 19% of the population classified as dying. Decadence slightly decreased in 1995 to 42%. Broom snakeweed was sampled and does not appear to be increasing in density or young age class. With the improvement in Wyoming big sagebrush and an apparently decreasing broom snakeweed population, the browse trend is slightly upward. Annual grasses do not dominate the understory of this site like they do on surrounding sites, but they do make up over 80% of the herbaceous cover. Sum of nested frequency for galleta and Indian ricegrass significantly decreased since 1986, while the increased sample size detected Salina wildrye and mutton bluegrass. The changes in composition of the grass species are likely due to a larger sample size and a better distribution of sampling over the entire site. Forbs add very little to the site and are found primarily beneath the sagebrush crowns. The herbaceous understory trend is stable for now and more of a trend will be evident the next time the site is evaluated. There is little soil movement or pedestaling evident on the site. Soil trend is stable with most of the erosion coming from disturbed areas. Previously, nested frequency was collected only in the sagebrush opening and not in the denser patches of trees. Also, a more accurate Utah juniper density is achieved by sampling throughout the entire vegetation type and not only in the more dense portions of the Utah juniper stand. The DCI score is poor due to low amounts of preferred browse and perennial herbaceous plants.

TREND ASSESSMENT
soil - stable (0)
browse - slightly up (+1)
herbaceous understory - stable (0)
winter range condition (DC Index) - poor (18) Lower potential scale

2000 TREND ASSESSMENT

Trend for soil is slightly down due to increased bare ground cover and a lower ratio of protective ground cover to bare soil. Several gullies are present underneath the juniper trees, although these are small, they are active. Trend for browse is slightly down and in poor condition. Even though recruitment from the young age class increased to a high level (34%), decadence still remains high at 45% with 29% of the population classified as dying. The mature portion of the population decreased by 51%. There are nearly as many dead plants as there are live in the population the last two sampling years. However, there appears to be currently enough young plants to replace the decadent/dying sagebrush if they can survive the drought. In addition, there is less heavy use than was reported in 1995. The site is still dominated by an overstory of Utah juniper which has an

overhead canopy cover value of 14%. Increasing juniper cover will continue to negatively effect the sagebrush to a greater degree. Trend for the herbaceous understory is stable, but depleted. Perennial grasses show a very slight decrease in sum of nested frequency from 163 to 156. A positive thing is the significant decline of Cheatgrass. Perennial forbs decreased to half of the sum of nested frequency value reported in 1995, however, they provide less than 1% average cover. The DCI score improved to fair, because of an increase browse cover and an increase in young.

TREND ASSESSMENT
soil - slightly down (-1)
browse - slightly down (-1)
herbaceous understory - stable (0)
winter range condition (DC Index) - fair (32) Lower potential scale

2005 TREND ASSESSMENT

The soil trend is slightly down. The ratio of protective cover improved slightly, but relative bare ground increased from 39% to 47%. Relative litter cover decreased from 28% to 25%. Erosion was rated as slight and the gullies are still active. The browse trend is down. Wyoming big sagebrush density declined 53%. Decadence was 96% in 2005 with 89% of the population classified as dying. In 2005, there were nearly no young plants and no seedlings to replace those that have died or those classified as dying. Drought, winter injury, and competition with juniper trees have caused a major decline in sagebrush. Juniper density is increasing with an associated increase in canopy cover. The herbaceous understory trend is slightly down. The sum of nested frequency for perennial grasses decreased 15%. Cheatgrass and sixweeks fescue each significantly increased. Annual forbs also increased greatly, especially common pepperweed. On the positive side, sego lily frequency was higher. The DCI score decreased to very poor, because of an increase in decadence, a decrease in browse cover, and a decrease in young.

TREND ASSESSMENT
soil - slightly down (-1)
browse - down (-2)
herbaceous understory - slightly down (-1)
winter range condition (DC Index) - very poor (2) Lower potential scale

HERBACEOUS TRENDS --
Management unit 10 , Study no: 15

Type	Species	Nested Frequency				Average Cover %		
		'86	'95	'00	'05	'95	'00	'05
G	Bromus tectorum (a)	-	c190	a33	b69	b1.41	.07	.33
G	Elymus salina	a-	b29	b15	b16	.63	.52	1.16
G	Hilaria jamesii	b129	a65	a83	a60	.74	1.97	2.26
G	Oryzopsis hymenoides	14	1	4	9	.03	.17	.25
G	Poa secunda	a-	b16	ab5	b16	.03	.02	.19
G	Sitanion hystrix	ab49	b52	ab49	a31	.83	.36	.76
G	Vulpia octoflora (a)	-	c186	a-	b75	.44	-	.52
Total for Annual Grasses		0	376	33	144	1.85	0.07	0.85

Type	Species	Nested Frequency				Average Cover %		
		'86	'95	'00	'05	'95	'00	'05
Total for Perennial Grasses		192	163	156	132	2.27	3.05	4.63
Total for Grasses		192	539	189	276	4.12	3.12	5.49
F	Astragalus convallarius	13	21	20	17	.27	.26	.99
F	Astragalus sp.	-	5	5	4	.01	.01	.01
F	Castilleja linariaefolia	9	8	-	-	.04	-	-
F	Calochortus nuttallii	$_{a}$-	$_{bc}$17	$_{ab}$1	$_{c}$22	.04	.00	.06
F	Chenopodium fremontii (a)	-	1	-	4	.00	-	.03
F	Cryptantha sp.	$_{a}$-	$_{b}$14	$_{a}$-	$_{a}$2	.03	-	.03
F	Descurainia pinnata (a)	-	$_{b}$26	$_{a}$-	$_{c}$34	.05	-	.21
F	Draba sp. (a)	-	-	-	1	-	-	.00
F	Eriogonum cernuum (a)	-	3	-	-	.01	-	-
F	Erigeron pumilus	2	6	5	-	.04	.01	.00
F	Euphorbia sp.	-	1	1	4	.00	.00	.01
F	Gilia hutchinifolia (a)	-	$_{b}$72	$_{a}$3	$_{c}$125	.20	.01	1.12
F	Lappula occidentalis (a)	-	$_{a}$6	$_{a}$-	$_{b}$35	.01	-	.22
F	Lepidium densiflorum (a)	-	$_{b}$139	$_{a}$18	$_{c}$178	.51	.04	8.69
F	Oenothera sp.	-	-	-	2	-	-	.00
F	Phlox longifolia	13	10	8	10	.01	.01	.04
F	Ranunculus testiculatus (a)	-	-	1	-	-	.00	-
F	Schoencrambe linifolia	-	2	-	-	.00	-	-
F	Sisymbrium altissimum (a)	-	5	-	6	.01	-	.01
F	Townsendia sp.	-	-	-	2	-	-	.00
F	Unknown forb-perennial	1	-	-	-	-	-	-
Total for Annual Forbs		0	252	22	383	0.81	0.05	10.31
Total for Perennial Forbs		38	84	40	63	0.47	0.31	1.17
Total for Forbs		38	336	62	446	1.28	0.36	11.48

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

BROWSE TRENDS --
Management unit 10 , Study no: 15

Type	Species	Strip Frequency			Average Cover %		
		'95	'00	'05	'95	'00	'05
B	Artemisia tridentata wyomingensis	39	38	30	5.23	6.04	2.01
B	Chrysothamnus viscidiflorus stenophyllus	0	1	0	-	-	-
B	Ephedra viridis	3	2	3	.00	.00	.06
B	Gutierrezia sarothrae	22	20	6	.43	.43	.51
B	Juniperus osteosperma	0	12	17	11.85	13.11	12.87
B	Leptodactylon pungens	0	0	2	-	-	-
B	Opuntia sp.	2	2	1	.15	.00	-
Total for Browse		66	75	59	17.68	19.60	15.45

CANOPY COVER, LINE INTERCEPT --
Management unit 10 , Study no: 15

Species	Percent Cover	
	'00	'05
Artemisia tridentata wyomingensis	-	7.30
Juniperus osteosperma	14.19	15.89
Leptodactylon pungens	-	.06

KEY BROWSE ANNUAL LEADER GROWTH --
Management unit 10 , Study no: 15

Species	Average leader growth (in)
	'05
Artemisia tridentata wyomingensis	1.7

POINT-QUARTER TREE DATA --
Management unit 10 , Study no: 15

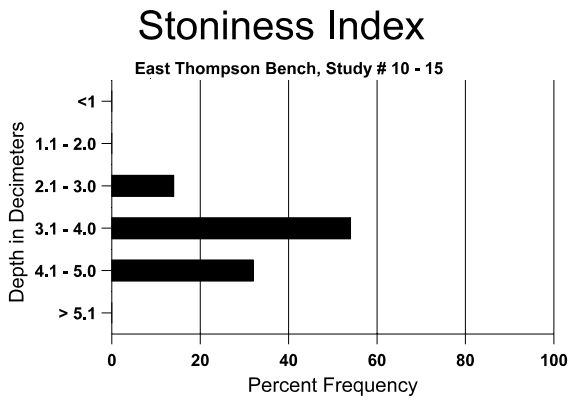
Species	Trees per Acre		Average diameter (in)	
	'00	'05	'00	'05
Juniperus osteosperma	84	136	3.0	3.9

BASIC COVER --
Management unit 10 , Study no: 15

Cover Type	Average Cover %			
	'86	'95	'00	'05
Vegetation	8.25	26.71	25.85	26.68
Rock	0	.68	.15	.06
Pavement	0	.10	.75	.78
Litter	40.25	34.96	34.76	27.98
Cryptogams	4.25	9.87	13.65	5.19
Bare Ground	47.25	30.85	47.48	53.02

SOIL ANALYSIS DATA --
Herd Unit 10, Study # 15, Study Name: East Thompson Bench

Effective rooting depth (in)	Temp °F (depth)	pH	%sand	%silt	%clay	%0M	ppm P	ppm K	dS/m
17.2	61.0 (18.0)	7.5	50.0	28.0	22.0	0.7	1.7	48.0	0.6



PELLET GROUP DATA --
Management unit 10 , Study no: 15

Type	Quadrat Frequency		
	'95	'00	'05
Sheep	22	-	-
Rabbit	43	36	58
Elk	-	8	6
Deer	19	19	31

Days use per acre (ha)	
'00	'05
-	-
-	-
1 (2)	5 (12)
35 (88)	46 (12)

BROWSE CHARACTERISTICS --
Management unit 10 , Study no: 15

		Age class distribution (plants per acre)					Utilization					
Year	Plants per Acre (excluding seedlings)	Seedling	Young	Mature	Decadent	Dead	% moderate	% heavy	% decadent	% dying	% poor vigor	Average Height Crown (in)
Artemisia tridentata wyomingensis												
86	**899**	33	133	300	466	-	26	74	52	9	19	18/20
95	**1680**	540	120	860	700	1460	43	24	42	19	19	20/31
00	**1960**	40	660	420	880	1160	48	7	45	29	29	21/29
05	**920**	-	20	20	880	1660	22	70	96	89	89	13/19
Chrysothamnus viscidiflorus stenophyllus												
86	**0**	-	-	-	-	-	0	0	-	-	0	-/-
95	**0**	-	-	-	-	-	0	0	-	-	0	-/-
00	**20**	-	20	-	-	-	0	0	-	-	0	-/-
05	**0**	-	-	-	-	-	0	0	-	-	0	7/13
Ephedra viridis												
86	**0**	-	-	-	-	-	0	0	0	-	0	-/-
95	**80**	-	20	60	-	-	0	0	0	-	0	16/16
00	**40**	-	-	20	20	-	0	50	50	50	50	9/9
05	**60**	-	-	40	20	-	0	33	33	33	33	21/19
Gutierrezia sarothrae												
86	**3466**	33	366	3100	-	-	0	0	0	-	0	8/7
95	**1160**	20	300	860	-	20	0	0	0	-	0	8/8
00	**860**	-	120	500	240	80	0	0	28	7	7	6/8
05	**200**	20	-	200	-	-	0	0	0	-	0	9/10
Juniperus osteosperma												
86	**200**	33	100	100	-	-	0	0	-	-	0	94/104
95	**0**	-	-	-	-	-	0	0	-	-	0	-/-
00	**260**	20	20	240	-	40	0	0	-	-	0	-/-
05	**340**	-	140	200	-	-	0	0	-	-	0	-/-
Leptodactylon pungens												
86	**0**	-	-	-	-	-	0	0	-	-	0	-/-
95	**0**	-	-	-	-	-	0	0	-	-	0	-/-
00	**0**	-	-	-	-	-	0	0	-	-	0	-/-
05	**140**	60	-	140	-	-	0	0	-	-	0	4/6
Opuntia sp.												
86	**33**	-	-	33	-	-	0	0	-	-	0	7/7
95	**40**	-	-	40	-	-	0	0	-	-	0	6/12
00	**40**	20	20	20	-	-	0	0	-	-	0	5/14
05	**20**	-	-	20	-	-	0	0	-	-	0	7/31

		Age class distribution (plants per acre)					Utilization					
Year	Plants per Acre (excluding seedlings)	Seedling	Young	Mature	Decadent	Dead	% moderate	% heavy	% decadent	% dying	% poor vigor	Average Height Crown (in)
Sclerocactus sp.												
86	**0**	-	-	-	-	-	0	0	-	-	0	-/-
95	**0**	-	-	-	-	-	0	0	-	-	0	-/-
00	**0**	-	-	-	-	-	0	0	-	-	0	-/-
05	**0**	-	-	-	-	20	0	0	-	-	0	-/-

Trend Study 10-16-05

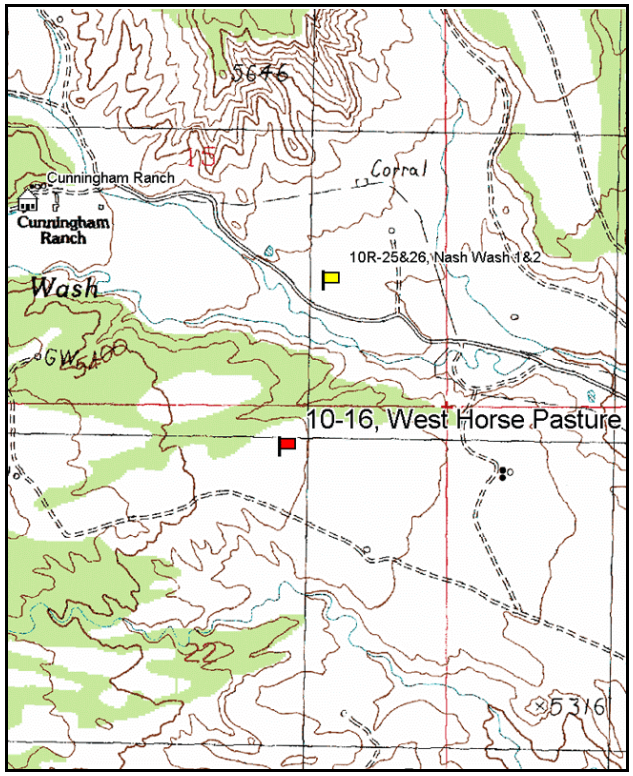
Study site name: West Horse Pasture . Vegetation type: Wyoming Big Sagebrush .

Compass bearing: frequency baseline 165 degrees magnetic.

Frequency belt placement: line 1 (11 & 95ft), line 2 (34ft), line 3 (59ft), line 4 (28ft).

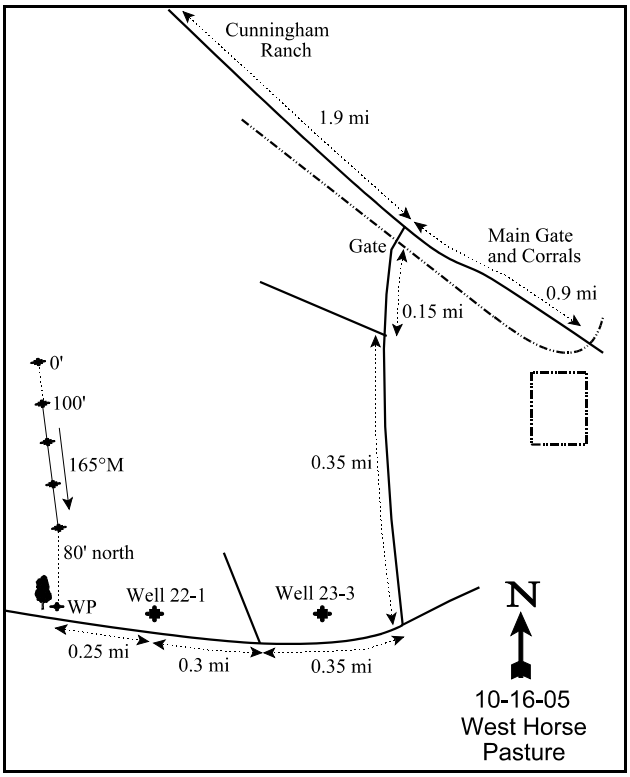
LOCATION DESCRIPTION

From the main gate at Cunningham Ranch travel south 1.9 miles to a fork and turn right. Go through a gate (100 yards) and proceed 0.15 miles to a fork at the top of a hill. Stay left and go 0.35 miles to a "T" intersection. Turn right and go 0.35 miles past a well [NP Energy #23-3] to a fork. Stay left and travel northwest 0.3 miles to another well [NP Energy #22-1]. Continue northwest for 0.25 miles to a rebar witness post on the right side of the road next to a small Juniper. The 400-foot stake is 80 feet due north from the witness post. The frequency baseline starts 400 feet north at a rebar tagged with browse tag #7807.



Map Name: Sego Canyon

Township 20S , Range 21E , Section 22



Diagrammatic Sketch

GPS: NAD 27, UTM 12S 4323935 N, 622913 E

DISCUSSION

West Horse Pasture - Trend Study No. 10-16

The West Horse Pasture transect is located south of Nash Wash and samples critical deer winter range. This large, open Wyoming big sagebrush flat is surrounded by junipers and eroded steep cliffs to the north and west. The elevation at the site is 5,380 feet. The bench is nearly flat, draining to the southeast by an ephemeral wash. Not only is this a critical deer winter concentration area, it also supports many other uses including cattle and sheep grazing, oil and gas exploration and production, mining, and associated human activity. Pellet group transects located in the Horse Pasture area showed an average use of 58 deer days use/acre (143 ddu/ha) between 1981 and 1986 (Jense et al. 1986). From 1986 through 1990, the last time this pellet transect was read, use averaged 39 deer days use/acre (95 ddu/ha) (Jense et al. 1991). Pellet group data from 2000 estimated 58 deer days use/acre (143 ddu/ha) and 5 elk days use/acre (12 edu/ha). Data from 2005 estimated 38 deer days use/acre (94 ddu/ha), 9 elk days use/acre (22 edu/ha), and 2 cow days use/acre (4cdu/ha). In 1986, four antler drops were found. Cover for deer is provided by a nearby dense stand of mature Utah Juniper. Antler rubs on trees were noted in 2005.

There was some evidence of surface erosion and a gully runs between the 300 and 400 foot baseline stakes. Soil loss in the past is evident by a high degree of soil movement from interspaces and subsequent pedestaling around the base of the shrubs. Litter build-up is also evident on mounds beneath shrub crowns. Cryptogams are mossy-like and are present under almost the entire area under the shrub crowns. Soil texture is a sandy clay loam. Effective rooting depth is estimated at about 15 inches. A profile stoniness index estimated from penetrometer readings shows a compact layer between 12-16 inches in depth. Very little rock is present in the profile, thus this index is a measure of the depth to a hardpan not actual rock. The soil is slightly alkaline (pH of 7.4) and both phosphorus and potassium levels are low (3.8 ppm P and 57.6 ppm K) (Tiedemann and Lopez 2004).

The key browse species is Wyoming big sagebrush. Wyoming big sagebrush cover was 12% in 1995, 15% in 2000, but decreased to 8% in 2005. Density was estimated at 4,300 plants/acre in 1995. This estimate was taken with the larger sampling design, which gives much better estimates for species with discontinuous and/or clumped distributions. Since 1995, sagebrush density has declined to 3,500 plants/acre in 2000 and to 3,140 plants/acre in 2005. Decadence was about 26% in both 1995 and 2000. In 2005, 71% of the population was classified as decadent with 50% classified as dying. Recruitment from young plants has been very poor, which means there are not enough young plants to replace those that are dying. In 1986, forage availability was limited due to severe hedging. Heavy use was displayed on 93% of the population in 1986, decreased to 50% in 1995, 23% in 2000, and increased to 67% in 2005. The high amounts of cheatgrass on this site may be preventing the establishment of seedling and young plants.

Broom snakeweed density and cover have been reflective of precipitation patterns. It was very abundant in 1995. Snakeweed was rare in 2000 during drought conditions, then density and cover increased in 2005. Spiny hopsage was sampled in 1986, but was not after the change in sampling design used beginning in mid-1992. It is still on the site as height and crown measurements were taken in other sampling years. There are some scattered young pinyon and juniper trees throughout the flat, but they do not appear to be encroaching into the area. Point-quarter data in 2000 estimated 5 pinyon and 13 juniper trees/acre.

As reported in 1986, the grass composition has been dominated by cheatgrass in the past, with perennial grasses being relatively scarce. Cheatgrass was sampled in every quadrat in 1995 (100%), but due to the dry conditions in 2000, had a reduced quadrat frequency to 70%. In 2005, it was again sampled in every quadrat. Cheatgrass cover was over 50% in 2005. This puts this site at risk for fire, which would destroy the sagebrush population. Perennial grasses have not been very abundant. Galleta and bottlebrush squirreltail have been the most abundant perennials. Scarlet globemallow and timber poisonvetch are the most abundant perennial forbs. Wooly plantain was the most abundant forb in 2005.

1986 APPARENT TREND ASSESSMENT

Wyoming big sagebrush on the site is sustaining severe heavy use and data indicates an apparent declining trend in vigor, age structure, and forage production. Ninety-eight percent of the sagebrush population is mature or decadent. The primary management objective should be to promote sagebrush seed production to enhance the opportunity for recruitment, but this is difficult with the high density of competing winter annuals in a very dry summer environment. Plant vigor needs to improve in order for seed production to occur. A combination of management practices could take place for this to happen. Grazing pressure on sagebrush must be greatly reduced. A thinning project designed to open up the stand could help reduce intraspecific competition and open up space for seedling establishment, however the cheatgrass could become more of a problem without competition from the sagebrush. Key browse species should be seeded in conjunction with the thinning treatment.

1995 TREND ASSESSMENT

Although the Wyoming big sagebrush is not as heavily hedged as in the past (93% vs 50%) and percent decadence in the population has decreased (55% vs 27%), 98% of the population still remains classified as mature or decadent. The broom snakeweed density, judging from its composition, appears to be relatively stable, although it is shifting to a more mature age structure. This leads to a stable browse trend. As mentioned in 1986, management objectives should be to promote sagebrush seed production. Concurrently, the herbaceous understory would benefit if the Wyoming big sagebrush population were thinned, but more importantly there should be fewer winter annuals for the herbaceous species and sagebrush seedlings to compete with. Wyoming big sagebrush now contributes over 12% of the vegetation cover. With this high of a cover value from Wyoming big sagebrush, the herbaceous understory production would be reduced and anything more than an annual herbaceous understory should be expected. The increase in sum of nested frequency for galleta and bottlebrush, which are good to fair forage in the spring, and the increase in sum of nested frequency for perennial forbs, indicates a slightly upward herbaceous understory trend. Although this trend is slightly upward, this is still a poor composition and is nonetheless dominated by annual species. An active gully is located in the center of the study site, but shows some signs of healing. Elsewhere on the site, there is not much evidence of erosion, mostly due to the dense cheatgrass and Wyoming big sagebrush cover. Soil trend for this site is stable for now and the gully should be monitored for further activity. The DCI score is poor due to low browse recruitment, high annual grass cover, and lack of perennial herbaceous plants.

TREND ASSESSMENT
soil - stable (0)
browse - stable (0)
herbaceous understory - slightly up (+1)
winter range condition (DC Index) - poor (22) Lower potential scale

2000 TREND ASSESSMENT

Trend for soil is slightly down due to a large increase in bare ground and decreases in vegetation and litter cover. As a result, the ratio of bare soil to protective ground cover decreased in 2000 and is relatively low at 1:2.1. Interspaces between shrubs show past signs of soil loss and with the decrease in annual species, these are virtually bare making them more susceptible to erosion. Trend for browse is slightly down. The population of Wyoming big sagebrush decreased 19% from 4,300 plants/acre to 3,500 in 2005. Young recruitment remains low at 1% which could translate into a decreasing population in the future if the decadent, dying plants die-off. Dying individuals increased slightly. Heavy use has decreased again in 2000 to 23% of the population, down from 50% in 1995. Trend for the herbaceous understory is slightly up as sum of nested frequency for perennial species slightly increased and cheatgrass decreased in 2000. Cheatgrass is likely to return when timing of precipitation is better. The DCI score improved to fair to good to fair, due to an increase in browse cover, an increase in perennial grass cover, and a decrease in annual grass cover.

TREND ASSESSMENT
soil - slightly down (-1)
browse - slightly down (-1)
herbaceous understory - slightly up (+1)
winter range condition (DC Index) - fair to good (45) Lower potential scale

2005 TREND ASSESSMENT

The soil trend is slightly up due to increased vegetation cover from cheatgrass and lower amounts of bare ground. The browse trend is down. Wyoming big sagebrush density declined 10% to 3,140 plants/acre. However, the proportion of the population classified as mature decreased by 67%. Cover declined from 15% to 8%. Decadence increased to 71%, while 50% of the population was classified as dying. There were very few young plants to replace those that are dying. The high amounts of annuals like cheatgrass make it very difficult for sagebrush to persist with no replacement plants. Heavy use also increased from a quarter of the population to two-thirds of the population. Broom snakeweed increased with the improved moisture patterns in 2005. The herbaceous understory trend is down. Cheatgrass increased significantly and is a major fire risk. Sum of nested frequency for perennial grasses and forbs combined declined 31%. The DCI score decreased to very poor due to a decrease in browse cover, a decrease in perennial grass cover, an increase in decadence, and an increase in annual grass cover.

TREND ASSESSMENT
soil - slightly up (+1)
browse - down (-2)
herbaceous understory - down (-2)
winter range condition (DC Index) - very poor (-6) Lower potential scale

HERBACEOUS TRENDS --
Management unit 10 , Study no: 16

Type	Species	Nested Frequency				Average Cover %		
		'86	'95	'00	'05	'95	'00	'05
G	Bromus tectorum (a)	-	$_{b}$374	$_{a}$196	$_{b}$379	12.08	1.44	51.08
G	Hilaria jamesii	$_{a}$2	$_{b}$50	$_{b}$51	$_{b}$44	1.25	3.73	.91
G	Oryzopsis hymenoides	1	3	5	6	.15	.44	.82
G	Sitanion hystrix	$_{a}$3	$_{b}$42	$_{b}$63	$_{a}$14	.44	1.58	.40
G	Sporobolus cryptandrus	$_{b}$12	$_{a}$-	$_{ab}$2	$_{a}$-	-	.03	-
G	Vulpia octoflora (a)	-	$_{a}$10	$_{a}$-	$_{b}$67	.01	-	.75
Total for Annual Grasses		0	384	196	446	12.10	1.44	51.83
Total for Perennial Grasses		18	95	121	64	1.83	5.78	2.14
Total for Grasses		18	479	317	510	13.94	7.22	53.97
F	Astragalus convallarius	5	12	7	9	.17	.21	.48
F	Astragalus moencopensis	1	-	-	-	-	-	-
F	Astragalus sp.	$_{a}$3	$_{b}$28	$_{a}$3	$_{a}$5	.05	.00	.01
F	Castilleja linariaefolia	-	6	3	-	.16	.00	-
F	Calochortus nuttallii	$_{a}$-	$_{a}$3	$_{a}$1	$_{b}$20	.00	.00	.08

Type	Species	Nested Frequency				Average Cover %		
		'86	'95	'00	'05	'95	'00	'05
F	Delphinium nuttallianum	-	-	-	2	-	-	.00
F	Descurainia pinnata (a)	-	$_{a}$11	$_{a}$-	$_{b}$16	.02	-	.13
F	Draba sp. (a)	-	1	-	1	.00	-	.00
F	Erigeron pumilus	1	-	5	-	-	.04	-
F	Gilia hutchinifolia (a)	-	$_{a}$8	$_{a}$-	$_{b}$34	.02	-	.20
F	Holosteum umbellatum (a)	-	$_{b}$21	$_{a}$-	$_{a}$-	.06	-	-
F	Lappula occidentalis (a)	-	$_{b}$31	$_{a}$-	$_{c}$61	.05	-	.34
F	Leucelene ericoides	-	1	3	3	.00	.03	.03
F	Lepidium sp. (a)	-	$_{c}$51	$_{a}$-	$_{b}$27	.11	-	.59
F	Oenothera sp.	-	5	-	-	.01	-	-
F	Phlox longifolia	$_{a}$-	$_{b}$19	$_{b}$21	$_{a}$-	.04	.04	-
F	Plantago patagonica (a)	-	$_{c}$129	$_{a}$2	$_{b}$183	.30	.00	3.93
F	Schoencrambe linifolia	-	-	1	-	-	.00	-
F	Sphaeralcea coccinea	$_{a}$20	$_{ab}$28	$_{b}$43	$_{ab}$38	.16	1.57	1.12
F	Townsendia sp.	-	-	-	3	-	-	.00
F	Unknown forb-perennial	3	-	-	-	-	-	-
Total for Annual Forbs		0	252	2	322	0.58	0.00	5.20
Total for Perennial Forbs		33	102	87	80	0.61	1.92	1.74
Total for Forbs		33	354	89	402	1.19	1.93	6.94

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

BROWSE TRENDS --
Management unit 10 , Study no: 16

Type	Species	Strip Frequency			Average Cover %		
		'95	'00	'05	'95	'00	'05
B	Artemisia tridentata wyomingensis	84	80	77	12.32	15.15	8.03
B	Atriplex canescens	0	1	0	-	-	-
B	Gutierrezia sarothrae	97	34	71	7.67	.23	3.80
B	Opuntia sp.	9	10	11	.00	.09	.58
Total for Browse		190	125	159	20.01	15.48	12.43

CANOPY COVER, LINE INTERCEPT --
Management unit 10 , Study no: 16

Species	Percent Cover '05
Artemisia tridentata wyomingensis	7.71
Gutierrezia sarothrae	4.00
Opuntia sp.	.45

KEY BROWSE ANNUAL LEADER GROWTH --
Management unit 10 , Study no: 16

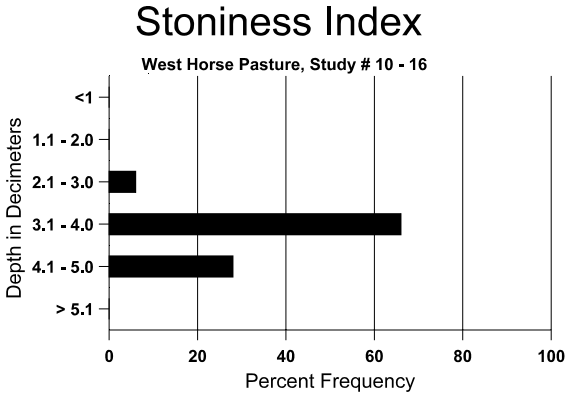
Species	Average leader growth (in) '05
Artemisia tridentata wyomingensis	1.2

BASIC COVER --
Management unit 10 , Study no: 16

Cover Type	Average Cover %			
	'86	'95	'00	'05
Vegetation	24.50	36.40	27.21	68.36
Rock	0	.07	.01	.04
Pavement	0	0	.12	.01
Litter	48.00	45.56	33.00	18.70
Cryptogams	0	1.89	2.98	.63
Bare Ground	27.50	29.78	51.00	20.34

SOIL ANALYSIS DATA --
Herd Unit 10, Study # 16, Study Name: West Horse Pasture

Effective rooting depth (in)	Temp °F (depth)	pH	%sand	%silt	%clay	%0M	ppm P	ppm K	dS/m
15.4	63.8 (15.5)	7.4	50.0	24.0	26.0	0.7	3.8	57.6	0.5



PELLET GROUP DATA --
Management unit 10 , Study no: 16

Type	Quadrat Frequency		
	'95	'00	'05
Rabbit	49	30	16
Elk	-	3	1
Deer	44	66	24
Cattle	-	-	-

Days use per acre (ha)	
'00	'05
-	-
5 (12)	9 (22)
58 (143)	38 (94)
-	2 (4)

BROWSE CHARACTERISTICS --
Management unit 10 , Study no: 16

		Age class distribution (plants per acre)					Utilization					
Year	Plants per Acre (excluding seedlings)	Seedling	Young	Mature	Decadent	Dead	% moderate	% heavy	% decadent	% dying	% poor vigor	Average Height Crown (in)
Artemisia tridentata wyomingensis												
86	**2799**	-	66	1200	1533	-	5	93	55	1	21	12/14
95	**4300**	-	100	3060	1140	760	43	50	27	16	16	17/30
00	**3500**	-	20	2580	900	580	58	23	26	19	19	16/26
05	**3140**	180	40	860	2240	920	25	67	71	50	51	19/28
Atriplex canescens												
86	**0**	-	-	-	-	-	0	0	-	-	0	-/-
95	**0**	-	-	-	-	-	0	0	-	-	0	-/-
00	**20**	-	-	20	-	-	100	0	-	-	0	-/-
05	**0**	-	-	-	-	-	0	0	-	-	0	-/-

		Age class distribution (plants per acre)					Utilization					
Year	Plants per Acre (excluding seedlings)	Seedling	Young	Mature	Decadent	Dead	% moderate	% heavy	% decadent	% dying	% poor vigor	Average Height Crown (in)
Grayia spinosa												
86	**266**	-	-	66	200	-	0	100	75	-	25	13/17
95	**0**	-	-	-	-	-	0	0	0	-	0	10/20
00	**0**	-	-	-	-	-	0	0	0	-	0	-/-
05	**0**	-	-	-	-	-	0	0	0	-	0	20/27
Gutierrezia sarothrae												
86	**7533**	733	4000	3133	400	-	0	0	5	-	0	10/7
95	**15140**	580	5280	9820	40	20	0	0	0	.13	.13	12/13
00	**1020**	40	20	820	180	240	0	0	18	12	12	10/11
05	**3880**	180	40	3760	80	-	0	0	2	-	0	13/13
Opuntia sp.												
86	**0**	-	-	-	-	-	0	0	0	-	0	-/-
95	**200**	-	-	200	-	-	0	0	0	-	0	6/18
00	**240**	20	-	180	60	-	8	0	25	17	17	5/17
05	**360**	-	-	360	-	-	0	0	0	-	0	6/23

Trend Study 10-17-05

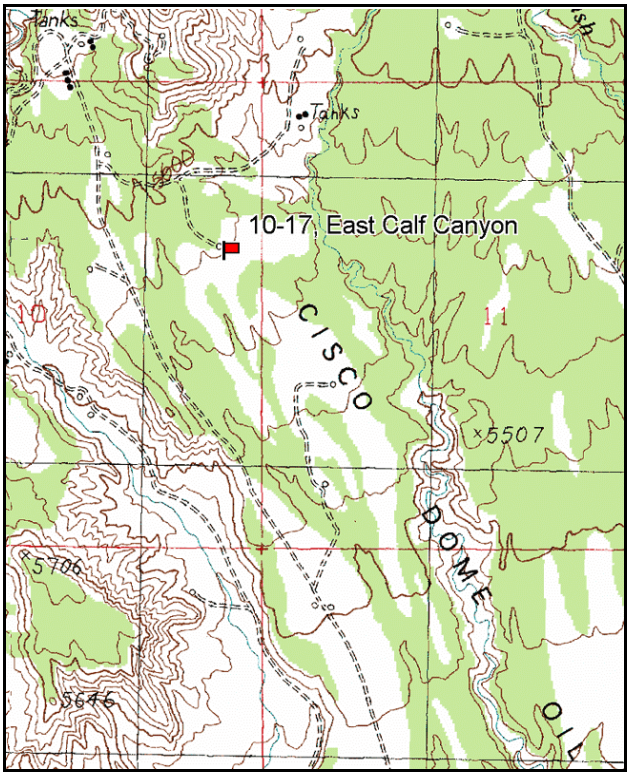
Study site name: East Calf Canyon . Vegetation type: Wyoming Big Sagebrush .

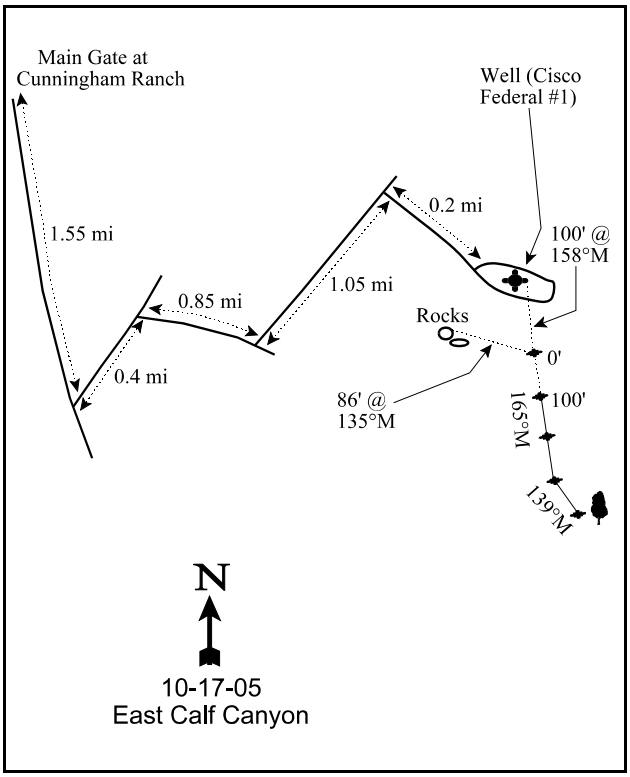
Compass bearing: frequency baseline 165 degrees magnetic.

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

LOCATION DESCRIPTION

From the main gate at Cunningham Ranch go southeast on the main road for 1.55 miles to a fork and turn left (northeast). Proceed 0.4 miles to a fork. Turn right and proceed 0.85 to a fork. Stay left and go 1.05 miles to another fork. Turn right and go 0.2 miles to a well numbered Cisco Federal #1. The first baseline stake is approximately 100 feet southeast of the road in the sagebrush opening.





Map Name: Calf Canyon

Diagrammatic Sketch

Township 20S , Range 21E , Section 10

GPS: NAD 27, UTM 12S 4326704 N, 623276 E

DISCUSSION

East Calf Canyon - Trend Study No. 10-17

The East Calf Canyon transect is located in a sagebrush clearing on a mixed pinyon-juniper-sagebrush bench at the base of the Book Cliffs. The study is located north of Horse Pasture and Nash Wash at an elevation of 5,500 feet with a slight southeastern exposure. This Wyoming big sagebrush type has been an important wintering area for deer. This site is located within the large Cisco Allotment which is grazed from November 1 to May 10 by 3 cattle permittees. Two sheep premittees also use the allotment from December through early May. Prior to 1986, sheep use occurred in the winter months and cattle were present from mid-October to mid-June. A 330-acre chaining project was completed in the fall of 1987 on the area just east and northeast of the study site. The chaining and seeding was an Interagency project coordinated with State Lands, BLM, and DWR. This chaining was done with a light smooth chain to help protect an understory population of decadent cliffrose. Pellet group transect data from 2000 indicated deer use to be moderate with an estimated 29 deer days use/acre (72 ddu/ha). Data from 2005 was estimated at 69 deer days use/acre (170 ddu/ha), 14 elk days use/acre (35 edu/ha), and 1 cow day use/acre (2 cdu/ha). Besides its importance as big game and livestock winter range, there is active oil and gas exploration with associated developments and network of roads in the area. At the north end of the clearing is an oil pump and storage tanks.

Soil on the site is a moderately deep, well-drained, loam to clay loam. Effective rooting depth is estimated at nearly 16 inches. Soils are neutral in reactivity (pH of 7.2). Phosphorus and potassium levels are marginal (Tiedemann and Lopez 2004). Shrub interspaces are mostly bare with small gullies and compacted animal trails showing the effects of some surface erosion. It was estimated in 2000 that the interspaces had between 4-6 inches of soil loss as indicated by the pedestaled shrubs. An erosion condition class assessment rated erosion as stable in 2005, despite high amounts of bare soil.

The overall area supports a complex comprised mostly of juniper-pinyon woodland with scattered sagebrush openings. These sagebrush-grass openings provide the important forage for deer, sheep, and cattle. Wyoming big sagebrush is the key browse species, and according to earlier BLM studies on the allotment in 1986, sagebrush utilization was heavy to severe. Sagebrush density was estimated at 3,999 plants/acre in 1986. After the sampling size was increased in the early 1990's, sagebrush density estimated at 5,600 plants/acre in 1995, 5,880 plants/acre in 2000, and 5,140 plants/acre in 2005. Data collected by the range crew in late June 1986 found a high percentage of decadent plants (55%) and many plants in the heavily hedged form class (57%). Since 1995 decadence has been between 18-31%. Utilization has been moderate in that period of time. Although decadence and the percent of plants classified as dying increased in 2005, young recruitment was high at 32% of the population and nearly 5,000 seedlings/acre were sampled. This site contrasts with the West Horse Pasture (10-16) study less than 2 miles to the south. This site has much less cheatgrass and shows good sagebrush reproduction. In 2005, leader growth averaged 1.9 inches, while West Horse Pasture averaged 1.2 inches because sagebrush has to compete with cheatgrass for moisture. Cover from Wyoming big sagebrush was estimated at 17-19%, and with this level of cover, the herbaceous understory is usually in a suppressed state and will have a difficult time increasing.

The two other browse species found on the transect are broom snakeweed and pricklypear cactus. Utah Juniper surrounds the sagebrush opening and does not appear to be invading. Mature trees, especially on the edges and in the opening, have been highlined. Point-center quarter data estimates were 43 juniper trees/acre in 2000 and 47 trees/acre in 2005. Mean diameter was 2.5 inches in 2000 and 3.8 inches in 2005.

The sagebrush interspaces are basically devoid of vegetation except for annual cheatgrass. Even this invader species grows best under the protection of the sagebrush canopy. In 1995, cheatgrass was present in nearly every quadrat (98%), but was much lower in 2000 and 2005. Bottlebrush squirreltail was most abundant in 1995, but has since declined. It occurs sporadically throughout the site, but mostly under shrub crowns. There

are a few scattered forbs, the most abundant are longleaf phlox and several milkvetch species that occur in low densities. The disturbed areas along the road and drill pad are a refuge for exotic annual weeds such as Russian thistle, but they have not yet invaded into the flat.

1986 APPARENT TREND ASSESSMENT

The sagebrush cannot sustain current levels of use for many more years and there does not appear to be enough young plants to maintain stand density. A drought or severe winter could be deleterious. Soil trend appears downward because of the lack of ground cover, subsequent loss of the sandy soil through gully and surface erosion and lack of establishment of perennial plants in the bare areas. A combination of reduced grazing pressure and a sagebrush reduction treatment would be helpful in rejuvenating this area.

1995 TREND ASSESSMENT

Due to the recovery of the Wyoming sagebrush population from many years of excessive grazing, the browse trend is slightly upward. Although the Wyoming big sagebrush appears to be adequately recovering from heavy grazing pressure, the density of sagebrush coupled with the extended drought is causing the herbaceous understory to be stunted and to have poor diversity. The broom snakeweed population appears to be slightly increasing and the age class structure indicates a mature population with many young and seedlings present. This slight increase could be due to the much larger sample size and better distribution of the sample used throughout the sagebrush opening. The herbaceous understory is in poor condition with very few perennial species present. Sum of nested frequency for bottlebrush squirreltail and longleaf phlox significantly increased since 1986, but do not provide much forage or cover on this site. Cheatgrass is very abundant and dominates the site, which is a fire hazard. The herbaceous understory trend is stable, but with poor composition. The interspaces have little protection from erosion and some pedestaling is evident, but it does not appear to be any different than in 1986. Most litter and herbaceous vegetation is associated with the sagebrush plants, leaving the interspaces bare of cover. Trend for soil is stable for now. Thinning the sagebrush population on this site would benefit the herbaceous understory as well as provide needed soil protection. The Desirable Components Index score is fair due to good browse cover, good young recruitment, and moderate annual grass cover.

TREND ASSESSMENT
soil - stable (0)
browse - slightly up (+1)
herbaceous understory - stable (0)
winter range condition (DC Index) - fair (36) Lower potential scale

2000 TREND ASSESSMENT

Trend for soil is slightly down to a large increase in bare soil, decreases in vegetation and litter cover, and a decrease in sum of nested frequency for perennial herbaceous species. The ratio of protective ground cover to bare soil also largely decreased due to the these factors. Trend for browse is stable. Wyoming big sagebrush slightly increased in percent decadence and heavy use in 2000, but is still well below the 1986 levels of 55% and 57%, respectively. Recruitment from young plants is currently high at 24% and adequate to replace the dying individuals that may be lost. The sagebrush is very dense at this site, and some thinning out of the population would be positive. Sum of nested frequency of the herbaceous perennial component decreased in 2000 from an already low level, but on the positive side cheatgrass significantly declined. The herbaceous understory will remain in this suppressed condition and poor composition unless the sagebrush is thinned out. Trend for the herbaceous understory is slightly down and in poor condition. The DCI score improved with the reduction of cheatgrass.

TREND ASSESSMENT
soil - slightly down (-1)
browse - stable (0)
herbaceous understory - slightly down (-1)
winter range condition (DC Index) - good (49) Lower potential scale

2005 TREND ASSESSMENT

The soil trend is stable. Conditions were very similar to 2000. Vegetation was slightly higher and litter slightly lower than in 2000. The browse trend is slightly down. Sagebrush has been negatively effected by drought as decadence and the number of dying plants increased, but recruitment of young plants and number of seedlings were been excellent. However, sagebrush density decreased 13% from 5,880 plants/acre to 5,140 in 2005. This decrease was primarily in the mature age class of the population. Broom snakeweed density was unchanged since 2000. The herbaceous understory trend is slightly down. Sum of nested frequency for perennial species decreased about 25%. Annuals increased in 2005 with the wet spring weather, but cheatgrass did not increase significantly. The DCI score improved with the increase in young individuals.

TREND ASSESSMENT
soil - stable (0)
browse - slightly down (-1)
herbaceous understory - slightly down (-1)
winter range condition (DC Index) - good (51) Lower potential scale

HERBACEOUS TRENDS --
Management unit 10 , Study no: 17

Type	Species	Nested Frequency				Average Cover %		
		'86	'95	'00	'05	'95	'00	'05
G	Bromus tectorum (a)	-	b359	a95	a116	16.90	1.02	.95
G	Hilaria jamesii	3	-	-	-	-	-	-
G	Poa fendleriana	-	3	1	-	.00	.00	-
G	Sitanion hystrix	a31	b95	ab58	a38	.66	.41	.90
G	Vulpia octoflora (a)	-	b37	a1	c87	.07	.00	.84
Total for Annual Grasses		0	396	96	203	16.97	1.02	1.79
Total for Perennial Grasses		34	98	59	38	0.66	0.41	0.90
Total for Grasses		34	494	155	241	17.63	1.44	2.70
F	Astragalus convallarius	-	-	6	-	.00	.19	.00
F	Astragalus sp.	1	8	1	11	.36	.00	1.50
F	Castilleja linariaefolia	-	6	3	2	.06	.03	.00
F	Calochortus nuttallii	2	-	-	5	-	-	.01
F	Chenopodium fremontii (a)	-	-	-	10	-	-	.54
F	Chenopodium leptophyllum(a)	-	3	-	-	.00	-	-
F	Chaenactis stevioides	-	-	-	3	-	-	.01
F	Descurainia pinnata (a)	-	a8	a-	b94	.01	-	.83

Type	Species	Nested Frequency				Average Cover %		
		'86	'95	'00	'05	'95	'00	'05
F	Draba sp. (a)	-	$_{a}$18	$_{a}$2	$_{b}$57	.03	.00	.80
F	Eriogonum cernuum (a)	-	-	-	6	-	-	.02
F	Eriogonum sp.	-	2	-	-	.00	-	-
F	Erigeron pumilus	-	-	1	3	-	.00	.04
F	Erigeron utahensis	1	8	-	-	.06	-	-
F	Gilia hutchinifolia (a)	-	$_{b}$17	$_{a}$-	$_{c}$199	.04	-	2.35
F	Lappula occidentalis (a)	-	$_{a}$8	$_{a}$-	$_{b}$125	.02	-	1.51
F	Lepidium sp. (a)	-	-	-	2	-	-	.03
F	Oenothera sp.	-	-	-	7	-	-	.02
F	Phlox longifolia	$_{ab}$39	$_{b}$60	$_{ab}$41	$_{a}$19	.17	.13	.16
F	Plantago patagonica (a)	-	$_{b}$18	$_{a}$-	$_{c}$43	.03	-	.45
F	Salsola iberica (a)	-	$_{a}$-	$_{b}$29	$_{b}$17	-	.06	.03
F	Schoencrambe linifolia	-	4	6	-	.01	.04	.03
F	Sisymbrium altissimum (a)	-	-	-	6	-	-	.03
Total for Annual Forbs		0	72	31	559	0.15	0.06	6.62
Total for Perennial Forbs		43	88	58	50	0.67	0.40	1.78
Total for Forbs		43	160	89	609	0.82	0.46	8.41

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

BROWSE TRENDS --
Management unit 10 , Study no: 17

Type	Species	Strip Frequency			Average Cover %		
		'95	'00	'05	'95	'00	'05
B	Artemisia nova	0	0	0	-	.15	-
B	Artemisia tridentata wyomingensis	91	97	87	17.57	19.38	17.38
B	Atriplex canescens	0	0	0	-	.38	-
B	Gutierrezia sarothrae	60	23	34	1.05	.21	1.92
B	Juniperus osteosperma	0	2	3	1.85	.03	1.56
B	Opuntia sp.	5	9	9	.30	.18	.33
Total for Browse		156	131	133	20.77	20.33	21.21

CANOPY COVER, LINE INTERCEPT --
Management unit 10 , Study no: 17

Species	Percent Cover	
	'00	'05
Artemisia tridentata wyomingensis	-	22.98
Gutierrezia sarothrae	-	3.40
Juniperus osteosperma	3.40	3.63
Opuntia sp.	-	.60

KEY BROWSE ANNUAL LEADER GROWTH --
Management unit 10 , Study no: 17

Species	Average leader growth (in)
	'05
Artemisia tridentata wyomingensis	1.9

POINT-QUARTER TREE DATA --
Management unit 10 , Study no: 17

Species	Trees per Acre	
	'00	'05
Juniperus osteosperma	43	47

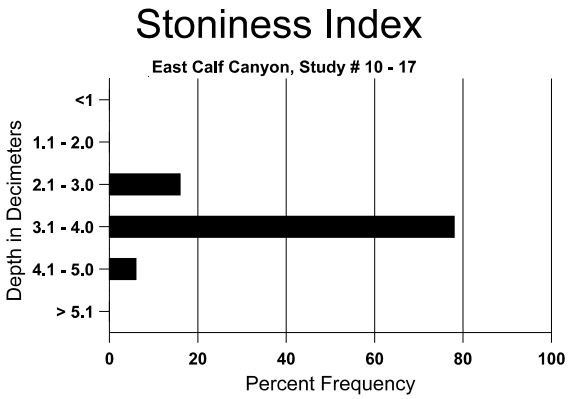
Average diameter (in)	
'00	'05
2.5	3.8

BASIC COVER --
Management unit 10 , Study no: 17

Cover Type	Average Cover %			
	'86	'95	'00	'05
Vegetation	5.50	37.69	23.30	30.57
Rock	.25	.27	.69	.45
Pavement	.25	.17	.43	.33
Litter	47.00	38.50	33.78	22.35
Cryptogams	2.50	7.52	9.76	8.75
Bare Ground	44.50	29.38	47.86	47.38

SOIL ANALYSIS DATA --
Herd Unit 10, Study # 17, Study Name: East Calf Canyon

Effective rooting depth (in)	Temp °F (depth)	pH	%sand	%silt	%clay	%0M	ppm P	ppm K	dS/m
15.7	62.0 (13.6)	7.2	44.0	29.4	26.6	0.8	6.6	67.2	0.5



PELLET GROUP DATA --
Management unit 10 , Study no: 17

Type	Quadrat Frequency		
	'95	'00	'05
Sheep	9	-	-
Rabbit	16	19	42
Elk	-	-	1
Deer	21	30	50

Days use per acre (ha)	
'00	'05
-	-
-	-
-	14 (170)
29 (72)	1 (2)

BROWSE CHARACTERISTICS --
Management unit 10 , Study no: 17

		Age class distribution (plants per acre)					Utilization					
Year	Plants per Acre (excluding seedlings)	Seedling	Young	Mature	Decadent	Dead	% moderate	% heavy	% decadent	% dying	% poor vigor	Average Height Crown (in)
Artemisia tridentata wyomingensis												
86	**3999**	1266	466	1333	2200	-	2	57	55	-	10	12/18
95	**5600**	700	1140	3480	980	300	74	4	18	4	4	20/33
00	**5880**	140	1420	3000	1460	440	38	22	25	8	9	18/30
05	**5140**	4940	1640	1900	1600	1440	28	27	31	19	20	22/32
Gutierrezia sarothrae												
86	**1932**	533	400	1266	266	-	0	0	14	-	0	9/7
95	**4940**	540	1980	2960	-	80	.80	0	0	-	0	9/9
00	**1000**	60	20	900	80	220	0	0	8	4	4	5/6
05	**1140**	1060	120	1020	-	-	0	0	0	-	0	14/19
Juniperus osteosperma												
86	**0**	-	-	-	-	-	0	0	-	-	0	-/-
95	**0**	-	-	-	-	-	0	0	-	-	0	-/-
00	**40**	20	20	20	-	-	0	0	-	-	0	-/-
05	**60**	-	60	-	-	-	0	0	-	-	0	-/-

		Age class distribution (plants per acre)					Utilization					
Year	Plants per Acre (excluding seedlings)	Seedling	Young	Mature	Decadent	Dead	% moderate	% heavy	% decadent	% dying	% poor vigor	Average Height Crown (in)
Opuntia sp.												
86	**0**	-	-	-	-	-	0	0	0	-	0	-/-
95	**100**	-	-	100	-	-	0	0	0	-	0	6/19
00	**240**	-	-	240	-	-	0	0	0	-	0	4/19
05	**200**	-	-	180	20	20	0	0	10	-	0	7/32
Sclerocactus sp.												
86	**0**	-	-	-	-	-	0	0	-	-	0	-/-
95	**0**	-	-	-	-	-	0	0	-	-	0	-/-
00	**0**	-	-	-	-	-	0	0	-	-	0	-/-
05	**0**	-	-	-	-	-	0	0	-	-	0	3/5

Trend Study 10-18-05

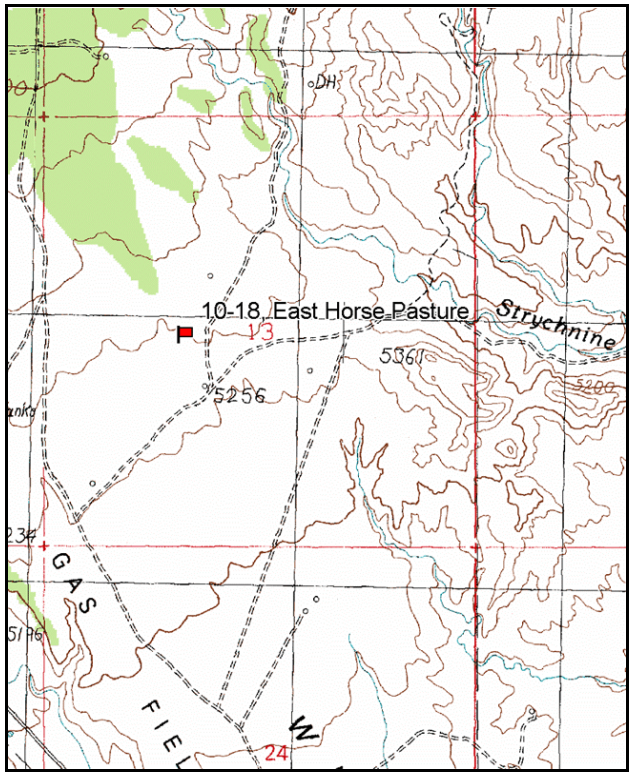
Study site name: East Horse Pasture . Vegetation type: Wyoming Big Sagebrush .

Compass bearing: frequency baseline 165 degrees magnetic.

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

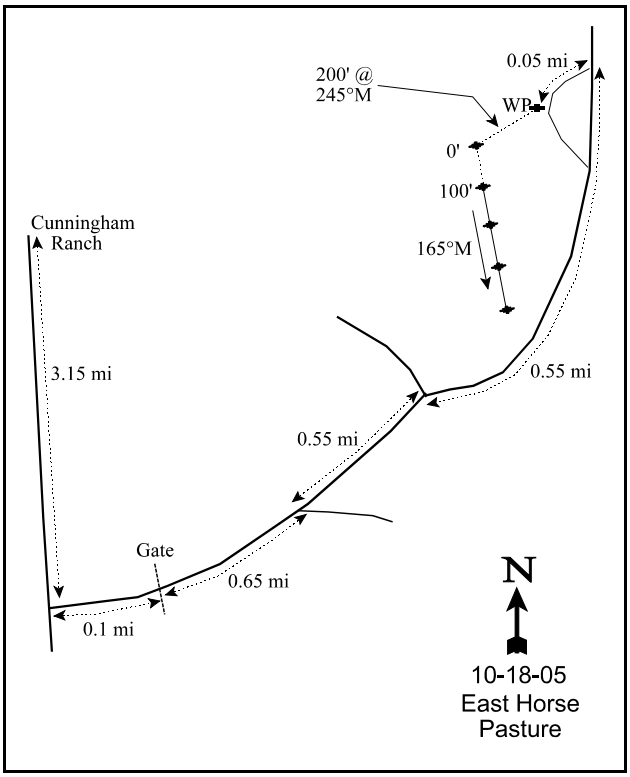
LOCATION DESCRIPTION

From Cunningham Ranch travel south 3.15 miles to a fork. Turn left and go 0.1 miles to a gate. Continue another 0.65 miles to a fork. Stay left (on main road) and continue 0.55 miles to another fork. Turn right and go 0.55 miles to a faint road turning back to the left. Go 0.05 miles on this faint road to a 2-foot tall rebar witness post on the right. The 0' stake begins 200 feet west of the witness post on a bearing of 245°M.



Map Name: Calf Canyon

Township 20S , Range 21E , Section 13



Diagrammatic Sketch

GPS: NAD 27, UTM 12S 4324894 N, 625552 E

DISCUSSION

East Horse Pasture - Trend Study No. 10-18

The East Horse Pasture study lies in an area of mixed pinyon-juniper and sagebrush flats located to the east of Nash Wash and the Cunningham Ranch at an elevation of 5,300 feet. This site is located within the large Cisco Allotment which is grazed from November 1 to May 10 by 3 cattle permittees. Two sheep permittees also use the allotment from December through early May. Prior to 1986, sheep use occurred in the winter months and cattle were present from mid-October to mid-June. The sagebrush flat where the transect is located has a gentle slope with a south, southeast exposure. The transect runs through a low lying depression where water run-off from the bench flows. This extra amount of water creates a much higher amount of cheatgrass in the draw compared to the rest of the bench. Use by wildlife was light in 2000. Pellet group transect data in 2000 was estimated at 27 deer days use/acre (67 ddu/ha) with no elk use. In 2005, deer use was estimated at 44 days use/acre (107 ddu/ha). Also estimated in 2005 was 4 elk days use/acre (10 edu/ha), 4 cow days use/acre (9 cdu/ha), and 5 sheep days use/acre (12 sdu/ha). More pellets were found on the first half of the transect near the cover of junipers.

The sandy clay loam soil is fine textured and moderately deep. In some areas there are large rocks near the surface, although there is little rock or pavement on the surface or in the profile. Effective rooting depth is estimated at 17 inches. The soil is slightly alkaline (pH of 7.4) and phosphorus levels are low at 4.8 ppm (Tiedemann and Lopez 2004). The soil has a dry crust formed on the surface which is easily broken and disturbed by animal activities. This crusting could impede seedling establishment. Since cover is poor, except for Wyoming big sagebrush and cheatgrass, any soil disturbance could leave the soil subject to wind and water erosion. There are rills and gullies present with evidence of soil loss, but due to the gentle terrain, erosion does not appear to be excessive. Bare ground is abundant in the shrub interspaces on the slightly higher terrain. The lower draw, where water accumulates, had robust amounts of cheatgrass in 2005. An erosion condition class assessment rated erosion as stable in 2005.

Wyoming big sagebrush is the key browse species on this site. Sagebrush cover was 9% in 1995, 12% in 2000, and 7% in 2005. Density was estimated at 3,833 plants/acre in 1986, 2,660 plants/acre in 1995, 2,940 plants/acre in 2000. This declined to 2,200 plants/acre in 2005. The decrease between the 1986 reading and 1995 is primarily due to the greatly increased sample size used beginning in mid-1992. This modification more accurately estimates shrub populations with clumped and/or discontinuous distributions. Density dropped in 2005 after many years of drought. Decadency increased to 41% in 2005 from 25% in 2000 and 18% in 1995. Nineteen percent of the population was classified as dying in 2005. This is much higher than the number of young plants that are being recruited into the population. Although grazing intensity has been reduced, it may not be enough for the Wyoming big sagebrush population during drought to fully recover with the competition it receives from cheatgrass. Cheatgrass is the dominant understory plant that provides intense competition for sagebrush seedling establishment. This competition does not allow the development of seed or the germination and establishment of sagebrush seedlings.

Broom snakeweed was very abundant in 1995, but declined sharply in 2000 with drought conditions. Density was increasing in 2005. Other shrubs sampled on the site include: fourwing saltbush, winterfat, spiny hopsage, and a cactus, all of which are in low densities. Fourwing saltbush density was much higher in 2005 and many young plants were sampled. Junipers appear to be encroaching from the north, although there are none within the sampling area. The nearby stand provides fair resting and thermal cover and the older trees are highlined with the younger ones appearing to be only lightly utilized.

Cheatgrass was extremely abundant in 1995 and 2005, which were wet years. Cover was 27% in 1995 and 33% in 2005. Cheatgrass was so robust in 2005 it completely engulfed some sagebrush plants so they could not be seen. Cheatgrass abundance was much lower in 2000, when conditions were dryer. Perennial grasses

are sparse and include: galleta, bottlebrush squirreltail, and sand dropseed. Galleta and sand dropseed significantly increased in nested frequency in 2000, while squirreltail increased but not significantly. Sand dropseed decreased significantly in 2005. Desirable forbs are rare. Annual forbs were very abundant in 2000 and 2005. This type of range site is not known for its diversity and abundance of herbaceous vegetation, but this site has definitely suffered the effects of long-term overgrazing and drought.

1986 APPARENT TREND ASSESSMENT

The soil and vegetation trends indicated by current management practices appear to be downward. There is inadequate ground cover and soil movement is ongoing. The key species is severely hedged. The sagebrush will likely become more decadent with no recruitment from young plants into the population. Besides these problems found in all three transects in the Nash Wash area, there is a continued loss of habitat due to oil and gas leasing and road building. As a very important deer wintering area, it seems necessary to protect and even improve range conditions. Possible solutions are more restrictive oil and gas leasing regulations, manipulation of livestock classes, their distribution and season of use, antlerless hunts to reduce the deer population and implementation of land treatments (chaining) to increase the carrying capacity for wildlife.

1995 TREND ASSESSMENT

Although the grazing pressure appears to be reduced, this Wyoming big sagebrush stand may be past the point of naturally reclaiming itself. The dense cheatgrass understory makes it difficult for sagebrush to produce seed, or for seedlings to become established if they germinate. This has resulted in the creation of a primarily mature or decadent stand. Sagebrush density has declined but the remaining population is healthier. Percent decadence has declined from 60% to 18%. Utilization is also lighter, declining from 90% heavy use in 1986 to 14% in 1995. These factors lead to a slightly upward browse trend for Wyoming big sagebrush. The herbaceous understory is comprised primarily of cheatgrass and very few forbs. Although cheatgrass is still very abundant, the total sum of nested frequency for the perennial grasses and forbs has increased, leading to a slightly upward herbaceous understory trend. It still is in poor condition. Soil erosion is limited to the disturbed interspaces between the sagebrush. Erosion is not extensive and apparently has not increased since 1986, leading to a stable, yet only fair soil trend. The Desirable Components Index score is very poor due to only moderate browse cover and high annual grass cover.

TREND ASSESSMENT
soil - stable (0)
browse - slightly up (+1)
herbaceous understory - slightly up (+1)
winter range condition (DC Index) - very poor (7) Lower potential scale

2000 TREND ASSESSMENT

Trend for soil is slightly down. Bare ground cover increased in 2000, while vegetation and litter cover decreased. As a result, the ratio of protective ground cover to bare soil decreased also. Trend for the key browse species, Wyoming big sagebrush, is stable but only in fair condition. Percent decadence slightly increased from 18% to 25% with 10% of the population classified as dying. Recruitment remains very low at 1%. Trend could go down in the future if recruitment remains low and the proportion of dying individuals continues to increase. Heavy use is about the same as in 1995, with moderate use decreasing somewhat. Trend for the herbaceous understory is up. Sum of nested frequency for perennials increased while the abundance of cheatgrass decreased. However, cheatgrass remains the most abundant herbaceous species even with drought conditions. The DCI score increased to fair due to decreased annual grass cover and increased perennial forb cover.

TREND ASSESSMENT
soil - slightly down (-1)
browse - stable (0)
herbaceous understory - up (+2)
winter range condition (DC Index) - fair (33) Lower potential scale

2005 TREND ASSESSMENT

The soil trend is slightly up. Vegetation cover increased and bare soil decreased, due to the increase in cheatgrass. The browse trend is down. Wyoming big sagebrush density dropped 25%. Percent decadency and the percent of dying plants increased since 2000. Recruitment is low at only 5% and no seedlings were encountered. Competition with cheatgrass is hampering sagebrush recruitment. Broom snakeweed density also increased in 2005. The herbaceous understory trend is slightly down. The understory conditions are very similar to those in 1995. Cheatgrass increased and perennial grasses decreased, with most of the decrease from sand dropseed. Perennial forbs are rare, while annual forbs are very abundant. Although perennial forbs increased, that increase was not enough to compensate for the loss of perennial grasses. The DCI score decreased to very poor due to increased annual grass cover, decreased browse cover, and decreased perennial grass cover.

TREND ASSESSMENT
soil - slightly up (+1)
browse - down (-2)
herbaceous understory - slightly down (-1)
winter range condition (DC Index) - very poor (9) Lower potential scale

HERBACEOUS TRENDS --
Management unit 10 , Study no: 18

Type	Species	Nested Frequency				Average Cover %		
		'86	'95	'00	'05	'95	'00	'05
G	Bromus tectorum (a)	-	b352	a176	b348	27.40	7.01	33.48
G	Hilaria jamesii	a6	b56	c84	bc84	1.25	3.27	2.53
G	Oryzopsis hymenoides	-	2	-	8	.00	.01	.21
G	Sitanion hystrix	a4	ab19	b28	ab11	.27	.47	.09
G	Sporobolus cryptandrus	a-	b14	c32	ab3	.05	.55	.04
G	Stipa comata	-	3	3	-	.03	.00	-
G	Vulpia octoflora (a)	-	b28	a-	c77	.06	-	.53
Total for Annual Grasses		0	380	176	425	27.47	7.01	34.02
Total for Perennial Grasses		10	94	147	106	1.61	4.32	2.88
Total for Grasses		10	474	323	531	29.09	11.33	36.90
F	Astragalus sp.	-	-	1	-	-	.00	-
F	Calochortus nuttallii	-	-	-	-	-	-	.00
F	Cryptantha sp.	-	-	-	5	-	-	.04
F	Descurainia pinnata (a)	-	a7	a3	b83	.02	.00	.71

Type	Species	Nested Frequency				Average Cover %		
		'86	'95	'00	'05	'95	'00	'05
F	Draba sp. (a)	-	-	1	-	-	.00	-
F	Erodium cicutarium (a)	-	-	11	13	-	.21	.48
F	Erigeron utahensis	7	4	-	-	.00	-	-
F	Gilia hutchinifolia (a)	-	-	-	6	-	-	.03
F	Lappula occidentalis (a)	-	$_{b}$30	$_{a}$-	$_{c}$90	.08	-	.52
F	Lactuca serriola	-	3	-	-	.00	-	-
F	Leucelene ericoides	$_{a}$-	$_{ab}$9	$_{b}$15	$_{a}$-	.06	.15	-
F	Lepidium montanum	$_{a}$-	$_{b}$31	$_{a}$3	$_{b}$45	.06	.03	.95
F	Machaeranthera grindelioides	-	2	-	-	.00	-	-
F	Orobanche corymbosa	3	-	-	-	-	-	-
F	Phlox longifolia	6	4	3	4	.01	.01	.01
F	Plantago patagonica (a)	-	$_{b}$145	$_{a}$-	$_{b}$119	.28	-	1.48
F	Salsola iberica (a)	-	$_{a}$-	$_{b}$106	$_{a}$9	-	1.35	.01
F	Schoencrambe linifolia	-	2	-	6	.00	-	.01
F	Sisymbrium altissimum (a)	-	$_{a}$30	$_{b}$51	$_{ab}$39	.18	2.49	3.70
F	Sphaeralcea coccinea	15	27	31	32	.68	.76	.60
F	Unknown forb-perennial	1	-	-	-	-	-	-
Total for Annual Forbs		0	212	172	359	0.57	4.07	6.95
Total for Perennial Forbs		32	82	53	92	0.84	0.96	1.62
Total for Forbs		32	294	225	451	1.41	5.03	8.58

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

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

Type	Species	Strip Frequency			Average Cover %		
		'95	'00	'05	'95	'00	'05
B	Artemisia tridentata wyomingensis	65	67	56	8.57	11.68	7.06
B	Atriplex canescens	0	1	13	-	.00	.55
B	Ceratoides lanata	1	0	0	-	-	-
B	Grayia spinosa	1	1	1	.00	1.01	.00
B	Gutierrezia sarothrae	68	29	42	2.53	.97	1.66
B	Opuntia sp.	5	4	7	.00	.01	.09
Total for Browse		140	102	119	11.12	13.68	9.38

CANOPY COVER, LINE INTERCEPT --
Management unit 10 , Study no: 18

Species	Percent Cover '05
Artemisia tridentata wyomingensis	11.28
Atriplex canescens	.56
Grayia spinosa	.06
Gutierrezia sarothrae	2.31
Opuntia sp.	.15

KEY BROWSE ANNUAL LEADER GROWTH --
Management unit 10 , Study no: 18

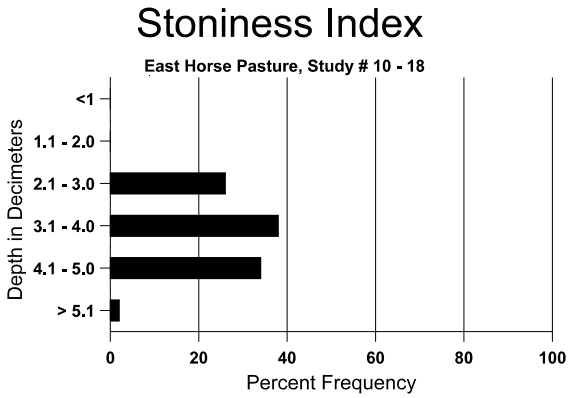
Species	Average leader growth (in) '05
Artemisia tridentata wyomingensis	2.3

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

Cover Type	Average Cover %			
	'86	'95	'00	'05
Vegetation	8.25	43.52	32.86	51.50
Rock	0	.15	.04	.01
Pavement	.25	.12	.88	.47
Litter	56.50	48.29	36.91	19.11
Cryptogams	1.75	2.11	1.41	.33
Bare Ground	33.25	28.83	44.73	36.01

SOIL ANALYSIS DATA --
Herd Unit 10, Study # 18, Study Name: East Horse Pasture

Effective rooting depth (in)	Temp °F (depth)	pH	%sand	%silt	%clay	%0M	ppm P	ppm K	dS/m
17.0	63.4 (15.2)	7.4	48.0	24.0	28.0	1.1	4.5	108.8	0.7



PELLET GROUP DATA --
Management unit 10 , Study no: 18

Type	Quadrat Frequency		
	'95	'00	'05
Sheep	-	-	2
Rabbit	22	23	28
Elk	1	-	3
Deer	17	41	28
Cattle	1	-	-

Days use per acre (ha)	
'00	'05
-	5 (12)
-	-
-	4 (10)
27 (67)	44 (107)
-	4 (9)

BROWSE CHARACTERISTICS --
Management unit 10 , Study no: 18

		Age class distribution (plants per acre)					Utilization					
Year	Plants per Acre (excluding seedlings)	Seedling	Young	Mature	Decadent	Dead	% moderate	% heavy	% decadent	% dying	% poor vigor	Average Height Crown (in)
Artemisia tridentata wyomingensis												
86	**3833**	-	133	1400	2300	-	7	90	60	6	10	21/23
95	**2660**	-	-	2180	480	520	50	14	18	7	8	22/34
00	**2940**	-	40	2160	740	640	33	18	25	10	12	20/32
05	**2200**	-	100	1200	900	480	45	38	41	19	19	24/36
Atriplex canescens												
86	**0**	-	-	-	-	-	0	0	-	-	0	-/-
95	**0**	-	-	-	-	-	0	0	-	-	0	43/65
00	**20**	-	20	-	-	-	0	0	-	-	0	32/65
05	**340**	20	260	80	-	-	0	35	-	-	0	26/33

		Age class distribution (plants per acre)					Utilization					
Year	Plants per Acre (excluding seedlings)	Seedling	Young	Mature	Decadent	Dead	% moderate	% heavy	% decadent	% dying	% poor vigor	Average Height Crown (in)
Ceratoides lanata												
86	**0**	-	-	-	-	-	0	0	-	-	0	-/-
95	**20**	-	-	20	-	-	0	0	-	-	0	11/6
00	**0**	-	-	-	-	-	0	0	-	-	0	-/-
05	**0**	-	-	-	-	-	0	0	-	-	0	-/-
Grayia spinosa												
86	**33**	-	-	-	33	-	0	100	100	-	0	-/-
95	**20**	-	-	-	20	-	0	0	100	100	100	11/7
00	**20**	20	-	-	20	-	0	0	100	100	100	35/75
05	**20**	-	-	-	20	-	0	100	100	100	100	17/14
Gutierrezia sarothrae												
86	**5065**	333	1733	3166	166	-	0	0	3	-	0	9/6
95	**8860**	640	3420	5440	-	20	0	0	0	-	0	12/12
00	**1220**	-	560	660	-	-	0	0	0	-	0	8/9
05	**2440**	-	20	2420	-	-	0	0	0	-	0	13/12
Opuntia sp.												
86	**199**	-	33	66	100	-	0	0	50	-	0	5/4
95	**100**	-	20	80	-	-	0	0	0	-	0	5/14
00	**80**	20	-	80	-	20	0	0	0	-	0	4/14
05	**160**	-	20	120	20	-	0	0	13	13	13	7/20
Sclerocactus sp.												
86	**0**	-	-	-	-	-	0	0	-	-	0	-/-
95	**0**	-	-	-	-	-	0	0	-	-	0	-/-
00	**0**	-	-	-	-	-	0	0	-	-	0	-/-
05	**0**	-	-	-	-	-	0	0	-	-	0	9/5

Trend Study 10-26-05

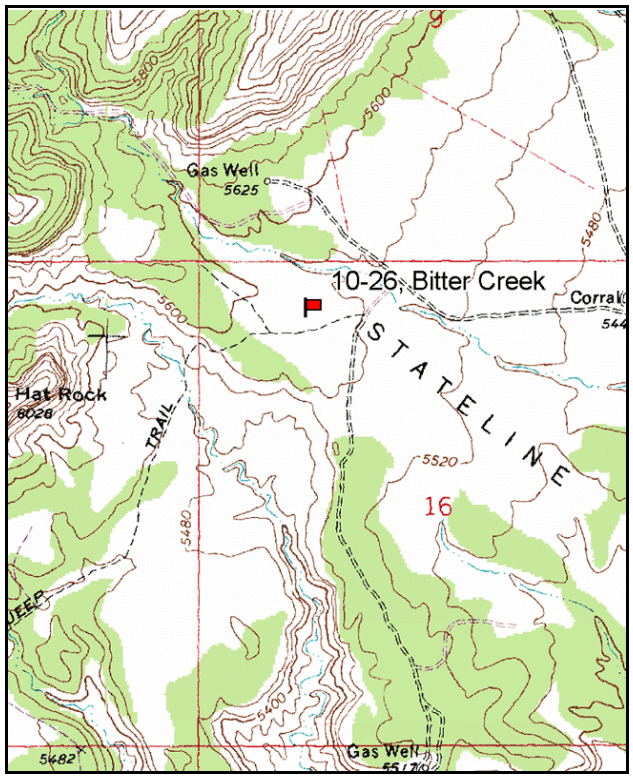
Study site name: Bitter Creek . Vegetation type: Wyoming Big Sagebrush .

Compass bearing: frequency baseline 291 degrees magnetic.

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

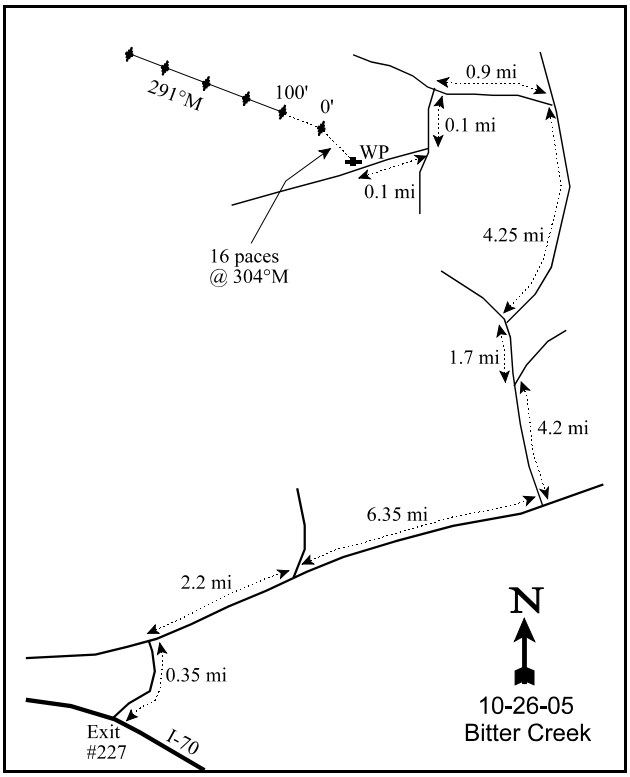
LOCATION DESCRIPTION

Take I-70 exit #225 Westwater and turn left to the Book Cliff area. Travel 0.35 miles to a "T" intersection and turn right (northeast). Proceed 2.2 miles to a fork and keep right. Stay on the main road for 6.35 miles to a dirt road on the left. Turn left traveling north-northwest. Proceed 4.2 miles and stay left on the main road. Continue 1.7 and turn right. Travel another 4.25 to a fork. Turn left at this fork and go 0.9 miles. At the next fork turn left and go 0.1 miles. Then take the right fork and go 0.1 miles to the witness post on the right side of the road. The 0-foot stake is 16 paces away at 304°M.



Map Name: Bryson Canyon .

Township 17S , Range 25E , Section 16



Diagrammatic Sketch

GPS: NAD 27, UTM 12S 4355232 N, 6586670 E

DISCUSSION

Bitter Creek - Trend Study No. 10-26

The Bitter Creek transect was established in 2000 to monitor essential winter range for big game, primarily elk. The site is located near the Utah-Colorado state line on the south Book Cliffs. The area has a gentle slope (5%) and a southeast exposure at an elevation of 5,500 feet. The transect was placed on the alluvial fan that was deposited where Bitter Creek comes off of the cliffs. The site lies in a Wyoming big sagebrush flat surrounded by pinyon-juniper woodland. This area is grazed as part of the San Arroyo BLM allotment, which grazes sheep. According to DWR biologists, a moderate herd of elk are year round residents to this area. Pellet group transect data from 2000 estimated high elk use at 82 elk days use/acre (203 edu/ha) and light use by deer at 4 deer days use/acre (10 ddu/ha). Data from 2005 estimated 8 elk days use/acre (20 edu/ha), 26 deer days use/acre (65 ddu/ha), and 67 sheep days use/acre (165 sdu/ha).

Soils have a sandy clay loam texture. Estimated effective rooting depth is only about 12 inches. A stoniness profile index shows the majority of rock to occur between 4-12 inches in depth. Phosphorus is low at 4.5 ppm, (Tiedemann and Lopez 2004). Soils are neutral in reactivity (pH of 7.1) and organic matter is very low at 0.4%. Shrub interspaces are bare except when cheatgrass is present, with pedestaling occurring around and underneath shrub canopies. Some heavy localized erosion was noted in the general area of this transect with deep gullies, but erosion is not as severe on the site because of the gentle slope. Vegetation and litter cover appear to be adequate to minimize erosion. An erosion condition class assessment rated erosion as stable in 2005.

Wyoming big sagebrush is the key browse species. Sagebrush cover was estimated at 20% with an estimated 5,320 plants/acre in 2000. Decadence was moderately high (56%) in 2000 and no young plants or seedlings were observed. A quarter of the population was classified as dying. Use was at a moderate to heavy level with 59% showing moderate use and 24% displaying heavy use. In 2005, after many years of drought, sagebrush density was a third lower at 3,540 plants/acre. Cover declined to 14%. Decadence increased to 75% and half of the population was classified as dying. This is a dry site and the sagebrush appears to be showing the effects of the extended drought. Some thinning of this population was probably good, but without any young plants to replace those that are dying this population may continue to decline. High amounts of cheatgrass make it difficult for sagebrush to establish young replacement plants. Other browse include: broom snakeweed and spiny hopsage in very small numbers.

Herbaceous vegetation was sparse in 2000 and was found mainly underneath sagebrush canopies. Cheatgrass was abundant in 2000, but not very robust at only 1% cover. In 2005, cheatgrass frequency increased from 72% of the quadrats to 100% and cover increased to 30%. Mutton bluegrass and bottlebrush squirreltail were the only perennial grasses sampled in each year and each declined significantly in 2005. Perennial forbs are infrequent. Annual forbs increased greatly in 2005. Historically excessive grazing practices have caused the loss of almost all of the cool season herbaceous species and the inevitable increases in sagebrush which eventually excludes herbaceous species other than winter annuals like cheatgrass to dominate the understory.

2000 APPARENT TREND ASSESSMENT

Trend for soil appears stable, but is somewhat vulnerable to high intensity thunderstorms with very little protective herbaceous cover on the site. The browse population appears to be in a state of decline with no recruitment, high decadence (56%), and 26% of the population classified as dying. Also, 27% of the sagebrush display poor vigor. Sagebrush density and cover are very high and need to be thinned to increase vigor and reproduction as well as to rejuvenate the understory. The understory is depleted and will remain so without some type of treatment to reduce sagebrush density and cover. The Desirable Components Index score rated this site as fair due to excellent browse cover and low annual grass cover.

winter range condition (DC Index) - fair (27) Lower potential scale

2005 TREND ASSESSMENT

The soil trend is considered stable. Increases in cheatgrass have reduced the amount of bare soil, but not enough to warrant a change in trend. The browse trend is down. Wyoming big sagebrush has declined due to drought conditions. Density declined 33%, while 75% of the population was classified as decadent. Sagebrush cover decreased from 20% to 14%. Recruitment is very poor as young and seedling plants are very rare. High amounts of cheatgrass will negatively effect sagebrush reproduction. Utilization was moderate to heavy and sign of sheep was high. The herbaceous understory trend is down. Cheatgrass increased drastically and is a fire hazard. Perennial grasses and forbs decreased, while annual forbs increased. The DCI score decreased to very poor due to an increase in annual grass cover and decrease in browse cover.

TREND ASSESSMENT
soil - stable (0)
browse - down (-2)
herbaceous understory - down (-2)
winter range condition (DC Index) - very poor (-2) Lower potential scale

HERBACEOUS TRENDS --
Management unit 10 , Study no: 26

Type	Species	Nested Frequency		Average Cover %	
		'00	'05	'00	'05
G	Bromus tectorum (a)	$_{a}$203	$_{b}$467	1.02	30.21
G	Poa secunda	$_{b}$114	$_{a}$83	1.09	1.87
G	Sitanion hystrix	$_{b}$78	$_{a}$38	1.04	.39
G	Vulpia octoflora (a)	$_{a}$4	$_{b}$186	.01	.86
Total for Annual Grasses		207	653	1.03	31.07
Total for Perennial Grasses		192	121	2.13	2.26
Total for Grasses		399	774	3.17	33.34
F	Astragalus sp.	-	2	-	.00
F	Calochortus nuttallii	-	6	-	.01
F	Descurainia pinnata (a)	$_{a}$-	$_{b}$75	-	.39
F	Draba sp. (a)	-	3	-	.00
F	Erodium cicutarium (a)	3	1	.00	.00
F	Erigeron pumilus	$_{b}$23	$_{a}$-	.07	-
F	Gilia sp. (a)	$_{a}$-	$_{b}$61	-	.27
F	Lappula occidentalis (a)	-	6	-	.04
F	Leucelene ericoides	12	-	.05	-
F	Lepidium sp. (a)	$_{a}$-	$_{b}$22	-	.07
F	Phlox longifolia	6	8	.01	.02
F	Plantago patagonica (a)	$_{a}$2	$_{b}$204	.00	.74
F	Schoencrambe linifolia	$_{b}$23	$_{a}$3	.06	.04

Type	Species	Nested Frequency '00	Nested Frequency '05	Average Cover % '00	Average Cover % '05
F	Sisymbrium altissimum (a)	-	-	-	.00
Total for Annual Forbs		5	372	0.00	1.53
Total for Perennial Forbs		64	19	0.19	0.07
Total for Forbs		69	391	0.20	1.61

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

BROWSE TRENDS --
Management unit 10 , Study no: 26

Type	Species	Strip Frequency '00	Strip Frequency '05	Average Cover % '00	Average Cover % '05
B	Artemisia tridentata wyomingensis	91	88	20.00	13.50
B	Grayia spinosa	1	1	-	.03
B	Gutierrezia sarothrae	8	0	.30	-
B	Juniperus osteosperma	0	1	-	-
B	Opuntia sp.	6	7	.18	.21
Total for Browse		106	97	20.48	13.73

CANOPY COVER, LINE INTERCEPT --
Management unit 10 , Study no: 26

Species	Percent Cover '05
Artemisia tridentata wyomingensis	13.31
Grayia spinosa	.20
Opuntia sp.	.68

KEY BROWSE ANNUAL LEADER GROWTH --
Management unit 10 , Study no: 26

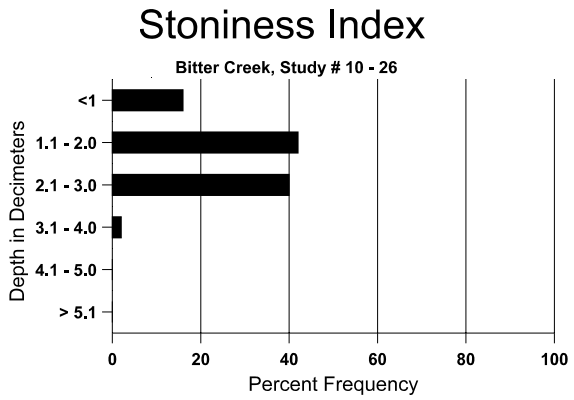
Species	Average leader growth (in) '05
Artemisia tridentata wyomingensis	1.9

BASIC COVER --
Management unit 10 , Study no: 26

Cover Type	Average Cover %	
	'00	'05
Vegetation	27.48	45.09
Rock	.89	.97
Pavement	.75	.80
Litter	34.70	25.46
Cryptogams	14.39	4.30
Bare Ground	44.19	33.99

SOIL ANALYSIS DATA --
Herd Unit 10, Study # 26, Study Name: Bitter Creek

Effective rooting depth (in)	Temp °F (depth)	pH	%sand	%silt	%clay	%0M	ppm P	ppm K	dS/m
11.8	62.8 (11.4)	7.1	60.0	17.4	22.6	0.4	4.5	99.2	0.5



PELLET GROUP DATA --
Management unit 10 , Study no: 26

Type	Quadrat Frequency	
	'00	'05
Sheep	-	18
Rabbit	5	33
Elk	44	23
Deer	18	31

Days use per acre (ha)	
'00	'05
-	67 (165)
-	-
82 (203)	8 (20)
4 (10)	26 (65)

BROWSE CHARACTERISTICS --
Management unit 10 , Study no: 26

		Age class distribution (plants per acre)					Utilization					
Year	Plants per Acre (excluding seedlings)	Seedling	Young	Mature	Decadent	Dead	% moderate	% heavy	% decadent	% dying	% poor vigor	Average Height Crown (in)
Artemisia tridentata wyomingensis												
00	**5320**	-	-	2340	2980	760	59	24	56	26	27	20/31
05	**3540**	-	20	880	2640	2000	47	50	75	51	51	23/37
Chrysothamnus viscidiflorus stenophyllus												
00	**0**	-	-	-	-	-	0	0	-	-	0	-/-
05	**0**	-	-	-	-	-	0	0	-	-	0	6/8
Echinocereus sp.												
00	**0**	-	-	-	-	-	0	0	-	-	0	-/-
05	**0**	-	-	-	-	-	0	0	-	-	0	7/18
Grayia spinosa												
00	**20**	-	-	20	-	20	0	0	-	-	0	10/16
05	**20**	-	-	20	-	-	0	0	-	-	0	24/27
Gutierrezia sarothrae												
00	**620**	80	120	420	80	100	0	0	13	13	13	8/9
05	**0**	-	-	-	-	-	0	0	0	-	0	-/-
Juniperus osteosperma												
00	**0**	-	-	-	-	-	0	0	-	-	0	-/-
05	**20**	-	20	-	-	-	0	0	-	-	0	-/-
Opuntia sp.												
00	**120**	-	-	120	-	-	0	0	0	-	0	5/16
05	**140**	-	-	120	20	-	0	0	14	14	29	6/28
Sclerocactus sp.												
00	**0**	-	-	-	-	-	0	0	-	-	0	-/-
05	**0**	-	-	-	-	-	0	0	-	-	0	7/4

Trend Study 10-27-05

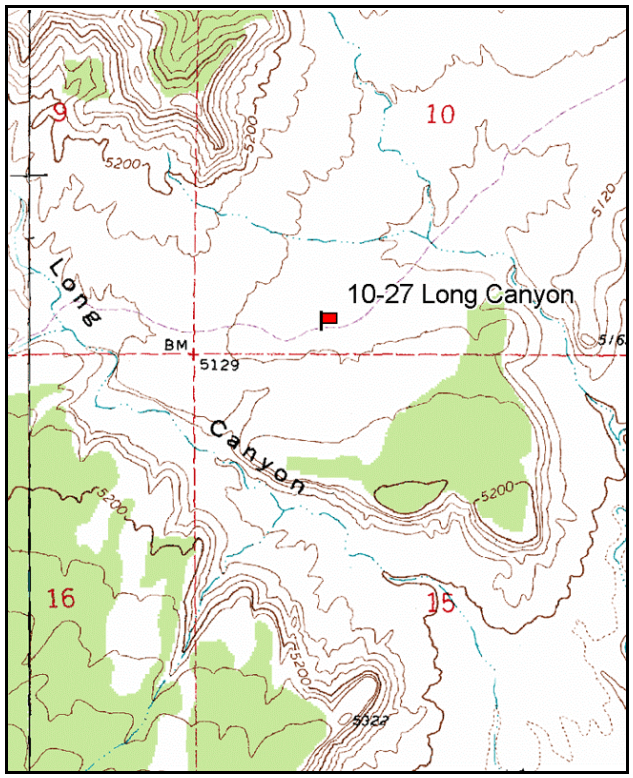
Study site name: Long Canyon . Vegetation type: Wyoming Big Sagebrush .

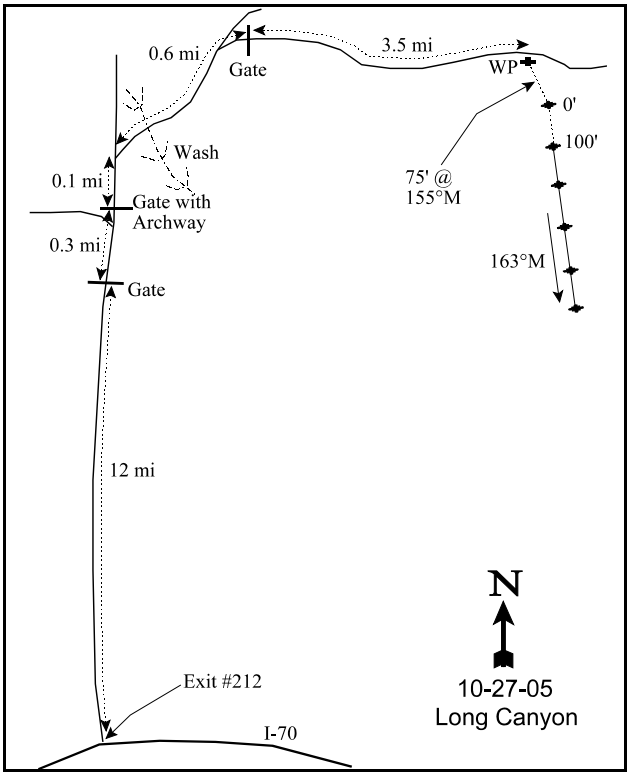
Compass bearing: frequency baseline 163 degrees magnetic.

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

LOCATION DESCRIPTION

From I-70, take the east Cisco exit (exit #212). From the north side of the overpass travel 12 miles to a gate. Go through the gate and proceed 0.3 miles to a sheep ranch gate with an archway. Go through the gate and continue 0.1 miles to a fork. Turn right and drive 0.6 miles to a road on the right with a gate. Turn right (south) and drive along the bench 3.5 miles to the witness post on the right (south) side of the road. From the witness post walk 75 ft at 155 degrees magnetic to 0' stake. The 0' stake is marked with browse tag #147.





Map Name: Antone Canyon . Diagrammatic Sketch

Township 19S , Range 23E , Section 10 GPS: NAD 27, UTM 12S 4335832 N, 641348 E

DISCUSSION

Long Canyon - Trend Study No. 10-27

The Long Canyon trend study was established in 2005. It monitors the lowest bench of the Book Cliffs above the Cisco Desert at an elevation of 5,100 feet. Long Canyon is just above Cottonwood Wash. The bench slopes at about 4% to the northwest. The bench is dominated by Wyoming big sagebrush, surrounded by pinyon-juniper woodlands. This is considered an important deer winter range and is also used for sheep grazing in the BLM Cisco Mesa allotment. The west end of the bench near Cottonwood Wash, appeared to be a sheep bedding area and showed signs of heavy use. Pellet group data in 2005 was estimated at 33 deer days use/acre (81ddu/ha), 11 elk days use/acre (26 edu/ha), and 50 sheep days use/acre (124 sdu/ha). One deer carcass was found on the site.

The soil is a shallow loam with an estimated effective rooting depth of 13 inches. The soil reaction is neutral with a pH of 7.3. Soil phosphorus and potassium levels are sufficient for wildland soils (Tiedemann and Lopez 2004). Soil erosion appeared to be minimal in 2005. An erosion condition class assessment rated erosion as stable. The gentle slope and vegetation cover help prevent erosion. Some slight pedestaling was noted. The amount of bare soil was high at 46%.

Wyoming big sagebrush is the key browse species at this site. Sagebrush cover was 18% in 2005, while density was estimated at 3,700 plants/acre. Decadence was relatively low at 30%, with 17% of the population classified as dying. Six percent of the population was classified as young and seedlings were rare at 40/acre. Utilization was moderate to heavy with 43% classified as moderate and 50% as heavy. Sagebrush vigor at this site was much better than some of the other sites on the south end of the Book Cliffs. It appears that drought conditions prior to 2005 did not negatively effect this site as much as other sites in the area. Recruitment appears to be good despite high amounts of cheatgrass to compete with seedlings. Other palatable browse species sampled on the site include: fourwing saltbush, shadscale, winterfat, and spiny hopsage. Fourwing saltbush was heavily hedged in 2005. Black greasewood was also seen near the transect location.

The herbaceous understory was in poor condition in 2005. Cheatgrass was the most abundant herbaceous species in 2005. Cheatgrass cover was over 20% and was sampled in 97 of 100 quadrats. The dense cover fills the shrub interspaces and makes this site vulnerable to fire, which would eliminate the browse component. Sixweeks fescue was also very abundant in 2005 with nearly 9% cover. It was also sampled in 97% of the quadrats. Perennial grasses were infrequent. Six annual forbs were sampled and were much more abundant than perennial forbs.

2005 APPARENT TREND ASSESSMENT

The soil trend appears to be stable. When cheatgrass is less abundant due to dry conditions the soil may be more vulnerable to erosion, due to a lack of perennial understory species. The browse trend appears to be stable. Wyoming big sagebrush was in relatively good condition in 2005. Percent decadence was moderate and a few young plants were sampled. The herbaceous understory was in poor condition. Annual species dominate the site. Cheatgrass and sixweeks fescue were the most abundant grasses. The high amount of cheatgrass creates a fire hazard, which could completely change the browse component of the site. The Desirable Components Index rated this site as poor to fair due to excellent browse cover, but high annual grass cover and low perennial grass cover.

winter range condition (DC Index) - poor to fair (24) Lower potential scale

HERBACEOUS TRENDS --
Management unit 10 , Study no: 27

Type	Species	Nested Frequency '05	Average Cover % '05
G	Bromus tectorum (a)	395	20.31
G	Hilaria jamesii	3	.15
G	Oryzopsis hymenoides	11	.34
G	Sitanion hystrix	40	.68
G	Sporobolus cryptandrus	5	.06
G	Vulpia octoflora (a)	354	8.70
Total for Annual Grasses		749	29.02
Total for Perennial Grasses		59	1.23
Total for Grasses		808	30.25
F	Alyssum alyssoides (a)	61	.49
F	Cryptantha sp.	8	.16
F	Descurainia pinnata (a)	111	.86
F	Gilia sp. (a)	52	.26
F	Lappula occidentalis (a)	37	.26
F	Lepidium sp. (a)	5	.18
F	Mentzelia sp.	1	.00
F	Phlox longifolia	22	.08
F	Plantago patagonica (a)	61	.50
F	Sphaeralcea coccinea	23	.24
F	Townsendia incana	2	.00
Total for Annual Forbs		327	2.57
Total for Perennial Forbs		56	0.49
Total for Forbs		383	3.07

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

BROWSE TRENDS --
Management unit 10 , Study no: 27

Type	Species	Strip Frequency '05	Average Cover % '05
B	Artemisia tridentata wyomingensis	81	17.76
B	Atriplex canescens	5	.15
B	Ceratoides lanata	1	-
B	Chrysothamnus viscidiflorus stenophyllus	4	-
B	Grayia spinosa	1	.15
B	Gutierrezia sarothrae	11	.18
B	Opuntia sp.	12	.91
Total for Browse		115	19.15

CANOPY COVER, LINE INTERCEPT --
Management unit 10 , Study no: 27

Species	Percent Cover '05
Artemisia tridentata wyomingensis	22.66
Atriplex canescens	1.14
Grayia spinosa	.10
Gutierrezia sarothrae	.56
Opuntia sp.	.91

KEY BROWSE ANNUAL LEADER GROWTH --
Management unit 10 , Study no: 27

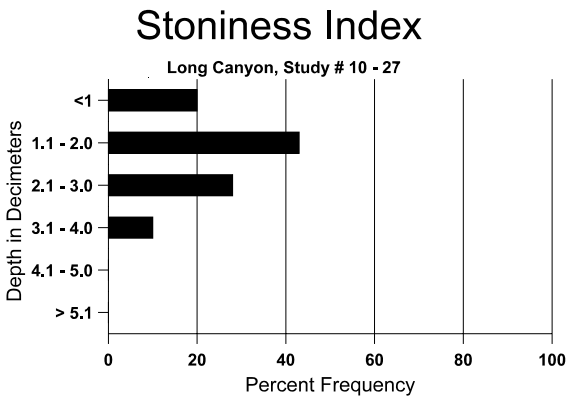
Species	Average leader growth (in) '05
Artemisia tridentata wyomingensis	1.9

BASIC COVER --
Management unit 10 , Study no: 27

Cover Type	Average Cover % '05
Vegetation	42.81
Rock	.38
Pavement	.56
Litter	17.82
Cryptogams	4.11
Bare Ground	46.40

SOIL ANALYSIS DATA --
Herd Unit 10, Study # 27, Study Name: Long Canyon

Effective rooting depth (in)	Temp °F (depth)	pH	%sand	%silt	%clay	%0M	ppm P	ppm K	dS/m
12.7	55.0 (14.1)	7.3	47.7	33.7	18.6	1.0	9.7	182.4	0.6



PELLET GROUP DATA --
Management unit 10 , Study no: 27

Type	Quadrat Frequency '05	Days use per acre (ha) '05
Sheep	3	50 (124)
Rabbit	43	-
Elk	7	11 (26)
Deer	23	33 (81)
Antelope	3	-

BROWSE CHARACTERISTICS --
Management unit 10 , Study no: 27

		Age class distribution (plants per acre)					Utilization					
Year	Plants per Acre (excluding seedlings)	Seedling	Young	Mature	Decadent	Dead	% moderate	% heavy	% decadent	% dying	% poor vigor	Average Height Crown (in)
Artemisia tridentata wyomingensis												
05	**3700**	40	220	2380	1100	800	43	50	30	17	17	26/43
Atriplex canescens												
05	**120**	-	-	80	40	-	50	17	33	17	17	29/32
Atriplex confertifolia												
05	**0**	-	-	-	-	-	0	0	-	-	0	25/15
Ceratoides lanata												
05	**20**	-	-	20	-	-	0	100	-	-	0	18/14
Chrysothamnus viscidiflorus stenophyllus												
05	**80**	-	20	60	-	40	0	0	-	-	0	13/15
Grayia spinosa												
05	**40**	-	-	20	20	20	100	0	50	50	50	18/27
Gutierrezia sarothrae												
05	**280**	-	20	260	-	-	0	0	-	-	0	11/11
Opuntia sp.												
05	**460**	-	-	320	140	100	0	0	30	13	13	7/33
Sclerocactus sp.												
05	**0**	-	-	-	-	-	0	0	-	-	0	6/9

Trend Study 10R-4-05

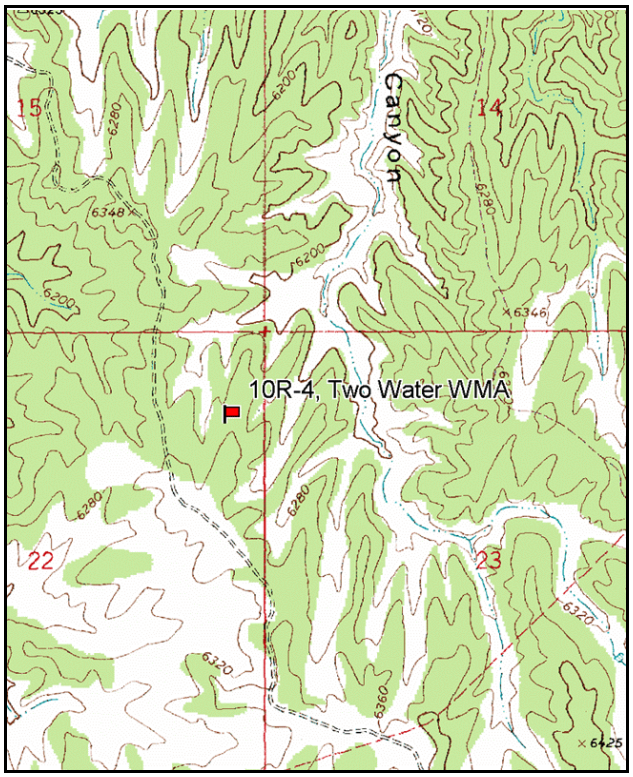
Study site name: Two Water WMA . Vegetation Type: Black Sagebrush .

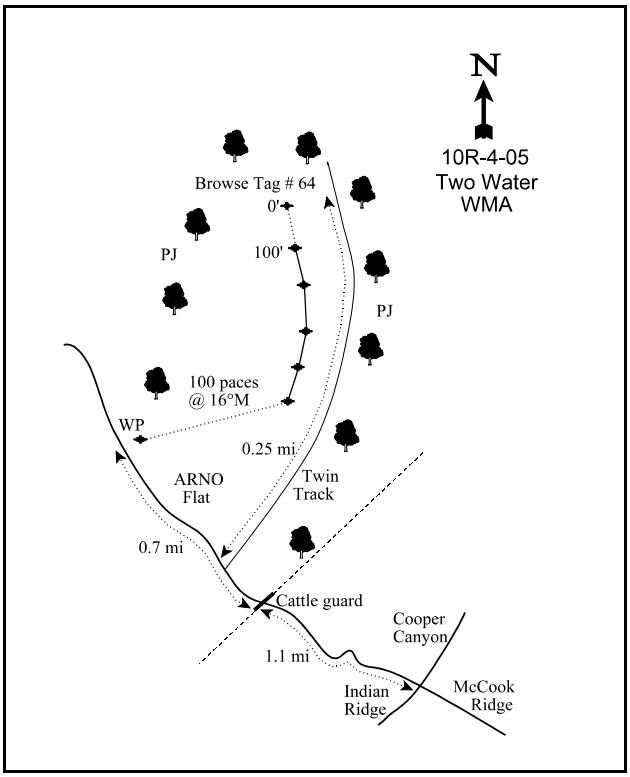
Compass bearing: frequency baseline 162 degrees magnetic. (Line 3 177°M, line 4 180°M, line 5 182°M).

Frequency belt placement: line 1 (11ft), line 2 (34ft), line 3 (59ft), line 4 (71ft), line 5 (95ft). Belt 2 rebar at 5ft., belt 5 rebar at 10ft.

LOCATION DESCRIPTION

From the intersection of Cooper Canyon, Indian Ridge and McCook Ridge go northwest on McCook Ridge road. Travel 1.1 miles to a cattle guard. Go 0.7 miles past the cattle guard to a sage brush flat on the right and a witness post. The 500-foot stake is 100 paces into the sagebrush flat at an azimuth of 16°M. It is also possible to reach the site by taking the two track road on the east side of the chaining 0.25 miles to the 0-foot stake. The 0-foot stake is marked with browse tag number 64.





Map name: Cooper Canyon . Diagrammatic Sketch

Township 13S , Range 23E , Section 22 GPS: NAD 27, UTM 12S 4393205 N, 643973 E

DISCUSSION

Two Water Wildlife Management Area - Trend Study No. 10R-4

This study is located in a black sagebrush flat in the Two Water Wildlife Management Area. The site is surrounded by pinyon and juniper woodland and located about 1/4 of a mile from a main road. It is on gently sloping (3-5%) terrain with a northerly aspect and elevation of approximately 6,300 feet. Pellet group transect data from 1997 indicated moderate use on this flat with 13 elk, 33 deer, and 1 cow days use/acre (32 elk, 82 deer and 2 cow days use/ha). Pellet group data estimates from 2000 were 5 elk and 60 deer days use/acre (12 edu/ha and 148 ddu/ha). Data from 2005 was estimated at 44 elk, 29 deer, and 2 cow days use/acre (109 deer, 73 elk, and 5 cow days use/ha).

The soil is moderately shallow with an effective rooting depth of almost 15 inches. It has a clay loam texture with a neutral pH. The soil surface is cracked, indicating shrink-swell potential. Rocks are found throughout the soil profile with a high amount of pavement on the surface. Phosphorus is low at 3.6 ppm, as values less than 6 ppm may be limiting to normal plant growth and development (Tiedemann and Lopez 2004). Pedestaling was noted around the base of black sagebrush plants with cryptogamic crust found mostly under the sagebrush. Erosion appears minimal due to the level terrain and adequate protective ground cover of vegetation and litter. An erosion condition class assessment rated erosion as stable.

The dominant browse on the flat is black sagebrush, which has averaged between 20 and 22% cover from 1997-2005. It is a relatively low growing form, averaging only 6 to 8 inches in height. Density was very high in 2000 at an estimated 21,180 plants/acre. In 2005, sagebrush cover increased slightly, but density dropped to 11,720 plants/acre. The number of young plants decreased and more dead plants were sampled. Apparently, in 2000 there were many small plants that were classified as mature that must have died off during the drought. Decadence increased to 33% in 2005, which is only moderate. Use has been light to moderate on black sagebrush with each reading. Although density declined in 2005, this population appeared to have stabilized.

Winterfat provides some additional preferred forage on the site. It had an estimated density of 4,060 plants/acre in 1997, but declined to 2,960 by 2000. In 2005, density increased 15% to 3,480 plants/acre. Winterfat cover has been 1-2% since 1997. The population is mostly mature with moderate use. It has a low growth form of only 8 to 10 inches in height. Fringed sagebrush density dropped 80% in 2005, probably due to drought. Shadscale are widely scattered on the site and have shown moderate to heavy use. Other browse species sampled include broom snakeweed and cactus.

The herbaceous understory is limited. Cheatgrass was the most dominant species in 1997. Cheatgrass cover in 1997 was 4%, which was 43% of the grass cover. Quadrat frequency was 62%. In 2000, cheatgrass declined significantly in nested frequency and cover from 4% in 1997 to 0.1%. Quadrat frequency declined from 62% to only 8%. In 2005, cheatgrass remained stable and was only sampled in 5% of the quadrats. The most common perennial grasses are needle-and-thread, bottlebrush squirreltail, galleta, blue grama, and Indian ricegrass. Thickspike wheatgrass and bluebunch wheatgrass were also sampled, but only occasionally. Forbs are fairly diverse, but not particularly abundant. Scarlet globemallow is the most common forb. Cover of perennial forbs has only been about 1% with each reading. Annual stickseed was more abundant in 2005. Most of the forbs were found within the protective cover of black sagebrush canopies.

1997 APPARENT TREND ASSESSMENT

Erosion on the site does not currently appear to be a problem with the abundant litter and vegetation cover. Percent bare ground cover is moderately high, yet should not be a problem except under extreme conditions. Seedhead formation from last year is abundant on the black sagebrush and percent decadence is low at only 5%. Seedling abundance is low at this time, likely due to a combination of past drought conditions and moderately shallow soils. Herbaceous understory is very limiting with cheatgrass as the dominant species.

Other perennial grasses are present in low numbers that help add stability to the herbaceous understory community. The Desirable Components Index rated this site on the lower potential scale due to the low amount of precipitation in this area. The site was rated as good with good browse cover and healthy browse populations.

winter range condition (DC Index) - good (63) Lower potential scale

2000 TREND ASSESSMENT

Trend for soil is stable. Percent bare ground has increased slightly and sum of nested frequency of grasses and forbs have declined by about 12%. Most of this change is due to a significant decline in the nested frequency and cover of cheatgrass. Perennial grass cover and nested frequency remained fairly stable. Trend for browse is slightly up for the key species black sagebrush. Density has increased, use is mostly moderate, vigor good, and young plants account for 14% of the population. The herbaceous trend is stable due to perennial grasses and forbs and a significant loss of cheatgrass. Needle-and-thread grass and bottlebrush squirreltail remained stable while Indian ricegrass declined significantly. The increase in blue grama and decline in galleta appears to be due to a misidentification of blue grama in 1997. Cheatgrass declined significantly in cover and nested frequency. This was due to the very dry spring and early summer conditions of this season. The most abundant perennial forb, scarlet globemallow, declined slightly in frequency but increased in cover with less competition from cheatgrass. The DCI score was good for this site due to abundant and healthy preferred browse populations.

TREND ASSESSMENT
soil - stable (0)
browse - slightly up (+1)
herbaceous understory - stable (0)
winter range condition (DC Index) - good (61) Lower potential scale

2005 TREND ASSESSMENT

The soil trend is stable. The amount of bare ground remained stable. Litter decreased, but pavement increased. An erosion condition class assessment rated erosion as stable. The browse trend is stable. Black sagebrush density decreased, but is still very high. Density was extremely high in 2000 with many small plants that probably died during recent drought years. Black sagebrush cover was still very high in 2005 at 22%. Recruitment was fair at 8% of the population and decadency was only moderate at 33%. Winterfat density increased 15% and percent decadence decreased. Cover increased from 1% to 2%. The herbaceous understory trend is stable. Perennial grasses remain unchanged and cheatgrass did not increase despite the wet spring weather in 2005. The DCI score declined slightly due to higher decadence and lower recruitment of black sagebrush, but was still rated as good.

TREND ASSESSMENT
soil - stable (0)
browse - stable (0)
herbaceous understory - stable (0)
winter range condition (DC Index) - good (54) Lower potential scale

HERBACEOUS TRENDS --
Management unit 10R, Study no: 4

Type	Species	Nested Frequency			Average Cover %		
		'97	'00	'05	'97	'00	'05
G	Agropyron dasystachyum	6	2	4	.06	.03	.00
G	Agropyron spicatum	13	5	13	.36	.30	.37
G	Bouteloua gracilis	$_{a}$-	$_{b}$25	$_{c}$40	-	.31	1.02
G	Bromus tectorum (a)	$_{b}$215	$_{a}$28	$_{a}$10	4.02	.11	.03
G	Hilaria jamesii	$_{b}$75	$_{a}$46	$_{a}$43	1.10	.82	.71
G	Oryzopsis hymenoides	$_{b}$64	$_{a}$34	$_{b}$53	.91	.51	.73
G	Sitanion hystrix	$_{a}$84	$_{a}$92	$_{b}$52	.87	1.02	.59
G	Stipa comata	92	90	110	2.01	2.87	2.92
Total for Annual Grasses		215	28	10	4.02	0.11	0.03
Total for Perennial Grasses		334	294	315	5.32	5.89	6.37
Total for Grasses		549	322	325	9.35	6.01	6.40
F	Alyssum alyssoides (a)	6	-	-	.01	-	-
F	Castilleja sp.	4	-	1	.01	-	.00
F	Cryptantha sp.	$_{b}$10	$_{a}$-	$_{b}$9	.13	-	.10
F	Descurainia pinnata (a)	$_{b}$32	$_{a}$6	$_{b}$33	.10	.01	.33
F	Draba sp. (a)	$_{a}$-	$_{a}$-	$_{b}$11	-	-	.02
F	Erigeron sp.	3	-	2	.03	-	.00
F	Lappula occidentalis (a)	$_{b}$69	$_{a}$12	$_{b}$59	.40	.17	1.02
F	Linum lewisii	-	-	1	-	-	.03
F	Machaeranthera grindelioides	-	1	-	-	.03	-
F	Navarretia intertexta (a)	5	-	2	.01	-	.01
F	Penstemon sp.	2	-	-	.03	-	-
F	Schoencrambe linifolia	4	2	-	.03	.00	-
F	Sphaeralcea coccinea	100	85	77	.57	.82	.84
F	Townsendia incana	-	8	4	-	.04	.04
F	Tragopogon dubius	2	2	-	.00	.00	-
F	Unknown forb-annual (a)	9	-	-	.01	-	-
Total for Annual Forbs		121	18	105	0.53	0.18	1.39
Total for Perennial Forbs		125	98	94	0.82	0.90	1.02
Total for Forbs		246	116	199	1.36	1.08	2.42

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

BROWSE TRENDS --
Management unit 10R, Study no: 4

Type	Species	Strip Frequency			Average Cover %		
		'97	'00	'05	'97	'00	'05
B	Artemisia frigida	28	31	12	.62	1.00	.19
B	Artemisia nova	92	96	96	19.72	21.10	22.46
B	Atriplex confertifolia	34	32	26	.85	.79	.34
B	Ceratoides lanata	71	57	72	2.12	1.41	2.23
B	Gutierrezia sarothrae	12	3	12	-	.01	.19
B	Opuntia sp.	2	3	3	-	-	.03
B	Pediocactus simpsonii	1	1	3	.00	.00	-
Total for Browse		240	223	224	23.32	24.31	25.44

CANOPY COVER, LINE INTERCEPT --
Management unit 10R, Study no: 4

Species	Percent Cover '05
Artemisia frigida	.28
Artemisia nova	23.54
Atriplex confertifolia	.20
Ceratoides lanata	1.98
Gutierrezia sarothrae	.10

KEY BROWSE ANNUAL LEADER GROWTH --
Management unit 10R, Study no: 4

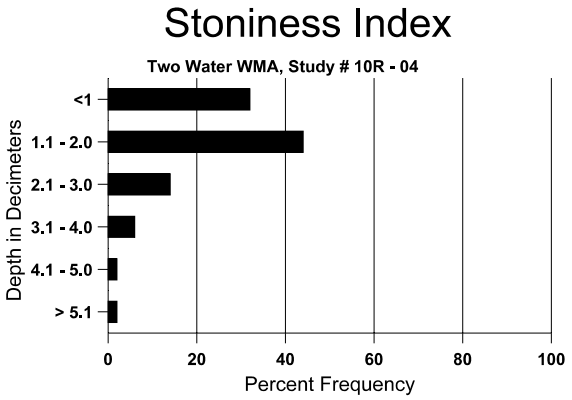
Species	Average leader growth (in) '05
Artemisia nova	1.3
Ceratoides lanata	3.8

BASIC COVER --
Management unit 10R, Study no: 4

Cover Type	Average Cover %		
	'97	'00	'05
Vegetation	28.09	33.27	30.62
Rock	5.72	5.38	3.32
Pavement	13.89	10.66	24.53
Litter	21.39	21.67	14.10
Cryptogams	6.80	7.54	6.41
Bare Ground	23.37	31.45	29.30

SOIL ANALYSIS DATA --
Herd Unit 10R, Study no: 04, Study Name: Two Water WMA

Effective rooting depth (in)	Temp °F (depth)	PH	%sand	%silt	%clay	%0M	ppm P	ppm K	dS/m
14.5	67.2 (14.3)	7.25	25.6	37.8	36.6	2.03	3.63	198.4	0.7



PELLET GROUP DATA --
Management unit 10R, Study no: 4

Type	Quadrat Frequency		
	'97	'00	'05
Rabbit	8	14	55
Elk	11	9	11
Deer	33	32	43
Cattle	-	1	-

Days use per acre (ha)	
'00	'05
-	-
5 (12)	44 (109)
60 (148)	29 (73)
-	2 (5)

BROWSE CHARACTERISTICS --
Management unit 10R, Study no: 4

		Age class distribution (plants per acre)					Utilization					
Year	Plants per Acre (excluding seedlings)	Seedling	Young	Mature	Decadent	Dead	% moderate	% heavy	% decadent	% dying	% poor vigor	Average Height Crown (in)
Artemisia frigida												
97	**1800**	-	260	1540	-	-	0	0	-	-	0	10/10
00	**2000**	20	460	1540	-	-	2	0	-	-	0	4/7
05	**380**	100	40	340	-	-	5	0	-	-	0	9/12
Artemisia nova												
97	**13260**	420	3060	9520	680	560	28	2	5	.30	.30	8/17
00	**21180**	260	2900	15800	2480	180	51	10	12	3	3	6/15
05	**11720**	80	960	6920	3840	1380	36	5	33	12	12	8/17
Atriplex confertifolia												
97	**880**	-	60	600	220	40	16	14	25	16	16	16/16
00	**860**	-	-	560	300	40	42	0	35	21	21	14/16
05	**600**	-	-	300	300	-	20	7	50	37	37	17/16
Ceratoides lanata												
97	**4060**	60	420	3600	40	-	22	3	1	.49	.49	10/10
00	**2960**	-	-	2420	540	-	35	7	18	11	11	8/8
05	**3480**	60	60	3380	40	20	32	51	1	.57	.57	9/9
Gutierrezia sarothrae												
97	**280**	-	20	260	-	-	0	0	-	-	0	8/6
00	**100**	-	-	100	-	-	0	0	-	-	0	2/3
05	**400**	-	-	400	-	-	0	0	-	-	0	7/7
Opuntia sp.												
97	**60**	-	-	60	-	-	0	0	-	-	0	5/9
00	**140**	-	-	140	-	-	0	0	-	-	0	2/5
05	**100**	-	-	100	-	-	0	0	-	-	0	4/10
Pediocactus simpsonii												
97	**20**	-	20	-	-	-	0	0	-	-	0	-/-
00	**20**	-	-	20	-	-	0	0	-	-	0	-/-
05	**60**	-	-	60	-	-	0	0	-	-	0	1/2

Trend Study 10R-5-05

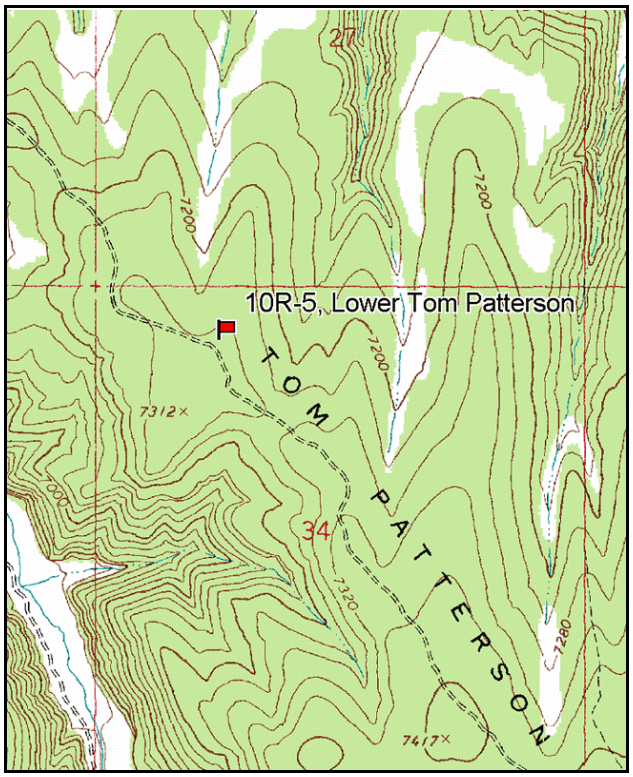
Study site name: Lower Tom Patterson Point . Vegetation Type: Chaining-Burn .

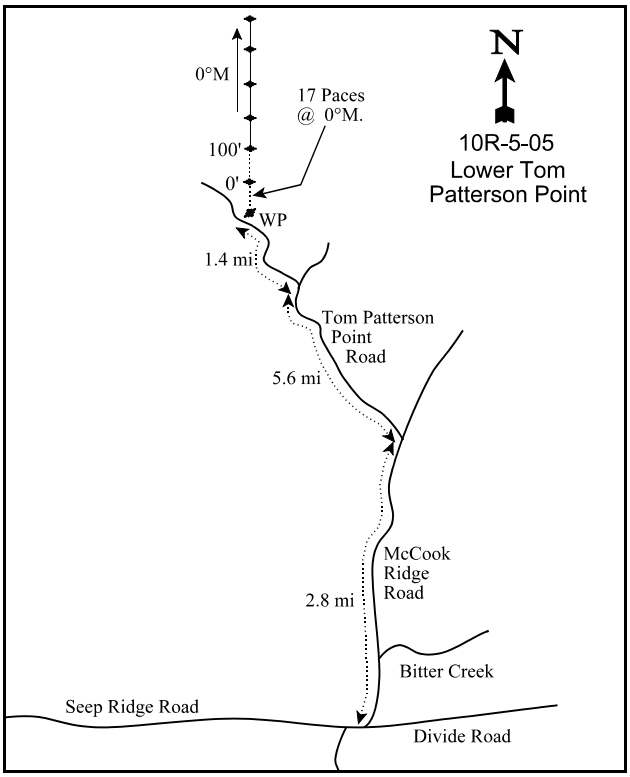
Compass bearing: frequency baseline 0 degrees magnetic.

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

LOCATION DESCRIPTION

From the intersection of McCook Ridge Road and Seep Ridge Road travel north on McCook Ridge Road for 2.8 miles. Turn left onto Tom Patterson Point Road and go 5.6 miles to a fork. Take the left fork and travel 1.4 miles to a witness post on the right (east) side of the road. From the witness post walk 17 paces due north to the 0-foot stake. The study is marked with green, steel fenceposts approximately 12-18 inches in height.





Map name: Tom Patterson Canyon

Diagrammatic Sketch

Township 14S , Range 24E , Section 34

GPS: NAD 27, UTM 12S 4380459 N, 652853 E

DISCUSSION

Lower Tom Patterson Point - Trend Study 10R-5

The Lower Tom Patterson study is located in an area that was chained in the late 1960's and was burned by a wildfire in the mid-1980's. Aspect is north with a gentle 3-5% slope and an elevation of about 7,300 feet. A water tank is located about a half mile south of the site. Water tanks are scattered along this entire point in an attempt to better distribute livestock use. Pellet transect data from 1997 estimated 143 elk, 22 cow, and 1 deer day use/acre (353 edu/ha, 54 cdu/ha and 3 ddu/ha). Use declined in 2000 with 101 elk, 14 cow, and 1 deer day use/acre estimated (250 edu/ha, 35 cdu/ha and 3 ddu/ha). In 2005, use was similar with an estimated 106 elk, 5 cow, and 5 deer days use/acre (263 edu/ha, 13 cdu/ha, and 12 ddu/ha). This area is within the BLM Sweetwater allotment which permits cattle grazing from May 1 through October 31 on a deferred rest rotation basis.

Soil on the site is moderately deep with an effective rooting depth estimated at nearly 17 inches. There is very little rock in the upper soil profile. Soil analysis indicates a sandy clay loam with a neutral pH. Potassium is low at just 38 ppm, where values less than 60 ppm may limit normal plant growth and development (Tiedemann and Lopez 2004). Some slight pedestaling has occurred in the past although there was no sign of recent erosion and protective ground cover is adequate to protect the soil. An erosion condition class assessment rated erosion as stable in 2005.

Shrubs are scarce on this site following the fire. Species encountered on the site include small numbers of mountain big sagebrush, true mountain mahogany, snowberry, broom snakeweed, dwarf rabbitbrush, and rubber rabbitbrush. Mahogany plants showed heavy use and were very decadent in 2005. All shrubs combined produced less than 1% cover each year the study has been read. Point-center quarter data from 1997 estimated only 5 pinyon and 5 juniper trees/acre.

Crested wheatgrass dominates the site. It was found in every quadrat in 2005. Quadrat frequency was 99% in 1997 and 97% in 2000. Nested frequency was highest in 1997, while cover was highest in 2005 at 34%. Other grasses occur only rarely and include: intermediate wheatgrass, a sedge, Russian wildrye, Sandberg bluegrass, needle-and-thread, and smooth brome. No utilization of grasses was apparent in 1997, but use was considered light to moderate during the 2000 reading. A variety of forbs found on the site offer additional preferred spring and early summer forage. Common species include: thickleaf penstemon, lobeleaf groundsel, and scarlet globe mallow.

1997 APPARENT TREND ASSESSMENT

There is no apparent erosion. Low levels of soil potassium may be a limiting factor on the site. Few browse species are present with mountain big sagebrush having an estimated density of 180 plants/acre. Other species are slowly returning, but are in very low densities. Crested wheatgrass is the dominant grass providing 73% of the total vegetation cover. Other grasses and forbs are present, but are mostly incidental. The Desirable Components Index (see methods) rated this site as poor due to the lack of browse.

winter range condition (DC Index) - poor (37) Mid-level potential scale

2000 TREND ASSESSMENT

Trend for soil is stable. Relative cover of bare ground is similar to 1997 estimates and herbaceous frequency and cover are more than adequate to protect the soil from erosion. There are few shrubs on the site and trend is considered down slightly with a decline in the already low density of mountain big sagebrush and mahogany. Currently, all shrubs combined produce less than 1% cover. Trend for the herbaceous understory is considered stable. Sum of nested frequency for the dominant grass, crested wheatgrass, declined significantly but quadrat

frequency remained high at 97% and cover increased from 14% to 18%. Sum of nested frequency for all grasses combined declined slightly. Frequency of forbs also declined slightly but cover remained similar. This change is obviously caused by the dry conditions of this season. Herbaceous vegetation is still abundant and vigorous and it provides nearly all of the vegetation cover on the site. The slight decline in nested frequency of grasses and forbs is not enough to warrant a downward trend. The Desirable Components Index (see methods) rated this site as poor due to the lack of browse.

TREND ASSESSMENT
soil - stable (0)
browse - slightly down (-1)
herbaceous understory - stable (0)
winter range condition (DC Index) - poor (36) Mid-level potential scale

2005 TREND ASSESSMENT

The soil trend is stable. Relative bare ground increased slightly and litter decreased. The decrease of litter was probably due to previous dry years that had poor production of crested wheatgrass. The ample amount of crested wheatgrass protects the soil from most erosion. The browse trend is stable, but in very poor condition. Mountain big sagebrush increased and many young plants were sampled. Mountain mahogany was not sampled this year and observations on the site noted heavy use and high decadence. This site needs a better browse component for wildlife winter range. The herbaceous understory is stable. The site is basically a monoculture of crested wheatgrass, but it would be preferred to have a more diverse understory. Crested wheatgrass does provide good forage for elk in the spring, fall, and mild winters. The Desirable Components Index (see methods) rated this site as poor due to the lack of browse.

TREND ASSESSMENT
soil - stable (0)
browse - stable (0)
herbaceous understory - stable (0)
winter range condition (DC Index) - poor (36) Mid-level potential scale

HERBACEOUS TRENDS --
Management unit 10R, Study no: 5

Type	Species	Nested Frequency			Average Cover %		
		'97	'00	'05	'97	'00	'05
G	Agropyron cristatum	b434	a397	a400	13.75	17.73	34.31
G	Agropyron intermedium	-	5	3	-	.03	.03
G	Bromus inermis	3	-	3	.03	-	.15
G	Carex sp.	25	28	14	.33	.49	.25
G	Elymus junceus	2	-	2	.15	-	.15
G	Poa secunda	a8	a8	b28	.09	.03	.37
G	Stipa comata	a-	a3	b20	-	.03	.99
Total for Annual Grasses		0	0	0	0	0	0
Total for Perennial Grasses		472	441	470	14.35	18.32	36.27
Total for Grasses		472	441	470	14.35	18.32	36.27

Type	Species	Nested Frequency			Average Cover %		
		'97	'00	'05	'97	'00	'05
F	Agoseris glauca	-	-	3	-	-	.15
F	Antennaria rosea	$_{ab}$7	$_{b}$14	$_{a}$3	.33	.38	.15
F	Arabis sp.	$_{10}$	3	5	.02	.03	.04
F	Astragalus convallarius	$_{ab}$4	$_{a}$-	$_{b}$8	.06	-	.24
F	Astragalus sp.	$_{ab}$4	$_{b}$13	$_{a}$-	.04	.40	-
F	Astragalus utahensis	-	3	1	-	.01	.00
F	Chaenactis douglasii	1	-	-	.00	-	-
F	Chenopodium fremontii (a)	-	-	4	-	-	.01
F	Descurainia pinnata (a)	-	-	8	-	-	.05
F	Erigeron sp.	8	7	2	.07	.04	.02
F	Eriogonum sp.	-	1	-	-	.00	-
F	Hedysarum boreale	$_{c}$33	$_{a}$-	$_{b}$13	.82	-	.39
F	Lappula occidentalis (a)	-	-	4	-	-	.01
F	Lygodesmia sp.	4	-	10	.03	-	.07
F	Machaeranthera grindelioides	$_{b}$25	$_{a}$-	$_{a}$2	.17	-	.01
F	Penstemon sp.	6	-	5	.07	-	.03
F	Penstemon pachyphyllus	$_{c}$81	$_{b}$52	$_{a}$1	1.23	.74	.01
F	Phlox austromontana	8	12	11	.21	.06	.33
F	Phlox longifolia	-	3	4	-	.00	.00
F	Salsola iberica (a)	-	-	2	-	-	.01
F	Senecio multilobatus	$_{b}$46	$_{c}$70	$_{a}$10	.24	.48	.21
F	Sphaeralcea coccinea	49	60	71	.38	.36	.90
F	Taraxacum officinale	$_{c}$24	$_{b}$9	$_{a}$-	.23	.05	-
F	Townsendia sp.	-	-	4	-	-	.01
F	Tragopogon dubius	$_{b}$15	$_{c}$46	$_{a}$-	.03	.15	.00
Total for Annual Forbs		0	0	18	0	0	0.07
Total for Perennial Forbs		325	293	153	3.98	2.73	2.60
Total for Forbs		325	293	171	3.98	2.73	2.68

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

BROWSE TRENDS --
Management unit 10R, Study no: 5

Type	Species	Strip Frequency			Average Cover %		
		'97	'00	'05	'97	'00	'05
B	Artemisia tridentata vaseyana	6	2	5	.38	.38	.53
B	Cercocarpus montanus	2	1	0	.15	-	-
B	Chrysothamnus depressus	1	0	1	-	-	-
B	Chrysothamnus nauseosus	0	0	2	-	-	.01
B	Chrysothamnus viscidiflorus	1	1	2	-	-	-
B	Gutierrezia sarothrae	2	10	12	.01	.45	.27
B	Symphoricarpos oreophilus	2	2	0	.00	.00	-
Total for Browse		14	16	22	0.55	0.84	0.81

CANOPY COVER, LINE INTERCEPT --
Management unit 10R, Study no: 5

Species	Percent Cover '05
Artemisia tridentata vaseyana	.38
Chrysothamnus viscidiflorus	.10
Gutierrezia sarothrae	.55

KEY BROWSE ANNUAL LEADER GROWTH --
Management unit 10R, Study no: 5

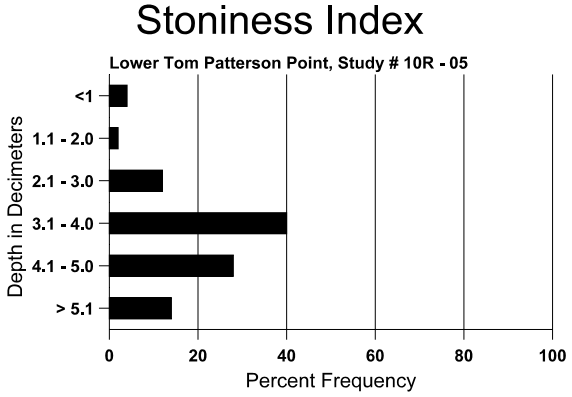
Species	Average leader growth (in) '05
Artemisia tridentata vaseyana	1.9
Cercocarpus montanus	1.5

BASIC COVER --
Management unit 10R, Study no: 5

Cover Type	Average Cover %		
	'97	'00	'05
Vegetation	20.14	28.12	40.93
Rock	1.58	.43	1.96
Pavement	7.10	2.22	3.55
Litter	24.71	33.69	18.95
Cryptogams	1.08	2.92	.58
Bare Ground	27.13	35.46	46.19

SOIL ANALYSIS DATA --
Herd Unit 10R, Study no: 05, Study Name: Lower Tom Patterson Point

Effective rooting depth (in)	Temp °F (depth)	PH	%sand	%silt	%clay	%0M	ppm P	ppm K	dS/m
16.9	60.6 (17.7)	6.8	48.0	28.8	23.2	3.11	7.41	38.4	2.0



PELLET GROUP DATA --
Management unit 10R, Study no: 5

Type	Quadrat Frequency		
	'97	'00	'05
Rabbit	3	5	17
Elk	70	58	80
Deer	2	5	19
Cattle	4	3	1

Days use per acre (ha)	
'00	'05
-	-
101 (250)	106 (263)
1 (2)	5 (12)
14 (35)	5 (13)

BROWSE CHARACTERISTICS --
Management unit 10R, Study no: 5

		Age class distribution (plants per acre)					Utilization					
Year	Plants per Acre (excluding seedlings)	Seedling	Young	Mature	Decadent	Dead	% moderate	% heavy	% decadent	% dying	% poor vigor	Average Height Crown (in)
Artemisia frigida												
97	**0**	-	-	-	-	-	0	0	-	-	0	-/-
00	**0**	-	-	-	-	-	0	0	-	-	0	-/-
05	**0**	-	-	-	-	-	0	0	-	-	0	9/13
Artemisia tridentata vaseyana												
97	**180**	60	100	80	-	-	11	0	-	-	0	26/31
00	**40**	40	20	20	-	-	0	0	-	-	0	33/35
05	**160**	280	80	80	-	-	0	38	-	-	0	25/37

		Age class distribution (plants per acre)					Utilization					
Year	Plants per Acre (excluding seedlings)	Seedling	Young	Mature	Decadent	Dead	% moderate	% heavy	% decadent	% dying	% poor vigor	Average Height Crown (in)
Cercocarpus montanus												
97	**40**	-	-	40	-	20	100	0	-	-	0	38/35
00	**20**	-	-	20	-	20	0	100	-	-	0	37/35
05	**0**	-	-	-	-	40	0	0	-	-	0	33/30
Chrysothamnus depressus												
97	**20**	-	-	20	-	-	0	0	-	-	0	7/16
00	**0**	-	-	-	-	-	0	0	-	-	0	-/-
05	**20**	-	-	20	-	-	100	0	-	-	0	5/9
Chrysothamnus nauseosus												
97	**0**	-	-	-	-	-	0	0	-	-	0	-/-
00	**0**	-	-	-	-	-	0	0	-	-	0	14/17
05	**40**	-	40	-	-	-	0	0	-	-	0	25/28
Chrysothamnus viscidiflorus												
97	**20**	-	-	20	-	-	0	0	-	-	0	8/14
00	**20**	-	-	20	-	-	0	0	-	-	0	-/-
05	**40**	-	-	40	-	-	50	50	-	-	0	13/15
Gutierrezia sarothrae												
97	**40**	-	-	40	-	-	0	0	-	-	0	7/6
00	**260**	20	40	220	-	-	0	0	-	-	0	7/9
05	**440**	-	20	420	-	-	14	9	-	-	0	7/8
Symphoricarpos oreophilus												
97	**40**	-	-	20	20	-	0	0	50	-	0	34/36
00	**40**	-	-	20	20	-	100	0	50	-	0	-/-
05	**0**	-	-	-	-	20	0	0	0	-	0	31/42

Trend Study 10R-7-05

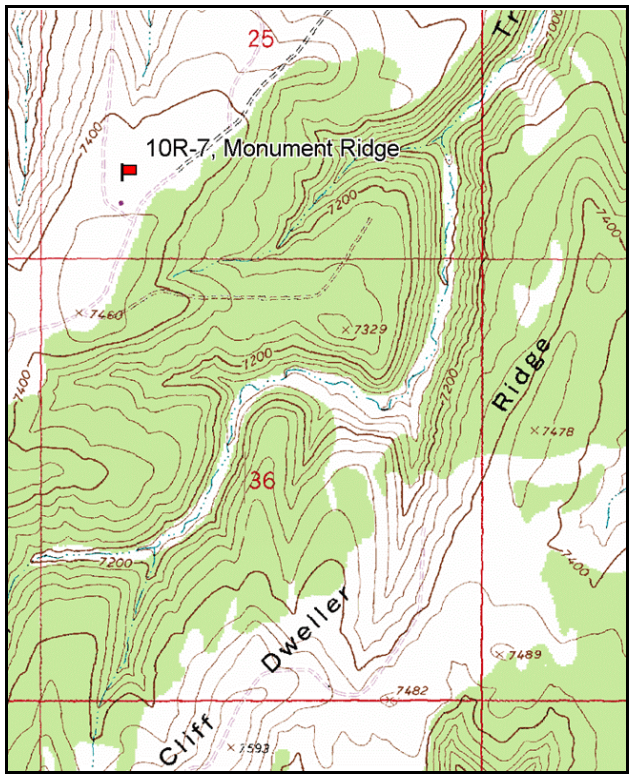
Study site name: Monument Ridge . Vegetation Type: Chained-Burn .

Compass bearing: frequency baseline 27 degrees magnetic.

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

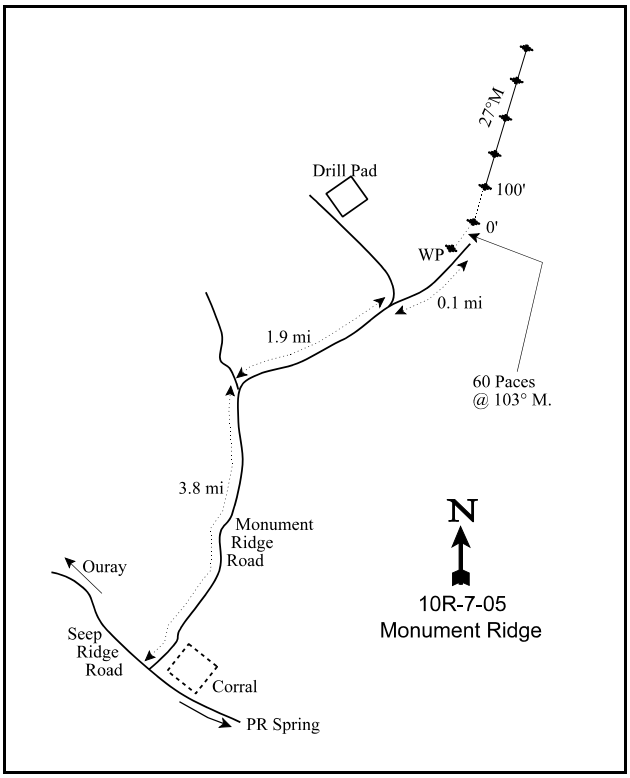
LOCATION DESCRIPTION

From Seep Ridge Road turn north onto Monument Ridge Road. Drive 3.8 miles to a fork. Take the right fork and travel 1.9 miles to a turnoff to a drill pad. Go straight past this turnoff 0.1 miles to a witness post on the left (north) side of the road. From the witness post walk 60 paces at 103°M to the 0-foot stake. The study is marked by green, steel fencepost approximately 12-18 inches in height. The 0' stake is marked with browse tag #88 DWR.



Map name: Seep Canyon .

Township 14S, Range 23E, Section 25



Diagrammatic Sketch

GPS: NAD 27, UTM 12S 4380795 N, 646308 E

DISCUSSION

Monument Ridge - Trend Study 10R-7

The Monument Ridge study is located about 2.5 miles from the Monument Ridge Road at the head of Monument Canyon which drains into Sweetwater Canyon. The area was chained and seeded in the 1960's. In the 1980's, a wild fire burned through the area removing the most of chaining debris. Pinyon and juniper trees are becoming reestablished. The study area is at an elevation of 7,450 feet. It is almost level with canyons sloping off to the east and west. A drill pad is located to the southwest of the site. The area is used heavily by elk in the fall and spring. The BLM allows cattle grazing as part of the Sweetwater allotment which permits grazing from May 1 through October 31 on a deferred rest rotation basis. Pellet group data from 1997 was estimated at 166 elk days use/acre and 20 cow days use/acre (410 edu/ha and 50 cdu/ha). In 2000, elk use was much lower at 72 days use/acre (178 edu/ha). No cattle use was noted, although deer use was estimated at 11 days use/acre (27 ddu/ha). Data from 2005 estimated 94 elk, 9 deer, and 12 cow days use/acre (231 edu/ha, 23 ddu/ha, and 29 cdu/ha).

Soil at the site is moderately shallow with an average effective rooting depth of about 14 inches. A rocky layer is found about 6 inches below the soil surface. The deepest soil measurements are characteristically associated with the stumps of dead juniper and pinyon trees, while areas of bare soil are indicative of very shallow soils (2-3 inches) above bed rock. In 2005 it was noted that there were some shallow rills on the site. Pedestaling was noted around all the vegetation. Movement of sediment was low on the site due to the gentle terrain. Erosion was rated as slight.

Preferred browse are limited to a few scattered mountain big sagebrush, mountain mahogany, and rubber rabbitbrush. Preferred browse species are not abundant enough to provide winter forage for wildlife species. Broom snakeweed and rubber rabbitbrush have had the highest cover for browse species. Broom snakeweed cover has been 1-2% at each reading. This species had an estimated density of 15,900 plants/acre in 1997, 14,320 in 2000, and declined to 8,120 in 2005. Although broom snakeweed is quite dense, it does not dominate the site. Pinyon and juniper trees are scattered over the site. Density was estimated at 14 trees/acre in 2000. Average diameter of pinyon was one inch and juniper was nearly two inches.

Most of the vegetation cover is contributed by crested wheatgrass. In 2005, it provided 98% of the grass cover, 90% of the herbaceous cover, and 82% of the total vegetation cover. Crested wheatgrass had 27% ground cover in 2005. It has been sampled in 99% of the quadrats each year the site has been read. Several other grasses occur on the site in small numbers. Forbs are diverse but only a few species are abundant. Tufted milkvetch (A*stragalus spatulatus*) and scarlet globe mallow were the most abundant forbs each year.

1997 APPARENT TREND ASSESSMENT

This site was chained in the 1960's and a wildfire burned through it in the 1980's. The study is located on a level area. This, combined with adequate protective cover, is enough to prevent erosion. The soil is moderately shallow and in some places does not allow vegetation to become established. The deepest soil is found near the stumps of burned juniper and pinyon. The dominant browse species is broom snakeweed. Although the density is estimated at 15,900 plants/acre, these plants are very small averaging only 5 inches in height and crown. Mountain big sagebrush is present, but in very low numbers. Not many seedlings were found for any browse species. Herbaceous cover is dominated by crested wheatgrass. This species offers good forage and supplies most of the protective ground cover. Other native perennial grasses are present, but in low abundance. The dominant forb is tufted milkvetch, with other forbs providing very little cover. The Desirable Components Index (see methods) rated this site as poor due to the lack of a significant browse component.

winter range condition (DC Index) - poor (34) Mid-level potential scale

2000 TREND ASSESSMENT

Trend for soil is slightly down. When examined on a relative scale percent cover of bare ground increased and percent litter cover decreased from 30% to 24%. The ratio of bare ground to protective ground cover (vegetation, litter, and cryptogams) has decreased. Due to the levelness of the site, combined with the good protective ground cover, erosion is not a problem. Trend for browse is stable but in poor condition due to a lack of preferred shrubs combined with the abundance of the increaser, broom snakeweed. Trend for the herbaceous understory is down slightly. Sum of nested frequency for both grasses and forbs declined slightly since 1997. In addition, nested frequency of crested wheatgrass and several forb species declined significantly. The DCI score remained at poor, although it improved slightly due to higher perennial grass and forb cover.

TREND ASSESSMENT
soil - slightly down (-1)
browse - stable (0)
herbaceous understory - slightly down (-1)
winter range condition (DC Index) - poor (41) Mid-level potential scale

2005 TREND ASSESSMENT

The soil trend is slightly down. The ratio of bare ground to protective ground cover (vegetation, litter, and cryptogams) decreased. Relative percent bare ground increased from 27% in 2000 to 36% in 2005. An erosion condition class assessment rated erosion as slight. The browse trend continues to be stable. There has been very little change for any preferred browse species. A few mountain big sagebrush seedlings were found in 2005. Broom snakeweed density did decline significantly, but cover was unchanged. The herbaceous understory trend is stable. Sum of nested frequency for perennial grasses increased slightly. Grass cover was also much higher. Nested frequency of forbs declined sharply after many years of drought. Tufted milkvetch was significantly less abundant, but is not an important forage species. The DCI score remained at poor.

TREND ASSESSMENT
soil - slightly down (-1)
browse - stable (0)
herbaceous understory - stable (0)
winter range condition (DC Index) - poor (37) Mid-level potential scale

HERBACEOUS TRENDS --
Management unit 10R, Study no: 7

Type	Species	Nested Frequency			Average Cover %		
		'97	'00	'05	'97	'00	'05
G	Agropyron cristatum	$_{b}$444	$_{a}$405	$_{a}$410	12.07	16.14	26.90
G	Agropyron dasystachyum	5	2	-	.01	.03	-
G	Bouteloua gracilis	5	-	-	.04	-	-
G	Carex sp.	13	20	14	.24	.30	.13
G	Oryzopsis hymenoides	$_{ab}$6	$_{a}$2	$_{b}$15	.06	.03	.26
G	Poa fendleriana	$_{b}$22	$_{a}$-	$_{a}$7	.19	-	.02
G	Poa secunda	3	1	1	.01	.00	.00

Type	Species	Nested Frequency			Average Cover %		
		'97	'00	'05	'97	'00	'05
G	Stipa comata	5	-	3	.03	-	.15
Total for Annual Grasses		0	0	0	0	0	0
Total for Perennial Grasses		503	430	450	12.67	16.52	27.46
Total for Grasses		503	430	450	12.67	16.52	27.46
F	Antennaria rosea	$_{a}$2	$_{b}$13	$_{ab}$5	.01	.08	.07
F	Arabis sp.	$_{b}$37	$_{a}$17	$_{a}$2	.12	.06	.00
F	Artemisia dracunculus	$_{a}$5	$_{b}$26	$_{ab}$12	.09	.61	.07
F	Arenaria fendleri	-	5	2	-	.03	.01
F	Astragalus spatulatus	$_{b}$155	$_{b}$162	$_{a}$53	2.37	5.93	1.18
F	Aster sp.	13	-	2	.19	-	.00
F	Cryptantha sp.	7	-	-	.02	-	-
F	Descurainia pinnata (a)	3	-	-	.01	-	-
F	Erigeron sp.	$_{b}$46	$_{a}$17	$_{a}$11	.45	.04	.09
F	Hymenoxys acaulis	-	7	1	-	.01	.00
F	Machaeranthera grindelioides	$_{a}$-	$_{b}$9	$_{a}$-	-	.05	.03
F	Penstemon pachyphyllus	$_{b}$28	$_{b}$28	$_{a}$-	.13	.41	-
F	Phlox longifolia	1	2	-	.00	.00	-
F	Schoencrambe linifolia	10	-	3	.04	-	.00
F	Senecio multilobatus	-	3	-	-	.01	-
F	Sphaeralcea coccinea	106	67	81	.74	.36	.89
F	Taraxacum officinale	-	1	-	-	.00	-
F	Tragopogon dubius	-	3	-	-	.01	-
Total for Annual Forbs		3	0	0	0.00	0	0
Total for Perennial Forbs		410	360	172	4.18	7.65	2.36
Total for Forbs		413	360	172	4.19	7.65	2.36

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

BROWSE TRENDS --
Management unit 10R, Study no: 7

Type	Species	Strip Frequency			Average Cover %		
		'97	'00	'05	'97	'00	'05
B	Artemisia frigida	14	24	12	.14	.09	.09
B	Artemisia tridentata vaseyana	6	6	5	.18	.03	.07
B	Cercocarpus montanus	3	2	2	-	-	-
B	Chrysothamnus depressus	1	0	0	.00	-	-
B	Chrysothamnus nauseosus hololeucus	1	5	3	.30	.76	1.25
B	Gutierrezia sarothrae	97	96	87	2.33	1.76	1.46
B	Opuntia sp.	0	0	1	-	-	.03
Total for Browse		122	133	110	2.96	2.65	2.91

CANOPY COVER, LINE INTERCEPT --
Management unit 10R, Study no: 7

Species	Percent Cover '05
Artemisia frigida	.05
Artemisia tridentata vaseyana	.26
Chrysothamnus nauseosus hololeucus	.26
Gutierrezia sarothrae	1.39

KEY BROWSE ANNUAL LEADER GROWTH --
Management unit 10R, Study no: 7

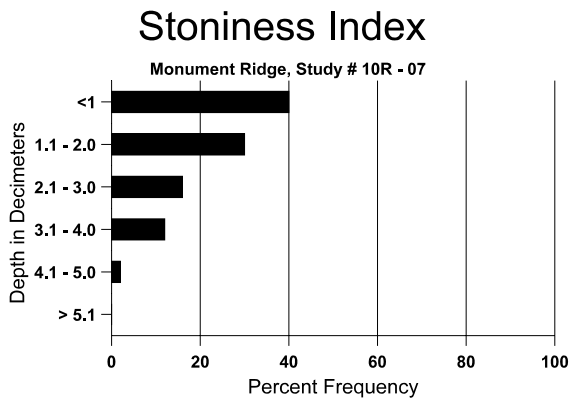
Species	Average leader growth (in) '05
Artemisia tridentata vaseyana	2.7
Cercocarpus montanus	1.8

BASIC COVER --
Management unit 10R, Study no: 7

Cover Type	Average Cover %		
	'97	'00	'05
Vegetation	23.26	32.34	31.30
Rock	7.60	7.85	6.38
Pavement	8.05	1.02	3.75
Litter	24.22	23.26	28.67
Cryptogams	3.00	6.57	.29
Bare Ground	13.55	26.27	39.65

SOIL ANALYSIS DATA --
Herd Unit 10R, Study no: 07, Study Name: Monument Ridge

Effective rooting depth (in)	Temp °F (depth)	PH	%sand	%silt	%clay	%0M	ppm P	ppm K	dS/m
13.5	58.8 (13.8)	7.0	40.0	35.4	24.6	3.54	5.0	115.2	3.3



PELLET GROUP DATA --
Management unit 10R, Study no: 7

Type	Quadrat Frequency		
	'97	'00	'05
Rabbit	1	10	53
Elk	53	65	78
Deer	2	5	25
Cattle	1	1	11

Days use per acre (ha)	
'00	'05
-	-
72 (177)	94 (231)
11 (29)	9 (23)
-	12 (29)

BROWSE CHARACTERISTICS --
Management unit 10R, Study no: 7

		Age class distribution (plants per acre)					Utilization					
Year	Plants per Acre (excluding seedlings)	Seedling	Young	Mature	Decadent	Dead	% moderate	% heavy	% decadent	% dying	% poor vigor	Average Height Crown (in)
Artemisia frigida												
97	**380**	40	160	200	20	-	0	0	5	5	5	7/8
00	**620**	40	260	340	20	-	0	0	3	3	3	3/5
05	**380**	40	100	280	-	-	0	0	0	-	0	4/4
Artemisia tridentata vaseyana												
97	**120**	20	60	60	-	-	33	0	-	-	0	15/22
00	**160**	-	60	100	-	-	50	13	-	-	0	13/21
05	**140**	80	-	140	-	-	14	57	-	-	0	16/26
Cercocarpus montanus												
97	**60**	-	-	40	20	-	0	100	33	-	0	23/37
00	**40**	-	-	-	40	-	50	50	100	50	50	39/43
05	**60**	-	20	20	20	-	0	100	33	-	0	33/39
Chrysothamnus depressus												
97	**20**	-	-	20	-	-	0	0	-	-	0	-/-
00	**0**	-	-	-	-	-	0	0	-	-	0	-/-
05	**0**	-	-	-	-	-	0	0	-	-	0	-/-
Chrysothamnus nauseosus hololeucus												
97	**20**	-	-	-	20	-	0	0	100	-	0	15/20
00	**120**	-	80	-	40	-	0	0	33	17	17	24/33
05	**80**	-	-	80	-	100	0	25	0	-	0	22/26
Gutierrezia sarothrae												
97	**15900**	140	3100	12800	-	420	0	0	0	-	0	5/5
00	**14320**	180	2180	11600	540	580	0	0	4	2	2	4/5
05	**8120**	2020	2820	5140	160	240	0	0	2	1	1	5/6
Opuntia sp.												
97	**0**	-	-	-	-	-	0	0	-	-	0	-/-
00	**0**	-	-	-	-	-	0	0	-	-	0	-/-
05	**20**	-	-	20	-	-	0	0	-	-	0	4/3

Trend Study 10R-9-05

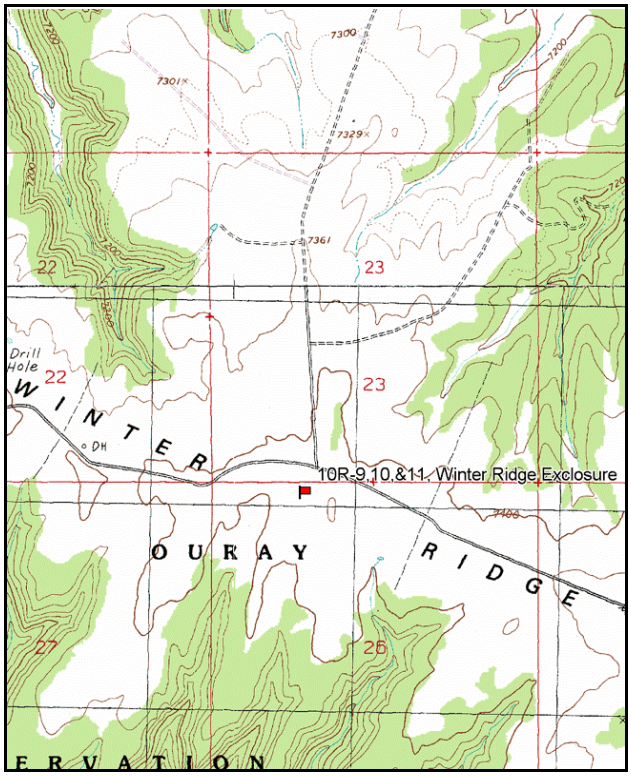
Study site name: Winter Ridge Exclosure Out . Vegetation Type: Mountain big sagebrush .

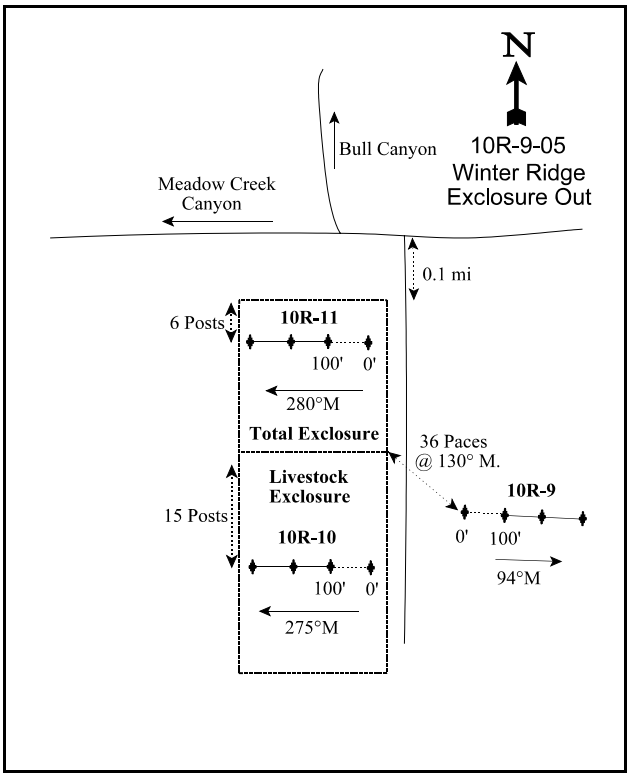
Compass bearing: Frequency baseline 94 degrees magnetic.

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

LOCATION DESCRIPTION

From the intersection of the Seep Ridge and Book Cliff Divide road, proceed west along the divide for 9.4 miles to the major Three Pines-Hay Canyon intersection. Drive west along the Winter Ridge Rd for 9.8 miles to a fork. From the intersection where Meadow Creek Canyon and Bull Canyon meet, take the road to the south. Go 0.1 miles to the Winter Ridge Exclosure. From the "T" in the fence on the west side of the exclosure where the two parts of the exclosure meet, walk 36 paces at an azimuth of 130°M, to the 0-foot stake. The 0-foot stake is marked by browse tag number 63.





Map name: Tenmile Canyon North

Diagrammatic Sketch

Township 15S , Range 21E , Section 26

GPS: NAD 27, UTM 12S 4371961 N, 625766 E

DISCUSSION

Winter Ridge Exclosure Outside - Trend Study 10R-9

This study is found outside of the exclosure complex on Winter Ridge. The exclosure was constructed in 1964. The trend study was established in 1997. The site has a slope of 4% with a westerly aspect and an elevation of 7,400 feet. The area is a mountain big sagebrush/grass type in association with scattered pinyon and juniper. It is used as winter range for deer and elk and is grazed by cattle in the Horse Point allotment during the summer. At the time the study was established on June 5, 1997, cattle were grazing on the site. Pellet group data estimates were 44 elk, 2 deer and 30 cow days use/acre (109 edu/ha, 5 edu/ha and 74 cdu/ha). Data from 2000 were estimated at 22 elk, 2 deer and 19 cow days use/acre (54 edu/ha, 5 ddu/ha and 47 cdu/ha). Most of the cattle pats sampled in 2000 appeared to be from the late summer or previous fall. Pellet data from 2005 estimated 32 elk, 2 deer, 7 cow, and 5 horse days use/acre (79 edu/ha, 5 ddu/ha, 16 cdu/ha, and 13 hdu/ha).

Soil at the site is moderately deep with an effective rooting depth estimated at just over 15 inches. It has a loam texture with a neutral soil reaction (7.2 pH). Phosphorus and potassium are low at 5.4 ppm P and 3.2 ppm K. Values less than 6 ppm for phosphorus and 60 ppm for potassium may limit normal plant growth and development (Tiedemann and Lopez 2004). Soil pedestaling is evident around the base of shrubs, indicative of soil loss in the past. An erosion condition class assessment rated erosion as stable in 2005.

Mountain big sagebrush is the most abundant browse species. Sagebrush cover was 13% in 1997 and 16% in 2000. This declined to 9% in 2005. Sagebrush density was 7,960 plants/acre in 2000, which dropped by 35% to 5,140 plants/acre in 2005. Decadence was very high in 2000 at 51%, while 20% of the population was classified as dying. Drought conditions after 2000 must have led to a die-off of many of these plants. Decadence was still high in 2005 at 42%, with 27% of the population classified as dying. Young plants were not abundant in 2005, but seedlings were estimated at 740 seedlings/acre.

Broom snakeweed was present at an estimated density of only 1,440 plants/acre in 1997. Density rapidly increased in 2000 to 19,460 plants/acre. In 2005, density decreased to 8,040 plants/acre, but plants were much bigger. Cover for broom snakeweed increased from less than 3% in 2000 to 10% in 2005. Snakeweed made up more than half of the total browse cover in 2005. Other browse species encountered in low densities include dwarf and stickyleaf low rabbitbrush, and winterfat.

Perennial grasses are abundant with six species sampled. Thickspike, mutton bluegrass, and Sandberg bluegrass were the most abundant prior to 2005. In 2005, both bluegrass species declined significantly while needle-and-thread and prairie junegrass increased significantly. Forbs are diverse but most provide little cover. Mat penstemon, desert phlox, and scarlet globe mallow have been the most abundant forbs. Mat penstemon was not sampled at all in 2005. Most of the forbs associated with this site are low growing species. Although they afford some protection to the soil, they offer little forage value. Other prevalent species include Rose's pussytoes and longleaf phlox.

1997 APPARENT TREND ASSESSMENT

Soil is adequately protected at this time with some past erosion apparent. Bare ground is most vulnerable in the unprotected shrub interspaces. Mountain big sagebrush is the dominant browse with an overly mature age structure. Other browse are present, but in low densities. Grass accounts for two-thirds of the herbaceous cover with thickspike wheatgrass being the most abundant. Forbs are mostly low growing increaser species providing little forage. The Desirable Components Index (see methods) rated this site as fair due to moderate browse and perennial grass cover.

winter range condition (DC Index) - fair (60) Mid-level potential scale

2000 TREND ASSESSMENT

Trend for soil appears stable. There is some limited erosion occurring within the shrub interspaces, but the abundant herbaceous vegetation and litter cover adequately protect the soil from serious erosion. Trend for browse is down slightly for the key species, mountain big sagebrush. Use is moderate to heavy (74% of the population), percentage of plants classified with poor vigor has increased (10 to 20%), and decadence has doubled from 24% to 51%. There are currently not enough seedlings and young to replace the decadent plants that are classified as dying. In addition, the density of the increaser, broom snakeweed has increased almost exponentially to 19,460 plants/acre, a 15-fold increase. Trend for the herbaceous understory is stable. Sum of nested frequency for grasses and forbs changed very little. The nested frequency of mutton bluegrass and Sandberg bluegrass has increased significantly, while prairie junegrass decreased. The DCI score rated this site as fair to good due to increased browse and perennial grass cover.

TREND ASSESSMENT
soil - stable (0)
browse - slightly down (-1)
herbaceous understory - stable (0)
winter range condition (DC Index) - fair to good (67) Mid-level potential scale

2005 TREND ASSESSMENT

The soil trend is considered slightly down. Relative percent bare ground cover increased from 29% to 38%. Vegetation and litter cover did not change, but relative cryptogam cover decreased from 10% to less than 2%. The ratio of bare ground to protective ground cover (vegetation, litter, and cryptogams) also decreased. The browse trend is also down. Mountain big sagebrush density declined 35%. The ratio of living to dead plants was very high at 1:1.9. Decadence was slightly better than 2000, but was still high at 42%. Plants classified as dying also increased from 20% to 27%. Broom snakeweed density declined, but it appears the population has matured and plants were much bigger. Snakeweed cover increased and was higher than 10%. Strip frequency for snakeweed increased from 75 to 81%. The herbaceous understory trend is slightly down. Sum of nested frequency for grasses and forbs combined decreased 25%. Grasses only decreased very slightly, but there was a major decline for forbs. The DCI score rated this site as fair due to a large decrease in browse cover.

TREND ASSESSMENT
soil - slightly down (-1)
browse - down (-2)
herbaceous understory - slightly down (-1)
winter range condition (DC Index) - fair (55) Mid-level potential scale

HERBACEOUS TRENDS --
Management unit 10R, Study no: 9

Type	Species	Nested Frequency			Average Cover %		
		'97	'00	'05	'97	'00	'05
G	Agropyron dasystachyum	$_{b}$340	$_{ab}$324	$_{a}$296	3.00	4.00	4.88
G	Bouteloua gracilis	26	37	39	.93	1.74	2.40
G	Koeleria cristata	$_{c}$152	$_{a}$45	$_{b}$84	1.75	.48	1.77
G	Poa fendleriana	$_{a}$171	$_{b}$249	$_{a}$184	2.79	5.97	3.26

Type	Species	Nested Frequency			Average Cover %		
		'97	'00	'05	'97	'00	'05
G	Poa secunda	$_{b}$191	$_{c}$251	$_{a}$43	2.06	3.75	.50
G	Stipa comata	$_{b}$56	$_{a}$11	$_{c}$177	.26	.07	4.30
Total for Annual Grasses		0	0	0	0	0	0
Total for Perennial Grasses		936	917	823	10.83	16.03	17.12
Total for Grasses		936	917	823	10.83	16.03	17.12
F	Agoseris glauca	-	-	-	-	-	.00
F	Antennaria rosea	$_{b}$28	$_{b}$25	$_{a}$1	.53	.32	.00
F	Arabis sp.	$_{b}$17	$_{a}$2	$_{a}$1	.03	.00	.00
F	Arenaria fendleri	-	3	-	-	.00	-
F	Astragalus convallarius	12	10	9	.02	.05	.08
F	Astragalus lentiginosus	-	-	1	-	-	.00
F	Castilleja linariaefolia	7	3	-	.04	.00	-
F	Crepis acuminata	4	-	1	.03	-	.03
F	Cryptantha sp.	4	-	6	.04	-	.04
F	Eriogonum alatum	-	-	4	-	-	.03
F	Erigeron eatonii	$_{b}$30	$_{b}$16	$_{a}$-	.06	.06	-
F	Erigeron pumilus	$_{a}$-	$_{c}$48	$_{b}$14	-	.19	.14
F	Hymenoxys acaulis	-	-	6	-	-	.06
F	Lesquerella sp.	22	13	19	.10	.20	.06
F	Lithospermum sp.	-	2	-	-	.00	-
F	Lygodesmia grandiflora	1	-	-	.03	-	-
F	Machaeranthera grindelioides	-	-	2	-	-	.03
F	Penstemon caespitosus	$_{b}$64	$_{b}$54	$_{a}$-	1.02	.94	-
F	Petradoria pumila	-	3	-	-	.03	-
F	Physaria acutifolia	-	3	-	-	.15	-
F	Phlox austromontana	$_{b}$190	$_{b}$228	$_{a}$65	2.20	3.54	.62
F	Phlox longifolia	$_{b}$56	$_{a}$22	$_{a}$6	.15	.06	.02
F	Sphaeralcea coccinea	$_{a}$78	$_{b}$104	$_{c}$126	.70	.61	2.48
F	Townsendia sp.	-	-	4	-	-	.01
Total for Annual Forbs		0	0	0	0	0	0
Total for Perennial Forbs		513	536	265	4.98	6.19	3.62
Total for Forbs		513	536	265	4.98	6.19	3.62

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

BROWSE TRENDS --
Management unit 10R, Study no: 9

Type	Species	Strip Frequency			Average Cover %		
		'97	'00	'05	'97	'00	'05
B	Artemisia tridentata vaseyana	94	98	91	12.95	15.57	9.22
B	Ceratoides lanata	1	2	3	.03	-	.03
B	Chrysothamnus depressus	6	7	4	.16	.19	.06
B	Chrysothamnus viscidiflorus viscidiflorus	0	0	0	-	.00	-
B	Gutierrezia sarothrae	30	75	81	.16	2.52	10.31
B	Pediocactus simpsonii	6	8	8	.01	.01	-
B	Pinus edulis	0	2	2	.03	-	.15
B	Tetradymia canescens	0	1	0	-	-	-
Total for Browse		137	193	189	13.34	18.30	19.78

CANOPY COVER, LINE INTERCEPT --
Management unit 10R, Study no: 9

Species	Percent Cover '05
Artemisia tridentata vaseyana	9.25
Chrysothamnus depressus	.08
Gutierrezia sarothrae	13.08

KEY BROWSE ANNUAL LEADER GROWTH --
Management unit 10R, Study no: 9

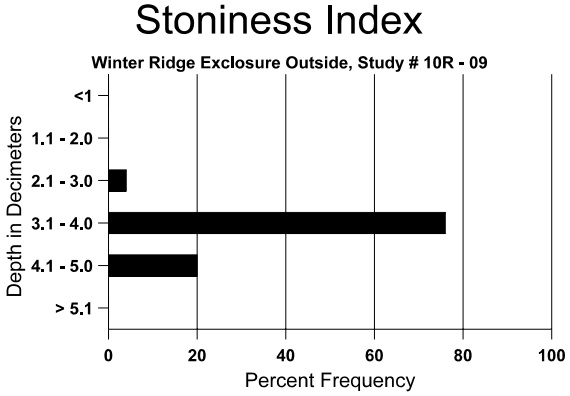
Species	Average leader growth (in) '05
Artemisia tridentata vaseyana	1.9

BASIC COVER --
Management unit 10R, Study no: 9

Cover Type	Average Cover %		
	'97	'00	'05
Vegetation	31.92	40.52	37.43
Rock	.11	.04	.05
Pavement	.54	.18	.07
Litter	25.17	33.08	29.99
Cryptogams	15.88	12.26	1.79
Bare Ground	31.46	35.23	42.84

SOIL ANALYSIS DATA --
Herd Unit 10R, Study no: 09, Study Name: Winter Ridge Exclosure Outside

Effective rooting depth (in)	Temp °F (depth)	PH	%sand	%silt	%clay	%0M	ppm P	ppm K	dS/m
15.4	61.2 (14.6)	7.2	35.6	38.8	25.6	1.4	5.4	3.2	0.5



PELLET GROUP DATA --
Management unit 10R, Study no: 9

Type	Quadrat Frequency		
	'97	'00	'05
Rabbit	14	5	20
Horse	-	-	5
Elk	24	15	24
Deer	4	9	9
Cattle	2	3	8

Days use per acre (ha)	
'00	'05
-	-
-	5 (13)
22 (55)	32 (79)
2 (5)	2 (5)
19 (47)	7 (16)

BROWSE CHARACTERISTICS --
Management unit 10R, Study no: 9

		Age class distribution (plants per acre)					Utilization					
Year	Plants per Acre (excluding seedlings)	Seedling	Young	Mature	Decadent	Dead	% moderate	% heavy	% decadent	% dying	% poor vigor	Average Height Crown (in)
Artemisia tridentata vaseyana												
97	**6920**	40	220	5060	1640	1600	53	25	24	10	10	21/27
00	**7960**	60	660	3220	4080	1520	44	30	51	20	20	20/22
05	**5140**	740	140	2860	2140	2740	49	9	42	27	27	19/23
Ceratoides lanata												
97	**20**	-	-	20	-	-	0	0	-	-	0	6/6
00	**40**	-	-	40	-	-	0	100	-	-	0	4/5
05	**80**	-	-	80	-	-	0	100	-	-	0	3/4

		Age class distribution (plants per acre)					Utilization					
Year	Plants per Acre (excluding seedlings)	Seedling	Young	Mature	Decadent	Dead	% moderate	% heavy	% decadent	% dying	% poor vigor	Average Height Crown (in)
Chrysothamnus depressus												
97	**260**	-	40	220	-	-	0	0	0	-	0	3/7
00	**420**	-	100	260	60	-	0	5	14	10	10	3/7
05	**280**	-	-	240	40	-	100	0	14	-	0	3/7
Gutierrezia sarothrae												
97	**1440**	-	160	1280	-	-	0	0	0	-	0	5/6
00	**19460**	1140	5380	14020	60	220	0	0	0	-	0	4/4
05	**8040**	520	2560	5420	60	-	0	0	1	.24	.24	7/9
Opuntia sp.												
97	**0**	-	-	-	-	-	0	0	-	-	0	-/-
00	**0**	-	-	-	-	-	0	0	-	-	0	4/5
05	**0**	-	-	-	-	-	0	0	-	-	0	-/-
Pediocactus simpsonii												
97	**120**	-	20	100	-	-	0	0	-	-	0	1/3
00	**200**	-	100	100	-	-	0	0	-	-	0	1/2
05	**300**	-	-	300	-	20	0	0	-	-	0	1/2
Pinus edulis												
97	**0**	-	-	-	-	-	0	0	-	-	0	-/-
00	**40**	-	40	-	-	-	0	0	-	-	0	-/-
05	**40**	-	40	-	-	-	0	0	-	-	0	-/-
Tetradymia canescens												
97	**0**	-	-	-	-	-	0	0	-	-	0	-/-
00	**20**	-	20	-	-	-	0	0	-	-	0	-/-
05	**0**	-	-	-	-	-	0	0	-	-	0	-/-

Trend Study 10R-10-05

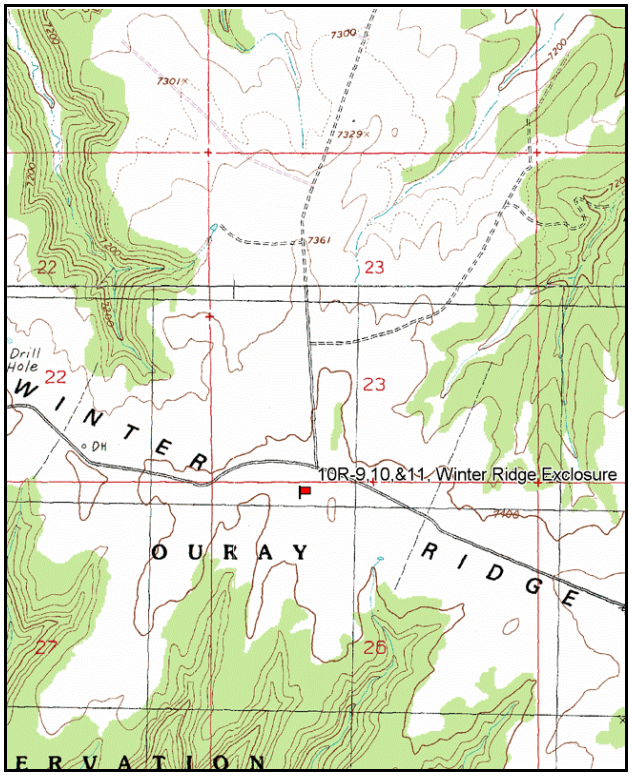
Study site name: Winter Ridge Livestock Exclosure . Vegetation Type: Mountain big sagebrush .

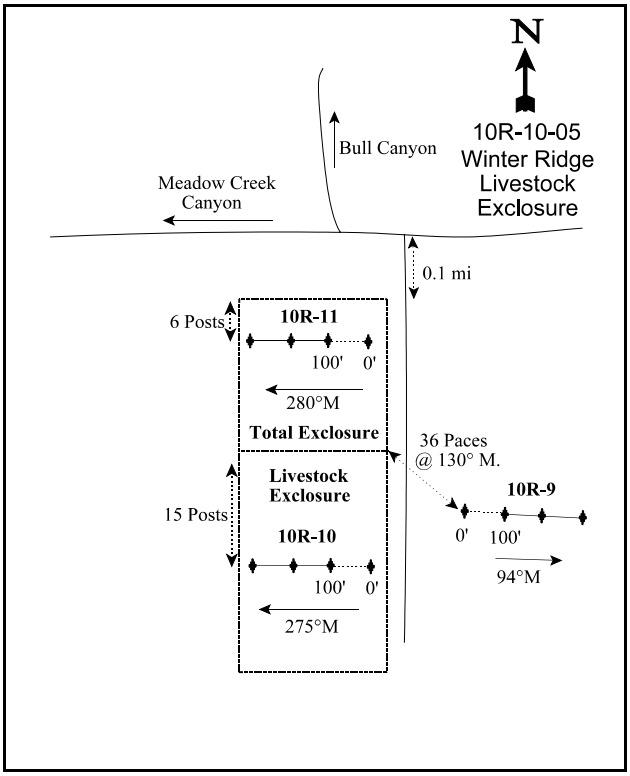
Compass bearing: Frequency baseline 275 degrees magnetic.

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

LOCATION DESCRIPTION

From the intersection of the Seep Ridge and Book Cliff Divide road, proceed west along the divide for 9.4 miles to the major Three Pines-Hay Canyon intersection. Drive west along the Winter Ridge Rd for 9.8 miles to a fork. From the intersection where Meadow Creek Canyon and Bull Canyon meet, take the road to the south. Go 0.1 miles to the Winter Ridge Exclosure. Go to the northwest corner of the livestock part of the exclosure. From here walk down 15 posts and the 300-foot stake is to the east. The 0-foot stake is on the east end and marked by browse tag number 76.





Map name: Tenmile Canyon North

Diagrammatic Sketch

Township 15S , Range 21E , Section 26

GPS: NAD 27, UTM 12S 4371940 N, 625695 E

DISCUSSION

Winter Ridge Livestock Exclosure - Trend Study 10R-10

This study is located within the Winter Ridge livestock exclosure which excludes livestock use. The exclosure was constructed in 1964 and the trend study was established in 1997. The site has a mild slope of 5% with a westerly aspect and an elevation of 7,400 feet. Pellet group data indicated high elk use within the livestock exclosure in 1997 with 100 elk days use/acre (247 edu/ha). Deer use was only 4 days use/acre (10 ddu/ha). Data from the 2000 reading were estimated at a lower use of 28 elk days use/acre (69 edu/ha). In 2005, 80 elk and 3 deer days use/acre (197 edu/ha and 8 ddu/ha) were estimated. There was also 2 cow days use/acre (5 cdu/ha) were estimated due to a part of the fence that was knocked over.

Soil in the exclosure is moderately deep with an effective rooting depth estimated at nearly 16 inches. It has a loam texture and neutral soil reaction (pH of 7.2). Phosphorus and potassium are both low at 5.4 and 3.2 ppm, respectively. Values less than 6 ppm for phosphorus and 60 ppm for potassium may limit normal plant growth and development (Tiedemann and Lopez 2004). Some soil pedestaling is evident in the shrub interspaces, although current erosion appears minimal and was rated as stable in 2005.

As with the surrounding mountain big sagebrush community outside of the exclosure, sagebrush within the exclosure has a mostly mature age structure. Sagebrush within the exclosure are noticeably larger than the plants sampled on the outside. They show light to moderate hedging. Sagebrush cover was nearly 15% in 2000, but declined to 10% in 2005. Decadence was estimated at 31% in 1997. In 2000, decadence declined to 23%, but then increased to 39% in 2005. Plants classified as dying increased from 15% to 23% in 2005. Sagebrush density increased to 5,600 plants/acre in 2005, which was about equal to density in 1997. Young plants have not been extremely abundant during any of the three sampling periods. A moderate amount of seedlings (280/acre) were sampled in 2005. Other common browse on the site include dwarf and stickyleaf low rabbitbrush, and broom snakeweed. Broom snakeweed density increased by nearly four times in 2005.

Grasses are abundant and diverse. Thickspike wheatgrass, prairie Junegrass, mutton bluegrass, and Sandberg bluegrass are all abundant. Thickspike wheatgrass and needle-and-thread grass increased significantly in 2005. Forbs are diverse yet few species are very abundant. The most common forb is desert phlox. No annual grasses or forbs have ever been sampled on this site.

1997 APPARENT TREND ASSESSMENT

There is some slight rill erosion apparent in the shrub interspaces. As with most of the surrounding area, the soil is most vulnerable in the unprotected interspaces between the mountain big sagebrush. Cryptogams also help protect the soil. Mountain big sagebrush is the dominant browse with an overly mature age structure and very low number of seedlings. At this time there does not appear to be enough seedlings or young plants present to replace the decadent and/or dying population. Other browse are present but in low densities. Grass accounts for three-fourths of the herbaceous cover with muttongrass being the most abundant. No annual forbs are present and the perennial forbs consist of primarily low growing species that provide little forage. The Desirable Components Index (see methods) rated this site as good due to moderate browse cover and excellent perennial grass cover.

winter range condition (DC Index) - good (68) Mid-level potential scale

2000 TREND ASSESSMENT

Trend for soil is considered stable with similar amounts of bare ground estimated in 1997 and 2000. Vegetation and litter cover are abundant and adequate to protect the soil from significant erosion events.

Trend for the key browse species, mountain big sagebrush, is stable. Use of sagebrush is similar to 1997 levels. Percent decadence declined slightly, however the proportion of plants displaying poor vigor increased from 10% to 23% due to drought conditions. Density of young plants increased, although there are currently not enough to replace decadent sagebrush that appear to be dying. Another unfavorable factor is the increase in broom snakeweed which occurred rarely in 1997. Now it numbers 1,240 plants/acre and 44% of these are young plants. Trend for the herbaceous understory is down slightly due to a decline in the sum of nested frequency of perennial grasses and forbs. Mutton bluegrass was the most abundant grass on the site in 1997 with a quadrat frequency of 93% and a cover value of 8%. It has since declined significantly to a quadrat frequency of 56% and a cover value of less than 5%. All other grass frequencies remained similar. Sum of nested frequency of perennial forbs declined to less than half of the 1997 level. The DCI score continued to rate this site as good.

TREND ASSESSMENT
soil - stable (0)
browse - stable (0)
herbaceous understory - slightly down (-1)
winter range condition (DC Index) - good (70) Mid-level potential scale

2005 TREND ASSESSMENT

Trend for soil is considered stable as there was not enough change to warrant a change in trend. Relative percent bare soil has increased from 28% to 34%. Vegetation cover and litter cover decreased slightly after drought. The browse trend is stable. Mountain big sagebrush density increased to the same density as 1997, but percent decadence also increased from 23% to 39% in 2005. The number of plants classified as dying increased to 23%. Sagebrush cover decreased from 15% to 10%. Broom snakeweed density increased by four times. Utilization has been light to moderate. The herbaceous understory trend is slightly up. Sum of nested frequency for grasses and forbs combined increased 20%. Needle-and-thread and thickspike wheatgrass each significantly increased. Forb nested frequency increased 40% from 2000, which was a very dry year. The DCI score rated this site as fair due to a decrease in browse cover and an increase in browse decadence.

TREND ASSESSMENT
soil - stable (0)
browse - stable (0)
herbaceous understory - slightly up (+1)
winter range condition (DC Index) - fair (57) Mid-level potential scale

HERBACEOUS TRENDS --
Management unit 10R, Study no: 10

Type	Species	Nested Frequency			Average Cover %		
		'97	'00	'05	'97	'00	'05
G	Agropyron dasystachyum	a226	a227	b282	.86	3.01	4.45
G	Bouteloua gracilis	17	15	21	.28	.51	1.08
G	Koeleria cristata	230	255	262	3.71	10.16	8.50
G	Oryzopsis hymenoides	-	6	5	-	.30	.03
G	Poa fendleriana	b299	a158	a177	7.85	3.38	5.25
G	Poa secunda	99	99	92	1.83	1.02	1.29

Type	Species	Nested Frequency			Average Cover %		
		'97	'00	'05	'97	'00	'05
G	Stipa comata	$_{a}$6	$_{a}$10	$_{b}$58	.06	.13	2.11
G	Stipa lettermani	3	-	-	.15	-	-
Total for Annual Grasses		0	0	0	0	0	0
Total for Perennial Grasses		880	770	897	14.76	18.53	22.74
Total for Grasses		880	770	897	14.76	18.53	22.74
F	Agoseris glauca	-	-	4	-	-	.09
F	Antennaria rosea	15	18	10	.15	.11	.10
F	Arabis sp.	$_{b}$11	$_{ab}$2	$_{a}$-	.03	.01	-
F	Astragalus convallarius	$_{ab}$18	$_{a}$5	$_{b}$27	.06	.01	.64
F	Castilleja linariaefolia	$_{b}$41	$_{a}$7	$_{a}$-	.69	.01	.00
F	Crepis acuminata	$_{b}$22	$_{a}$10	$_{a}$10	.33	.25	.27
F	Cryptantha sp.	5	14	5	.01	.07	.01
F	Erigeron eatonii	$_{b}$35	$_{a}$13	$_{a}$10	.22	.05	.10
F	Erigeron pumilus	-	8	8	-	.07	.10
F	Lesquerella sp.	$_{ab}$1	$_{a}$-	$_{b}$13	.00	-	.19
F	Machaeranthera canescens	-	2	-	-	.06	-
F	Machaeranthera grindelioides	13	6	4	1.38	.06	.06
F	Penstemon caespitosus	$_{b}$31	$_{a}$4	$_{a}$6	.58	.15	.06
F	Phlox austromontana	$_{c}$174	$_{a}$55	$_{b}$101	2.32	1.12	1.10
F	Phlox longifolia	$_{b}$28	$_{a}$-	$_{a}$3	.09	-	.01
F	Senecio multilobatus	-	3	8	-	.01	.18
F	Sphaeralcea coccinea	11	12	12	.02	.10	.18
F	Townsendia sp.	-	-	1	-	-	.00
Total for Annual Forbs		0	0	0	0	0	0
Total for Perennial Forbs		405	159	222	5.92	2.13	3.14
Total for Forbs		405	159	222	5.92	2.13	3.14

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

BROWSE TRENDS --
Management unit 10R, Study no: 10

Type	Species	Strip Frequency			Average Cover %		
		'97	'00	'05	'97	'00	'05
B	Artemisia tridentata vaseyana	96	93	99	13.12	14.75	10.43
B	Ceratoides lanata	1	1	1	.03	-	.00
B	Chrysothamnus depressus	34	34	37	1.22	1.37	2.07
B	Chrysothamnus viscidiflorus viscidiflorus	4	17	14	.09	.53	.51
B	Gutierrezia sarothrae	2	21	65	.03	.04	3.01
B	Opuntia sp.	4	1	6	.00	-	.00
B	Pediocactus simpsonii	0	1	0	.00	.00	-
B	Pinus edulis	0	0	1	.15	.00	.03
B	Sclerocactus sp.	0	0	0	-	.00	-
Total for Browse		141	168	223	14.66	16.71	16.08

CANOPY COVER, LINE INTERCEPT --
Management unit 10R, Study no: 10

Species	Percent Cover '05
Artemisia tridentata vaseyana	14.39
Ceratoides lanata	.03
Chrysothamnus depressus	1.48
Chrysothamnus viscidiflorus viscidiflorus	.51
Gutierrezia sarothrae	2.86

KEY BROWSE ANNUAL LEADER GROWTH --
Management unit 10R, Study no: 10

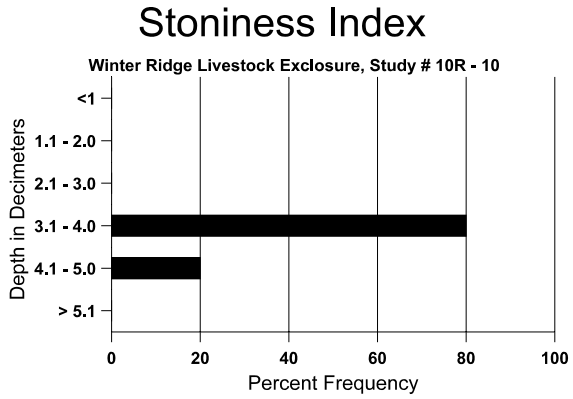
Species	Average leader growth (in) '05
Artemisia tridentata vaseyana	1.3

BASIC COVER --
Management unit 10R, Study no: 10

Cover Type	Average Cover %		
	'97	'00	'05
Vegetation	33.37	47.15	43.04
Rock	.04	0	.01
Pavement	.18	.04	.05
Litter	29.62	30.74	27.72
Cryptogams	16.89	2.14	5.28
Bare Ground	30.52	31.20	38.77

SOIL ANALYSIS DATA --
Herd Unit 10R, Study no: 10, Study Name: Winter Ridge Livestock Exclosure

Effective rooting depth (in)	Temp °F (depth)	PH	%sand	%silt	%clay	%0M	ppm P	ppm K	dS/m
15.8	61.2 (15.6)	7.2	35.6	38.8	25.6	1.4	5.4	3.2	0.5



PELLET GROUP DATA --
Management unit 10R, Study no: 10

Type	Quadrat Frequency			Days use per acre (ha)	
	'97	'00	'05	'00	'05
Rabbit	9	4	4	-	-
Elk	49	22	52	28 (70)	80 (197)
Deer	-	3	6	1 (4)	3 (8)
Cattle	-	1	4	-	2 (5)

BROWSE CHARACTERISTICS --
Management unit 10R, Study no: 10

		Age class distribution (plants per acre)					Utilization					
Year	Plants per Acre (excluding seedlings)	Seedling	Young	Mature	Decadent	Dead	% moderate	% heavy	% decadent	% dying	% poor vigor	Average Height Crown (in)
Artemisia tridentata vaseyana												
97	**5740**	20	340	3600	1800	1500	36	1	31	10	10	48/54
00	**4720**	-	540	3100	1080	1020	38	7	23	15	23	30/33
05	**5600**	280	240	3160	2200	1960	46	16	39	23	23	22/26
Ceratoides lanata												
97	**20**	-	-	20	-	-	0	0	-	-	0	5/11
00	**20**	-	-	20	-	-	0	0	-	-	0	-/-
05	**20**	-	-	20	-	-	0	100	-	-	0	7/12
Chrysothamnus depressus												
97	**2140**	-	80	2060	-	-	0	0	-	-	0	5/9
00	**1900**	20	20	1880	-	-	0	0	-	-	0	5/7
05	**1620**	-	-	1620	-	-	26	14	-	-	0	5/11
Chrysothamnus viscidiflorus viscidiflorus												
97	**100**	-	20	80	-	-	0	0	-	-	0	13/23
00	**500**	-	100	400	-	-	8	0	-	-	0	7/9
05	**420**	-	100	320	-	-	5	0	-	-	0	9/13
Gutierrezia sarothrae												
97	**40**	-	20	20	-	-	0	0	0	-	0	6/7
00	**1240**	-	540	680	20	-	0	0	2	-	0	5/5
05	**4940**	-	1080	3840	20	-	0	0	0	.40	.40	7/9
Opuntia sp.												
97	**80**	-	40	40	-	-	0	0	-	-	0	2/6
00	**20**	-	-	20	-	-	0	0	-	-	100	1/6
05	**240**	-	40	200	-	-	0	0	-	-	0	2/6
Pediocactus simpsonii												
97	**0**	-	-	-	-	-	0	0	-	-	0	-/-
00	**20**	-	-	20	-	-	0	0	-	-	0	-/-
05	**0**	-	-	-	-	-	0	0	-	-	0	-/-
Pinus edulis												
97	**0**	-	-	-	-	-	0	0	-	-	0	-/-
00	**0**	-	-	-	-	-	0	0	-	-	0	-/-
05	**20**	-	20	-	-	-	0	0	-	-	0	-/-

Trend Study 10R-11-05

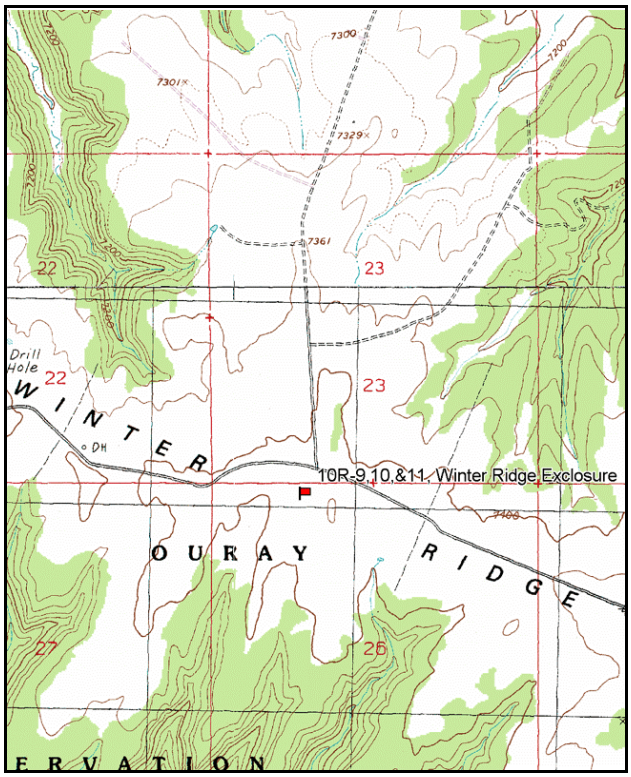
Study site name: Winter Ridge Total Exclosure . Vegetation Type: Mountain big sagebrush .

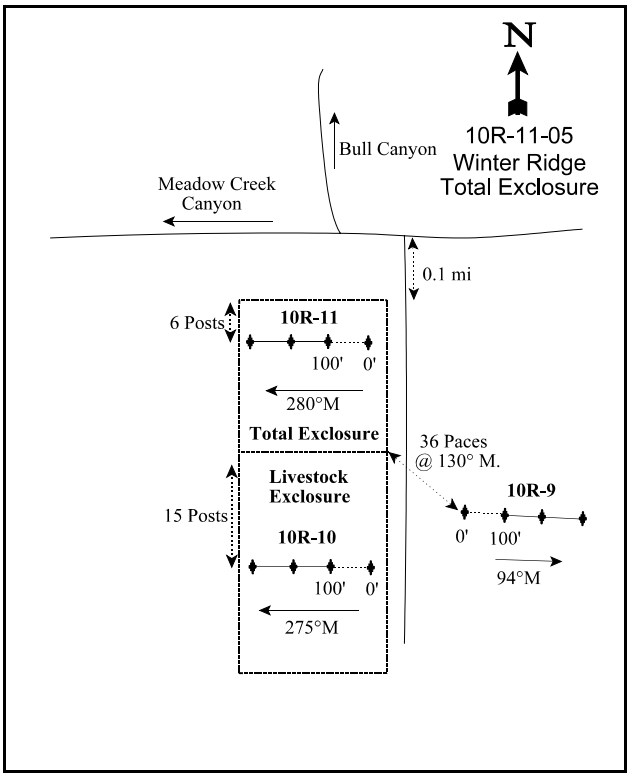
Compass bearing: Frequency baseline 280 degrees magnetic.

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

LOCATION DESCRIPTION

From the intersection of the Seep Ridge and Book Cliff Divide road, proceed west along the divide for 9.4 miles to the major Three Pines-Hay Canyon intersection. Drive west along the Winter Ridge Rd for 9.8 miles to a fork. From the intersection where Meadow Creek Canyon and Bull Canyon meet, take the road to the south. Go 0.1 miles to the Winter Ridge Exclosure. From the northwest corner of the total exclosure, walk down six fenceposts. The 300-foot stake is just east of the sixth post. The 0-foot stake is on the east end and is marked by browse tag number 86.





Map name: Tenmile Canyon North

Diagrammatic Sketch

Township 15S , Range 21E , Section 26

GPS: NAD 27, UTM 12S 4372030 N, 625733 E

DISCUSSION

Winter Ridge Total Exclosure - Trend Study 10R-11

The Winter Ridge total exclosure study is found within the exclosure complex on Winter Ridge. The exclosure was constructed in 1964 and the trend study was established in 1997. The study samples the area of the total exclosure which excludes livestock and big game use. The site has a slope of 5% with a westerly aspect and an elevation of 7,200 feet.

Soil within the total exclosure is moderately deep with an effective rooting depth estimated at nearly 18 inches. There is a compacted layer at that depth. There is a slight soil depth gradient with more shallow soils near the west fence and deeper soils near the east end of the exclosure fence. It has a loam texture with a neutral soil reaction (7.2 pH). Phosphorus and potassium are low at 5.4 and 3.2 ppm, respectively. Values less than 6 ppm for phosphorus and 60 ppm for potassium may limit normal plant growth and development (Tiedemann and Lopez 2004). Cracks are apparent from the soil drying and shrinking. There is some pedestaling apparent around plants, but there is enough vegetation and litter cover to protect the soil.

Mountain big sagebrush is the dominant browse within the exclosure. Sagebrush cover has averaged about 21% cover over the three sampling readings. Sagebrush density was estimated at 5,740 plants/acre. In 2000 density was higher with an estimated 7,460 plants/acre. After many drought years density declined to 5,360 plants/acre in 2005. There have been few seedlings and young plants, especially in 2005. Mature plants are large and vigorous averaging 29 inches in height. Nearly one-quarter of the population was classified as decadent in 1997, which increased to 51% in 2000. Decadence in 2000 may have been estimated too high due to leaf drop in a drought year. Only 6% of the population was classified as dying in 2000, while 18% were classified as dying in 2005. Decadence was 37% in 2005. The plants on the east side of the exclosure (deeper soils) appear to be in better vigor than the plants further west. Other browse species are scattered throughout the area, although none are very abundant. Other species sampled include: winterfat, dwarf and stickyleaf low rabbitbrush, broom snakeweed, and cactus.

Grasses are abundant and vigorous with six species providing about 35% cover in 2000 and 2005. Mutton bluegrass dominates the composition by providing over half of the grass cover. Thickspike wheatgrass, blue grama, prairie Junegrass, and Sandberg bluegrass are also common. Forbs are fairly diverse but provide only about 4% cover. The only common forbs are desert phlox and scarlet globemallow.

1997 APPARENT TREND ASSESSMENT

The soil within the total exclosure shows little erosion but there are signs of past erosion events. Some of the plants are pedestaled, although it appears that this has not occurred recently. Vegetation, litter, and cryptogams help protect the soil adequately to prevent runoff, except in severe cases. Mountain big sagebrush does not have residual seed heads and there are very few seedling or young plants present. Although percent decadence is not overly high at this time, the lack of seedlings and young should be monitored as there are probably not enough now to replace the dying plants. Grasses dominate the herbaceous understory, specifically muttongrass. Forbs are not very abundant, but Indian paintbrush appears at a higher density within the exclosure than outside. The Desirable Components Index (see methods) rated this site as good due to excellent browse and perennial grass cover.

winter range condition (DC Index) - good (78) Mid-level potential scale

2000 TREND ASSESSMENT

Trend for soil is up slightly due to a decline in percent bare ground, an increase vegetation cover, and an increase in herbaceous cover. Trend for the key browse, mountain big sagebrush, appears stable. Percent decadence increased from 24% to 51%, even though the number of plants classified as dying declined. The number of young plants appear abundant enough to replace those currently being lost. The proportion of sagebrush in poor vigor and the number of dead plants remains the same as before. It is apparent, however, that the sagebrush are stressed from intraspecific competition (high densities) combined with drought. Trend for the herbaceous understory is stable with an increase in the sum of nested frequency of perennial grasses being offset by losses to the forbs. Mutton bluegrass, the dominant species, increased significantly since 1997. Thickspike wheatgrass and Sandberg bluegrass also increased significantly. Sum of nested frequency of perennial forbs declined slightly but the most abundant species, desert phlox and scarlet globemallow, remained stable. The DCI score was rated as good.

TREND ASSESSMENT
soil - slightly up (+1)
browse - stable (0)
herbaceous understory - stable (0)
winter range condition (DC Index) - good (71) Mid-level potential scale

2005 TREND ASSESSMENT

The soil trend is considered slightly down. Relative bare ground increased, this can be partially explained by the drop of cryptogams. Cryptogams are likely still in the soil, but were not as visible as they were in previous readings. However, vegetative cover dropped and litter cover also decreased substantially. The browse trend is stable. Mountain big sagebrush density declined, but percent decadence improved. Sagebrush cover has remained unchanged at about 22%. Recruitment is poor and needs to improve as young and seedlings are rare. Broom snakeweed density decreased and was only half of the 2000 density. The herbaceous understory trend is stable. Nested frequency for perennial grasses and forbs declined slightly, but not enough to warrant a downward trend. Mutton bluegrass and thickspike wheatgrass declined significantly, but prairie junegrass and needle-and-thread increased significantly. The DCI score remained good.

TREND ASSESSMENT
soil - slightly down (-1)
browse - stable (0)
herbaceous understory - stable (0)
winter range condition (DC Index) - good (72) Mid-level potential scale

HERBACEOUS TRENDS --
Management unit 10R, Study no: 11

Type	Species	Nested Frequency			Average Cover %		
		'97	'00	'05	'97	'00	'05
G	Agropyron dasystachyum	$_{a}$259	$_{b}$287	$_{a}$227	1.82	4.11	3.15
G	Bouteloua gracilis	30	42	35	.95	2.17	1.01
G	Koeleria cristata	$_{b}$195	$_{a}$114	$_{b}$211	4.24	3.57	10.11
G	Poa fendleriana	$_{a}$290	$_{b}$352	$_{a}$266	10.91	24.99	14.99

Type	Species	Nested Frequency			Average Cover %		
		'97	'00	'05	'97	'00	'05
G	Poa secunda	$_{b}$47	$_{c}$99	$_{a}$7	.54	1.23	.16
G	Stipa comata	$_{a}$21	$_{a}$17	$_{b}$108	.16	.13	4.51
Total for Annual Grasses		0	0	0	0	0	0
Total for Perennial Grasses		842	911	854	18.64	36.21	33.95
Total for Grasses		842	911	854	18.64	36.21	33.95
F	Antennaria rosea	$_{b}$18	$_{a}$6	$_{a}$2	.08	.06	.01
F	Arabis sp.	19	14	5	.11	.05	.01
F	Astragalus convallarius	27	19	38	.19	.10	.50
F	Castilleja linariaefolia	$_{b}$32	$_{a}$6	$_{a}$17	.64	.01	.56
F	Calochortus nuttallii	-	-	4	-	-	.00
F	Crepis acuminata	7	-	4	.16	-	.15
F	Cryptantha sp.	4	-	3	.01	-	.00
F	Erigeron eatonii	$_{ab}$5	$_{b}$15	$_{a}$-	.01	.03	-
F	Erigeron pumilus	-	-	1	-	-	.03
F	Lesquerella sp.	-	3	3	-	.00	.03
F	Lygodesmia grandiflora	8	3	-	.04	.00	-
F	Machaeranthera grindelioides	-	-	4	-	-	.03
F	Penstemon caespitosus	8	3	8	.30	.03	.09
F	Phlox austromontana	$_{b}$125	$_{b}$119	$_{a}$65	1.69	3.45	.77
F	Phlox longifolia	$_{b}$54	$_{a}$14	$_{a}$19	.14	.03	.06
F	Senecio multilobatus	-	-	1	-	-	.00
F	Sphaeralcea coccinea	52	58	64	.44	.35	1.23
F	Unknown forb-annual (a)	-	4	-	-	.15	-
Total for Annual Forbs		0	4	0	0	0.15	0
Total for Perennial Forbs		359	260	238	3.83	4.14	3.50
Total for Forbs		359	264	238	3.83	4.29	3.50

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

BROWSE TRENDS --
Management unit 10R, Study no: 11

Type	Species	Strip Frequency			Average Cover %		
		'97	'00	'05	'97	'00	'05
B	Artemisia tridentata vaseyana	96	97	96	19.43	20.13	21.98
B	Ceratoides lanata	5	6	5	.15	.03	.15
B	Chrysothamnus depressus	3	1	2	.03	.00	-
B	Chrysothamnus viscidiflorus viscidiflorus	6	6	6	.45	.33	.81
B	Gutierrezia sarothrae	6	30	34	.06	.61	1.76
B	Juniperus osteosperma	0	0	0	-	.00	-
B	Pediocactus simpsonii	5	11	15	.11	.16	.21
B	Pinus edulis	0	2	2	-	.03	.03
Total for Browse		121	153	160	20.25	21.31	24.94

CANOPY COVER, LINE INTERCEPT --
Management unit 10R, Study no: 11

Species	Percent Cover '05
Artemisia tridentata vaseyana	20.50
Ceratoides lanata	.01
Chrysothamnus depressus	.05
Chrysothamnus viscidiflorus viscidiflorus	.50
Gutierrezia sarothrae	2.81
Pinus edulis	.03

KEY BROWSE ANNUAL LEADER GROWTH --
Management unit 10R, Study no: 11

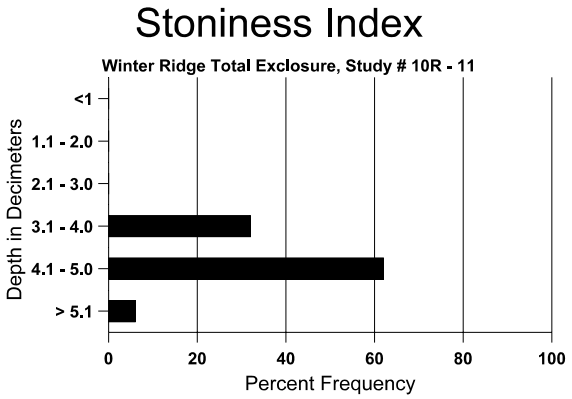
Species	Average leader growth (in) '05
Artemisia tridentata vaseyana	1.2

BASIC COVER --
Management unit 10R, Study no: 11

Cover Type	Average Cover %		
	'97	'00	'05
Vegetation	40.81	58.45	54.51
Rock	.07	.06	.09
Pavement	.19	.15	.02
Litter	33.62	42.13	32.40
Cryptogams	13.07	20.97	3.95
Bare Ground	21.73	15.06	25.02

SOIL ANALYSIS DATA --
Herd Unit 10R, Study no: 11, Study Name: Winter Ridge Total Exclosure

Effective rooting depth (in)	Temp °F (depth)	PH	%sand	%silt	%clay	%0M	ppm P	ppm K	dS/m
17.7	59.0 (16.5)	7.2	35.6	38.8	25.6	1.4	5.4	3.2	0.5



PELLET GROUP DATA --
Management unit 10R, Study no: 11

Type	Quadrat Frequency		
	'97	'00	'05
Rabbit	5	3	15
Grouse	-	2	-

Days use per acre (ha)	
'00	'05
-	-
-	-

BROWSE CHARACTERISTICS --
Management unit 10R, Study no: 11

		Age class distribution (plants per acre)					Utilization					
Year	Plants per Acre (excluding seedlings)	Seedling	Young	Mature	Decadent	Dead	% moderate	% heavy	% decadent	% dying	% poor vigor	Average Height Crown (in)
Artemisia tridentata vaseyana												
97	**5740**	40	340	4020	1380	1520	.69	0	24	11	11	28/35
00	**7460**	60	460	3160	3840	1520	.53	0	51	6	11	30/31
05	**5360**	-	120	3240	2000	1660	.74	0	37	18	19	28/32
Ceratoides lanata												
97	**160**	-	-	160	-	-	0	0	0	-	0	14/13
00	**200**	-	-	180	20	-	0	0	10	-	0	17/11
05	**120**	-	-	60	60	-	50	0	50	17	17	10/9
Chrysothamnus depressus												
97	**60**	-	-	60	-	-	0	0	-	-	0	5/9
00	**20**	-	20	-	-	-	0	0	-	-	0	-/-
05	**40**	-	-	40	-	-	0	0	-	-	0	6/10
Chrysothamnus viscidiflorus viscidiflorus												
97	**280**	-	20	240	20	20	0	0	7	-	0	14/16
00	**220**	20	60	40	120	-	0	0	55	9	9	16/19
05	**300**	-	20	280	-	-	0	0	0	-	0	13/18
Gutierrezia sarothrae												
97	**200**	-	-	200	-	-	0	0	-	-	0	5/5
00	**4400**	40	980	3420	-	20	0	0	-	-	0	4/6
05	**2080**	60	-	2080	-	20	0	0	-	-	0	7/10
Juniperus osteosperma												
97	**0**	-	-	-	-	-	0	0	-	-	0	-/-
00	**0**	20	-	-	-	-	0	0	-	-	0	-/-
05	**0**	-	-	-	-	-	0	0	-	-	0	-/-
Pediocactus simpsonii												
97	**100**	-	-	100	-	20	0	0	0	-	0	3/4
00	**220**	-	40	180	-	-	0	0	0	-	0	2/3
05	**340**	-	60	260	20	20	0	0	6	6	6	2/3
Pinus edulis												
97	**0**	-	-	-	-	-	0	0	-	-	0	-/-
00	**40**	-	40	-	-	-	0	0	-	-	0	-/-
05	**40**	-	40	-	-	-	0	0	-	-	0	-/-

WINTER RIDGE EXCLOSURE COMPARISON SUMMARY

Trend Study No. 10R-9 (outside), 10R-10 (livestock), and 10R-11 (total)

Ground cover characteristics are similar between the livestock exclosure and outside of the exclosure where percent bare ground is relatively high, yet litter and vegetation cover are abundant and appear adequate to protect the soil. Inside the total exclosure, herbaceous cover is more abundant and percent bare ground lower.

The key browse for this study area is mountain big sagebrush (Tables 1 and 2). Sagebrush density decreased outside the exclosure and inside the total exclosure in 2005. Sagebrush density was nearly equal for each study in 2005 at about 5,400 plants/acre. Sagebrush cover was much higher in the total exclosure where no browsing takes place. Cover was 22% in 2005 in the total exclosure, compared to 9% outside and 10% in the livestock exclosure. Plants in the total exclosure were on average much larger (28 inches tall, 32 inches crown width) than those that can be browsed outside the exclosure (19/23 inches) or in the livestock exclosure (22/26 inches). Percent decadence and percent dying were similar for each study. Decadency and plants classified as dying increased in 2005 compared to 2000. This shows the impact of the recent drought as each study was similarly effected. Percent young was also similar for each study in 2005.

	Outside Exclosure	Livestock Exclosure	Total Exclosure
Mountain big sagebrush			
Average Cover %	15.6	14.8	20.1
Density (plants/acre)	7,960	4,720	7,460
% young	8% (660/acre)	11% (540cre)	6% (460/acre)
% decadent	51% (4,080/acre)	23% (1,080/acre)	51% (3,840/acre)
% dying	20% (1,560/acre)	15% (720/acre)	6% (460/acre)
% heavy use	30% (2,360/acre)	7% (320/acre)	0% (0/acre)
Average height/crown	20/22	30/33	30/31

Table 1. Mountain big sagebrush data comparisons for Winter Ridge Exclosure complex in 2000.

	Outside Exclosure	Livestock Exclosure	Total Exclosure
Mountain big sagebrush			
Average Cover %	9.2	10.4	22.0
Density (plants/acre)	5,140	5,600	5,360
% young	3% (140/acre)	4% (240/acre)	2% (120/acre)
% decadent	42% (2,140/acre)	39% (2,200/acre)	37% (2,000/acre)
% dying	20% (1,380/acre)	23% (1,260/acre)	18% (980/acre)
% heavy use	9% (480/acre)	16% (900/acre)	0% (0/acre)
Average height/crown	19/23	22/26	28/32

Table 2. Mountain big sagebrush data comparisons for Winter Ridge Exclosure complex in 2005.

The herbaceous understories are relatively abundant and diverse on all treatment effects with perennial grasses dominating the herbaceous understory. Six grass species are common to each study site, but vary in their abundance (Tables 3 and 4). The most common species include: thickspike wheatgrass, blue grama, prairie Junegrass, mutton bluegrass, Sandberg bluegrass, and needle-and-thread grass. A major difference between the three site treatment effects is the abundance of mutton bluegrass in the total exclosure. In 2000, it provided 69% of the grass cover in the total exclosure with a cover value nearly 4 times more than outside of the exclosure and 7 times more than the livestock exclosure. In 2005, mutton bluegrass declined, but was still the most abundant species in the total exclosure. Prairie junegrass was much more abundant in the livestock and total exclosure, which shows its sensitivity to spring grazing. The only warm season species, blue grama, was sightly more abundant outside the exclosure where cool season species are grazed in the spring. Forbs are diverse on all sites, but only provided about 3-4% cover in 2005. The most common forb for all sites is desert phlox.

	Species	**Nested Frequency 2000**			**Average Cover % 2000**		
		Outside	***Livestock***	***Total Ex.***	***Outside***	***Livestock***	***Total Ex.***
G	Agropyron dasystachyum	400	227	287	5.98	3.01	4.11
G	Bouteloua gracilis	**50**	15	42	2.45	.51	2.17
G	Koeleria cristata	56	**255**	**114**	.84	**10.16**	**3.57**
G	Poa fendleriana	271	158	**352**	6.46	3.38	**24.99**
G	Poa secunda	286	99	99	4.77	1.02	1.23
G	Stipa comata	14	10	17	.10	.13	.13
Total for Grasses		1077	770	911	20.63	18.53	36.21

Table 3. Comparisons of grass abundance by species for Winter Ridge outside exclosure, livestock exclosure, and total exclosure in 2000.

	Species	**Nested Frequency 2005**			**Average Cover % 2005**		
		Outside	***Livestock***	***Total Ex.***	***Outside***	***Livestock***	***Total Ex.***
G	Agropyron dasystachyum	296	282	227	4.88	4.45	3.15
G	Bouteloua gracilis	**39**	21	35	**2.40**	1.08	1.01
G	Koeleria cristata	84	**262**	**211**	1.77	**8.50**	**10.11**
G	Poa fendleriana	184	177	**266**	3.26	5.25	**14.99**
G	Poa secunda	43	92	7	.50	1.29	.16
G	Stipa comata	177	58	108	4.30	2.11	4.51
Total for Grasses		823	897	854	17.12	22.74	33.95

Table 4. Comparisons of grass abundance by species for Winter Ridge outside exclosure, livestock exclosure, and total exclosure in 2005.

It is difficult much of the time to determine which of many factors may be the most influential in effecting the trend for a key species. Transects were established in 1997 and read again in 2000 and 2005 for this relatively

high elevation three-way exclosure. When comparing the effects of the different grazing treatments on this area it appears that drought has the biggest effect on the sagebrush population as sagebrush density for each treatment was similar in 2005 and had declined after drought. Browsing does appear to have an effect on sagebrush cover as the unbrowsed plants were on average larger and provided more cover. Grazing has appeared to effect the abundance of some of the grass species. Mutton bluegrass and prairie junegrass decreased when grazed and were more abundant when protected from grazing.

Trend Study 10R-12-05

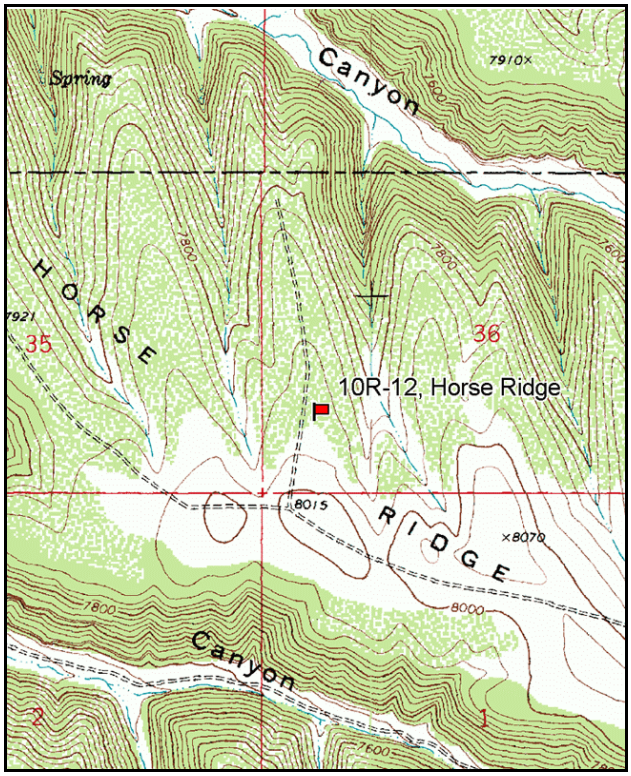
Study site name: Horse Ridge . Vegetation Type: Mountain Brush .

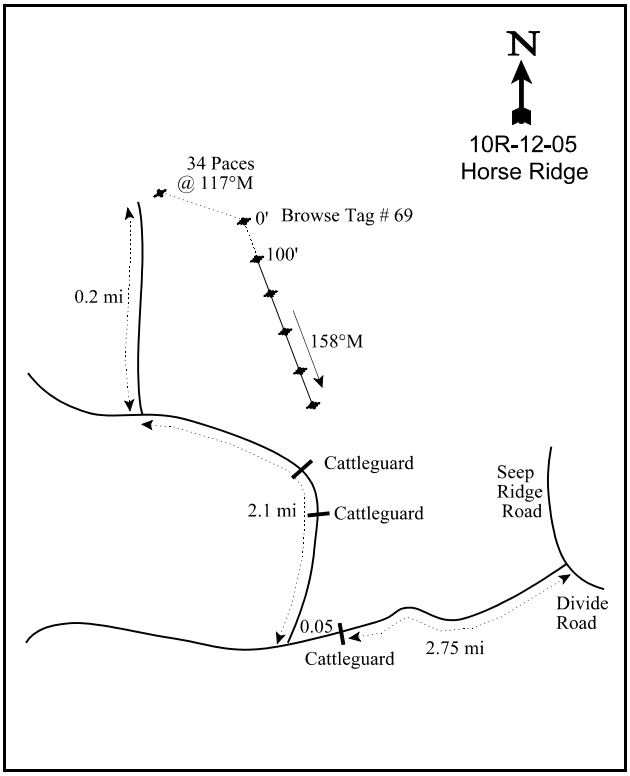
Compass bearing: frequency baseline 158 degrees magnetic.

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

LOCATION DESCRIPTION

From the intersection of Divide road and Seep Ridge, turn west off of Divide road. Drive down this road 2.75 miles to a cattle guard. Proceed 0.05 miles, turn right (north) and drive 2.1 miles crossing two cattle guards. At this point there is a fork. Take the right fork for 0.2 miles to a witness post on the right side of the road. The 0-foot stake is 34 paces from the witness post at 117°M. The study is marked by green, steel fenceposts approximately 12-18 inches in height. The 0-foot stake is marked by browse tag number 69.





Map name: P R Spring .

Diagrammatic Sketch

Township 15½S , Range 23E , Section 36

GPS: NAD 27, UTM 12S 4368302 N, 643199 E

DISCUSSION

Horse Ridge - Trend Study 10R-12

The Horse Ridge trend study is located on Horse Ridge about 2.5 miles west of the Seep Ridge Road and Divide Ridge Road intersection. The site has a slope of 5-10% with a slight northwest aspect and an elevation of approximately 7,900 feet. The area is dominated by mixed mountain brush species, which include serviceberry, bitterbrush, and mountain big sagebrush. Pellet group data indicated moderate big game use in 1997 with an estimated 71 elk and 68 deer days use/acre (175 edu/ha and 168 ddu/ha). Use was lighter in 2000 with 45 elk, 47 deer and 3 cow days use/acre estimated (111 edu/ha, 116 ddu/ha and 7 cdu/ha). In 2005, pellet group data estimated 60 elk, 40 deer and 2 cow days use/acre (147 edu/ha, 98 ddu/ha and 5 cdu/ha).

Soil is moderately deep with an effective rooting depth of over 19 inches. It has a clay loam texture with a moderately acid soil reaction (5.9 pH). Soil organic matter is very high at 11%. There is little rock or pavement on the surface and percent bare ground is low. Some soil pedestaling is evident under shrubs, but the site has a low erosion potential due to the levelness of the terrain combined with the abundant vegetation and litter cover. The erosion condition was stable in 2005.

The area supports a variety of useful browse species including serviceberry, mountain big sagebrush, bitterbrush, and snowberry. The most numerous browse is mountain big sagebrush which provides more than half of the browse cover with 21% cover estimated in 2005. This was a decrease from 25% cover in 2000. Density was 7,380 plants/acre in 2000, which declined to 6,260 plants/acre in 2005. This decline may be attributed to a high amount of rodent damage that was noted in 2005. Sagebrush stems were girdled by rodents which resulted in crown death. Bitterbrush was also girdled, but less frequently. Most likely, the species which caused the girdling were the long-tailed vole *(Microtus longicaudus)* and the deer mouse *(Peromyscus maniculatus)*. This occurs when rodent populations are high and food is scarce especially during winters with long lasting snow packs (Parmenter et al. 1987). Utilization of sagebrush has been light to moderate. Reproduction was good in 2000 with young plants making up 18% of the population, but declined to only 7% of the population in 2005.

Bitterbrush cover was high in 2000 at 12%, but declined to 6% in 2005 after rodent damage. In 2000, it provided 27% of the browse cover. In 2005 this declined to 16% of the total browse cover. Density in 2000 was estimated at 2,960 plants/acre. This only declined 5% to 2,800 plants/acre in 2005, but decadence increased from 20% to 34%. Twenty-six percent of the population was classified as dying in 2005. Utilization was classified as moderate to heavy in 1997 with many of the plants exhibiting a clubbed appearance. Some of the current years growth was protected by dead stems on the outer portions of the plants making it partially unavailable to browsing. During the 2000 reading, use was classified as heavy (>60% of stems browsed) on 74% of the population and nearly 30% of the bitterbrush were considered unavailable due to heavy browsing growth form. These bitterbrush have a prostrate growth form with an average height of only 11-14 inches. Some plants appear to be layering (vegetative reproduction) as well as reproducing from seed.

Serviceberry is visually more noticeable because of its height, averaging four to five feet in height with a crown of five feet. These plants exhibit good vigor and low decadence with moderate to heavy hedging. Serviceberry density and cover declined slightly in 2005. Some of the current years growth is protected by dead stems on the outer portions of the plants, making much of it unavailable to browsing. Snowberry is also present with an estimated density of over 1,000 plants/acre. Vigor has been good with little decadence.

Grasses and forbs are diverse and abundant. The most abundant grass is mutton bluegrass which provided 30% of the grass cover in 1997 and over 50% in 2000 and 2005. Other common grasses include: thickspike wheatgrass, a sedge, Kentucky bluegrass, and needle-and-thread grass. Some use was noted on grasses in 1997. Twenty-five species of forbs were sampled in 1997, 27 in 2000, and 29 in 2005. The most abundant forbs are low growing species, rose pussytoes and longleaf phlox.

1997 APPARENT TREND ASSESSMENT

Soil is classified as a clay loam with abundant vegetation and litter cover. Erosion potential is low due to the slight slope and well disbursed vegetation and litter cover. This site appears to receive use by elk and deer but may be too far removed from water to be utilized by livestock. Mountain big sagebrush appears to be stable at this time with many young plants in the population. Bitterbrush exhibits a mostly mature population with a clubbed appearance. Although these plants show moderate to heavy hedging, they still show good vigor with only one plant classified as dying. The large serviceberry plants dominate the landscape because of their size. They appear to be moderate to heavily hedged. The dominant grasses encountered are muttongrass and thickspike wheatgrass, which both showed recent utilization. Many of the forbs encountered are caespitose and do not provide much forage. The Desirable Components Index rating scored this site as good to excellent due to excellent browse cover, low browse decadence, good perennial grass cover, and excellent perennial forb cover.

winter range condition (DC Index) - good to excellent (89) Higher potential scale

2000 TREND ASSESSMENT

Trend for soil is fairly stable with abundant vegetation and litter cover protecting the soil. There is little bare ground on the site and no noticeable erosion. Trend for the key browse species, Utah serviceberry, mountain big sagebrush, and bitterbrush is stable. Use is heavy on most of the bitterbrush and some of the serviceberry but vigor is good, percent decadence low, and reproduction adequate. Due to the mild winters of the past couple of years, it appears that sagebrush is only being lightly utilized at the present time. Sagebrush also shows good vigor, low decadence, and excellent reproduction. Trend for the herbaceous understory is slightly down. The sum of nested frequency for perennial grasses has declined by 20% while frequency for perennial forbs has increased slightly (6%). The biggest change is the significant decline in nested frequency of thickspike wheatgrass. The DCI score remained good to excellent.

TREND ASSESSMENT
soil - stable (0)
browse - stable (0)
herbaceous understory - slightly down (-1)
winter range condition (DC Index) - good to excellent (90) Higher potential scale

2005 TREND ASSESSMENT

Trend for soil is slightly down. The ratio of bare ground to protective ground cover (vegetation, litter, and cryptogams) decreased noticeably, but still considered quite good. Relative litter cover decreased from 50% to 36% after many years of drought. The browse trend is slightly down. Sagebrush cover and density declined, which was due to rodent damage and drought. Bitterbrush cover declined and percent decadency increased, but density only slightly declined. Serviceberry cover and density slightly declined also. The herbaceous understory trend is stable. Perennial grasses increased, but perennial forbs declined. Prairie junegrass and Kentucky bluegrass increased in nested frequency. The DCI score declined to 83 which is a rating of good. This decline was due to higher decadence of preferred shrubs.

TREND ASSESSMENT
soil - slightly down (-1)
browse - slightly down (-1)
herbaceous understory - stable (0)
winter range condition (DC Index) - good (83) Higher potential scale

HERBACEOUS TRENDS --
Management unit 10R, Study no: 12

Type	Species	Nested Frequency			Average Cover %		
		'97	'00	'05	'97	'00	'05
G	Agropyron dasystachyum	$_{b}$252	$_{a}$76	$_{a}$86	3.03	.50	1.51
G	Bromus anomalus	-	1	-	-	.00	-
G	Carex sp.	77	70	80	2.00	2.02	2.69
G	Koeleria cristata	$_{a}$46	$_{a}$45	$_{b}$125	.48	.70	1.78
G	Poa fendleriana	$_{b}$288	$_{b}$295	$_{a}$233	3.47	8.97	11.43
G	Poa pratensis	$_{ab}$62	$_{a}$46	$_{b}$96	1.85	2.92	2.30
G	Poa secunda	$_{a}$-	$_{b}$19	$_{b}$20	-	.08	.28
G	Stipa comata	27	50	31	.79	2.86	.53
Total for Annual Grasses		0	0	0	0	0	0
Total for Perennial Grasses		752	602	671	11.64	18.08	20.56
Total for Grasses		752	602	671	11.64	18.08	20.56
F	Agoseris glauca	$_{a}$7	$_{ab}$27	$_{b}$38	.02	.57	.30
F	Antennaria rosea	126	133	104	5.01	3.18	2.31
F	Androsace septentrionalis (a)	$_{a}$3	$_{a}$5	$_{b}$49	.01	.01	.28
F	Arabis sp.	-	12	6	-	.02	.01
F	Arenaria fendleri	$_{ab}$50	$_{b}$67	$_{a}$30	.91	1.97	.40
F	Astragalus convallarius	31	41	22	.37	.55	.14
F	Astragalus tenellus	$_{b}$33	$_{ab}$17	$_{a}$14	.40	.72	.58
F	Aster sp.	5	9	-	.04	.02	-
F	Astragalus utahensis	-	2	2	-	.03	.00
F	Balsamorhiza sagittata	$_{b}$21	$_{a}$7	$_{a}$8	.21	.08	.27
F	Castilleja linariaefolia	-	1	1	-	.00	.00
F	Calochortus nuttallii	2	-	-	.00	-	-
F	Comandra pallida	23	30	14	.13	.16	.05
F	Collinsia parviflora (a)	$_{b}$39	$_{a}$-	$_{c}$143	.14	-	1.75
F	Crepis acuminata	63	78	73	.42	.58	.93
F	Delphinium nuttallianum	1	-	3	.00	-	.01
F	Eriogonum alatum	-	2	11	-	.00	.05
F	Erigeron eatonii	$_{b}$62	$_{a}$33	$_{b}$78	.38	.06	.60
F	Erigeron pumilus	$_{a}$-	$_{b}$23	$_{a}$3	-	.16	.03
F	Eriogonum umbellatum	29	43	30	.57	.92	.96
F	Gayophytum ramosissimum(a)	$_{a}$-	$_{a}$-	$_{b}$28	-	-	.11
F	Lesquerella sp.	-	4	1	-	.00	.00
F	Linum lewisii	3	8	-	.03	.06	-
F	Lupinus argenteus	$_{ab}$9	$_{b}$9	$_{a}$-	.08	.20	.03

Type	Species	Nested Frequency			Average Cover %		
		'97	'00	'05	'97	'00	'05
F	Lychnis drummondii	-	3	-	-	.00	-
F	Penstemon caespitosus	$_{b}$33	$_{a}$-	$_{b}$36	.70	-	.82
F	Pedicularis centranthera	7	-	-	.04	-	-
F	Penstemon watsonii	$_{a}$3	$_{b}$45	$_{a}$-	.01	.70	-
F	Phlox longifolia	$_{a}$107	$_{ab}$145	$_{b}$160	.49	.82	1.11
F	Polygonum douglasii (a)	$_{b}$89	$_{a}$5	$_{b}$76	.18	.00	.19
F	Senecio integerrimus	$_{b}$44	$_{a}$-	$_{b}$52	.27	-	1.11
F	Sphaeralcea coccinea	2	-	-	.00	-	-
F	Taraxacum officinale	$_{b}$50	$_{a}$28	$_{a}$24	.76	.13	.26
F	Thlaspi sp.	-	4	8	-	.01	.04
F	Tragopogon dubius	-	2	1	-	.00	.03
F	Unknown forb-perennial	19	-	-	.30	-	-
Total for Annual Forbs		131	10	296	0.33	0.01	2.34
Total for Perennial Forbs		730	773	719	11.20	11.01	10.11
Total for Forbs		861	783	1015	11.53	11.03	12.45

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

BROWSE TRENDS --
Management unit 10R, Study no: 12

Type	Species	Strip Frequency			Average Cover %		
		'97	'00	'05	'97	'00	'05
B	Amelanchier utahensis	35	39	25	4.67	4.26	2.03
B	Artemisia tridentata vaseyana	92	93	94	16.44	25.25	21.46
B	Chrysothamnus depressus	0	1	1	-	.03	-
B	Chrysothamnus viscidiflorus viscidiflorus	42	53	50	1.00	.87	.92
B	Gutierrezia sarothrae	0	0	2	-	-	-
B	Purshia tridentata	60	74	70	8.35	12.19	5.82
B	Symphoricarpos oreophilus	28	33	33	2.30	1.96	2.29
B	Tetradymia canescens	4	5	6	.15	.36	.34
Total for Browse		261	298	281	32.93	44.93	32.89

CANOPY COVER, LINE INTERCEPT --
Management unit 10R, Study no: 12

Species	Percent Cover	
	'00	'05
Amelanchier utahensis	.40	5.43
Artemisia tridentata vaseyana	-	29.83
Chrysothamnus viscidiflorus viscidiflorus	-	1.63
Purshia tridentata	-	5.50
Symphoricarpos oreophilus	-	1.86
Tetradymia canescens	-	.03

KEY BROWSE ANNUAL LEADER GROWTH --
Management unit 10R, Study no: 12

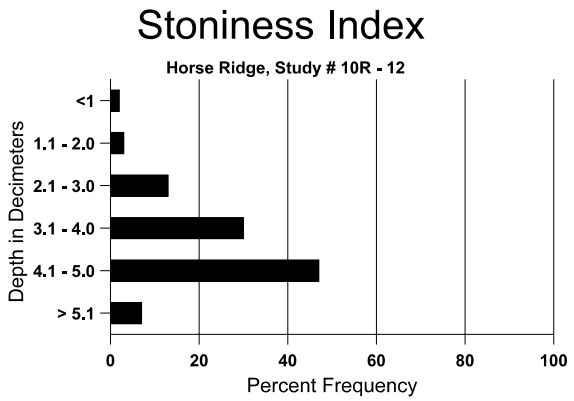
Species	Average leader growth (in)
	'05
Amelanchier utahensis	2.2
Artemisia tridentata vaseyana	2.2
Purshia tridentata	1.6

BASIC COVER --
Management unit 10R, Study no: 12

Cover Type	Average Cover %		
	'97	'00	'05
Vegetation	44.94	62.26	56.68
Rock	.04	.03	.04
Pavement	.95	.17	.30
Litter	66.99	75.81	41.70
Cryptogams	.59	.41	.00
Bare Ground	6.67	12.63	18.22

SOIL ANALYSIS DATA --
Herd Unit 10R, Study no: 12, Study Name: Horse Ridge

Effective rooting depth (in)	Temp °F (depth)	PH	%sand	%silt	%clay	%0M	ppm P	ppm K	dS/m
19.2	59.2 (16.7)	5.9	35.3	34.2	30.5	3.54	11.1	160.0	0.5



PELLET GROUP DATA --
Management unit 10R, Study no: 12

Type	Quadrat Frequency		
	'97	'00	'05
Rabbit	1	12	18
Elk	28	22	32
Deer	19	16	13
Cattle	-	-	-

Days use per acre (ha)	
'00	'05
-	-
45 (111)	60 (147)
47 (116)	40 (98)
3 (8)	2 (5)

BROWSE CHARACTERISTICS --
Management unit 10R, Study no: 12

		Age class distribution (plants per acre)					Utilization					
Year	Plants per Acre (excluding seedlings)	Seedling	Young	Mature	Decadent	Dead	% moderate	% heavy	% decadent	% dying	% poor vigor	Average Height Crown (in)
Amelanchier utahensis												
97	**1060**	-	520	500	40	-	51	21	4	-	0	51/59
00	**1280**	20	820	400	60	20	14	20	5	2	3	60/55
05	**940**	20	540	280	120	-	30	26	13	4	6	63/52
Artemisia tridentata vaseyana												
97	**4800**	620	1120	3600	80	860	38	3	2	1	1	27/36
00	**7380**	980	1300	4840	1240	660	9	.81	17	.81	2	27/30
05	**6260**	180	440	4520	1300	680	26	6	21	12	13	26/33
Chrysothamnus depressus												
97	**0**	-	-	-	-	-	0	0	0	-	0	-/-
00	**40**	-	-	40	-	-	0	0	0	-	0	2/4
05	**40**	-	-	20	20	20	0	100	50	50	50	4/8

		Age class distribution (plants per acre)					Utilization					
Year	Plants per Acre (excluding seedlings)	Seedling	Young	Mature	Decadent	Dead	% moderate	% heavy	% decadent	% dying	% poor vigor	Average Height Crown (in)
Chrysothamnus viscidiflorus viscidiflorus												
97	**1640**	-	80	1560	-	20	0	0	0	-	0	11/12
00	**3280**	-	820	2380	80	-	.60	.60	2	1	1	10/9
05	**2460**	100	580	1760	120	-	2	0	5	2	2	9/10
Gutierrezia sarothrae												
97	**0**	-	-	-	-	-	0	0	-	-	0	-/-
00	**0**	-	-	-	-	-	0	0	-	-	0	-/-
05	**40**	-	-	40	-	-	0	0	-	-	0	4/3
Purshia tridentata												
97	**2300**	20	260	1940	100	-	43	43	4	.86	.86	14/27
00	**2960**	20	200	2160	600	-	11	74	20	5	5	14/28
05	**2800**	-	100	1740	960	80	11	68	34	26	26	11/26
Symphoricarpos oreophilus												
97	**1100**	20	320	780	-	-	15	11	0	-	0	13/20
00	**1240**	-	680	540	20	-	0	5	2	-	0	14/19
05	**1300**	-	220	1040	40	-	9	0	3	2	2	11/15
Tetradymia canescens												
97	**80**	-	-	80	-	-	0	25	0	-	0	13/14
00	**120**	-	-	-	120	-	0	17	100	-	0	16/14
05	**140**	-	60	80	-	-	14	14	0	-	0	7/11

Trend Study 10R-13-05

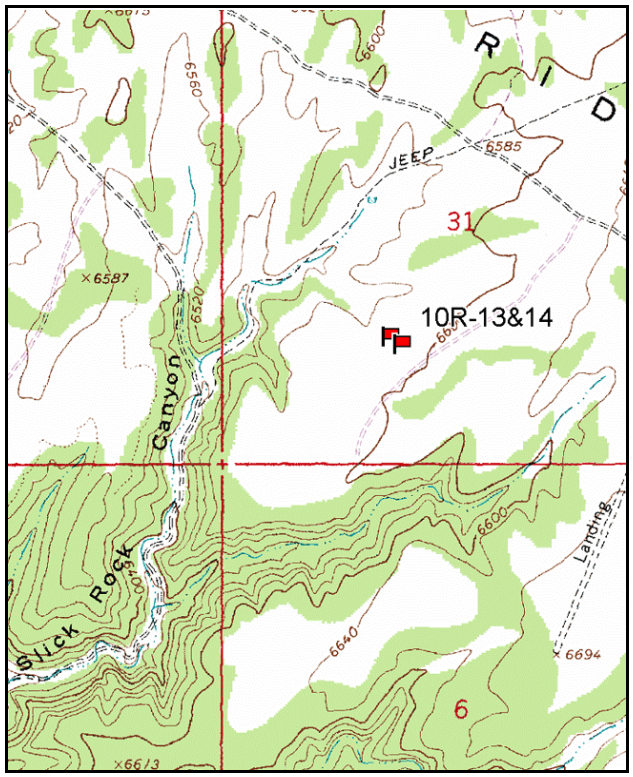
Study site name: Lower McCook Ridge Livestock Exclosure . Vegetation Type: Desert Shrub .

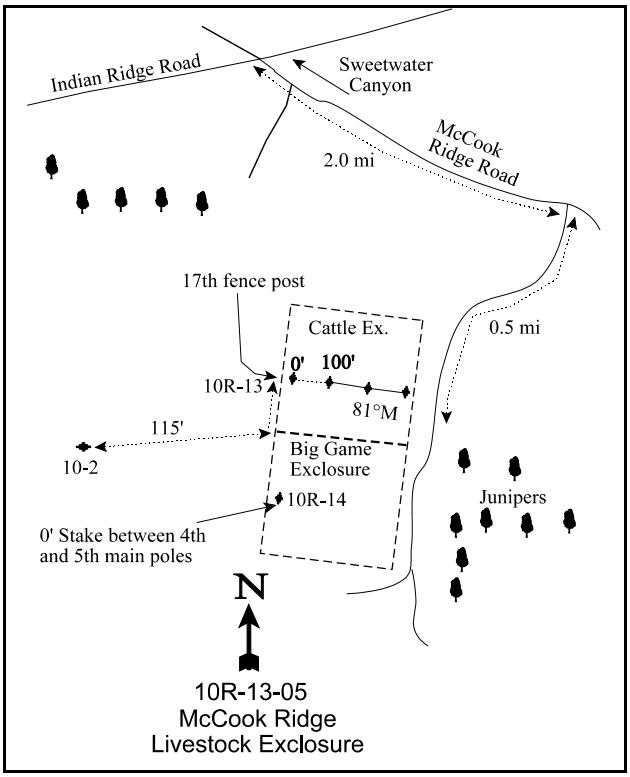
Compass bearing: frequency baseline 81 degrees magnetic.

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

LOCATION DESCRIPTION

From Ouray, go 38 miles south to the McCook Ridge-Indian Ridge turnoff. Turn left (east) and travel on the Indian Ridge road towards Sweetwater Canyon and McCook Ridge 9.1 miles to the intersection of Cooper Canyon, Indian Ridge and McCook Ridge. From Indian Ridge road, turn southeast and proceed up McCook Ridge approximately 2 miles to road on the right (A large exclosure can be seen off the south side of the road.). Turn right and drive approximately 0.5 miles to the exclosure. From the southwest corner of the livestock exclosure count down 17 fenceposts to the 0-foot baseline stake. The frequency baseline is marked by green fenceposts, 12-18 inches tall.





Map Name: Cooper Canyon . Diagrammatic Sketch

Township 13S , Range 24E , Section 31 GPS: NAD 27, UTM 12S 4389044 N, 648042 E

DISCUSSION

Lower McCook Ridge-Livestock Exclosure - Trend Study No. 10R-13

The Lower McCook Ridge-Livestock Exclosure study is located within the Lower McCook Ridge exclosure complex. The exclosure was constructed in 1964 and is approximately 300 feet by 500 feet. This trend study is located within the livestock exclosure and was established in 1997. This site has a slight southwest aspect and a 2-3% slope with an elevation of 6,600 feet. A pellet group transect in the livestock exclosure was estimated at 96 elk days use/acre (237 edu/ha) and 59 deer days use/acre (146 ddu/ha) in 1997. Pellet group data from 2000 were estimated at about the same level of deer use at 64 deer days use/acre (158 ddu/ha), but much lighter elk use at 12 elk days use/acre (30 edu/ha). This much lighter use by elk in 2000 is most likely due to several consecutive mild winters which did not force elk down onto this important wintering area. In 2005, deer use was much higher at an estimated 166 deer days use/acre (410 ddu/ha), while elk use was estimated at 26 elk days use/acre (65 edu/ha). Rabbit use was also very high in 2005 (quadrat frequency of 73%).

Vegetation cover is abundant with most being provided above the ground by the browse species (72% in both 1997 and 2000, 53% in 2005). Effective rooting depth was found to be nearly 15 inches with a majority of the rock (56%) in the soil profile found between 12 and 15 inches below the soil surface. Soil texture is clay loam. Phosphorus is marginal with only 7 ppm. This can limit plant growth and development (Tiedemann and Lopez 2004). Relative bare ground cover was about 21% in 1997 and 2000, but increased to 35% in 2005. Relative litter and vegetation cover were also slightly lower in 2005.

There are several important browse species on this site including: basin big sagebrush, fourwing saltbush, and winterfat. Sagebrush on the site has characteristics of both basin big sagebrush (*Artemisia tridentata tridentata*) and Wyoming big sagebrush (*Artemisia tridentata wyomingensis*). Identification was difficult due to the high level of hybridization, as a result, all sagebrush were classified as basin big sagebrush. The effects of drought were seen in 2005. Sagebrush is the dominant browse species and was estimated at 5,780 plants/acre in 1997, 6,900 plants/acre in 2000, and 6,060 plants/acre in 2005. These plants average nearly two feet in height with a two foot crown. Sagebrush cover was estimated at nearly 22% in 2000, but declined to 16% in 2005. Utilization has been moderate to heavy with each reading, but was heaviest in 2005. This level of use coupled with the smaller growth form is more indicative of Wyoming big sagebrush than basin big sagebrush. Percent decadence was quite low at 10% in 1997, but increased to 31% in 2000, and 44% in 2005. The proportion of plants classified as dying was low at 3% in 1997 and 2000, but increased to 26% in 2005. Young recruitment is moderate at 14% in 2000, but declined to only 4% in 2005.

Fourwing saltbush cover was 4% in 1997 and 6% in 2000, but declined to 1% in 2005 after years of drought. It has a relatively high density for fourwing saltbush at 1,100 plants/acre in 2000 and 900 plants/acre in 2005. This is an overly mature population with very high decadence each year it was sampled (61% in 1997, 67% in 2000, and 82% in 2005). In 2005, 47% of the population was classified as dying. Use was mostly light to moderate with only 13% showing heavy use in 2000. This increased to 38% in 2005. Fourwing was noted as having very few seed stalks in both 1997 and 2000. Recruitment and number of seedlings were very low each year it was sampled. Winterfat cover has been 2-3%, but was lowest in 2005. Density was 5,920 plants/acre in 2000 and declined to 4,900 plants/acre in 2005. The population has been mostly mature population with low percent decadence. Recruitment was fair in 2005 at 9%. Use is difficult to determine for winterfat as most of the plant is browsed away.

Other browse species on the site include fringed sagebrush, broom snakeweed, and cactus. Fringed sagebrush had an estimated density of 6,260 plants/acre in 1997, this slightly increased to 6,500 plants/acre in 2000, and declined sharply to 1,120 plants/acre in 2005 after drought.

Cheatgrass appears in scattered dense patches throughout the area, with other bare interspaces between the basin big sagebrush. Cheatgrass is the dominant herbaceous species which provided 65% of the herbaceous cover and 18% of the total vegetation cover in 1997. Due to dry conditions in 2000, cheatgrass decreased in frequency and cover. In 2005, cheatgrass abundance did not increase, but due to wet spring conditions it was robust with over 10% cover (5-6% previously). Cheatgrass is the most abundant herbaceous species. Perennial grasses are few and consist of thickspike wheatgrass, Indian ricegrass, Sandberg bluegrass, and bottlebrush squirreltail. Sandberg bluegrass increased significantly in 2005. Forbs contribute very little to the herbaceous understory. Scarlet globemallow is the most abundant perennial forb. Annual stickseed and tansy mustard were more abundant in 2005.

1997 APPARENT TREND ASSESSMENT

Soils are alluvially deposited and loamy in texture, with some rock and pavement on the surface (<10%). There are signs of past soil movement, yet erosion is not severe at this time. Vegetation and litter cover values are high enough to protect the soil from most wind and water erosion events. Basin big sagebrush is moderately utilized and appears to have a good age structure. The basin big sagebrush shows more utilization than winterfat, probably due to its availability during periods of snow cover. Winterfat is only lightly hedged with a predominately mature age structure. Fourwing saltbush is light to moderately hedged with 61% of the population reported as decadent. Mature plants are relatively large (2½ feet by a 3 foot crown) with 16% of the fourwing saltbush population classified as dying. The herbaceous understory is dominated by cheatgrass. Cheatgrass is scattered throughout the site in dense patches, leaving few areas where perennial species may be able to withstand cheatgrass competition. The thickspike wheatgrass plants are small statured, usually containing only one culm with one or two leaves. Sandberg bluegrass appeared in small clumps with good vigor. Forbs are nearly nonexistent on this site. The herbaceous understory could be used as an indicator of trend in the future. The Desirable Components Index score was good due to excellent browse cover and good good recruitment.

winter range condition (DC Index) - good (53) Lower potential scale

2000 TREND ASSESSMENT

Trend for soil is stable. Average cover of vegetation and litter both increased and should counter the slight increase in bare soil. Sum of nested frequency for perennial herbaceous species increased in 2000 as well, which is a positive factor for holding soils in place. Trend for browse is stable. The key species, most likely a hybrid between basin big sagebrush and Wyoming big sagebrush, has shown a slight increase in heavy use and percent decadence has increased from 10% to 30%. However, vigor remains good and young recruitment is more than adequate to maintain the population. Trend for the herbaceous understory is up as perennial species increased in sum of nested frequency and cheatgrass decreased in frequency due to drought. The DCI score remained good.

TREND ASSESSMENT
soil - stable (0)
browse - stable (0)
herbaceous understory - up (+2)
winter range condition (DC Index) - good (53) Lower potential scale

2005 TREND ASSESSMENT

Trend for soil is slightly down. Relative bare ground cover increased from 21% to 35%. Much of this may be due to a decrease in litter cover after years of lower production due to drought. Erosion was rated as stable in an erosion condition class rating. The browse trend is slightly down as each of the three key species had

declines in density and cover. Percent decadence and percent dying increased for both sagebrush and fourwing saltbush. The herbaceous understory trend is stable. Perennial grasses increased slightly in nested frequency, while perennial forbs decreased substantially. Grasses make up a larger portion of the herbaceous understory. Cheatgrass remained stable in abundance, but was more robust in 2005. Annual forbs were also more abundant in 2005. The DCI score decreased to fair due to an increase in browse decadence and decrease in browse recruitment.

TREND ASSESSMENT
soil - slightly down (-1)
browse - slightly down (-1)
herbaceous understory - stable (0)
winter range condition (DC Index) - fair (36) Lower potential scale

HERBACEOUS TRENDS --
Management unit 10R, Study no: 13

Type	Species	Nested Frequency			Average Cover %		
		'97	'00	'05	'97	'00	'05
G	Agropyron dasystachyum	18	28	24	.49	2.15	.16
G	Bromus tectorum (a)	$_{b}$339	$_{a}$241	$_{a}$221	5.82	4.84	10.17
G	Oryzopsis hymenoides	1	1	-	.15	.18	.00
G	Poa secunda	$_{ab}$131	$_{a}$116	$_{b}$162	1.31	2.68	3.20
G	Sitanion hystrix	$_{a}$43	$_{b}$107	$_{b}$91	.44	2.74	1.45
Total for Annual Grasses		339	241	221	5.82	4.84	10.17
Total for Perennial Grasses		193	252	277	2.40	7.75	4.81
Total for Grasses		532	493	498	8.22	12.59	14.99
F	Arabis sp.	2	-	-	.00	-	-
F	Castilleja sp.	-	6	-	.03	.01	-
F	Descurainia pinnata (a)	$_{b}$23	$_{a}$3	$_{c}$46	.07	.00	1.14
F	Draba sp. (a)	$_{a}$-	$_{a}$-	$_{b}$13	-	-	.05
F	Erigeron pumilus	$_{b}$25	$_{b}$42	$_{a}$-	.15	.22	-
F	Lappula occidentalis (a)	$_{a}$8	$_{a}$6	$_{b}$72	.02	.03	.52
F	Phlox longifolia	-	1	-	-	.00	-
F	Schoencrambe linifolia	$_{b}$19	$_{a}$-	$_{a}$-	.04	-	-
F	Sphaeralcea coccinea	57	63	45	.41	.53	.45
F	Tragopogon dubius	$_{a}$-	$_{b}$17	$_{a}$-	-	.08	-
Total for Annual Forbs		31	9	131	0.09	0.03	1.73
Total for Perennial Forbs		103	129	45	0.63	0.85	0.45
Total for Forbs		134	138	176	0.73	0.89	2.18

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

BROWSE TRENDS --
Management unit 10R, Study no: 13

Type	Species	Strip Frequency			Average Cover %		
		'97	'00	'05	'97	'00	'05
B	Artemisia frigida	66	69	28	2.56	3.62	.21
B	Artemisia tridentata tridentata	75	78	79	13.35	21.68	15.86
B	Atriplex canescens	35	36	29	3.79	5.64	1.32
B	Ceratoides lanata	61	66	58	3.03	2.51	1.57
B	Gutierrezia sarothrae	7	19	9	.15	.19	.03
B	Juniperus osteosperma	0	0	1	-	-	-
B	Opuntia sp.	5	5	1	.15	.38	.03
B	Sclerocactus sp.	0	1	0	-	-	-
Total for Browse		249	274	205	23.06	34.05	19.03

CANOPY COVER, LINE INTERCEPT --
Management unit 10R, Study no: 13

Species	Percent Cover '05
Artemisia frigida	.23
Artemisia tridentata tridentata	14.00
Atriplex canescens	.85
Ceratoides lanata	.86
Gutierrezia sarothrae	.03

KEY BROWSE ANNUAL LEADER GROWTH --
Management unit 10R, Study no: 13

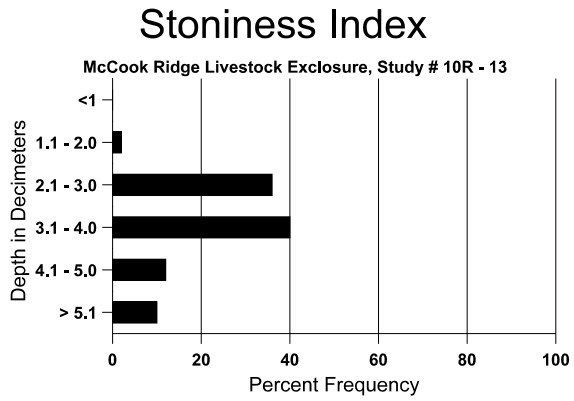
Species	Average leader growth (in) '05
Artemisia tridentata tridentata	2.1
Atriplex canescens	4.4
Ceratoides lanata	3.2

BASIC COVER --
Management unit 10R, Study no: 13

Cover Type	Average Cover %		
	'97	'00	'05
Vegetation	32.47	45.88	33.21
Rock	.75	.20	.25
Pavement	8.74	3.42	3.87
Litter	35.06	51.30	35.02
Cryptogams	3.60	1.75	2.04
Bare Ground	21.07	27.85	39.18

SOIL ANALYSIS DATA --
Herd Unit 10R, Study no: 13, Study Name: McCook Ridge Livestock Exclosure

Effective rooting depth (in)	Temp °F (depth)	PH	%sand	%silt	%clay	%0M	ppm P	ppm K	dS/m
14.6	61.4 (20.0)	6.7	31.0	37.8	31.2	5.0	7.2	153.6	0.7



PELLET GROUP DATA --
Management unit 10R, Study no: 13

Type	Quadrat Frequency		
	'97	'00	'05
Rabbit	10	12	73
Elk	18	16	13
Deer	36	41	85

Days use per acre (ha)	
'00	'05
-	-
12 (30)	26 (65)
64 (158)	166 (410)

BROWSE CHARACTERISTICS --
Management unit 10R, Study no: 13

		Age class distribution (plants per acre)					Utilization					
Year	Plants per Acre (excluding seedlings)	Seedling	Young	Mature	Decadent	Dead	% moderate	% heavy	% decadent	% dying	% poor vigor	Average Height Crown (in)
Artemisia frigida												
97	**6260**	100	780	5440	40	-	.31	0	1	.31	.31	13/10
00	**6500**	10620	380	5900	220	20	17	.61	3	-	0	5/8
05	**1120**	140	280	840	-	-	11	5	0	-	0	5/5
Artemisia tridentata tridentata												
97	**5780**	400	1820	3380	580	540	36	25	10	3	3	24/29
00	**6900**	-	1000	3760	2140	520	44	30	31	3	3	20/26
05	**6060**	-	260	3140	2660	1360	27	66	44	26	27	21/27
Atriplex canescens												
97	**880**	-	60	280	540	80	34	9	61	16	16	30/35
00	**1100**	-	-	360	740	-	25	13	67	13	13	31/38
05	**900**	-	40	120	740	140	33	38	82	47	47	22/20
Ceratoides lanata												
97	**4960**	20	420	4380	160	20	34	17	3	-	.40	10/11
00	**5920**	20	140	4960	820	20	33	3	14	3	3	8/8
05	**4900**	-	420	3920	560	220	5	91	11	7	7	5/6
Gutierrezia sarothrae												
97	**300**	-	-	300	-	-	0	0	-	-	0	8/8
00	**840**	80	60	780	-	20	0	0	-	-	0	5/7
05	**180**	20	-	180	-	-	0	0	-	-	0	6/6
Juniperus osteosperma												
97	**0**	-	-	-	-	-	0	0	-	-	0	-/-
00	**0**	20	-	-	-	-	0	0	-	-	0	-/-
05	**20**	-	20	-	-	-	0	0	-	-	0	-/-
Opuntia sp.												
97	**180**	-	-	180	-	-	0	0	-	-	0	5/9
00	**180**	20	20	160	-	-	0	0	-	-	0	3/9
05	**20**	-	-	20	-	-	0	0	-	-	0	4/8
Sclerocactus sp.												
97	**0**	-	-	-	-	-	0	0	-	-	0	-/-
00	**20**	-	-	20	-	-	0	0	-	-	0	-/-
05	**0**	-	-	-	-	-	0	0	-	-	0	-/-

Trend Study 10R-14-05

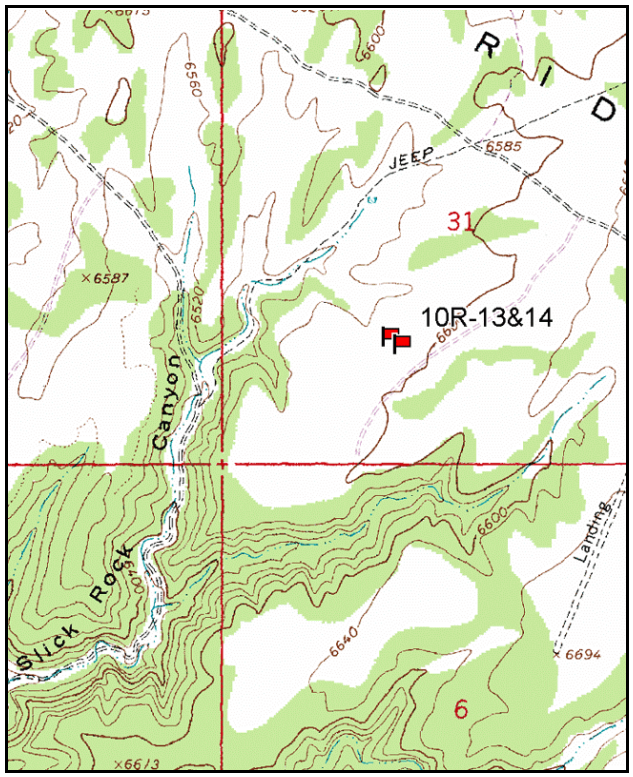
Study site name: Lower McCook Ridge Total Exclosure . Vegetation Type: Desert Shrub .

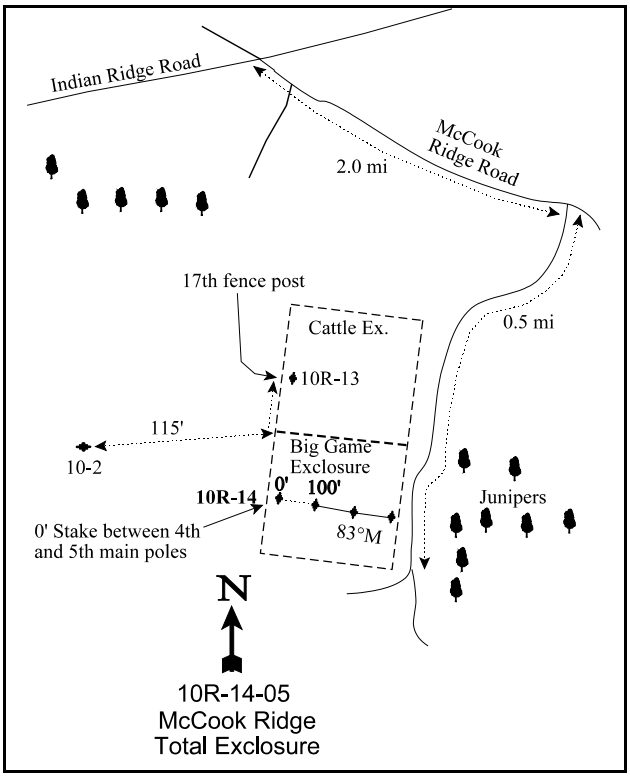
Compass bearing: frequency baseline 83 degrees magnetic.

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

LOCATION DESCRIPTION

From Ouray, go 38 miles south to the McCook Ridge-Indian Ridge turnoff. Turn left (east) and travel on the Indian Ridge road towards Sweetwater Canyon and McCook Ridge 9.1 miles to the intersection of Cooper Canyon, Indian Ridge and McCook Ridge. From Indian Ridge road, turn southeast and proceed up McCook Ridge approximately 2 miles to road on the right (A large exclosure can be seen off the south side of the road.). Turn right and drive approximately 0.5 miles to the exclosure. Go inside the total exclosure. The 0-foot stake is on the west side between the 4th and 5th main poles of the fence. The 0-foot stake is marked with browse tag number 78. The frequency baseline is marked by green fenceposts, 12-18 inches tall.





Map Name: Cooper Canyon . Diagrammatic Sketch

Township 13S , Range 24E , Section 31 GPS: NAD 27, UTM 12S 4388946 N, 648035 E

DISCUSSION

Lower McCook Ridge Total Exclosure - Trend Study No. 10R-14

The Lower McCook Ridge Total Exclosure study is located within the Lower McCook Ridge exclosure complex. The exclosure was constructed in 1964 and is approximately 300 feet by 125 feet. The trend study was established in 1997. It samples inside of the total exclosure, which excludes grazing. The site has a slight southwest aspect with a 2-3% slope and an elevation of 6,600 feet. Parts of the exclosure were in poor repair in 2005, but were repaired as much as possible as we visited the site. As a result, evidence of deer entering the exclosure was noted. Deer pellet groups were sampled in 16% of the quadrats. Rabbit use was also very high with an 82% quadrat frequency.

Past erosion is apparent with pedestaling around shrubs, yet there are no signs of recent erosion events. Most of the protective ground cover comes from vegetation and litter, with much of this coming from cheatgrass. Soil texture is clay loam. Phosphorus is marginal with only 7 ppm, which can limit plant growth and development (Tiedemann and Lopez 2004). There is a soil gradient with deeper soils down slope (west) and more shallow soils up slope (east). Average effective rooting depth down slope was 32 inches, while up slope average rooting depth was 15 inches. Coinciding with the average rooting depth is the amount of rock found within the soil profile. A stony profile was encountered at an average of 27 inches down slope and 11 inches up slope. It was observed that less cheatgrass and more young basin big sagebrush plants were associated with the more shallow soils, while the opposite was observed with the deeper soils. Relative bare ground was low in 1997 and 2000 (6% and 9%), but increased in 2005 (25%).

Winterfat has the highest browse density in the total exclosure with an estimated 8,020 plants/acre in 1997, 9,060 plants/acre in 2000, and 7,020 plants/acre in 2005. These plants are larger than the plants in the adjacent livestock exclosure and outside the exclosure sites. However in 2005, winterfat plants in the total exclosure were much smaller than they previously had been. Cover was down to 4% from 14% in 2000. This is likely due to drought conditions and possibly browsing by deer that got into the exclosure. This population has a mostly mature age structure with low recruitment from young plants. Decadence was low in 1997 at 8%, but increased to 37% in 2000. With no use inside the total exclosure, this increase in decadence could be due to drought and/or old age in a mostly mature population. In 2005, decadence was low at 5% with some light to moderate use noted. Vigor for these plants has been good with only 2% of the population classified as dying at each reading.

Fourwing saltbush had an estimated density of 1,280 plant/acre in 1997, 1,160 plants/acre in 2000, and dropped to 920 plants/acre in 2005. Decadence had been moderately high in 1997 and 2000 at about 40%. Decadence increased sharply to 91% in 2005, while 72% of the population was classified as dying. Recruitment has been very low with each reading. Cover decreased from 12% to only 2% by 2005. Fringed sagebrush was also encountered and had an estimated density of 4,620 plants/acre in 2000, which declined to 3,140 plants/acre in 2005.

Sagebrush on the site has characteristics of basin big sagebrush (*Artemisia tridentata tridentata*) and Wyoming big sagebrush *(Artemisia tridentata wyomingensis*). Identification was difficult due to the level of hybridization resulting in all sagebrush being classified as basin big sagebrush. Basin big sagebrush had an estimated density of 1,200 plants/acre in 2000. This declined to 700 plants/acre in 2005. While cover decreased for other species it remained stable at about 3% for sagebrush. Inside the total exclosure, basin big sagebrush is found mainly along the fence line on the more shallow soils along the east fence where cheatgrass is less dense. Other basin big sagebrush plants were observed along the fence on deep and shallow soils with the deeper soils having a lower abundance of seedlings compared to the more shallow soils. In 1997, the seedlings (2,480 plants/acre) were encountered only under three mature shrubs. Seedlings were estimated at only 80 per acre in 2000. Recruitment of young plants was high at 81% in 1997 and 68% in 2000.

Recruitment was very low in 2005 (6%) with no seedlings sampled. The sagebrush population has had good vigor with each reading.

In 1997, cheatgrass provided nearly 29% average cover, had a nested frequency of 473 out of a possible 500, and was found in 99% of the quadrats. Due to drought in 2000, cheatgrass was much less abundant and decreased to only 2% cover, and had a nested frequency of 178. It was sampled in only 61% of the quadrats. Cheatgrass increased again in 2005 with the wet weather. Cover was 24%, nested frequency increased to 369, and quadrat frequency was 94%. Perennial herbaceous species are found sporadically on this site with only three perennial grasses and five perennial forbs ever sampled. Perennial grasses include: thickspike wheatgrass, Sandberg bluegrass, and bottlebrush squirreltail. These species combined for just over 1% cover in 2000 and contributed to less than 1% cover in 1997 and 2005.

1997 APPARENT TREND ASSESSMENT

Soils are alluvially deposited, loamy in texture, with some rock and pavement on the surface (~2%). There are signs of past soil movement, but movement is not severe at this time. Vegetation and litter cover values are high enough to protect the soil from both wind and water erosion. This site exhibits the effects of a soil depth gradient. It was observed that areas with more shallow soil on the site did not support as dense a stand of cheatgrass as do the areas with deeper soils. It was also observed that basin big sagebrush was basically restricted to the edge of the exclosure with none found in the middle. The middle of the exclosure was dominated by fringed sagebrush, winterfat, and a few scattered fourwing saltbush plants. Winterfat accounts for 54% of the browse cover and has the highest density with 8,020 plants/acre. The herbaceous understory is of extremely poor composition with cheatgrass dominating. With such a dense stand of cheatgrass, shrub recruitment will be suppressed and will be detrimental to the reproductive success of the shrub populations. The Desirable Components Index score is fair due to excellent browse cover, but high annual grass cover.

winter range condition (DC Index) - fair (28) Lower potential scale

2000 TREND ASSESSMENT

Trend for soil is stable. Bare ground only slightly increased with drought, while vegetation and litter cover combined remain very high and adequate to prevent serious erosion. Trend for browse is stable overall. The main negative factor is the increased decadence in winterfat from 8% to 37%. Vigor remains generally good and very few of the decadent plants are classified as dying. With normal precipitation, decadence will most likely decrease. Fourwing saltbush shows a stable, but overly mature population with decadence staying nearly the same at 41%. No seedling or young plants were sampled in 2000. A hybrid of basin big sagebrush and Wyoming big sagebrush shows increased density and high recruitment. Vigor is good and no decadent plants were sampled in either 1997 or 2000. Trend for the herbaceous understory is up with perennial species increasing in sum of nested frequency. Cheatgrass was also greatly reduced due to drought. The DCI score increased with the reduction of cheatgrass.

TREND ASSESSMENT
soil - stable (0)
browse - stable (0)
herbaceous understory - up (+2)
winter range condition (DC Index) - fair (43) Lower potential scale

2005 TREND ASSESSMENT

Trend for soil is down. The ratio of bare ground to protective ground cover (vegetation, litter, and cryptogams) decreased substantially and relative bare ground increased from 9% in 2000 to 25% in 2005.

Relative litter cover declined from 60% to 41% in 2005 after many years of drought. The browse trend is down. Winterfat and fourwing saltbush density and cover declined substantially. Drought and browsing from deer may have caused this decline. Fourwing saltbush vigor worsened as 91% of the population was decadent and 72% were dying. Sagebrush density declined, but the number of mature plants has increased with each reading. It appears many of the young plants from 1997 and 2000 have been successfully recruited into the population, but in 2005 there were very few young plants to continue to expand the population. The herbaceous understory trend is down. Cheatgrass increased with the wet conditions of 2005 and there was not enough of a perennial component to compete with it. Perennial forbs declined substantially in 2005. The DCI score declined with the reduced amount of preferred browse and the increase of cheatgrass.

TREND ASSESSMENT
soil - down (-2)
browse - down (-2)
herbaceous understory - down (-2)
winter range condition (DC Index) - very poor (8) Lower potential scale

HERBACEOUS TRENDS --
Management unit 10R, Study no: 14

Type	Species	Nested Frequency			Average Cover %		
		'97	'00	'05	'97	'00	'05
G	Agropyron dasystachyum	$_{a}$5	$_{b}$23	$_{b}$26	.15	.84	.31
G	Bromus tectorum (a)	$_{c}$473	$_{a}$178	$_{b}$369	28.89	2.16	23.75
G	Poa secunda	9	11	15	.36	.12	.13
G	Sitanion hystrix	1	6	4	.03	.18	.06
Total for Annual Grasses		473	178	369	28.89	2.16	23.75
Total for Perennial Grasses		15	40	45	0.54	1.14	0.49
Total for Grasses		488	218	414	29.44	3.30	24.24
F	Descurainia pinnata (a)	$_{a}$16	$_{a}$25	$_{b}$52	.23	.13	.92
F	Draba sp. (a)	-	2	-	-	.00	-
F	Lappula occidentalis (a)	$_{a}$3	$_{a}$5	$_{b}$137	.01	.01	2.61
F	Lactuca serriola	$_{a}$-	$_{b}$61	$_{a}$-	-	.88	-
F	Schoencrambe linifolia	-	-	4	-	-	.01
F	Sisymbrium altissimum (a)	-	1	1	-	.00	.03
F	Sphaeralcea coccinea	25	31	16	.31	.36	.06
F	Taraxacum officinale	-	-	-	.00	-	-
F	Tragopogon dubius	$_{b}$9	$_{c}$45	$_{a}$-	.07	.61	-
Total for Annual Forbs		19	33	190	0.24	0.15	3.56
Total for Perennial Forbs		34	137	20	0.38	1.85	0.07
Total for Forbs		53	170	210	0.63	2.01	3.64

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

BROWSE TRENDS --
Management unit 10R, Study no: 14

Type	Species	Strip Frequency			Average Cover %		
		'97	'00	'05	'97	'00	'05
B	Artemisia frigida	41	58	44	2.42	5.33	.59
B	Artemisia tridentata tridentata	7	6	7	1.33	2.62	2.53
B	Atriplex canescens	45	44	32	7.39	12.48	2.00
B	Ceratoides lanata	94	93	88	13.34	13.75	3.83
Total for Browse		187	201	171	24.50	34.18	8.96

CANOPY COVER, LINE INTERCEPT --
Management unit 10R, Study no: 14

Species	Percent Cover '05
Artemisia frigida	.61
Artemisia tridentata tridentata	3.04
Atriplex canescens	3.56
Ceratoides lanata	4.43

KEY BROWSE ANNUAL LEADER GROWTH --
Management unit 10R, Study no: 14

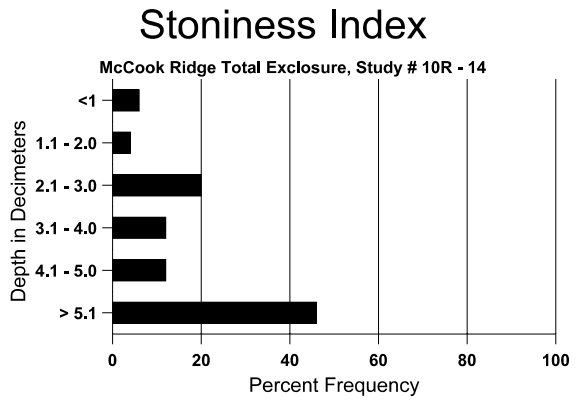
Species	Average leader growth (in) '05
Artemisia tridentata tridentata	3.6
Atriplex canescens	5.2
Ceratoides lanata	5.2

BASIC COVER --
Management unit 10R, Study no: 14

Cover Type	Average Cover %		
	'97	'00	'05
Vegetation	51.66	38.90	37.27
Rock	.13	.01	.11
Pavement	1.81	.74	1.84
Litter	61.01	76.09	45.46
Cryptogams	3.45	.23	.09
Bare Ground	7.03	10.85	27.53

SOIL ANALYSIS DATA --
Herd Unit 10R, Study no: 14, Study Name: McCook Ridge Total Exclosure

Effective rooting depth (in)	Temp °F (depth)	PH	%sand	%silt	%clay	%0M	ppm P	ppm K	dS/m
25.9	59.6 (20.0)	6.7	31.0	37.8	31.2	5.0	7.2	153.6	0.7



PELLET GROUP DATA --
Management unit 10R, Study no: 14

Type	Quadrat Frequency		
	'97	'00	'05
Rabbit	2	6	82
Elk	-	-	1
Deer	-	-	16

Days use per acre (ha)	
'00	'05
-	-
-	-
-	-

BROWSE CHARACTERISTICS --
Management unit 10R, Study no: 14

		Age class distribution (plants per acre)					Utilization					
Year	Plants per Acre (excluding seedlings)	Seedling	Young	Mature	Decadent	Dead	% moderate	% heavy	% decadent	% dying	% poor vigor	Average Height Crown (in)
Artemisia frigida												
97	**2320**	-	220	2080	20	-	0	0	1	-	0	15/16
00	**4620**	2060	620	3700	300	20	0	0	6	-	0	6/13
05	**3140**	60	680	2440	20	-	26	0	1	.63	.63	4/6
Artemisia tridentata tridentata												
97	**640**	2480	520	120	-	-	0	0	0	-	0	33/37
00	**1200**	80	820	380	-	-	0	0	0	-	0	30/31
05	**700**	-	40	600	60	200	14	0	9	-	0	37/45

		Age class distribution (plants per acre)					Utilization					
Year	Plants per Acre (excluding seedlings)	Seedling	Young	Mature	Decadent	Dead	% moderate	% heavy	% decadent	% dying	% poor vigor	Average Height Crown (in)
Atriplex canescens												
97	**1280**	-	20	740	520	100	0	0	41	14	14	34/40
00	**1160**	-	-	700	460	80	2	0	40	5	5	38/52
05	**920**	20	20	60	840	620	2	2	91	72	72	37/40
Ceratoides lanata												
97	**8020**	-	960	6420	640	80	0	0	8	2	2	23/18
00	**9060**	20	240	5480	3340	100	0	.22	37	2	2	17/19
05	**7020**	-	520	6160	340	300	21	13	5	2	3	10/11
Juniperus osteosperma												
97	**0**	-	-	-	-	-	0	0	-	-	0	-/-
00	**0**	20	-	-	-	-	0	0	-	-	0	-/-
05	**0**	-	-	-	-	-	0	0	-	-	0	-/-

LOWER MCCOOK RIDGE EXCLOSURE COMPARISON SUMMARY

Trend Study No. 10-2 (Outside), 10R-13 (Livestock), and 10R-14 (Total)

The Lower McCook Ridge area is important big game winter range. Several important key browse species are present in the area including: big sagebrush, winterfat, and fourwing saltbush. The table below compares some of the key browse parameters for these three species. Differences in densities for these species, especially sagebrush, may be the result of several factors including: grazing regimes, interspecific and intraspecific competition, small sampled area, timing of precipitation, and a non-homogeneous landscape.

Big sagebrush was classified as basin big sagebrush, but is most likely a hybrid between basin big sagebrush and Wyoming big sagebrush. Density and cover varies between the exclosures with the total exclosure having the lowest density of sagebrush plants, the livestock exclosure having the highest, and outside the exclosure being intermediate. Recruitment from the young age class was high in 2000, but was much lower in 2005. The rate of decadence is highest in the livestock exclosure, slightly lower outside the exclosure, with no decadence found in the total exclosure. There are several possible explanations for the differences in population parameters for sagebrush between exclosures. The highest level of recruitment occurs in the total exclosure where the sagebrush density is lowest, but with no use, each plant has more seed from year to year which increases the probability of young plants becoming established from seed. Also, with a lower density of sagebrush, there is less intraspecific competition with young plants to become established. The lowest recruitment is found in the livestock exclosure which also has the highest sagebrush density and average cover. Competition is greatest here with high density and cover which would appear to more negatively affect the establishment of younger plants. Drought adds to the problem with less resources being available and more stress being placed on individual plants.

Conversely, winterfat has the highest density and cover inside the total exclosure, is intermediate outside the exclosure, and is lowest inside the livestock exclosure. Recruitment from young plants is low on all three transects. Winterfat cover was about 6 times greater in the total exclosure than in both the livestock exclosure and outside the exclosure in 2000. Average height and crown measurements in 2000 show winterfat inside the total exclosure to be twice that of winterfat in either of the other two transects. With the highest density, highest cover, and largest individuals occurring inside the total exclosure, it is likely that competition is greater here and may be responsible for the highest rate of decadence inside the total exclosure. Drought is the likely cause for the decline of winterfat in 2005.

Fourwing saltbush has similar densities in the total and livestock exclosures, with a lower density outside the exclosure. Percent decadence has been high for each transect in each reading. The percent of the population classified as dying was very high in 2005 for each exclosure transect. As with winterfat, the high decadence of fourwing saltbush is likely due more to drought and/or competition rather than utilization.

The herbaceous understories have been similar for each transect.

Trend Data Comparisons for key browse species for Lower McCook Ridge Exclosure transects in 2000 and 2005.

	2000			2005		
	Outside	**Livestock**	**Total**	**Outside**	**Livestock**	**Total**
Big sagebrush						
Average Cover	12.0	21.7	2.6	10.6	15.9	2.5
Density (plants/acre)	3,980	6,900	1,200	3,500	6,060	700
% young (plants/acre)	32 (1,260)	14 (1,000)	68 (820)	5 (180)	4 (260)	6 (40)
% decadent (plants/acre)	26 (1,020)	31 (2,140)	0	35 (1,240)	31 (2,140)	9 (60)
% dying (plants/acre)	24 (360)	3 (220)	0	24 (840)	26 (1,600)	0
% heavy use	13	30	0	37	66	0
Winterfat						
Average Cover	2.2	2.5	13.8	2.4	1.6	3.8
Density (plants/acre)	7,020	5,920	9,060	4,860	4,900	7,020
% young (plants/acre)	3 (200)	2 (140)	3 (240)	6 (280)	9 (420)	7 (520)
% decadent (plants/acre)	10 (720)	14 (820)	37 (3,340)	2 (120)	11 (560)	5 (340)
% dying (plants/acre)	1 (40)	3 (180)	2 (200)	0 (20)	7 (360)	2 (160)
% heavy use	21	3	0	77	91	13
Fourwing saltbush						
Average Cover	2.6	5.6	12.5	2.6	1.3	2.0
Density (plants/acre)	700	1,100	1,160	640	900	920
% young (plants/acre)	0	0	0	6 (40)	4 (40)	2 (20)
% decadent (plants/acre)	40 (280)	67 (740)	40 (460)	66 (420)	82 (740)	91 (840)
% dying (plants/acre)	0	13 (140)	5 (60)	25 (160)	47 (420)	72 (660)
% heavy use	3	13	0	56	38	2

Trend Study 10R-15-05

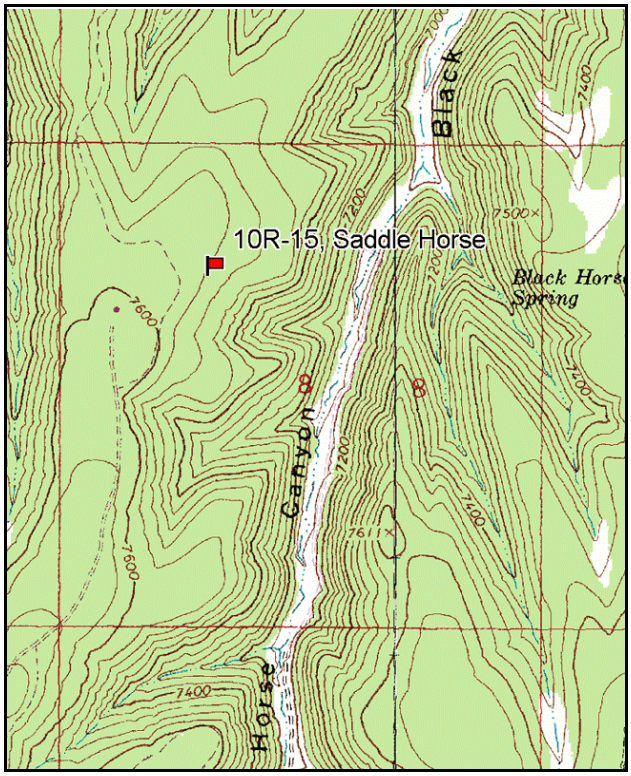
Study site name: Saddle Horse . Vegetation Type: Mountain Brush .

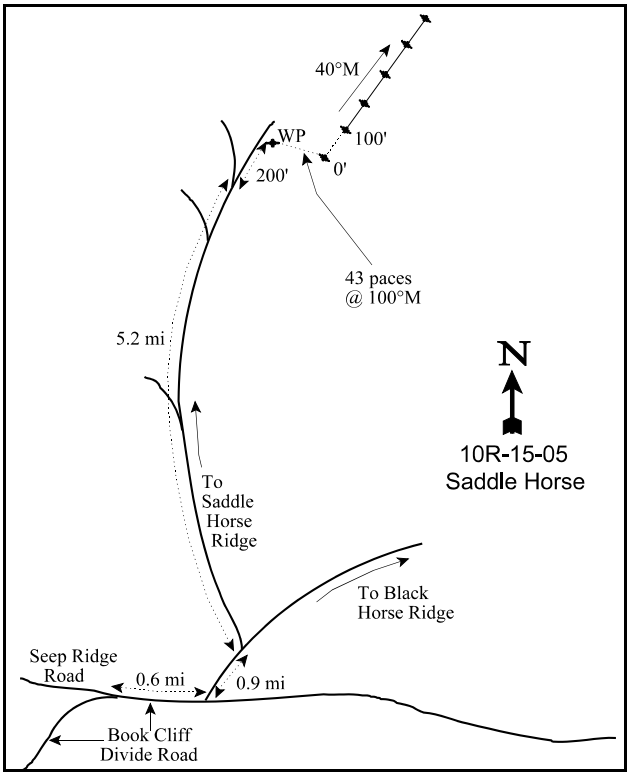
Compass bearing: frequency baseline 40 degrees magnetic.

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

LOCATION DESCRIPTION

From the intersection of Seep Ridge road and Book Cliffs Divide road, continue 0.6 miles to an intersection with the road to Black Horse Ridge. Turn left here and go 0.9 miles to the intersection with the road to Saddle Horse Ridge. Go left here and continue 5.2 miles to the third fork (staying right through two forks). From the third fork the witness post is approximately 200 feet on the right side of the road. From the witness post the 0' stake is 43 paces at 100°M.





Map name: Seep Canyon

Diagrammatic Sketch

Township 15S , Range 24E , Section 8 .

GPS: NAD 27, UTM 12S 4376915 N, 649791 E

DISCUSSION

Saddle Horse - Trend Study No. 10R-15

The Saddle Horse trend study was established in 1998. It samples a chaining that was done in the 1960's on Saddle Horse Ridge which is between PR Canyon and Black Horse Canyon. The site supports a mixed community of sagebrush, true mountain mahogany, bitterbrush, pinyon, and juniper. It has a slope of 10-15%, a southeast aspect, and an elevation of about 7,540 feet. A small fire burned the last 100 feet of the baseline sometime between 2000 and 2005. The area has moderate to heavy use by elk, but there is little cattle use here since there is no available water on the ridge. There are plans to pipe water to a trough about 1/4 of a mile from the study site. Pellet group data from 1998 estimated 78 elk, 11 deer, and 6 cow days use/acre (193 edu/ha, 27 ddu/ha and 15 cdu/ha). Use was lower in 2000 with 36 elk and 15 deer days use/acre estimated (89 edu/ha and 37 ddu/ha). In 2005, use was estimated at 62 elk and 37 deer days use/acre (154 edu/ha and 91 ddu/ha). Season of use for big game appears to be fall, spring and early summer.

Soil on the site is moderately deep with an effective rooting depth estimated at just over 16 inches. It has a sandy clay loam to sandy loam texture with a neutral pH. Phosphorus is marginal at 8.4 ppm and may be limiting, as values between 6 and 11 ppm may limit normal plant growth and development (Tiedemann and Lopez 2004). Rock and pavement are not abundant on the surface, but widely variable sized rocks are found throughout the soil profile. Calcium carbonate deposits are common on rocks within the soil, some up to 1/4 inch thick. An erosion condition class assessment rated erosion as slight in 2005. There is some rill erosion and minor soil pedestaling observed around shrubs, but vegetation and litter cover are adequate to prevent significant erosion.

The site supports a variety of browse, with the key species being mountain big sagebrush, true mountain mahogany, and bitterbrush. Mountain big sagebrush cover has been 3-4% with each reading. Density was 1,480 plants/acre in 1998, decreased to 1,080 plants/acre in 2000, and increased to 1,280 plants/acre in 2005. Recruitment and vigor has been excellent for sagebrush. Sagebrush is not the preferred shrub in this area due to the apparent season of use for big game (spring/fall).

The key shrub with respect to abundance and preference is bitterbrush. Bitterbrush has averaged 4-6% cover, which is about one-third of the total browse cover. Density has been between 800-980 plants/acre, with a good young age class at each reading. Bitterbrush has a prostrate spreading growth form. It has displayed moderate to heavy use. Even at this level of use, vigor has been good for most plants, but percent decadence increased to 31% in 2005. During the 2000 and 2005 readings, bitterbrush was producing abundant flowers and seed. Another key browse species is true mountain mahogany, which has averaged about 2% cover with each reading. Use was judged moderate to heavy in 1998, moderate in 2000, and heavy in 2005. Percent decadence increased from 0% in 2000 to 33% in 2005.

Other shrubs encountered include rubber rabbitbrush, snowberry, and released pinyon and juniper trees. Point-center quarter data from 2000 estimated 98 pinyon and 128 Utah juniper trees/acre. Rocky mountain juniper was also present. Average basal diameter of pinyon was 1.8 inches, while juniper was 3.4 inches. In 2005, density was lower after the fire. Pinyon density was 51 trees/acre and juniper was 53 trees/acre. Diameter was estimated at 2.4 inches for pinyon and 5.0 inches for juniper. Line intercept cover was about 4% for each species.

The herbaceous understory is quite abundant. Several grass species are found on the site but only two have been common. The dominant species is intermediate wheatgrass which provided 82-90% of the grass cover at each sampling time. It did decline significantly in 2005. Carex has also been common, but also declined in 2005. Cheatgrass is rare, but did increase significantly in 2005. It was found in 18% of the quadrats, up from 0% in 2000, and 8% in 1998. Forbs are not abundant and do not provide much additional forage. The most

common species are Watson penstemon and scarlet globemallow. Some of the grasses and forbs showed light utilization in 2000.

1998 APPARENT TREND ASSESSMENT

The soil is well protected with abundant vegetation and litter cover with no sign of significant erosion occurring. The key browse, mountain big sagebrush, mahogany, and bitterbrush, appear to have stable populations. Use is heavy on mahogany and moderate to heavy on bitterbrush, but vigor is normal for both species and percent decadence is low. Mountain big sagebrush is only lightly browsed, in good vigor, and has no decadent plants. Recruitment is also good with nearly half of the population consisting of young plants. The herbaceous understory is dominated by intermediate wheatgrass. Forbs are diverse but most species occur only occasionally. The Desirable Components Index rated this site as good on the higher potential scale. This site probably falls on the lower end of higher potential sites, so this rating is very good.

winter range condition (DC Index) - good (82) Higher potential scale

2000 TREND ASSESSMENT

Trend for soil is considered stable. Percent cover of vegetation has declined and bare ground has increased slightly but not enough to warrant a change in trend. In addition, cover and frequency of perennial grasses and forbs has also declined. The proportion of bare soil to protective cover (vegetation, litter and cryptogams) has also decreased. However, there still appears to be adequate protective ground cover to prevent serious erosion. Trend for the key browse species, mountain big sagebrush, true mountain mahogany and bitterbrush is considered stable. Mahogany and bitterbrush show moderate to heavy use but normal vigor and low percent decadence. Mountain big sagebrush does not appear to be as preferred. It displays mostly light use, good vigor and low decadence. Trend for the herbaceous understory is down due to a decline in the nested frequencies of perennial grasses and forbs. The DCI score declined due to losses of preferred browse and perennial grass cover.

TREND ASSESSMENT
soil - stable (0)
browse - stable (0)
herbaceous understory - down (-2)
winter range condition (DC Index) - fair (68) Higher potential scale

2005 TREND ASSESSMENT

The soil trend is slightly down. The ratio of bare ground to protective ground cover (vegetation, litter, and cryptogams) decreased substantially. Bare ground increased from 22% to 34%, due to a decrease of litter cover and a slight decrease of vegetation cover. Erosion was rated as slight in 2005. The browse trend is stable. Densities of the key species, bitterbrush, true mountain mahogany, and mountain big sagebrush, remained stable. Recruitment appears to be good, but percent decadence did increase. Bitterbrush and mahogany have received moderate to heavy use. The trend for the herbaceous understory is down. Perennial grass nested frequency declined 31% due to significant declines of intermediate wheatgrass and the sedge. Annual cheatgrass increased significantly but still produces less than 1% cover. Perennial forbs increased slightly, but are not abundant. The DCI score continued to decline due to losses of preferred browse and perennial grass cover, as well as increased decadency of browse.

TREND ASSESSMENT
soil - slightly down (-1)
browse - stable (0)
herbaceous understory - down (-2)
winter range condition (DC Index) - poor to fair (57) Higher potential scale

HERBACEOUS TRENDS --
Management unit 10R, Study no: 15

Type	Species	Nested Frequency			Average Cover %		
		'98	'00	'05	'98	'00	'05
G	Agropyron cristatum	$_{b}$16	$_{a}$-	$_{ab}$4	.19	-	.15
G	Agropyron intermedium	$_{b}$332	$_{b}$321	$_{a}$213	16.06	12.37	9.80
G	Bromus tectorum (a)	$_{b}$29	$_{a}$-	$_{b}$43	.23	-	.87
G	Carex sp.	$_{b}$63	$_{b}$53	$_{a}$23	1.82	1.10	.31
G	Oryzopsis hymenoides	14	3	5	.48	.00	.12
G	Poa fendleriana	29	18	10	.40	.30	.10
G	Sitanion hystrix	$_{b}$18	$_{a}$-	$_{b}$16	.38	-	.55
Total for Annual Grasses		29	0	43	0.23	0	0.87
Total for Perennial Grasses		472	395	271	19.36	13.78	11.04
Total for Grasses		501	395	314	19.59	13.78	11.92
F	Antennaria rosea	6	3	3	.19	.06	.09
F	Arabis sp.	11	6	14	.02	.01	.04
F	Astragalus convallarius	4	-	-	.04	-	-
F	Astragalus sp.	3	-	-	.07	-	-
F	Chenopodium fremontii (a)	$_{a}$-	$_{a}$-	$_{b}$11	-	-	.05
F	Descurainia pinnata (a)	$_{a}$-	$_{a}$-	$_{b}$62	-	-	.98
F	Erigeron sp.	-	-	2	.00	-	.00
F	Lappula occidentalis (a)	$_{a}$15	$_{a}$3	$_{b}$93	.10	.00	2.24
F	Machaeranthera grindelioides	2	2	3	.03	.03	.04
F	Penstemon caespitosus	3	-	-	.03	-	-
F	Penstemon pachyphyllus	$_{a}$-	$_{b}$11	$_{ab}$3	-	.08	.04
F	Penstemon watsonii	$_{b}$39	$_{a}$8	$_{a}$7	.56	.45	.33
F	Polygonum douglasii (a)	-	-	4	-	-	.00
F	Senecio multilobatus	3	4	7	.04	.01	.01
F	Sphaeralcea coccinea	35	28	32	.71	.14	.51
F	Tragopogon dubius	2	-	-	.00	-	-
F	Viguiera multiflora	3	1	3	.03	.03	.00
Total for Annual Forbs		15	3	170	0.10	0.00	3.29
Total for Perennial Forbs		111	63	74	1.73	0.81	1.08
Total for Forbs		126	66	244	1.84	0.81	4.37

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

BROWSE TRENDS --
Management unit 10R, Study no: 15

Type	Species	Strip Frequency			Average Cover %		
		'98	'00	'05	'98	'00	'05
B	Amelanchier utahensis	1	0	1	.00	-	.00
B	Artemisia tridentata vaseyana	36	24	29	4.28	3.15	3.34
B	Cercocarpus montanus	10	3	9	2.29	2.12	1.72
B	Chrysothamnus nauseosus hololeucus	2	2	3	.30	.06	.18
B	Chrysothamnus viscidiflorus viscidiflorus	1	1	2	-	-	-
B	Juniperus osteosperma	6	5	3	4.44	3.50	4.03
B	Opuntia fragilis	2	3	5	.38	-	.15
B	Pinus edulis	7	7	5	1.37	2.27	2.54
B	Purshia tridentata	26	28	23	6.08	5.57	4.36
B	Symphoricarpos oreophilus	2	1	1	.15	.66	-
Total for Browse		93	74	81	19.33	17.34	16.36

CANOPY COVER, LINE INTERCEPT --
Management unit 10R, Study no: 15

Species	Percent Cover		
	'98	'00	'05
Artemisia tridentata vaseyana	-	-	5.08
Cercocarpus montanus	-	.80	1.89
Chrysothamnus nauseosus hololeucus	-	-	.05
Juniperus osteosperma	2.59	1.60	4.08
Juniperus scopulorum	-	1.60	-
Opuntia fragilis	-	-	.06
Pinus edulis	-	1.39	4.15
Purshia tridentata	-	-	2.70
Symphoricarpos oreophilus	-	-	.08

KEY BROWSE ANNUAL LEADER GROWTH --
Management unit 10R, Study no: 15

Species	Average leader growth (in)
	'05
Artemisia tridentata vaseyana	2.3
Cercocarpus montanus	1.3
Purshia tridentata	1.5

POINT-QUARTER TREE DATA --
Management unit 10R, Study no: 15

Species	Trees per Acre	
	'00	'05
Juniperus osteosperma	134	53
Pinus edulis	99	51

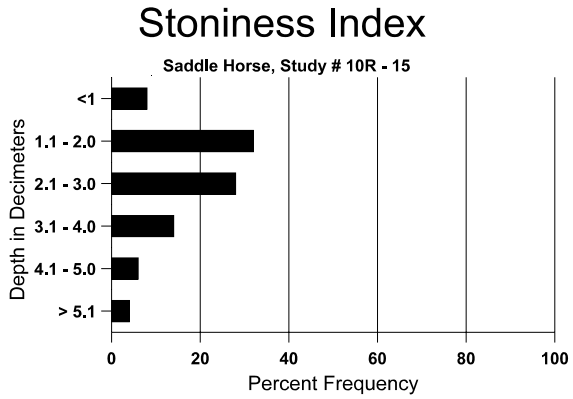
Average diameter (in)	
'00	'05
3.5	5.0
1.9	2.4

BASIC COVER --
Management unit 10R, Study no: 15

Cover Type	Average Cover %		
	'98	'00	'05
Vegetation	41.13	34.22	30.35
Rock	3.09	4.38	3.45
Pavement	2.00	1.38	1.82
Litter	57.48	56.59	41.66
Cryptogams	.20	.83	1.43
Bare Ground	16.27	21.62	33.52

SOIL ANALYSIS DATA --
Herd Unit 10R, Study # 15, Study Name: Saddle Horse

Effective rooting depth (in)	Temp °F (depth)	pH	%sand	%silt	%clay	%0M	ppm P	ppm K	ds/m
16.5	61.0 (16.8)	7.0	52.7	26.7	20.6	4.5	8.4	70.4	0.9



PELLET GROUP DATA --
Management unit 10R, Study no: 15

Type	Quadrat Frequency		
	'98	'00	'05
Rabbit	6	52	45
Elk	30	29	31
Deer	14	15	16
Cattle	1	-	-

Days use per acre (ha)		
'98	'00	'05
-	-	-
78 (193)	36 (90)	62 (154)
11 (28)	15 (38)	37 (91)
6 (14)	-	-

BROWSE CHARACTERISTICS --
Management unit 10R, Study no: 15

		Age class distribution (plants per acre)					Utilization					
Year	Plants per Acre (excluding seedlings)	Seedling	Young	Mature	Decadent	Dead	% moderate	% heavy	% decadent	% dying	% poor vigor	Average Height Crown (in)
Amelanchier utahensis												
98	**40**	-	40	-	-	-	0	0	-	-	0	-/-
00	**0**	-	-	-	-	-	0	0	-	-	0	-/-
05	**20**	-	20	-	-	-	0	0	-	-	0	8/13
Artemisia frigida												
98	**0**	-	-	-	-	-	0	0	-	-	0	-/-
00	**0**	-	-	-	-	-	0	0	-	-	0	-/-
05	**0**	-	-	-	-	-	0	0	-	-	0	4/11
Artemisia tridentata vaseyana												
98	**1480**	180	680	800	-	-	7	0	0	-	0	30/43
00	**1080**	60	420	620	40	-	9	0	4	-	0	23/33
05	**1280**	200	360	820	100	20	27	0	8	3	3	20/29
Cercocarpus montanus												
98	**260**	-	-	260	-	20	38	62	0	-	0	52/50
00	**60**	-	-	60	-	20	100	0	0	-	0	54/54
05	**180**	-	20	100	60	20	22	56	33	-	0	41/40
Chrysothamnus nauseosus hololeucus												
98	**40**	-	20	20	-	-	0	0	0	-	0	17/19
00	**40**	-	-	20	20	-	0	0	50	50	50	17/19
05	**60**	-	-	40	20	-	0	0	33	-	0	17/26
Chrysothamnus viscidiflorus viscidiflorus												
98	**40**	-	-	40	-	-	0	0	0	-	0	19/20
00	**40**	-	-	20	20	-	100	0	50	-	0	11/14
05	**60**	-	-	60	-	-	0	0	0	-	0	11/10

		Age class distribution (plants per acre)					Utilization					
Year	Plants per Acre (excluding seedlings)	Seedling	Young	Mature	Decadent	Dead	% moderate	% heavy	% decadent	% dying	% poor vigor	Average Height Crown (in)
Juniperus osteosperma												
98	**160**	-	120	20	20	-	0	13	13	-	13	-/-
00	**180**	-	120	40	20	20	0	0	11	-	0	-/-
05	**160**	-	-	100	60	-	0	0	38	13	25	-/-
Opuntia fragilis												
98	**40**	-	-	40	-	-	0	0	0	-	0	5/29
00	**60**	-	-	60	-	-	0	0	0	-	0	3/13
05	**420**	-	60	160	200	-	0	0	48	48	48	3/9
Pinus edulis												
98	**140**	-	80	60	-	-	0	0	-	-	14	-/-
00	**160**	-	120	40	-	60	0	0	-	-	0	-/-
05	**100**	-	20	80	-	20	0	0	-	-	0	-/-
Purshia tridentata												
98	**980**	40	260	720	-	-	37	18	0	-	0	23/58
00	**800**	-	120	580	100	-	15	65	13	3	3	18/51
05	**980**	-	220	460	300	40	31	45	31	14	14	15/33
Symphoricarpos oreophilus												
98	**40**	-	-	40	-	-	0	0	0	-	0	44/68
00	**20**	-	-	-	20	-	0	0	100	100	100	27/59
05	**20**	-	-	20	-	-	0	0	0	-	0	19/31

Trend Study 10R-22-05

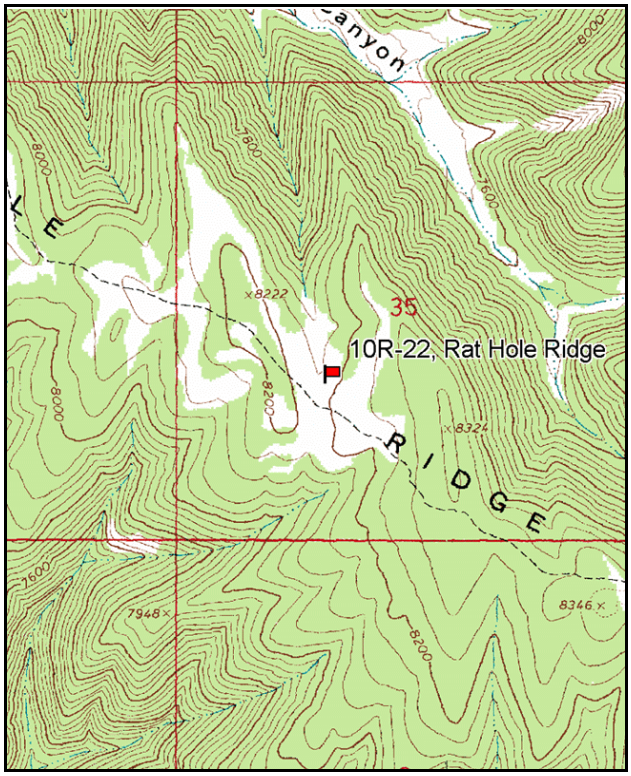
Study site name: Rathole Ridge . Vegetation Type: Mountain big sagebrush .

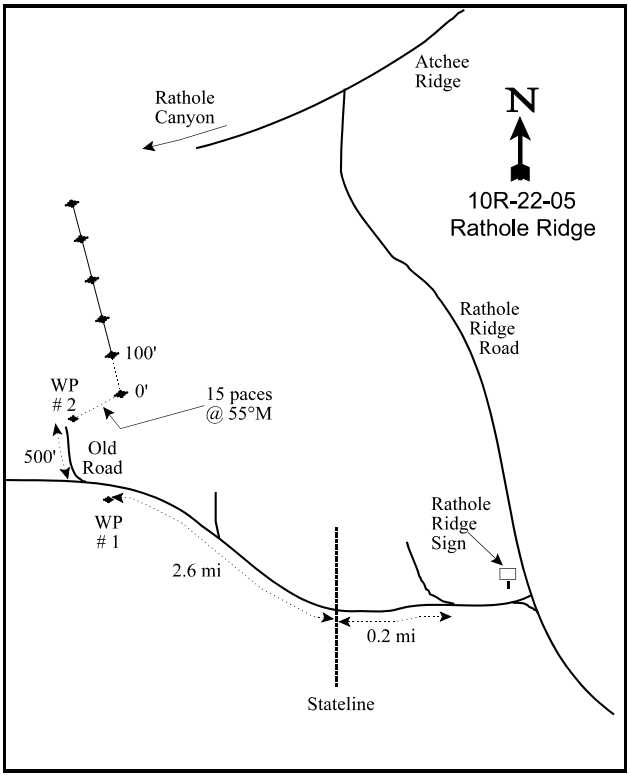
Compass bearing: frequency baseline 336 degrees magnetic.

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

LOCATION DESCRIPTION

From the Junction of Atchee Ridge Road, Rathole Canyon and Rathole Ridge Road follow Rathole Ridge Road up to the a sign pointing to Rathole Ridge. Take this road to the first fork. Take a left at the fork and continue down the canyon 0.2 miles to the state line. Continue 2.6 miles down (staying left) to a witness post on the left side of the road. Just past the witness post an old road breaks off to the right follow it about 500' to another witness post on the right side of the road. From this second witness post the 0' stake is 15 paces at 55°M and is marked with browse tag #111.





Map name: Rathole Ridge

Diagrammatic Sketch

Township 14S , Range 25E , Section 35 .

GPS: NAD 27, UTM 12S 4379806 N, 664253 E

DISCUSSION

Rathole Ridge - Trend Study No. 10R-22

The Rathole Ridge study was established in 1998 to monitor perceived conflicts over elk and livestock use in the North Bookcliffs. This site has a northwest aspect with a slope of 3-6% at 8,200 feet in elevation. This sagebrush flat on top of the ridge was burned in a prescribed fire in the fall of 1998 to reduce sagebrush cover and increase herbaceous vegetation. This area is within the Atchee Ridge allotment which permits cattle grazing from June through September on a deferred rest rotation basis. Estimated pellet group transect data in 1998 was one deer days use/acre (2 ddu/ha), 27 elk days use/acre (67 edu/ha), and eight cow days use/acre (20 cdu/ha). Pellet group transect data estimates in 2000 showed similar levels of use with two deer days/acre (5 ddu/ha), 33 elk days use/acre (82 edu/ha), and one cow days use/acre (2 cdu/ha). Utilization was higher in 2005 with an estimated 56 elk, 16 deer, and 14 cow (137 edu/ha, 40 ddu/ha, and 34 cdu/ha).

Soils are loamy in texture and soil reaction is slightly acidic (pH of 6.3). With very little rock actually sampled within the profile, the stoniness index is more a measure of compaction than rockiness. Soil depth is moderately shallow with an estimated effective rooting depth of just over 12 inches. Vegetation and litter were abundant in 1998 and after the fire the high amount of herbaceous cover is excellent at protecting the soil from erosion. The erosion state was classified as stable in 2005.

In 1998, browse was abundant and contributed over 25% average cover. Mountain big sagebrush was the dominant species providing 86% of the browse cover. However on summer range, browse is not the key vegetation component and the dense stand of mountain big sagebrush needed to be reduced to improve the understory and possibly other preferred browse species such as bitterbrush and serviceberry. After the fire, browse cover was reduced to only 5% in 2000, which increased to 7% in 2005. Mountain big sagebrush was greatly reduced from 21% cover before the treatment to only 2% in 2000 and 2005. Although cover of sagebrush did not increase in 2005, density increased from 540 plants/acre to 1,100 plants/acre in 2005. Recruitment of young plants was good in both 2000 and 2005. The prescribed burn was not very hot as many of the burned sagebrush skeletons were still standing when the site was read in 2000. Bitterbrush density increased to 140 plants/acre in 2000, but only 40 plants/acre were estimated in 2005. Serviceberry, a fire tolerant species, survived the fire and was vigorous in 2005. Many large serviceberry plants surround the transect on the ridge.

Herbaceous vegetation is the dominant and key component of this study. Needle-and-thread, Kentucky bluegrass, and thickspike wheatgrass are the most abundant. Other moderately abundant species include a sedge, subalpine needlegrass, mutton bluegrass, prairie junegrass, and mountain brome. After the fire, perennial grass nested frequency increased 8% in 2000 and another 20% in 2005. Production has also increased as grass cover increased from 15% to 38% in 2005. Forbs are very diverse with a good composition. Increasers are present but not dominant, with many abundant preferred forage species. The forb component is key on this site as they provide important forage for deer and elk in the spring and summer. Perennial forbs increased in sum of nested frequency by 22% in 2000, but then declined by 31% in 2005. Forb cover also declined in 2005. This may be due to drought and timing of precipitation. Some of the Penstemon's were noted as utilized in 2000. In 2005, light grazing on grasses, hawksbeard, and paintbrush was noted.

1998 APPARENT TREND ASSESSMENT

Soils appear stable. There is no apparent erosion due to the gentle slope and the abundance of protective ground cover from vegetation and litter. Browse is abundant, especially mountain big sagebrush. As this is transitional/summer range, browse is not the critical component and a prescribed burn is planned to reduce sagebrush density and cover and increase herbaceous species. Herbaceous trend appears stable with a diverse understory of both perennial grasses and forbs. With the planned prescribed burn, herbaceous vegetation should increase and would become a more important component for this site.

2000 TREND ASSESSMENT

Soil trend is considered slightly down with the decrease in vegetation and litter cover decreased and relative bare ground increasing from 10% to 22%. The ratio of bare ground to protective cover was substantially reduced. Herbaceous vegetation provides nearly as much cover as before the burn and it has increased in sum of nested frequency following the burn. Trend for browse is slightly up overall as mountain big sagebrush no longer dominates the site and the more preferred species such as serviceberry and bitterbrush have resprouted and survived the fire. Trend for the herbaceous understory is slightly up as perennial species, especially forbs, increased in sum of nested frequency in 2000. Composition of the understory is good with many good forage species present.

TREND ASSESSMENT
soil - slightly down (-1)
browse - slightly up (+1)
herbaceous understory - slightly up (+1)
winter range condition (DC Index) - Not applicable, summer range

2005 TREND ASSESSMENT

The soil trend is considered stable as relative percent bare soil only decreased from 22% to 18%. The bare ground to protective ground cover (vegetation, litter, and cryptogams) ratio was almost unchanged. Herbaceous cover increased from 37% to 53% in 2005. The browse trend is stable. Mountain big sagebrush has recruited new individuals, but is not dominant as it was prior to the fire. Bitterbrush and serviceberry have also remained stable. The trend for the herbaceous understory is stable. Sum of nested frequency for perennial grasses increased 20% and grass cover increased from 15% to 38%, however sum of nested frequency of perennial forbs declined 31%. Grasses have taken a larger proportion of the total vegetation cover. Drought and timing of precipitation likely have not favored forbs. Nutrient flush immediately following the fire may have also influenced the increase of forbs in 2000.

TREND ASSESSMENT
soil - stable (0)
browse - stable (0)
herbaceous understory - stable (0)
winter range condition (DC Index) - Not applicable, summer range

HERBACEOUS TRENDS --
Management unit 10R, Study no: 22

Type	Species	Nested Frequency			Average Cover %		
		'98	'00	'05	'98	'00	'05
G	Agropyron dasystachyum	184	222	225	1.97	3.22	5.95
G	Bouteloua gracilis	-	1	-	-	.03	-
G	Bromus carinatus	b29	a5	a-	.35	.06	-
G	Bromus tectorum (a)	2	-	-	.03	-	-
G	Carex sp.	a3	b54	b56	.03	.73	.62
G	Koeleria cristata	b42	b36	a13	.52	.37	.51
G	Poa fendleriana	b69	ab43	a29	1.45	.95	.72

Type	Species	Nested Frequency			Average Cover %		
		'98	'00	'05	'98	'00	'05
G	Poa nevadensis	a-	b14	c115	-	.19	2.38
G	Poa pratensis	a156	a162	b202	6.88	3.09	10.69
G	Sitanion hystrix	13	-	1	.10	-	.00
G	Stipa columbiana	a15	b76	b64	.30	1.12	3.84
G	Stipa comata	b183	a137	b193	6.68	5.70	12.82
Total for Annual Grasses		2	0	0	0.03	0	0
Total for Perennial Grasses		694	750	898	18.30	15.47	37.55
Total for Grasses		696	750	898	18.34	15.47	37.55
F	Achillea millefolium	18	25	10	.19	.55	.24
F	Agoseris glauca	a-	b41	b57	-	.22	1.15
F	Alyssum alyssoides (a)	-	1	-	-	.00	-
F	Antennaria rosea	27	21	13	.73	.55	.71
F	Androsace septentrionalis (a)	a11	a-	b32	.07	-	.25
F	Arabis sp.	8	-	-	.04	-	-
F	Arenaria congesta	b227	ab209	a173	3.19	4.18	2.84
F	Astragalus convallarius	ab13	b33	a4	.22	.27	.04
F	Astragalus miser	b155	b168	a79	6.25	5.81	1.19
F	Aster sp.	a-	c45	c17	-	.59	.25
F	Castilleja flava	b97	b82	a3	2.02	1.60	.00
F	Calochortus nuttallii	3	-	-	.03	-	.00
F	Chenopodium leptophyllum(a)	-	-	6	-	-	.01
F	Crepis acuminata	ab100	b125	a75	1.42	1.70	1.41
F	Delphinium nuttallianum	a4	a-	b25	.01	-	.14
F	Draba sp. (a)	1	1	3	.03	.00	.00
F	Erigeron eatonii	a12	b39	a9	.05	.18	.04
F	Eriogonum sp.	2	-	-	.00	-	-
F	Eriogonum umbellatum	b25	a8	b28	.55	.12	.56
F	Gayophytum ramosissimum(a)	a-	a1	b16	-	.00	.03
F	Geranium richardsonii	ab36	b52	a24	1.82	1.22	.76
F	Hackelia patens	a1	b21	ab8	.00	.09	.07
F	Lupinus argenteus	b28	b29	a-	1.16	1.00	-
F	Penstemon caespitosus	18	27	24	.37	.34	.90
F	Penstemon watsonii	64	58	43	1.56	.98	1.36
F	Phlox longifolia	a15	b46	b58	.05	.14	.26
F	Polygonum douglasii (a)	b44	a2	c77	.36	.00	.18
F	Potentilla gracilis	a-	b14	b24	-	.97	1.18

Type	Species	Nested Frequency			Average Cover %		
		'98	'00	'05	'98	'00	'05
F	Potentilla pennsylvanica	19	27	13	.87	.76	.65
F	Senecio integerrimus	$_{a}$5	$_{a}$-	$_{b}$19	.04	-	.59
F	Taraxacum officinale	15	29	22	.19	.21	.18
F	Thalictrum fendleri	-	1	-	-	.00	-
F	Tragopogon dubius	2	3	-	.00	.00	-
F	Unknown forb-perennial	-	-	30	-	-	.08
F	Viguiera multiflora	9	-	-	.33	-	-
Total for Annual Forbs		56	5	134	0.46	0.01	0.48
Total for Perennial Forbs		903	1103	758	21.16	21.56	14.67
Total for Forbs		959	1108	892	21.62	21.58	15.15

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

BROWSE TRENDS --
Management unit 10R, Study no: 22

Type	Species	Strip Frequency			Average Cover %		
		'98	'00	'05	'98	'00	'05
B	Amelanchier utahensis	6	8	7	.78	.56	.81
B	Artemisia tridentata vaseyana	88	10	31	21.83	2.33	2.38
B	Chrysothamnus depressus	0	0	1	-	-	.15
B	Chrysothamnus viscidiflorus viscidiflorus	19	17	25	.70	.19	.95
B	Juniperus osteosperma	1	1	0	-	-	-
B	Mahonia repens	0	0	1	-	-	-
B	Purshia tridentata	2	3	2	.03	.06	.00
B	Quercus gambelii	0	1	1	-	.15	.38
B	Symphoricarpos oreophilus	23	23	21	1.93	2.03	2.09
B	Tetradymia canescens	4	5	5	.06	.03	.06
Total for Browse		143	68	94	25.34	5.37	6.84

CANOPY COVER, LINE INTERCEPT --
Management unit 10R, Study no: 22

Species	Percent Cover '05
Amelanchier utahensis	.78
Artemisia tridentata vaseyana	3.25
Chrysothamnus viscidiflorus viscidiflorus	2.29
Purshia tridentata	.15
Quercus gambelii	.03
Symphoricarpos oreophilus	2.88
Tetradymia canescens	.05

KEY BROWSE ANNUAL LEADER GROWTH --
Management unit 10R, Study no: 22

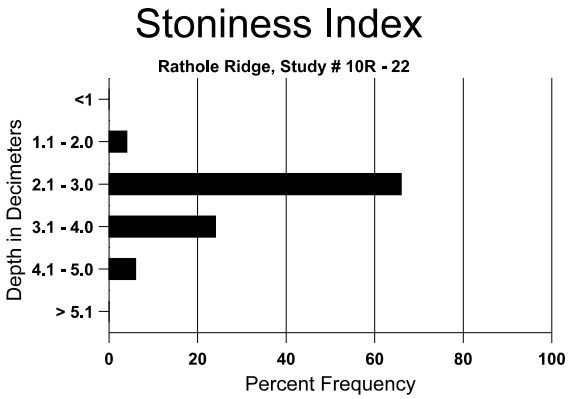
Species	Average leader growth (in) '05
Amelanchier utahensis	5.1
Artemisia tridentata vaseyana	2.4
Purshia tridentata	3.9

BASIC COVER --
Management unit 10R, Study no: 22

Cover Type	Average Cover %		
	'98	'00	'05
Vegetation	62.92	46.29	56.63
Rock	.14	.24	.45
Pavement	.33	.34	.14
Litter	58.79	50.99	34.81
Cryptogams	.98	.07	0
Bare Ground	14.93	28.55	20.71

SOIL ANALYSIS DATA --
Herd Unit 10R, Study # 22, Study Name: Rathole Ridge

Effective rooting depth (in)	Temp °F (depth)	pH	%sand	%silt	%clay	%0M	ppm P	ppm K	ds/m
12.4	61.4 (13.7)	6.3	40.0	37.4	22.6	3.6	12.0	124.8	0.9



PELLET GROUP DATA --
Management unit 10R, Study no: 22

Type	Quadrat Frequency		
	'98	'00	'05
Rabbit	-	2	14
Elk	14	34	58
Deer	-	8	15
Cattle	8	-	8

Days use per acre (ha)		
'98	'00	'05
-	-	-
27 (68)	33 (81)	56 (137)
1 (3)	2 (5)	16 (40)
8 (20)	1 (2)	14 (34)

BROWSE CHARACTERISTICS --
Management unit 10R, Study no: 22

		Age class distribution (plants per acre)					Utilization					
Year	Plants per Acre (excluding seedlings)	Seedling	Young	Mature	Decadent	Dead	% moderate	% heavy	% decadent	% dying	% poor vigor	Average Height Crown (in)
Amelanchier utahensis												
98	**180**	-	80	100	-	-	56	0	0	-	0	66/50
00	**240**	-	160	60	20	60	8	0	8	-	0	63/55
05	**200**	-	120	80	-	-	20	0	0	-	0	27/29
Artemisia tridentata vaseyana												
98	**4060**	520	800	2800	460	680	1	2	11	6	6	35/45
00	**540**	80	160	260	120	3760	11	0	22	-	0	27/27
05	**1100**	420	520	500	80	20	20	7	7	5	5	16/20
Chrysothamnus depressus												
98	**0**	-	-	-	-	-	0	0	-	-	0	-/-
00	**0**	-	-	-	-	-	0	0	-	-	0	2/10
05	**60**	-	-	60	-	-	0	0	-	-	0	3/9

		Age class distribution (plants per acre)					Utilization					
Year	Plants per Acre (excluding seedlings)	Seedling	Young	Mature	Decadent	Dead	% moderate	% heavy	% decadent	% dying	% poor vigor	Average Height Crown (in)
Chrysothamnus nauseosus hololeucus												
98	**0**	-	-	-	-	-	0	0	-	-	0	-/-
00	**0**	-	-	-	-	-	0	0	-	-	0	-/-
05	**0**	-	-	-	-	-	0	0	-	-	0	21/27
Chrysothamnus viscidiflorus viscidiflorus												
98	**920**	-	220	700	-	-	0	0	0	-	0	13/16
00	**820**	-	260	560	-	-	0	5	0	-	0	9/10
05	**940**	520	120	800	20	-	11	4	2	-	2	10/16
Juniperus osteosperma												
98	**20**	-	-	-	20	-	0	0	100	100	100	-/-
00	**20**	-	-	-	20	-	0	0	100	-	0	-/-
05	**0**	-	-	-	-	-	0	0	0	-	0	-/-
Mahonia repens												
98	**0**	-	-	-	-	-	0	0	-	-	0	-/-
00	**0**	-	-	-	-	-	0	0	-	-	0	-/-
05	**20**	-	-	20	-	-	0	0	-	-	0	4/5
Purshia tridentata												
98	**60**	-	40	20	-	-	33	0	-	-	0	22/62
00	**140**	-	120	20	-	100	0	0	-	-	0	14/26
05	**40**	-	-	40	-	-	50	50	-	-	0	11/21
Quercus gambelii												
98	**0**	-	-	-	-	-	0	0	-	-	0	-/-
00	**60**	-	60	-	-	-	0	0	-	-	0	-/-
05	**20**	-	20	-	-	-	0	0	-	-	0	25/10
Symphoricarpos oreophilus												
98	**1200**	100	620	580	-	-	20	0	-	-	0	19/32
00	**1640**	-	1400	240	-	-	0	0	-	-	0	13/18
05	**1120**	-	300	820	-	-	2	43	-	-	0	9/15
Tetradymia canescens												
98	**100**	-	100	-	-	-	0	0	-	-	0	-/-
00	**160**	-	160	-	-	-	0	0	-	-	0	-/-
05	**140**	20	-	140	-	-	0	0	-	-	0	6/9

Trend Study 10R-29-05

Study site name: Massey Junction . Vegetation Type: Desert Shrub .

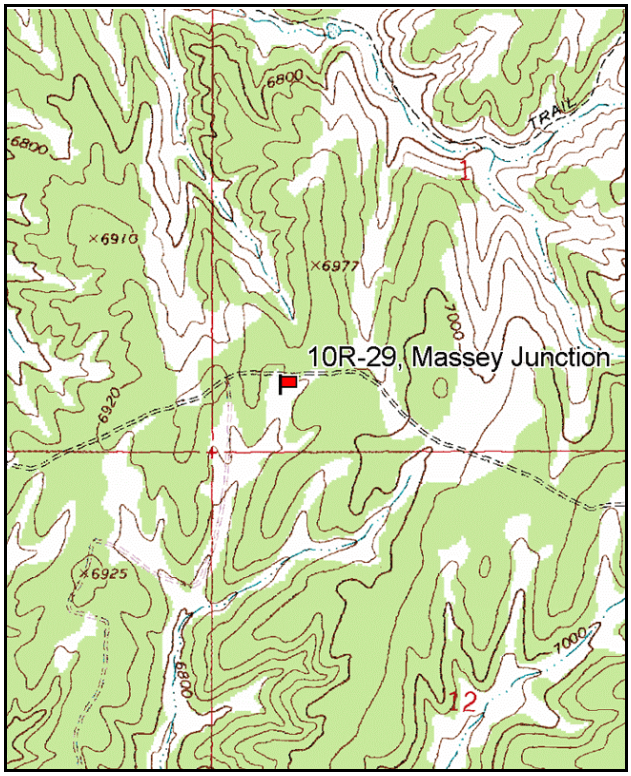
Compass bearing: frequency baseline 175 degrees magnetic.

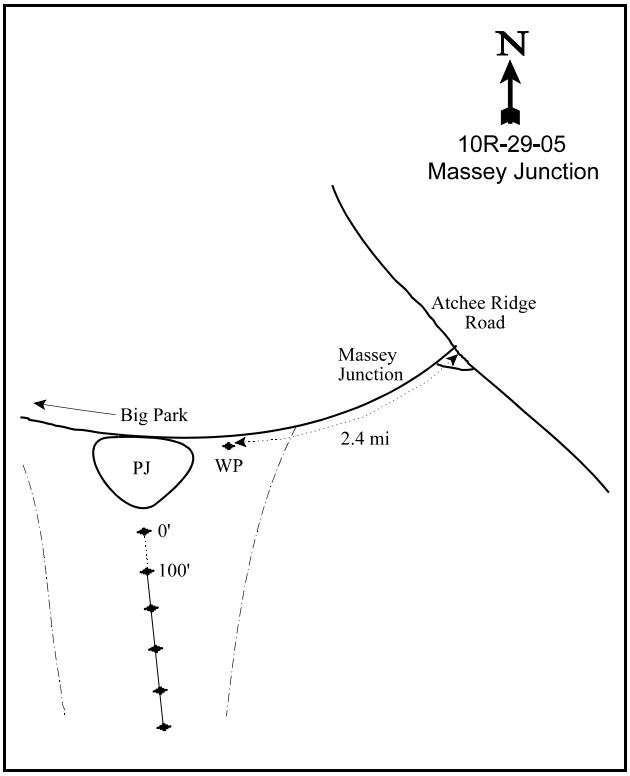
Frequency belt placement: line 1(11ft), line 2(34 ft), line 3(59 ft), line 4(71 ft) line 5 (95 ft).

LOCATION DESCRIPTION

From the Seep Ridge Road, about 10 miles north of Pine Spring, turn onto the Bitter Creek Road near McCoy Reservoir. Drive easterly on this road for 10.9 miles to where the road tops out, turn right off the main road. Go 7.65 miles staying on the main road to a fork. Turn right (east) and drive 0.2 miles to a fork, stay left and drive 1.0 miles to the witness post on the right (south) side of the road. From the witness post the 0' post is located down the canyon near the tip of the P-J Island separating the two drainages. The baseline continues down the draw.

Alternate Route: From Massey Junction off Atchee Ridge Road. Follow the road east towards Big Park 2.4 miles to a witness post on the left side of the road. From the witness post the 0' post is located down the canyon near the tip of the P-J Island separating the two drainages. The baseline continues down the draw.





Map name: Burnt Timber Canyon

Diagrammatic Sketch

Township 13S , Range 24E , Section 1 .

GPS: NAD 27, UTM 12S 4396959 N, 655571 E

DISCUSSION

Massey Junction - Trend Study No. 10R-29

The Massey Junction trend study was established in 1999. It samples a narrow draw surrounded by a pinyon-juniper woodland. The draw was burned probably sometime during the 1980's and now supports a salt desert shrub type. The site has a slight slope (3-6%) to the south and an elevation of approximately 6,950 feet. This area is used as winter range for deer and elk and grazed by cattle in the fall and spring. Cattle grazing is part of the Atchee Ridge allotment which permits grazing from April 1 through October 31 on a deferred rest rotation basis. Pellet group data estimated 24 deer and 145 elk days use/acre (59 ddu/ha and 358 edu/ha) in 1999. Cattle use was estimated at 36 days use/acre (89 cdu/ha). In 2005, wildlife and cattle use was lower with an estimated 12 deer, 42 elk, and 16 cow days use/acre (30 ddu/ha, 104 edu/ha, and 39 cdu/ha). Rabbit pellets were very common in 2005.

Soil at the site is moderately deep but compacted. Effective rooting depth is estimated at nearly 17 inches. There is little rock or pavement on the surface or within the soil profile. Soil texture is a clay loam with a soil reaction that is slightly alkaline (pH of 7.5). Organic matter is relatively high at 5.4%. Due to the abundant vegetation and litter cover, erosion is not significant.

The site supports two preferred browse species: fourwing saltbush, and winterfat. In 1999, fourwing saltbush provided 60% of the total browse cover with nearly 9% cover. This declined in 2005 to 2% cover, which was 32% of the total browse cover. The lower amount of cover was due to increased decadence and not decreased density. Density was estimated at 2,100 plants/acre in 1999 and 2,300 plants/acre in 2005. Decadence increased from 22% to 63% in 2005, while 29% of the population was classified as dying. Use has been moderate to heavy and was slightly heavier in 2005 likely because there was less available to browse. Winterfat is the most abundant shrub at a density of 10,780 plants/acre in 1999 and 7,480 plants/acre in 2005. Winterfat cover has averaged 4-5% at both readings. These shrubs are short, averaging only 10 inches in height with a crown of only eight inches. Use was classified as light in 1999, but was heavy in 2005. Most of the plants sampled were mature with a fair amount of young replacement plants. Fringed sagebrush was abundant at 7,000 plants/acre in 1999, but declined to 2,420 plants/acre in 2005. Cover declined from 2% to less than 0.3% in 2005. Drought conditions are likely the cause further declines in fourwing saltbush and fringed sagebrush.

The herbaceous understory was dominated by thickspike wheatgrass in 1999. Cover was very high at 27% and it was sampled in 97% of the quadrats. Thickspike declined significantly in 2005 and was only sampled in 38% of the quadrats. Cover was only slightly higher than 1% in 2005. The only other common grass is cheatgrass. In 1999, it was scattered throughout the site, had 7% cover, and was sampled in 90 % of the quadrats. In 2005, sum of nested frequency increased significantly, cover increased to 29%, and was sampled in 97% of the quadrats. It was the dominant species as it provided 56% of the total vegetation cover. Forbs were rare in 1999 and in 2005 forbs were mostly comprised of annual species.

1999 APPARENT TREND ASSESSMENT

There is little bare ground with abundant vegetation and litter cover to protect the soil. The key browse populations appear stable with good vigor, low percent decadence and adequate reproduction. The herbaceous understory is abundant and dominated by thickspike wheatgrass. There is some cheatgrass on the site. Forbs are rare. The DCI rating was good to excellent with healthy shrub populations and high amounts of perennial grasses.

winter range condition (DC Index) - good to excellent (63) Lower potential scale

2005 TREND ASSESSMENT

The trend for soil is down. Bare ground increased from 13% to 29% in 2005. The ratio of bare ground to protective ground cover (vegetation, litter, and cryptogams) decreased substantially. Erosion has not been a problem in 2005, due to the high amount of vegetation cover. The browse trend is slightly down. Fourwing saltbush decadence increased from 22% to 63%, while 29% of the population was classified as dying. Vigor of fourwing saltbush may be improved with improved precipitation patterns. With the decreased vigor and production (cover went down from 9% to 2%), utilization increased to 57% showing signs of heavy use. Winterfat density declined 31%, but cover remained stable and 9% of the population was classified as young. Fringed sagebrush density and cover also declined substantially. The herbaceous understory trend is down. In six years this site changed from one dominated by perennial grass to one dominated by annual cheatgrass. Cheatgrass sum of nested frequency increased significantly in 2005, while thickspike wheatgrass decreased significantly. Cheatgrass puts this site at risk for fire and also hampers the reproduction of shrubs. The DCI score declined to poor due to high amounts of cheatgrass, less perennial grass cover, less preferred browse cover, and high decadence of fourwing saltbush.

TREND ASSESSMENT
soil - down (-2)
browse - slightly down (-1)
herbaceous understory - down (-2)
winter range condition (DC Index) - poor (15) Lower potential scale

HERBACEOUS TRENDS --
Management unit 10R, Study no: 29

Type	Species	Nested Frequency		Average Cover %	
		'99	'05	'99	'05
G	Agropyron dasystachyum	$_{b}$428	$_{a}$125	26.81	1.51
G	Bouteloua gracilis	15	27	.36	.44
G	Bromus tectorum (a)	$_{a}$335	$_{b}$425	7.25	29.22
G	Poa secunda	$_{a}$-	$_{b}$20	-	.41
G	Sitanion hystrix	1	-	.03	-
Total for Annual Grasses		335	425	7.25	29.22
Total for Perennial Grasses		444	172	27.20	2.36
Total for Grasses		779	597	34.46	31.59
F	Camelina microcarpa (a)	-	7	-	.07
F	Chenopodium fremontii (a)	-	3	-	.00
F	Chorispora tenella (a)	-	2	-	.15
F	Descurainia pinnata (a)	$_{a}$12	$_{b}$92	.03	3.16
F	Lappula occidentalis (a)	$_{a}$-	$_{b}$263	-	7.08
F	Sisymbrium altissimum (a)	-	3	-	.15
F	Sphaeralcea coccinea	$_{a}$85	$_{b}$133	.97	2.57
F	Taraxacum officinale	-	3	-	.00
F	Tragopogon dubius	-	1	-	.00

Type	Species	Nested Frequency '99	Nested Frequency '05	Average Cover % '99	Average Cover % '05
Total for Annual Forbs		12	370	0.03	10.62
Total for Perennial Forbs		85	137	0.97	2.58
Total for Forbs		97	507	1.00	13.21

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

BROWSE TRENDS --
Management unit 10R, Study no: 29

Type	Species	Strip Frequency '99	Strip Frequency '05	Average Cover % '99	Average Cover % '05
B	Artemisia frigida	50	47	2.03	.28
B	Artemisia tridentata tridentata	1	1	-	-
B	Atriplex canescens	63	67	8.95	2.43
B	Ceratoides lanata	95	93	4.01	4.69
B	Gutierrezia sarothrae	3	3	-	.15
Total for Browse		212	211	15.00	7.55

CANOPY COVER, LINE INTERCEPT --
Management unit 10R, Study no: 29

Species	Percent Cover '05
Artemisia frigida	1.08
Atriplex canescens	3.13
Ceratoides lanata	4.06
Gutierrezia sarothrae	.15

KEY BROWSE ANNUAL LEADER GROWTH --
Management unit 10R, Study no: 29

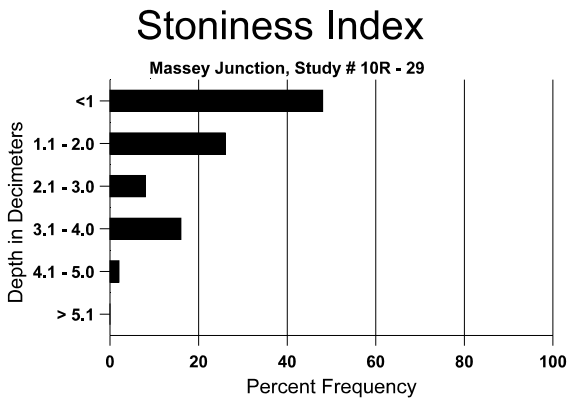
Species	Average leader growth (in)
Atriplex canescens	4.1
Ceratoides lanata	6.5

BASIC COVER --
Management unit 10R, Study no: 29

Cover Type	Average Cover %	
	'99	'05
Vegetation	52.90	50.59
Rock	.11	.20
Pavement	3.76	2.99
Litter	49.88	28.83
Cryptogams	.03	.34
Bare Ground	12.93	28.52

SOIL ANALYSIS DATA --
Herd Unit 10R, Study no: 29, Massey Junction

Effective rooting depth (in)	Temp °F (depth)	pH	%sand	%silt	%clay	%0M	ppm P	ppm K	dS/m
16.9	67.8 (18.0)	7.5	28.9	34.6	36.6	5.4	17.1	336.0	0.8



PELLET GROUP DATA --
Management unit 10R, Study no: 29

Type	Quadrat Frequency	
	'99	'05
Rabbit	16	63
Elk	25	38
Deer	19	24
Cattle	6	6

Days use per acre (ha)	
'99	'05
-	-
90 (222)	42 (104)
16 (40)	12 (30)
26 (64)	16 (39)

BROWSE CHARACTERISTICS --
Management unit 10R, Study no: 29

		Age class distribution (plants per acre)					Utilization					
Year	Plants per Acre (excluding seedlings)	Seedling	Young	Mature	Decadent	Dead	% moderate	% heavy	% decadent	% dying	% poor vigor	Average Height Crown (in)
Artemisia frigida												
99	**7000**	20	260	6740	-	-	24	13	-	-	0	7/7
05	**2420**	140	140	2280	-	-	29	18	-	-	0	7/8
Artemisia tridentata tridentata												
99	**20**	-	-	20	-	500	0	0	-	-	0	34/31
05	**20**	-	-	20	-	-	0	100	-	-	0	34/36
Atriplex canescens												
99	**2100**	-	140	1500	460	140	43	29	22	7	7	33/41
05	**2300**	40	200	640	1460	180	30	57	63	29	29	27/34
Ceratoides lanata												
99	**10780**	-	700	10040	40	-	6	3	0	.18	.18	10/8
05	**7480**	40	900	6560	20	-	7	82	0	-	0	7/8
Chrysothamnus nauseosus												
99	**0**	-	-	-	-	-	0	0	-	-	0	-/-
05	**0**	-	-	-	-	-	0	0	-	-	0	12/15
Gutierrezia sarothrae												
99	**100**	-	20	80	-	-	0	0	-	-	0	6/6
05	**100**	-	-	100	-	-	0	0	-	-	0	7/8

Trend Study 10R-32-05

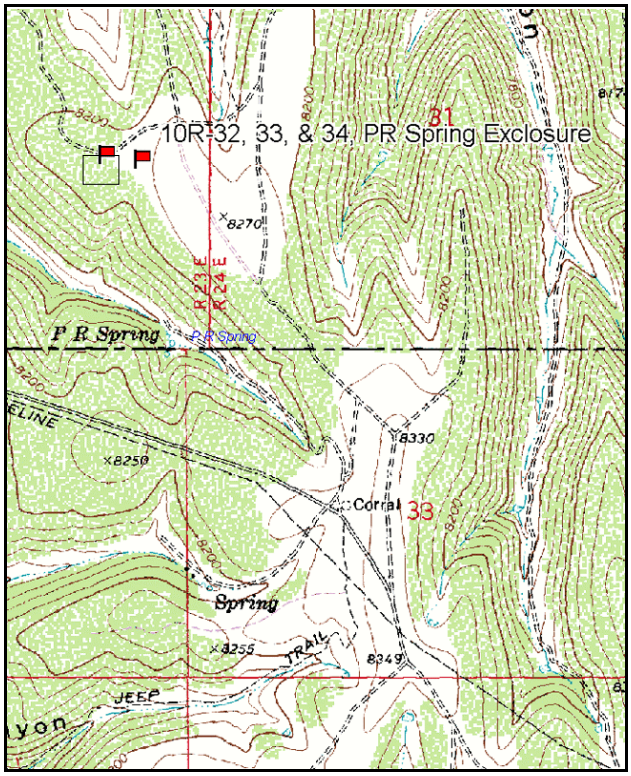
Study site name: PR Spring Total Exclosure . Vegetation type: Mountain Brush .

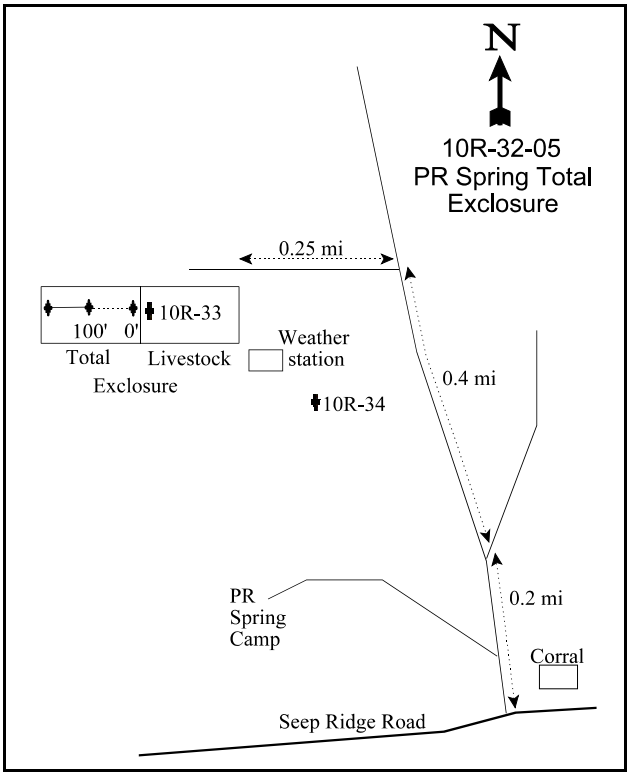
Compass bearing: frequency baseline 260 degrees magnetic.

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

LOCATION DESCRIPTION

On Seep Ridge Road go to the PR Spring turnoff. Travel 0.2 miles staying right (do not go down road to PR Spring and campground). Continue left 0.4 miles. Turn left once again and travel approximately 0.25 miles to a weather station then the exclosure. The 0-foot stake in the total exclosure is located near the fence separating the total and livestock exclosures. The 0-foot stake is five fence posts from the north fence. The first baseline is 100 feet long and the second baseline is 86 feet long. The 0-foot stake is marked by browse tag number 435.





Map Name: P R Spring

Diagrammatic Sketch

Township 15S , Range 23E, Section 36

GPS: NAD 27, UTM 12S 4369908 N 647433 E

DISCUSSION

PR Spring Total Exclosure - Study No. 10R-32

This study was established in 2002 to gather baseline data for a 3-way exclosure that was built in 2001 by the BLM near PR Spring on the North Book Cliffs. This transect samples a mountain brush community within the total exclosure which is now inaccessible to big game or livestock. The study lies on a nearly level ridge at an elevation of 8,200 feet. Due to the dimensions of the exclosure, the sampling baseline is only 200 feet in length. The area represents summer range for wildlife, and is also grazed by livestock. In 2002, a pellet group transect was read to estimate use before the exclosure was constructed. Elk, deer, and cattle use was estimated at 23, 39, and 7 days use/acre, respectively(56 edu/ha, 96 ddu/ha, and 18 cdu/ha).

Soils on the site are clay loam in texture and neutral in reactivity (pH of 6.7). Percent organic matter is moderate at 3.6%. Soils are quite shallow with an effective rooting depth of less than 10 inches. Penetrometer readings taken in 2002 also show that the upper 8 inches of the profile were very rocky. Erosion is minimal due to the abundance of vegetation and litter cover and lack of significant slope. The erosion condition class was determined as stable in 2002 and 2005.

The browse component dominates the vegetation community as it provides more than 70% of the total vegetation cover on the site. Total line-intercept canopy cover of the browse component was estimated at 61% in 2002 and 56% in 2005. Several preferred species are present including serviceberry, mountain big sagebrush, true mountain mahogany, and bitterbrush. Prior to the exclosure, use on serviceberry and mahogany was moderate to heavy, while use on mountain big sagebrush was light. Snowberry, although less preferred, provides the highest average cover and has the highest density of any single species in the total exclosure. Snowberry density was estimated at 5,320 plant/acre in 2002 and 7,780 plants/acre in 2005. Line intercept cover was 20% in 2002 and 19% in 2005. Serviceberry density declined from 1,800 plants/acre to 1,300 plants/acre in 2005. A large number of the population was made up of young plants. Decadence increased from 9% to 18% in 2005, with 12% classified as dying. Serviceberry line intercept cover declined from 13% in 2002 to 11% in 2005. Annual leader growth was 2.1 inches in 2002 and 3.3 inches in 2005.

Mountain big sagebrush density declined 11% from 3,560 plants/acre to 3,180 plants/acre in 2005. Line intercept cover also declined from 20% to 15%. Decadence increased from 15% to 27%. Young recruitment was good in 2002 at 21% of the population and 13% in 2005. Sagebrush leader growth was 2.1 inches in 2002 and 2.2 inches in 2005. True mountain mahogany density also declined 11% in 2005 from 2,920 plants/acre to 2,600 plants/acre. Decadence increased from 1% to 11%. Recruitment was excellent in 2002 and 2005 with more than a quarter of the population classified as young. Line intercept cover increased from 5% to 7%. Average leader growth for mahogany was 1.9 inches for 2002 and 2.3 inches in 2005. Less preferred browse sampled include stickyleaf low rabbitbrush, Gambel oak, and grey horsebrush.

Grasses are comprised totally of perennial species including a sedge, thickspike wheatgrass, mutton bluegrass, Kentucky bluegrass, prairie junegrass, and bluebunch wheatgrass. Most of the grasses are found underneath, or in close proximity to, shrubs and it was noted that interspaces were relatively bare in 2002. The forb component is diverse, but had only fair production. Two species, weedy milkvetch and mat penstemon, provided the majority of the forb cover. Composition is fairly good with desirable species such as pale agoseris, yellow Indian paintbrush, redroot eriogonum, sulfur eriogonum, and Lewis flax present. The understory could benefit from a reduction in shrubs.

2002 APPARENT TREND ASSESSMENT

Soils appear to be stable with an abundance of protective ground cover from vegetation and litter. Erosion is very minimal at the present time and will likely remain so. The browse component is diverse and abundant

and appears to be stable. Preferred species are plentiful and have very good reproduction. Line-intercept canopy cover for browse is estimated at over 61% which is very high. The herbaceous understory has fair diversity and a fairly good composition, but could be much more abundant with a reduction in the overstory canopy of shrubs. The DCI score is good to excellent with abundant preferred browse and a healthy understory.

winter range condition (DC Index) - good to excellent (91) Higher potential scale

2005 TREND ASSESSMENT

The soil trend stable. Bare ground decreased from 9% to only 3%, while the ratio of bare ground to protective ground cover (vegetation, litter, and cryptogams) improved. The browse trend is slightly down. Density declined slightly for serviceberry, mountain big sagebrush, true mountain mahogany, and bitterbrush. Percent decadence increased for each species, but not to extremely high levels. Drought conditions are likely the reason for the increased decadence. The herbaceous understory trend is stable. The nested frequency and percent cover of perennial grasses and forbs has changed very little since 2002. Sedge decreased significantly, while Kentucky blue grass increased even in the absence of grazing. The DCI score remained good to excellent despite a slight decrease in the cover of preferred browse.

TREND ASSESSMENT
soil - stable (0)
browse - slightly down (-1)
herbaceous understory - stable (0)
winter range condition (DC Index) - good to excellent (88) Higher potential scale

HERBACEOUS TRENDS --
Management unit 10R, Study no: 32

Type	Species	Nested Frequency		Average Cover %	
		'02	'05	'02	'05
G	Agropyron dasystachyum	193	189	3.82	2.81
G	Agropyron spicatum	5	4	.06	.03
G	Carex sp.	b148	a92	5.37	3.12
G	Koeleria cristata	6	-	.18	-
G	Poa fendleriana	74	113	2.85	4.34
G	Poa pratensis	a16	b68	.25	2.83
Total for Annual Grasses		0	0	0	0
Total for Perennial Grasses		442	466	12.55	13.14
Total for Grasses		442	466	12.55	13.14
F	Agoseris glauca	4	-	.01	-
F	Antennaria rosea	4	3	.01	.03
F	Androsace septentrionalis (a)	a-	b12	-	.07
F	Arenaria sp.	5	11	.03	.05
F	Astragalus miser	91	77	2.77	3.04
F	Aster sp.	-	1	-	.00

Type	Species	Nested Frequency		Average Cover %	
		'02	'05	'02	'05
F	Astragalus utahensis	6	1	.15	.00
F	Balsamorhiza sagittata	1	-	.00	-
F	Castilleja flava	31	16	.49	.11
F	Cirsium sp.	19	14	.15	.70
F	Collinsia parviflora (a)	2	9	.00	.04
F	Crepis acuminata	5	-	.03	.00
F	Delphinium nuttallianum	-	3	-	.03
F	Erigeron eatonii	75	80	.54	.99
F	Eriogonum racemosum	$_{b}$18	$_{a}$4	.13	.03
F	Eriogonum umbellatum	20	14	.37	.68
F	Ipomopsis aggregata	4	2	.03	.00
F	Lepidium sp. (a)	3	11	.01	.03
F	Linum lewisii	11	9	.08	.20
F	Machaeranthera canescens	4	4	.03	.03
F	Penstemon caespitosus	129	104	1.56	1.81
F	Phlox longifolia	7	18	.02	.11
F	Polygonum douglasii (a)	$_{a}$-	$_{b}$54	-	.16
F	Senecio integerrimus	-	2	-	.00
F	Taraxacum officinale	$_{a}$14	$_{b}$24	.03	.26
F	Tragopogon dubius	4	1	.01	.00
Total for Annual Forbs		5	86	0.01	0.31
Total for Perennial Forbs		452	388	6.51	8.17
Total for Forbs		457	474	6.52	8.48

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

BROWSE TRENDS --
Management unit 10R, Study no: 32

Type	Species	Strip Frequency '02	Strip Frequency '05	Average Cover % '02	Average Cover % '05
B	Amelanchier utahensis	55	47	11.43	10.35
B	Artemisia tridentata vaseyana	77	77	14.28	12.20
B	Cercocarpus montanus	66	64	7.50	6.93
B	Chrysothamnus viscidiflorus viscidiflorus	60	52	3.65	3.75
B	Gutierrezia sarothrae	0	1	-	-
B	Purshia tridentata	11	7	.33	.06
B	Quercus gambelii	20	18	.95	.39
B	Symphoricarpos oreophilus	93	97	17.60	15.85
B	Tetradymia canescens	3	2	.04	.00
Total for Browse		385	365	55.81	49.56

CANOPY COVER, LINE INTERCEPT --
Management unit 10R, Study no: 32

Species	Percent Cover '02	Percent Cover '05
Amelanchier utahensis	13.61	11.44
Artemisia tridentata vaseyana	20.08	15.36
Cercocarpus montanus	5.36	7.15
Chrysothamnus viscidiflorus viscidiflorus	.96	2.54
Gutierrezia sarothrae	.88	-
Purshia tridentata	.20	.06
Quercus gambelii	.21	.61
Symphoricarpos oreophilus	20.31	19.25

KEY BROWSE ANNUAL LEADER GROWTH --
Management unit 10R, Study no: 32

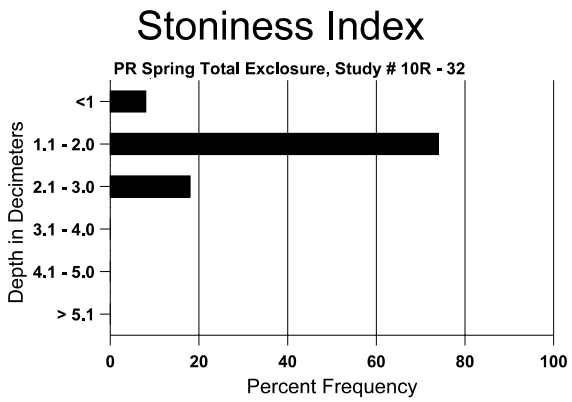
Species	Average leader growth (in) '02	Average leader growth (in) '05
Amelanchier utahensis	3.1	3.3
Artemisia tridentata vaseyana	2.1	2.2
Cercocarpus montanus	1.9	2.3

BASIC COVER --
Management unit 10R, Study no: 32

Cover Type	Average Cover %	
	'02	'05
Vegetation	58.40	59.05
Rock	.23	.04
Pavement	7.22	8.35
Litter	58.92	50.58
Cryptogams	.25	.10
Bare Ground	9.25	3.23

SOIL ANALYSIS DATA --
Herd Unit 10R, Study no: 32, PR Spring Total Exclosure

Effective rooting depth (in)	Temp °F (depth)	pH	%sand	%silt	%clay	%0M	ppm P	ppm K	dS/m
9.7	-	6.8	35.3	32.7	32.0	3.6	14.9	291.2	0.8



PELLET GROUP DATA --
Management unit 10R, Study no: 32

Type	Quadrat Frequency	
	'02	'05
Rabbit	12	42
Elk	9	-
Deer	15	3
Cattle	1	1

Days use per acre (ha)	
'02	'05
-	-
23 (56)	-
39 (96)	-
7 (18)	-

BROWSE CHARACTERISTICS --
Management unit 10R, Study no: 32

		Age class distribution (plants per acre)					Utilization					
Year	Plants per Acre (excluding seedlings)	Seedling	Young	Mature	Decadent	Dead	% moderate	% heavy	% decadent	% dying	% poor vigor	Average Height Crown (in)
Amelanchier utahensis												
02	**1800**	20	760	880	160	20	16	27	9	4	4	52/51
05	**1300**	20	500	560	240	20	0	0	18	12	14	46/50
Artemisia tridentata vaseyana												
02	**3560**	100	760	2280	520	340	10	4	15	4	4	30/38
05	**3180**	320	400	1920	860	580	0	0	27	19	25	23/31
Cercocarpus montanus												
02	**2920**	80	760	2120	40	60	14	52	1	.68	.68	43/35
05	**2600**	220	780	1540	280	60	0	0	11	6	12	46/37
Chrysothamnus viscidiflorus viscidiflorus												
02	**2980**	40	260	2680	40	-	0	0	1	-	0	13/14
05	**2680**	-	200	2440	40	-	4	.74	1	.74	.74	10/13
Gutierrezia sarothrae												
02	**0**	-	-	-	-	-	0	0	-	-	0	-/-
05	**20**	-	-	20	-	-	0	0	-	-	0	-/-
Mahonia repens												
02	**0**	-	-	-	-	-	0	0	-	-	0	-/-
05	**0**	-	-	-	-	-	0	0	-	-	0	4/7
Purshia tridentata												
02	**260**	-	-	240	20	-	31	46	8	-	0	12/18
05	**160**	-	20	140	-	-	0	0	0	-	0	12/18
Quercus gambelii												
02	**560**	20	280	280	-	-	4	0	-	-	0	-/-
05	**920**	40	860	60	-	-	0	0	-	-	0	12/9
Symphoricarpos oreophilus												
02	**5320**	140	980	4340	-	-	0	0	0	-	0	17/31
05	**7780**	-	1580	6180	20	40	0	0	0	-	0	15/21
Tetradymia canescens												
02	**100**	-	40	60	-	-	0	0	-	-	0	7/8
05	**80**	-	-	80	-	-	0	0	-	-	0	6/7

Trend Study 10R-33-05

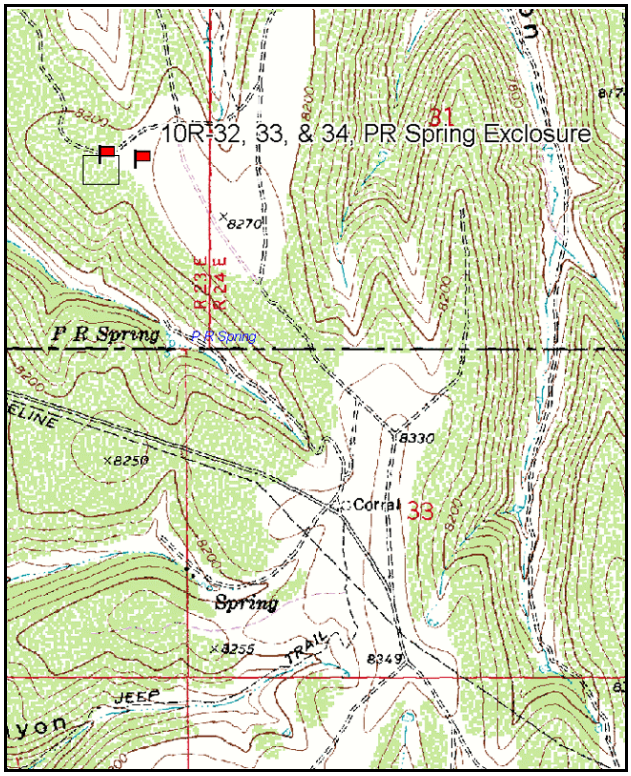
Study site name: PR Spring Livestock Exclosure . Vegetation type: Mountain Brush .

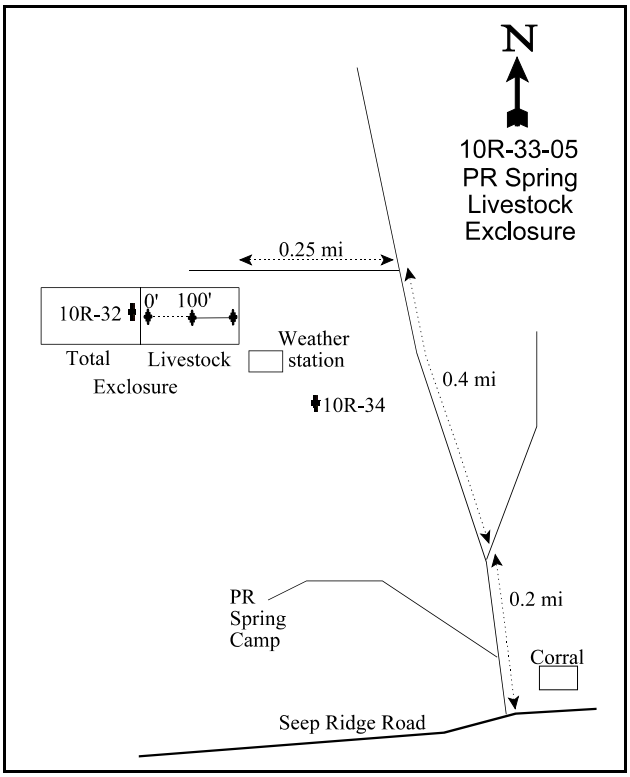
Compass bearing: frequency baseline 80 degrees magnetic.

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

LOCATION DESCRIPTION

On the Seep Ridge Road go to the PR Spring turnoff. Travel 0.2 miles staying right (do not go down road to PR Spring and campground). Continue left 0.4 miles. Turn left once again and travel approximately 0.25 miles to a weather station then the exclosure. The 0-foot stake in the livestock exclosure is located near the fence separating the total and livestock exclosures. The 0-foot stake is marked by browse tag number 423.





Map Name: P R Spring

Township 15S, Range 23E, Section 36

Diagrammatic Sketch

GPS: NAD 27, UTM 12S 4369912 N 647434 E

DISCUSSION

PR Spring Livestock Exclosure - Study No. 10R-33

This transect samples the livestock exclosure at PR Spring which is accessible to wildlife, but excludes livestock. The sampling baseline lies just east of the total exclosure baseline. Physical characteristics are the same as those reported for the total exclosure transect. The sampling baseline within the livestock exclosure is also only 200 feet in length. One observation worth noting is that the browse component within the livestock exclosure is not as thick compared to the total exclosure. Use inside the livestock exclosure prior to exclosure construction was light to moderate by wildlife and light by livestock. Estimated Pellet group transect data from 2002 was 19 elk days use/acre (46 edu/ha), 48 deer days use/acre (117 ddu/ha), and 14 cow days use/acre (34 cdu/ha). As with the total exclosure, cattle use inside the livestock portion of the exclosure was prior to the construction of the exclosure. In 2005, pellet group data was estimated at 21 elk, 63 deer, and 14 cow days use/acre (53 edu/ha, 155 ddu/ha, and 34 cdu/ha) in the livestock exclosure. Apparently cows had trespassed into the exclosure, but it is possible that pats were from prior to construction of the exclosure.

Soils are clay loam in texture and neutral in reactivity (pH of 6.7). Effective rooting depth along this transect was estimated at just under 12 inches in 2002. Penetrometer readings also reveal that the upper 8-12 inches of the profile are very rocky. Vegetation and litter cover are abundant and adequate to keep erosion at a minimal level. The erosion condition classification was determined as stable in 2002 and 2005.

Although diverse and abundant, the browse component in the livestock exclosure is not as dense as that in the nearby total exclosure. Line-intercept canopy cover for browse was estimated at just over 45% in 2002 and 2005. Serviceberry, mountain big sagebrush, and true mountain mahogany are the key browse species. Together they provide about two thirds of browse cover. Serviceberry had an estimated density of 1,760 plants/acre in 2002 that increased to 1,920 plants/acre in 2005. Over one-half of the population were classified as young at each reading. Vigor was good and decadence was low. Serviceberry leader growth was 2.0 inches in 2002 and 2.6 inches in 2005. Mountain big sagebrush density was estimated at 3,240 plants/acre and decreased to 2,740 plants/acre in 2005. Most of the population consisted of mature and decadent plants. In 2002, the young age class was moderately abundant (460 young plants/acre) and decreased slightly in 2005 (280 plants/acre). Line intercept cover estimates were about 17% for sagebrush in 2002 and 2005. Mahogany density was estimated at 1,240 plants/acre in 2002 and increased slightly to 1,340 plants/acre in 2005. Line intercept cover was about 5% in both 2002 and 2005. Decadence was low in 2002, but increased to 24% from only 3%. Utilization was heavy on two-thirds of the plants in 2005. Average annual leader growth was 2.2 inches in 2002 and 1.8 inches in 2005.

As with the total exclosure, snowberry has the highest density of all the browse species within the livestock exclosure at 4,640 plants/acre in 2002 and 6,060 plants/acre in 2005. Use was light, vigor normal, and decadence low. Bitterbrush, while highly preferred, occurs in low density at about 300 plants/acre in both 2002 and 2005. Bitterbrush shows heavy use, normal vigor, and decadence was low in 2002 (13%), but increased to 40% in 2005. Other browse sampled within the livestock exclosure include dwarf rabbitbrush, low rabbitbrush, broom snakeweed, Gambel oak, and grey horsebrush.

The understory is slightly more abundant within the livestock exclosure than it was in the total exclosure. Grasses provided about a quarter of the total vegetation cover on the site, with forbs providing an additional 16-18%. *Carex* sp. was the most abundant species, and provided nearly 9% average cover in 2002 and 6% in 2005. This was 63% of the total grass cover in 2002 and 36% in 2005. Kentucky bluegrass and thickspike wheatgrass were also moderately abundant. Kentucky bluegrass increased from 3% to 7% cover in 2005.

The forb component has good diversity and composition. Two species, weedy milkvetch and mat penstemon, are the dominant species as together they accounted for 74% of the total forb cover in 2002 and 69% in 2005.

Desirable forbs include pale agoseris, Utah milkvetch, yellow Indian paintbrush, tapertip hawksbeard, redroot eriogonum, Lewis flax, lobeleaf groundsel, and globemallow.

2002 APPARENT TREND ASSESSMENT

Soils are in good condition due to good vegetation and litter cover and the nearly level terrain. Bare ground is moderately high at 20%, but with a dry spring and summer, this is not excessive. The browse component appears healthy overall. Preferred species provide the bulk of the total cover and have good recruitment from young plants, low decadence, and generally good vigor. Use on the key species is moderate to heavy, except on mountain big sagebrush, which shows mostly light use. Less preferred increasers such as broom snakeweed and stickyleaf low rabbitbrush are only a minor component and should remain so. The herbaceous understory has fair diversity, but good composition within the livestock exclosure. Although a handful of species are dominant, many desirable species are present and should increase with better precipitation in the future. Trend for both the browse and the herbaceous understory components appear stable. The DCI score is good to excellent due to excellent browse and perennial grass cover.

winter range condition (DC Index) - good to excellent (89) Higher potential scale

2005 TREND ASSESSMENT

The trend for soil is stable. Bare ground remained at about the same level as 2002. An erosion condition class assessment rated erosion as stable. The browse trend is stable for the entire site. Different species have different trends. Serviceberry density increased 8%, while cover declined from 9% to 8%. Mountain big sagebrush density declined 15% , while line intercept cover remained stable at 17%. True mountain mahogany density increased 7%, decadence increased to 24%, and cover remained stable at 5%. Snowberry density and cover also increased. The herbaceous understory trend is stable. Sum of nested frequency for grasses and forbs combined was unchanged. Grasses increased slightly, while forbs decreased slightly. The DCI score remained good to excellent.

TREND ASSESSMENT
soil - stable (0)
browse - stable (0)
herbaceous understory - stable (0)
winter range condition (DC Index) - good to excellent (88) Higher potential scale

HERBACEOUS TRENDS --
Management unit 10R, Study no: 33

Type	Species	Nested Frequency		Average Cover %	
		'02	'05	'02	'05
G	Agropyron dasystachyum	102	124	1.14	2.24
G	Agropyron spicatum	a1	b41	.00	.69
G	Carex sp.	b187	a139	8.90	6.26
G	Koeleria cristata	a-	b8	-	.12
G	Poa fendleriana	24	31	.57	.62
G	Poa pratensis	136	185	3.43	7.22
G	Poa secunda	-	9	-	.18

Type	Species	Nested Frequency '02	Nested Frequency '05	Average Cover % '02	Average Cover % '05
G	Sitanion hystrix	5	1	.03	.03
Total for Annual Grasses		0	0	0	0
Total for Perennial Grasses		455	538	14.08	17.38
Total for Grasses		455	538	14.08	17.38
F	Agoseris glauca	7	-	.02	-
F	Antennaria rosea	$_{a}$12	$_{b}$28	.11	.37
F	Androsace septentrionalis (a)	$_{a}$-	$_{b}$19	-	.07
F	Astragalus miser	$_{b}$146	$_{a}$135	5.00	5.12
F	Astragalus utahensis	5	6	.04	.09
F	Castilleja flava	25	12	.35	.14
F	Cirsium sp.	8	4	.02	.07
F	Collinsia parviflora (a)	$_{a}$-	$_{b}$9	-	.02
F	Crepis acuminata	5	12	.01	.07
F	Erigeron eatonii	130	104	.83	1.08
F	Eriogonum racemosum	22	15	.20	.11
F	Eriogonum umbellatum	14	12	.14	.10
F	Lepidium sp. (a)	5	8	.02	.04
F	Linum lewisii	9	16	.02	.14
F	Lupinus argenteus	2	2	.15	.00
F	Machaeranthera canescens	13	6	.11	.05
F	Penstemon caespitosus	$_{b}$217	$_{a}$166	1.85	3.08
F	Phlox longifolia	90	87	.32	.55
F	Polygonum douglasii (a)	$_{a}$5	$_{b}$60	.01	.17
F	Potentilla gracilis	1	-	.00	.00
F	Senecio integerrimus	-	1	-	.18
F	Senecio multilobatus	3	-	.00	.00
F	Sphaeralcea coccinea	11	7	.06	.18
F	Taraxacum officinale	$_{a}$4	$_{b}$25	.02	.31
F	Tragopogon dubius	-	2	-	.00
Total for Annual Forbs		10	96	0.02	0.31
Total for Perennial Forbs		724	640	9.31	11.69
Total for Forbs		734	736	9.34	12.00

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

BROWSE TRENDS --
Management unit 10R, Study no: 33

Type	Species	Strip Frequency		Average Cover %	
		'02	'05	'02	'05
B	Amelanchier utahensis	53	51	5.44	4.23
B	Artemisia tridentata vaseyana	79	72	15.19	13.78
B	Cercocarpus montanus	31	36	3.41	3.48
B	Chrysothamnus depressus	4	3	.04	.03
B	Chrysothamnus viscidiflorus viscidiflorus	48	39	1.00	1.26
B	Gutierrezia sarothrae	4	7	.03	.33
B	Mahonia repens	1	2	-	.03
B	Purshia tridentata	14	11	.48	.86
B	Quercus gambelii	4	3	.01	.03
B	Symphoricarpos oreophilus	80	82	9.72	11.39
B	Tetradymia canescens	17	14	.62	.36
Total for Browse		335	320	35.95	35.81

CANOPY COVER, LINE INTERCEPT --
Management unit 10R, Study no: 33

Species	Percent Cover	
	'02	'05
Amelanchier utahensis	9.10	8.08
Artemisia tridentata vaseyana	17.66	17.48
Cercocarpus montanus	5.05	5.56
Chrysothamnus depressus	-	.06
Chrysothamnus viscidiflorus viscidiflorus	1.14	1.88
Gutierrezia sarothrae	.03	.10
Mahonia repens	-	.18
Purshia tridentata	1.28	.53
Quercus gambelii	.15	.15
Symphoricarpos oreophilus	10.63	13.96
Tetradymia canescens	.16	.01

KEY BROWSE ANNUAL LEADER GROWTH --
Management unit 10R, Study no: 33

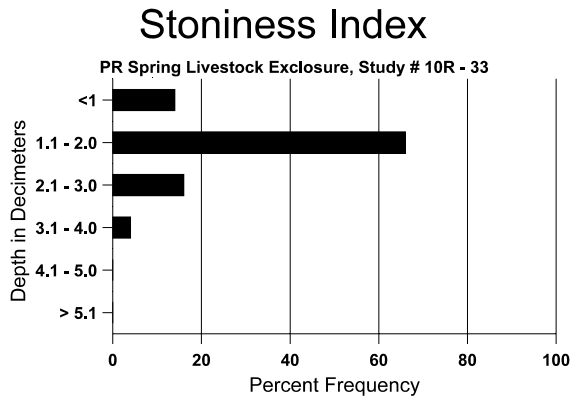
Species	Average leader growth (in)	
	'02	'05
Amelanchier utahensis	2.0	2.6
Artemisia tridentata vaseyana	2.2	2.1
Cercocarpus montanus	1.9	1.8

BASIC COVER --
Management unit 10R, Study no: 33

Cover Type	Average Cover %	
	'02	'05
Vegetation	52.09	55.32
Rock	1.24	1.43
Pavement	6.34	6.40
Litter	46.46	38.85
Cryptogams	.03	.18
Bare Ground	20.18	20.83

SOIL ANALYSIS DATA --
Herd Unit 10R, Study no: 33, PR Spring Livestock Exclosure

Effective rooting depth (in)	Temp °F (depth)	pH	%sand	%silt	%clay	%0M	ppm P	ppm K	dS/m
11.7	-	6.8	35.3	32.7	32.0	3.6	14.9	291.2	0.8



PELLET GROUP DATA --
Management unit 10R, Study no: 33

Type	Quadrat Frequency	
	'02	'05
Rabbit	11	37
Elk	7	14
Deer	14	22
Cattle	3	1

Days use per acre (ha)	
'02	'05
-	-
19 (46)	21 (53)
48 (117)	63 (155)
14 (34)	14 (34)

BROWSE CHARACTERISTICS --
Management unit 10R, Study no: 33

		Age class distribution (plants per acre)					Utilization					
Year	Plants per Acre (excluding seedlings)	Seedling	Young	Mature	Decadent	Dead	% moderate	% heavy	% decadent	% dying	% poor vigor	Average Height Crown (in)
Amelanchier utahensis												
02	**1760**	100	920	740	100	20	22	25	6	2	2	45/43
05	**1920**	400	1160	620	140	-	15	23	7	5	6	45/39
Artemisia tridentata vaseyana												
02	**3240**	120	460	1620	1160	400	6	10	36	11	11	29/37
05	**2740**	100	280	1600	860	520	20	1	31	17	17	29/37
Cercocarpus montanus												
02	**1240**	80	420	780	40	40	15	50	3	-	0	50/36
05	**1340**	60	260	760	320	20	22	66	24	22	22	46/31
Chrysothamnus depressus												
02	**120**	-	-	120	-	-	33	0	-	-	0	3/8
05	**80**	-	-	80	-	-	75	0	-	-	0	3/6
Chrysothamnus viscidiflorus viscidiflorus												
02	**2160**	-	260	1760	140	-	.92	0	6	2	2	11/11
05	**1900**	-	440	1460	-	-	3	0	0	-	0	11/13
Gutierrezia sarothrae												
02	**240**	-	40	160	40	-	0	0	17	-	0	4/6
05	**340**	-	140	200	-	-	0	6	0	-	0	5/8
Mahonia repens												
02	**120**	-	-	120	-	-	0	0	-	-	0	-/-
05	**60**	-	20	40	-	-	0	33	-	-	0	3/7
Purshia tridentata												
02	**320**	-	40	240	40	-	6	81	13	-	0	12/25
05	**300**	-	-	180	120	-	0	73	40	7	7	15/22

		Age class distribution (plants per acre)					Utilization					
Year	Plants per Acre (excluding seedlings)	Seedling	Young	Mature	Decadent	Dead	% moderate	% heavy	% decadent	% dying	% poor vigor	Average Height Crown (in)
Quercus gambelii												
02	**100**	-	80	20	-	-	0	0	-	-	0	17/7
05	**100**	-	100	-	-	-	0	0	-	-	0	5/4
Symphoricarpos oreophilus												
02	**4640**	-	1140	3400	100	20	3	0	2	1	1	15/25
05	**6060**	100	1040	4980	40	-	9	.33	1	-	0	14/19
Tetradymia canescens												
02	**720**	-	120	540	60	-	6	11	8	-	0	4/5
05	**740**	-	160	580	-	-	43	35	0	-	0	5/6

Trend Study 10R-34-05

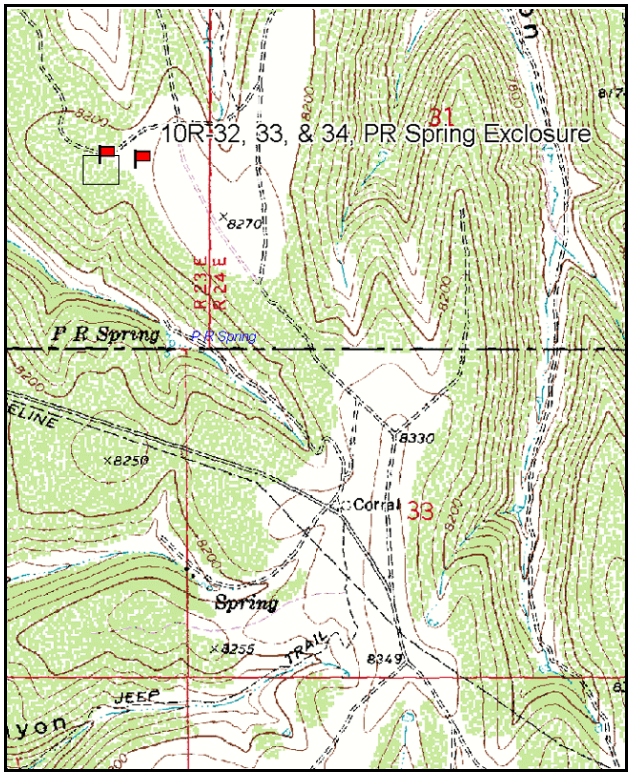
Study site name: P R Spring Exclosure Outside Vegetation type: Mountain Brush

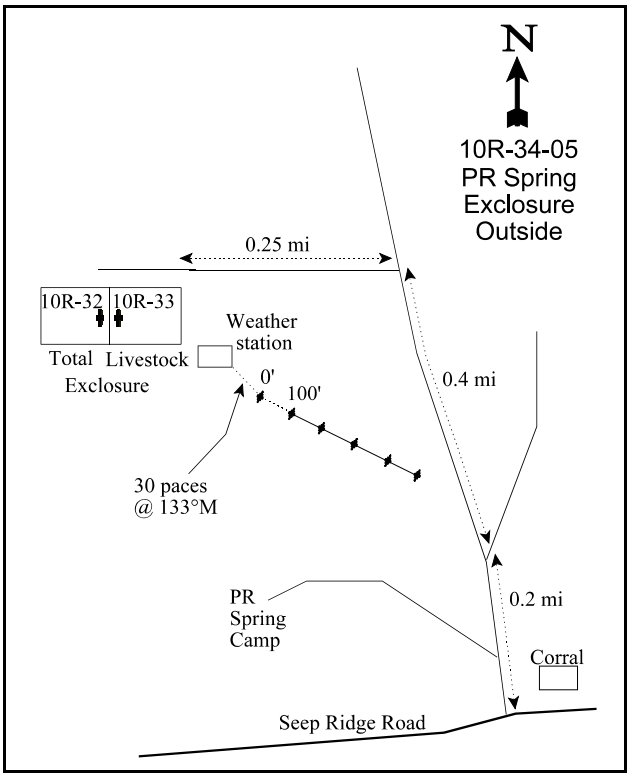
Compass bearing: frequency baseline__degrees magnetic.

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

LOCATION DESCRIPTION

On the Seep Ridge Road go to the PR Spring turnoff. Travel 0.2 miles staying right (do not go down road to PR Spring and campground). Continue left 0.4 miles. Turn left once again and travel approximately 0.25 miles to a weather station then the exclosure. From the southeast corner of the weather station the 0-foot stake is 150 feet at 133 degrees magnetic. The 0-foot stake is marked by browse tag number 424.





Map Name: P R Spring Diagrammatic Sketch

Township 15S, Range 23E, Section 36 GPS: NAD 27, UTM 12S 4369889 N 647559 E

DISCUSSION

PR Spring Exclosure Outside - Study No. 10R-34

This transect samples the mountain brush community outside of and surrounding the exclosure complex at PR Spring. This site slopes gently (5-10%) to the southwest at an elevation of about 8,200 feet. This site is accessible by all classes of animals as it lies outside the exclosure. Because this transect lies outside of the exclosure complex, it is a full 500 feet in length. In 2002, big game use was moderate while livestock use was light. A pellet group transect estimate was 31 elk days use/acre (78 edu/ha), 73 deer days use/acre (180 ddu/ha), and 14 cow days use/acre (34 cdu/ha). In 2005, pellet group data reflected less utilization with 7 elk days use/acre (17 edu/ha), 23 deer days use/acre (56 ddu/ha), and 10 cow days use/acre (25 cdu/ha).

Soils are clay loam in texture and neutral in reactivity (pH of 6.7). Effective rooting depth along the baseline averaged nearly 13 inches. The soil profile is rocky throughout. The soil surface outside the exclosure has moderately high pedestaling around shrubs leaving the interspaces with a pitted appearance. There are many game and livestock trails transecting the site. This is where most of the bare ground is found. Vegetation and litter cover are abundant and erosion appears to be minimized, except along the trails. The erosion condition class bordered on being stable and slight in 2002 and was slight in 2005. It was noted in 2005 that slight erosion was occurring where trails had been created.

The key browse component outside the exclosure complex contains the same species as those within both the total and livestock exclosures, but dominance levels of these species differ. These difference are not due to the effects of excluding grazing, but rather placement of the study site and exclosure. Mountain big sagebrush remains abundant, but bitterbrush is more abundant outside the exclosure while serviceberry and true mountain mahogany are minor components. Mountain big sagebrush and bitterbrush provided more than 72% of the browse cover in 2002 and 2005. Sagebrush density was estimated at 4,180 plants/acre in 2002 and 3,940 plants/acre in 2005. Decadence increased from 32% to 38%, while plants classified as dying rose from 8% to 22%. Sagebrush cover has been very high with an estimated 26% in 2002 and 24% in 2005, using the line intercept method. Annual leader growth increased from 0.8 inches to 2.0 inches in 2005. Bitterbrush density remained stable from 2002 to 2005 with an estimated 1,840 plants/acre in 2002 and 1,820 plants/acre in 2005. Bitterbrush has been heavily utilized, but had good recruitment by young plants (22% in 2002), low decadence, and normal vigor. Serviceberry density was estimated at 1,220 plants/acre in both 2002 and 2005. Utilization was light to moderate, vigor good, recruitment very high, and decadence low. Annual leader growth improved from 1.1 inches to 2.5 inches in 2005. Mahogany density was estimated at 480 plants/acre in both 2002 and 2005 with high recruitment in 2002 (46%), mostly good vigor, and moderate to heavy use. Annual leader growth for these key species was low in 2002 averaging about one inch outside the exclosure. Snowberry is also abundant outside the exclosure with an estimated 3,340 plants/acre in 2002.

As with the total and livestock exclosure transects, the understory outside has fair diversity and good composition. Three perennial grasses are particularly abundant outside the exclosure, *Carex*, mutton bluegrass, and Kentucky bluegrass. Thickspike wheatgrass is also moderately abundant. The majority of the grass plants occur underneath shrub crowns, which did not appear to have been utilized at the time of sampling in June 2002 and 2005. Forbs are diverse and well distributed throughout the site. The most abundant species include mat penstemon, longleaf phlox, rose pussytoes, Eaton fleabane, silvery lupine, and weedy milkvetch. As this is summer range for wildlife, forbs are of particular importance. With the abundance of browse throughout this area, the understory could be greatly improved with a prescribed burn or other treatment to decrease the canopy and density of shrubs and favor an increase in herbaceous plants.

2002 APPARENT TREND ASSESSMENT

Soils are well protected by vegetation and litter cover on the site, except for the areas impacted by nearby game and livestock trails. Erosion is apparent on the trails transecting the site but the condition class was determined as stable to slight overall. The browse component outside the exclosure is abundant and diverse, but currently but the proportion of mountain big sagebrush is too high. Although palatable, mountain big sagebrush is less preferred in the summer than bitterbrush, serviceberry, and mahogany, and a treatment to reduce the amount of sagebrush should be considered. Prescribed burning is a good option because most of the highly preferred browse species will resprout after fire, while most of the mountain big sagebrush would be removed. Because the herbaceous component is diverse and moderately abundant, there is an adequate seed-bank and the herbaceous understory would be greatly improved following treatment. Both the browse and herbaceous components appear stable at this time. Further increases in shrub densities and canopy cover would be negative for the herbaceous understory. The DCI score is good. It is slightly lower than the other two exclosure sites due to slightly higher decadence and lower numbers of young shrubs.

winter range condition (DC Index) - good (82) Higher potential scale

2005 TREND ASSESSMENT

The soil trend is stable. Percent bare ground remained stable at about 14%. Erosion may be slight with pedestaling occurring and erosion on livestock/game trails. The browse trend is stable. Density and cover has remained stable for the key species: mountain big sagebrush, bitterbrush, serviceberry, true mountain mahogany, and snowberry. Sagebrush is more abundant than would be desired for this high elevation site. The herbaceous understory is also stable. Perennial grasses declined very slightly, while perennial forbs increased very slightly. Thickspike wheatgrass increased significantly in nested frequency, while Kentucky bluegrass decreased significanlty. The DCI score remained good with a slight increase in browse decadence and decrease in browse recruitment.

TREND ASSESSMENT
soil - stable (0)
browse - stable (0)
herbaceous understory - stable (0)
winter range condition (DC Index) - good (78) Higher potential scale

HERBACEOUS TRENDS --
Management unit 10R, Study no: 34

Type	Species	Nested Frequency		Average Cover %	
		'02	'05	'02	'05
G	Agropyron cristatum	-	1	-	.00
G	Agropyron dasystachyum	a144	b205	1.09	2.59
G	Agropyron spicatum	4	7	.06	.21
G	Carex sp.	147	115	5.56	5.61
G	Festuca ovina	4	-	.00	-
G	Poa fendleriana	189	169	4.75	3.93
G	Poa pratensis	b178	a127	4.47	5.00
G	Poa secunda	10	2	.02	.03

Type	Species	Nested Frequency		Average Cover %	
		'02	'05	'02	'05
G	Stipa columbiana	3	9	.38	.07
G	Stipa comata	-	1	-	.03
Total for Annual Grasses		0	0	0	0
Total for Perennial Grasses		679	636	16.36	17.50
Total for Grasses		679	636	16.36	17.50
F	Agoseris glauca	28	25	.11	.31
F	Alyssum alyssoides (a)	9	-	.02	-
F	Antennaria rosea	a26	b37	.93	1.54
F	Androsace septentrionalis (a)	a8	b43	.05	.17
F	Arenaria sp.	21	36	.25	.59
F	Astragalus miser	30	31	.49	.87
F	Astragalus utahensis	a13	b36	.06	.15
F	Castilleja flava	13	9	.05	.07
F	Cirsium sp.	2	4	.00	.06
F	Collinsia parviflora (a)	a-	b53	-	.11
F	Crepis acuminata	9	12	.05	.10
F	Delphinium nuttallianum	a-	b9	-	.02
F	Eriogonum alatum	-	3	-	.18
F	Erigeron eatonii	92	75	.65	.76
F	Eriogonum umbellatum	23	22	.13	.23
F	Hackelia patens	1	-	.03	-
F	Lepidium sp. (a)	a4	b12	.01	.03
F	Linum lewisii	1	-	.00	.00
F	Lomatium sp.	-	1	-	.00
F	Lupinus argenteus	43	52	.54	1.79
F	Microsteris gracilis (a)	7	4	.01	.00
F	Penstemon caespitosus	b129	a71	1.33	1.56
F	Phlox hoodii	2	-	.00	-
F	Phlox longifolia	129	144	.98	1.12
F	Polygonum douglasii (a)	a4	b73	.01	.30
F	Potentilla gracilis	2	-	.03	-
F	Senecio integerrimus	a6	b27	.03	1.07
F	Sphaeralcea coccinea	-	1	-	.00
F	Taraxacum officinale	a54	b106	.30	1.98
F	Tragopogon dubius	2	-	.00	-
F	Unknown forb-perennial	-	4	-	.01

Type	Species	Nested Frequency '02	Nested Frequency '05	Average Cover % '02	Average Cover % '05
F	Viola sp.	2	1	.03	.03
F	Zigadenus paniculatus	-	4	-	.00
Total for Annual Forbs		32	185	0.10	0.62
Total for Perennial Forbs		628	710	6.05	12.53
Total for Forbs		660	895	6.16	13.16

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

BROWSE TRENDS --
Management unit 10R, Study no: 34

Type	Species	Strip Frequency '02	Strip Frequency '05	Average Cover % '02	Average Cover % '05
B	Amelanchier utahensis	41	32	.39	.54
B	Artemisia tridentata vaseyana	91	87	22.69	21.13
B	Cercocarpus montanus	15	14	.76	.39
B	Chrysothamnus depressus	1	3	.00	.00
B	Chrysothamnus viscidiflorus viscidiflorus	35	15	.78	.67
B	Gutierrezia sarothrae	0	1	-	-
B	Purshia tridentata	63	54	2.77	2.87
B	Quercus gambelii	1	0	-	-
B	Sclerocactus sp.	0	0	-	.15
B	Symphoricarpos oreophilus	77	78	8.12	6.76
B	Tetradymia canescens	3	2	-	.01
Total for Browse		327	286	35.54	32.54

CANOPY COVER, LINE INTERCEPT --
Management unit 10R, Study no: 34

Species	Percent Cover	
	'02	'05
Amelanchier utahensis	1.08	.41
Artemisia tridentata vaseyana	26.10	24.14
Cercocarpus montanus	1.11	.91
Chrysothamnus viscidiflorus viscidiflorus	.63	.38
Purshia tridentata	5.00	3.15
Symphoricarpos oreophilus	8.53	7.65
Tetradymia canescens	.06	.05

KEY BROWSE ANNUAL LEADER GROWTH --
Management unit 10R, Study no: 34

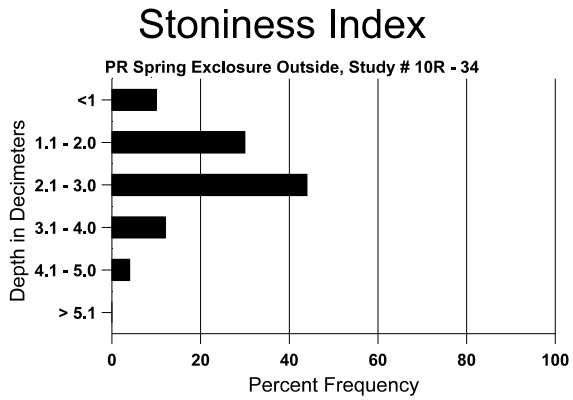
Species	Average leader growth (in)	
	'02	'05
Amelanchier utahensis	1.1	2.5
Artemisia tridentata vaseyana	0.8	2.0
Cercocarpus montanus	0.9	1.3
Purshia tridentata	-	1.4

BASIC COVER --
Management unit 10R, Study no: 34

Cover Type	Average Cover %	
	'02	'05
Vegetation	52.77	53.62
Rock	.16	1.01
Pavement	2.59	3.01
Litter	53.15	47.06
Cryptogams	.03	.10
Bare Ground	13.12	14.86

SOIL ANALYSIS DATA --
Herd Unit 10R, Study no: 34, PR Spring Outside Exclosure

Effective rooting depth (in)	Temp °F (depth)	pH	%sand	%silt	%clay	%0M	ppm P	ppm K	dS/m
12.9	-	6.8	35.3	32.7	32.0	3.6	14.9	291.2	0.8



PELLET GROUP DATA --
Management unit 10R, Study no: 34

Type	Quadrat Frequency	
	'02	'05
Rabbit	12	41
Grouse	1	-
Elk	24	17
Deer	19	18
Cattle	2	4

Days use per acre (ha)	
'02	'05
-	-
-	-
31 (78)	7 (17)
73 (180)	23 (56)
14 (34)	10 (25)

BROWSE CHARACTERISTICS --
Management unit 10R, Study no: 34

		Age class distribution (plants per acre)					Utilization					
Year	Plants per Acre (excluding seedlings)	Seedling	Young	Mature	Decadent	Dead	% moderate	% heavy	% decadent	% dying	% poor vigor	Average Height Crown (in)
Amelanchier utahensis												
02	**1220**	20	800	240	180	80	16	28	15	3	3	43/33
05	**1220**	20	540	600	80	180	11	34	7	3	3	27/21
Artemisia tridentata vaseyana												
02	**4180**	240	300	2560	1320	520	14	2	32	8	8	31/38
05	**3940**	40	260	2200	1480	560	17	3	38	22	22	30/38
Cercocarpus montanus												
02	**480**	20	220	220	40	-	33	38	8	8	8	49/36
05	**480**	-	40	320	120	-	17	71	25	17	21	45/43
Chrysothamnus depressus												
02	**40**	-	-	40	-	-	0	0	0	-	0	2/3
05	**80**	-	-	60	20	-	25	25	25	-	0	-/-

		Age class distribution (plants per acre)					Utilization					
Year	Plants per Acre (excluding seedlings)	Seedling	Young	Mature	Decadent	Dead	% moderate	% heavy	% decadent	% dying	% poor vigor	Average Height Crown (in)
Chrysothamnus viscidiflorus viscidiflorus												
02	**1300**	-	140	980	180	-	5	0	14	5	5	14/17
05	**580**	-	40	540	-	-	3	0	0	-	0	15/18
Gutierrezia sarothrae												
02	**0**	-	-	-	-	-	0	0	-	-	0	-/-
05	**20**	-	20	-	-	-	0	0	-	-	0	-/-
Purshia tridentata												
02	**1840**	-	400	1320	120	-	14	70	7	1	1	14/25
05	**1820**	-	40	1620	160	-	7	56	9	2	2	9/19
Quercus gambelii												
02	**20**	-	20	-	-	-	0	0	-	-	0	76/36
05	**0**	-	-	-	-	-	0	0	-	-	0	-/-
Symphoricarpos oreophilus												
02	**3340**	-	500	2780	60	80	5	8	2	1	1	16/25
05	**5200**	20	1520	3620	60	-	6	.76	1	1	1	15/22
Tetradymia canescens												
02	**60**	-	20	40	-	-	33	0	0	-	0	8/8
05	**40**	-	20	-	20	-	50	0	50	50	50	4/6

PR Spring Exclosure Complex - Summary

Because the exclosure complex was built only the year prior to the establishment of these transects, treatment effects could not be determined from the data in 2002 and no effects were noticeable in 2005. However, the data does provide a baseline for the vegetation community sampled by these studies. Future readings will allow monitoring of changes and comparisons between the treatments to be evaluated.

It is important to point out that the exclosure complex was not built in a totally homogeneous area. The total and livestock exclosures were placed in an area where several browse species are moderately abundant. This includes large, tree-like serviceberry plants that provide an abundance of overhead canopy cover. The transect that monitors the community outside of the exclosures is much more open where mountain big sagebrush is the dominant species. Due to the dimensions of the exclosure, the transects established inside the total and livestock exclosures are only 200 feet in length, while the transect outside is 500 feet long. Some of the difference in vegetation characteristics between these studies arises from differing transect lengths as well as the heterogeneity of the vegetation community.

Basic ground cover characteristics are similar between all of the transects. Vegetation and litter cover are abundant, especially the browse component. Relative bare ground ranges from 16% inside the livestock exclosure to only 3% within the total exclosure. Rock and pavement are low on all the treatments.

The browse component dominates the vegetation community on all transects. Inside the total exclosure, browse accounts for 74% of the total vegetation cover. Shrubs provide about 60% of the vegetation cover both inside the livestock exclosure and outside the exclosure complex. Herbaceous species, especially forbs, are somewhat limited on these studies. Grasses provide about 28%, 24%, and 11% of the vegetation cover in the total exclosure, livestock exclosure, and outside the exclosure complex respectively. Forbs provide 18% or less of the total cover on all sites.

SUMMARY

WILDLIFE MANAGEMENT UNIT - 10 BOOK CLIFFS

In 2005, 32 trend studies were monitored on the Book Cliffs. Of these, seven sites are located on the south of the Book Cliffs Divide and 25 are north of the divide. All of the studies south of the divide are lower elevation winter range sites. On the north end, 14 of the 25 studies monitored in 2005 are winter range sites. The other 11 studies are transitional or summer range sites.

Herbaceous trends

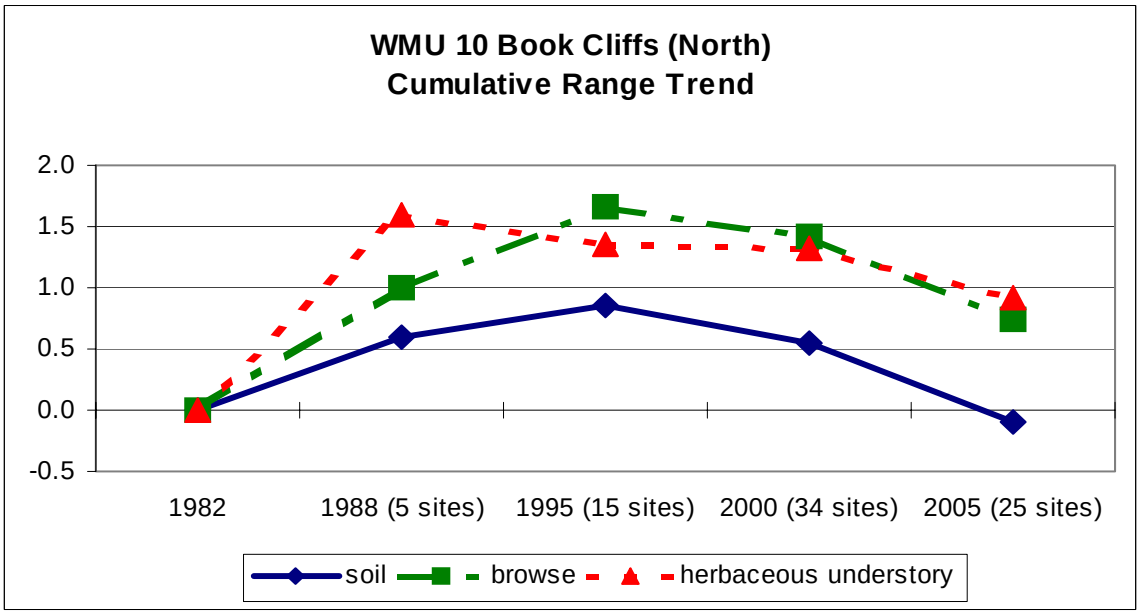
- All 15 studies under 7,000 feet have cheatgrass
- Only 2 studies over 7,000 feet have cheatgrass (Cherry Mesa and Saddle Horse)
- 69% of those with cheatgrass show a significant increase of cheatgrass nested frequency since 2000
- 58% of the sites show a substantial decline in the sum of nested frequency for perennial grasses and perennial forbs

Sagebrush trends

- 66% of the sagebrush sites had > 10% decline of sagebrush density since 2000
- 59% of sites show substantial increased percent decadence for sagebrush
- 62% of sites show more plants with poor vigor
- 52% have substantially fewer young plants than in 2000

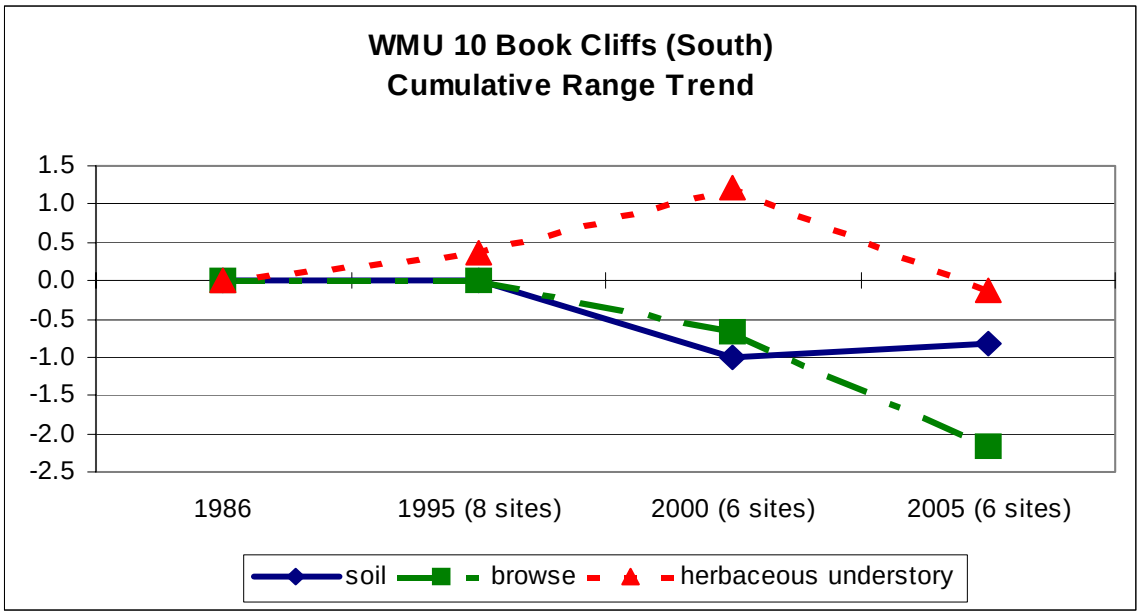
Cumulative Trends–WMU 10 Book Cliffs (North)

	1982	1988	1995	2000	2005
Soil	0.0	0.6	0.9	0.5	-0.1
Browse	0.0	1.0	1.7	1.4	0.7
Herbaceous	0.0	1.6	1.4	1.3	0.9



Cumulative Trends–WMU 10 Book Cliffs (South)

	1986	1995	2000	2005
Soil	0.0	0.0	-1.0	-0.8
Browse	0.0	0.0	-0.7	-2.2
Herbaceous	0.0	0.4	1.2	-0.1



TREND SUMMARY

	Category	1982	1988	1995	1997	2000	2005
10-1 Indian Ridge	soil	est	0	0	NR	0	-1
	browse	est	0	+2	NR	-1	-1
	herbaceous understory	est	+1	-2	NR	-1	+1
10-2 McCook Ridge Exclosure	soil	est	+1	+1	0	0	-1
	browse	est	+2	0	-1	0	-2
	herbaceous understory	est	+1	+2	0	+2	-1
10-3 McCook Ridge Chaining	soil	est	+1	0	NR	0	0
	browse	est	-1	+2	NR	-1	-1
	herbaceous understory	est	+2	+2	NR	-2	-1
10-4 Wirefence Point	soil	est	+1	0	0	-1	-1
	browse	est	+2	0	-1	0	0
	herbaceous understory	est	+2	0	0	-1	-2
10-5 Willow Flat	soil	est	0	0	NR	-1	0
	browse	est	+2	+2	NR	+1	0
	herbaceous understory	est	+2	0	NR	-1	-2
	Category		1988	1995	1997	2000	2005
10-6 Little Jim Canyon	soil		est	0	NR	0	NR
	browse		est	-1	NR	0	NR
	herbaceous understory		est	-2	NR	-1	NR
10-7 Cherry Mesa	soil		est	0	0	-1	0
	browse		est	+1	0	0	-2
	herbaceous understory		est	-1	0	-1	0
10-8 Black Horse	soil		est	+1	NR	0	0
	browse		est	+1	NR	0	0
	herbaceous understory		est	0	NR	0	0

(-2) = down, (-1) = slightly down, (0) = stable, (+1) = slightly up, (+2) = up, est = site established, NR = site not read

	Category	1988	1995	1997	2000	2005
10-9 Agency Draw	soil	est	+1	NR	0	-1
	browse	est	+1	NR	-1	-2
	herbaceous understory	est	+1	NR	0	+2
10-10 Sunday School	soil	est	0	NR	-2	-2
	browse	est	0	NR	0	-1
	herbaceous understory	est	-2	NR	+2	0
10-11 Park Ridge	soil	est	0	NR	-1	NR
	browse	est	0	NR	-1	NR
	herbaceous understory	est	-1	NR	0	NR
10-12 Wolf Den	soil	est	0	NR	-1	0
	browse	est	0	NR	0	0
	herbaceous understory	est	0	NR	+1	-1
10-13 Moon Ridge Burn	soil		est	+1	+2	NR
	browse		est	0	-2	NR
	herbaceous understory		est	0	-2	NR
	Category	1986	1995	1997	2000	2005
10-14 East Floy Bench	soil	est	0	NR	-1	0
	browse	est	0	NR	-1	0
	herbaceous understory	est	-2	NR	+2	-1
10-15 East Thompson Bench	soil	est	0	NR	-1	-1
	browse	est	+1	NR	-1	-2
	herbaceous understory	est	0	NR	0	-1
10-16 West Horse Pasture	soil	est	0	NR	-1	+1
	browse	est	0	NR	-1	-2
	herbaceous understory	est	+1	NR	+1	-2
10-17 East Calf Canyon	soil	est	0	NR	-1	0
	browse	est	+1	NR	0	-1
	herbaceous understory	est	0	NR	-1	-1

(-2) = down, (-1) = slightly down, (0) = stable, (+1) = slightly up, (+2) = up, est = site established, NR = site not read

	Category	1986	1995	1997	2000	2005
10-18 East Horse Pasture	soil	est	0	NR	-1	+1
	browse	est	+1	NR	0	-2
	herbaceous understory	est	+1	NR	+2	-1
10-19 Lower Cottonwood	soil	est	0	NR	NR	NR
	browse	est	-1	NR	NR	NR
	herbaceous understory	est	+1	NR	NR	NR
10-20 Upper Cottonwood	soil	est	0	NR	-1	NR
	browse	est	0	NR	-1	NR
	herbaceous understory	est	+1	NR	+1	NR
10-21 East Sulfur Bench	soil	est	0	NR	NR	NR
	browse	est	-2	NR	NR	NR
	herbaceous understory	est	+1	NR	NR	NR
10-22 Bryson Draw	soil	est	0	NR	NR	NR
	browse	est	+1	NR	NR	NR
	herbaceous understory	est	0	NR	NR	NR
10-23 Bogar-She	soil	est	0	NR	NR	NR
	browse	est	N/A	NR	NR	NR
	herbaceous understory	est	0	NR	NR	NR
10-24 Turner Canyon	soil	est	+2	NR	0	NR
	browse	est	0	NR	0	NR
	herbaceous understory	est	0	NR	-1	NR
10-25 Little Ridge	soil	est	0	NR	NR	NR
	browse	est	N/A	NR	NR	NR
	herbaceous understory	est	0	NR	NR	NR
10-26 Bitter Creek	soil				est	0
	browse				est	-2
	herbaceous understory				est	-2

(-2) = down, (-1) = slightly down, (0) = stable, (+1) = slightly up, (+2) = up, est = site established, NR = site not read

	Category	2005
10-27 Long Canyon	soil	est
	browse	est
	herbaceous understory	est

	Category	1997	2000	2005
10R-2 Lone Spring	soil	est	0	NR
	browse	est	+2	NR
	herbaceous understory	est	0	NR
10R-3 Burnt Timber	soil	est	0	NR
	browse	est	-2	NR
	herbaceous understory	est	0	NR
10R-4 Two Water WMA	soil	est	0	0
	browse	est	+1	0
	herbaceous understory	est	0	0
10R-5 Lower Tom Patterson Point	soil	est	0	0
	browse	est	-1	0
	herbaceous understory	est	0	0
10R-6 Sweet Water Canyon	soil	est	0	NR
	browse	est	0	NR
	herbaceous understory	est	0	NR
10R-7 Monument Ridge	soil	est	-1	-1
	browse	est	0	0
	herbaceous understory	est	-1	0
10R-8 Upper Tom Patterson Point	soil	est	-2	NR
	browse	est	-2	NR
	herbaceous understory	est	-2	NR

(-2) = down, (-1) = slightly down, (0) = stable, (+1) = slightly up,
(+2) = up, est = site established, NR = site not read

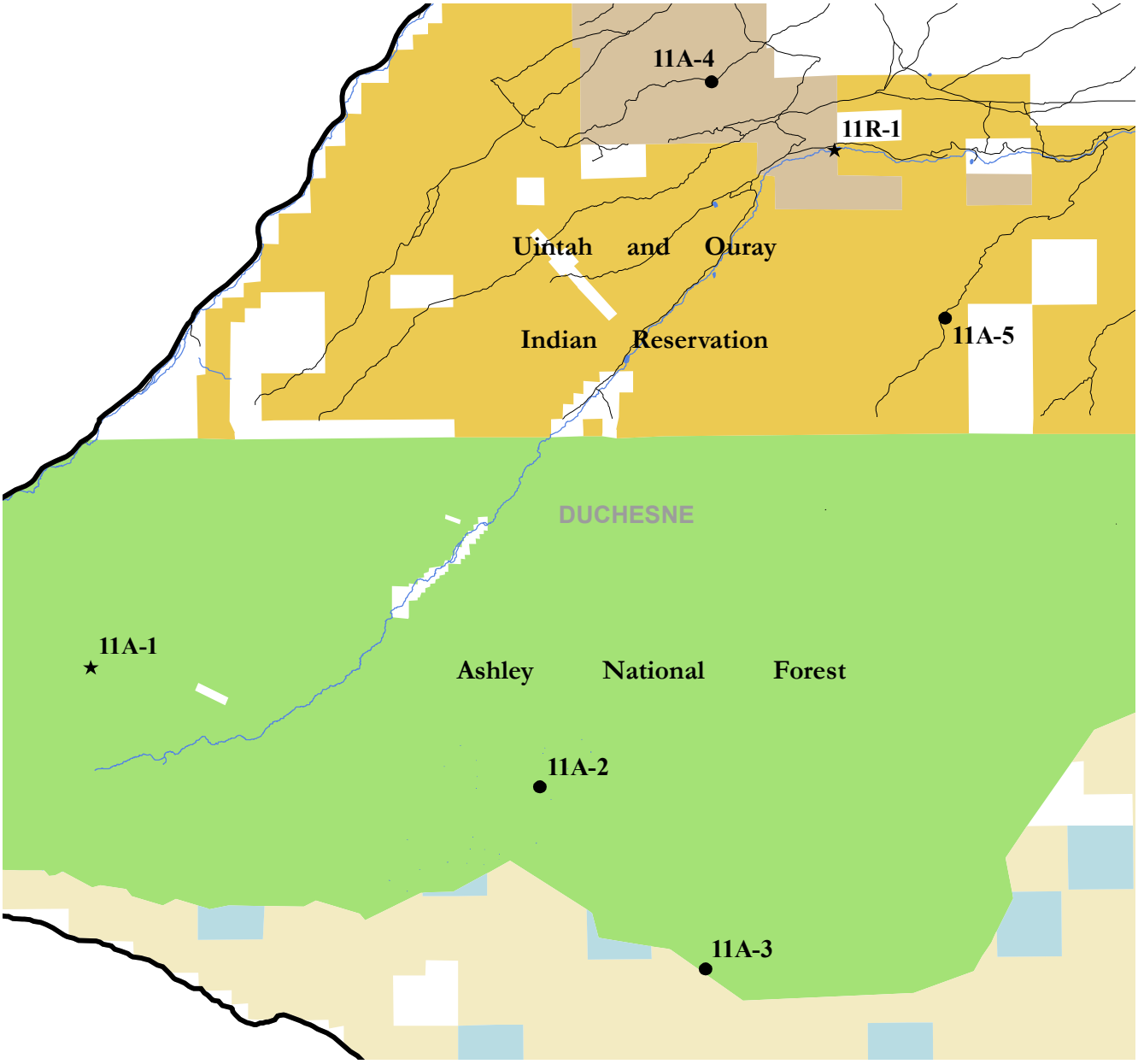
	Category	1997	2000	2005
10R-9 Winter Ridge Exclosure Out	soil	est	0	-1
	browse	est	-1	-2
	herbaceous understory	est	0	-1
10R-10 Winter Ridge Livestock Exclosure	soil	est	0	0
	browse	est	0	0
	herbaceous understory	est	-1	+1
10R-11 Winter Ridge Total Exclosure	soil	est	+1	-1
	browse	est	0	0
	herbaceous understory	est	0	0
10R-12 Horse Ridge	soil	est	0	-1
	browse	est	0	-1
	herbaceous understory	est	-1	0
10R-13 McCook Ridge Livestock Exclosure	soil	est	0	-1
	browse	est	0	-1
	herbaceous understory	est	+2	0
10R-14 McCook Ridge Total Exclosure	soil	est	0	-2
	browse	est	0	-2
	herbaceous understory	est	+2	-2
	Category	1998	2000	2005
10R-15 Saddle Horse	soil	est	0	-1
	browse	est	0	0
	herbaceous understory	est	-2	-2
10R-17 Railroad Canyon	soil	est	-2	NR
	browse	est	-2	NR
	herbaceous understory	est	+1	NR
10R-19 Lower South Canyon	soil	est	0	NR
	browse	est	0	NR
	herbaceous understory	est	0	NR

(-2) = down, (-1) = slightly down, (0) = stable, (+1) = slightly up,
(+2) = up, est = site established, NR = site not read

	Category	1998	2000	2005
10R-20 Dick Canyon	soil	est	0	NR
	browse	est	+1	NR
	herbaceous understory	est	+1	NR
10R-22 Rathole Ridge	soil	est	-1	0
	browse	est	+1	0
	herbaceous understory	est	+1	0
10R-23 South Rathole	soil	est	0	NR
	browse	est	0	NR
	herbaceous understory	est	+1	NR
10R-24 Upper Tent Canyon	soil	est	0	NR
	browse	est	0	NR
	herbaceous understory	est	+1	NR
	Category	1999	2000	2005
10R-28 Indian Ridge #2	soil	est	NR	NR
	browse	est	NR	NR
	herbaceous understory	est	NR	NR
10R-29 Massey Junction	soil	est	NR	-2
	browse	est	NR	-1
	herbaceous understory	est	NR	-2
	Category		2002	2005
10R-32 PR Spring Total Exclosure	soil		est	0
	browse		est	-1
	herbaceous understory		est	0
10R-33 PR Spring Livestock Exclosure	soil		est	0
	browse		est	0
	herbaceous understory		est	0
10R-34 PR Spring Exclosure Outside	soil		est	0
	browse		est	0
	herbaceous understory		est	0

(-2) = down, (-1) = slightly down, (0) = stable, (+1) = slightly up, (+2) = up, est = site established, NR = site not read

Management Unit 11A

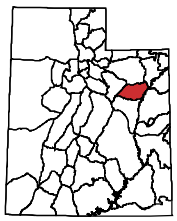


Map Scale 1:160,000 (1 inch = 2.5 miles)

N

- Transect location
- Suspended site
- Forest Service
- BLM
- State of Utah
- Native American
- Private
- State Wildlife Reserve
- Water body
- River or stream
- Road

Unit Location



MANAGEMENT UNIT 11A - NINE MILE /ANTHRO

Boundary Description

Duchesne and Uintah counties - Boundary begins at Duchesne and Highway US-191; then southwest on US-191 to the Argyle Canyon Road; southeast on this road to the Nine Mile Canyon Road; east along this road, to it's end near Bulls Canyon; south from the end of the road to Nine Mile Creek; east along this creek to the Green River; north along this river to the Duchesne River; northwest along this river to Highway US-40; west on US-40 to Duchesne and beginning point (excludes all Ute Indian Tribal lands within this boundary).

Management Unit Description

The 1997 Utah Big Game Annual Report identifies 639,228 acres of land within management unit 11A. The Bureau of Land Management is responsible for 43% of the land area, U.S. Forest Service lands are 16%, State of Utah lands are 5%, Indian lands are 14%, and private lands are 21% (Evans et al. 1997). There is a long and gradual northerly slope to the Anthro Mountain terrain, which lends itself to an abundance of winter range. The long slopes are covered by pinyon-juniper woodland with natural openings of sagebrush. Grassy openings are often found in the drainages. Some ridge tops are covered with black sagebrush. Summer range is limited with most of the high country being comprised of open sagebrush slopes and scattered patches of aspen. Most of the winter range in the unit is available even in severe winters. The upper limits for winter range are generally considered between 8,000 and 8,500 feet. The desert country below 4,000 feet is seldom used by migrating deer.

Livestock Grazing

Cattle grazing is the major activity occurring on Forest Service managed lands within management unit 11A. Oil and gas exploration and drilling with their associated roads and year-round activity are the prominent activities taking place on the lower ends of the ridges. These lands are administered by the BLM and Ute Indians. Firewood cutting is also an important use on the Ute Indian lands.

Information on the current livestock grazing program was provided by the Ashley National Forest. The Cottonwood allotment, where study 11A-1 is located, is a 2-unit deferred rotation system with 326 head of cattle from June 16 to October 15. Prior to 1981, the allotment was generally grazed season long. Study 11A-2 is in the Anthro Mountain allotment and is grazed by 481 head of cattle under a 7- unit rest-rotation system from June 1 to October 15. The Antelope Winter allotment, where study 11A-3 is located, is a 3-unit deferred rotation system with 200 head of cattle grazing the allotment from December 1 to March 23.

Big Game Management Objectives

A small, but increasing number of elk constitute the Anthro herd. It has been hunted under a bull only permit system since 1978, but was separated from the larger Avintaquin-White River herd unit in 1983. The elk herd is managed as a limited entry hunting area with an emphasis on quality hunting by maintaining low hunter numbers and a high percentage of mature bulls in the population. The high for bull permits came in 1990 with 22 permits allowed. In 1991 through 1994 13-15 permits were allowed, only 9 in 1995, 11 in 1996 and 1997, 13 in 1998 and 1999, 12 in 2000, and 10 in 2005. Hunter success is usually high. Elk herd management objectives, as of 2001, call for a target winter herd size of 1700 animals shared between the units 11A and 11B with a minimum post season bull to cow ratio of 8:100, with at least 4 bulls being 2 ½ years of age or older.

Deer numbers on the Anthro Mountain unit continue to be relatively low. Buck harvest averaged 161/year from 1979 to 1983 and then doubled to an average annual harvest of 387 bucks from 1984 to 1988. From

1989 to 1991, buck harvest numbers steadily declined from a high of 579 in 1988 to 237 in 1991. From 1991 to 1996, the buck harvest numbers remained fairly constant with an average of 183/year. Success has remained fairly constant over all years at around 33% (Evans et al. 1997). In 2001, the deer herd unit 11 plan objectives (which include both 11A and 11B) are for a winter population of 8,500 with a buck to doe ratio of 15:100, with at least 30% of the bucks with 2 points or larger (DeBloois et al. 2001).

Unfortunately, the pellet transects are no longer maintained so deer days use per hectare estimates for key areas are unavailable. Because of these changes in big-game management data gathering activities, pellet-group transect data has been incorporated into each of our transect monitoring activities since 1997.

Pronghorn are also present within the study area. They have been observed on Myton Bench and on the pinyon-juniper and sagebrush ridges of Lower Cottonwood and Antelope Canyons. Buck hunting was first permitted in 1978. In 1997, 20 bucks were harvested, 42 in 1998, 50 in 1999, and 46 in 2000 (DeBloois et al. 2001).

Study Site Description

The Upper Cottonwood Ridge (11A-1) study samples an aspen type at 9,200 feet, while the Wirefence Canyon (11A-2) and Chokecherry Canyon (11A-3) studies are located in the sagebrush/grass type. These studies were established in late September of 1982, then re-read in late July 1988. Two additional studies were established in early August 1988, which sample representative winter range for the area. The Cottonwood Canyon (11A-4) study is on DWR land, while the Nutters Canyon (11A-5) study is apparently on the Uintah and Ouray Indian Reservation (it was originally thought to be on BLM). They are both located in naturally open sagebrush valleys surrounded by pinyon-juniper woodland. All sites were reread in 1995, 2000, and 2005 with the exception of study number 11A-1 which was not read in 2000 or 2005.

Trend Study 11A-2-05

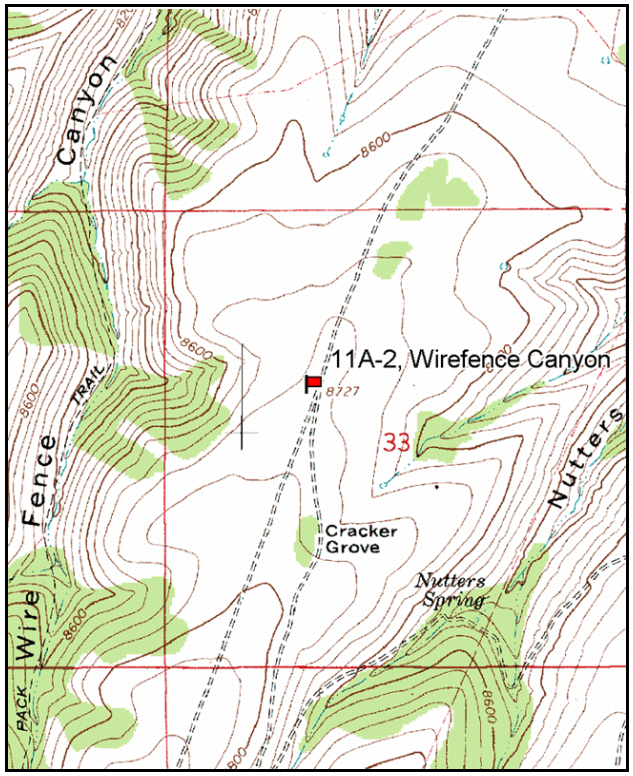
Study site name: Wirefence Canyon . Vegetation type: Mountain big sagebrush-.

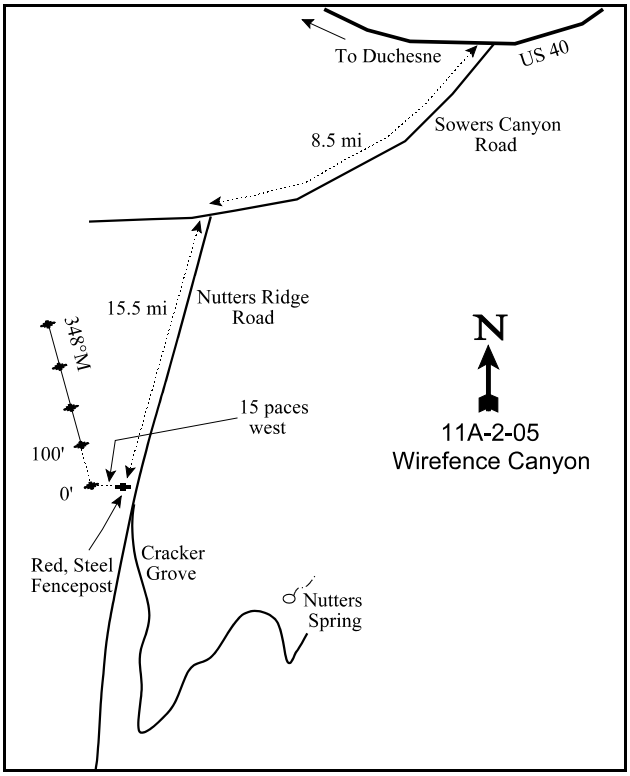
Compass bearing: frequency baseline 348 degrees magnetic.

Frequency belt placement: line 1 (16 & 86ft), line 2 (33ft), line 3 (52ft), line 4 (66ft). Belt 3 and belt 5 rebar @ 2ft.

LOCATION DESCRIPTION

From the junction of Highway U.S. 40 and the Sowers Canyon Road (near Bridgeland), drive south on the Sowers Canyon Road for 8.5 miles to the Nutters Ridge Road. Turn left here by an old ranch and proceed south along Nutters Ridge for 15.5 miles to a narrow "Y" in the road. Six paces west of the fork is a red steel fencepost. The 0-foot baseline stake is 15 paces west of the red fencepost. The baseline is marked by green, 12-18 inch tall fenceposts.





Map Name: Dyer Mountain

Diagrammatic Sketch

Township 6S , Range 5W , Section 33

GPS: NAD 27, UTM 12S 4418574 N, 546524 E

DISCUSSION

Wirefence Canyon - Trend Study No. 11A-2

The Wirefence Canyon trend study is located on summer range within a large sagebrush-grass park occupying a flat ridge between the uppermost reaches of Wirefence and Nutters Canyons. The elevation is 8,700 feet with a 3% slope and west aspect. This study is located immediately adjacent to an old permanent line-intercept study established in 1977 and is intended to replace it. After decades of season-long grazing by cattle and sheep from 1915 to 1944, a summer rest-rotation grazing system was established in 1972. This study is within the Anthro Mountain allotment and is now grazed by 481 head of cattle from June 1 to October 15 as a 7-unit rest-rotation system. Escape or thermal cover is lacking and the nearest cover is ½ mile away in Nutters Canyon or within an isolated, but badly depleted, aspen grove (Cracker Grove) approximately the same distance to the southeast. Use by wildlife was light in 2000 with 18 elk days use/acre (44 edu/ha) and 1 deer day use/acre (3 ddu/ha), according to estimates from pellet group transect data. Livestock use was moderate in 2000 with 52 cow days use/acre (128 cdu/ha). In 2005, use was higher for deer, but lower for elk and cattle. Pellet group data in 2005 was estimated at 7 elk, 34 deer, and 41 cow days use/acre (17 edu/ha, 84 ddu/ha, and 102 cdu/ha). All elk and deer pellets were from the current season. Also in 2005, 35 grouse pellet groups/acre were estimated.

Supplemental site information provided by the Ashley National Forest indicate that numerous treatments have been done on the Anthro Mountain allotment, including plowing and seeding on this particular study site (a 2,363 acre treatment) in 1958 and 1959. These old treatments have future plans for maintenance, which include burning and/or spraying, but have not occurred as of 2005.

Soil is a moderately shallow loam with an estimated effective rooting depth of less than 12 inches. Soils are neutral in reactivity (pH of 7.2). Phosphorus is low at 5.1 ppm, values less than 6 ppm may limit normal plant growth and development in wildland soils (Tiedemann and Lopez 2004). A hardpan is present about 6 inches below the soil surface. Due to the nearly level terrain, erosion has not been severe. Relative vegetation cover was estimated at 33% in 1995, then increased to 36% in 2000 and 2005. Earlier estimates were considerably lower as only basal vegetation cover was estimated prior to 1995. Relative cover from rock and pavement combined were estimated at 6% in 1995 and 2000, and 9% in 2005. Litter cover has decreased through time. Relative litter cover was estimated at 32% in 1995, 30% in 2000, and 21% in 2005. Percent bare ground has slowly increased from 29% in 1995 to 28% in 2000, to 35% in 2005. The erosion index measurement in 2005 rated the soil erosion as slight, mainly because of small pedestals surrounding shrubs and perennial grasses, minor surface rock and litter movement, small rills, as well as minor gullies and flow patterns between perennial species.

Mountain big sagebrush is the dominant overstory species. It has historically had light to moderate use and mostly good vigor. However in 2000, sagebrush displayed a dramatic increase in plants showing poor vigor (4% in 1995 to 41% in 2000) and showed a moderate increase in percent decadency (6% in 1995 to 19% in 2000). Many of the mature and decadent individuals in the population also displayed a chlorotic appearance. Therefore, they were classified as having poor vigor. In 2005, plants with poor vigor decreased to 13%, but the percentage of decadent individuals increased again to 31%. The drought in 2000 would be considered the major cause of this increase in poor vigor, which decreased somewhat after better precipitation in 2004. In 2000, the sagebrush population was composed of mostly mature individuals (70%) with a moderate level of young plant recruitment (11%) into the population. In 2005, the population had declined from 3,380 plants/acre in 2000 to 2,680. This decline was likely due to the mature age of the population and low percentage of young individuals. In 2005, the young individuals only constituted 14% of the population and plants classified as dying made up 13%. This small difference between young recruitment and dying plants may not successfully sustain the population. Average leader growth on sagebrush in 2000 was 3 inches and decreased to 1.6 inches in 2005. Mountain big sagebrush provided about 70% of the total browse cover in both 1995 and 2000, but had decreased to 51% in 2005.

Mountain low rabbitbrush density has remained relatively constant over all years with a mostly mature age structure. Mountain low rabbitbrush accounted for 28% of the total browse cover in 1995 and 2000, and 32% in 2005. Rabbitbrush density was estimated to be 4,4880 plants/acre in 1995, 3,920 in 2000, and 4,740 in 2005. Other browse includes: broom snakeweed, gray horsebrush, snowberry, and fringed sagebrush.

The understory is the key component on this summer range and it made up 69% of the total vegetation cover in 1995, 78% in 2000, and only 48% in 2005. Smooth brome is the dominant species; it has been sampled in every quadrat during all sampling periods and has remained at a fairly stable nested frequency. Smooth brome is more palatable when it is young and loses palatability with age, although fall green up does provide some forage later in the year (Stubbendieck et al 1992). Mutton bluegrass is the second most abundant grass. Other species include: sheep fescue, Sandberg bluegrass, Prairie junegrass, crested wheatgrass, intermediate wheatgrass, and bluebunch wheatgrass. There was no noticeable use on grasses in 2000 or 2005. No annual grasses have been sampled in any year. Perennial forbs are diverse, but the sum of nested frequency decreased in 2000 due to drought, then recovered somewhat in 2005. Looseflower milkvetch is the most abundant forb, which has provided between 4-7% average cover. Perennial forbs are diverse with 18 species identified in 1995, 11 in 2000, and 16 in 2005. Annual forbs are present, but occur infrequently.

1988 TREND ASSESSMENT

Ground cover percentages remained about the same between 1982 and 1988. The estimate for litter cover (51%) is good, especially considering the grazing pressure this site received in 1988 due to its close proximity to water and a salt lick. Percent cover for bare ground remains at 24%. Current observations indicate that the soil condition and trends have stabilized. Trend for browse is stable. Mountain big sagebrush remains at a stable density, displays a low percent decadency, and has a high rate of recruitment from young plants (46%). Trend for the herbaceous understory appears stable. Twenty-three perennial grass and forb species were sampled in 1988 making it an important component of this vegetation community.

TREND ASSESSMENT
soil - stable (0)
browse - stable (0)
herbaceous understory - stable (0)

1995 TREND ASSESSMENT

The bare interspaces between mountain big sagebrush individuals show some signs of erosion, but this is only slight. The level terrain helps keep the soil in place along with the vegetation and litter cover. Therefore, soil trend is considered stable. The mountain big sagebrush population is stable with moderate utilization and a low decadency rate. The broom snakeweed and mountain low rabbitbrush populations also appear stable with a mature age structure. The mature plants continue to increase in size. Browse trend is stable at this time. The herbaceous understory accounts for 69% of the total vegetation cover. The dominant species is smooth brome, which comprises 27% of the total vegetation cover. The sum of nested frequency for perennial forbs has increased slightly. Many of the forb species are not sought after by wildlife or livestock. Although sum of nested frequency has increased for forbs, a different composition may be desired. Herbaceous understory trend is slightly up.

TREND ASSESSMENT
soil - stable (0)
browse - stable (0)
herbaceous understory - slightly upward (+1)
winter range condition (DC Index) - not applicable, summer range

2000 TREND ASSESSMENT

Trend for soil is stable. Erosion appears minimal at the present time and the ratio of protective ground cover to bare ground remained at nearly the same level as in 1995. Trend for browse is down as the number of mountain big sagebrush with poor vigor sharply increased (4% to 41%). Sagebrush density has also decreased 17% since 1995 (4,080 to 3,380 plants/acre). There was also a moderate increase in those classified as decadent (6% to 19%) since 1995. Recruitment from young plants also decreased from 42% to 11%. Increases in poor vigor and decadency are due to the extremely dry conditions in 2000 and could improve with normal precipitation patterns. Trend for the herbaceous understory is down. The sum of nested frequencies for perennial grasses remained the same, but perennial forbs decreased 23%. The sum of nested frequency for perennial forbs decreased by almost 50%, which is most likely caused by the excessively dry conditions of 2000. Forbs should increase on this summer range with normal precipitation.

TREND ASSESSMENT
soil - stable (0)
browse - down (-2)
herbaceous understory - down (-2)
winter range condition (DC Index) - not applicable, summer range

2005 TREND ASSESSMENT

The trend for soil is stable. The ratio of protective ground cover (vegetation, litter and cryptogams) to bare ground has remained relatively unchanged from 2000 to 2005. The trend for browse is down. The key browse, mountain big sagebrush, population decreased by 21% from 3,380 in 2000 to 2,680 plants/acre in 2005. The percentage of decadent individuals increased from 19% in 2000 to 31% in 2005. The individuals classified as dying increased from 4% to 13%. This decline in population and sagebrush health would mostly be attributed to the dry conditions experienced for many years.The percentage of young individuals is even with that of the dying individuals, therefore recruitment is very low. The herbaceous understory trend is up. The sum of grass and forb nested frequencies increased 23% from 2000 to 2005. Annual species only make up a small part of the community and there are no annual grass species on the site.

TREND ASSESSMENT
soil - stable (0)
browse - down (-2)
herbaceous understory - up (+2)
winter range condition (DC Index) - not applicable, summer range

HERBACEOUS TRENDS --
Management unit 11A, Study no: 2

Type	Species	Nested Frequency				Average Cover %		
		'88	'95	'00	'05	'95	'00	'05
G	Agropyron cristatum	a16	ab33	ab22	b39	.97	1.05	1.66
G	Agropyron dasystachyum	-	-	-	8	-	-	.09
G	Agropyron intermedium	b41	a3	a8	a-	.01	.16	-
G	Agropyron spicatum	a-	a-	b13	b14	-	.55	.78
G	Bromus inermis	330	337	334	340	9.80	16.74	14.69
G	Elymus salina	a34	b56	a4	b66	.68	.18	.77
G	Festuca ovina	a-	b45	c72	b37	.63	1.30	.43
G	Koeleria cristata	b52	b51	a27	b66	.73	.73	2.04
G	Poa fendleriana	c123	a66	bc120	ab83	1.52	2.95	2.32
G	Poa secunda	a-	b40	b39	b22	.60	.36	.45
Total for Annual Grasses		0	0	0	0	0	0	0
Total for Perennial Grasses		596	631	639	675	14.96	24.04	23.27
Total for Grasses		596	631	639	675	14.96	24.04	23.27
F	Agoseris glauca	-	2	-	-	.00	-	-
F	Allium sp.	-	3	-	2	.00	-	.01
F	Androsace septentrionalis (a)	-	b32	a7	a8	.06	.01	.07
F	Arabis drummondi	a4	b20	a1	ab9	.07	.00	.03
F	Astragalus argophyllus	a4	ab23	b33	ab12	.22	.46	.09
F	Astragalus convallarius	a4	ab12	a4	b17	.05	.03	.16
F	Astragalus detritalis	-	6	-	-	.03	-	-
F	Astragalus tenellus	ab132	a99	b167	ab132	4.39	6.58	4.72
F	Aster sp.	a-	b26	a-	a-	.70	-	-
F	Castilleja flava	b19	ab12	a5	a6	.14	.04	.09
F	Chaenactis douglasii	6	8	-	1	.16	-	.00
F	Cymopterus longipes	a-	d122	b33	c87	.77	.22	1.29
F	Descurainia pinnata (a)	-	3	-	2	.00	-	.00
F	Eriogonum alatum	-	-	-	-	.00	-	-
F	Erigeron eatonii	ab26	b30	a7	b42	.17	.06	.49
F	Eriogonum umbellatum	a15	b65	a26	ab46	1.56	.78	1.15
F	Gilia sp. (a)	-	-	-	2	-	-	.00
F	Hedysarum boreale	a-	c18	ab4	bc15	.25	.00	.22
F	Hymenoxys acaulis	-	1	-	3	.00	-	.03
F	Ipomopsis aggregata	8	-	1	2	-	.03	.00
F	Linum lewisii	ab2	a-	ab3	b8	.00	.01	.30
F	Lupinus argenteus	6	10	6	1	.16	.33	.00

Type	Species	Nested Frequency				Average Cover %		
		'88	'95	'00	'05	'95	'00	'05
F	Machaeranthera canescens	$_{a}$-	$_{b}$13	$_{ab}$1	$_{ab}$6	.27	.15	.19
F	Oxytropis lambertii	$_{b}$40	$_{a}$2	$_{a}$-	$_{a}$7	.01	-	.31
F	Penstemon caespitosus	$_{c}$48	$_{bc}$48	$_{a}$5	$_{ab}$23	.66	.09	.29
F	Penstemon comarrhenus	-	1	-	1	.15	-	.15
F	Physaria acutifolia	$_{a}$-	$_{b}$63	$_{a}$7	$_{a}$-	.23	.04	-
F	Phlox longifolia	11	21	9	18	.09	.04	.15
F	Physaria sp.	$_{c}$40	$_{a}$-	$_{a}$-	$_{b}$26	-	-	.33
F	Potentilla sp.	3	-	-	-	-	-	-
F	Schoencrambe linifolia	$_{ab}$5	$_{ab}$7	$_{a}$-	$_{b}$12	.02	-	.09
F	Senecio canus	$_{a}$-	$_{ab}$7	$_{ab}$2	$_{b}$14	.06	.00	.36
F	Thlaspi arvense (a)	-	1	-	-	.00	-	-
Total for Annual Forbs		0	36	7	12	0.07	0.01	0.08
Total for Perennial Forbs		373	619	314	490	10.24	8.93	10.51
Total for Forbs		373	655	321	502	10.32	8.94	10.60

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

BROWSE TRENDS --
Management unit 11A, Study no: 2

Type	Species	Strip Frequency			Average Cover %		
		'95	'00	'05	'95	'00	'05
B	Artemisia frigida	2	1	4	.00	-	.15
B	Artemisia tridentata vaseyana	80	70	49	8.18	6.43	4.41
B	Chrysothamnus viscidiflorus lanceolatus	80	68	83	3.20	2.56	2.71
B	Gutierrezia sarothrae	33	23	45	.04	.27	1.04
B	Symphoricarpos oreophilus	1	0	1	-	-	-
B	Tetradymia canescens	9	15	16	.15	.03	.24
Total for Browse		205	177	198	11.58	9.30	8.57

CANOPY COVER, LINE INTERCEPT --
Management unit 11A, Study no: 2

Species	Percent Cover '05
Artemisia frigida	.08
Artemisia tridentata vaseyana	4.66
Chrysothamnus viscidiflorus lanceolatus	4.11
Gutierrezia sarothrae	.06
Tetradymia canescens	.06

KEY BROWSE ANNUAL LEADER GROWTH --
Management unit 11A, Study no: 2

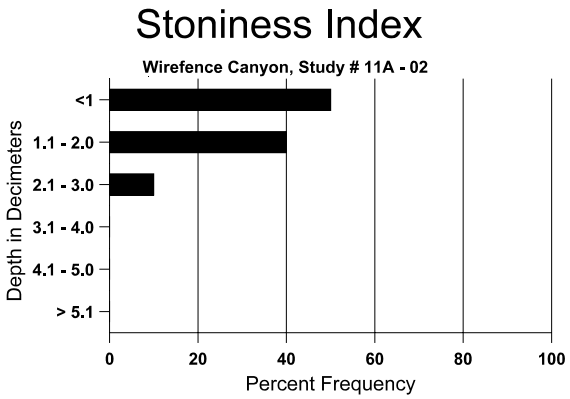
Species	Average leader growth (in) '05
Artemisia tridentata vaseyana	1.6

BASIC COVER --
Management unit 11A, Study no: 2

Cover Type	Average Cover %				
	'82	'88	'95	'00	'05
Vegetation	0	6.25	36.06	48.48	39.88
Rock	0	3.00	3.17	2.85	3.95
Pavement	0	15.50	3.07	5.52	5.61
Litter	0	51.25	34.34	40.47	23.03
Cryptogams	0	0	.15	.15	.04
Bare Ground	24.50	24.00	32.06	37.24	38.72

SOIL ANALYSIS DATA --
Herd Unit 11A, Study # 2, Study Name: Wirefince Canyon

Effective rooting depth (in)	Temp °F (depth)	pH	%sand	%silt	%clay	%0M	ppm P	ppm K	dS/m
11.7	53.6 (13.9)	7.2	43.4	33.0	23.56	4.4	5.1	96.0	0.8



PELLET GROUP DATA --
Management unit 11A, Study no: 2

Type	Quadrat Frequency		
	'95	'00	'05
Rabbit	6	10	41
Grouse	-	-	1
Elk	15	10	22
Deer	1	6	19
Cattle	1	12	12

Days use per acre (ha)	
'00	'05
-	-
-	35/ac
18 (45)	7 (17)
4 (10)	34 (84)
52 (129)	41 (102)

BROWSE CHARACTERISTICS --
Management unit 11A, Study no: 2

		Age class distribution (plants per acre)					Utilization					
Year	Plants per Acre (excluding seedlings)	Seedling	Young	Mature	Decadent	Dead	% moderate	% heavy	% decadent	% dying	% poor vigor	Average Height Crown (in)
Artemisia frigida												
82	**0**	-	-	-	-	-	0	0	-	-	0	-/-
88	**0**	-	-	-	-	-	0	0	-	-	0	-/-
95	**40**	20	-	40	-	-	50	0	-	-	0	4/10
00	**20**	-	-	20	-	-	0	0	-	-	0	3/4
05	**120**	-	-	120	-	-	0	0	-	-	0	12/10
Artemisia tridentata vaseyana												
82	**3132**	-	666	2466	-	-	2	0	0	-	4	15/18
88	**4333**	266	2000	2000	333	-	32	0	8	-	0	14/20
95	**4080**	120	1720	2120	240	160	41	9	6	2	4	14/26
00	**3380**	40	380	2360	640	180	49	4	19	4	41	13/25
05	**2680**	60	380	1460	840	620	43	11	31	13	13	10/20

		Age class distribution (plants per acre)					Utilization					
Year	Plants per Acre (excluding seedlings)	Seedling	Young	Mature	Decadent	Dead	% moderate	% heavy	% decadent	% dying	% poor vigor	Average Height Crown (in)
Chrysothamnus viscidiflorus lanceolatus												
82	**3932**	-	466	3466	-	-	3	0	0	-	0	8/13
88	**3798**	-	866	2866	66	-	4	0	2	-	0	5/4
95	**4880**	20	540	4340	-	-	0	0	0	-	0	8/11
00	**3920**	20	540	3320	60	20	0	0	2	-	0	7/9
05	**4740**	-	380	4280	80	-	8	0	2	.84	.84	7/10
Eriogonum microthecum												
82	**600**	-	-	600	-	-	0	0	-	-	0	2/4
88	**0**	-	-	-	-	-	0	0	-	-	0	-/-
95	**0**	-	-	-	-	-	0	0	-	-	0	-/-
00	**0**	-	-	-	-	-	0	0	-	-	0	-/-
05	**0**	-	-	-	-	-	0	0	-	-	0	-/-
Gutierrezia sarothrae												
82	**0**	-	-	-	-	-	0	0	0	-	0	-/-
88	**1733**	-	-	1733	-	-	0	0	0	-	0	4/4
95	**1580**	60	140	1440	-	40	0	0	0	-	0	7/8
00	**760**	-	-	720	40	20	0	0	5	5	5	4/5
05	**2440**	20	580	1860	-	20	0	0	0	-	0	5/6
Symphoricarpos oreophilus												
82	**0**	-	-	-	-	-	0	0	-	-	0	-/-
88	**0**	-	-	-	-	-	0	0	-	-	0	-/-
95	**20**	-	-	20	-	-	0	0	-	-	0	12/15
00	**0**	-	-	-	-	-	0	0	-	-	0	9/20
05	**20**	-	-	20	-	-	0	0	-	-	0	11/16
Tetradymia canescens												
82	**399**	-	333	66	-	-	83	0	0	-	0	10/11
88	**665**	-	333	66	266	-	0	0	40	-	0	9/12
95	**200**	-	60	140	-	-	30	0	0	-	0	7/10
00	**420**	-	60	360	-	-	10	10	0	-	0	6/9
05	**400**	-	-	400	-	-	50	10	0	-	0	7/11

Trend Study 11A-3-05

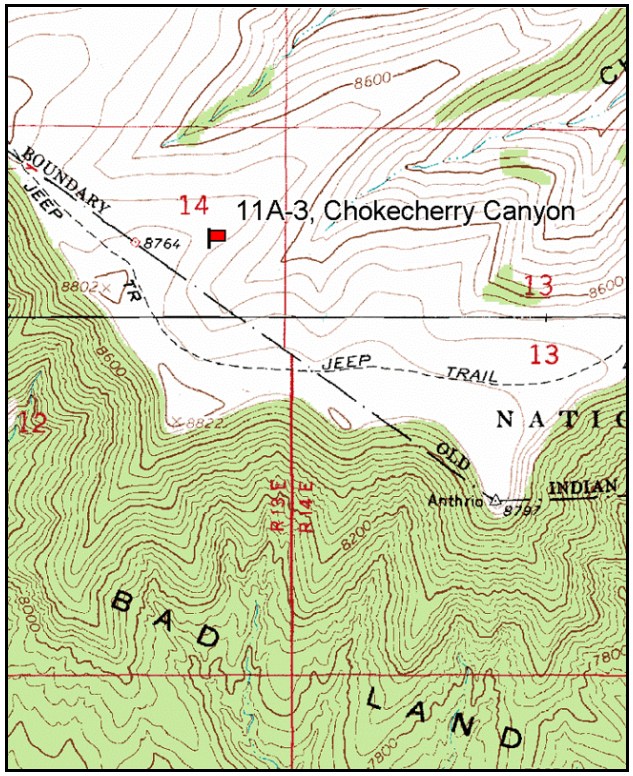
Study site name: Chokecherry Canyon . Vegetation type: Mountain big sagebrush .

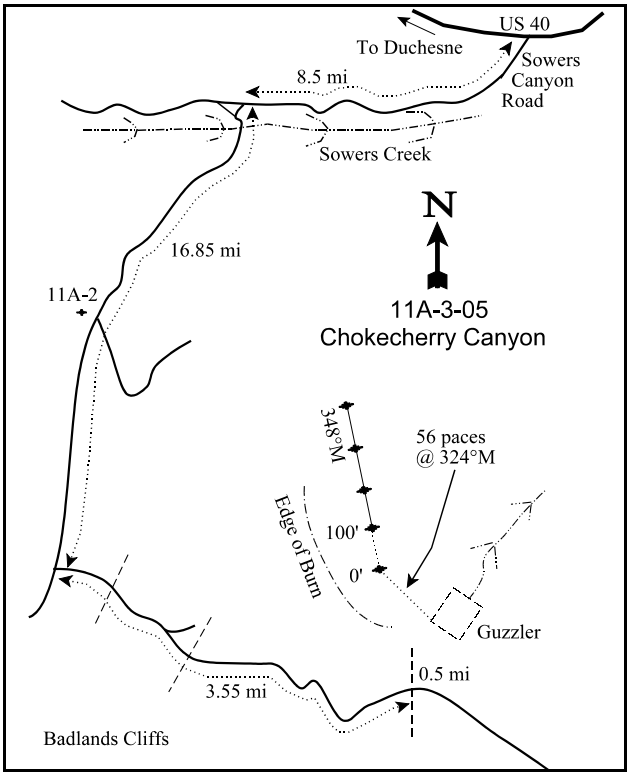
Compass bearing: frequency baseline 348 degrees magnetic.

Frequency belt placement: line 1 (6 & 95ft), line 2 (25ft), line 3 (46ft), line 4 (62ft).

LOCATION DESCRIPTION

From the junction of Highway U.S. 40 and the Sowers Canyon Road (near Bridgeland), proceed south on the Sowers Canyon Road for 8.5 miles to the Nutters Ridge road. Turn left and drive south 16.85 miles up Nutters Ridge to a “T" intersection above the Badland Cliffs. Turn left and go 3.55 miles along the edge to a fence. Continue 0.5 miles and stop. Walk north over the ridge to a large, fenced guzzler. From the southwest fence corner, the 0-foot baseline stake is located 56 paces away at a bearing of 324°. The baseline is marked by green steel fenceposts, 12-18 inches in height.





Map Name: Anthro Mountain

Diagrammatic Sketch

Township 7S , Range 5W , Section 14

GPS: NAD 27, UTM 12S 4414055 N, 550638 E

DISCUSSION

Chokecherry Canyon - Trend Study No. 11A-3

The Chokecherry Canyon trend study is located at the head of Chokecherry and Alkali Canyons and samples a prescribed burn treatment on a sagebrush/grass type. The burn was completed in 1977 and consumed approximately 500 acres. The burn was not seeded, however native species have readily reestablished on the burned area. The elevation is 8,700 feet. A wildlife guzzler is located adjacent to the site. The aspect is to the north with a gentle 10% slope. The Forest Service manages this land under the Antelope allotment and is grazed by 200 head of cattle from December 1 to March 23 on a 3-unit deferred rotation system. Wildlife use was estimated at 84 elk days use/acre (207 edu/ha) and 4 deer days use/acre (10 ddu/ha) in 2000, based on the pellet group data. Cattle use was an estimated 1 cow day use/acre (2 cdu/ha). In 2005, pellet group data estimates were 77 elk and 39 deer days use/acre (96 ddu/ha and 190 edu/ha), all of which were from early summer.

Soils are a moderately shallow clay loam with neutral reactivity (pH of 6.9). The stoniness index shows rock to be fairly uniformly distributed throughout the profile. Soil depth increases further down slope in the drainage bottom. Total relative vegetation cover has been moderately high and was 39% in 1995, 35% in 2000, and 45% in 2005, with around half of this total coming from perennial grasses all three years. High grass cover and abundant litter cover have kept erosion minimal. Combined relative rock and pavement cover were estimated at 8% in 1995, and 12% in both 2000 and 2005. The relative bare ground cover was low in 1995 at 11%, increased in 2000 to 18%, then 17% in 2005. The erosion index measurement in 2005 rated the soil erosion as stable.

The two principle browse species are mountain big sagebrush and mountain low rabbitbrush. In earlier readings, the rabbitbrush was the key browse species. The mountain low rabbitbrush density in 1995 was 9,660 plants/acre with 83% of the population in the mature age class. In 2000, the population had decreased to 5,800 plants/acre with a similar age class distribution as 1995 with 80% classified as mature. The 2005 rabbitbrush community had decreased to 5,360 plants/acre, 94% of which was classified as mature. Mature plants showed light use and the average height was 8 inches with an average crown diameter of 12 inches. Leader growth on rabbitbrush averaged between 3-4 inches in 2000.

The mountain big sagebrush population is productive and vigorous and has become the key browse. The sagebrush density was estimated at 1,500 plants/acre in 1995, increased to 6,000 in 2000, then decreased slightly to 5,100 in 2005. Utilization has been light to moderate with mostly good vigor throughout the population during all readings. The stature of sagebrush is relatively small with an average height of 14 inches and crown of 21 inches. Previous to 2005, around half of the community was made up of young individuals. In 2005, only 9% of the population consisted of young individuals. Percent decadency was low at 3% in 1995 and 2000, then increased slightly to 7% in 2005. In 2005, the dying individuals increased from less than 1% of the population in 2000 to 3%. Average leader growth on sagebrush was estimated at about 3 inches in 2000 and 1.8 inches in 2005. Other browse species include: snowberry, gray horsebrush, and dwarf rabbitbrush. In 2000, gray horsebrush had been used more than any other browse species with 88% of the plants sampled displaying moderate to heavy use. This had decreased to 46% moderate to heavy use by 2005. Average leader growth for gray horsebrush was less than one inch in 2000. Density for this species was estimated at 440 plants/acre in 1995, 500 plants/acre in 2000, and 480 plants/acre in 2005.

Perennial grasses are the dominant vegetation component. They provided an average cover of 22% in 1995, 26% in 2000, and 24% in 2005. Eleven species were sampled during the past 3 sampling dates, slender wheatgrass was the most abundant. Other abundant species include: Letterman needlegrass, needle-and-thread, prairie junegrass, and thickspike wheatgrass. The sum of nested frequency for perennial grass species slightly decreased with each reading since 1988. In 2000, nested frequency for thickspike wheatgrass, needle-

and-thread, and prairie junegrass significantly decreased, while that of slender wheatgrass significantly increased. All other species remained at stable frequencies in 2000. Identification of grasses was difficult in 2000 due to the lack of heads and common physical characteristics between the species. Minimal use was noted on grasses in 2000. In 2005, the nested frequency of slender wheatgrass decreased significantly and thickspike wheatgrass increased significantly. Sheep fescue also showed a significant nested frequency decrease in 2005.

Forbs are diverse and have been moderately abundant. In 1995, twenty-nine species of forbs were encountered and had increased in the sum of nested frequency from 1988. However, due to drought in 2000, forbs were less abundant in species richness (21 species), cover, and sum of nested frequency. In 2005, 29 forb species were sampled and both nested frequency and percent cover of forbs had increased. Bastard toadflax provides the greatest amount of forb cover, followed by sulfur eriogonum and Watson penstemon.

1982 APPARENT TREND ASSESSMENT

Soil trend appears stable, but could decline if grazing intensity were to increase. Vegetation condition is good considering the perceived management objectives of forb enhancement.

1988 TREND ASSESSMENT

Trend for soil is stable with adequate cover from litter and herbaceous vegetation to limit erosion. Browse species are increasing in abundance following the prescribed burn. Trend for browse is slightly up with the increase in shrub densities. Trend for the herbaceous understory is up with abundant herbaceous vegetation. Basal vegetation cover nearly doubled in 1988.

TREND ASSESSMENT
soil - stable (0)
browse - slightly up (+1)
herbaceous understory - up (+2)

1995 TREND ASSESSMENT

Soil trend is stable with little bare ground and excellent vegetation and litter cover. The mountain big sagebrush density appears to be expanding in size and exhibits moderate hedging. Mountain low rabbitbrush is the dominant browse species (50% of browse cover) with light to moderate hedging and a stable population. Snowberry is heavily utilized with an apparently stable population and heavy hedging. These factors lead to a slightly upward browse trend. The herbaceous understory sum of nested frequency is increasing although there is a slight decrease in the sum of nested frequency of grasses. Diversity of forbs has increased along with the sum of nested frequency for perennial forbs. There are very few annual species. This would indicate a stable herbaceous understory trend.

TREND ASSESSMENT
soil - stable (0)
browse - slightly up (+1)
herbaceous understory - stable (0)
winter range condition (DC Index) - not applicable, summer range

2000 TREND ASSESSMENT

Trend for soil is stable. Vegetation and litter cover remain high and erosion is minimal. Trend for browse is slightly up. Mountain big sagebrush has high recruitment from young plants and continues to increase in density. However, this increase in density is not at the expense of the herbaceous understory as cover from sagebrush is currently only 7%. Trend for the herbaceous understory is slightly down. Sum of nested frequency for perennial grasses slightly decreased, while that of perennial forbs decreased by more than half in 2000. This drastic decrease is due to the drought experienced in 2000. This trend should improve with normal precipitation patterns.

TREND ASSESSMENT
soil - stable (0)
browse - slightly up (+1)
herbaceous understory - slightly down (-1)
winter range condition (DC Index) - not applicable, summer range

2005 TREND ASSESSMENT

The trend for soil is stable. The ratio of protective ground cover (vegetation, litter and cryptogams) to bare ground remained relatively unchanged from 2000 to 2005. Trend for browse is stable. Density of mature sagebrush increased from 2,940 plants/acre in 2000 to 4,280 in 2005. However, the overall density decreased from 6,000 plants/acre to 5,100 plants/acre. The changes in density can be attributed to mostly losses of the young population between 2000 and 2005. Percent decadency remains low, vigor is good, and utilization is light. Seedlings were very abundant in 2005, there were 4,080 seedlings/acre. The trend for herbaceous understory is slightly up. Perennial grasses remained fairly stable and perennial forbs increased substantially. Watson penstemon showed the largest increase in nested frequency of perennial forbs.

TREND ASSESSMENT
soil - stable (0)
browse - stable (0)
herbaceous understory - slightly up (+1)
winter range condition (DC Index) - not applicable, summer range

HERBACEOUS TRENDS --
Management unit 11A, Study no: 3

Type	Species	Nested Frequency				Average Cover %		
		'88	'95	'00	'05	'95	'00	'05
G	Agropyron dasystachyum	$_{d}$307	$_{c}$211	$_{a}$89	$_{b}$162	4.99	.77	2.69
G	Agropyron trachycaulum	$_{a}$16	$_{b}$115	$_{d}$234	$_{c}$175	3.54	13.17	9.15
G	Bromus anomalus	$_{b}$25	$_{a}$-	$_{a}$3	$_{a}$-	-	.03	-
G	Carex sp.	$_{b}$49	$_{a}$5	$_{a}$9	$_{a}$6	.03	.27	.15
G	Festuca ovina	$_{a}$-	$_{ab}$11	$_{b}$10	$_{a}$-	.04	.27	-
G	Koeleria cristata	$_{a}$7	$_{b}$49	$_{a}$12	$_{ab}$29	2.57	.21	1.62
G	Poa fendleriana	$_{b}$83	$_{a}$18	$_{a}$42	$_{a}$34	.25	.69	1.12
G	Stipa columbiana	-	4	-	5	.15	-	.01

Type	Species	Nested Frequency				Average Cover %		
		'88	'95	'00	'05	'95	'00	'05
G	Stipa comata	a17	c122	b62	ab37	3.59	1.60	1.15
G	Stipa lettermani	b252	a154	a160	ab184	6.78	9.46	8.29
Total for Annual Grasses		0	0	0	0	0	0	0
Total for Perennial Grasses		756	689	621	632	21.98	26.50	24.22
Total for Grasses		756	689	621	632	21.98	26.50	24.22
F	Agoseris glauca	a-	a-	a-	b40	-	-	.49
F	Antennaria rosea	6	-	4	-	-	.30	-
F	Androsace septentrionalis (a)	-	b31	a-	a3	.27	-	.01
F	Arabis drummondi	a1	b16	a-	a-	.06	-	-
F	Astragalus convallarius	1	4	-	5	.00	-	.06
F	Astragalus sp.	4	-	-	-	-	-	-
F	Castilleja flava	a-	b10	a-	b19	.33	-	.41
F	Calylophus lavandulifolius	a-	b22	b9	b14	.98	.05	.33
F	Calochortus nuttallii	a-	ab3	a-	b10	.00	-	.02
F	Chenopodium album (a)	-	b42	a-	b30	.15	-	.13
F	Chaenactis douglasii	b34	b20	a6	a4	.13	.03	.01
F	Chenopodium leptophyllum(a)	-	-	-	11	-	-	.04
F	Comandra pallida	a186	b250	a186	a202	3.52	3.40	4.84
F	Collinsia parviflora (a)	-	a-	b40	a-	-	.77	-
F	Crepis acuminata	a3	b76	a4	a14	.37	.06	.54
F	Cymopterus longipes	-	-	3	1	-	.00	.00
F	Delphinium nuttallianum	a-	a1	a-	b21	.00	-	.14
F	Eriogonum alatum	a-	a2	b14	a1	.00	.21	.03
F	Erigeron eatonii	b19	ab8	a-	a2	.07	-	.03
F	Eriogonum umbellatum	a35	b70	a34	a29	1.72	.45	.63
F	Geranium sp.	3	-	-	-	-	-	-
F	Hedysarum boreale	-	1	-	-	.00	-	-
F	Heterotheca villosa	-	-	3	-	-	.03	-
F	Hymenoxys acaulis	a-	b19	b12	b10	.32	.15	.05
F	Ipomopsis aggregata	8	3	-	1	.03	-	.00
F	Linum lewisii	a-	b21	ab10	a-	.27	.10	.00
F	Lithospermum ruderale	a-	b8	ab5	a-	.19	.06	-
F	Lupinus argenteus	c67	b25	ab8	a4	.65	.55	.33
F	Lychnis sp.	2	-	-	-	-	-	-
F	Machaeranthera canescens	b31	a4	a-	a-	.07	-	-
F	Penstemon caespitosus	a-	b21	a3	a5	.58	.01	.09

Type	Species	Nested Frequency				Average Cover %		
		'88	'95	'00	'05	'95	'00	'05
F	Penstemon comarrhenus	$_{c}$50	$_{b}$27	$_{ab}$18	$_{a}$3	.36	.31	.01
F	Penstemon watsonii	$_{b}$73	$_{b}$84	$_{a}$13	$_{b}$70	1.38	.27	2.86
F	Physaria acutifolia	$_{a}$-	$_{b}$9	$_{ab}$4	$_{ab}$5	.08	.03	.03
F	Phlox longifolia	$_{b}$86	$_{a}$20	$_{a}$4	$_{a}$8	.10	.06	.07
F	Polygonum douglasii (a)	-	$_{b}$51	$_{a}$-	$_{c}$106	.22	-	.53
F	Potentilla gracilis	-	8	9	4	.07	.02	.03
F	Schoencrambe linifolia	-	-	1	3	-	.00	.01
F	Senecio canus	-	-	-	3	-	-	.03
F	Tragopogon dubius	-	3	-	-	.03	-	-
F	Unknown forb-perennial	20	-	-	-	-	-	-
Total for Annual Forbs		0	124	40	150	0.64	0.76	0.71
Total for Perennial Forbs		629	735	350	478	11.41	6.15	11.11
Total for Forbs		629	859	390	628	12.06	6.92	11.82

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

BROWSE TRENDS --
Management unit 11A, Study no: 3

Type	Species	Strip Frequency			Average Cover %		
		'95	'00	'05	'95	'00	'05
B	Artemisia nova	2	0	0	-	-	-
B	Artemisia tridentata vaseyana	40	69	70	1.45	7.04	13.93
B	Chrysothamnus depressus	7	15	10	.16	.39	.07
B	Chrysothamnus viscidiflorus lanceolatus	83	82	77	4.86	4.06	4.90
B	Gutierrezia sarothrae	2	1	3	.01	.00	-
B	Opuntia sp.	4	2	3	.03	-	-
B	Symphoricarpos oreophilus	24	9	7	2.28	.21	.03
B	Tetradymia canescens	12	17	15	.83	.39	.62
Total for Browse		174	195	185	9.63	12.10	19.56

CANOPY COVER, LINE INTERCEPT --
Management unit 11A, Study no: 3

Species	Percent Cover '05
Artemisia tridentata vaseyana	18.98
Chrysothamnus depressus	.18
Chrysothamnus viscidiflorus lanceolatus	5.03
Symphoricarpos oreophilus	.35
Tetradymia canescens	.41

KEY BROWSE ANNUAL LEADER GROWTH --
Management unit 11A, Study no: 3

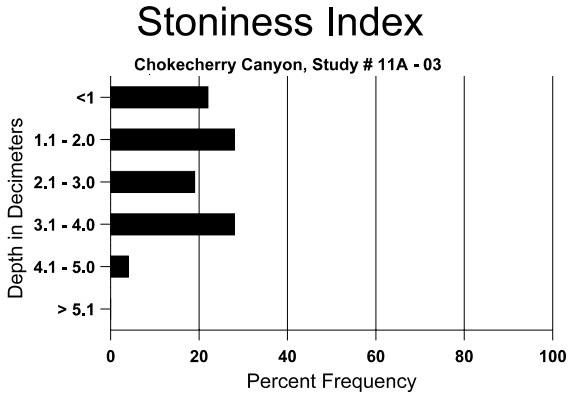
Species	Average leader growth (in) '05
Artemisia tridentata vaseyana	1.8

BASIC COVER --
Management unit 11A, Study no: 3

Cover Type	Average Cover %				
	'82	'88	'95	'00	'05
Vegetation	12.50	23.00	45.31	50.65	50.59
Rock	2.00	5.50	8.19	5.89	7.51
Pavement	4.75	2.50	1.29	10.82	5.93
Litter	55.75	53.75	47.58	49.29	29.78
Cryptogams	0	0	.63	0	.03
Bare Ground	25.00	15.25	12.67	26.07	19.37

SOIL ANALYSIS DATA --
Herd Unit 11A, Study # 3, Study Name: Chokecherry Canyon

Effective rooting depth (in)	Temp °F (depth)	pH	%sand	%silt	%clay	%0M	ppm P	ppm K	dS/m
13.5	56.2 (14.7)	6.9	32.9	33.8	33.2	4.3	11.8	217.6	0.9



PELLET GROUP DATA --
Management unit 11A, Study no: 3

Type	Quadrat Frequency		
	'95	'00	'05
Rabbit	4	3	3
Elk	27	46	55
Deer	3	9	11
Cattle	-	1	-

Days use per acre (ha)	
'00	'05
-	-
84 (208)	77 (190)
11 (28)	39 (96)
1 (2)	-

BROWSE CHARACTERISTICS --
Management unit 11A, Study no: 3

		Age class distribution (plants per acre)					Utilization					
Year	Plants per Acre (excluding seedlings)	Seedling	Young	Mature	Decadent	Dead	% moderate	% heavy	% decadent	% dying	% poor vigor	Average Height Crown (in)
Artemisia nova												
82	**0**	-	-	-	-	-	0	0	0	-	0	-/-
88	**0**	-	-	-	-	-	0	0	0	-	0	-/-
95	**120**	-	20	60	40	-	0	17	33	-	0	5/7
00	**0**	-	-	-	-	-	0	0	0	-	0	-/-
05	**0**	-	-	-	-	-	0	0	0	-	0	-/-
Artemisia tridentata vaseyana												
82	**0**	-	-	-	-	-	0	0	0	-	0	-/-
88	**800**	133	600	200	-	-	17	0	0	-	0	11/16
95	**1500**	960	820	640	40	240	28	1	3	-	1	16/23
00	**6000**	160	2900	2940	160	460	12	0	3	.33	3	14/25
05	**5100**	4080	480	4280	340	300	6	1	7	3	4	14/21

		Age class distribution (plants per acre)					Utilization					
Year	Plants per Acre (excluding seedlings)	Seedling	Young	Mature	Decadent	Dead	% moderate	% heavy	% decadent	% dying	% poor vigor	Average Height Crown (in)
Chrysothamnus depressus												
82	**0**	-	-	-	-	-	0	0	0	-	0	-/-
88	**0**	-	-	-	-	-	0	0	0	-	0	-/-
95	**360**	-	-	340	20	-	72	22	6	6	6	3/9
00	**960**	-	-	940	20	140	44	0	2	-	0	2/5
05	**300**	-	-	300	-	40	27	0	0	-	0	3/4
Chrysothamnus viscidiflorus lanceolatus												
82	**3733**	-	533	3200	-	-	0	0	0	-	0	12/18
88	**9199**	266	5200	2866	1133	-	7	0	12	-	13	13/14
95	**9660**	-	1660	8000	-	-	22	0	0	-	0	9/13
00	**5800**	20	640	4660	500	20	5	4	9	1	2	8/11
05	**5360**	-	240	5040	80	40	3	0	1	.74	.74	9/12
Gutierrezia sarothrae												
82	**0**	-	-	-	-	-	0	0	-	-	0	-/-
88	**0**	-	-	-	-	-	0	0	-	-	0	-/-
95	**40**	-	20	20	-	-	0	0	-	-	0	3/5
00	**80**	-	-	80	-	-	0	0	-	-	0	4/4
05	**60**	-	-	60	-	-	0	0	-	-	0	5/6
Opuntia sp.												
82	**0**	-	-	-	-	-	0	0	-	-	0	-/-
88	**0**	-	-	-	-	-	0	0	-	-	0	-/-
95	**80**	-	-	80	-	-	0	0	-	-	0	4/15
00	**40**	-	-	40	-	-	0	0	-	-	0	3/10
05	**60**	-	-	60	-	-	0	0	-	-	0	3/11
Symphoricarpos oreophilus												
82	**266**	-	-	266	-	-	0	0	0	-	0	12/21
88	**1199**	-	800	333	66	-	61	11	6	-	0	15/26
95	**1180**	40	140	960	80	-	5	58	7	-	0	13/28
00	**200**	-	100	20	80	-	0	0	40	-	0	11/20
05	**180**	-	-	180	-	-	0	0	0	-	0	12/20
Tetradymia canescens												
82	**133**	-	-	133	-	-	0	0	0	-	0	7/11
88	**199**	-	66	133	-	-	33	0	0	-	0	11/12
95	**440**	-	40	380	20	-	77	5	5	-	0	9/13
00	**500**	-	60	380	60	-	52	36	12	-	0	7/12
05	**480**	20	20	400	60	60	38	8	13	-	0	7/10

Trend Study 11A-4-05

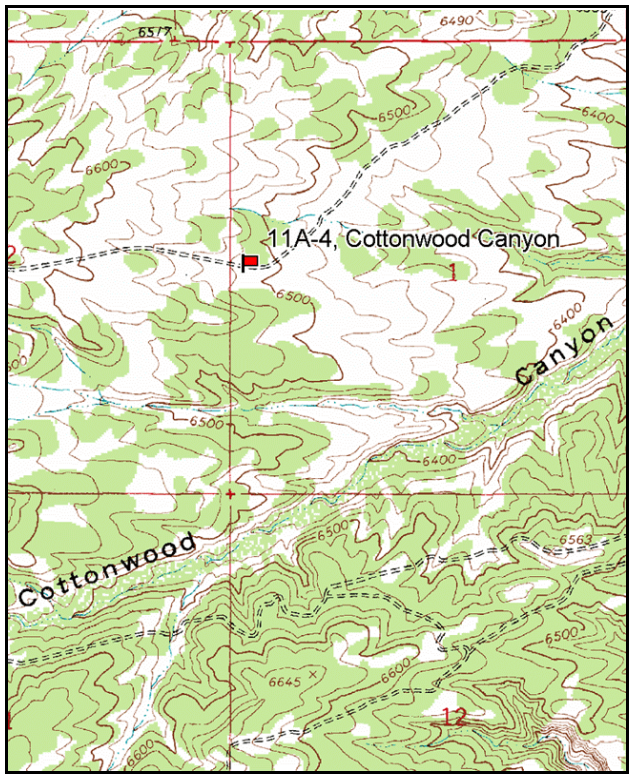
Study site name: Cottonwood Canyon . Vegetation type: Desert Shrub .

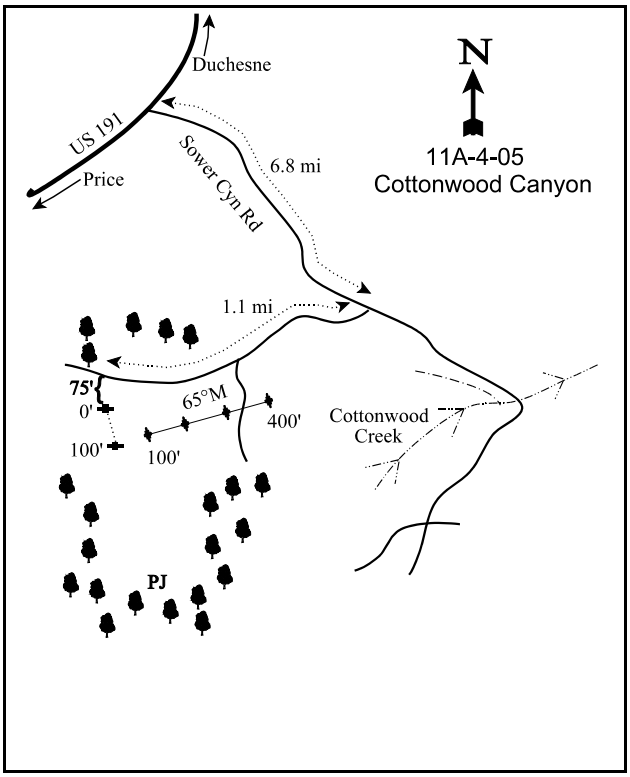
Compass bearing: frequency baseline 151 degrees magnetic (line 2-4 is 65°M).

Frequency belt placement: line 1 (11 & 95ft), line 2 (34ft), line 3 (59ft), line 4 (71ft). Belt 4 no rebar.

LOCATION DESCRIPTION

From Duchesne, go up Indian Canyon (U.S. 191) approximately 2.5 miles to the Cottonwood-Sowers Canyon Road. Turn left and to southeast on the main road 6.4 miles to a jeep trail on top of the ridge just before Cottonwood Creek. Turn right on the jeep trail and drive 1 mile west to a fork. Continue approximately 0.1 miles up the right fork to the study site. The 0-foot baseline stake is 15 paces south of the road in the sage/grass type. The study is marked with 12 inch tall fenceposts. The 0-foot baseline stake is marked with browse tag #9037. The baseline is interrupted between the first and second lines.





Map Name: Duchesne SW

Diagrammatic Sketch

Township 5S , Range 5W , Section 1

GPS: NAD 27, UTM 12S 4436058 N, 550778 E

DISCUSSION

Cottonwood Canyon - Trend Study No. 11A-4

The Cottonwood Canyon trend study samples winter range on the long slope down from Anthro Mountain and the Badland Cliffs to the Duchesne River. The study is in a mixed shrub/grass community on a 2% east-facing slope surrounded by pinyon-juniper woodland. It is located on the DWR Cottonwood wildlife management area at an elevation of 6,500 feet. The unit is surrounded by BLM and Ute tribal lands. The pellet group data estimates in 2000 were 59 elk and 15 deer days use/acre (146 edu/ha and 37 ddu/ha). No cattle pats were sampled in 2000. Antelope also utilize the site, but sign was relatively infrequent. In 2005, pellet group data estimates were 35 elk and 1 deer days use/acre (86 edu/ha and 2 ddu/ha). Most pellets were from winter and most of the utilization was on grasses.

The soil is a moderately deep clay loam with an estimated effective rooting depth of over 27 inches. The soil reaction is slightly alkaline (pH of 7.5). The sum of relative rock and pavement cover values were estimated at 9% in 1995, 8% in 2000, and 7% in 2005. Relative vegetation cover was estimated at 34% in 1995, 27% in 2000, and 28% in 2005. The main negative factor influencing the soil is the constant increase of bare ground cover. In 1995, the relative bare ground cover was 22%. It increased to 37% in 2000 and 52% by 2005. This increase in bare ground has been a product of decreasing relative litter cover from 31% in 1995, to 27% in 2000, down to 12% in 2005. Soil erosion is not a significant problem due to the high grass frequency, although some soil loss is evident in the interspaces, resulting in pedestalling around shrubs. Erosion is more severe in the surrounding pinyon-juniper woodland type. The soil erosion index in 2005 rated soil erosion as stable.

Historically, fringed sagebrush was the most abundant browse species, with 11,933 plants/acre in 1988 and 14,260 in 1995. In 2000, the population decreased to 8,680 plants/acre, then decreased again to 960 plants/ace in 2005. Fringed sagebrush cover averaged 1.5% cover in 1995 and 2000, but decreased to less than 1% in 2005. With the dieoff of fringed sagebrush, shadscale and winterfat have become the key browse species.

Shadscale density has been declining since 1995 from 2,100 plant/acre, to 1,740 in 2000, and to 1,420 in 2005. Vigor was good in 1995, but in 2000 53% of the population displayed poor vigor. In 2005, this improved to only 7% of the population with poor vigor. Decadence was low in 1995 at 10%, this drastically increased to 70% in 2000 (due to dry conditions), then returned to 10% in 2005. Use was light in 1995, moderate to heavy in 2000, and returned to light in 2005.

Winterfat also decreased in density from 1988 to 1995, but showed a substantial increase in 2005. The winterfat population was 4,266 plants/acre in 1988, 1,420 in 1995, 1,080 in 2000, and 4,500 in 2005. In 2005, young plants constituted 54% of the population and mature plants made up 46% of the population. The decadent plants increased from 0% of the population in 1995 to 63% in 2000, then returned to 0% in 2005. Also, 52% of the population was classified as having heavy use in 2000, but returned to mostly light use in 2005. The level of use may have been overestimated in 2000 due to the dry conditions yielding very little annual growth. These downward changes in the key browse components were mostly due to the drought experienced in 2000 and improved with better precipitation in 2004 and the spring of 2005. Other browse species present in low densities include: bud sage, black sagebrush, basin big sagebrush, Wyoming big sagebrush, fourwing saltbush, rabbitbrush, broom snakeweed, and prickly pear.

Perennial grasses averaged 18% cover in 1995, 21% in 2000, and 19% in 2005. Needle-and-thread, thickspike wheatgrass, and blue grama are the dominant species and provide nearly all of the grass cover. Needle-and-thread and thickspike remained at stable frequencies in 2000, while blue grama significantly decreased. Blue grama is a warm season species and this decrease is not surprising with the extremely dry conditions in 2000, especially in the summer. In 2005, blue grama continued to decrease significantly as did thickspike

wheatgrass, but needle-and-thread increased signicantly. Cheatgrass was sampled in one quadrat in 1995, but was not sampled in 2000 or 2005. The sum of nested frequency for grasses has decreased gradually over the years, but decreased substantially between 2000 to 2005. In 1995, forbs were dominated by annual species which included woolly navarretia, Fremont goosefoot, slimleaf goosefoot, annual stickweed, and tansy mustard. No annual forbs were sampled in 2000 due to drought, but in 2005 the annual forbs had nearly completely recovered. Total cover for forbs has never exceeded 4% in any year. Perennial forbs have been very scarce in all years.

1988 APPARENT TREND ASSESSMENT

The grasses are quite competitive. Forb density and diversity is predictably low. The grasses provide significant ground cover. Most of the vegetation cover is provided by mats of blue grama and numerous western wheatgrass stems which together provide excellent erosion control. There is also a significant amount of pavement cover (25%).

1995 TREND ASSESSMENT

The soil shows little sign of erosion due to the abundance of herbaceous vegetation and litter cover. Soil trend is stable. Fringed sagebrush density is high and the plants have become more robust since 1988. The most preferred forage species are found in moderate densities with mostly moderate hedging and nearly the same height and crown measurements. The exception is winterfat which doubled in size (height and crown). Other invasive species are in low abundance and do not appear to be increasing. The browse trend is stable, although there is a dense population of fringed sagebrush. Sum of nested frequency for perennial grasses has stayed nearly the same with only a single occurrence of cheatgrass. Perennial forb sum of nested frequency has increased, but the forbs are still proportionally dominated by annual species. Grasses contribute the most to the herbaceous understory. This leads to a stable herbaceous understory at this time, although there is poor forb composition. The Desirable Components Index rated this site as good to excellent with a score of 63 due to excellent perennial grass cover, fair browse cover, and low shrub decadence.

TREND ASSESSMENT
soil - stable (0)
browse - stable (0)
herbaceous understory - stable (0)
winter range condition (DC Index) - good to excellent (63) Lower Potential scale

2000 TREND ASSESSMENT

Trend for soil is slightly down with a large increase of bare ground and evident soil loss in the interspaces. The ratio of protective ground cover to bare soil decreased as well. The large increase in bare ground is the result of the drought experienced in 2000. Trend for browse is down as shadscale and winterfat show drastic increases in poor vigor and percent decadency. Estimated use increased on these species in 2000, but this may be overestimated due to these species appearing heavily used because of low annual growth caused by drought. Although the sum of nested frequency for perennial grasses and forbs slightly decreased in 2000, trend is considered stable. Most of the loss in frequency is from perennial forbs which have been in low abundance in all years. Currently, forbs only contribute 0.1% cover. Perennial grasses are the dominant component in the herbaceous understory and remained at nearly the same sum of nested frequency as the previous reading. The Desirable Components Index rated this site as fair with a score of 41 due to excellent perennial grass cover.

TREND ASSESSMENT
soil - slightly down (-1)
browse - down (-2)
herbaceous understory - stable (0)
winter range condition (DC Index) - fair (41) Lower Potential scale

2005 TREND ASSESSMENT

The trend for soil is slightly down. The ratio of protective ground cover (vegetation, litter and cryptogams) to bare ground decreased from 2.3:1 in 2000 to 1.9:1 in 2005. This decrease is due to a decrease in the nested frequency of cryptocamic crust and a decrease in the nested frequency of litter. The trend for browse is up. Fringed sagebrush, historically the most dominant browse species, decreased ninefold from 2000 to 2005. This loss made way for an increase of winterfat. From 2000 to 2005, winterfat density increased from 1,080 plants/acre to 4,500, an increase of 76%. Winterfat is far more palatable and nutritious for elk than fringed sagebrush and therefore this increase has helped improve this elk winter range. The winterfat decadence decreased from 63% in 2000 to 0% in 2005 and 54% of the winterfat population consisted of young individuals. Shadscale, also an important winter range species, density decreased 18% from 2000 to 2005, but this is minor in comparison to the large increase in winterfat. Shadscale decadence decreased from 70% in 2000 to 10% in 2005. The dying individuals decreased from 44% of the population to 7%. In the case of both winterfat and shadscale, the height and crown both increased between 2 and 3 times that of 2000. The herbaceous understory trend is slightly down. The nested frequency of perennial grasses decreased 19%. The nested frequency of thickspike wheatgrass decreased significantly and that of needle-and-thread increased significantly. The most preferred forage species on this site had been thickspike wheatgrass and being replaced by needle-and-thread is not a good replacement when considering the preferences of elk. The nested frequency of forbs increased, but were in small numbers and are of little importance to big game on this winter range. The Desirable Components Index rated this site as excellent with a score of 73 due to excellent perennial grass cover, high recruitment for shrubs, and low shrub decadence.

TREND ASSESSMENT
soil - slightly down (-1)
browse - up (+2)
herbaceous understory - slightly down (-1)
winter range condition (DC Index) - excellent (73) Lower Potential scale

HERBACEOUS TRENDS --
Management unit 11A, Study no: 4

Type	Species	Nested Frequency				Average Cover %		
		'88	'95	'00	'05	'95	'00	'05
G	Agropyron dasystachyum	$_{a}$179	$_{b}$255	$_{b}$279	$_{a}$164	6.46	5.86	4.64
G	Agropyron spicatum	-	4	-	-	.04	-	-
G	Bouteloua gracilis	$_{d}$298	$_{c}$190	$_{b}$152	$_{a}$82	4.76	4.83	2.42
G	Bromus tectorum (a)	-	1	-	-	.00	-	-
G	Oryzopsis hymenoides	$_{a}$12	$_{b}$44	$_{ab}$21	$_{a}$18	1.10	.51	.47
G	Sitanion hystrix	15	15	36	14	.09	.84	.34
G	Sporobolus cryptandrus	-	-	-	5	-	-	.21
G	Stipa comata	$_{a}$190	$_{a}$167	$_{a}$172	$_{b}$251	5.62	9.39	11.31

Type	Species	Nested Frequency				Average Cover %		
		'88	'95	'00	'05	'95	'00	'05
Total for Annual Grasses		0	1	0	0	0.00	0	0
Total for Perennial Grasses		694	675	660	534	18.08	21.44	19.42
Total for Grasses		694	676	660	534	18.09	21.44	19.42
F	Astragalus purshii	-	6	-	-	.01	-	-
F	Chenopodium fremontii (a)	-	$_{c}$77	$_{a}$-	$_{b}$16	.55	-	.03
F	Chenopodium leptophyllum(a)	-	$_{c}$66	$_{a}$-	$_{b}$19	.23	-	.19
F	Cryptantha sp.	5	4	-	-	.01	-	-
F	Descurainia pinnata (a)	-	$_{b}$38	$_{a}$-	$_{a}$3	.39	-	.01
F	Halogeton glomeratus (a)	-	-	-	4	-	-	.01
F	Lappula occidentalis (a)	-	$_{b}$32	$_{a}$-	$_{c}$111	.32	-	.84
F	Machaeranthera grindelioides	-	3	-	-	.00	-	-
F	Navarretia intertexta (a)	-	$_{c}$135	$_{a}$-	$_{b}$61	1.06	-	.19
F	Orthocarpus luteus (a)	3	-	-	-	-	-	-
F	Phlox austromontana	3	-	5	-	-	.03	-
F	Schoencrambe linifolia	$_{a}$1	$_{b}$48	$_{a}$5	$_{a}$6	.31	.01	.09
F	Sphaeralcea coccinea	$_{a}$9	$_{a}$15	$_{a}$8	$_{b}$30	.09	.04	2.17
F	Taraxacum officinale	-	2	-	-	.00	-	-
F	Townsendia incana	-	4	4	2	.01	.01	.03
F	Tragopogon dubius	2	-	-	-	-	-	-
Total for Annual Forbs		3	348	0	214	2.56	0	1.29
Total for Perennial Forbs		20	82	22	38	0.45	0.10	2.28
Total for Forbs		23	430	22	252	3.02	0.10	3.58

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

BROWSE TRENDS --
Management unit 11A, Study no: 4

Type	Species	Strip Frequency			Average Cover %		
		'95	'00	'05	'95	'00	'05
B	Artemisia frigida	93	87	30	1.34	1.63	.49
B	Artemisia nova	5	3	3	-	.15	.03
B	Artemisia spinescens	15	1	1	.19	.18	.15
B	Artemisia tridentata wyomingensis	1	1	0	-	-	-
B	Atriplex confertifolia	62	49	45	4.85	1.62	4.58
B	Ceratoides lanata	29	27	61	1.56	.30	3.60
B	Chrysothamnus viscidiflorus stenophyllus	1	2	0	-	-	-
B	Gutierrezia sarothrae	4	2	1	.15	-	.03
B	Opuntia sp.	1	0	1	-	-	-
B	Pediocactus simpsonii	2	0	0	-	-	-
Total for Browse		213	172	142	8.10	3.89	8.89

CANOPY COVER, LINE INTERCEPT --
Management unit 11A, Study no: 4

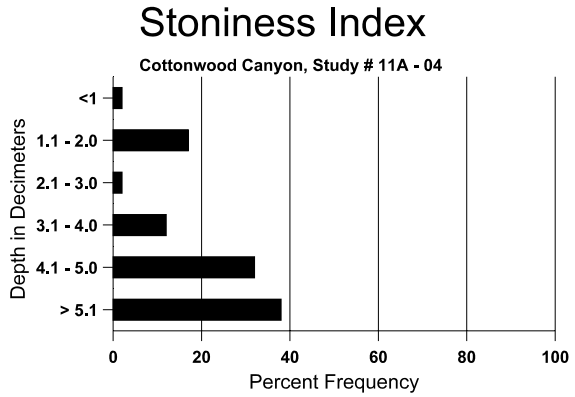
Species	Percent Cover '05
Artemisia frigida	1.04
Artemisia nova	.40
Atriplex confertifolia	8.86
Ceratoides lanata	4.11
Gutierrezia sarothrae	.10

BASIC COVER --
Management unit 11A, Study no: 4

Cover Type	Average Cover %			
	'88	'95	'00	'05
Vegetation	23.50	31.20	28.95	30.33
Rock	0	.91	.08	.07
Pavement	24.75	7.81	8.63	8.12
Litter	30.50	28.26	29.41	13.60
Cryptogams	.25	4.27	1.81	.33
Bare Ground	21.00	20.09	39.95	57.65

SOIL ANALYSIS DATA --
Herd Unit 11A, Study # 4, Study Name: Cottonwood Canyon

Effective rooting depth (in)	Temp °F (depth)	pH	%sand	%silt	%clay	%0M	ppm P	ppm K	dS/m
27.3	60.0 (18.1)	7.5	36.9	34.8	28.3	1.9	8.7	233.6	0.7



PELLET GROUP DATA --
Management unit 11A, Study no: 4

Type	Quadrat Frequency			Days use per acre (ha)	
	'95	'00	'05	'00	'05
Rabbit	26	36	48	-	-
Elk	15	28	39	59 (146)	35 (86)
Deer	13	7	14	15 (37)	1 (2)
Cattle	2	-	-	-	-

BROWSE CHARACTERISTICS --
Management unit 11A, Study no: 4

		Age class distribution (plants per acre)					Utilization					
Year	Plants per Acre (excluding seedlings)	Seedling	Young	Mature	Decadent	Dead	% moderate	% heavy	% decadent	% dying	% poor vigor	Average Height Crown (in)
Artemisia frigida												
82	**0**	-	-	-	-	-	0	0	0	-	0	-/-
88	**11933**	466	4600	6333	1000	-	0	0	8	.50	10	6/4
95	**14260**	2920	9700	4560	-	-	2	0	0	-	0	15/9
00	**8680**	20	1460	5380	1840	200	21	.46	21	11	42	2/4
05	**960**	160	-	960	-	-	4	8	0	-	0	16/14

		Age class distribution (plants per acre)					Utilization					
Year	Plants per Acre (excluding seedlings)	Seedling	Young	Mature	Decadent	Dead	% moderate	% heavy	% decadent	% dying	% poor vigor	Average Height Crown (in)
Artemisia nova												
82	**0**	-	-	-	-	-	0	0	0	-	0	-/-
88	**266**	-	200	-	66	-	0	0	25	8	25	-/-
95	**160**	-	-	160	-	20	63	0	0	-	0	13/18
00	**160**	-	-	-	160	-	13	63	100	100	100	6/21
05	**100**	80	-	40	60	40	0	0	60	60	60	10/18
Artemisia spinescens												
82	**0**	-	-	-	-	-	0	0	0	-	0	-/-
88	**2333**	-	333	1400	600	-	0	0	26	3	14	5/6
95	**440**	-	20	420	-	-	27	73	0	-	0	6/12
00	**20**	-	-	20	-	-	0	0	0	-	0	4/13
05	**20**	20	-	-	20	-	0	0	100	100	100	6/14
Artemisia tridentata wyomingensis												
82	**0**	-	-	-	-	-	0	0	0	-	0	-/-
88	**0**	-	-	-	-	-	0	0	0	-	0	-/-
95	**20**	-	-	20	-	-	100	0	0	-	0	17/26
00	**40**	-	-	20	20	-	0	100	50	50	100	21/40
05	**0**	-	-	-	-	-	0	0	0	-	0	-/-
Atriplex canescens												
82	**0**	-	-	-	-	-	0	0	-	-	0	-/-
88	**0**	-	-	-	-	-	0	0	-	-	0	-/-
95	**0**	-	-	-	-	-	0	0	-	-	0	18/31
00	**0**	-	-	-	-	-	0	0	-	-	0	-/-
05	**0**	-	-	-	-	-	0	0	-	-	0	-/-
Atriplex confertifolia												
82	**0**	-	-	-	-	-	0	0	0	-	0	-/-
88	**4198**	333	866	1666	1666	-	10	0	40	.47	2	13/18
95	**2100**	60	40	1860	200	340	10	2	10	5	5	13/23
00	**1740**	-	-	520	1220	520	31	48	70	44	53	8/17
05	**1420**	300	60	1220	140	280	0	0	10	7	7	15/32
Ceratoides lanata												
82	**0**	-	-	-	-	-	0	0	0	-	0	-/-
88	**4266**	133	2400	1200	666	-	13	3	16	.93	5	6/6
95	**1420**	-	60	1360	-	40	38	1	0	-	0	12/11
00	**1080**	-	40	360	680	140	30	52	63	33	63	3/5
05	**4500**	1660	2420	2060	20	-	25	2	0	-	0	11/13

		Age class distribution (plants per acre)					Utilization					
Year	Plants per Acre (excluding seedlings)	Seedling	Young	Mature	Decadent	Dead	% moderate	% heavy	% decadent	% dying	% poor vigor	Average Height Crown (in)
Chrysothamnus viscidiflorus stenophyllus												
82	**0**	-	-	-	-	-	0	0	-	-	0	-/-
88	**2000**	-	1400	600	-	-	0	0	-	-	0	7/4
95	**20**	-	-	20	-	-	0	0	-	-	0	10/12
00	**40**	-	-	40	-	-	0	0	-	-	0	2/4
05	**0**	-	-	-	-	-	0	0	-	-	0	9/23
Gutierrezia sarothrae												
82	**0**	-	-	-	-	-	0	0	0	-	0	-/-
88	**266**	-	66	-	200	-	0	0	75	8	25	-/-
95	**120**	40	-	120	-	-	0	0	0	-	0	10/12
00	**60**	-	-	20	40	-	0	0	67	-	0	4/6
05	**20**	-	-	20	-	-	0	0	0	-	0	9/11
Opuntia sp.												
82	**0**	-	-	-	-	-	0	0	0	-	0	-/-
88	**66**	-	-	66	-	-	0	0	0	-	0	4/12
95	**20**	-	-	-	20	-	0	0	100	100	100	6/14
00	**0**	-	-	-	-	-	0	0	0	-	0	3/10
05	**20**	-	20	-	-	-	0	0	0	-	0	4/12
Pediocactus simpsonii												
82	**0**	-	-	-	-	-	0	0	-	-	0	-/-
88	**0**	-	-	-	-	-	0	0	-	-	0	-/-
95	**60**	-	-	60	-	-	0	0	-	-	0	1/2
00	**0**	-	-	-	-	-	0	0	-	-	0	-/-
05	**0**	-	-	-	-	-	0	0	-	-	0	-/-
Sarcobatus vermiculatus												
82	**0**	-	-	-	-	-	0	0	-	-	0	-/-
88	**0**	-	-	-	-	-	0	0	-	-	0	-/-
95	**0**	-	-	-	-	-	0	0	-	-	0	-/-
00	**0**	-	-	-	-	-	0	0	-	-	0	-/-
05	**0**	-	-	-	-	-	0	0	-	-	0	28/37

Trend Study 11A-5-05

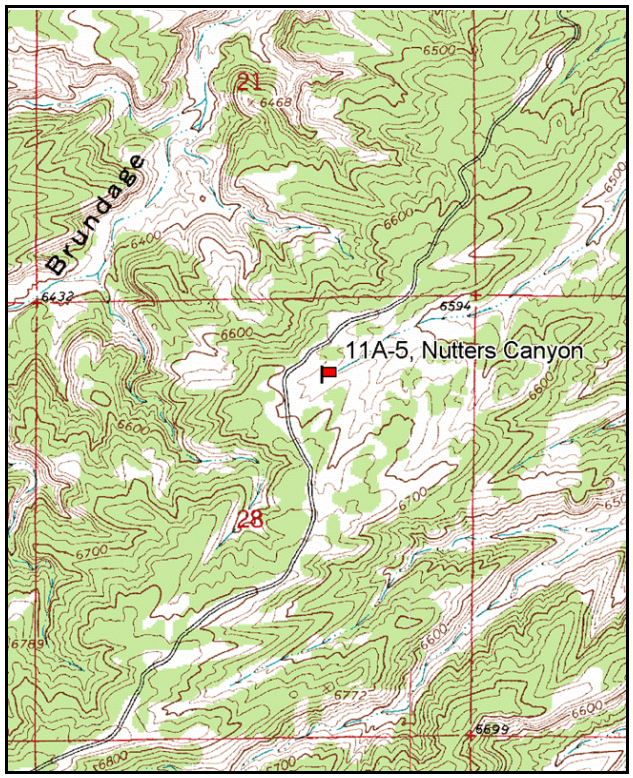
Study site name: Nutters Canyon . Vegetation type: Black Sagebrush .

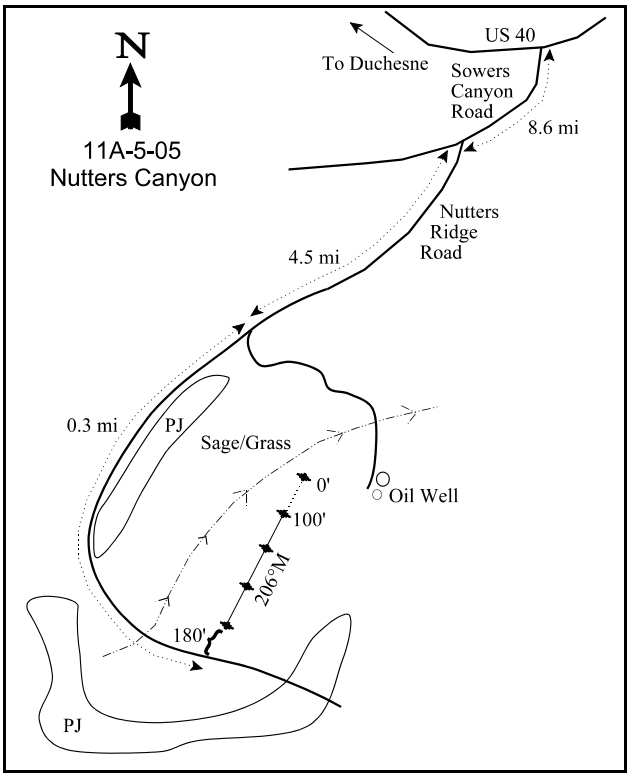
Compass bearing: frequency baseline 206 degrees magnetic.

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

LOCATION DESCRIPTION

From Highway U.S. 40 near Bridgeland, turn south and go up the Anthro Mountain-Sowers Canyon Road 8.6 miles to the turnoff to Nutters Ridge by an old cabin and an oil well. Turn left and go 4.5 miles up the ridge on the main road (stay left at major forks) to another fork to an oil well. Bear right and continue 0.3 miles to where the road curves and crosses a small drainage. Stop before you drive back into the P-J and walk down into the sage opening about 180 feet to the 400-foot baseline stake. The 0-foot baseline stake is marked with browse tag #9035. The study is marked by green fenceposts approximately 18 inches tall.





Map Name: Duchesne SE

Diagrammatic Sketch

Township 5S , Range 4W , Section 28

GPS: NAD 27, UTM 12S 4430201 N, 556569 E

DISCUSSION

Nutters Canyon - Trend Study No. 11A-5

This trend study is located above Nutters Canyon in the middle of a sagebrush/grass swale surrounded by pinyon-juniper woodland. Natural sagebrush/grass openings are found within the heads of most drainages. This swale drains to the east-northeast and has a north aspect. This winter range study has a slope of 3-5% at an elevation of approximately 6,600 feet. There are roads along most of the main ridges, plus spur roads going to numerous oil wells within the area. Cattle grazing is of relatively light use on this Ute Reservation land. The area receives light to moderate use from deer, elk and antelope. Pellet group data read in 2000 were estimated at 5 deer and 40 elk days use/acre (12 ddu/ha and 99 edu/ha). In 2005, pellet group data estimates were 41 deer and 31 elk days use/acre (101 ddu/ha and 76 edu/ha). The majority of elk pellets were found in the grassy areas and most deer pellets were found in the black sagebrush adjacent to the pinyon-juniper woodland.

Soils are loamy in texture and slightly alkaline (pH of 7.4). Soil depth is moderate with an estimated effective rooting depth of nearly 18 inches. Rocks are fairly uniformly distributed throughout the profile as illustrated by the stoniness index. Phosphorus was measured at 6.6 ppm, values less than 6 ppm may limit normal plant growth and development in wildland soils (Tiedemann and Lopez 2004). Erosion is light, although vegetation and litter cover are not particularly abundant. Relative pavement cover has been high (45% in 1995, 41% in 2000, and 28% in 2005), and the relative bare ground cover value was low but is increasing (5% in 1995, 9% in 2000, and 26% in 2005). Pedestaling is slight around the base of sagebrush plants. The erosion index measurement in 2005 rated soil erosion as stable.

The sagebrush is classified as black sagebrush, although there appears to be some hybridization between Wyoming big sagebrush and black sagebrush. Along the edge of the pinyon-juniper type and along the drainage bottom, there are shrubs more characteristic of mountain big sagebrush. Black sagebrush provided around 16% cover in both 1995 and 2000, or over 90% of the total browse cover in both years. In 2005, cover had decreased to 8% (79% of the total browse cover). The estimated black sagebrush density was 10,840 plants/acre in 1995, 12,100 plant/acre in 2000, and had decreased substantially to 6,180 plants/acre in 2005. The decadent individuals made up 12% of the popolation in 1995, 39% in 2000, and 37% in 2005. Dying individuals increased from 5% in 1995, to 12% in 2000, to 26% in 2005. Since 1995, the majority of the population has been mature with at least 58% of the population rated in the mature age class. Recruitment of young individuals has also been low with 17% of the population being young plants in 1995, 3% in 2000, and 2% in 2005. Since 1995, recruitment has not been adequate enough to replace those individuals in the population classified as dying. Utilization on the shrubs has been moderate to heavy all years, but had decreased some in 2005. The proportion of the population displaying poor vigor mirrored the numbers of dying. Leader growth on black sagebrush was minimal in 2000 and 2005. Other browse include: winterfat, shadscale, fringed sagebrush, stickyleaf low rabbitbrush, and snakeweed. These species have low densities and combine to contribute under 2% average cover.

The herbaceous understory is dominated by perennial grasses. Blue grama, bottlebrush squirreltail, and needle-and-thread grass are the dominant species. Other perennial species sampled, but occur less frequently, include: thickspike wheatgrass, galleta, Indian ricegrass, and Sandberg bluegrass. The sum of nested frequencies for grasses has decreased slightly since 1995. However, the average cover of the grasses has increased since 1995. Forbs have provided very little vegetation cover during all sampling periods, especially in 2000. Due to drought in 2000, forbs were nearly non-existent with only four species being sampled. In 1995 and 2005, forbs consituted about 1.5% of the total average cover, but in 2000 only provided 1/100 of 1%. The sum of nested frequency for forbs declined substantially from 1995 to 2000, and only half recovered by 2005.

1988 APPARENT TREND ASSESSMENT

Grasses provide considerable litter cover at this site (44%). Decomposition is relatively slow with the soil containing very little organic matter. Pavement contributes 33% of the ground cover. With the 11% vegetation cover provided by the grasses, total ground cover is adequate with only 11% of the surface exposed as bare soil.

1995 TREND ASSESSMENT

Percent bare ground is low, while pavement cover is extremely high. Although pavement does protect from rain drop impact, it also can accelerate runoff across the ground. Percent bare ground has decreased and pavement cover has increased. The majority of the soil loss most likely occurred in the past. As a result, the soil trend is stable. The black sagebrush population appears to be shifting to a more mature population with 8% of the population classified as dead. Hedging is moderate to heavy with height staying nearly the same and the crown measurements increasing by 6 inches. There is low biotic potential which is due to drought conditions over the past several years. Other increaser species such as broom snakeweed, sticky leaf rabbitbrush, and fringed sagebrush appear to have stable populations with low densities. The browse trend is stable. The sum of nested frequency for perennial grasses has greatly decreased while there was a great increase in perennial forb sum of nested frequency. Many forbs are annual species and account for high cover and nested frequency values. Because of the large decrease in perennial grasses, herbaceous understory trend is slightly down. The Desirable Components Index rated this site as good with a score of 61 due to fair perennial grass cover, good browse cover, and low shrub decadence.

TREND ASSESSMENT
soil - stable (0)
browse - stable (0)
herbaceous understory - slightly down (-1)
winter range condition (DC Index) - good (61) Lower Potential scale

2000 TREND ASSESSMENT

The trend for soil is slightly down. The ratio of protective ground cover (vegetation, litter and cryptogams) to bare ground decreased from 3.8:1 in 1995 to 3.1:1 in 2000. This downward trend is a product of a two-fold increase in the cover for bare ground. Erosion still appears to be minimal even with a large decrease in the abundance of forbs in 2000. Trend for browse would be considered stable. Even though black sagebrush shows an increase in decadency (13% to 39%), poor vigor (5% to 13%), and dying (5% to 12%), the sagebrush population actually increased in density by more than 10%. These negative aspects are of concern, but not substantial enough to warrant a downward trend with the corresponding increase in density. Trend for the herbaceous understory is slightly down overall due to drought. Perennial grasses slightly decreased in sum of nested frequency in 2000, while perennial forbs drastically decreased in sum of nested frequency. The Desirable Components Index rated this site as good with a score of 54 due to good perennial grass cover and good browse cover.

TREND ASSESSMENT
soil - slightly down (-1)
browse - stable (0)
herbaceous understory - slightly down (-1)
winter range condition (DC Index) - good (54) Lower Potential scale

2005 TREND ASSESSMENT

The trend for soil is slightly down. The ratio of protective ground cover (vegetation, litter and cryptogams) to bare ground decreased from 3.1:1 in 2000 to 2.5:1 in 2005, a 19% decrease. This decrease is a product of a three-fold increase in the bare ground cover and a three-fold decrease in the cryptogamic cover. Although the soil trend is slightly down, there is still no apparent soil erosion. The trend for browse is down. This is due to a large loss in numbers of black sagebrush, the key browse species on the site. The black sagebrush density decreased 49% from 12,100 plants/acre in 2000 to 6,180 plants/acre in 2005. The percentage of decadent individuals in the population changed little (39% down to 37%), while those individuals classified as dying increased from 12% to 26% in 2005. With only 2% of the individuals in the population classified as young, recruitment of new plants is very low and not enough to replace the dying indiviuals. A substantial increase in winterfat occured from 2000 to 2005 (from 120 to 1,360 plants/acre), but this was not sufficient enough to compensate for the losses to black sagebrush. The herbaceous understory trend is slightly down. The nested frequency of perennial grasses decreased 13% and perennial forbs increased some. This winter range is dependent upon the perennial grass component for providing forage for big game during the spring and autumn, whereas perennial forbs provide little forage during these seasons. Therefore, the decrease in perennial grasses has the largest impact on the herbaceous trend. The Desirable Components Index rated this site as good with a score of 57 due to excellent perennial grass cover and fair browse cover.

TREND ASSESSMENT
soil - slightly down (-1)
browse - down (-2)
herbaceous understory - slightly down (-1)
winter range condition (DC Index) - good (57) Lower Potential scale

HERBACEOUS TRENDS --
Management unit 11A, Study no: 5

Type	Species	Nested Frequency				Average Cover %		
		'88	'95	'00	'05	'95	'00	'05
G	Agropyron dasystachyum	a-	b17	b20	ab9	.16	.05	.04
G	Bouteloua gracilis	c209	b139	b154	a65	1.20	3.24	1.54
G	Hilaria jamesii	a-	b18	b14	ab5	.24	.07	.04
G	Oryzopsis hymenoides	b10	b8	ab6	a-	.06	.07	-
G	Poa secunda	ab14	ab17	a7	b25	.11	.04	.42
G	Sitanion hystrix	b221	a157	a165	ab179	2.01	3.34	7.67
G	Stipa comata	b281	a174	a136	a154	2.88	4.56	8.07
Total for Annual Grasses		0	0	0	0	0	0	0
Total for Perennial Grasses		735	530	502	437	6.67	11.38	17.81
Total for Grasses		735	530	502	437	6.67	11.38	17.81
F	Arabis perennans	a-	b18	a-	a-	.06	-	-
F	Astragalus purshii	a-	c58	a-	b8	.19	-	.02
F	Astragalus sp.	ab7	c44	a-	b21	.15	-	.10
F	Chenopodium fremontii (a)	-	b35	a-	a-	.23	-	-
F	Chenopodium leptophyllum(a)	-	3	-	5	.01	-	.01

Type	Species	Nested Frequency				Average Cover %		
		'88	'95	'00	'05	'95	'00	'05
F	Cryptantha sp.	-	1	-	-	.00	-	-
F	Descurainia pinnata (a)	-	$_{b}$48	$_{a}$-	$_{a}$1	.33	-	.00
F	Eriogonum cernuum (a)	-	4	-	3	.01	-	.03
F	Erigeron pumilus	-	3	-	-	.00	-	-
F	Lappula occidentalis (a)	-	$_{b}$49	$_{a}$-	$_{b}$44	.20	-	.18
F	Machaeranthera canescens	1	3	-	1	.01	-	.03
F	Navarretia intertexta (a)	-	$_{b}$32	$_{a}$-	$_{a}$3	.12	-	.01
F	Orobanche sp.	-	1	-	-	.00	-	-
F	Phlox longifolia	$_{a}$-	$_{b}$38	$_{a}$-	$_{b}$23	.07	-	.06
F	Schoencrambe linifolia	7	10	4	4	.03	.01	.19
F	Sphaeralcea coccinea	$_{b}$32	$_{b}$20	$_{a}$2	$_{ab}$20	.13	.01	.85
F	Taraxacum officinale	-	1	-	-	.00	-	-
F	Townsendia sp.	-	-	-	2	-	-	.00
Total for Annual Forbs		0	171	0	56	0.91	0	0.24
Total for Perennial Forbs		47	197	6	79	0.68	0.01	1.26
Total for Forbs		47	368	6	135	1.60	0.01	1.51

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

BROWSE TRENDS --
Management unit 11A, Study no: 5

Type	Species	Strip Frequency			Average Cover %		
		'95	'00	'05	'95	'00	'05
B	Artemisia frigida	6	5	1	.01	.04	.00
B	Artemisia nova	92	95	83	16.18	16.71	7.67
B	Artemisia tridentata wyomingensis	1	0	0	-	-	-
B	Atriplex confertifolia	12	8	15	1.32	.71	1.41
B	Ceratoides lanata	10	6	26	.06	.00	.29
B	Chrysothamnus nauseosus graveolens	3	2	0	.07	.00	-
B	Chrysothamnus viscidiflorus stenophyllus	6	7	7	.01	.21	.25
B	Gutierrezia sarothrae	10	23	5	.08	.28	.00
B	Opuntia sp.	3	2	1	.00	.03	.03
B	Pediocactus simpsonii	2	10	4	.00	.04	.00
B	Pinus edulis	0	4	4	-	-	.03
Total for Browse		145	162	146	17.76	18.05	9.69

CANOPY COVER, LINE INTERCEPT --
Management unit 11A, Study no: 5

Species	Percent Cover '05
Artemisia nova	11.80
Atriplex confertifolia	3.36
Ceratoides lanata	.58
Chrysothamnus viscidiflorus stenophyllus	.50
Pinus edulis	.45

KEY BROWSE ANNUAL LEADER GROWTH --
Management unit 11A, Study no: 5

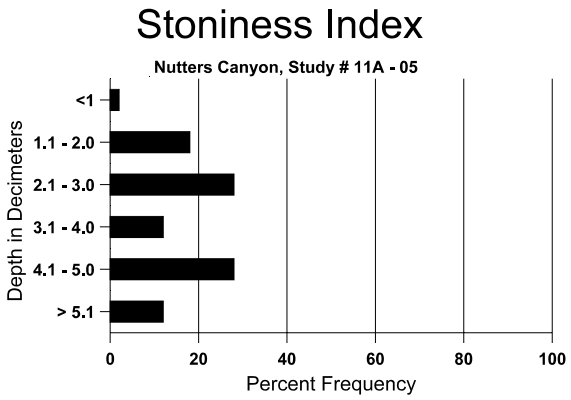
Species	Average leader growth (in) '05
Ceratoides lanata	3.8

BASIC COVER --
Management unit 11A, Study no: 5

Cover Type	Average Cover %			
	'88	'95	'00	'05
Vegetation	11.00	25.97	29.31	27.87
Rock	.50	.84	2.42	1.05
Pavement	33.00	47.27	44.26	30.35
Litter	44.50	25.42	19.22	21.31
Cryptogams	0	.05	2.71	.94
Bare Ground	11.00	5.48	9.82	28.22

SOIL ANALYSIS DATA --
Herd Unit 11A, Study # 5, Study Name: Nutters Canyon

Effective rooting depth (in)	Temp °F (depth)	pH	%sand	%silt	%clay	%0M	ppm P	ppm K	dS/m
17.8	60.8 (18.1)	7.4	44.9	33.8	21.3	2.3	6.6	220.8	0.9



PELLET GROUP DATA --
Management unit 11A, Study no: 5

Type	Quadrat Frequency				
	'82	'88	'95	'00	'05
Rabbit	-	-	6	10	6
Elk	-	-	15	24	37
Deer	-	-	17	9	24

Days use per acre (ha)	
'00	'05
-	-
40 (99)	31 (76)
5 (13)	41 (101)

BROWSE CHARACTERISTICS --
Management unit 11A, Study no: 5

		Age class distribution (plants per acre)					Utilization					
Year	Plants per Acre (excluding seedlings)	Seedling	Young	Mature	Decadent	Dead	% moderate	% heavy	% decadent	% dying	% poor vigor	Average Height Crown (in)
Artemisia frigida												
82	**0**	-	-	-	-	-	0	0	0	-	0	-/-
88	**2532**	1200	1533	933	66	-	16	11	3	-	5	7/11
95	**240**	40	140	100	-	-	0	0	0	-	0	12/10
00	**200**	-	60	140	-	-	0	0	0	-	0	3/5
05	**20**	-	-	20	-	-	0	0	0	-	0	9/8
Artemisia nova												
82	**0**	-	-	-	-	-	0	0	0	-	0	-/-
88	**21066**	5866	8933	9000	3133	-	13	.31	15	.56	5	10/12
95	**10840**	320	1800	7740	1300	980	58	32	12	5	5	11/18
00	**12100**	200	420	7020	4660	1160	15	35	39	12	13	7/15
05	**6180**	2120	100	3780	2300	4540	8	23	37	26	26	7/15
Artemisia tridentata wyomingensis												
82	**0**	-	-	-	-	-	0	0	-	-	0	-/-
88	**0**	-	-	-	-	-	0	0	-	-	0	-/-
95	**20**	-	-	20	-	-	100	0	-	-	0	15/7
00	**0**	-	-	-	-	-	0	0	-	-	0	-/-
05	**0**	-	-	-	-	-	0	0	-	-	0	-/-
Atriplex confertifolia												
82	**0**	-	-	-	-	-	0	0	0	-	0	-/-
88	**133**	-	-	133	-	-	0	0	0	-	0	8/13
95	**360**	-	20	320	20	-	0	0	6	-	6	16/29
00	**320**	-	40	80	200	20	19	31	63	6	6	13/28
05	**400**	220	160	220	20	-	0	0	5	5	10	16/39
Ceratoides lanata												
82	**0**	-	-	-	-	-	0	0	0	-	0	-/-
88	**266**	-	200	-	66	-	0	0	25	-	0	-/-
95	**320**	-	40	280	-	-	19	6	0	-	0	10/10
00	**120**	-	-	100	20	-	33	67	17	17	17	3/3
05	**1360**	720	980	340	40	20	21	0	3	3	3	11/15

		Age class distribution (plants per acre)					Utilization					
Year	Plants per Acre (excluding seedlings)	Seedling	Young	Mature	Decadent	Dead	% moderate	% heavy	% decadent	% dying	% poor vigor	Average Height Crown (in)
Chrysothamnus nauseosus graveolens												
82	**0**	-	-	-	-	-	0	0	0	-	0	-/-
88	**0**	-	-	-	-	-	0	0	0	-	0	-/-
95	**300**	-	60	240	-	-	0	0	0	-	0	9/11
00	**40**	-	-	20	20	-	0	50	50	50	50	11/6
05	**0**	-	-	-	-	-	0	0	0	-	0	-/-
Chrysothamnus viscidiflorus stenophyllus												
82	**0**	-	-	-	-	-	0	0	0	-	0	-/-
88	**132**	66	-	66	66	-	0	0	50	-	0	3/2
95	**140**	-	-	140	-	-	0	0	0	-	0	6/7
00	**340**	40	40	100	200	20	0	24	59	59	59	2/7
05	**260**	100	160	100	-	-	0	0	0	-	0	8/10
Gutierrezia sarothrae												
82	**0**	-	-	-	-	-	0	0	-	-	0	-/-
88	**266**	-	66	200	-	-	0	0	-	-	0	5/5
95	**240**	380	20	220	-	20	0	0	-	-	0	7/6
00	**1680**	60	120	1560	-	40	0	0	-	-	0	3/5
05	**100**	-	-	100	-	-	0	0	-	-	0	8/8
Opuntia sp.												
82	**0**	-	-	-	-	-	0	0	-	-	0	-/-
88	**0**	-	-	-	-	-	0	0	-	-	0	-/-
95	**60**	-	-	60	-	-	0	0	-	-	0	6/10
00	**40**	-	-	40	-	-	0	0	-	-	0	-/-
05	**20**	-	-	20	-	-	0	0	-	-	0	3/8
Pediocactus simpsonii												
82	**0**	-	-	-	-	-	0	0	-	-	0	-/-
88	**0**	-	-	-	-	-	0	0	-	-	0	-/-
95	**40**	-	-	40	-	-	0	0	-	-	0	0/1
00	**260**	-	80	180	-	-	8	0	-	-	0	1/2
05	**80**	-	-	80	-	-	0	0	-	-	0	1/1
Pinus edulis												
82	**0**	-	-	-	-	-	0	0	-	-	0	-/-
88	**133**	-	133	-	-	-	0	0	-	-	0	-/-
95	**0**	-	-	-	-	-	0	0	-	-	0	-/-
00	**100**	20	100	-	-	-	0	0	-	-	0	-/-
05	**100**	-	100	-	-	-	0	0	-	-	0	-/-

SUMMARY

WILDLIFE MANAGEMENT UNIT 11A

Summer/transition range on this unit is sampled by two sites, Wirefence Canyon (11A-2) and Chokecherry Canyon (11A-3). Wirefence Canyon and Chokecherry Canyon both sample high elevation mountain big sagebrush areas. The soil trends on both sites were stable. Browse trend for Wirefence Canyon was down while Chokecherry Canyon was stable. In both cases, the density of mountain big sagebrush had decreased, likely a product of the exceptionally low precipitation from 2001 and 2003 which added to the effects of the extended drought. The herbaceous understory of both sites improved, Wirefence Canyon was up and Chokecherry Canyon was slightly up. This increase in herbaceous understory was from an increase in perennial grasses, a response to higher precipitation levels in 2004 and the spring of 2005.

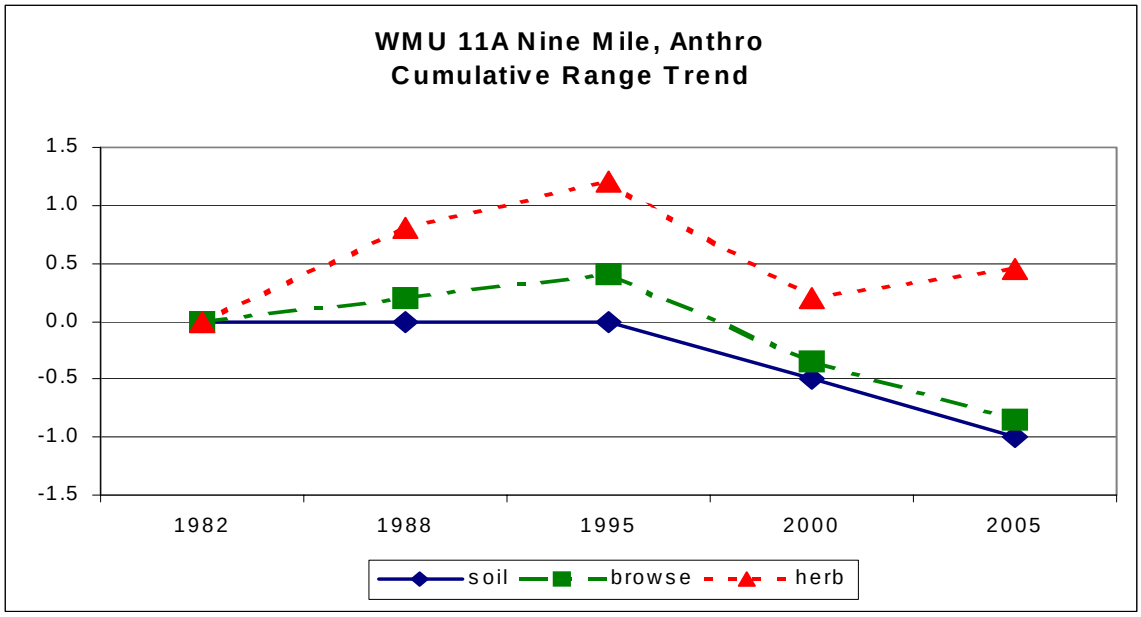
Cottonwood Canyon (11A-4) and Nutters Canyon (11A-5) sample winter ranges within the unit. In both cases, the soil trend was slightly down. Both sites showed an increase in bare ground and decrease in cryptogamic cover. The browse trend for the Cottonwood Canyon site was up and that of the Nutters Canyon site was down. The Nutters Canyon site showed a massive black sagebrush dieoff, likely a delayed product of the low precipitation from 2001 to 2003. The perennial herbaceous understory trend for both Cottonwood Canyon and Nutters Canyon was slightly down. The major herbaceous component for both sites was the perennial grasses which makeup 90% or more of the total herbaceous perennial cover. Forbs have always been a minor component of the herbaceous understory on these two sites.

Pellet group data showed changes in the use of elk and deer. Elk use was down on all sites. Deer use increased on all sites except Cottonwood Canyon (11A-4). Sagegrouse pellet groups were identified on the Wirefence Canyon site (11A-2) for the first time in 2005.

In summary, although pinyon and juniper stands dominate much of the winter range, there are sufficient natural openings to provide good quality winter range. There are pinyon-juniper sites with the potential after treatment, to provide more forage during the fall-spring period. The summer range remains the limiting factor, especially for deer.

Cumulative Range Trends -- 11A Nine Mile, Anthro

	1982	1988	1995	2000	2005
soil	0	0	0	-0.5	-1.0
browse	0	0.2	0.4	-0.4	-0.9
herb	0	0.8	1.2	0.2	0.5



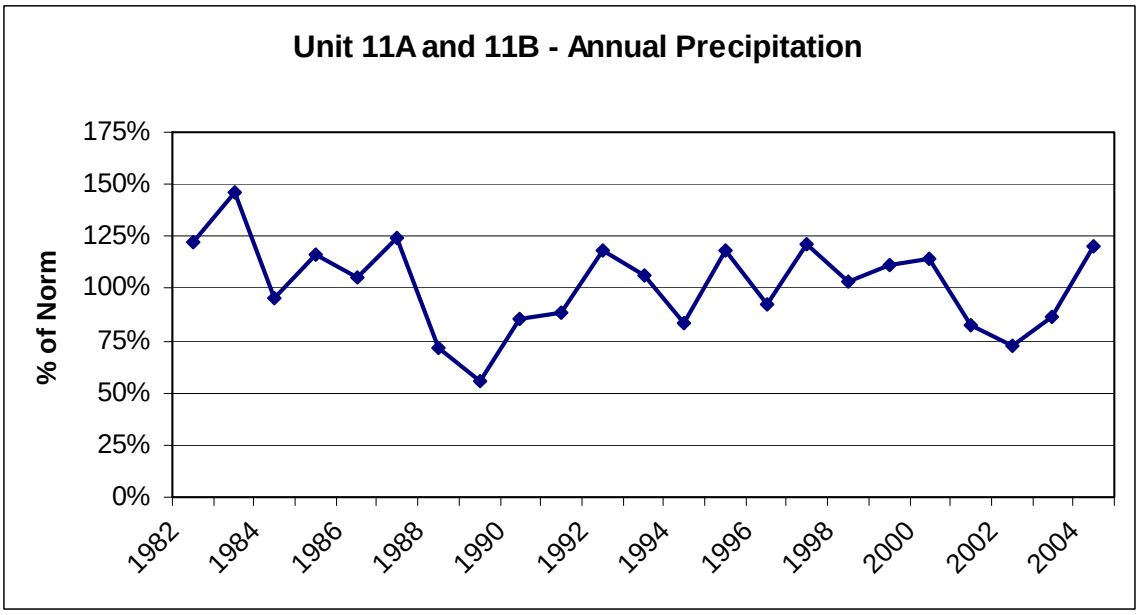
Trend Summary

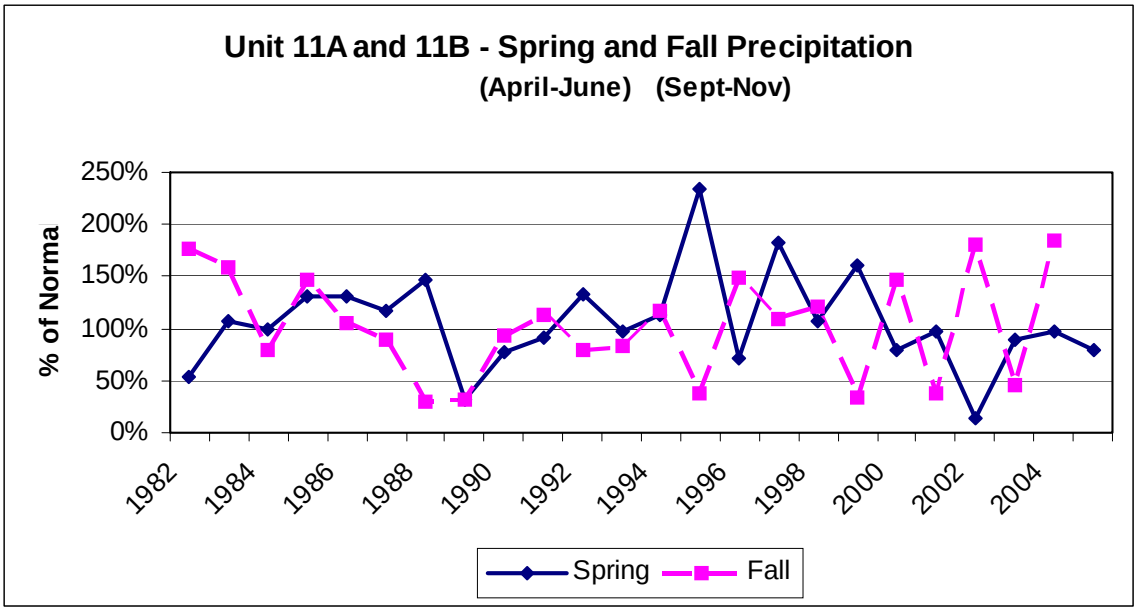
	Category	1982	1988	1995	2000	2005
11A-1 Upper Cottonwood Ridge	soil	est	0	0	NR	NR
	browse	est	0	0	NR	NR
	herbaceous understory	est	+2	+2	NR	NR
11A-2 Wirefence Canyon	soil	est	0	0	0	0
	browse	est	0	0	-2	-2
	herbaceous understory	est	0	+1	-2	+2
11A-3 Chokecherry Canyon	soil	est	0	0	0	0
	browse	est	+1	+1	+1	0
	herbaceous understory	est	+2	0	-1	+1
11A-4 Cottonwood Canyon	soil		est	0	-1	-1
	browse		est	0	-2	+2
	herbaceous understory		est	0	0	-1
11A-5 Nutters Canyon	soil		est	0	-1	-1
	browse		est	0	0	-2
	herbaceous understory		est	-1	-1	-1

	Category		1982	1988	1995	2000
Average Range Trend	**soil**		0	0	-0.5	-0.5
	browse		0.2	0.2	-0.8	-0.5
	herbaceous understory		0.8	0.4	-1	0.3
Total Number of Sites Read		3	5	5	4	4

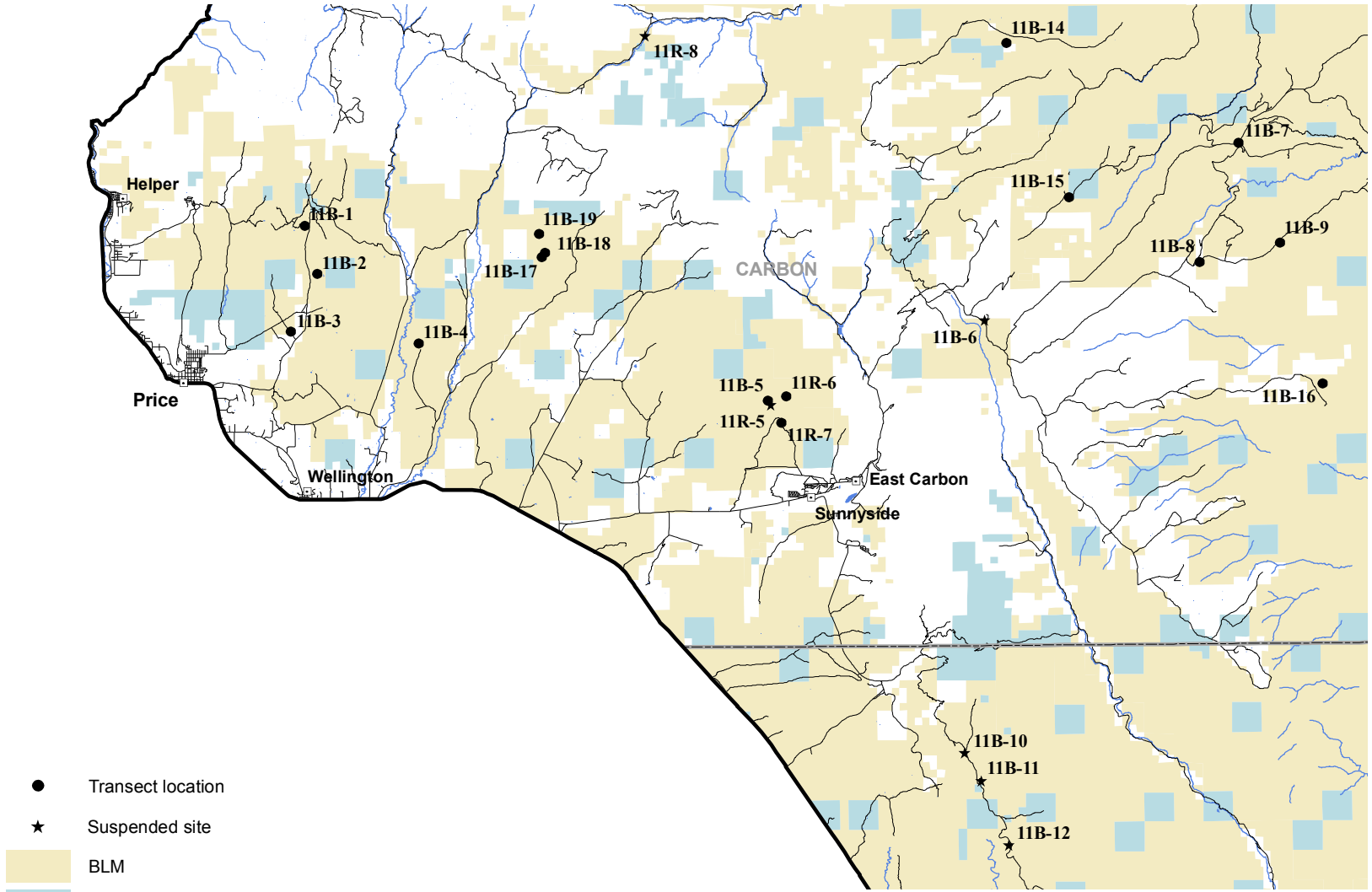
(-2) = down, (-1), slightly down, (0) = stable, (+1) = slightly up, (+2) = up
(est) = site established, (NR) = site not read

Precipitation graphs for the Anthro and Range Creek units. Data is percent of normal precipitation averaged for weather stations in Sunnyside, Wellington, and Duchesne (Utah Climate Summaries 2005).





Management Unit 11B



Transect location

Suspended site

BLM

State of Utah

Private

Water body

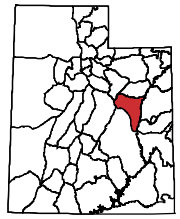
River or stream

Road

Map Scale 1:345,000 (1 inch = 5.4 miles)

N

Unit Location



WILDLIFE MANAGEMENT UNIT 11B - NINE MILE/RANGE CREEK

Boundary Description

Carbon, Duchesne, and Emery counties - Boundary begins in Green River and Interstate 70; then west on I-70 to highway US-6; northwest on US-6 to Highway US-191; northeast on US-191 to the Argyle Canyon road; southeast on the Argyle Canyon road to the Nine-mile Canyon road; east on the Nine-Mile Canyon road to its end near Bull Canyon; then continuing along Nine-Mile Creek to the Green River; south along the Green River to I-70 and beginning point.

Herd Unit Description

Unit 11B contains the eastern portion of Carbon County, the northeastern part of Emery County, and a small piece of southern Duchesne County. This triangular unit encompasses the West Tavaputs Plateau, bounded by the Book Cliffs and Soldier Canyon on the west, the Price River-Duchesne River drainage divide on the north and Green River on the east. Topography is steep and rough. The major drainages are: Nine-Mile Creek, which drains Minnie Maude, Dry, Argyle, Cow, and Harmon Canyons into the Green River; Range Creek, which drains the east side; and Pace, Whitmore and Horse Canyons. Elevation ranges from 4,064 feet at Green River to 10,285 feet on Bruin Point. Communities within the unit include Helper, Price, Wellington, Sunnyside, East Carbon, and Green River.

Normal winter range below the 8,500 foot elevation completely encompasses the summer range. Severe winter range is limited to areas below 7,000 feet. On the east side of the unit, steep bare slopes limit use to the ridge tops and canyon bottoms along lower Nine-Mile Creek and the Green River. During severe winters, all deer wintering in these areas are forced into the canyon bottoms, usually causing heavy winter losses. Along the west side of the unit, from Soldier Creek Canyon east to Horse Canyon, access to the winter range is good. However, from Horse Canyon south, the Roan and Book Cliffs drop off sharply presenting major obstacles to deer migration and preventing use of much of the lower elevation range. Winter concentration areas include: Nine-Mile Creek, Rock House Cow Camp area, Cedar Ridge, Argyle Canyon, and Little Park.

During the summer of 1966, Coles and Pederson (1967) inventoried the deer winter range on the Range Creek unit. The overstory types identified were: pinyon-juniper (covering 89% of the winter range), sagebrush (3%), greasewood (3%), seedings (2%), and agricultural land (2%). Although the most extensive, the pinyon-juniper type is the least productive. This type averages 327 lbs/forage/acre and has been heavily grazed historically. The sagebrush-rabbitbrush and sagebrush-grass associations have also been intensely grazed, but with production of 942 lbs/acre and 381 lbs/acre respectively, these can be very important vegetation types on the winter range. With an estimated 1,498 lbs/acre, the greasewood-grass type is the most productive on the unit. However, this type is restricted to only canyon bottoms and the valley floors, and receives greatest use only during severe winters. Coles and Pederson (1967) concluded that overall forage production on the unit (winter range) was low due to the nature of the land, soils and native vegetation, and also past grazing abuses.

The unit presents several challenges to public land and wildlife managers. Since 75% of the summer range is private land, hunting access is limited and may become more restricted unless hunters are willing to pay trespass fees. Some of the ranches are privately managed for trophy hunting.

Grazing Summary

All of the study sites on the Range Creek deer herd unit occur on lands administered by the BLM or are privately owned. The 16 study sites on the unit occur in 6 different allotments. Sites at Deadman (11B-1) and Airport Bench (11B-2) occur in the Coal Creek allotment which is grazed by a total of 664 cows, 405 graze the allotment from April 16 to May 31 and 259 graze it from October 16 to 31. The Airport (11B-3) site occurs on

the Hayes Wash allotment, a winter and spring allotment, which is grazed by 61 cows for short periods between October 15 and May 31. Trend studies Coal Creek (11B-4), Dugout Creek Unchained (11B-17), Dugout Creek Sagebrush Chaining (11B-18), and Dugout Creek Pinyon-Juniper Chaining (11B-19) are in the Soldier Canyon allotment which is also a winter and spring allotment. Grazing occurs from November 1 to February 28 with 119 cows. Grazing is also permitted from March 1 to May 31. The studies 'B' Canyon (11B-5), East Carbon Burn 2 (11R-6), and East Carbon Burn 3 (11R-7) occur within the Mud Springs allotment. This allotment utilizes a four pasture deferred rotation schedule to graze 338 cows from October 15 to June 15.

Study sites Cottonwood (11B-7), Cedar Ridge (11B-9), Twin Hollow (11B-15) and Steer Ridge (11B-16) occur in the large Green River allotment. It consists of 8 pastures in which 500 cows graze from February 1 to April 15, 150 from March 16 to April 15, 750 from April 16 to May 31, and 1,110 from June 1 to October 15. A large herd of wild horses also uses this allotment.

Study site number 11B-14, Prickly Pear, is in the Stone Cabin allotment which utilizes a four pasture deferred rotation schedule to graze 350 cows from May 1 to September 30 and 6 horses from May 1 to September 30.

Cedar Corral (11B-8) was acquired by the Nutter Ranch and is part of the Nutter Ranch CWMU.

Big Game Trends

The management objectives in the 2001 management plan for the Range Creek portion of unit 11 are to maintain a wintering population of 8,500 deer (combined with unit 11A) with a herd composition of 15 bucks to 100 does. Thirty percent of these bucks are to be 2 point or better. Harvests have continually increased since the harsh winters of the mid 1980's when less than 400 bucks were harvested. Buck harvests ranged between 830 and 756 between 1988 and 1991, then dropped dramatically to 581 in 1992 and only 282 in 1993. This decline is due to the extremely harsh winter of 1992-93. In 1994, 316 bucks were harvested and 355 in 1996. The fawn/doe ratio has also declined from a high of 67 fawns/100 does in 1988-89 to only 34 in 1992-93. The ratio rebounded somewhat to 47 fawns/100 does in 1994-95, then dropped to only 25 in 1995-96. Wildlife management units Anthro and Range Creek were combined in 1998 into the Nine Mile management unit with the Anthro portion being subunit 11A and Range Creek subunit 11B. In 1997, 454 bucks were harvested, 583 in 1998, 358 in 1999, and 453 in 2000. Fawn/doe ratios for the entire unit were moderately high at 74 fawns/100 does in 1997-98, 69 in 1998-99, and 66 in 1999-2000.

Elk are present in the area in small but increasing numbers. Current management objectives are to maintain a winter herd size of 1,000 elk on the Range Creek subunit (1,700 with unit 11A) with a herd composition of 8 bulls to 100 cows. At least 4 of those bulls being 2 ½ years of age or older. Aerial counts in 1999 estimated 1,200 elk, which is above the management objective (BLM, 2000).

There is a portion of what once was the Icelander Wash pronghorn unit between the Book Cliffs and US Highway 6, which is now part of the Range Creek Wildlife Management unit. In 1972, 150 antelope were introduced to the area and then 165 more in 1982. Aerial counts have increased from 174 in 1977 to 1,022 in 1989 and 703 in 1995. The pronghorn numbers in 1998-1999 for units 11A and 11B were 580. Hunting was allowed in 1974 and permits have increased from 10 that year to 235 in 1999 for both units 11A and 11B. In 1997, 20 pronghorn were harvested in both units 11A and 11B, 42 in 1998, 50 in 1999, and 46 in 2000. Although only a small percentage of the herd is found east of Highway 6, that number is increasing with the rest of the herd. These increasing numbers of elk and antelope will necessitate continued monitoring of vegetation trend on the Range Creek unit.

Trend Study Site Establishment

Interagency Range Trend Studies were established on 16 sites within the Range Creek unit in June 1986. Of these, three were located on summer range and the remainder were placed on winter range. In 1994, three new winter range sites were added and four suspended after meetings with BLM and Division managers. During the 2000 season, 13 of the remaining 15 sites were reread and two old special study sites were reread. In 2005, two additional sites were suspended, three old special study sites at the Dugout Creek chaining were added to the rotation, and two other special study sites were read to finalize the 1997 roving data.

Trend Study 11B-1-05

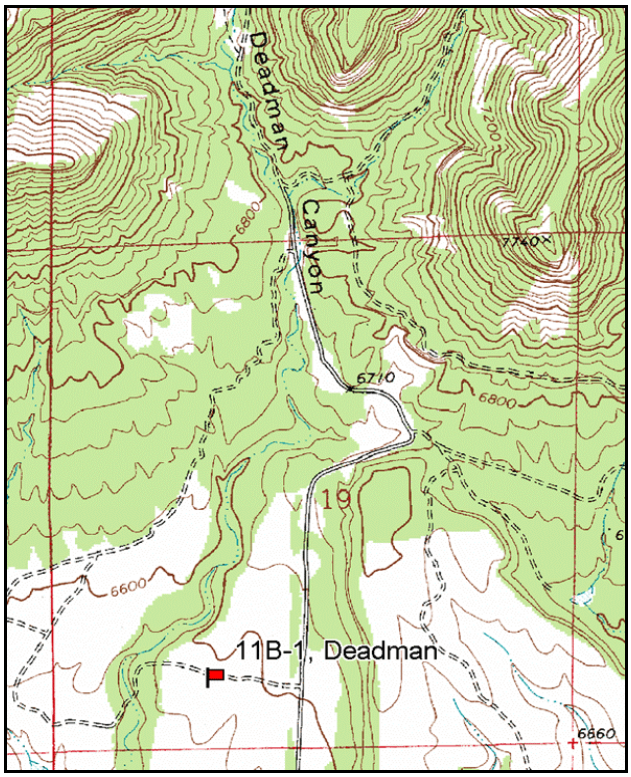
Study site name: Deadman . Vegetation type: Chained, Seeded P-J .

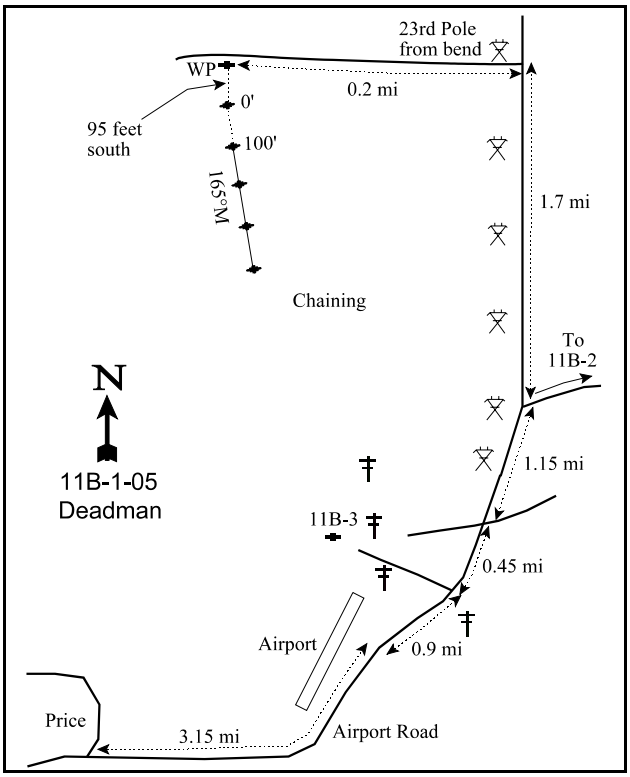
Compass bearing: frequency baseline 165 degrees magnetic.

Frequency belt placement: line 1 (11 & 95ft), line 2 (34ft), line 3 (59ft), line 4 (71ft). Belt 1 rebar @ 1ft and belt 3 rebar @ 10 ft.

LOCATION DESCRIPTION

From the southeast end of Price, take the Airport Road east 3.15 miles to the airport. Continue 0.9 miles to a power line (and a left turn to the Airport transect). Proceed 0.45 miles to an intersection. Stay left on the main road for 1.15 miles to a corral and a fork to the right which leads to the Airport Bench transect. There is a bend in the power line on the left. Stay left and proceed up the main road another 1.7 miles (to the 23rd pole from the bend in the power line) and turn left. Proceed 0.2 miles, passing power pole #365, to a witness post (a green fence post with browse tag #7854) on the left side of the road in a chaining. The transect starts 95 feet south of the witness post. The transect is marked by rebar stakes, 1 to 2 ½ feet in height.





Map Name: Deadman Canyon

Diagrammatic Sketch

Township 13S , Range 11E , Section 19

GPS: NAD 27, UTM 12S 4391637 N, 522924 E

DISCUSSION

Deadman - Trend Study No. 11B-1

Located near the mouth of Deadman Canyon, the Deadman trend study samples winter range on the bench lands northeast of Price and south of the Book Cliffs. Much of the area (managed by the BLM Price River Resource Area) was chained and seeded in 1965-66. Since the treatment, young surviving pinyon and juniper trees have resumed dominance of the area. Wood cutting (chained wood only) and Christmas tree cutting is allowed on the chained area. The site elevation is 6,600 feet with a slope of 3-4% on a southern exposure. The study is near Deadman Creek, which only contains water seasonally. It drains south into the Price River. Human activity is high with numerous roads making the area very accessible. There is also activity associated with the coal mines located farther up the canyon. This area lies within the Coal Creek allotment which is grazed by cattle from mid-April to the end of May and again during the month of October. Wildlife use appears to have declined since 1994. Quadrat frequency of deer and rabbit pellet groups were high in 1994 at 42% for deer and 44% for rabbit, then dropped dramatically in 2000 to 23% for rabbit and 15% for deer. A pellet group transect read on site in 2000 provided an estimate of only 19 deer use days/acre (47 ddu/ha). In 2005, the estimated pellet group data estimated 60 deer and 2 cow days use/acre (149 ddu/ha and 4 cdu/ha).

Soil texture is a sandy loam with a mildly alkaline pH of 7.5. The soil appears moderately deep overall with an effective rooting depth estimated at almost 15 inches. Rock and pavement are common on the surface and within the profile with most of the rock concentrated in the upper 8 inches. Much of the rock contains a calcium carbonate coating and some areas have developed a weak hardpan at a depth of about 12 inches. There is also some exposed sandstone bedrock in the area. There is a fair amount of litter protecting the soil surface, much of it is large persistent litter from the chaining. However, there are large areas of bare soil in the shrub and tree interspaces. Erosion does not appear to be a problem, even with large amounts of bare soil. Phosphorus could be a limiting factor at only 4.3 ppm, values less than 6 ppm may limit normal plant growth and development in wildland soils (Tiedemann and Lopez 2004). The erosion condition class determined soil movement as stable in 2005.

The most abundant key browse species is true mountain mahogany. Mahogany cover was 1% in 1994 and 2% in 2000 with an estimated density of 100 plants/acre in both 1994 and 2000. In 2005, mahogany cover was only 1% with an estimated density of 80 plants/acre. These plants have spread naturally into the area. The majority of the mountain mahogany encountered were vigorous mature plants that showed only light to moderate use in 1986 and 1994. However, use was heavy on 60% of the plants sampled in 2000 and 100% of the plants in 2005. In past studies, the tallest portions of these plants were growing out of reach of browsing animals, allowing their bushy growth habit provides good amounts of available forage, but in 2005 the plants averaged less than 4 feet in height. Important browse species that were seeded when the area was chained, include fourwing saltbush and bitterbrush. Individuals of these species are widely scattered and are mostly older plants. They do not appear to be reproducing although the plants are vigorous and putting on good growth. A few mountain big sagebrush occur in the area and the first plants sampled in density measurements occurred in 2005 with an estimated 20 young plants/acre. Green ephedra has been vigorous with an estimated density of 160 plants/acre in 2000 and 320 plants/acre in 2005. Use was very heavy in 2000 with 75% of the plants sampled showing heavy use, but this decreased to 87% showing light use in 2005.

Broom snakeweed is the most abundant shrub on the site with a density that has increased from zero in 1986 to 760 plants/acre in 1994, and 9,380 plants/acre by 2000. By 2005, the snakeweed population had decreased to 520 plants/acre. Before the 2005 study, most of the population (87%) was mature, but young plants were common with the potential for population increase. In 2005, only 4% of the population was mature and 92% was young. This 94% decline in population was likely a product of drought and the increasing pinyon and juniper cover. Pinyon and juniper have dominated the overstory by providing combined cover of 8% in 1994, 12% in 2000, and over 27% in 2005. As pinyon and juniper cover increases, the understory cover decreases

(Tausch and West 1994). There has been evidence of light browsing of juniper. Both the juniper and pinyon appear to be resuming their dominance of the site. Point-quarter data from 2000 estimated 104 pinyon and 183 juniper trees/acre with an average diameter of 3.6 and 2.1 inches, respectively. Point-quarter data from 2005 estimated 118 pinyon and 213 juniper trees/acre with an average diameter of 5.4 and 4.3 inches, respectively. Nearly all of the pinyon and juniper appear to have been released by the chaining. This area needs to be retreated to reduce the pinyon-juniper competition. Pinyon and juniper trees may still small enough to be treated by a roller-chopper.

The seeding of crested wheatgrass established a fair stand, but began declining between 2000 and 2005. In 1986 crested wheatgrass was sampled in 97% of the quadrats, but was only found in 16% of the quadrats in 2005. Plants are scattered in small patches, are small in stature, and only provided 5% cover in 1994, 4% in 2000, and <1% in 2005.

A wide variety of forbs are found on the site, although none provide significant forage. All forbs combined, on average provide less than 3% cover. Seeded alfalfa was encountered in 8 quadrats in 1986 ,but significantly declined in nested frequency by 1994. It was not sampled in 2000 and 2005, and apparently died due to the extended drought and increased competition of pinyon and juniper trees. The pinyon-juniper cover has begun to inhibit growth of the understory species.

1986 APPARENT TREND ASSESSMENT

In terms of providing important winter forage for deer, this area appears to have an overall downward trend as pinyon and juniper increase in size. Much of the mountain mahogany has become unavailable due to height. Browse reproduction and variety are encouraging signs for this site to become good winter range. Management should strive to maintain the mountain mahogany and other browse species. Continued removal of the increasing pinyon-juniper with firewood and Christmas tree harvest is desirable. The soil is in good condition and trend appears stable.

1994 TREND ASSESSMENT

With the continuing drought, trend for soil is down with the increase in percent bare ground, a decrease in litter cover, and a significant decrease in crested wheatgrass. Key browse species are in low numbers, with the increaser broom snakeweed the most numerous shrub. However, the browse trend is stable. Trend for the herbaceous understory is downward as the majority of the cover is contributed by crested wheatgrass which has decreased significantly in nested frequency since 1986. The Desirable Components Index score was poor due to very low browse cover and only moderate to poor perennial grass and forb cover.

TREND ASSESSMENT
soil - down (-2)
browse - stable (0)
herbaceous understory - down (-2)
winter range condition (DC Index) - Poor (16) Lower Potential scale

2000 TREND ASSESSMENT

Trend for soil appears stable. Percent cover of bare ground increased slightly, but the ratio of bare soil to protective cover is almost unchanged. Relative cover of vegetation, litter and bare ground have remained similar between readings. There is some erosion occurring but it is minimized by the gentle terrain. Herbaceous vegetation is not abundant but sum of nested frequency for perennial grasses has remained similar to 1994. Trend for browse is down. Use of the preferred browse species, mountain mahogany, rubber rabbitbrush, and green ephedra is extremely high. In addition, percent decadency and plants with poor vigor

has increased for rubber rabbitbrush and green ephedra, and density of the increaser broom snakeweed has exploded from 760 plants/acre in 1994 to 9,380 in 2000. Pinyon and juniper trees are also increasing in size and density. Point-quarter data from 2000 estimate 104 pinyon and 183 juniper trees/acre with an average diameter of 3.6 and 2.1 inches, respectively. Nearly all of the pinyon and juniper trees appear to have been released by the chaining since only 5% of the trees sampled were surviving chained trees. These trees currently account for 55% of the total vegetation cover and produce 12% overhead canopy cover. Key browse species are low in number and without some sort of retreatment of the site to control pinyon and juniper, this area will no longer contain enough useful browse forage to be considered an important winter range. Trend for perennial grasses appears stable with similar sum of nested frequency values compared to 1994. Sum of nested frequency of perennial forbs has declined slightly but forbs were never very abundant. Overall, the herbaceous trend is considered stable but in poor condition. Herbaceous forage is limited with grasses and forbs combining to produce only 6% cover. The DCI score continued to be poor.

TREND ASSESSMENT
soil - stable (0)
browse - down (-2)
herbaceous understory - stable (0)
winter range condition (DC Index) - Poor (15) Lower Potential scale

2005 TREND ASSESSMENT

The trend for soil is stable. The ratio of protective ground cover (vegetation, litter and cryptogams) to bare ground has not changed from 2000 to 2005. The browse trend is slightly down. From 2000 to 2005, pinyon and juniper increased in cover from 13% to 16%. The combined canopy cover of pinyon and juniper increased from 12% in 2000 to 27% in 2005. This increase in pinyon-juniper cover has caused a steady decrease in the already low cover for understory species, both herbaceous and browse. Mahogany density decreased with all of the population shifting from mature to decadent individuals. The average height and crown width decreased over a foot from 2000 to 2005. This is likely due to an increase in use from 60% heavy use in 2000 to 100% in 2005. Rubber rabbitbrush density also declined. The ephedra population increased from 160 to 320 plants/acre from 2000 to 2005, a 50% increase. As well, the percentage of mature individuals increased from 63% to 81% of the population and the percentage of decadent individuals decreased from 25 to 13%. The herbaceous understory trend is down. The perennial grass nested frequency decreased 81% from 2000 to 2005. The perennial forb nested frequency increased 55%, but the loss of perennial grasses is greater than the gain of perennial forbs. Besides, perennial grasses are of greater importance on winter range. The DCI score decreased to very poor due to decreases in browse and perennial grass covers.

TREND ASSESSMENT
soil - stable (0)
browse - slightly down (-1)
herbaceous understory - down (-2)
winter range condition (DC Index) - Very Poor (8) Lower Potential scale

HERBACEOUS TRENDS --
Management unit 11B, Study no: 1

Type	Species	Nested Frequency				Average Cover %		
		'86	'94	'00	'05	'94	'00	'05
G	Agropyron cristatum	$_{c}$292	$_{b}$223	$_{b}$237	$_{a}$37	5.12	4.13	.13
G	Aristida purpurea	-	4	1	-	.03	.15	-
G	Bouteloua gracilis	-	-	-	1	-	-	.00
G	Oryzopsis hymenoides	8	8	10	8	.08	.08	.01
Total for Annual Grasses		0	0	0	0	0	0	0
Total for Perennial Grasses		300	235	248	46	5.24	4.36	0.15
Total for Grasses		300	235	248	46	5.24	4.36	0.15
F	Arabis perennans	$_{b}$16	$_{a}$-	$_{a}$-	$_{a}$-	-	-	-
F	Astragalus convallarius	5	-	1	-	.00	.00	-
F	Chenopodium fremontii (a)	-	$_{a}$2	$_{a}$-	$_{b}$86	.00	-	.27
F	Cryptantha fulvocanescens	$_{a}$43	$_{a}$44	$_{ab}$51	$_{b}$72	.58	1.02	.58
F	Descurainia pinnata (a)	-	$_{a}$5	$_{a}$-	$_{b}$21	.01	-	.28
F	Eriogonum alatum	-	-	4	-	-	.01	.00
F	Eriogonum cernuum (a)	-	$_{a}$-	$_{a}$-	$_{b}$104	-	-	.43
F	Eriogonum umbellatum	19	16	15	9	.09	.13	.04
F	Euphorbia fendleri	$_{b}$80	$_{a}$24	$_{a}$30	$_{a}$14	.07	.11	.03
F	Gilia sp. (a)	-	-	-	3	-	-	.00
F	Hedysarum boreale	5	-	-	-	-	-	-
F	Ipomopsis aggregata	3	8	-	8	.01	-	.07
F	Lappula occidentalis (a)	-	-	-	1	-	-	.00
F	Lesquerella ludoviciana	$_{a}$-	$_{b}$21	$_{a}$2	$_{a}$3	.10	.00	.03
F	Lithospermum multiflorum	2	2	-	1	.01	-	.03
F	Machaeranthera canescens	$_{a}$-	$_{b}$20	$_{a}$1	$_{a}$3	.12	.00	.04
F	Machaeranthera grindelioides	4	5	-	-	.01	-	-
F	Medicago sativa	$_{b}$18	$_{ab}$5	$_{a}$-	$_{a}$-	.04	-	-
F	Penstemon caespitosus	-	3	-	-	.01	-	-
F	Penstemon cyanocaulis	$_{a}$31	$_{a}$27	$_{a}$14	$_{b}$96	.16	.09	1.51
F	Salsola iberica (a)	-	$_{c}$77	$_{b}$-	$_{b}$16	.82	-	.04
F	Sphaeralcea coccinea	$_{a}$5	$_{b}$20	$_{ab}$15	$_{b}$19	.11	.22	.03
F	Townsendia incana	$_{b}$14	$_{ab}$7	$_{ab}$12	$_{a}$-	.01	.03	-
Total for Annual Forbs		0	84	0	231	0.84	0	1.03
Total for Perennial Forbs		245	202	145	225	1.36	1.64	2.40
Total for Forbs		245	286	145	456	2.21	1.64	3.43

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

BROWSE TRENDS --
Management unit 11B, Study no: 1

Type	Species	Strip Frequency			Average Cover %		
		'94	'00	'05	'94	'00	'05
B	Artemisia tridentata vaseyana	0	0	1	-	-	.00
B	Cercocarpus montanus	5	5	3	1.46	2.04	1.37
B	Chrysothamnus nauseosus hololeucus	5	7	4	.00	.38	.03
B	Ephedra viridis	4	6	6	.03	.18	.30
B	Gutierrezia sarothrae	14	57	17	.45	1.75	.03
B	Juniperus osteosperma	0	12	12	3.27	5.59	6.90
B	Opuntia sp.	5	5	3	.00	.03	.06
B	Pinus edulis	0	8	7	4.42	7.23	9.59
B	Purshia tridentata	2	1	0	.38	.03	-
Total for Browse		35	101	53	10.03	17.25	18.29

CANOPY COVER, LINE INTERCEPT --
Management unit 11B, Study no: 1

Species	Percent Cover	
	'00	'05
Cercocarpus montanus	-	.70
Chrysothamnus nauseosus hololeucus	-	.03
Ephedra viridis	-	.93
Gutierrezia sarothrae	-	.10
Juniperus osteosperma	5.00	9.36
Pinus edulis	6.59	17.73

KEY BROWSE ANNUAL LEADER GROWTH --
Management unit 11B, Study no: 1

Species	Average leader growth (in)
	'05
Cercocarpus montanus	0.5

POINT-QUARTER TREE DATA --
Management unit 11B, Study no: 1

Species	Trees per Acre	
	'00	'05
Juniperus osteosperma	184	213
Pinus edulis	105	118

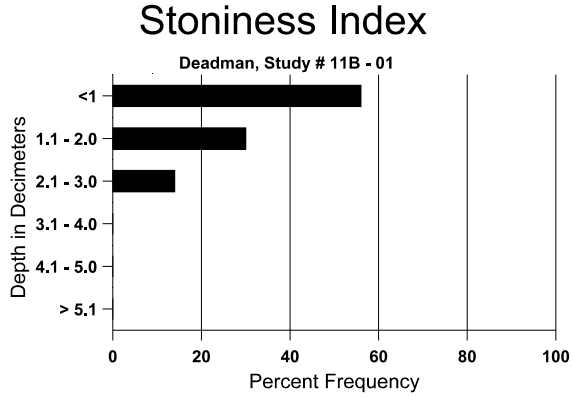
Average diameter (in)	
'00	'05
2.1	4.3
3.6	5.4

BASIC COVER --
Management unit 11B, Study no: 1

Cover Type	Average Cover %			
	'86	'94	'00	'05
Vegetation	6.25	17.24	25.72	20.64
Rock	2.25	8.81	9.61	8.77
Pavement	10.00	4.03	9.95	8.51
Litter	58.25	30.11	34.09	36.68
Cryptogams	0	.18	.13	.53
Bare Ground	23.25	29.17	37.48	41.76

SOIL ANALYSIS DATA --
Herd Unit 11B, Study # 1, Study Name: Deadman

Effective rooting depth (in)	Temp °F (depth)	pH	%sand	%silt	%clay	%0M	ppm P	ppm K	dS/m
14.9	52.4 (14.1)	7.5	57.3	24.7	18.0	2.6	4.3	70.4	0.8



PELLET GROUP DATA --
Management unit 11B, Study no: 1

Type	Quadrat Frequency			Days use per acre (ha)	
	'94	'00	'05	'00	'05
Sheep	-	1	-	-	-
Rabbit	44	23	49	-	-
Elk	5	-	-	-	-
Deer	42	15	23	19 (47)	60 (149)
Cattle	-	2	-	3 (7)	2 (4)

BROWSE CHARACTERISTICS --
Management unit 11B, Study no: 1

		Age class distribution (plants per acre)					Utilization					
Year	Plants per Acre (excluding seedlings)	Seedling	Young	Mature	Decadent	Dead	% moderate	% heavy	% decadent	% dying	% poor vigor	Average Height Crown (in)
Artemisia tridentata vaseyana												
86	**0**	-	-	-	-	-	0	0	-	-	0	-/-
94	**0**	-	-	-	-	-	0	0	-	-	0	6/5
00	**0**	-	-	-	-	-	0	0	-	-	0	29/62
05	**20**	20	20	-	-	-	0	0	-	-	0	-/-
Cercocarpus montanus												
86	**233**	33	33	200	-	-	29	0	0	-	0	83/29
94	**100**	-	-	100	-	-	40	0	0	-	0	59/78
00	**100**	-	-	100	-	-	20	60	0	-	0	56/65
05	**80**	20	-	-	80	-	0	100	100	-	0	42/48
Chrysothamnus nauseosus hololeucus												
86	**0**	-	-	-	-	-	0	0	0	-	0	-/-
94	**100**	-	-	100	-	-	0	0	0	-	0	21/21
00	**140**	100	20	60	60	-	14	57	43	29	29	24/12
05	**80**	-	-	40	40	20	0	100	50	50	50	16/21
Ephedra viridis												
86	**0**	-	-	-	-	-	0	0	0	-	0	-/-
94	**180**	-	100	80	-	-	0	0	0	-	0	24/30
00	**160**	-	20	100	40	-	13	75	25	-	13	31/35
05	**320**	-	20	260	40	-	13	0	13	-	0	31/40
Gutierrezia sarothrae												
86	**0**	-	-	-	-	-	0	0	0	-	0	-/-
94	**760**	40	20	740	-	-	0	0	0	-	0	8/8
00	**9380**	120	860	8180	340	180	0	0	4	1	1	6/5
05	**520**	80	480	20	20	80	0	4	4	4	4	3/5

		Age class distribution (plants per acre)					Utilization					
Year	Plants per Acre (excluding seedlings)	Seedling	Young	Mature	Decadent	Dead	% moderate	% heavy	% decadent	% dying	% poor vigor	Average Height Crown (in)
Juniperus osteosperma												
86	**200**	-	100	100	-	-	33	17	-	-	0	122/67
94	**0**	-	-	-	-	-	0	0	-	-	0	-/-
00	**260**	-	180	80	-	20	0	0	-	-	0	-/-
05	**400**	-	220	180	-	80	0	0	-	-	0	-/-
Opuntia sp.												
86	**0**	-	-	-	-	-	0	0	0	-	0	-/-
94	**140**	-	-	120	20	-	0	0	14	-	0	3/13
00	**180**	20	40	100	40	-	0	0	22	22	22	4/14
05	**80**	-	-	80	-	20	0	0	0	-	0	3/12
Pinus edulis												
86	**166**	-	66	100	-	-	0	0	-	-	0	59/48
94	**0**	-	-	-	-	-	0	0	-	-	0	-/-
00	**180**	-	20	160	-	-	0	0	-	-	0	-/-
05	**140**	-	-	140	-	-	0	0	-	-	14	-/-
Purshia tridentata												
86	**0**	-	-	-	-	-	0	0	-	-	0	-/-
94	**60**	-	-	60	-	-	67	0	-	-	0	6/12
00	**20**	-	20	-	-	-	0	0	-	-	0	33/72
05	**0**	-	-	-	-	-	0	0	-	-	0	-/-

Trend Study 11B-2-05

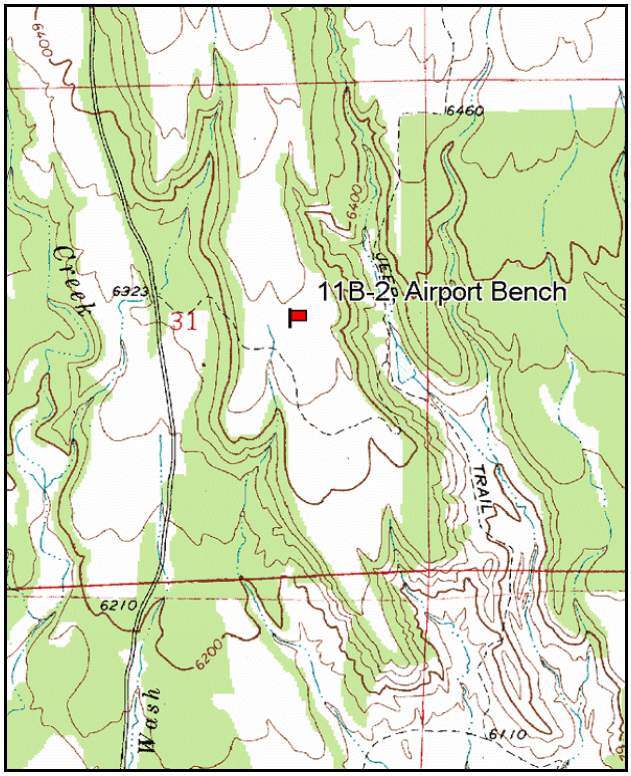
Study site name: Airport Bench . Vegetation type: Chained, Seeded P-J .

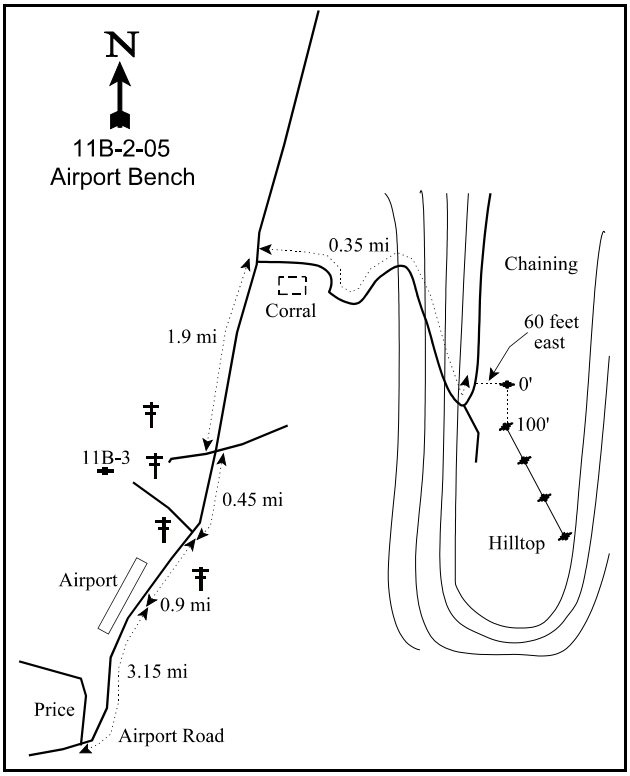
Compass bearing: frequency baseline 170 degrees magnetic.

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

LOCATION DESCRIPTION

Turn east on the Airport Road at the southeast end of Price and go 3.15 miles to the airport. After another 0.9 miles on the main road, you cross under a power line. Continue 0.45 miles to an intersection. Stay left. Go another 1.9 miles and turn right onto a dirt road just beyond a corral. Drive up this rocky road 0.35 miles to a fork on top of the bench. Bear left and go approximately 100 feet. The transect is in the chaining on the right side of the road. The 100-foot end of the baseline is 60 feet east of the road. All transect stakes are 1- to 2-foot tall fence posts.





Map Name: Deadman Canyon

Diagrammatic Sketch

Township 13S , Range llE , Section 31

GPS: NAD 27, UTM 12S 4389026 N, 523587 E

DISCUSSION

Airport Bench - Trend Study No. 11B-2

The Airport Bench study site is located approximately two miles south of the Deadman (11B-1). This bench was also part of the 1965 chaining and seeding project. As part of the same grazing allotment, management is similar except cattle use this area at a different time each year. Vegetation composition and condition has paralleled that of the Deadman study site, with the exception of a much higher cover value for pinyon-juniper on Deadman. The pinyon and juniper on the site were selectively burned in May of 2005 and the site was read in August of that year. The site is at an elevation of 6,400 feet and is nearly level, although the bench top does slope slightly southward. As with the Deadman site (11B-1), human pressure is high because of its proximity and easy access to Price. Evidence of human activity includes wood cutting, ORV tracks, and litter. Deer pellet groups are common. Quadrat frequency of deer pellet groups was high in 1994 at 60% and steadily declined to 17% by 2005. Pellet group transect data taken on the study site baseline in 2000 provided an estimate of 54 deer use days/acre (133 ddu/ha). In 2005, estimated pellet group data was 36 deer and 5 cow days use/acre (88 ddu/ha and 13 cdu/ha).

The soil is compacted, but appears to be fairly deep with an effective rooting depth estimated at 15 inches. It has a sandy clay loam texture which had a relative rock-pavement cover of 16% in 1994, 13% in 2000, and 24% in 2005. Rocks are also common throughout the soil profile. Soil phosphorous was measured at 6.3 ppm, where values less than 6 ppm may limit normal growth and development in wildland soils (Tiedemann and Lopez 2004). Vegetation cover from crested wheatgrass combined with level terrain tends to limited erosion. The erosion condition class determined soil movement as stable in 2005.

As previously mentioned, vegetation composition is quite similar to the Deadman study (11B-1), but desirable browse forage is more limited here. Utah Juniper provided 8% cover in 2000. Trees averaged 8-10 feet in height before the 2005 burn. Point-quarter data from 2000 estimated 211 juniper and 97 pinyon trees/acre with an average diameter of 3.2 and 3.6 inches, respectively. These trees also appeared to have been released by the chaining, since only 10% of the junipers sampled were tipped over surviving chained trees. In 2005 after the fire, point-quarter data estimated 27 pinyon and juniper trees/acre, all of which were 1-4 feet tall.

True mountain mahogany was fairly abundant in 1986 at an estimated 199 plants/acre. These were moderately hedged but vigorous. With the much larger sample size used since 1992, this clumped population was estimated at only 40 plants/acre in 1994 and no plants were encountered in 2000 and 2005. There are some tall mahogany plants scattered throughout the site which appear to be heavily hedged, but much of the forage is unavailable due to height. In 2005, those mahogany which were not heavily burned were heavily hedged. Bitterbrush (seeded) and green Ephedra are uncommon. Most of the bitterbrush seen in the surrounding area were heavily hedged in 2000 and moderately hedged in 2005. Use of ephedra is consistently light to moderate. The only abundant shrub on the site before the burn was broom snakeweed, which increased from 160 plants/acre in 1994 to 3,320 in 2000. In 2005, there were only 340 plants/acre measured, this decline in numbers likely due to the burn treatment.

Crested wheatgrass dominates the herbaceous understory and provided 6% cover in 1994, then increased to 16% in 2000. Other grass species combined provided less <1% every year. After the fire in 2005, the crested wheatgrass had declined drastically to 2% cover and nested frequency was significantly lower than any previous reading. There is also some Indian ricegrass and mutton bluegrass scattered throughout the understory. Perennial forbs are not very common and do not produce significant forage, but increased after the fire from <1% cover 2000 to 3% in 2005. Annual forbs were also positively impacted by the burn. Annual forbs increased from no cover in 2000 to 11% in 2005.

1986 APPARENT TREND ASSESSMENT

Although the site is similar to the Deadman transect in may ways, overall this area appears to be in a slightly worse condition with a downward trend. There are few desirable shrubs, mainly true mountain mahogany. Juniper and pinyon appear to be rapidly increasing. The lack of shrub reproduction may indicate a declining population due to increased competition with the pinyon and juniper. Mean annual precipitation would be less at this lower site, as a result, the trees would have a greater competitive influence on understory composition. The soil trend appears stable.

1994 TREND ASSESSMENT

Comparing the data with 1986, the soil trend is slightly down, as litter cover has declined and percent bare ground has increased substantially. This basic trend has been noted throughout the state because of the prolonged drought. The browse trend is stable to declining and in poor condition because of the low numbers of useful shrubs present. When the young pinyon and juniper trees become more mature, they will have a strong negative effect on the understory browse. A treatment with a roller chopper would be timely and cost effective at this time. The herbaceous understory trend is slightly down with significant decreases in crested wheatgrass nested frequency and a very high occurrence of annual Russian thistle throughout the understory. Together they make up 85% of the total herbaceous understory cover. The Desirable Components Index score was poor due to very low browse cover and only moderate perennial grass cover.

TREND ASSESSMENT
soil - slightly down (-1)
browse - slightly down (-1)
herbaceous understory - slightly down (-1)
winter range condition (DC Index) - Poor (17) Lower Potential scale

2000 TREND ASSESSMENT

Trend for soil appears to be slightly up. The relative percent cover of bare ground declined from 31% down to 21%. Cover of litter and vegetation have both increased substantially. In addition, the dominant crested wheatgrass has increased significantly in nested frequency and cover has more than doubled. Erosion is minimal due to the level terrain combined with the abundant herbaceous cover. Trend for browse is slightly down. The browse composition is poor with few useful shrubs present. The declining trend is based upon an increase in pinyon-juniper cover. Juniper currently provides 82% of the total browse cover and juniper and pinyon have increased in size and density since 1994. Cover has increased from 2% in 1994 to 9% in 2000. Broom snakeweed has increased in density from 160 plants/acre in 1994 to 3,320 by 2000. Trend for the herbaceous understory is slightly up due to an increase in the nested frequency of crested wheatgrass which currently provides 98% of the herbaceous cover. Sum of nested frequency of perennial forbs has declined. However, perennial forbs are limited and produce little useful forage and perennial grasses are more important on this winter range. Russian thistle was also much less abundant. The DCI score increased to fair due to increases in perennial grass cover.

TREND ASSESSMENT
soil - slightly up (+1)
browse - slightly down (-1)
herbaceous understory - slightly up (+1)
winter range condition (DC Index) - Fair (31) Lower Potential scale

2005 TREND ASSESSMENT

The trend for soil is stable. Protective ground cover decreased slightly due to the burn and relative bare ground increased from 21% to 28%. The 2005 erosion condition class rated the soil as stable. The trend for browse is slightly up, due to the reduction of pinyon and juniper from the fire. The key browse species on the site since 2000 has been green ephedra. The population of green ephedra decreased 75% (60 plants/acre). However, 240 young Wyoming big sagebrush plants/acre were estimated to occur on the site. No sagebrush had previously been sampled. A very small stable population of fourwing saltbush remains on the site. The broom snakeweed population declined substantially from 3,320 plant/acre in 2000 to 340 in 2005. This decline may be due to the burn, although the population may increase again because of the lack of competition from other shrub species. The largest improvement on the browse component was the decrease in pinyon-juniper cover caused by the fire. Combined pinyon-juniper cover was 9% in 2000 and decreased to 1% in 2005. The herbaceous understory trend is down. This trend decline is due mainly to an overwhelming 11-fold increase in the nested frequency of annual forbs from 2000 to 2005 coupled with a 64% decrease in the nested frequency of perennial grasses, particularly crested wheatgrass. The annual species that increased were dominated by weedy species like annual stickseed and Russian thistle. Despite the decline in perennial grasses and the increase in annual forbs, the nested frequency of perennial forbs increased substantially. Perennial forbs on this site are of secondary importance to perennial grasses. The DCI score decreased to poor due to decreases in perennial grass cover.

TREND ASSESSMENT
soil - stable (0)
browse - slightly up (+1)
herbaceous understory - down (-2)
winter range condition (DC Index) - Poor (14) Lower Potential scale

HERBACEOUS TRENDS --
Management unit 11B, Study no: 2

Type	Species	Nested Frequency				Average Cover %		
		'86	'94	'00	'05	'94	'00	'05
G	Agropyron cristatum	$_{c}$302	$_{b}$240	$_{c}$298	$_{a}$93	6.41	16.37	2.44
G	Agropyron intermedium	-	-	-	-	-	-	.01
G	Oryzopsis hymenoides	16	42	28	19	.72	.11	.45
G	Poa fendleriana	6	-	-	-	-	-	-
G	Sitanion hystrix	-	-	-	5	-	-	.09
Total for Annual Grasses		0	0	0	0	0	0	0
Total for Perennial Grasses		324	282	326	117	7.13	16.48	3.00
Total for Grasses		324	282	326	117	7.13	16.48	3.00
F	Chenopodium fremontii (a)	-	$_{a}$-	$_{a}$-	$_{b}$13	-	-	.23
F	Chenopodium leptophyllum(a)	-	-	-	6	-	-	.04
F	Cirsium sp.	-	-	-	-	-	-	.03
F	Collinsia parviflora (a)	-	-	-	3	-	-	.00
F	Cryptantha fulvocanescens	8	17	9	6	.21	.07	.17
F	Descurainia pinnata (a)	-	$_{a}$11	$_{a}$-	$_{b}$74	.03	-	.66

Type	Species	Nested Frequency				Average Cover %		
		'86	'94	'00	'05	'94	'00	'05
F	Eriogonum cernuum (a)	-	$_{a}$-	$_{a}$1	$_{b}$185	-	.00	5.49
F	Eriogonum ovalifolium	-	8	1	4	.07	.00	.04
F	Eriogonum umbellatum	$_{b}$19	$_{ab}$17	$_{a}$-	$_{a}$-	.03	-	-
F	Euphorbia fendleri	$_{ab}$10	$_{b}$24	$_{a}$9	$_{ab}$23	.26	.04	.73
F	Gayophytum ramosissimum(a)	-	-	-	2	-	-	.03
F	Ipomopsis aggregata	-	1	-	-	.00	-	-
F	Lappula occidentalis (a)	-	$_{a}$-	$_{a}$-	$_{b}$85	-	-	.52
F	Lactuca serriola	-	-	-	6	-	-	.04
F	Lesquerella sp.	$_{a}$-	$_{ab}$6	$_{b}$14	$_{ab}$1	.03	.03	.01
F	Lithospermum incisum	2	7	4	3	.08	.03	.04
F	Linum lewisii	-	-	-	-	-	-	.00
F	Malcolmia africana	-	-	-	3	-	-	.03
F	Machaeranthera canescens	$_{a}$-	$_{ab}$4	$_{a}$3	$_{b}$15	.04	.00	.64
F	Medicago sativa	$_{b}$11	$_{ab}$9	$_{ab}$2	$_{a}$-	.02	.03	-
F	Penstemon cyanocaulis	$_{a}$2	$_{b}$50	$_{a}$2	$_{b}$38	.34	.01	1.11
F	Salsola iberica (a)	-	$_{c}$263	$_{a}$4	$_{b}$186	5.12	.00	3.72
F	Sisymbrium altissimum (a)	-	-	-	12	-	-	.73
F	Tragopogon dubius	-	-	-	8	-	-	.04
Total for Annual Forbs		0	274	5	566	5.15	0.00	11.45
Total for Perennial Forbs		52	143	44	107	1.10	0.23	2.90
Total for Forbs		52	417	49	673	6.26	0.24	14.35

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

BROWSE TRENDS --
Management unit 11B, Study no: 2

Type	Species	Strip Frequency			Average Cover %		
		'94	'00	'05	'94	'00	'05
B	Artemisia tridentata wyomingensis	0	0	3	-	-	.03
B	Atriplex canescens	0	1	2	-	.15	.88
B	Cercocarpus montanus	2	0	0	.18	-	-
B	Chrysothamnus nauseosus	0	1	0	-	-	.03
B	Chrysothamnus viscidiflorus viscidiflorus	0	1	1	-	-	-
B	Ephedra viridis	2	2	1	-	.00	.53
B	Gutierrezia sarothrae	2	31	12	-	.73	1.21
B	Juniperus osteosperma	0	11	2	1.77	8.03	1.00
B	Opuntia sp.	1	1	0	-	-	-
B	Pinus edulis	0	1	0	-	.88	-
Total for Browse		7	49	21	1.95	9.80	3.69

CANOPY COVER, LINE INTERCEPT --
Management unit 11B, Study no: 2

Species	Percent Cover	
	'00	'05
Atriplex canescens	-	1.31
Chrysothamnus viscidiflorus viscidiflorus	-	.28
Ephedra viridis	-	1.08
Gutierrezia sarothrae	-	1.14
Juniperus osteosperma	4.19	.76

KEY BROWSE ANNUAL LEADER GROWTH --
Management unit 11B, Study no: 2

Species	Average leader growth (in)
	'05
Cercocarpus montanus	4.3

POINT-QUARTER TREE DATA --
Management unit 11B, Study no: 2

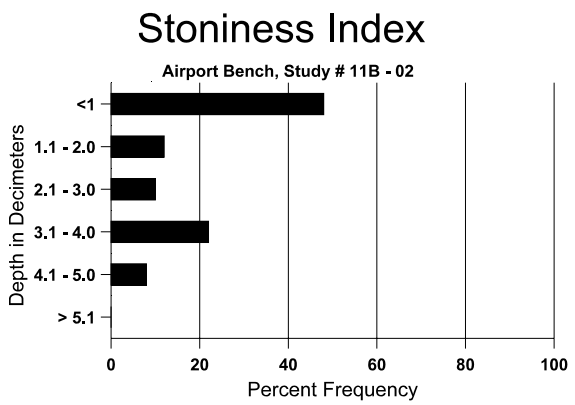
Species	Trees per Acre		Average diameter (in)	
	'00	'05	'00	'05
Juniperus osteosperma	211	27	3.2	1.8
Pinus edulis	97	-	3.6	-

BASIC COVER --
Management unit 11B, Study no: 2

Cover Type	Average Cover %			
	'86	'94	'00	'05
Vegetation	14.00	14.85	26.38	19.81
Rock	5.25	7.11	3.84	3.25
Pavement	10.25	5.91	11.58	22.76
Litter	51.25	28.81	45.04	31.90
Cryptogams	0	0	.04	0
Bare Ground	19.25	24.90	23.78	30.25

SOIL ANALYSIS DATA --
Herd Unit 11B, Study # 2, Study Name: Airport Bench

Effective rooting depth (in)	Temp °F (depth)	pH	%sand	%silt	%clay	%0M	ppm P	ppm K	dS/m
15.0	52.4 (16.2)	7.5	54.0	22.0	24.0	3.9	6.3	147.2	0.7



PElLET GROUP DATA --
Management unit 11B, Study no: 2

Type	Quadrat Frequency		
	'94	'00	'05
Rabbit	58	30	31
Elk	3	-	1
Deer	60	42	17
Cattle	6	5	2

Days use per acre (ha)	
'00	'05
-	-
-	-
55 (134)	36 (88)
1 (2)	5 (13)

BROWSE CHARACTERISTICS --
Management unit 11B, Study no: 2

		Age class distribution (plants per acre)					Utilization					
Year	Plants per Acre (excluding seedlings)	Seedling	Young	Mature	Decadent	Dead	% moderate	% heavy	% decadent	% dying	% poor vigor	Average Height Crown (in)
Artemisia tridentata wyomingensis												
86	**0**	-	-	-	-	-	0	0	-	-	0	-/-
94	**0**	-	-	-	-	-	0	0	-	-	0	-/-
00	**0**	-	-	-	-	-	0	0	-	-	0	-/-
05	**240**	40	240	-	-	-	0	0	-	-	0	7/6
Atriplex canescens												
86	**0**	-	-	-	-	-	0	0	-	-	0	-/-
94	**0**	-	-	-	-	-	0	0	-	-	0	-/-
00	**20**	-	-	20	-	-	100	0	-	-	0	22/46
05	**40**	-	20	20	-	-	0	0	-	-	0	56/91
Cercocarpus montanus												
86	**199**	-	66	133	-	-	100	0	-	-	0	63/39
94	**40**	-	-	40	-	-	0	0	-	-	0	46/45
00	**0**	-	-	-	-	-	0	0	-	-	0	60/71
05	**0**	-	-	-	-	-	0	0	-	-	0	47/51
Chrysothamnus nauseosus												
86	**0**	-	-	-	-	-	0	0	-	-	0	-/-
94	**0**	-	-	-	-	-	0	0	-	-	0	-/-
00	**80**	40	80	-	-	20	0	0	-	-	0	22/21
05	**0**	-	-	-	-	-	0	0	-	-	0	-/-
Chrysothamnus viscidiflorus viscidiflorus												
86	**0**	-	-	-	-	-	0	0	-	-	0	-/-
94	**0**	-	-	-	-	-	0	0	-	-	0	-/-
00	**20**	-	-	20	-	-	0	0	-	-	0	5/7
05	**60**	-	60	-	-	-	0	0	-	-	0	18/15

		Age class distribution (plants per acre)					Utilization					
Year	Plants per Acre (excluding seedlings)	Seedling	Young	Mature	Decadent	Dead	% moderate	% heavy	% decadent	% dying	% poor vigor	Average Height Crown (in)
Echinocereus sp.												
86	**0**	-	-	-	-	-	0	0	-	-	0	-/-
94	**0**	-	-	-	-	-	0	0	-	-	0	-/-
00	**0**	-	-	-	-	-	0	0	-	-	0	6/18
05	**0**	-	-	-	-	-	0	0	-	-	0	-/-
Ephedra viridis												
86	**0**	-	-	-	-	-	0	0	0	-	0	-/-
94	**100**	-	20	60	20	-	0	0	20	-	0	39/59
00	**80**	-	-	80	-	-	25	0	0	-	0	32/48
05	**20**	-	-	20	-	-	0	0	0	-	0	37/63
Gutierrezia sarothrae												
86	**0**	-	-	-	-	-	0	0	0	-	0	-/-
94	**160**	-	-	80	80	-	0	0	50	-	0	9/10
00	**3320**	200	20	3160	140	300	0	0	4	3	3	5/6
05	**340**	-	-	340	-	-	0	0	0	-	0	13/20
Juniperus osteosperma												
86	**199**	-	133	66	-	-	0	0	0	-	0	31/30
94	**0**	-	-	-	-	-	0	0	0	-	0	-/-
00	**240**	-	100	120	20	-	0	0	8	-	8	-/-
05	**40**	-	20	-	20	160	0	0	50	50	50	-/-
Opuntia sp.												
86	**0**	-	-	-	-	-	0	0	-	-	0	-/-
94	**20**	-	-	20	-	-	0	0	-	-	0	4/13
00	**40**	-	-	40	-	-	0	0	-	-	0	4/18
05	**0**	-	-	-	-	-	0	0	-	-	0	3/14
Pinus edulis												
86	**66**	-	-	66	-	-	0	0	-	-	0	87/70
94	**0**	-	-	-	-	-	0	0	-	-	0	-/-
00	**20**	-	20	-	-	-	0	0	-	-	0	-/-
05	**0**	-	-	-	-	20	0	0	-	-	0	-/-
Purshia tridentata												
86	**200**	-	-	200	-	-	33	0	-	-	0	31/45
94	**0**	-	-	-	-	-	0	0	-	-	0	26/47
00	**0**	-	-	-	-	-	0	0	-	-	0	24/69
05	**0**	-	-	-	-	-	0	0	-	-	0	52/88

Trend Study 11B-3-05

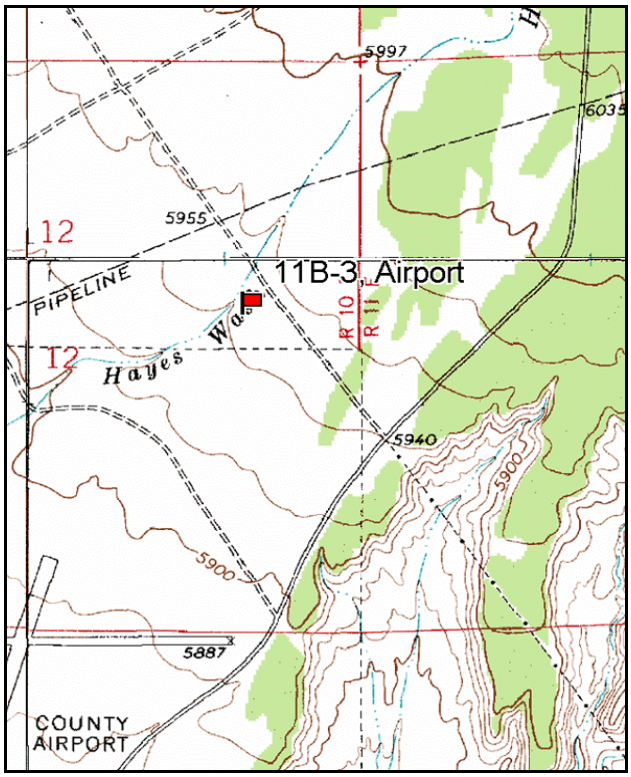
Study site name: Airport . Vegetation type: Chained, Seeded P-J .

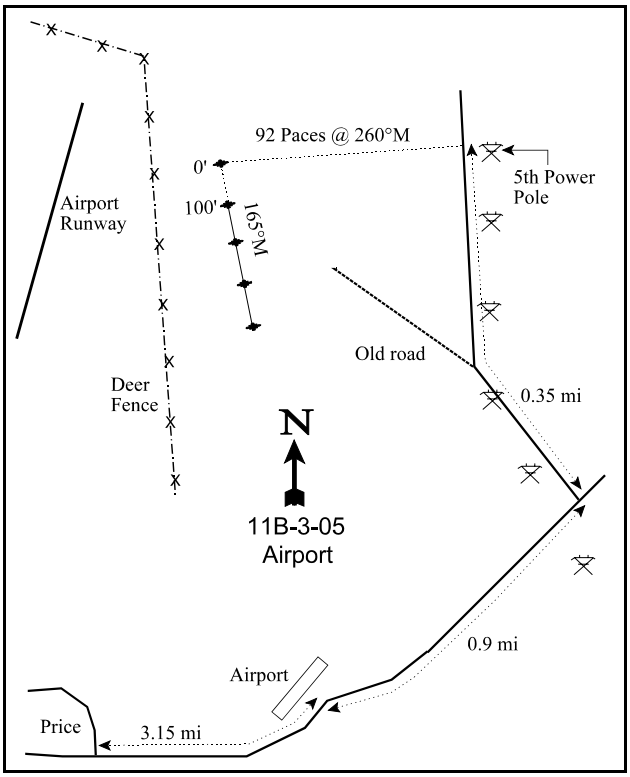
Compass bearing: frequency baseline 165 degrees magnetic.

Frequency belt placement: line 1 (11 & 95ft), line 2 (34ft), line 3 (51ft), line 4 (71ft).

LOCATION DESCRIPTION

From the intersection of Main Street and the Airport Road in Price, go 3.15 miles to the airport. Continue on the paved road 0.9 miles past the Carbon County Airport to a point where two power lines cross the road and there is a dirt road turning off to the left. Turn on this road and follow the power line 0.35 miles to the fifth wooden pole. Stop here. Walk west 92 paces @ 260°M to the start of the baseline, a rebar tagged #7891.





Map Name: Wellington

Diagrammatic Sketch

Township 14S , Range l0E , Section 12

GPS: NAD 27, UTM 12S 4385891 N, 522162 E

DISCUSSION

Airport - Trend Study No. 11B-3

This study site is located on a sagebrush flat one mile north and slightly east of the Carbon County Airport. The large flat extends several miles north to the higher benches and mesas of the West Tavaputs Plateau. Elevation on the flat is 5,950 feet. Mature juniper stands border the east side. This area was dominated by Wyoming big sagebrush with scattered Juniper and then was chained and drill seeded with crested wheatgrass in 1965-66 by the BLM. Now the area supports a moderately low density of Wyoming big sagebrush with a crested wheatgrass understory. Sometime after the 1994 reading, the Carbon County Airport was expanded with a longer runway. A large deer fence now encloses the airport and is only about 300 feet west of the study site, which may concentrate more deer use on the site. Quadrat frequency of deer pellet groups was quite low in 1994 at only 8%. In 2000, frequency increased to 22% and 18% in 2005, which is still moderately low. A pellet group transect read along the baseline in 2000 provided an estimated 23 deer days use/acre (57 ddu/ha). All of the deer pellet groups appeared to be from winter use. As part of the Hayes Wash allotment, this area is grazed by 61 cattle from mid-October to the end of May. Utilization of the crested wheatgrass appeared to be moderate to heavy in 1986, but light in 2000 with only a few old cattle pats encountered. In 2005, pellet group data estimated 27 deer and 10 cow days use/acre (68 ddu/ha and 25 cdu/ha). Half of the deer pellets were from winter and half from spring. The cow pats were all from winter. Deer bones were found on the site in 2005.

The soil is moderately deep with an effective rooting depth of just over 14 inches. Depth is limited in some areas by a hardpan at about 7 inches in depth which could restrict the density of adult Wyoming sagebrush. The soil has a sandy clay loam texture with a slightly alkaline pH of 7.8. Phosphorus levels were measured at 7.5 ppm, where values below 6 ppm may hinder normal plant growth and development in wildland soils (Tiedemann and Lopez 2004). Organic matter is low at only 1%, which is the lowest reading on the entire unit. Small gravel is common within the profile and concentrated on the surface, indicating soil loss in the past. Some of the gravel is coated with white calcium-carbonate. No gullies are evident. Rows of seeded crested wheatgrass are contoured to the slight slope which limits erosion and also helps the buildup of litter. Windrowed piles of juniper and sagebrush are remnants of the pre-treatment of the flat. The erosion condition class determined soil movement as stable in 2005.

The site has supported a moderate stand of Wyoming big sagebrush with just over 1,000 plants/acre estimated in 1986 and 1994, which increased to 2,280 plants/acre in 2000, and continued to increase to 3,180 plants/acre in 2005. Sagebrush cover increased from 4-5% in 1995 and 2000 to 9% in 2005. Forty-seven percent of the plants sampled were decadent in 1986, but this decreased to only 14% by 1994, 11% in 2000, and 8% in 2005. Recruitment in the form of seedlings and young is excellent. In 2000, 32% of the population consisted of young plants, indicating an expanding population. This percentage increased in 2005 to 57% of the population. Use of sagebrush was extremely heavy in 1986, 88% of the plants sampled were heavily hedged. On some plants, the new growth was short and unavailable due to the clubbed aspect of the plant. Use was much lighter in 1994, with only 2% of the sagebrush displaying heavy use. During the 2000 and 2005 readings, use was mostly light to moderate with only 4% of the plants sampled displaying heavy use. Some sagebrush on this site display characteristics of black sagebrush (*Artemisia nova*), and mountain big sagebrush (*Artemisia tridentata vaseyana*). There is obviously some hybridizing occurring between the sagebrush subspecies. Plants with the heaviest use appeared to have more characteristics of mountain big sagebrush, which is the most palatable of the sagebrush subspecies.

Other preferred browse plants include a few green ephedra and fourwing saltbush. Broom snakeweed had been the most numerous shrub on the site and, similar to other trend sites in the area, it had increased in density by 2005. Density was estimated at only 266 plants/acre in 1986 which increased to 420 by 1994. In 2000, the population had exploded to 8,940 plants/acre. In 2005, this population had declined to 1,460 plants/acre.

Crested wheatgrass had completely dominated the herbaceous component by providing almost 100% of the herbaceous understory cover, until a large dieoff occurred between 2000 and 2005. Crested wheatgrass cover decreased from 16% in 2000 to less than 1% in 2005. The reduction of crested wheatgrass is likely due to precipitation levels at 75% of normal from 2001-03. Other grass species are uncommon. Forbs are limited and have provided little forage except during wet, favorable springs, which occurred in 2005. Total forb cover increased from less than 2% in 2000 to nearly 13% in 2005. Annual forbs provided over 7% cover in 2005. Annual stickseed and pinnate tansy mustard were the dominant annual forb species. The dominant perennial forb species was scarlet globemallow, which provided 5% cover.

1986 APPARENT TREND ASSESSMENT

Past grazing management has maintained the crested wheatgrass which appears to have a stable trend. Although somewhat heavily used and putting on minimal growth, the sagebrush is reproducing and doing fairly well for such a low rainfall area (annual average of about 11 inches in Price). Therefore, the range trend appears stable, although continued heavy use of sagebrush could lead to a downward trend in terms of deer winter range. The soil is fairly well protected and the site is level so soil loss is not a major concern. Soil trend also appears to be stable.

1994 TREND ASSESSMENT

The soil trend is slightly down because of the loss of much of the litter cover and the increased percentage of bare ground. This trend has been noted throughout much of Utah especially at the lower elevation sites with the prolonged drought we have been experiencing since the late 1980's. This should turn around with near normal precipitation patterns. The browse trend is stable. The condition of the sagebrush has improved with decreases in those classified with moderate to heavy use (88% to 2%), decreased decadence (47% to 14%), and an increase in seedling recruitment (12% to 46%). Trend for the herbaceous understory is stable. The forb component for the herbaceous understory is almost nonexistent but nested frequency of scarlet globemallow has increased. The Desirable Components Index score was good due to moderate browse cover, moderate decadence, and only excellent perennial grass cover.

TREND ASSESSMENT
soil - slightly down (-1)
browse - stable (0)
herbaceous understory - stable (0)
winter range condition (DC Index) - Good (55) Lower Potential scale

2000 TREND ASSESSMENT

Trend for soil appears to be stable. The ratio of protective ground cover (vegetation, litter and cryptogams) to bare ground remained unchanged. The relative cover of litter decreased slightly and relative cover of bare ground increased slightly, but not enough to affect the trend. The browse trend continues to improve with density increasing by 51% since 1994 and percent decadence declining from 14% to 11%. Young plant recruitment has increased from 16% to 32%. Use is mostly light to moderate with good vigor. The only negative aspect of the browse trend is the more than 20-fold increase in broom snakeweed density (420 to 8,940 plants/acre). Most of the population consists of mature and decadent plants so it does not appear that this population will continue to increase in the immediate future. The herbaceous trend appears stable with nested frequency of crested wheatgrass remaining stable. Forbs are still rare except for scarlet globemallow. The DCI score improved to excellent due to improvements in browse cover, browse decadence, and browse young recruitment.

TREND ASSESSMENT
soil - stable (0)
browse - up (+2)
herbaceous understory - stable (0)
winter range condition (DC Index) - Excellent (68) Lower Potential scale

2005 TREND ASSESSMENT

The trend for soil is stable. The ratio of protective ground cover (vegetation, litter and cryptogams) to bare ground remained identical from 2000 to 2005. The trend for browse is up. The population of the key browse species Wyoming big sagebrush increased from 2,280 plants/acre in 2000 to 3,180 in 2005, all of the increase from an increase in young individuals. Accompanied by the increase in population is an increase of young from 32% (2000) of the population to 57% in 2005. The density of decadent individuals remained unchanged. The broom snakeweed on the study site decreased 84% from 8,940 plants/acre in 2000 to 1,460 in 2005. The herbaceous understory trend is down. This is due mainly due to a substantial (78%) decrease in the nested frequency of perennial grasses, mainly crested wheatgrass. The nested frequency of annual forbs increased greatly, with the majority of annual forb species being weedy species like pinnate tansymustard, annual stickseed, pepperweed species, and Russian thistle. The nested frequency of perennial forbs increased, but this increase is not enough to counter a decrease in perennial grasses and increase in weedy annual forbs. The DCI score decreased to good due to the large loss of perennial grass cover.

TREND ASSESSMENT
soil - stable (0)
browse - up (+2)
herbaceous understory - down (-2)
winter range condition (DC Index) - Good (54) Lower Potential scale

HERBACEOUS TRENDS --
Management unit 11B, Study no: 3

Type	Species	Nested Frequency				Average Cover %		
		'86	'94	'00	'05	'94	'00	'05
G	Agropyron cristatum	b298	b289	b301	a59	15.34	16.43	.81
G	Agropyron dasystachyum	7	-	3	1	-	.01	.03
G	Agropyron trachycaulum	5	-	-	-	-	-	-
G	Bouteloua gracilis	-	-	-	7	-	-	.01
G	Oryzopsis hymenoides	1	-	-	-	-	-	-
G	Poa secunda	-	1	-	-	.00	-	-
Total for Annual Grasses		0	0	0	0	0	0	0
Total for Perennial Grasses		311	290	304	67	15.34	16.44	0.85
Total for Grasses		311	290	304	67	15.34	16.44	0.85
F	Astragalus convallarius	1	-	5	6	-	.23	.18
F	Chaenactis douglasii	-	-	-	1	-	-	.00
F	Chenopodium fremontii (a)	-	a-	a-	b24	-	-	.06
F	Cirsium sp.	-	-	-	3	-	-	.00

Type	Species	Nested Frequency				Average Cover %		
		'86	'94	'00	'05	'94	'00	'05
F	Cryptantha fulvocanescens	-	-	-	9	-	-	.04
F	Descurainia pinnata (a)	-	$_{a}$-	$_{a}$-	$_{b}$145	-	-	2.97
F	Eriogonum cernuum (a)	-	$_{a}$-	$_{a}$-	$_{b}$163	-	-	.78
F	Eriogonum ovalifolium	-	1	-	-	.00	-	-
F	Halogeton glomeratus (a)	-	-	-	2	-	-	.00
F	Lappula occidentalis (a)	-	$_{a}$-	$_{a}$-	$_{b}$174	-	-	3.40
F	Leucelene ericoides	-	-	3	3	-	.00	.38
F	Lepidium sp. (a)	-	$_{a}$-	$_{a}$-	$_{b}$27	-	-	.23
F	Orobanche fasciculata	-	-	1	-	-	.00	-
F	Salsola iberica (a)	-	$_{a}$-	$_{a}$-	$_{b}$17	-	-	.03
F	Sphaeralcea coccinea	$_{a}$50	$_{ab}$79	$_{a}$69	$_{b}$104	.50	1.38	4.48
Total for Annual Forbs		0	0	0	552	0	0	7.49
Total for Perennial Forbs		51	80	78	126	0.50	1.63	5.10
Total for Forbs		51	80	78	678	0.50	1.63	12.59

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

BROWSE TRENDS --
Management unit 11B, Study no: 3

Type	Species	Strip Frequency			Average Cover %		
		'94	'00	'05	'94	'00	'05
B	Artemisia tridentata wyomingensis	32	49	65	4.21	5.21	9.35
B	Atriplex canescens	1	1	1	.03	.03	.20
B	Chrysothamnus viscidiflorus stenophyllus	4	0	0	.15	-	-
B	Ephedra viridis	1	1	3	.38	.03	.15
B	Gutierrezia sarothrae	11	54	35	.52	2.72	2.67
B	Opuntia polyacantha	10	8	5	.00	.03	-
Total for Browse		59	113	109	5.30	8.03	12.38

CANOPY COVER, LINE INTERCEPT --
Management unit 11B, Study no: 3

Species	Percent Cover '05
Artemisia tridentata wyomingensis	7.48
Ephedra viridis	.05
Gutierrezia sarothrae	2.31

KEY BROWSE ANNUAL LEADER GROWTH --
Management unit 11B, Study no: 3

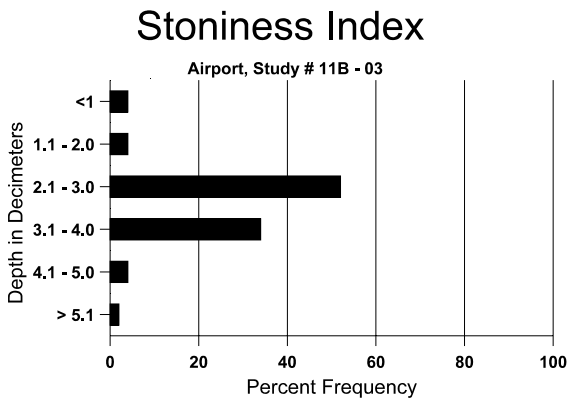
Species	Average leader growth (in) '05
Artemisia tridentata wyomingensis	2.5
Atriplex canescens	2.2

BASIC COVER --
Management unit 11B, Study no: 3

Cover Type	Average Cover %			
	'86	'94	'00	'05
Vegetation	3.25	21.21	27.20	24.29
Rock	.50	5.38	.18	.32
Pavement	18.00	5.61	9.19	12.31
Litter	50.75	15.90	14.14	18.38
Cryptogams	0	.11	1.45	.32
Bare Ground	27.50	31.23	47.47	53.56

SOIL ANALYSIS DATA --
Herd Unit 11B, Study # 3, Study Name: Airport

Effective rooting depth (in)	Temp °F (depth)	pH	%sand	%silt	%clay	%0M	ppm P	ppm K	dS/m
14.2	55.8 (13.5)	7.8	59.6	19.8	20.6	1.0	7.5	291.2	0.6



PELLET GROUP DATA --
Management unit 11B, Study no: 3

Type	Quadrat Frequency		
	'94	'00	'05
Rabbit	50	73	81
Elk	1	1	1
Deer	8	22	18
Cattle	4	10	2

Days use per acre (ha)	
'00	'05
-	-
-	-
24 (58)	27 (68)
2 (4)	10 (25)

BROWSE CHARACTERISTICS --
Management unit 11B, Study no: 3

		Age class distribution (plants per acre)					Utilization					
Year	Plants per Acre (excluding seedlings)	Seedling	Young	Mature	Decadent	Dead	% moderate	% heavy	% decadent	% dying	% poor vigor	Average Height Crown (in)
Artemisia tridentata wyomingensis												
86	**1066**	133	233	333	500	-	6	88	47	-	0	18/22
94	**1120**	520	180	780	160	220	0	2	14	4	4	22/34
00	**2280**	240	740	1300	240	340	28	4	11	4	4	18/23
05	**3180**	6240	1820	1120	240	320	9	4	8	5	5	20/29
Atriplex canescens												
86	**0**	-	-	-	-	-	0	0	0	-	0	-/-
94	**20**	-	-	20	-	20	0	0	0	-	0	44/63
00	**20**	20	-	-	20	-	100	0	100	-	0	44/56
05	**20**	580	20	-	-	-	0	100	0	-	0	38/64
Chrysothamnus viscidiflorus stenophyllus												
86	**100**	-	-	-	100	-	0	100	100	-	0	-/-
94	**100**	-	-	100	-	-	0	0	0	-	0	6/12
00	**0**	-	-	-	-	-	0	0	0	-	0	-/-
05	**0**	-	-	-	-	-	0	0	0	-	0	-/-

		Age class distribution (plants per acre)					Utilization					
Year	Plants per Acre (excluding seedlings)	Seedling	Young	Mature	Decadent	Dead	% moderate	% heavy	% decadent	% dying	% poor vigor	Average Height Crown (in)
Ephedra viridis												
86	**133**	-	33	100	-	-	25	25	0	-	0	17/6
94	**220**	-	-	220	-	-	0	0	0	-	0	24/31
00	**20**	-	-	-	20	-	0	100	100	-	0	-/-
05	**60**	-	20	40	-	-	0	67	0	-	0	22/37
Gutierrezia sarothrae												
86	**266**	-	33	33	200	-	0	0	75	-	0	6/4
94	**420**	20	-	420	-	-	0	0	0	-	0	9/11
00	**8940**	120	180	7300	1460	100	0	.44	16	13	13	7/12
05	**1460**	2160	80	1360	20	80	0	0	1	-	0	8/12
Juniperus osteosperma												
86	**0**	-	-	-	-	-	0	0	-	-	0	-/-
94	**0**	-	-	-	-	-	0	0	-	-	0	-/-
00	**0**	-	-	-	-	20	0	0	-	-	0	-/-
05	**0**	-	-	-	-	-	0	0	-	-	0	-/-
Opuntia polyacantha												
86	**432**	-	33	233	166	-	0	0	38	-	38	4/6
94	**260**	-	-	240	20	-	0	0	8	8	8	3/15
00	**240**	20	-	220	20	-	0	0	8	-	0	3/6
05	**100**	-	-	100	-	-	0	0	0	-	0	5/15

Trend Study 11B-4-05

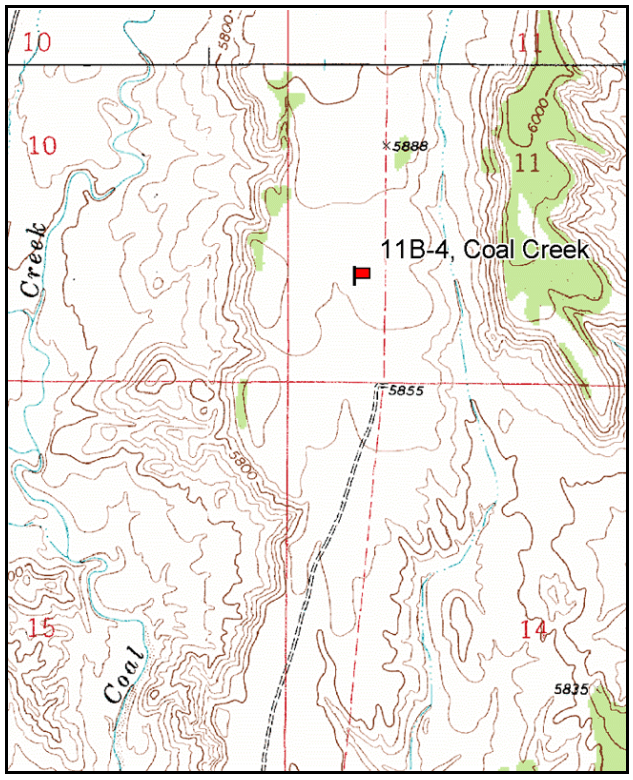
Study site name: Coal Creek . Vegetation type: Wyoming big sagebrush .

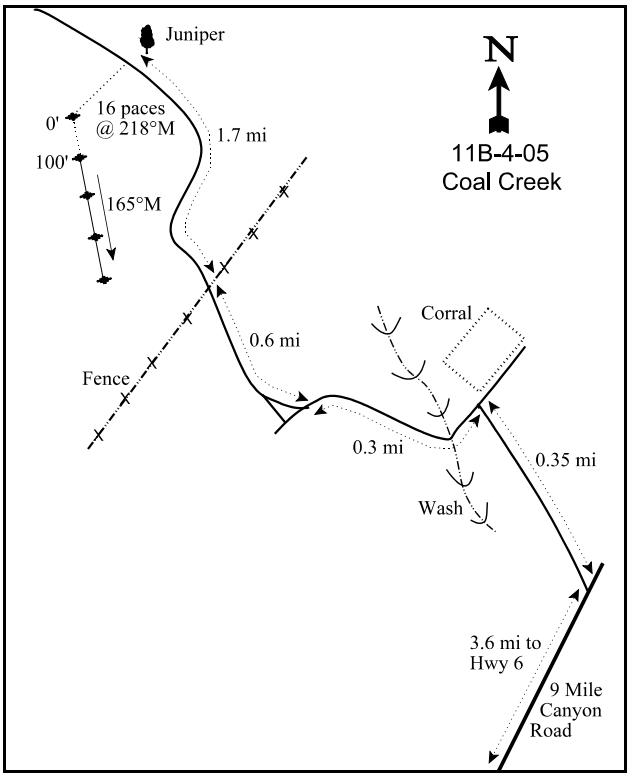
Compass bearing: frequency baseline 165 degrees magnetic.

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

LOCATION DESCRIPTION

From Highway 6 east of Wellington, turn northeast on the Soldier Creek Road (9 Mile Canyon). Stay on this road 3.6 miles, then turn left onto a dirt road. Go 0.35 miles up to a fork near a corral. From the fork proceed 0.3 miles to another fork. Turn right and continue 0.6 miles to a wire gate. Go through the gate and drive 1.7 miles to a small Juniper 20 feet to the right of the road. The transect baseline starts 16 paces from the juniper at a bearing of 218°M. There is a browse tag #7839 on the 0-foot baseline stake.





Map Name: Wellington

Diagrammatic Sketch

Township 14S ,Range 11 , Section 11

GPS: NAD 27, UTM 12S 4385244 N, 529105 E

DISCUSSION

Coal Creek - Trend Study No. 11B-4

The Coal Creek study is in an open sagebrush flat about four miles south of the mouth of Soldier Creek Canyon. The study is on top of a long, narrow, south-sloping plateau between Coal Creek and Soldier Creek at an elevation of 5,850 feet. The area is managed by the BLM as part of the Soldier Canyon allotment. It is grazed by cattle in winter and again in late spring. Permitted numbers are for 119 cattle from November through May. Sign of cattle use was infrequent on this particular site in 1986 and deer pellet groups were encountered only occasionally. A pellet group transect located further up Coal Creek (elevation 6,300) is the lowest elevation pellet group transect in the unit. In the past, it has consistently shown the highest use of any area sampled in the herd unit. Deer days use/acre averaged 44 (109 ddu/ha) between 1981-82 and 1990-91, but dropped considerably in 1991-92 to only 23 ddu/acre (58 ddu/ha) and have averaged only 17 deer days use/acre (41 ddu/ha) between 1991-92 and 1995-96. Numbers are usually higher in hard winters as the deer inevitably move to the lower elevations those years, even though thermal cover is limited on the plateau. It does not appear that this study area is still being used by significant numbers of deer or elk since 1986. Quadrat frequency of deer pellet groups was only 15% in 1994, then declined to 3% in 2000 and 2005. Pellet group data on the trend study in 2000 was estimated at only 4 deer days use/acre (10 ddu/ha). In 2005, the estimated pellet group data was 7 deer and 1 cow days use/acre (17 ddu/ha and 2 cdu/ha). These low numbers may be partly due to the mild winter conditions of the several previous years. During the reading of 2005, a deer carcass was found on the site. Rabbits appear to be abundant on the site with numerous pellets and trails.

The soil is moderately deep but compacted. It has a sandy clay loam texture with a soil reaction that is slightly alkaline (7.5 pH). Organic matter is low at only 1%, which is comparable to the Airport (11B-3) site as the lowest sites on unit 11, with respect to soil organic matter. Phosphorus is also low at just 6.4 ppm, where values less than 6 ppm may limit normal plant growth and development in wildland soils (Tiedemann and Lopez 2004). Due to the compaction of the soil, effective rooting depth is estimated at just over 13 inches. There is abundant pavement on the surface in exposed areas, but little rock within the soil profile. Vegetation and litter cover are both low, yet erosion is minimized due to the level terrain. The erosion condition class determined soil movement as slight in 2005 due to localized soil loss evidenced by soil pedestaling around shrubs and grasses.

Wyoming big sagebrush dominates the plateau, it provided 15% cover in 1994, 17% in 2000, and 14% in 2005. It has steadily increased in density from 1,866 plants/acre in 1986 to 2,900 in 1994, to 5,560 in 2000, then returned to 2,940 in 2005. The major increase in 2000 came from a flush of young plants, which likely did not survive. Vigor had remained good and percent decadence had steadily remained around 22% from 1986 to 2000, but increased to 39% poor vigor and 71% decadence in 2005. Use was moderate to heavy in 1986, but has been light to moderate since. Annual growth has been minimal, with any browsing causing them to appear to have been heavily hedged and clubbed in appearance. Two desirable shrubs, winterfat and shadscale, occur at fairly low densities and are mostly decadent and over-utilized. Rabbits appear to be using these low growing shrubs. Density of shadscale was fairly stable in 1994 and 2000, but decreased by 56% in 2005. Winterfat was not sampled in 2000 or 2005.

Broom snakeweed densities estimated 11,465 plants/acre in 1986, 6,280 in 1994, and an amazingly high 26,900 in 2000. With continuing drought before 2005, the population of broom snakeweed had declined to only 1,360 plants/acre. However, it is still the second-most abundant shrub behind Wyoming big sagebrush. Other invaders, and possible indicators of range deterioration, are pricklypear cactus and narrowleaf low rabbitbrush. Both had remained at a fairly stable density from 1986 to 2000, but the densities for both species decreased substantially in 2005.

Grasses and forbs are lacking on the site. Grasses provided only 4% cover in 2000 and forbs accounted for less than 1%. The cover of grasses increased to 6% and forbs to 2% in 2005. There are some small open areas of perennial grasses, but these have been invaded by broom snakeweed. The most common grass species are galleta, bottlebrush squirreltail, needle-and-thread, red three-awn, and blue grama. Since most of the production is from warm season grasses, the value for spring use is limited. The forb composition is poor.

1986 APPARENT TREND ASSESSMENT

There are a large number of undesirable invader species on this site. Although they indicate a less than optimal range condition, they do not necessarily indicate a future downward trend. However, the hedged form of the Wyoming big sagebrush could indicate a downward trend. An encouraging sign is the presence of young sagebrush. Actually, the area appears more to be recovering from past abuses and with favorable conditions may continue to produce a large amount of winter range forage. Not much can be done to protect the scarce, more palatable shrubs from overuse. Because of inadequate ground cover, presence of erosion pavement, and lack of organic matter, the soil trend appears to be declining.

1994 TREND ASSESSMENT

With the lack of significant slope and percent bare ground changing little, trend for the soils is considered stable but in less than satisfactory condition. Even though the key browse species, Wyoming big sagebrush, has more plants that are now judged as decadent, this is more than compensated for by the exceptionally high amount of seedlings. Both shadscale and winterfat have greatly improved vigor and much lower rates of decadence. Trend for key browse is up, but the broom snakeweed population should be watched closely for any unusual increases in its population. The trend for the herbaceous understory is up, but still in very poor condition with a total of just 3% cover for all species combined. The Desirable Components Index score was fair due to good browse cover and low perennial grass and forb cover.

TREND ASSESSMENT
soil - stable (0)
browse - up (+2)
herbaceous understory - up (+2)
winter range condition (DC Index) - Fair (39) Lower Potential scale

2000 TREND ASSESSMENT

Trend for soil appears stable but still in poor condition with the ratio of bare ground to protective cover remaining unchanged. Litter and total vegetation cover are low while unprotected bare ground is high and herbaceous vegetation scarce. Interspaces between shrubs contain abundant erosion pavement while soil is pedestaled under the shrubs. Cryptogamic cover has increased but these are concentrated under shrub canopies. There is obviously some localized soil erosion occurring during high intensity storms but it is minimized by the level terrain. Trend for browse is up for the key species Wyoming big sagebrush. Density has increased due to a large number of young plants counted this year. Seedlings are also abundant. The number of decadent plants has increased (700 to 1,240 plants/acre) but this is more than compensated by the large number of young. Use is mostly light and vigor good. Rabbits appear to be heavily utilizing the other preferred browse, shadscale. It appears to have a stable population, but vigor is poor and percent decadence is high. One negative aspect of the browse trend is the dramatic 4-fold increase in density of broom snakeweed since 1994 (6,280 plants/acre to 26,900). Trend for the herbaceous understory is up, although grass and forb cover is less than ideal. The nested frequency of perennial grasses increased 48% and are moderately diverse. Sum of nested frequency for forbs declined, but perennial grasses are a more important component to winter range. The DCI score improved to good due mainly to improvements browse recruitment and perennial grass cover.

TREND ASSESSMENT
soil - stable (0)
browse - up (+2)
herbaceous understory - up (+2)
winter range condition (DC Index) - Good (57) Lower Potential scale

2005 TREND ASSESSMENT

The trend for soil is stable. The ratio of protective ground cover (vegetation, litter and cryptogams) to bare ground remained unchanged from 2000 to 2005. The trend for browse is down. The population of the key browse species Wyoming big sagebrush decreased drastically from 5,560 plants/acre in 2000 to 2,940 in 2005, a 47% decline. The majority of the population loss is in the young and mature age classes. This population decrease is accompanied with an increase from 22% to 71% in decadent individuals and an increase from 10% to 39% in individuals classified as dying. Shadscale, another preferred browse species, decreased 56% in density, but the percentage of dying and decadent individuals decreased substantially. This decrease in shrub species is likely due to a three year drought from 2001 through 2003 where the annual precipitation for the area averaged 80% of normal. One positive effect of the drought is the decline in broom snakeweed numbers, which decreased 95% from 26,900 plants/acre in 2000 to 1,360 in 2005. The herbaceous understory trend is up. The sum of the nested frequencies perennial grasses and forbs increased 40% from 2000 to 2005. The cover of most perennial species also increased. Unfortunately, there was also an increase in weedy annual forb species, many of which first made their appearance in the 2005 study. The DCI score decreased to fair due mainly to the loss of young individuals and the increase in decadence.

TREND ASSESSMENT
soil - stable (0)
browse - down (-2)
herbaceous understory - up (+2)
winter range condition (DC Index) - Fair (35) Lower Potential scale

HERBACEOUS TRENDS --
Management unit 11B, Study no: 4

Type	Species	Nested Frequency				Average Cover %		
		'86	'94	'00	'05	'94	'00	'05
G	Aristida purpurea	$_{a}$-	$_{b}$10	$_{ab}$7	$_{b}$10	.08	.16	.21
G	Bouteloua gracilis	$_{a}$17	$_{b}$41	$_{b}$65	$_{b}$43	1.04	1.86	1.52
G	Hilaria jamesii	$_{a}$-	$_{b}$34	$_{a}$5	$_{b}$26	.66	.18	.61
G	Oryzopsis hymenoides	$_{a}$-	$_{b}$9	$_{b}$15	$_{b}$20	.03	.44	.07
G	Poa fendleriana	-	3	-	-	.01	-	-
G	Sitanion hystrix	$_{a}$28	$_{a}$16	$_{b}$65	$_{b}$70	.20	.81	2.06
G	Stipa comata	$_{a}$1	$_{ab}$14	$_{b}$31	$_{c}$64	.57	.77	1.91
Total for Annual Grasses		0	0	0	0	0	0	0
Total for Perennial Grasses		46	127	188	233	2.61	4.23	6.41
Total for Grasses		46	127	188	233	2.61	4.23	6.41
F	Astragalus convallarius	-	2	-	-	.00	-	.00
F	Chenopodium fremontii (a)	-	$_{a}$-	$_{a}$-	$_{b}$34	-	-	.08

Type	Species	Nested Frequency				Average Cover %		
		'86	'94	'00	'05	'94	'00	'05
F	Chenopodium leptophyllum(a)	-	-	-	9	-	-	.02
F	Cruciferae	-	3	-	-	.03	-	-
F	Cryptantha sp.	-	4	-	4	.15	-	.01
F	Descurainia pinnata (a)	-	-	-	59	-	-	.72
F	Eriogonum cernuum (a)	-	$_{a}$2	$_{a}$-	$_{b}$41	.00	-	.15
F	Eriogonum ovalifolium	-	3	1	-	.01	.00	-
F	Gilia sp. (a)	-	$_{a}$-	$_{a}$-	$_{b}$76	-	-	.27
F	Lappula occidentalis (a)	-	4	-	8	.01	-	.02
F	Leucelene ericoides	-	4	4	8	.15	.03	.06
F	Lepidium montanum	-	$_{b}$24	$_{a}$4	$_{b}$24	.08	.01	.77
F	Oenothera sp.	-	-	-	3	-	-	.00
F	Sphaeralcea coccinea	3	1	-	4	.00	-	.09
Total for Annual Forbs		0	6	0	227	0.01	0	1.26
Total for Perennial Forbs		3	41	9	43	0.43	0.05	0.95
Total for Forbs		3	47	9	270	0.45	0.05	2.22

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

BROWSE TRENDS --
Management unit 11B, Study no: 4

Type	Species	Strip Frequency			Average Cover %		
		'94	'00	'05	'94	'00	'05
B	Artemisia tridentata wyomingensis	74	82	78	15.10	16.59	13.94
B	Atriplex confertifolia	19	20	8	.45	.31	.44
B	Ceratoides lanata	2	0	0	-	-	-
B	Chrysothamnus viscidiflorus stenophyllus	37	38	20	1.63	.66	.70
B	Echinocereus sp.	0	1	1	-	.00	-
B	Gutierrezia sarothrae	81	95	40	2.20	4.37	.96
B	Juniperus osteosperma	0	1	1	-	-	-
B	Leptodactylon pungens	5	7	4	.30	.30	.18
B	Opuntia sp.	28	34	8	.25	.48	.03
Total for Browse		246	278	160	19.96	22.75	16.25

CANOPY COVER, LINE INTERCEPT --
Management unit 11B, Study no: 4

Species	Percent Cover '05
Artemisia tridentata wyomingensis	14.16
Atriplex confertifolia	.41
Chrysothamnus viscidiflorus stenophyllus	.30
Gutierrezia sarothrae	.81
Leptodactylon pungens	.13

KEY BROWSE ANNUAL LEADER GROWTH --
Management unit 11B, Study no: 4

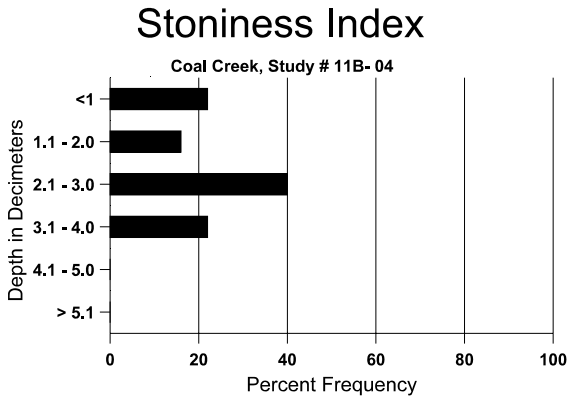
Species	Average leader growth (in) '05
Artemisia tridentata wyomingensis	2.4

BASIC COVER --
Management unit 11B, Study no: 4

Cover Type	Average Cover %			
	'86	'94	'00	'05
Vegetation	3.75	21.64	28.34	23.04
Rock	0	10.46	1.77	2.06
Pavement	18.25	4.25	17.54	11.66
Litter	39.00	20.09	17.54	22.19
Cryptogams	3.50	3.26	10.94	5.90
Bare Ground	35.50	35.29	47.24	47.62

SOIL ANALYSIS DATA --
Herd Unit 11B, Study # 4, Study Name: Coal Creek

Effective rooting depth (in)	Temp °F (depth)	pH	%sand	%silt	%clay	%0M	ppm P	ppm K	dS/m
13.2	50.2 (11.7)	7.5	54.0	22.0	24.0	1.0	6.4	140.8	0.6



PELLET GROUP DATA --
Management unit 11B, Study no: 4

Type	Quadrat Frequency		
	'94	'00	'05
Rabbit	45	39	60
Cattle	-	-	-
Elk	-	1	-
Deer	15	3	3

Days use per acre (ha)	
'00	'05
-	-
-	1 (2)
-	-
4 (10)	7 (17)

BROWSE CHARACTERISTICS --
Management unit 11B, Study no: 4

		Age class distribution (plants per acre)					Utilization					
Year	Plants per Acre (excluding seedlings)	Seedling	Young	Mature	Decadent	Dead	% moderate	% heavy	% decadent	% dying	% poor vigor	Average Height Crown (in)
Artemisia tridentata wyomingensis												
86	**1866**	66	333	1133	400	-	64	29	21	-	0	14/15
94	**2900**	2860	80	2120	700	480	12	5	24	9	9	20/31
00	**5560**	2020	2300	2020	1240	480	15	3	22	10	10	22/35
05	**2940**	6380	200	660	2080	1640	27	6	71	39	39	23/34
Atriplex canescens												
86	**0**	-	-	-	-	-	0	0	-	-	0	-/-
94	**0**	-	-	-	-	-	0	0	-	-	0	-/-
00	**0**	-	-	-	-	-	0	0	-	-	0	-/-
05	**0**	-	-	-	-	-	0	0	-	-	0	17/14

		Age class distribution (plants per acre)					Utilization					
Year	Plants per Acre (excluding seedlings)	Seedling	Young	Mature	Decadent	Dead	% moderate	% heavy	% decadent	% dying	% poor vigor	Average Height Crown (in)
Atriplex confertifolia												
86	**133**	-	-	-	133	-	0	100	100	-	100	-/-
94	**600**	-	-	360	240	-	7	7	40	7	7	10/13
00	**540**	-	20	140	380	80	7	85	70	70	70	8/14
05	**240**	40	80	140	20	20	8	25	8	-	0	14/17
Ceratoides lanata												
86	**533**	-	-	-	533	-	0	75	100	-	75	-/-
94	**60**	-	20	20	20	-	33	0	33	33	33	6/7
00	**0**	-	-	-	-	-	0	0	0	-	0	-/-
05	**0**	-	-	-	-	-	0	0	0	-	0	6/12
Chrysothamnus viscidiflorus stenophyllus												
86	**1866**	-	-	66	1800	-	4	0	96	3	18	3/7
94	**1740**	20	-	1300	440	-	1	7	25	5	11	7/10
00	**1360**	20	20	140	1200	380	1	6	88	74	74	4/7
05	**740**	-	-	520	220	180	5	5	30	11	11	8/11
Echinocereus sp.												
86	**0**	-	-	-	-	-	0	0	-	-	0	-/-
94	**0**	-	-	-	-	-	0	0	-	-	0	-/-
00	**20**	-	-	20	-	-	0	0	-	-	0	3/12
05	**20**	-	-	20	-	20	0	0	-	-	0	3/9
Gutierrezia sarothrae												
86	**11465**	866	1666	6666	3133	-	0	0	27	.87	7	7/8
94	**6280**	20	720	5060	500	360	0	0	8	.95	5	8/7
00	**26900**	100	1040	23660	2200	740	0	0	8	4	4	4/5
05	**1360**	120	-	1360	-	100	0	0	0	-	0	8/9
Juniperus osteosperma												
86	**66**	-	66	-	-	-	0	0	-	-	0	-/-
94	**0**	-	-	-	-	-	0	0	-	-	0	-/-
00	**20**	-	20	-	-	-	0	0	-	-	0	-/-
05	**20**	-	20	-	-	-	0	0	-	-	0	-/-
Leptodactylon pungens												
86	**0**	-	-	-	-	-	0	0	0	-	0	-/-
94	**440**	-	-	420	20	-	0	0	5	5	5	5/7
00	**700**	40	60	60	580	60	0	40	83	20	20	8/7
05	**260**	-	-	200	60	100	0	0	23	8	8	5/8

		Age class distribution (plants per acre)					Utilization					
Year	Plants per Acre (excluding seedlings)	Seedling	Young	Mature	Decadent	Dead	% moderate	% heavy	% decadent	% dying	% poor vigor	Average Height Crown (in)
Opuntia sp.												
86	**1332**	-	66	1133	133	-	0	0	10	-	40	4/6
94	**1060**	-	20	1020	20	-	0	0	2	-	0	3/11
00	**1220**	-	-	820	400	100	0	0	33	10	13	4/8
05	**220**	-	-	60	160	480	0	0	73	64	64	4/9
Pinus edulis												
86	**0**	66	-	-	-	-	0	0	-	-	0	-/-
94	**0**	-	-	-	-	-	0	0	-	-	0	-/-
00	**0**	-	-	-	-	-	0	0	-	-	0	-/-
05	**0**	-	-	-	-	-	0	0	-	-	0	-/-

Trend Study 11B-5-05

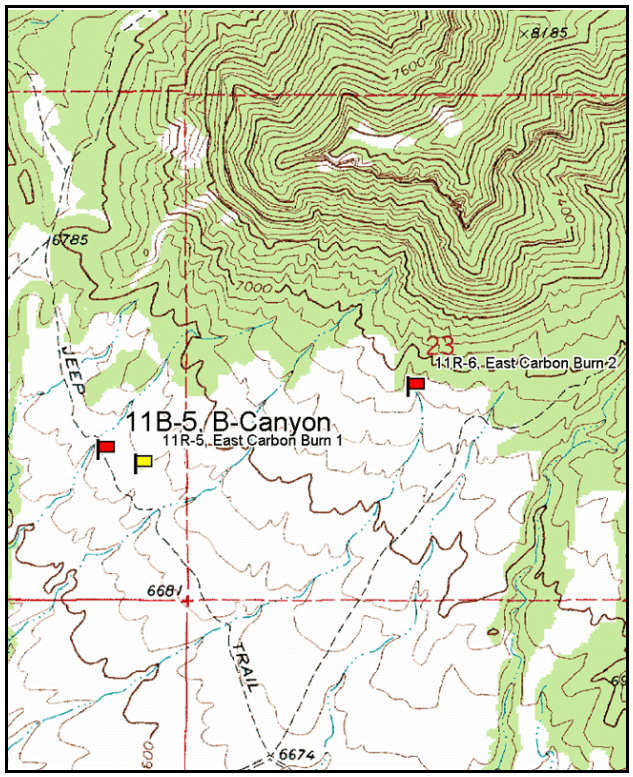
Study site name: B Canyon . Vegetation type: Chained, Seeded P-J Burn .

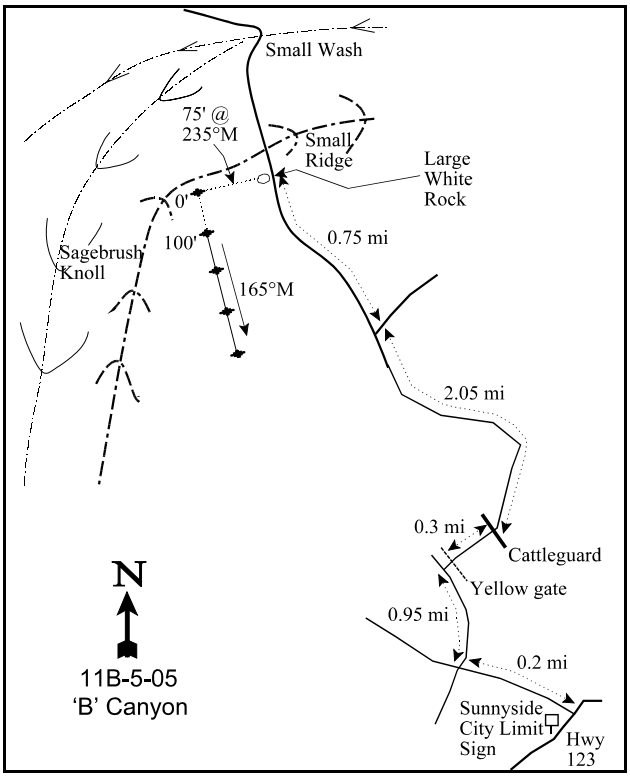
Compass bearing: frequency baseline 165 degrees magnetic.

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

LOCATION DESCRIPTION

From the Sunnyside City limit sign on Highway 123 at the west end of town, turn north and go 0.2 miles, passing the East Carbon High School football field. Turn right and go 0.95 miles. Turn right and pass through a yellow metal gate, continuing 0.3 miles to a cattle guard. Stay on the main road and go north 2.05 miles to an intersection. Keep left at the intersection (right turn goes to A Canyon transect) and go 0.75 miles more to just beyond the crest of a small hill. On the left side of the road you should find a large white rock. The transect, marked by a red painted rebar (tag #7894), starts 75 feet away at a bearing of 235°M.





Map Name: Sunnyside

Diagrammatic Sketch

Township 14S , Range 13E , Section 22

GPS: NAD 27, UTM 12S 4382171 N, 547991 E

DISCUSSION

'B' Canyon Trend Study No. 11B-5

This study is located near the mouth of 'B' Canyon on the gentle (7%) west-facing slope at the base of the Book Cliffs. Elevation at the site is 6,700 feet. The site is about 4 miles northwest of Sunnyside. Plans have been proposed to mine 15 million tons of coal from the 'B' Canyon mining project. Surface facilities, in addition to improved roads, would be located on public lands within the deer winter range. In 1966, the area was two-way chained and seeded to crested wheatgrass, fourwing saltbush, and nomad alfalfa. After 20 years, the site was again dominated by the release of the young trees left after the original chaining. Pinyon and juniper density was estimated at 250 plants/acre (pinyon at 106 trees/acre and juniper at 149) in 1994, most were young trees. In 1996, the area was burned by a wildfire, afterward it was chained and apparently seeded with a dribbler. The wildfire eliminated all of the trees and nearly all of the shrubs. The only shrubs left are a few surviving mountain mahogany, bitterbrush, and resprouting green ephedra.

The site is on the Mud Springs grazing allotment, which is permitted for 338 cattle from mid-October to mid-June. The four pastures are rotated on the basis of forage condition and water availability as determined by the permittee. Cattle use on the site was light to moderate, but was very heavy during the 2005 reading. Judging from pellet groups, deer and elk use is light, with rabbit use being somewhat heavier. Pellet group data from the 2000 reading was estimated at 9 deer and 4 cow days use/acre (22 ddu/ha, 10 cdu/ha). Rabbit droppings were frequently encountered. In 2005, the estimated pellet group data was 7 elk, 6 deer, and 42 cow days use/acre (17 edu/ha, 15 ddu/ha, and 104 cdu/ha). During the 2005 reading, several head of cattle were on the site and most of the cattle use had been from fall through spring. Elk and deer use had been mainly from winter.

The soil is moderately deep, but fairly rocky and variable, demonstrated by the presence of both black sagebrush and mountain big sagebrush prior to the fire. Effective soil depth is estimated at 14 inches. It has a sandy clay loam texture with a soil reaction that is neutral (7.3 pH). Phosphorus was measured at just 5.2 ppm, where values less than 6 ppm may limit normal plant growth and development in wildland soils (Tiedemann and Lopez 2004). There are patches of exposed soil, but overall ground cover is good and erosion minimal. Rocks and pavement are found in the bare areas and large rocks and boulders are common within the soil profile and on the surface. Many rocks in the soil profile contain a calcium carbonate crust. The erosion condition class determined soil movement as stable in 2005.

The most numerous shrub prior to the 1996 fire was black sagebrush. It had 9% cover in 1994 with a population of 6,080 plants/acre. The majority of these plants were mature and vigorous although rather heavily browsed in 1986. There were also some scattered mountain big sagebrush plants (180 plants/acre). Less numerous shrubs in the area included green ephedra (40 plants/acre) and true mountain mahogany (60 plants/acre). After the wildfire of 1996, there remained only a few surviving or resprouting fourwing saltbush (40 plants/acre), mountain mahogany (20 plants/acre), and green ephedra (200 plants/acre). Bitterbrush was seeded after the fire and was growing at 20 plants/acre in 2000. All of the fourwing and mountain mahogany and nearly all (90%) of the green ephedra were heavily hedged. In 2005, the fourwing saltbush remained at 40 plants/acre, mahogany increased slightly to 40 plants/acre, ephedra decreased to 160 plant/acre, and bitterbrush remained at 20 plants/acre.

Before and after the fire, crested wheatgrass was the dominant herbaceous plant. Plants are tall, vigorous and were lightly grazed until 2005, when grazing was heavy. Comparing photos from 2000 and 2005 clearly shows heavy cattle grazing. A few other valuable species, including Indian ricegrass, smooth brome, bluebunch wheatgrass, and mutton bluegrass are present, but provide only limited forage. Abundance of forbs is low and has produced less than 1% every year. Only four herbaceous species established from the post-fire seeding treatment: intermediate wheatgrass, orchardgrass, alfalfa, and small burnet.

1986 APPARENT TREND ASSESSMENT

The range appears to be in good condition. The key species, black sagebrush, is vigorous and productive. Although there is a fairly high percentage of decadent plants, there is a healthy number of young plants and the population appears stable. The one downward parameter is the increasing cover of the released pinyon and juniper, which in time could restrict growth and reproduction of more desirable browse species. Except for scattered bare patches, ground cover is excellent with little erosion. Therefore, the current soil trend appears to be stable also.

1994 TREND ASSESSMENT

The trend for soil is stable with percent bare ground decreasing slightly and a good cover value for grasses. The trend for browse is stable for the key browse species, black sagebrush. Percent decadence has declined (27% to 14%) and the percentage of plants that were moderate to heavily hedged has also gone down (67% to 1%). Trend for the herbaceous understory species is stable with nested frequency values that are almost unchanged from 1986. There was a slight decrease for the forbs, but altogether they provide less than 1% of the vegetation cover. The Desirable Components Index score was good due to moderate browse cover and good perennial grass cover.

TREND ASSESSMENT
soil - stable (0)
browse - stable (0)
herbaceous understory - stable (0)
winter range condition (DC Index) - Good (52) Lower Potential scale

2000 TREND ASSESSMENT

Trend for soil is down with percent bare ground increasing and litter cover and vegetation cover declining. Since the fire, vegetation cover has changed from mainly shrub and tree cover to mostly herbaceous cover. Even with this change in composition, the ratio of bare soil to protective cover has decreased substantially. Erosion is not a noticeable problem on the site due to the abundant herbaceous cover combined with the gentle slope. Trend for browse is down due to a loss of most shrubs to fire. The few surviving preferred browse species are being heavily used but should increase through time. Trend for the herbaceous understory is up with an increase in the sum of nested frequency for perennial grasses and forbs. Nested frequency of the dominant grass, crested wheatgrass, remained stable but several other species increased. The DCI score decreased to fair due mainly to a nearly complete loss of browse cover, but an increase in perennial grass cover.

TREND ASSESSMENT
soil - down (-2)
browse - down (-2)
herbaceous understory - up (+2)
winter range condition (DC Index) - Fair (32) Lower Potential scale

2005 TREND ASSESSMENT

The trend for soil is slightly down. The ratio of protective ground cover (vegetation, litter and cryptogams) to bare ground remained nearly identical from 2000 to 2005. However, the relative cover of bare ground increased from 34 to 52%, relative litter cover decreased from 27 to 16%, and relative vegetation cover decreased from 21 to 17%. Most of which is a product of high grazing pressure on the site. The trend for browse is stable. The site has few preferred browse individuals scattered across the site. Densities of

fourwing saltbush, mountain mahogany, and bitterbrush remained unchanged or increased very slightly. This population change is due to 100% heavy use on all preferred browse species. The herbaceous trend is stable. The sum of the nested frequency of perennial grasses, the most important component of the herbaceous understory, decreased minimally. Crested wheatgrass, the dominant grass species, did not change. The degradation again is a product of high livestock grazing pressure on the site. Perennial forbs showed a decrease in nested frequency, but it is of minor importance on this winter range. The DCI score remained fair with only a slight decrease in perennial forbs.

TREND ASSESSMENT
soil - slightly down (-1)
browse - stable (0)
herbaceous understory - stable (0)
winter range condition (DC Index) - Fair (31) Lower Potential scale

HERBACEOUS TRENDS --
Management unit 11B, Study no: 5

Type	Species	Nested Frequency				Average Cover %		
		'86	'94	'00	'05	'94	'00	'05
G	Agropyron cristatum	269	263	274	289	9.44	17.78	16.36
G	Agropyron dasystachyum	4	-	-	-	-	-	-
G	Agropyron intermedium	a-	a-	b43	a1	-	1.74	.00
G	Agropyron spicatum	-	6	-	-	.33	-	-
G	Bouteloua gracilis	a-	b12	a3	a1	.10	.03	.03
G	Bromus inermis	ab12	ab6	a4	b21	.21	.38	.47
G	Dactylis glomerata	-	-	9	-	-	.04	-
G	Festuca ovina	a-	a-	b15	a1	-	.09	.00
G	Oryzopsis hymenoides	10	4	8	19	.06	.99	.24
G	Poa fendleriana	-	7	-	-	.21	-	-
G	Sitanion hystrix	1	-	-	-	-	-	-
Total for Annual Grasses		0	0	0	0	0	0	0
Total for Perennial Grasses		296	298	356	332	10.36	21.06	17.11
Total for Grasses		296	298	356	332	10.36	21.06	17.11
F	Arabis selbyi	ab2	b11	a-	a-	.02	-	-
F	Astragalus convallarius	a13	a9	ab21	b33	.20	.55	.13
F	Astragalus wingatanus	b21	a15	a-	a2	.46	.06	.15
F	Chenopodium fremontii (a)	-	-	6	5	-	.01	.02
F	Descurainia pinnata (a)	-	-	-	3	-	-	.00
F	Gilia sp. (a)	-	-	-	1	-	-	.00
F	Hedysarum boreale	2	-	3	3	-	.15	.03
F	Lesquerella ludoviciana	3	7	5	-	.01	.01	-
F	Linum lewisii	-	-	8	-	-	.02	-

Type	Species	Nested Frequency				Average Cover %		
		'86	'94	'00	'05	'94	'00	'05
F	Machaeranthera grindelioides	3	1	-	-	.03	-	-
F	Medicago sativa	5	-	5	-	-	.01	-
F	Penstemon cyanocaulis	$_{b}$17	$_{a}$5	$_{a}$4	$_{a}$-	.01	.03	-
F	Salsola iberica (a)	-	$_{a}$-	$_{ab}$12	$_{b}$13	-	.04	.03
F	Sanguisorba minor	-	-	1	-	-	.03	-
F	Schoencrambe linifolia	$_{a}$-	$_{a}$3	$_{b}$16	$_{a}$1	.01	.06	.01
F	Sphaeralcea coccinea	3	-	6	5	-	.01	.06
F	Townsendia incana	-	-	-	1	-	-	.00
F	Trifolium sp.	-	-	-	2	-	-	.00
Total for Annual Forbs		0	0	18	22	0	0.05	0.06
Total for Perennial Forbs		69	51	69	47	0.76	0.94	0.38
Total for Forbs		69	51	87	69	0.76	1.00	0.45

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

BROWSE TRENDS --
Management unit 11B, Study no: 5

Type	Species	Strip Frequency			Average Cover %		
		'94	'00	'05	'94	'00	'05
B	Artemisia nova	78	0	0	8.85	-	-
B	Artemisia tridentata vaseyana	3	0	0	.81	-	-
B	Atriplex canescens	0	2	2	-	-	-
B	Cercocarpus montanus	3	1	1	1.00	.03	.03
B	Ephedra viridis	2	2	3	.41	.15	.15
B	Gutierrezia sarothrae	8	1	1	.21	-	-
B	Juniperus osteosperma	0	0	0	3.00	-	-
B	Opuntia sp.	1	0	1	-	-	-
B	Pinus edulis	0	0	0	1.63	-	-
B	Purshia tridentata	0	1	1	-	.15	.15
Total for Browse		95	7	9	15.93	0.33	0.33

CANOPY COVER, LINE INTERCEPT --
Management unit 11B, Study no: 5

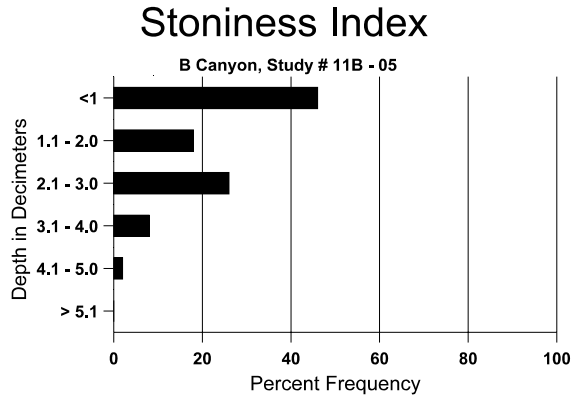
Species	Percent Cover '05
Atriplex canescens	.13
Ephedra viridis	.55

BASIC COVER --
Management unit 11B, Study no: 5

Cover Type	Average Cover %			
	'86	'94	'00	'05
Vegetation	11.50	28.43	24.17	17.87
Rock	7.00	10.55	13.60	13.45
Pavement	3.75	1.52	6.80	2.12
Litter	60.50	45.45	30.78	17.16
Cryptogams	.75	2.80	.63	.04
Bare Ground	16.50	15.73	38.27	55.37

SOIL ANALYSIS DATA --
Herd Unit 11B, Study # 5, Study Name: B Canyon

Effective rooting depth (in)	Temp °F (depth)	pH	%sand	%silt	%clay	%0M	ppm P	ppm K	dS/m
13.7	51.4 (13.8)	7.3	51.0	26.4	22.6	2.2	5.2	124.8	0.7



PELLET GROUP DATA --
Management unit 11B, Study no: 5

Type	Quadrat Frequency		
	'94	'00	'05
Rabbit	20	66	27
Elk	1	-	10
Deer	35	20	11
Cattle	-	1	12

Days use per acre (ha)	
'00	'05
-	-
-	7 (17)
9 (22)	6 (15)
5 (11)	42 (104)

BROWSE CHARACTERISTICS --
Management unit 11B, Study no: 5

		Age class distribution (plants per acre)					Utilization					
Year	Plants per Acre (excluding seedlings)	Seedling	Young	Mature	Decadent	Dead	% moderate	% heavy	% decadent	% dying	% poor vigor	Average Height Crown (in)
Artemisia nova												
86	**6132**	400	600	3866	1666	-	10	67	27	-	3	9/16
94	**6080**	100	520	4700	860	220	31	.65	14	3	3	15/21
00	**0**	-	-	-	-	-	0	0	0	-	0	-/-
05	**0**	-	-	-	-	-	0	0	0	-	0	-/-
Artemisia tridentata vaseyana												
86	**200**	-	-	200	-	-	100	0	0	-	0	20/20
94	**180**	-	20	140	20	-	44	0	11	-	0	16/28
00	**0**	-	-	-	-	-	0	0	0	-	0	-/-
05	**0**	-	-	-	-	-	0	0	0	-	0	10/15
Atriplex canescens												
86	**66**	-	-	-	66	-	0	0	100	-	0	-/-
94	**0**	-	-	-	-	-	0	0	0	-	0	-/-
00	**40**	-	40	-	-	-	0	100	0	-	0	-/-
05	**40**	-	-	40	-	-	0	100	0	-	0	18/20
Cercocarpus montanus												
86	**0**	-	-	-	-	-	0	0	-	-	0	-/-
94	**60**	-	-	60	-	-	33	0	-	-	0	38/42
00	**20**	-	-	20	-	-	0	100	-	-	0	9/8
05	**40**	-	-	40	-	-	0	100	-	-	0	14/11
Ephedra viridis												
86	**66**	-	-	66	-	-	100	0	-	-	100	36/25
94	**40**	-	-	40	-	-	0	0	-	-	0	26/24
00	**200**	-	20	180	-	-	10	90	-	-	0	11/12
05	**160**	-	-	160	-	-	0	100	-	-	0	14/27

		Age class distribution (plants per acre)					Utilization					
Year	Plants per Acre (excluding seedlings)	Seedling	Young	Mature	Decadent	Dead	% moderate	% heavy	% decadent	% dying	% poor vigor	Average Height Crown (in)
Gutierrezia sarothrae												
86	**0**	-	-	-	-	-	0	0	-	-	0	-/-
94	**300**	-	60	240	-	-	0	0	-	-	0	8/7
00	**20**	-	-	20	-	-	0	0	-	-	0	-/-
05	**20**	-	-	20	-	-	0	0	-	-	0	5/8
Juniperus osteosperma												
86	**266**	-	66	200	-	-	25	25	-	-	0	72/35
94	**0**	-	-	-	-	-	0	0	-	-	0	-/-
00	**0**	-	-	-	-	-	0	0	-	-	0	-/-
05	**0**	-	-	-	-	20	0	0	-	-	0	-/-
Opuntia sp.												
86	**0**	-	-	-	-	-	0	0	-	-	0	-/-
94	**20**	-	-	20	-	-	0	0	-	-	0	5/13
00	**0**	-	-	-	-	-	0	0	-	-	0	6/16
05	**40**	-	-	40	-	-	0	0	-	-	0	2/10
Pinus edulis												
86	**132**	-	66	66	-	-	0	0	-	-	0	108/71
94	**0**	-	-	-	-	-	0	0	-	-	0	-/-
00	**0**	-	-	-	-	-	0	0	-	-	0	-/-
05	**0**	-	-	-	-	-	0	0	-	-	0	-/-
Purshia tridentata												
86	**0**	-	-	-	-	-	0	0	-	-	0	-/-
94	**0**	-	-	-	-	-	0	0	-	-	0	-/-
00	**20**	-	20	-	-	-	0	0	-	-	0	13/24
05	**20**	-	-	20	-	-	0	100	-	-	0	10/18

Trend Study 11B-7-05

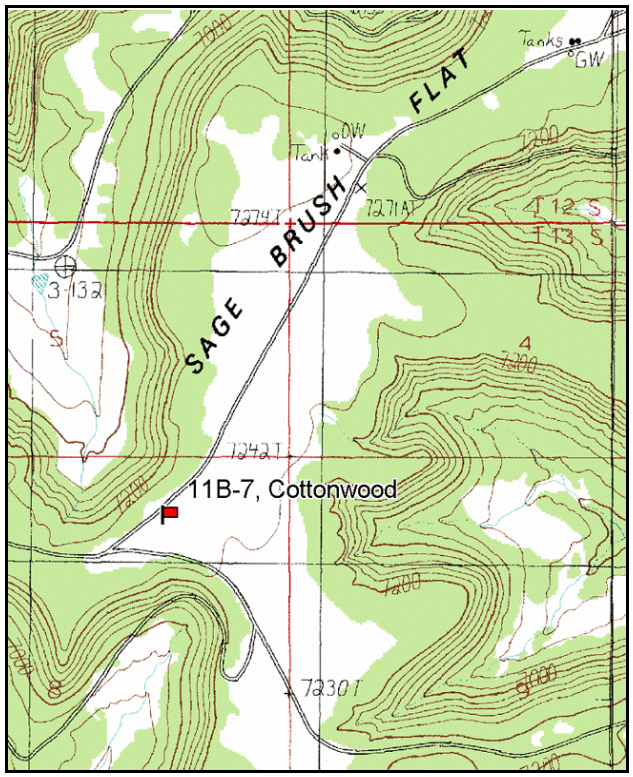
Study site name: Cottonwood . Vegetation type: Wyoming big sagebrush .

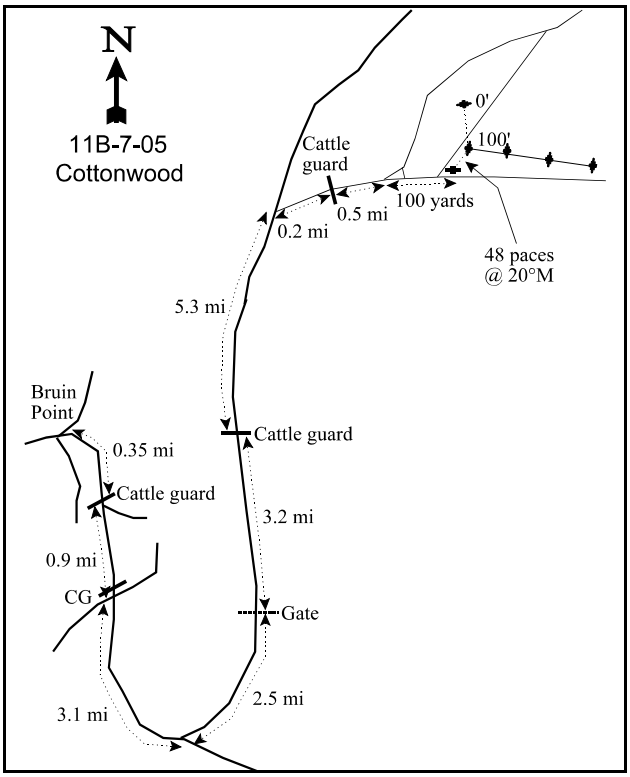
Compass bearing: frequency baseline 165 degrees magnetic.

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

LOCATION DESCRIPTION

At the Range Creek Summit (Bruin Point) take the middle fork and go 0.35 miles. Stay right at the fork just beyond a cattle guard and go 0.9 miles. Pass straight through an intersection beyond the next cattle guard and go 3.1 miles. Turn left at the fork and continue 2.5 miles. Pass through a gate near a cabin and continue 3.2 miles. Cross a cattle guard and proceed 5.3 miles on the main road. Bear right, cutting across the angle of a fork, and go 0.2 miles to a cattle guard. Continue 0.5 miles to another major fork. Stay right and go 100 yards to a rebar witness post on left side of the road. The 100-foot baseline stake is 48 paces at 20°M from the witness post. All markers are rebar, and the 0-foot end of the baseline has a browse tag #7872 attached.





Map Name: Twin Hollow

Diagrammatic Sketch

Township 13S , Range 16E , Section 8

GPS: NAD 27, UTM 12S 4396125 N, 573453 E

DISCUSSION

Cottonwood - Trend Study No. 11B-7

The study site samples a sagebrush flat at the northeast end of Cottonwood Ridge. The extensive sagebrush opening is surrounded by a mature pinyon pine woodland which gradually slopes down to steep canyons that drain east into the Green River. Terrain at the study site is nearly level (1% slope) with an elevation of 7,200 feet. A pellet group transect which runs north of the transect was read every year until 1989 when it was suspended. Data from the previous years was quite variable, but no use was the most common result. During the 12 years previous to 1989, deer did not use the area during most of the winters, and use ranged from 1 to 9 deer days use/acre (2 to 23 ddu/ha) during any one year. Correspondingly, few deer and elk pellet groups were found on the study site. Both deer and elk had the same quadrat frequency in 1994 (10%). Quadrat frequency of deer and elk pellet groups dropped in 2000 to only 1% deer and 6% elk, then in 2005 deer remained at 1%, but elk increased to 24%. Estimated pellet group data in 2000were 23 elk and 1 deer days use/acre (57 edu/ha and 2 ddu/ha). In 2005, the estimated pellet group data was 15 elk, 5 deer, and 2 cow days use/acre (38 edu/ha, 13 ddu/ha, and 5 cdu/ha). Cattle grazing pressure also appears to have been low during past readings and widely dispersed. As part of the Green River allotment, the area receives spring and summer cattle use. Sagegrouse droppings were also found on the site in 2005 at an estimated rate of 17 pellet groups/acre.

The soil is moderately deep and rocky with an effective rooting depth estimated at nearly 14 inches. There appears to be a layer of bedrock or a hardpan 12-16 inches below the surface. Deeper depth measurements were possible under sagebrush. The soil is a loam with a slightly alkaline soil reaction (7.4 pH). Phosphorus is limited at only 4.6 ppm, values less than 6 ppm may limit normal plant growth and development in wildland soils (Tiedemann and Lopez 2004). Much of the soil surface was exposed in 1986 with 59% of the ground surface estimated as bare ground. Bare ground has continued to be moderately high with a relative bare ground cover of 48% in 1994, 35% in 2000, and 44% in 2005. Litter and cryptogamic cover is limited to the areas beneath the sagebrush canopy. There is some evidence of soil movement and soil pedestaling around sagebrush, but the flat terrain prevents severe erosion. The erosion condition class determined soil movement as stable in 2005.

This sagebrush flat is dominated by an overly mature stand of Wyoming big sagebrush which provided 14% cover in 1994, 16% in 2000, and 13% in 2005. The sagebrush density was estimated at 5,132 plants/acre in 1986, decreased in 1994 to 4,020 plants/acre, increased slightly in 2000 to 4,140 plants/acre, then decreased again in 2005 to 3,320 plants/acre. The percentage of decadent individuals in the population has fluctuated from 66% in 1986, to 35% in 1994, to 69% in 2000, to 50% in 2005. The percentage of dying individuals in the population has fluctuated as well (8% in 1986, to 14% in 1994, to 30% in 2000, to 13% in 2005). Recruitment has been poor since the first reading in 1986. Young individuals made up 9% of the population in 1986, but have stayed at or below 3% since 1994. Most years, utilization was moderate to heavy, except in 2005 when use was mostly light. The plants on this site produced limited new growth in the past readings and were not very vigorous, making hedging appear more severe.

Broom snakeweed, an increaser, occurs in the bare interspaces. It has fluctuated in density, has seemed to have a stable population, but decreased drastically in 2005. In 1994, the estimated density was 2,620 plant/acre, decreased to 1,680 in 2000, then drastically decreased to 440 plants/acre in 2005. Very few pinyon are found in the flat and they do not appear to be increasing. The surrounding woodland provides good thermal cover.

The grass component is very good and abundant for a Wyoming sagebrush type. Needle-and-thread and western wheatgrass were the dominant grass species in 2005. In the early years of the study site, grazing pressure was moderate, but historically the area was subjected to long periods of excessive use by livestock. Since 1994, with little to no livestock grazing, cover of perennial grasses has nearly tripled and frequency has

also increased. In 2005, cheatgrass was sampled for the first time on the site, but was only found in 2 quadrats.

Forbs are diverse and produced as much cover as the grasses in 1994. Due to dry conditions in 2000, the nested frequency of forbs declined and then was stable in 2005. The majority of the forbs are found growing within the protection of the sagebrush, except for the low rounded mats of desert phlox. None are particularly important. Lobe-leaf groundsel, scarlet globemallow, and desert phlox are the most obvious species. No annual forbs were sampled on the site until 2005, when Douglas knotweed was sampled.

1986 APPARENT TREND ASSESSMENT

The key species, Wyoming big sagebrush, shows a high incidence of decadence (66%) and poor vigor (32%), but the number of seedlings is high. Recruitment appears adequate to maintain the stand so trend appears to be fairly stable. The shallow soil is a factor that cannot be changed, but a favorable water year would do much to improve the condition of the sagebrush. At this time, there does not appear to be excessive use by livestock or big game. Due to it's scattered and clumped distribution, the winterfat will always appear to be over utilized. The soil is in poor condition due to the large amounts of unprotected bare ground and lack of litter cover.

1994 TREND ASSESSMENT

The trend for soils has improved slightly since 1986 with the decrease in percent bare ground from 59% to 44% and a significant increase in the sum of nested frequency for western wheatgrass which is highly rhizomatous. The key browse, Wyoming big sagebrush, makes up 96% of the browse cover. It has experienced significant improvements in vigor and a decrease in percent decadence. The density has gone down, which is likely due to the much larger sample size utilized in 1994. The population appears more healthy and vigorous. Trend for browse is stable. The herbaceous understory has noted a slight increase in nested frequency for grasses and forbs. There has been a very significant increase in western wheatgrass. Trend for herbaceous understory is slightly improved. The Desirable Components Index score was good due to good browse cover and moderate perennial grass cover.

TREND ASSESSMENT
soil - slightly up (+1)
browse - stable (0)
herbaceous understory - slightly up (+1)
winter range condition (DC Index) - Good (48) Lower Potential scale

2000 TREND ASSESSMENT

Trend for soil appears to be slightly up with relative bare ground declining from 48% to 35% combined with increased perennial grass cover and nested frequency. Trend for the key browse species, Wyoming big sagebrush is stable, but concern for a future downward trend is warranted. Density has increased slightly from 4,020 plants/acre in 1994 to 4,140 by 2000. However, the proportion of plants in poor vigor has increased from 14% in 1994 to 31%, and percent decadence has gone up from 35% to 69%. Reproduction is poor and 1,240 plants/acre are classified as dying. There is currently not enough young plants to replace the dying shrubs. Use is moderate to heavy but these shrubs are not very vigorous and have limited growth which makes them appear more heavily hedged. The herbaceous understory displays a mixed trend. Cover and frequency of perennial grasses have increased dramatically. The biggest change comes from the significant increase in Indian ricegrass. On the down side, due in part to the dry spring and summer, frequency of perennial forbs has declined. Overall, the herbaceous trend is considered stable. The DCI score remained good but increased in perennial grass cover.

TREND ASSESSMENT
soils - slightly up (+1)
browse - stable (0)
herbaceous understory - stable (0)
winter range condition (DC Index) - Good (60) Lower Potential scale

2005 TREND ASSESSMENT

The trend for soil is stable. The ratio of protective ground cover (vegetation, litter and cryptogams) to bare ground remained nearly identical from 2000 to 2005. The trend for browse is down. The population of the key browse species Wyoming big sagebrush decreased 20% from 2000 to 2005. The percentage of decadent individuals decreased from 69% in 2000 to 50% in 2005, which is still higher than would be desired. Individuals classified as dying decreased from 30% to 13%. With 13% of the population classified as dying and only 2% (in 2005) of population classified as young the density will continue to decline. The trend for herbaceous understory is stable. There were various statistically significant changes in the nested frequency of the individual perennial grass and forb species, but the overall change of the nested frequency of perennial species changed little. Indian ricegrass nested frequency decreased significantly, while needle-and-thread increased significantly. Unfortunately, cheatgrass was sampled on the site for the first time. However, at this time cheatgrass nested frequency and cover were not high enough to change the trend. The DCI score remained good although browse cover and perennial grass cover decreased slightly.

TREND ASSESSMENT
soils - stable (0)
browse - down (-2)
herbaceous understory - stable (0)
winter range condition (DC Index) - Good (58) Lower Potential scale

HERBACEOUS TRENDS --
Management unit 11B, Study no: 7

Type	Species	Nested Frequency				Average Cover %		
		'86	'94	'00	'05	'94	'00	'05
G	Agropyron smithii	a88	c203	c235	b141	2.58	4.73	2.31
G	Bromus tectorum (a)	-	-	-	5	-	-	.01
G	Elymus salina	-	7	6	-	.18	.01	-
G	Oryzopsis hymenoides	a73	a65	b116	a43	1.00	6.86	1.54
G	Poa fendleriana	a14	a8	a2	b30	.01	.03	1.18
G	Poa secunda	a-	a-	a-	b16	-	-	.26
G	Sitanion hystrix	c68	a26	ab30	bc44	.30	.61	1.03
G	Stipa comata	116	79	99	172	1.57	3.81	7.49
Total for Annual Grasses		0	0	0	5	0	0	0.00
Total for Perennial Grasses		359	388	488	446	5.66	16.09	13.84
Total for Grasses		359	388	488	451	5.66	16.09	13.85
F	Antennaria rosea	-	-	11	7	-	.02	.02
F	Arabis sp.	-	7	-	5	.01	-	.01

Type	Species	Nested Frequency				Average Cover %		
		'86	'94	'00	'05	'94	'00	'05
F	Arabis drummondi	$_{b}$20	$_{a}$1	$_{a}$4	$_{a}$-	.00	.01	-
F	Castilleja chromosa	5	1	-	-	.00	-	-
F	Chaenactis douglasii	-	1	-	-	.00	-	-
F	Cryptantha fulvocanescens	$_{b}$48	$_{b}$73	$_{a}$-	$_{a}$7	.65	-	.04
F	Erigeron eatonii	6	1	4	-	.00	.01	-
F	Eriogonum racemosum	-	4	-	-	.01	-	-
F	Hymenoxys acaulis	$_{a}$-	$_{a}$7	$_{b}$18	$_{a}$6	.01	.10	.01
F	Lesquerella sp.	$_{b}$19	$_{ab}$18	$_{a}$7	$_{a}$2	.03	.01	.04
F	Machaeranthera canescens	-	1	-	-	.00	-	-
F	Orobanche sp.	-	-	-	1	-	-	.03
F	Phlox austromontana	$_{b}$144	$_{c}$203	$_{c}$199	$_{a}$22	4.51	5.32	.25
F	Phlox longifolia	-	-	-	1	-	-	.00
F	Polygonum douglasii (a)	-	-	-	4	-	-	.01
F	Schoencrambe linifolia	-	-	-	-	-	-	.00
F	Senecio multilobatus	$_{b}$71	$_{c}$107	$_{a}$3	$_{d}$200	.49	.01	8.01
F	Sphaeralcea coccinea	34	21	30	30	.11	.11	.18
F	Townsendia incana	$_{b}$54	$_{b}$32	$_{a}$5	$_{a}$8	.08	.02	.03
F	Unknown forb-perennial	9	-	-	-	-	-	-
Total for Annual Forbs		0	0	0	4	0	0	0.00
Total for Perennial Forbs		410	477	281	289	5.95	5.63	8.65
Total for Forbs		410	477	281	293	5.95	5.63	8.67

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

BROWSE TRENDS --
Management unit 11B, Study no: 7

Type	Species	Strip Frequency			Average Cover %		
		'94	'00	'05	'94	'00	'05
B	Artemisia tridentata wyomingensis	85	84	77	14.30	15.89	12.63
B	Ceratoides lanata	3	1	1	-	-	.00
B	Gutierrezia sarothrae	39	27	15	.59	.29	.04
B	Opuntia sp.	3	3	2	-	.00	.00
B	Pinus edulis	0	2	2	.00	.00	-
Total for Browse		130	117	97	14.90	16.20	12.68

CANOPY COVER, LINE INTERCEPT --
Management unit 11B, Study no: 7

Species	Percent Cover '05
Artemisia tridentata wyomingensis	14.26
Gutierrezia sarothrae	.20
Pinus edulis	.23

KEY BROWSE ANNUAL LEADER GROWTH --
Management unit 11B, Study no: 7

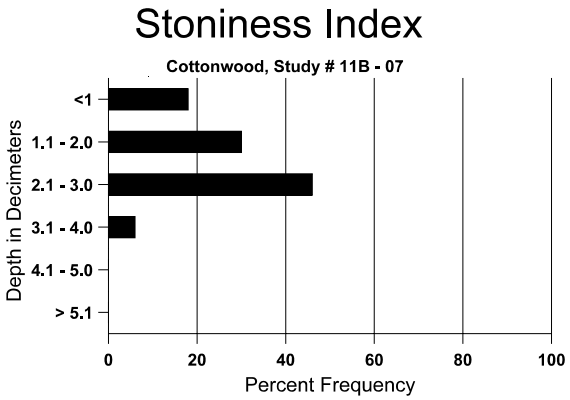
Species	Average leader growth (in) '05
Artemisia tridentata wyomingensis	1.3

BASIC COVER --
Management unit 11B, Study no: 7

Cover Type	Average Cover %			
	'86	'94	'00	'05
Vegetation	4.25	25.72	38.57	30.60
Rock	.75	2.25	1.16	1.72
Pavement	9.00	1.00	1.81	2.21
Litter	25.75	16.70	24.78	21.45
Cryptogams	1.25	2.92	8.11	4.07
Bare Ground	59.00	43.98	40.79	48.02

SOIL ANALYSIS DATA --
Herd Unit 11B, Study # 7, Study Name: Cottonwood

Effective rooting depth (in)	Temp °F (depth)	pH	%sand	%silt	%clay	%0M	ppm P	ppm K	dS/m
13.9	62.4 (15.1)	7.4	42.0	31.4	26.6	2.3	4.6	208.0	0.8



PELLET GROUP DATA --
Management unit 11B, Study no: 7

Type	Quadrat Frequency		
	'94	'00	'05
Rabbit	43	40	47
Grouse	-	-	1
Elk	10	6	24
Deer	10	1	1
Cattle	-	-	1

Days use per acre (ha)	
'00	'05
-	-
-	17/acre
24 (58)	15 (38)
2 (4)	5 (13)
-	2 (5)

BROWSE CHARACTERISTICS --
Management unit 11B, Study no: 7

		Age class distribution (plants per acre)					Utilization					
Year	Plants per Acre (excluding seedlings)	Seedling	Young	Mature	Decadent	Dead	% moderate	% heavy	% decadent	% dying	% poor vigor	Average Height Crown (in)
Artemisia tridentata wyomingensis												
86	**5132**	1533	466	1266	3400	-	44	12	66	8	32	24/25
94	**4020**	20	60	2560	1400	580	22	19	35	14	14	22/31
00	**4140**	20	140	1140	2860	1240	29	32	69	30	31	21/32
05	**3320**	80	80	1580	1660	1340	22	3	50	13	13	24/32
Ceratoides lanata												
86	**599**	-	200	266	133	-	11	33	22	3	11	9/6
94	**80**	-	20	60	-	-	0	0	0	-	0	6/5
00	**20**	-	-	20	-	-	0	100	0	-	0	-/-
05	**20**	-	-	20	-	-	0	100	0	-	0	4/4

		Age class distribution (plants per acre)					Utilization					
Year	Plants per Acre (excluding seedlings)	Seedling	Young	Mature	Decadent	Dead	% moderate	% heavy	% decadent	% dying	% poor vigor	Average Height Crown (in)
Gutierrezia sarothrae												
86	**599**	400	266	333	-	-	0	0	0	-	0	7/3
94	**2620**	20	40	2420	160	360	0	.76	6	5	5	5/7
00	**1680**	-	200	1480	-	-	0	0	0	-	0	3/4
05	**440**	-	20	420	-	-	0	0	0	-	0	8/9
Opuntia sp.												
86	**200**	-	200	-	-	-	0	0	0	-	0	-/-
94	**140**	20	-	100	40	20	0	57	29	29	57	2/5
00	**60**	-	20	40	-	-	0	0	0	-	0	3/6
05	**60**	-	-	60	-	-	0	0	0	-	0	3/9
Pinus edulis												
86	**66**	-	66	-	-	-	0	0	-	-	0	-/-
94	**0**	-	-	-	-	-	0	0	-	-	0	-/-
00	**40**	-	40	-	-	-	0	0	-	-	0	-/-
05	**40**	-	40	-	-	-	0	0	-	-	0	-/-

Trend Study 11B-8-05

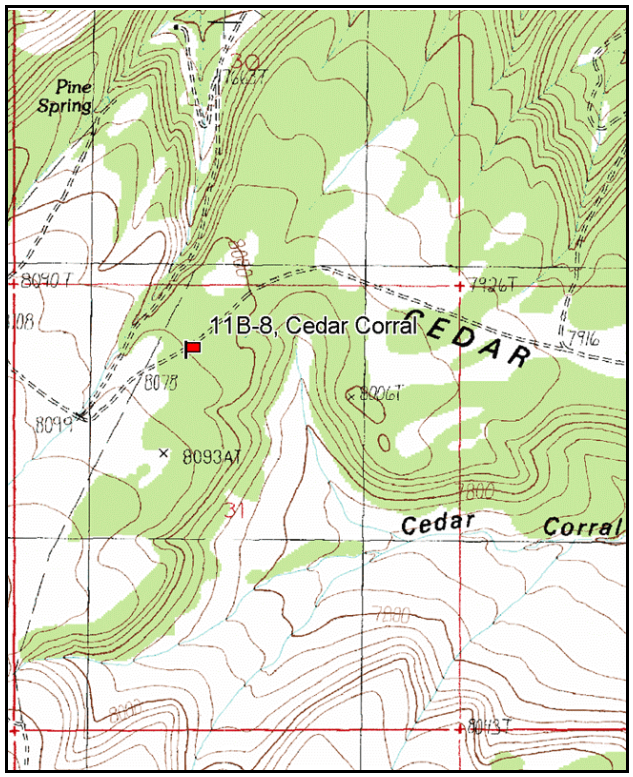
Study site name: Cedar Corral . Vegetation type: Pinyon-Juniper .

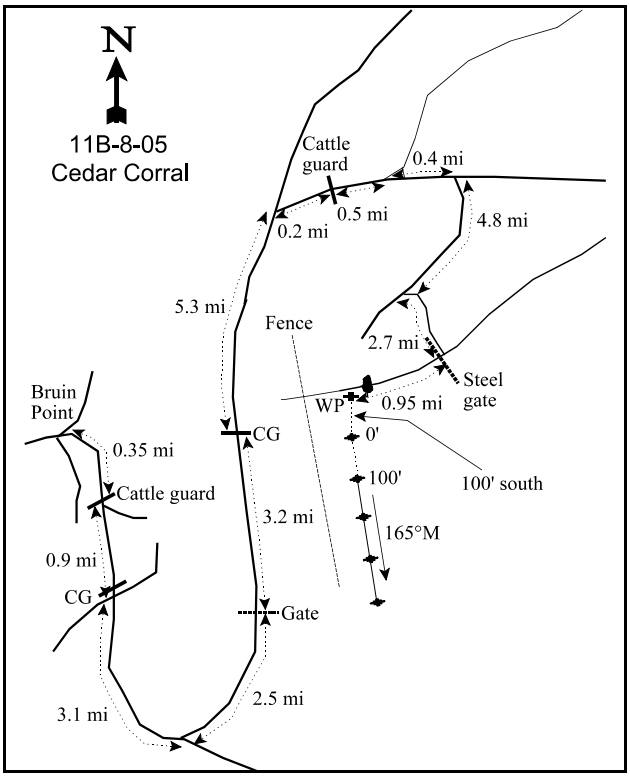
Compass bearing: frequency baseline 165 degrees magnetic.

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

LOCATION DESCRIPTION

From Bruin Point take the middle fork and go 0.35 miles. Stay right at the fork just beyond a cattle guard and go 0.9 miles. Proceed past another cattle guard, go straight through an intersection and continue 3.1 miles. Turn left at the fork and continue 2.5 miles to a gate by a cabin. Continue 3.2 miles, cross a cattle guard and go 5.3 miles more on the main road to a fork where you bear right. Go 0.2 miles to a cattle guard. Continue 0.5 miles to a major fork. Stay right and go 0.4 miles (passing 11B-7-00) to a fork. Stay right on the main road and go 4.8 miles to a junction. Turn left and go 2.7 miles to a "T" intersection. Turn right and go through the steel gate (You will need the combo to the lock). Proceed 0.95 miles to a witness post (fence post surrounded by pile of rocks) on the left side of the road, fifteen feet beyond a pinyon. The 0-foot end of the baseline (marked by a fence post tagged #7801) is 100 feet south of the witness post. There is a fence crossing the road approximately 200 yards southwest of the witness post.





Map Name: Twin Hollow

Diagrammatic Sketch

Township 13S , Range 16E , Section 31

GPS: NAD 27, UTM 12S 4389652 N, 571351 E

DISCUSSION

Cedar Corral - Trend Study No. 11B-8

The Cedar Corral site is located on winter range at a moderately high elevation (8,100 feet) on the southern part of the West Tavaputs Plateau. This study samples a part of the pinyon-juniper mountain brush-grass type with a northeast aspect on a nearly level slope (1%-2%). The study was originally on state land, but was sold to Nutter Ranch between the readings of 2000 and 2005. Cattle grazed the area in the past as part of the Green River allotment. However, there had been no cattle grazing on this allotment from 1994 until Nutter Ranch purchased the land. The grasses are rather depleted, with better elk forage found in the intermittent openings. The large pinyon provide excellent hiding and thermal cover, but the high elevation of the site would limit its use in some winters. Pellet group observations indicate light deer and elk use. Pellet group data from the 2000 reading was estimated at 8 deer and 10 elk days use/acre (20 ddu/ha and 25 edu/ha). Wild horse use was estimated at 9 days use/acre (22 hdu/ha). In 2005, the estimated pellet group data was 5 elk, 2 deer, 1 cow, and 8 horse days use/acre (12 edu/ha, 5 ddu/ha, 2 cdu/ha, and 19 hdu/ha). The Range Creek unit is used by an estimated 213 wild horses which reside in two groups. One group frequents the Cottonwood and Cold ridge area, while the other group primarily uses the Cedar ridge area. In addition, some sage grouse sign has also been encountered.

The soil is moderately shallow, yet quite variable as evidenced with the presence of black sagebrush and mountain big sagebrush. Effective soil depth is estimated at just over 9 inches. It is very compacted with abundant rocks on the surface and throughout the profile. There are also extensive sandstone rock layers just under the surface in some areas. The soil has a sandy clay loam to sandy loam texture with a marginally neutral soil reaction (6.6 pH). Organic matter is low at 1.9 % and phosphorus is limited at just 4.5 ppm, where values less than 6 ppm may limit normal plant growth and development in wildland soils (Tiedemann and Lopez 2004). There is evidence of erosion and soil movement, but the level terrain keeps water erosion to a minimum. There is a build-up of soil, litter and cryptogams under the scattered shrubs. Soil is deeper under the old pinyon. The erosion condition class determined soil movement as stable in 2005.

Pinyon pine is the dominant overstory tree species with an estimated density of 128 trees/acre in 2000 using point-center quarter data. Overhead canopy cover was estimated at 15%. Utah juniper and Rocky Mountain juniper were less common with an estimated density of 11 and 8 trees/acre respectively. In 2005, the densities were estimated at 104 pinyon pines/acre and 31 juniper/acre with an estimated overhead pinyon canopy cover of 16%. Valuable deer browse species include, true mountain mahogany, mountain big sagebrush, black sagebrush, and serviceberry. These key species made up 16% cover in 1994, 22% in 2000, and only 14% in 2005. Utilization has been mostly light to moderate since 1986. Vigor was generally good and percent decadence low, but percent decadence increased from 10% in 2000 to 34% in 2005 for black sagebrush.

Several desirable forage grasses occur on the site, but overall abundance is erratic with a low cover value of only 4% in 1994, 6% in 2000, and 3% in 2005. Common species include: thickspike and bluebunch wheatgrass, and mutton and Sandberg bluegrass. Utilization of grasses is light. Unfortunately, cheatgrass was identified on the site for the first time during the 2005 reading. A variety of forbs are present, but the majority are small, low-growing varieties and their contribution to forage production is small. Forbs do produce more cover than grasses. The most abundant species is the succulent, lance-leaved sedum or stonecrop. The only other common species include pussy toes, hairy goldaster, and desert phlox.

1986 APPARENT TREND ASSESSMENT

As far as browse species are concerned, vegetation trend is considered stable to possibly up because of the current excellent vigor and reproduction of the important browse species. If the management objective stresses the importance of grasses however, they are not fairing quite as well and under continued cattle grazing may decrease further. The soil trend appears stable.

1994 TREND ASSESSMENT

The soil trend is considered stable at this time, but with the continuing loss of grasses and forbs. This trend should be closely monitored. Overall trend for the five key browse is slightly up with significant decreases in percent decadence and improved vigor. The herbaceous trend is slightly down due to a decrease in the sum nested frequency of both grasses and forbs. The Desirable Components Index score is fair to good due to good browse cover, low browse decadence, and excellent perennial forb cover.

TREND ASSESSMENT
soil - stable (0)
browse - slightly up (+1)
herbaceous understory - slightly down (-1)
winter range condition (DC Index) - Fair to Good (63) Mid-level Potential scale

2000 TREND ASSESSMENT

Trend for soil is up slightly due to an increase in vegetation and litter cover combined with a decline in percent bare ground. Trend for browse appears stable with similar densities, good vigor and reproduction, low decadence, and mostly light use of the key species. It appears that deer and elk do not use this area very heavily. An important question to the browse trend is whether the pinyon and juniper continue to increase in canopy cover and how quickly. Currently, pinyon provides an overhead canopy cover of 15%. It does not currently appear to be effecting the understory shrubs. However, if it increases in the future, it will come at the expense of the understory shrubs and herbaceous plants. Trend for the herbaceous understory is down slightly due to a decline in the sum of nested frequency of perennial grasses and forbs. Sum of nested frequency of grasses and forbs have steadily declined since 1986 when the site was established. This is likely due to the increase in cover of shrubs and trees. The DCI score increased to good due to increased browse cover, improved browse decadence, and increased perennial grass cover.

TREND ASSESSMENT
soils - up slightly (+1)
browse - stable (0)
herbaceous understory - slightly down (-1)
winter range condition (DC Index) - Good (72) Moderate Potential scale

2005 TREND ASSESSMENT

The trend for soil is stable. The ratio of protective ground cover (vegetation, litter and cryptogams) to bare ground remained nearly identical from 2000 to 2005. The trend for browse is down. From 2000 to 2005, pinyon pine increased from 5% to 10% cover. Pinyon also increased 1% in overhead canopy cover. This pinyon increase has had deleterious effects on the key browse species on the site. The key browse species mountain big sagebrush has historically been the dominant browse species on the site, but declined from 10% cover in 2000 to 4% in 2005. The big sagebrush density decreased 23% from 3,620 plant/acre in 2000 to 2,780 in 2005, most of which was mature individuals. Along with this steep decline in numbers was an increase in decadence from 18% to 26% and 10% to 14% increase in dying indviduals. The density of true

mountain mahogany decreased 29% from 2000 to 2005, which was coupled with an increase in heavy use. The population numbers of both utah serviceberry and black sagebrush remained stable, but in both cases the percentage of decadent individuals increased and that of dying individauls also increased for both species. As well, the increaser species broom snakeweed increased 50%, although the density of this species is still relatively low. The herbaceous understory trend is slightly down. This is due mainly to a 16% decrease in the nested frequency of perennial grasses and an 8% decrease for perennial forbs since 2000 as well as the discovery of cheatgrass on the site. It had a quadrat frequency of 22%. The DCI score decreased to fair due to decreased browse cover, increased browse decadence, and decreased perennial grass cover.

TREND ASSESSMENT
soils - stable (0)
browse - down (-2)
herbaceous understory - slightly down (-1)
winter range condition (DC Index) - Fair (58) Moderate Potential scale

HERBACEOUS TRENDS --
Management unit 11B, Study no: 8

Type	Species	Nested Frequency				Average Cover %		
		'86	'94	'00	'05	'94	'00	'05
G	Agropyron dasystachyum	ab43	ab59	b66	a32	.22	.42	.49
G	Agropyron spicatum	b163	a41	a42	a34	.41	1.81	.90
G	Bromus tectorum (a)	-	a-	a-	b53	-	-	.67
G	Koeleria cristata	c23	ab7	a-	bc12	.16	-	.13
G	Oryzopsis hymenoides	ab13	a2	ab17	b22	.03	.28	.24
G	Poa fendleriana	a18	b79	b65	a33	1.65	1.75	.36
G	Poa secunda	b85	a45	a56	ab70	.50	1.25	.85
G	Sitanion hystrix	a1	b21	a-	a5	.39	-	.01
G	Stipa comata	-	4	10	3	.03	.21	.15
G	Stipa lettermani	a-	b15	a-	ab5	.12	-	.01
Total for Annual Grasses		0	0	0	53	0	0	0.67
Total for Perennial Grasses		346	273	256	216	3.54	5.75	3.15
Total for Grasses		346	273	256	269	3.54	5.75	3.83
F	Allium sp.	a-	c26	ab2	bc12	.06	.06	.04
F	Antennaria rosea	57	60	61	50	2.25	2.48	1.68
F	Arabis drummondi	b41	a3	a-	a4	.00	-	.04
F	Arabis perennans	b21	b14	a-	a-	.02	-	-
F	Astragalus argophyllus	8	5	1	-	.03	.00	-
F	Castilleja flava	2	-	-	-	-	-	-
F	Castilleja linariaefolia	-	-	3	-	-	.00	-
F	Calochortus nuttallii	1	2	-	3	.00	-	.00
F	Chenopodium album (a)	-	-	-	3	-	-	.00
F	Chaenactis douglasii	a-	ab5	a-	b14	.01	-	.10

Type	Species	Nested Frequency				Average Cover %		
		'86	'94	'00	'05	'94	'00	'05
F	Collinsia parviflora (a)	-	1	-	5	.00	-	.01
F	Crepis acuminata	$_{c}$21	$_{a}$-	$_{ab}$2	$_{bc}$13	-	.01	.03
F	Cryptantha sp.	-	-	1	-	-	.03	-
F	Eriogonum alatum	$_{b}$11	$_{a}$-	$_{a}$-	$_{a}$-	-	-	-
F	Erigeron eatonii	$_{b}$100	$_{a}$27	$_{a}$13	$_{a}$7	.12	.06	.04
F	Erigeron flagellaris	$_{a}$12	$_{b}$37	$_{ab}$21	$_{a}$11	.13	.18	.22
F	Eriogonum racemosum	$_{a}$-	$_{b}$11	$_{a}$-	$_{a}$-	.19	-	-
F	Eriogonum umbellatum	$_{b}$59	$_{a}$21	$_{ab}$43	$_{ab}$31	.20	.27	.27
F	Euphorbia sp.	-	-	-	1	-	-	.03
F	Gayophytum ramosissimum(a)	-	$_{a}$-	$_{a}$-	$_{b}$10	-	-	.02
F	Heterotheca villosa	$_{a}$7	$_{bc}$30	$_{c}$37	$_{ab}$16	.82	1.79	.60
F	Ipomopsis aggregata	11	10	3	1	.02	.00	.00
F	Lappula occidentalis (a)	-	-	-	3	-	-	.03
F	Linum lewisii	-	4	-	-	.01	-	-
F	Lomatium triternatum	$_{c}$29	$_{a}$-	$_{ab}$3	$_{bc}$13	-	.01	.04
F	Machaeranthera grindelioides	4	2	-	5	.03	-	.01
F	Penstemon sp.	-	3	4	3	.00	.01	.03
F	Phlox austromontana	$_{ab}$31	$_{ab}$15	$_{b}$28	$_{a}$10	.43	.91	.25
F	Phlox longifolia	-	-	3	-	-	.01	-
F	Polygonum douglasii (a)	-	$_{b}$35	$_{a}$4	$_{c}$146	.06	.00	.45
F	Sedum lanceolatum	$_{a}$135	$_{b}$210	$_{a}$152	$_{a}$152	3.44	2.44	2.52
F	Senecio multilobatus	-	1	-	1	.00	-	.01
F	Sphaeralcea coccinea	-	9	-	-	.04	-	-
F	Taraxacum officinale	-	3	-	1	.04	-	.00
F	Trifolium sp.	$_{b}$32	$_{a}$-	$_{a}$-	$_{a}$-	-	-	-
Total for Annual Forbs		0	36	4	167	0.07	0.00	0.51
Total for Perennial Forbs		582	498	377	348	7.91	8.30	5.97
Total for Forbs		582	534	381	515	7.98	8.31	6.49

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

BROWSE TRENDS --
Management unit 11B, Study no: 8

Type	Species	Strip Frequency			Average Cover %		
		'94	'00	'05	'94	'00	'05
B	Amelanchier utahensis	25	23	26	4.46	6.61	4.22
B	Artemisia frigida	0	0	0	.00	-	-
B	Artemisia nova	49	40	44	3.44	2.45	3.55
B	Artemisia tridentata vaseyana	57	66	52	6.50	9.81	4.00
B	Cercocarpus montanus	12	19	14	1.87	3.09	2.16
B	Chrysothamnus depressus	31	23	28	.25	.25	.34
B	Chrysothamnus nauseosus	0	0	0	-	.63	-
B	Chrysothamnus viscidiflorus viscidiflorus	34	28	19	.50	.13	.51
B	Gutierrezia sarothrae	18	12	15	.03	.04	.36
B	Opuntia sp.	11	7	5	.05	.00	.03
B	Pediocactus simpsonii	0	1	1	-	-	-
B	Pinus edulis	0	7	7	3.29	4.76	10.07
B	Purshia tridentata	0	0	1	-	-	.03
B	Symphoricarpos oreophilus	17	19	17	.18	1.66	1.22
Total for Browse		254	245	229	20.60	29.47	26.54

CANOPY COVER, LINE INTERCEPT --
Management unit 11B, Study no: 8

Species	Percent Cover	
	'00	'05
Amelanchier utahensis	1.39	10.23
Artemisia nova	-	4.30
Artemisia tridentata vaseyana	-	6.15
Cercocarpus montanus	-	5.06
Chrysothamnus depressus	-	.36
Chrysothamnus viscidiflorus viscidiflorus	-	.40
Gutierrezia sarothrae	-	.35
Opuntia sp.	-	.03
Pinus edulis	14.60	16.10
Symphoricarpos oreophilus	-	.70

KEY BROWSE ANNUAL LEADER GROWTH --
Management unit 11B, Study no: 8

Species	Average leader growth (in) '05
Amelanchier utahensis	3.0
Artemisia tridentata vaseyana	2.3
Cercocarpus montanus	4.2

POINT-QUARTER TREE DATA --
Management unit 11B, Study no: 8

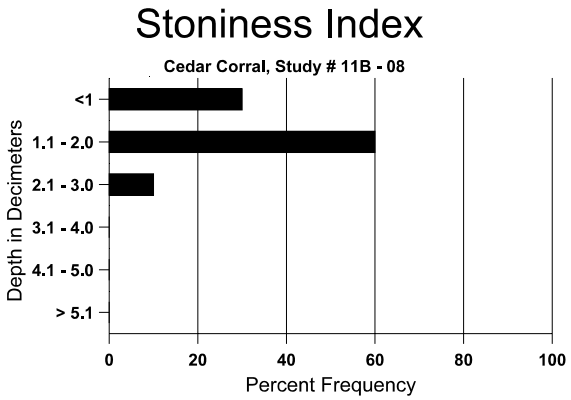
Species	Trees per Acre '00	Trees per Acre '05	Average diameter (in) '00	Average diameter (in) '05
Juniperus osteosperma	8	31	7.7	3.1
Pinus edulis	127	104	5.0	5.6

BASIC COVER --
Management unit 11B, Study no: 8

Cover Type	Average Cover % '86	'94	'00	'05
Vegetation	4.50	32.50	37.30	30.22
Rock	8.50	6.57	8.14	7.78
Pavement	1.00	.14	.72	.62
Litter	50.75	40.25	52.41	47.20
Cryptogams	3.50	.38	1.94	2.16
Bare Ground	31.75	29.77	22.95	27.28

SOIL ANALYSIS DATA --
Herd Unit 11B, Study # 8, Study Name: Cedar Corral

Effective rooting depth (in)	Temp °F (depth)	pH	%sand	%silt	%clay	%0M	ppm P	ppm K	dS/m
9.5	64.2 (9.9)	6.6	54.0	25.4	20.6	1.9	4.5	198.4	0.8



PELLET GROUP DATA --
Management unit 11B, Study no: 8

Type	Quadrat Frequency		
	'94	'00	'05
Rabbit	29	14	40
Horse	2	4	2
Cattle	-	-	-
Elk	8	8	5
Deer	16	7	2

Days use per acre (ha)	
'00	'05
-	-
-	8 (19)
-	1 (2)
10 (25)	5 (12)
8 (20)	2 (5)

BROWSE CHARACTERISTICS --
Management unit 11B, Study no: 8

		Age class distribution (plants per acre)					Utilization					
Year	Plants per Acre (excluding seedlings)	Seedling	Young	Mature	Decadent	Dead	% moderate	% heavy	% decadent	% dying	% poor vigor	Average Height Crown (in)
Amelanchier utahensis												
86	**133**	-	-	-	133	-	0	0	100	-	0	-/-
94	**680**	60	80	560	40	20	21	0	6	3	3	47/59
00	**700**	120	220	400	80	20	34	0	11	3	6	46/56
05	**680**	40	220	360	100	40	18	38	15	6	6	52/60
Artemisia nova												
86	**2399**	600	1533	466	400	-	17	0	17	-	0	9/10
94	**2540**	-	240	2060	240	280	31	8	9	2	2	11/17
00	**1780**	40	80	1520	180	200	30	2	10	3	3	10/18
05	**1920**	860	120	1140	660	380	0	0	34	6	6	11/22

		Age class distribution (plants per acre)					Utilization					
Year	Plants per Acre (excluding seedlings)	Seedling	Young	Mature	Decadent	Dead	% moderate	% heavy	% decadent	% dying	% poor vigor	Average Height Crown (in)
Artemisia tridentata vaseyana												
86	**1399**	1733	1066	333	-	-	0	0	0	-	0	13/16
94	**3280**	120	700	2400	180	340	21	0	5	2	2	21/31
00	**3620**	120	280	2700	640	360	13	0	18	10	10	17/26
05	**2780**	520	500	1560	720	580	22	15	26	14	14	18/27
Cercocarpus montanus												
86	**666**	66	400	200	66	-	30	0	10	-	0	15/15
94	**260**	-	40	220	-	-	15	8	0	-	0	51/51
00	**420**	100	140	260	20	-	33	5	5	-	5	56/68
05	**300**	200	160	140	-	-	27	27	0	-	0	52/58
Chrysothamnus depressus												
86	**3332**	133	400	2466	466	-	0	0	14	-	0	4/6
94	**1420**	-	80	1240	100	-	6	0	7	3	3	4/8
00	**1000**	-	40	860	100	60	16	2	10	8	8	4/6
05	**900**	80	140	620	140	20	20	18	16	7	7	5/8
Chrysothamnus viscidiflorus viscidiflorus												
86	**732**	-	66	466	200	-	0	0	27	-	0	10/7
94	**1160**	20	120	1020	20	-	0	0	2	2	2	9/8
00	**760**	-	120	580	60	-	0	0	8	-	0	10/9
05	**520**	-	180	280	60	-	23	8	12	4	4	14/16
Gutierrezia sarothrae												
86	**533**	-	133	400	-	-	0	0	0	-	0	5/6
94	**480**	20	60	400	20	-	4	0	4	-	0	5/6
00	**400**	-	40	360	-	-	0	0	0	-	0	5/6
05	**800**	-	160	620	20	-	0	0	3	3	3	7/10
Opuntia sp.												
86	**0**	-	-	-	-	-	0	0	0	-	0	-/-
94	**320**	-	100	120	100	-	25	0	31	6	6	3/7
00	**160**	-	40	100	20	-	0	0	13	-	0	2/4
05	**160**	-	40	120	-	-	0	0	0	-	0	2/8
Pediocactus simpsonii												
86	**0**	-	-	-	-	-	0	0	-	-	0	-/-
94	**0**	-	-	-	-	-	0	0	-	-	0	-/-
00	**20**	-	-	20	-	-	0	0	-	-	0	3/4
05	**40**	-	20	20	-	-	0	0	-	-	0	2/6

		Age class distribution (plants per acre)					Utilization					
Year	Plants per Acre (excluding seedlings)	Seedling	Young	Mature	Decadent	Dead	% moderate	% heavy	% decadent	% dying	% poor vigor	Average Height Crown (in)
Pinus edulis												
86	**0**	133	-	-	-	-	0	0	-	-	0	-/-
94	**0**	-	-	-	-	-	0	0	-	-	0	-/-
00	**140**	20	40	100	-	-	0	0	-	-	0	-/-
05	**140**	-	60	80	-	-	0	0	-	-	0	-/-
Purshia tridentata												
86	**0**	-	-	-	-	-	0	0	0	-	0	-/-
94	**0**	-	-	-	-	-	0	0	0	-	0	-/-
00	**0**	-	-	-	-	-	0	0	0	-	0	-/-
05	**20**	-	-	-	20	-	0	0	100	100	100	-/-
Symphoricarpos oreophilus												
86	**200**	-	-	200	-	-	33	0	0	-	0	18/25
94	**700**	20	60	620	20	-	3	3	3	-	0	15/27
00	**980**	-	140	720	120	-	4	0	12	-	0	8/14
05	**880**	20	200	680	-	-	0	0	0	-	0	14/20

Trend Study 11B-9-05

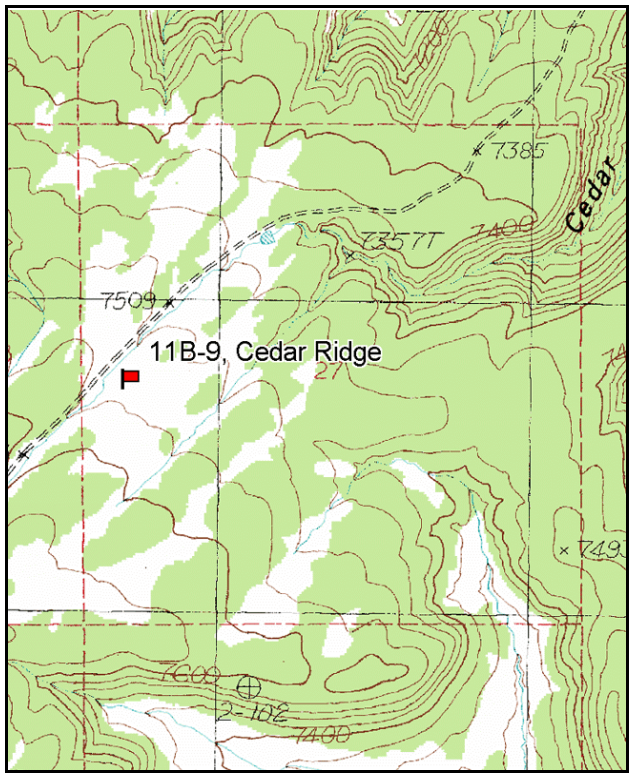
Study site name: Cedar Ridge . Vegetation type: Black Sagebrush .

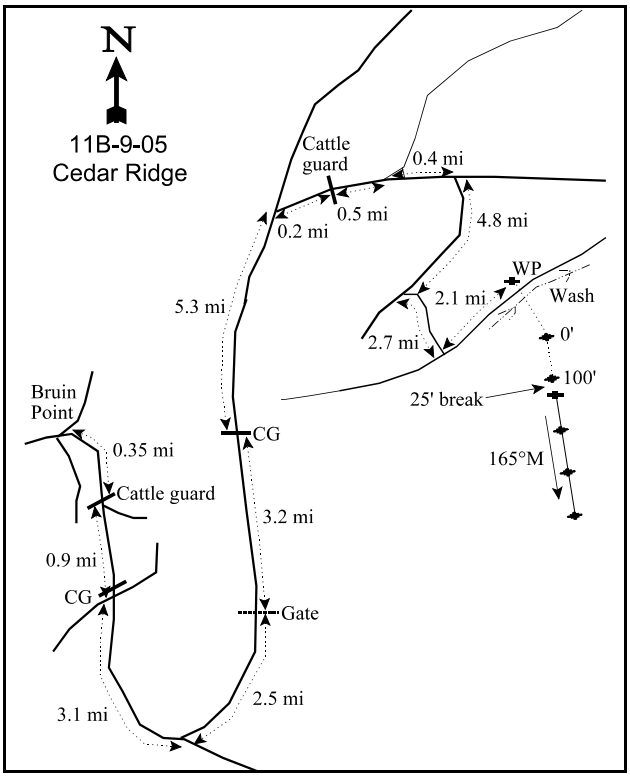
Compass bearing: frequency baseline 165 degrees magnetic.

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

LOCATION DESCRIPTION

From Sunnyside, go up Water Canyon to the summit (Bruin Point). At the summit take the middle fork and go 0.35 miles. Stay right at the fork just beyond a cattle guard and go 0.9 miles. Go through an intersection beyond another cattle guard and go 3.1 miles. Turn left at the fork and continue 2.5 miles to a gate by a cabin. Proceed 3.2 miles, cross a cattle guard and go 5.3 miles on the main road to a fork. Bear right and continue 0.2 miles to a cattle guard. Go 0.5 miles to a major fork. Stay right and keep going 0.4 miles (passing Cottonwood 11B-7) to another fork. Stay on the main road (right) and go 4.8 miles to a junction. Turn left and go 2.7 miles to a "T" intersection. Turn left and go 2.1 miles to a witness post on the left side of the road. The transect starts 280 feet southeast of the witness post across the wash in the sage flat. There is a 25 foot break in the baseline between the end of line 1 and 2. The end of line 1 is marked by partially buried rebar. The rest of the stakes, including the witness post, are green fence posts.





Map Name: Cedar Ridge Canyon

Diagrammatic Sketch

Township 13S , Range 16E , Section 28

GPS: NAD 27, UTM 12S 4390704 N, 575696 E

DISCUSSION

Cedar Ridge - Trend Study No. 11B-9

This study is located on the wide southwest portion of Cedar Ridge about 6 miles east of the Green River. Cedar Ridge is an important concentration area for wintering mule deer, although much of the use occurs on the lower limits of the ridge. The study site is located within an extensive sagebrush park at an elevation of 7,600 feet. This area and surrounding country is basically level, but dissected by numerous deep, intermittent drainages, which drain to the northeast. Slope is only about 3%. The area is used by deer, elk, and a large number of wild horses. Deer pellet groups on the site indicate light use during all readings although several antler drops were found in 1986. A well worn trail passes through the flat. Both cattle and horse droppings were common in 1994, but significant use was not evident. There was also light elk sign observed in 1994. During the 2000 reading, pellet group data estimated 29 elk and 21 horse days use/acre (71 edu/ha and 52 hdu/ha). No deer pellet groups were encountered, but a few were picked up in the quadrats. In 2005, 38 elk, 17 deer, 1 cow, and 30 horse days use/acre (94 edu/ha, 43 ddu/ha, 2cdu/ha, 75 hdu/ha) were estimated. Also in 2005, 9 sage grouse pellet groups/acre were observed.

The soil is moderately shallow as indicated by the abundance of black sagebrush. A rocky layer is found around 12 to 15 inches in depth which limits deeper soil measurements. Effective rooting depth is estimated at almost 13 inches. The soil has a loam texture with a neutral soil reaction (7.0 pH). Phosphorus is limited at only 5.3 ppm, where values less than 6 ppm may limit normal plant growth and development in wildland soils (Tiedemann and Lopez 2004). The soil is fairly rocky, but there is little concentration of erosion, pavement, or rocks on the soil surface. It is loosely compacted with a fair amount of bare soil. Litter and vegetation cover are evenly dispersed and provide adequate soil protection. Some small rills are evident, with an old gully north of the transect along the road. Erosion should not be a problem as long as a high percentage of ground cover comes from herbaceous species. The erosion condition class determined soil movement as slight in 2005 due to moderate pedestalling around the shrubs and perennial grasses.

This open sagebrush park is surrounded by pinyon-juniper woodland. The dominant browse species is black sagebrush, which had cover estimated at 12% in 1994, 21% in 2000, and 24% in 2005. Density was estimated at 5,733 plants/acre in 1986, and appeared to be expanding with an extremely high number of seedlings. By 1994, the population increased 4-fold to 22,840 plants/acre. Many of the seedlings sampled in 1986 survived to become young plants as half of the population consisted of young plants. Also, the 1994 reading was done with the larger sample size which better estimated shrub populations. Leader growth was good and the plants appeared vigorous. Use was mostly light. The population of black sagebrush increased slightly in 2000 to 25,180 plants/acre. The stand was mainly mature (84%), while seedlings and young were still common and mature plants appear to be producing abundant seed. The population decreased 54% in 2005 to 11,660 plants/acre. The population was 75% mature and had increased from 8% decadence (2000) to 15%. Use continued to be light, vigor good, and decadence low.

Other shrubs present include: dwarf rabbitbrush, rubber rabbitbrush, broom snakeweed, and gray horsebrush. These species make up only a small percent of the browse composition. Junipers appear to be slowly invading the flat, but will not threaten the site for decades. Point-center quarter data from 2000 estimated only 12 pinyon and 11 juniper trees/acre with average diameters of 4.5 inches and 3.4 inches, respectively. Point quarter measurements were not taken in 2005. The surrounding pinyon-juniper stand provides good cover and still maintains a good shrub understory.

Grasses and forbs are moderately abundant and an important component of this site. They not only provide valuable forage, but they also provide excellent protective ground cover. The most abundant species of grass is needle-and-thread. Bluebunch wheatgrass, mutton bluegrass, Sandberg's bluegrass, and thickspike wheatgrass are also fairly abundant. Use of mutton and Sandberg bluegrass appeared fairly heavy in 2000.

Forb composition is relatively diverse for this type of site with 24 species of forbs encountered in 1994, 18 in 2000, and 26 in 2005. Common species include the low growing pussytoes, sulfur eriogonum, mat penstemon, and long-leaf phlox. Lobe-leaf groundsel and scarlet globemallow are also common.

1986 APPARENT TREND ASSESSMENT

The area appears in good health, with a good diversity of species and moderate amounts of forage production for this range type. The sagebrush population is increasing with a very high biotic potential (# of seedlings). Sagebrush provides the bulk of the forage on the site, but the grasses are also vigorous and productive. Invasion by the few increaser woody species and pinyon-juniper is not currently a threat. Therefore, vegetation trend appears stable to improving on this site. The site provides good normal winter range for deer and elk. The soil has excellent protection and although there is the potential for erosion the current trend appears stable.

1994 TREND ASSESSMENT

The area still remains in good health. The trend for soils is slightly up with a decrease in percent bare ground (46% to 33%), even with a decrease in nested frequency value for grasses, this was compensated for with an increase in nested frequency for the forbs. The primary browse species is black sagebrush, which makes up 90% of the total browse cover. The density is quite high at 22,840 plants/acre, but 50% of the population is classified as young plants. Percent decadency has declined to only 5% and the browse trend is considered up. The trend for the herbaceous understory is mixed because the nested frequency value of grasses has decreased, while the nested frequency for forbs has increased. Trend for the herbaceous understory is therefore considered stable, but could decline with continued drought. The Desirable Components Index score is excellent due to moderate browse cover, low browse decadence, and excellent perennial forb cover.

TREND ASSESSMENT
soil - slightly up (+1)
browse - up (+2)
herbaceous understory - stable (0)
winter range condition (DC Index) - Excellent (74) Lower Potential scale

2000 TREND ASSESSMENT

Trend for soil is slightly improved with decreases in bare soil, increases in litter cover, and improved ratios of protective ground cover (vegetation, litter and cryptogams) to bare ground. There is little erosion occurring due to the level terrain combined with good herbaceous cover. Trend for browse is stable. The key species, black sagebrush, has increased in density and cover. Seedlings and young are still abundant, vigor is good and use light. However, continued increases in density and cover will negatively effect the herbaceous understory. Trend for the herbaceous understory is stable. Sum of nested frequency for grasses and forbs has remained similar to 1994. Nested frequency of the dominant grass, needle-and-thread, declined significantly since 1994, but cover remained similar and several other species of grass increased in nested frequency. The DCI score remained excellent with increases in browse cover and perennial grass cover.

TREND ASSESSMENT
soil - slightly up (+1)
browse - stable (0)
herbaceous understory - stable (0)
winter range condition (DC Index) - Excellent (77) Lower Potential scale

2005 TREND ASSESSMENT

Trend for soil is stable. The ratio of protective ground cover (vegetation, litter and cryptogams) to bare ground remained nearly identical from 2000 to 2005. The trend for browse is stable, despite the apparent self thinning of black sagebrush. Density decreased by half from 2000 to 2005, adjusting to lower precipitation and severe intraspecific competition between adult plants. Decadence was still low at only 15%. The population continues to be healthy and very abundant with only 3% of the population classified as dying and/or of poor vigor. Cover increased to nearly 24%. The herbaceous understory trend is slightly up. Perennial grass and forb species increased in the interval of 2000 and 2005. The sum of the nested frequency for perennial grasses and perennial forbs increased 17%. The DCI score remained excellent.

TREND ASSESSMENT
soil - stable (0)
browse - stable (0)
herbaceous understory - slightly up (+1)
winter range condition (DC Index) - Excellent (75) Lower Potential scale

HERBACEOUS TRENDS --
Management unit 11B, Study no: 9

Type	Species	Nested Frequency				Average Cover %		
		'86	'94	'00	'05	'94	'00	'05
G	Agropyron dasystachyum	$_{a}$10	$_{a}$8	$_{b}$66	$_{a}$15	.02	.81	.09
G	Agropyron spicatum	66	49	61	40	.86	.51	1.25
G	Bouteloua gracilis	30	43	30	29	2.12	.91	.21
G	Bromus tectorum (a)	-	$_{a}$-	$_{a}$2	$_{b}$16	-	.00	.09
G	Koeleria cristata	$_{a}$-	$_{b}$25	$_{a}$-	$_{c}$101	.29	-	.85
G	Oryzopsis hymenoides	-	3	7	-	.00	.09	-
G	Poa fendleriana	$_{c}$190	$_{ab}$57	$_{b}$87	$_{a}$37	.43	2.38	.47
G	Poa secunda	$_{b}$70	$_{a}$8	$_{b}$92	$_{c}$172	.01	.62	1.83
G	Sitanion hystrix	$_{b}$40	$_{ab}$21	$_{a}$4	$_{b}$33	.06	.03	.53
G	Stipa comata	$_{b}$246	$_{b}$269	$_{a}$160	$_{a}$194	5.36	4.62	4.27
Total for Annual Grasses		0	0	2	16	0	0.00	0.08
Total for Perennial Grasses		652	483	507	621	9.21	9.99	9.53
Total for Grasses		652	483	509	637	9.21	10.00	9.62
F	Agoseris glauca	-	-	3	1	-	.00	.03
F	Antennaria parvifolia	$_{ab}$65	$_{b}$87	$_{b}$98	$_{a}$37	2.59	2.63	.32
F	Arenaria fendleri	-	-	1	-	-	.00	-
F	Arabis perennans	$_{b}$10	$_{ab}$3	$_{a}$-	$_{b}$16	.01	-	.07
F	Astragalus convallarius	$_{c}$12	$_{ab}$3	$_{bc}$10	$_{a}$-	.00	.12	-
F	Astragalus tenellus	$_{a}$-	$_{ab}$12	$_{b}$18	$_{a}$-	.03	.37	.00
F	Astragalus utahensis	-	3	2	6	.00	.00	.01
F	Castilleja flava	-	-	9	4	-	.07	.03

Type	Species	Nested Frequency				Average Cover %		
		'86	'94	'00	'05	'94	'00	'05
F	Castilleja linariaefolia	$_{b}$23	$_{a}$4	$_{ab}$12	$_{a}$1	.03	.10	.00
F	Calochortus nuttallii	$_{a}$3	$_{b}$42	$_{a}$7	$_{b}$25	.11	.01	.08
F	Cryptantha sp.	$_{ab}$23	$_{ab}$18	$_{b}$30	$_{a}$12	.15	.28	.13
F	Delphinium nuttallianum	$_{b}$12	$_{a}$-	$_{ab}$2	$_{ab}$5	-	.01	.04
F	Eriogonum alatum	-	2	2	3	.03	.03	.00
F	Erigeron eatonii	-	2	1	-	.03	.00	.00
F	Eriogonum umbellatum	29	29	33	39	.28	.45	1.02
F	Hedysarum boreale	$_{a}$-	$_{c}$33	$_{ab}$11	$_{bc}$25	.95	.07	1.50
F	Heterotheca villosa	-	-	3	-	-	.00	-
F	Ipomopsis aggregata	-	-	3	-	-	.00	-
F	Lappula occidentalis (a)	-	$_{a}$-	$_{a}$-	$_{b}$14	-	-	.03
F	Lesquerella sp.	-	4	-	-	.03	-	-
F	Linum lewisii	-	-	2	5	-	.03	.02
F	Machaeranthera canescens	-	3	5	7	.00	.01	.36
F	Machaeranthera grindelioides	5	5	-	6	.01	-	.04
F	Penstemon caespitosus	$_{a}$35	$_{b}$70	$_{a}$47	$_{a}$23	1.65	.92	.09
F	Penstemon strictus	6	12	11	13	.05	.03	.11
F	Phlox hoodii	2	4	5	-	.03	.16	-
F	Phlox longifolia	$_{a}$60	$_{a}$65	$_{a}$57	$_{b}$103	.21	.29	.64
F	Polygonum douglasii (a)	-	$_{a}$-	$_{a}$-	$_{b}$135	-	-	.39
F	Sedum lanceolatum	-	-	-	5	-	-	.01
F	Senecio multilobatus	$_{a}$46	$_{a}$45	$_{a}$50	$_{b}$149	.27	.30	2.41
F	Sphaeralcea coccinea	$_{a}$19	$_{b}$62	$_{a}$27	$_{a}$19	.50	.11	.09
F	Townsendia incana	$_{a}$-	$_{a}$-	$_{b}$16	$_{a}$-	-	.05	-
F	Trifolium sp.	$_{b}$11	$_{a}$-	$_{ab}$6	$_{b}$18	-	.02	.11
F	Unknown forb-perennial	20	-	-	-	-	-	-
F	Vicia sp.	-	1	-	-	.00	-	-
Total for Annual Forbs		0	0	0	149	0	0	0.42
Total for Perennial Forbs		381	509	471	522	7.03	6.14	7.17
Total for Forbs		381	509	471	671	7.03	6.14	7.60

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

BROWSE TRENDS --
Management unit 11B, Study no: 9

Type	Species	Strip Frequency			Average Cover %		
		'94	'00	'05	'94	'00	'05
B	Amelanchier utahensis	0	0	1	-	-	.03
B	Artemisia nova	100	100	100	11.60	20.80	23.76
B	Artemisia tridentata vaseyana	0	0	0	-	-	.15
B	Chrysothamnus depressus	34	41	38	1.23	.81	1.75
B	Chrysothamnus viscidiflorus	2	0	2	-	-	-
B	Gutierrezia sarothrae	16	10	16	.06	.01	.25
B	Juniperus osteosperma	0	1	4	-	.18	1.00
B	Opuntia sp.	2	0	0	.03	-	-
B	Pediocactus simpsonii	0	0	2	-	-	-
B	Pinus edulis	0	2	1	-	.03	.15
B	Tetradymia canescens	5	5	8	-	.03	-
Total for Browse		159	159	172	12.93	21.87	27.11

CANOPY COVER, LINE INTERCEPT --
Management unit 11B, Study no: 9

Species	Percent Cover	
	'00	'05
Artemisia nova	-	25.63
Chrysothamnus depressus	-	1.63
Chrysothamnus viscidiflorus	-	.28
Gutierrezia sarothrae	-	.10
Juniperus osteosperma	.60	.96
Pinus edulis	.20	.28
Tetradymia canescens	-	.15

KEY BROWSE ANNUAL LEADER GROWTH --
Management unit 11B, Study no: 9

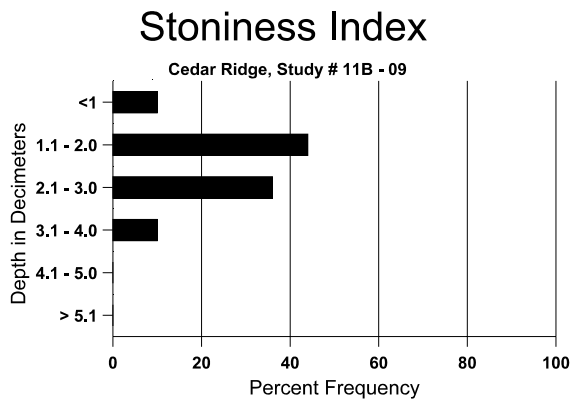
Species	Average leader growth (in)
	'05
Artemisia nova	1.3

BASIC COVER --
Management unit 11B, Study no: 9

Cover Type	Average Cover %			
	'86	'94	'00	'05
Vegetation	7.75	29.64	36.77	37.77
Rock	0	.58	.28	.59
Pavement	.75	.28	1.68	.48
Litter	44.50	25.51	43.31	36.57
Cryptogams	.75	.56	2.74	1.91
Bare Ground	46.25	33.27	31.65	35.69

SOIL ANALYSIS DATA --
Herd Unit 11B, Study # 9, Study Name: Cedar Ridge

Effective rooting depth (in)	Temp °F (depth)	pH	%sand	%silt	%clay	%0M	ppm P	ppm K	dS/m
12.9	64.6 (11.3)	7.0	47.3	32.2	20.6	2.4	5.3	243.2	0.7



PELLET GROUP DATA --
Management unit 11B, Study no: 9

Type	Quadrat Frequency		
	'94	'00	'05
Rabbit	12	8	17
Grouse	-	-	-
Horse	12	3	11
Elk	5	20	19
Deer	9	4	10
Cattle	1	-	-

Days use per acre (ha)	
'00	'05
-	-
9/acre	9/acre
16 (40)	30 (75)
29 (71)	38 (94)
-	17 (43)
-	1 (2)

BROWSE CHARACTERISTICS --
Management unit 11B, Study no: 9

		Age class distribution (plants per acre)					Utilization					
Year	Plants per Acre (excluding seedlings)	Seedling	Young	Mature	Decadent	Dead	% moderate	% heavy	% decadent	% dying	% poor vigor	Average Height Crown (in)
Amelanchier utahensis												
86	**0**	-	-	-	-	-	0	0	-	-	0	-/-
94	**0**	-	-	-	-	-	0	0	-	-	0	-/-
00	**0**	-	-	-	-	-	0	0	-	-	0	-/-
05	**20**	-	20	-	-	-	0	0	-	-	0	-/-
Artemisia nova												
86	**5733**	15800	2333	2000	1400	-	42	7	24	-	0	17/17
94	**22840**	1920	11380	10380	1080	380	6	.43	5	2	2	14/21
00	**25200**	4780	2020	21160	2020	620	8	.55	8	4	4	9/15
05	**11660**	5660	1200	8700	1760	1120	3	0	15	3	3	13/19
Chrysothamnus depressus												
86	**1332**	-	400	866	66	-	0	0	5	-	0	4/7
94	**3840**	-	120	3580	140	40	0	0	4	2	2	4/7
00	**4400**	40	200	4100	100	40	0	0	2	2	2	3/8
05	**2900**	360	340	2100	460	100	33	33	16	4	5	5/9
Chrysothamnus nauseosus												
86	**0**	-	-	-	-	-	0	0	-	-	0	-/-
94	**0**	-	-	-	-	-	0	0	-	-	0	19/24
00	**0**	-	-	-	-	-	0	0	-	-	0	20/21
05	**0**	-	-	-	-	-	0	0	-	-	0	23/26
Chrysothamnus viscidiflorus												
86	**0**	-	-	-	-	-	0	0	-	-	0	-/-
94	**40**	-	20	20	-	-	0	0	-	-	0	-/-
00	**0**	-	-	-	-	-	0	0	-	-	0	-/-
05	**40**	-	-	40	-	-	0	0	-	-	0	13/14
Gutierrezia sarothrae												
86	**1532**	66	333	1133	66	-	0	0	4	-	0	6/4
94	**540**	-	60	480	-	-	0	0	0	-	0	6/7
00	**300**	-	40	260	-	-	0	0	0	-	0	4/4
05	**400**	-	40	360	-	-	0	0	0	-	0	9/9

		Age class distribution (plants per acre)					Utilization					
Year	Plants per Acre (excluding seedlings)	Seedling	Young	Mature	Decadent	Dead	% moderate	% heavy	% decadent	% dying	% poor vigor	Average Height Crown (in)
Juniperus osteosperma												
86	**0**	-	-	-	-	-	0	0	-	-	0	-/-
94	**0**	-	-	-	-	-	0	0	-	-	0	-/-
00	**20**	-	-	20	-	-	0	0	-	-	0	-/-
05	**80**	-	80	-	-	-	0	0	-	-	0	-/-
Opuntia sp.												
86	**0**	-	-	-	-	-	0	0	-	-	0	-/-
94	**80**	-	-	80	-	-	0	0	-	-	0	4/4
00	**0**	-	-	-	-	-	0	0	-	-	0	-/-
05	**0**	-	-	-	-	-	0	0	-	-	0	-/-
Pediocactus simpsonii												
86	**0**	-	-	-	-	-	0	0	-	-	0	-/-
94	**0**	-	-	-	-	-	0	0	-	-	0	-/-
00	**0**	-	-	-	-	-	0	0	-	-	0	-/-
05	**40**	-	-	40	-	-	0	50	-	-	0	1/2
Pinus edulis												
86	**0**	-	-	-	-	-	0	0	-	-	0	-/-
94	**0**	-	-	-	-	-	0	0	-	-	0	-/-
00	**40**	-	20	20	-	-	0	0	-	-	0	-/-
05	**20**	-	20	-	-	-	0	0	-	-	0	-/-
Tetradymia canescens												
86	**133**	-	-	133	-	-	100	0	0	-	0	11/11
94	**140**	-	-	120	20	-	0	0	14	-	0	6/9
00	**120**	-	20	60	40	-	33	0	33	-	0	5/7
05	**200**	-	40	160	-	-	0	0	0	-	0	9/13

Trend Study 11B-14-05

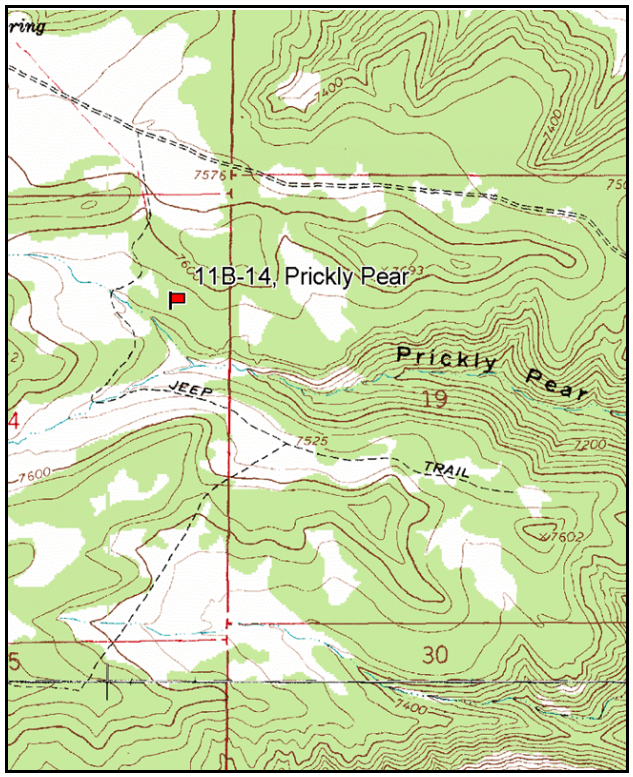
Study site name: Prickly Pear . Vegetation type: Chained, Seeded P-J .

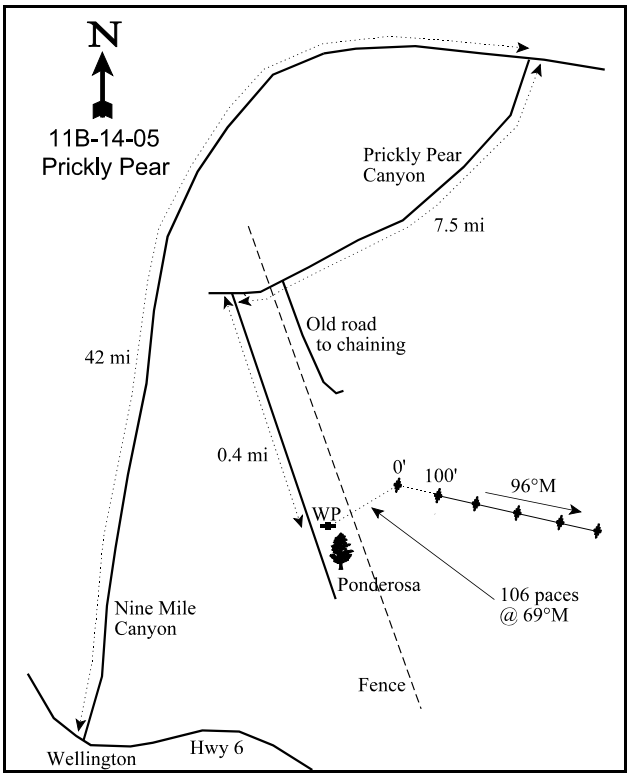
Compass bearing: frequency baseline 96 degrees magnetic.

Frequency belt placement: line 1 (11ft), line 2 (34ft), line 3 (59ft), line 4 (71ft), line 5 (95ft). No Rebar on belts.

LOCATION DESCRIPTION

In Wellington at the intersection of Highway 6 and Nine Mile Canyon Road drive 42 miles northeast down Nine Mile Canyon to the Prickly Pear turnoff. Turn right (south) and travel up Prickly Pear Canyon 7.5 miles to a fork just beyond a fence. Turn left (south) and travel 0.4 miles to a large Ponderosa pine tree on the east side of the road. A witness post is just north of the tree. From the witness post walk 106 paces at 69°M crossing the fence to the 0 foot base line post.





Map Name: Currant Canyon

Diagrammatic Sketch

Township 12S , Range 14E , Section 24

GPS: NAD 27, UTM 12S 4401517 N, 560899 E

DISCUSSION

Prickly Pear - Trend Study No. 11B-14

This study was established in 1994 and is located at the head of Prickly Pear Canyon at 7,540 feet in elevation on a southwest aspect. The transect is near the edge on a slightly sloping (12%) flat narrow ridge that runs west to east into Nine-Mile Canyon. It was not selected necessarily because of current elk use, but for the anticipated increase in elk winter use the future. The importance of the site to elk is evidenced by a pellet group frequency in 1994 of 21% compared to only 8% for deer. Pellet group frequency was much lower in 2000, perhaps due to the mild winter of 1999-2000. In 2005, pellet group frequency was also low, although the winter provided much more precipitation. Pellet group in 2000 was estimated at 22 elk, 9 cow, and 8 horse days use/acre (54 edu/ha, 23 cdu/ha and 20 hdu/ha). No deer pellet groups were encountered. In 2005, estimated pellet group data was 15 elk, 2 deer, 7 cow, and 3 horse days use/acre (38 edu/ha, 5 ddu/ha, 16 cdu/ha, and 9 hdu/ha). The area was chained and seeded in the mid-1970's and is currently grazed by livestock and horses as part of the Stone Cabin allotment, which is grazed on a deferred rotation schedule from May through September. Herbaceous production is poor and grasses on the site were heavily utilized by livestock in 2000. Use on grasses was light in 2005, as is expected from the fewer cow pats observed in 2005. Oil and gas exploration has expanded throughout the Nine Mile Canyon area. A new drill pad had been established just 500 feet beyond the end of the baseline. New roads associated with the oil exploration have also been established.

The soil is moderately deep and rocky with an estimated effective rooting depth of just over 14 inches. It has a clay loam texture with slightly alkaline pH of 7.6. Phosphorus was measured at just 2 ppm, where values less than 6 ppm may limit normal plant growth and development in wildland soils (Tiedemann and Lopez 2004). Small shale fragments and larger flat pieces of sandstone are common on the surface and throughout the soil profile. Combined rock and pavement contributed 24% relative cover in 1994, 27% in 2000, and 29% in 2005. Bare ground is high and litter cover is low, with most litter coming from pinyon and juniper debris from the chaining. Some erosion is taking place but it is minimized by the slight slope combined with the armored nature of the soil surface. The erosion condition class determined soil movement as slight in 2005 due to moderate pedestalling, moderate litter and soil movement, and small rills and flow patters on the sites.

Browse is very limited on this site with browse cover values of only 3% in 1994, 5% in 2000, and 8% in 2005. Total relative vegetation cover is not very high at only 13% to 15%. Similar sites have on average more than twice the vegetation cover. Site potential (number of young individuals versus dying individuals) appears to be low when compared to other comparable sites within the Range Creek unit. Key browse on this site consist of small numbers of true mountain mahogany and rubber rabbitbrush. Mahogany was estimated at 220 plants/acre in 2000, with over one-half of the population showing moderate to heavy use on both readings. Even with moderate to heavy use, vigor was good. No seed was produced in 2000, likely due to the extremely dry conditions. The lack of seed production was reflected in a low population number in 2005, 160 plants/acre. Rubber rabbitbrush also has had a relatively small population (480 plants/acre in 1994, 320 in 2000, and 260 in 2005). They were heavily utilized in 1994. However, use was light to moderate in 2000 and light in 2005. The most common shrub on the site is corymbed eriogonum, which has increased in density from 1,880 plants/acre in 1994 to 3,140 in 2005. These shrubs have showed little use.

Released pinyon and juniper trees are growing back within the chaining. Point-center quarter data from 2000 estimated 92 pinyon and 31 juniper trees/acre. Most trees were small with an average basal diameter estimated at 3.3 inches for pinyon and 3.6 inches for juniper. In 2005, the density of pinyons had increased to 140 trees/acre and junipers to 37 trees/acre. The average basal diameters were 2.3 inches for pinyon and 2.7 for juniper, which would suggest that there were more young trees sampled in 2005. In fact, 70% of the pinyon and 56% of the juniper sampled were between 1-4 feet tall. Five percent of the juniper and pinyon trees sampled in 2000 and 2005 were mature chained trees that are still alive.

The herbaceous understory is poor and produces only ~9% cover. The only fairly common grasses include Salina wildrye and crested wheatgrass, which have produced between 4-5% cover combined. Forbs are diverse but the only common species are indicative of shallow soil. The most common species include: stemless goldenweed, fineleaf hymenopappus, bladderpod, gumweed aster and desert phlox. There is little useful forage produced by these forbs.

1994 APPARENT TREND ASSESSMENT

Soil trend appears to be in stable, but poor, condition with a high percentage of bare ground and rock as well as a low cover value for litter. The browse component is poor with very low densities and poor vigor. The herbaceous understory has one of the lowest cover values for this type of site, but it still has a fair amount of grass production from Salina wildrye and crested wheatgrass. Because of the low abundance for both crested wheatgrass and smooth brome, seeded when this woodland was chained, this low density could mostly be explained because of the prolonged drought we have had in the past 8 years. The Desirable Components Index score is very poor due to low browse cover and low perennial grass cover.

winter range condition (DC Index) - Very Poor (20) Moderate Potential scale

2000 TREND ASSESSMENT

Trend for soil is stable, but remains in poor condition. Relative cover values for vegetation, litter, and bare ground are similar to 1994 estimates. There is some erosion occurring but it is minimized by the gentle terrain combined with the armored nature of the soil surface. Trend for browse is also stable. Density of desirable browse species, mountain mahogany and rabbitbrush, are low yet stable. Vigor is generally good and percent decadence low. Density of other less desirable shrubs on the site also appear to be stable. The only negative aspect of the browse trend is the number of pinyon and juniper trees released on the chaining. They are not currently abundant and do not produce much cover, but they will eventually regain dominance of the site, especially without a vigorous competitive herbaceous understory. Trend for the herbaceous understory is down due to a decline in the sum of nested frequency of both grasses and forbs. The DCI score remained very poor.

TREND ASSESSMENT
soil - stable (0)
browse - stable (0)
herbaceous understory - down (-2)
winter range condition (DC Index) - Very Poor (20) Moderate Potential scale

2005 TREND ASSESSMENT

Trend for soil is stable. The ratio of protective ground cover (vegetation, litter and cryptogams) to bare ground remained unchanged. The trend for browse is stable. The key browse species, true mountain mahogany, population decreased 27%, but was already very low in density. Use increased from 36% heavy use in 2000 to 75% in 2005. This increased use is likely a product of the decrease in numbers since the number of animals (days use/acre) on the site decreased slightly. Despite the decrease in numbers and increase in use, the total cover increased. The population of rubber rabbitbrush also declined, a decrease of 19% from 2000 to 2005. Comparatively, decadent rabbitbrush individuals increased from 19% to 31% and dying individuals increased from 6% to 15% from 2000 to 2005. According to the point-center quarter data, the density of pinyon and juniper trees increased on the site as well. The herbaceous understory trend is slightly down. Sum of nested frequency decreased 13% for perennial grasses and 23% for perennial forbs. The DCI score remained very poor.

TREND ASSESSMENT
soil - stable (0)
browse - stable (0)
herbaceous understory - slightly down (-1)
winter range condition (DC Index) - Very Poor (25) Moderate Potential scale

HERBACEOUS TRENDS --
Management unit 11B, Study no: 14

Type	Species	Nested Frequency			Average Cover %		
		'94	'00	'05	'94	'00	'05
G	Agropyron cristatum	$_{b}$69	$_{b}$62	$_{a}$15	1.30	1.31	.20
G	Agropyron spicatum	-	9	-	-	.33	-
G	Bromus inermis	5	-	-	.01	-	-
G	Carex sp.	13	11	6	.25	.45	.04
G	Elymus salina	128	118	104	3.40	2.82	4.48
G	Oryzopsis hymenoides	$_{a}$2	$_{a}$2	$_{b}$50	.00	.03	1.80
G	Stipa comata	7	-	1	.01	-	.03
G	Stipa lettermani	3	-	-	.03	-	-
Total for Annual Grasses		0	0	0	0	0	0
Total for Perennial Grasses		227	202	176	5.03	4.96	6.55
Total for Grasses		227	202	176	5.03	4.96	6.55
F	Antennaria rosea	-	5	-	-	.01	-
F	Arenaria fendleri	3	-	-	.03	-	-
F	Castilleja chromosa	2	-	10	.00	-	.02
F	Draba sp. (a)	-	3	-	-	.00	-
F	Euphorbia fendleri	10	-	6	.02	-	.04
F	Haplopappus acaulis	$_{a}$27	$_{b}$50	$_{ab}$35	.50	1.36	.52
F	Helianthella uniflora	20	15	18	.12	.08	.61
F	Hymenoxys acaulis	$_{b}$56	$_{a}$15	$_{a}$9	.24	.10	.05
F	Hymenopappus filifolius	54	30	34	1.20	.32	.68
F	Lesquerella sp.	$_{b}$135	$_{a}$37	$_{a}$19	.45	.13	.07
F	Lomatium sp.	-	-	1	-	-	.03
F	Lygodesmia sp.	-	-	1	-	-	.00
F	Machaeranthera grindelioides	67	68	43	.31	.74	.80
F	Pedicularis centranthera	-	-	7	-	-	.03
F	Penstemon palmeri	$_{b}$13	$_{b}$13	$_{a}$-	.06	.04	.00
F	Physaria acutifolia	$_{a}$2	$_{b}$14	$_{a}$-	.00	.03	-
F	Phlox hoodii	$_{b}$150	$_{b}$123	$_{a}$85	.80	1.13	.54
F	Schoencrambe linifolia	-	-	2	-	-	.00
F	Stanleya pinnata	-	-	-	-	-	.00

Type	Species	Nested Frequency			Average Cover %		
		'94	'00	'05	'94	'00	'05
F	Townsendia incana	13	12	13	.05	.05	.05
F	Unknown forb-perennial	37	-	12	.16	-	.25
Total for Annual Forbs		0	3	0	0	0.00	0
Total for Perennial Forbs		589	382	295	3.99	4.02	3.73
Total for Forbs		589	385	295	3.99	4.02	3.73

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

BROWSE TRENDS --
Management unit 11B, Study no: 14

Type	Species	Strip Frequency			Average Cover %		
		'94	'00	'05	'94	'00	'05
B	Cercocarpus montanus	8	7	7	.69	1.50	2.75
B	Chrysothamnus nauseosus	13	10	11	.28	.15	.23
B	Chrysothamnus viscidiflorus	2	3	1	.00	-	-
B	Ephedra viridis	3	1	2	-	-	-
B	Eriogonum corymbosum	37	45	61	.85	1.22	2.59
B	Gutierrezia sarothrae	15	12	14	.10	.08	.07
B	Juniperus osteosperma	0	1	0	-	.03	.15
B	Pinus edulis	0	4	5	1.26	1.52	2.64
Total for Browse		78	83	101	3.21	4.50	8.46

CANOPY COVER, LINE INTERCEPT --
Management unit 11B, Study no: 14

Species	Percent Cover	
	'00	'05
Cercocarpus montanus	-	3.29
Chrysothamnus nauseosus	-	.86
Eriogonum corymbosum	-	2.29
Gutierrezia sarothrae	-	.33
Pinus edulis	.80	3.08

KEY BROWSE ANNUAL LEADER GROWTH --
Management unit 11B, Study no: 14

Species	Average leader growth (in) '05
Cercocarpus montanus	5.9

POINT-QUARTER TREE DATA --
Management unit 11B, Study no: 14

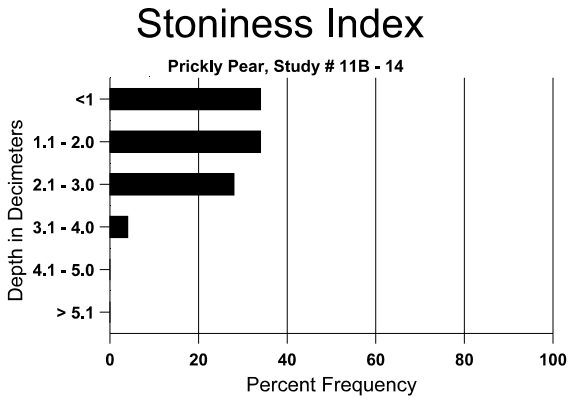
Species	Trees per Acre '00	Trees per Acre '05	Average diameter (in) '00	Average diameter (in) '05
Juniperus osteosperma	31	37	3.6	2.7
Pinus edulis	92	140	3.3	2.3

BASIC COVER --
Management unit 11B, Study no: 14

Cover Type	Average Cover % '94	'00	'05
Vegetation	12.62	13.89	17.20
Rock	15.38	13.51	9.51
Pavement	6.16	16.37	22.53
Litter	19.67	23.13	21.88
Cryptogams	.00	.06	0
Bare Ground	34.38	42.35	40.68

SOIL ANALYSIS DATA --
Herd Unit 11B, Study # 14, Study Name: Prickly Pear

Effective rooting depth (in)	Temp °F (depth)	pH	%sand	%silt	%clay	%0M	ppm P	ppm K	dS/m
14.2	64.6 (16.3)	7.6	31.6	36.8	31.6	3.5	2.0	201.6	0.6



PELLET GROUP DATA --
Management unit 11B, Study no: 14

Type	Quadrat Frequency		
	'94	'00	'05
Rabbit	10	8	31
Horse	-	2	-
Elk	21	7	6
Deer	8	1	2
Cattle	-	-	1

Days use per acre (ha)	
'00	'05
-	-
56 (138)	4 (7)
23 (57)	15 (38)
-	2 (5)
10 (25)	7 (16)

BROWSE CHARACTERISTICS --
Management unit 11B, Study no: 14

		Age class distribution (plants per acre)					Utilization					
Year	Plants per Acre (excluding seedlings)	Seedling	Young	Mature	Decadent	Dead	% moderate	% heavy	% decadent	% dying	% poor vigor	Average Height Crown (in)
Amelanchier utahensis												
94	**0**	-	-	-	-	-	0	0	-	-	0	45/61
00	**0**	-	-	-	-	-	0	0	-	-	0	-/-
05	**0**	-	-	-	-	-	0	0	-	-	0	-/-
Cercocarpus montanus												
94	**180**	-	-	180	-	20	44	22	-	-	0	29/36
00	**220**	100	-	220	-	-	18	36	-	-	0	32/47
05	**160**	40	-	160	-	-	13	75	-	-	0	42/52
Chrysothamnus nauseosus												
94	**480**	-	20	360	100	20	4	21	21	17	17	22/24
00	**320**	-	20	240	60	40	13	0	19	6	6	20/23
05	**260**	-	20	160	80	80	0	0	31	15	15	24/25
Chrysothamnus viscidiflorus												
94	**40**	-	-	40	-	-	0	0	0	-	0	5/8
00	**60**	-	-	40	20	-	0	0	33	33	33	4/7
05	**20**	-	-	20	-	-	0	100	0	-	0	-/-
Ephedra viridis												
94	**60**	-	20	20	20	-	33	0	33	-	0	16/19
00	**20**	-	-	20	-	-	0	100	0	-	0	16/10
05	**40**	-	20	20	-	-	50	0	0	-	0	21/19
Eriogonum corymbosum												
94	**1880**	40	660	1200	20	-	13	0	1	-	0	11/16
00	**2180**	180	580	1220	380	20	4	0	17	4	5	9/13
05	**3140**	1160	1320	1760	60	-	5	0	2	.63	.63	12/18

		Age class distribution (plants per acre)					Utilization					
Year	Plants per Acre (excluding seedlings)	Seedling	Young	Mature	Decadent	Dead	% moderate	% heavy	% decadent	% dying	% poor vigor	Average Height Crown (in)
Gutierrezia sarothrae												
94	**760**	-	120	600	40	60	0	0	5	3	3	5/6
00	**480**	-	-	480	-	-	0	0	0	-	0	4/6
05	**320**	20	20	300	-	-	0	0	0	-	0	7/9
Juniperus osteosperma												
94	**0**	-	-	-	-	-	0	0	-	-	0	-/-
00	**20**	20	20	-	-	-	0	0	-	-	0	-/-
05	**0**	-	-	-	-	-	0	0	-	-	0	-/-
Pinus edulis												
94	**0**	-	-	-	-	-	0	0	-	-	0	-/-
00	**80**	60	60	20	-	-	0	0	-	-	0	-/-
05	**120**	-	100	20	-	-	0	17	-	-	0	-/-

Trend Study 11B-15-05

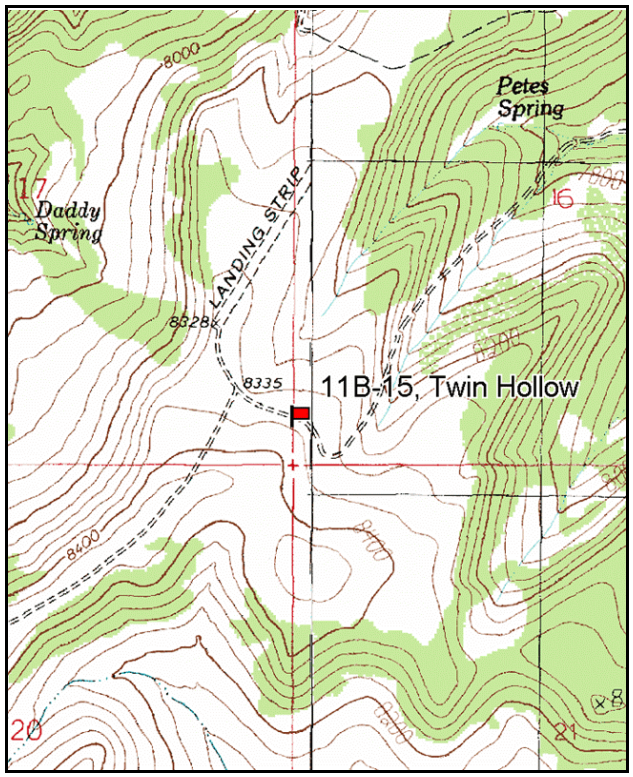
Study site name: Twin Hollow . Vegetation type: Mountain Brush .

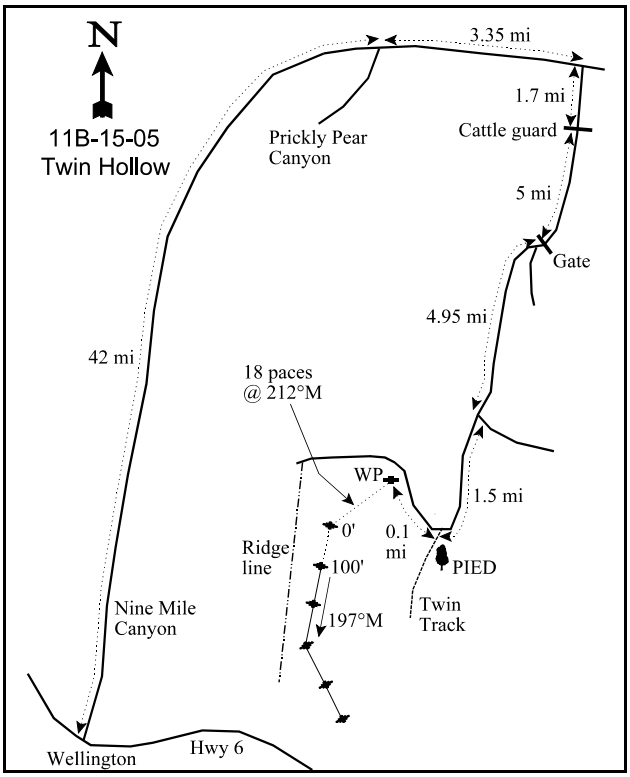
Compass bearing: frequency baseline 197 degrees magnetic (line4-5 174°M).

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

LOCATION DESCRIPTION

On the Nine Mile Canyon road, continue 3.35 miles past the turn to Prickly Pear Canyon. Turn right (south) and drive up Cottonwood Canyon. Continue 1.7 miles to a cattle guard. Drive an additional 5 miles to a gate. At the gate turn right and drive 4.95 miles to a fork. Continue straight 1.5 miles to a Y intersection (left is twin track) On the south side of the intersection is a large lone pinyon pine tree. Continue on the main road another 0.1 mile to a witness post on the left side of the road. The 0 foot stake is 18 paces away at a bearing of 212°M.





Map Name: Bruin Point

Diagrammatic Sketch

Township 13S , Range 15E , Section 15

GPS: NAD 27, UTM 12S 4393183 N, 564281 E

DISCUSSION

Twin Hollow - Trend Study No. 11B-15

The Twin Hollow study was established in 1994 to monitor critical winter range for elk and a transitional range for deer in most winters. It samples a mountain brush type at an elevation of 8,400 feet, just off a ridge with a slight southeast aspect. Slope is 20-25%. Pellet group transect data taken during the 2000 reading estimated 68 elk and only 5 deer days use/acre (168 edu/ha and 12 ddu/ha). Most of the elk pellet groups were concentrated on a ridge to the west of the study site baseline. The area is also utilized by a small band of wild horses with pellet group data estimating 12 horse days use/acre (30 hdu/ha). In 2005, estimated pellet group data was 46 elk, 5 deer, 4 cow, and 8 horse days use/acre (114 edu/ha, 13 ddu/ha, 9cdu/ha, and 20 hdu/ha). Sage grouse were observed on the site in 2005.

Soil is moderately deep (the deepest of all 11B sites), but quite variable as evidenced by the presence of both black sagebrush and mountain big sagebrush. Average effective rooting depth is estimated at just over 17 inches. It is deeper along the first 200 feet of the baseline then becomes more shallow and rocky. Serviceberry and mountain mahogany dominate on the deeper soil, while black and mountain big sagebrush are much more numerous on the more shallow soil. A few stunted mahogany and serviceberry are found on the more shallow soil. Parent material is sandstone. Soil texture is a loam with neutral soil reaction (pH of 7.0). Phosphorus was measured at only 3.5 ppm, where values less than 6 ppm may limit normal plant growth and development in wildland soils (Tiedemann and Lopez 2004). There is little rock on the surface except for some gravel and large flat rocks predominately at the end of the baseline. There is little sign of erosion with a very high cover value for vegetation with excellent litter cover. Over 40% of the cover is made up of herbaceous plants, which protect the soils from erosion caused by high intensity summer storms. The erosion condition class determined soil movement as stable in 2005.

The browse composition has been good with 9 species sampled in 1994, 2000, and 2005. Serviceberry, bitterbrush, mountain big sagebrush, and true mountain mahogany provide a combined 18% cover in 1994, 25% in 2000, and 31% in 2005. All four species showed light to moderate use, stable densities, low decadence, and generally good vigor, although use increased to moderate in 2005. Poor vigor on serviceberry in 2000 was the result of very dry conditions which caused leaves to yellow and drop off prematurely, but were healthy in 2005. Leader growth in 2000 averaged about 10 inches for serviceberry, 13 inches for mahogany and 4 inches for mountain big sagebrush. In 2005, the leader growth for mountain big sagebrush was 2.5 inches.

Black sagebrush is found in areas with more shallow soil and it appears to be hybridizing with the mountain big sagebrush. Other common understory shrubs include: dwarf and stickyleaf low rabbitbrush, snowberry, and broom snakeweed. There are also a few bitterbrush on the site which are only lightly browsed.

The herbaceous understory composition is excellent with 44 species encountered in 1994, 37 in 2000, and 43 in 2005. Nine species of grasses were found, but only three, bluebunch wheatgrass, needle-and-thread grass, and Salina wildrye, are abundant. Bluebunch and Salina combined provided 11% cover in 2000. In 2005, bluebunch and needle-and-thread provided 12% cover. Forbs are diverse and provide nearly as much cover as grasses. Total forb cover was higher in 1994, but due to the extremely dry conditions in 2000, forb cover declined from 11% to 8%. By 2005, forb cover had recovered to nearly 11% again. Common forbs include bastard toad flax, sulfur eriogonum, and desert phlox which provided nearly 2% in 2000, but had declined to less than one-quarter of 1% in 2005. No use was apparent on any of the grasses or forbs during the 2000 and 2005 readings.

1994 APPARENT TREND ASSESSMENT

Even with the moderately high percent of bare ground (21%), with the high amounts of both litter cover and vegetation cover, trend for this site appears stable. Trend for the browse species also appears stable with high cover values, good diversity, excellent health, and vigor for all key species. The herbaceous understory is diverse, abundant, and in good condition. The Desirable Components Index score is good due to excellent browse cover, low browse decadence, and good browse recruitment.

winter range condition (DC Index) - Good (82) Higher Potential scale

2000 TREND ASSESSMENT

Trend for soil is stable. The ratio of protective ground cover (vegetation, litter and cryptogams) to bare ground increased from 2.8:1 to 3.6:1 and relative cover of bare ground decreased from 19% to 13%. Nested frequency of vegetation and litter declined slightly but cover of both increased. In addition, herbaceous cover increased slightly compared to 1994. Trend for the key browse species, serviceberry, mountain big sagebrush, and true mountain mahogany, is stable. Use on these shrubs is light to moderate, vigor is good, and decadence low. The populations have remained at similar densities compared to 1994. Trend for the herbaceous understory is down. Even though cover of grasses increased since 1994 (9% to 13%), sum of nested frequency declined. Both perennial grasses and perennial forbs decreased substantially in nested frequencies. Due to the extremely dry conditions, cover and nested frequency of forbs declined. This trend should reverse itself with a return to normal precipitation patterns. The DCI score is excellent due to excellent browse cover, low browse decadence, good browse recruitment, and good perennial grass cover.

TREND ASSESSMENT
soil - stable (0)
browse - stable (0)
herbaceous understory - down (-2)
winter range condition (DC Index) - Excellent (91) Higher Potential scale

2005 TREND ASSESSMENT

The trend for soil is stable. The ratio of protective ground cover (vegetation, litter and cryptogams) to bare ground remained unchanged from 2000 to 2005. The trend for browse is slightly down. The trend for two of the key browse species on the site, serviceberry and true mountain mahogany, remained stable. The trend for the other key browse species mountain big sagebrush is down. Big sagebrush density decreased from 6,380 to 4,740 plants/acre, the majority of which were mature individuals. Utilization increased from light to moderate. Although the serviceberry and mahogany remained stable and are preferred over sagebrush, the sagebrush remains the most essential browse component after the mahogany and serviceberry lose their leaves in mid-winter. The sagebrush then becomes the key browse for the remaining winter months. The herbaceous understory trend is slightly up. The frequency of both perennial grasses and perennial forbs increased 11% and 18% from 2000 to 2005, respectively. No annual grasses were sampled on the site and annual forbs were minimal. The DCI score remained excellent with increased perennial grass cover and recruitment of young individuals.

TREND ASSESSMENT
soil - stable (0)
browse - slightly down (-1)
herbaceous understory - slightly up (+1)
winter range condition (DC Index) - Excellent (97) Higher Potential scale

HERBACEOUS TRENDS --
Management unit 11B, Study no: 15

Type	Species	Nested Frequency			Average Cover %		
		'94	'00	'05	'94	'00	'05
G	Agropyron spicatum	a159	ab178	b232	1.77	6.01	9.63
G	Bromus carinatus	-	-	5	-	-	.04
G	Carex sp.	9	5	15	.02	.15	.40
G	Elymus salina	b142	b128	a5	4.34	4.93	.03
G	Koeleria cristata	b24	a2	b20	.19	.06	.39
G	Oryzopsis hymenoides	ab7	a-	b15	.07	-	.41
G	Poa fendleriana	62	58	48	1.33	.77	.80
G	Sitanion hystrix	b26	a3	b39	.26	.04	.62
G	Stipa columbiana	b23	b15	a-	.57	.40	.03
G	Stipa comata	a-	a-	b61	-	-	2.15
G	Stipa lettermani	b57	a16	a10	.74	.65	.36
Total for Annual Grasses		0	0	0	0	0	0
Total for Perennial Grasses		509	405	450	9.32	13.03	14.88
Total for Grasses		509	405	450	9.32	13.03	14.88
F	Androsace septentrionalis (a)	4	5	14	.01	.00	.02
F	Arabis sp.	3	1	6	.00	.00	.01
F	Arenaria fendleri	9	5	2	.06	.04	.06
F	Astragalus convallarius	b18	a1	a2	.07	.00	.03
F	Astragalus miser	1	-	3	.00	-	.00
F	Aster sp.	b24	a8	a2	.18	.04	.00
F	Astragalus sp.	b11	a2	ab4	.03	.03	.01
F	Balsamorhiza sagittata	-	-	5	-	.03	.07
F	Castilleja flava	b36	a11	ab22	.15	.05	.34
F	Chaenactis douglasii	b15	a-	a-	.04	-	-
F	Chenopodium fremontii (a)	9	-	-	.04	-	-
F	Chenopodium leptophyllum(a)	a5	a-	b18	.01	-	.03
F	Comandra pallida	b150	c201	a118	2.10	3.40	2.03
F	Collinsia parviflora (a)	c65	b10	a-	.38	.08	-
F	Crepis acuminata	a-	a3	b76	-	.03	.91
F	Cryptantha sp.	-	1	-	-	.00	-
F	Eriogonum alatum	-	-	11	-	-	.07
F	Erigeron eatonii	b110	a23	a22	.44	.13	.30
F	Erigeron flagellaris	16	14	4	.18	.08	.03
F	Eriogonum racemosum	b54	a9	a2	1.12	.07	.06
F	Eriogonum umbellatum	150	115	154	2.83	1.30	2.17

Type	Species	Nested Frequency			Average Cover %		
		'94	'00	'05	'94	'00	'05
F	Hymenoxys acaulis	-	1	6	-	.03	.01
F	Hymenoxys richardsonii	5	-	-	.06	-	-
F	Ipomopsis aggregata	15	2	13	.07	.01	.03
F	Linum lewisii	$_{b}$30	$_{a}$-	$_{b}$10	.06	-	.02
F	Lithospermum sp.	$_{a}$16	$_{a}$8	$_{b}$40	.32	.18	1.21
F	Machaeranthera canescens	$_{b}$12	$_{a}$-	$_{a}$2	.08	-	.03
F	Machaeranthera grindelioides	$_{b}$30	$_{a}$2	$_{a}$6	.18	.03	.03
F	Microsteris gracilis (a)	-	-	-	-	-	-
F	Oenothera sp.	$_{c}$33	$_{a}$-	$_{b}$17	.36	-	.66
F	Penstemon caespitosus	$_{b}$90	$_{a}$38	$_{a}$34	.91	.15	.39
F	Penstemon palmeri	3	-	4	.01	-	.03
F	Petradoria pumila	-	-	2	-	-	.03
F	Penstemon watsonii	29	22	33	.25	.70	1.11
F	Phlox austromontana	$_{b}$50	$_{b}$58	$_{a}$19	1.11	1.65	.13
F	Phlox longifolia	$_{b}$58	$_{a}$27	$_{ab}$35	.11	.21	.21
F	Polygonum douglasii (a)	$_{b}$41	$_{a}$-	$_{c}$99	.07	-	.34
F	Taraxacum officinale	4	8	4	.03	.04	.06
Total for Annual Forbs		124	15	131	0.51	0.08	0.40
Total for Perennial Forbs		972	560	658	10.82	8.26	10.14
Total for Forbs		1096	575	789	11.33	8.35	10.54

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

BROWSE TRENDS --
Management unit 11B, Study no: 15

Type	Species	Strip Frequency			Average Cover %		
		'94	'00	'05	'94	'00	'05
B	Amelanchier utahensis	25	35	38	4.98	7.68	9.42
B	Artemisia frigida	1	0	0	-	-	-
B	Artemisia nova	23	24	15	1.37	.73	.42
B	Artemisia tridentata vaseyana	71	68	64	6.51	10.85	13.11
B	Cercocarpus montanus	41	41	42	6.06	6.55	7.96
B	Chrysothamnus depressus	16	20	21	.80	.19	.91
B	Chrysothamnus viscidiflorus viscidiflorus	84	47	50	1.26	.67	1.43
B	Gutierrezia sarothrae	27	14	19	.48	.12	.21
B	Opuntia sp.	2	1	2	-	-	-
B	Purshia tridentata	2	2	5	-	.38	.78
B	Symphoricarpos oreophilus	52	45	39	2.41	2.78	3.74
B	Tetradymia canescens	2	0	0	.03	-	-
Total for Browse		346	297	295	23.93	30.00	38.00

CANOPY COVER, LINE INTERCEPT --
Management unit 11B, Study no: 15

Species	Percent Cover '05
Amelanchier utahensis	13.58
Artemisia nova	.76
Artemisia tridentata vaseyana	15.18
Cercocarpus montanus	9.96
Chrysothamnus depressus	.46
Chrysothamnus viscidiflorus viscidiflorus	1.33
Gutierrezia sarothrae	.30
Purshia tridentata	.41
Symphoricarpos oreophilus	5.15

KEY BROWSE ANNUAL LEADER GROWTH --
Management unit 11B, Study no: 15

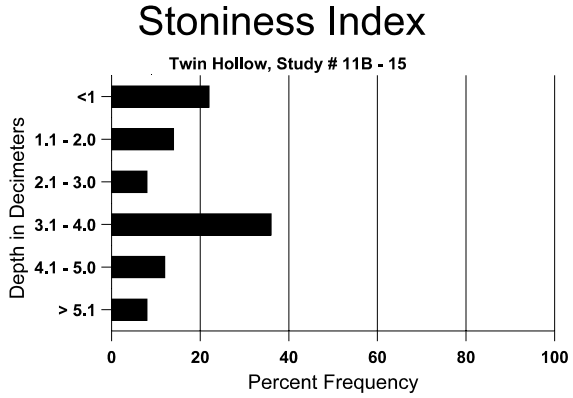
Species	Average leader growth (in) '05
Artemisia tridentata vaseyana	2.5
Cercocarpus montanus	4.3

BASIC COVER --
Management unit 11B, Study no: 15

Cover Type	Average Cover % '94	'00	'05
Vegetation	42.89	48.85	54.02
Rock	2.13	1.44	2.12
Pavement	.41	2.82	2.56
Litter	44.90	62.65	43.07
Cryptogams	.00	0	0
Bare Ground	21.18	17.28	15.23

SOIL ANALYSIS DATA --
Herd Unit 11B, Study # 15, Study Name: Twin Hollow

Effective rooting depth (in)	Temp °F (depth)	pH	%sand	%silt	%clay	%0M	ppm P	ppm K	dS/m
17.1	61.8 (17.0)	7.0	44.0	31.4	24.6	4.6	3.5	291.2	0.7



PELLET GROUP DATA --
Management unit 11B, Study no: 15

Type	Quadrat Frequency			Days use per acre (ha)	
	'94	'00	'05	'00	'05
Rabbit	5	1	5	-	-
Moose	-	-	1	-	-
Horse	4	4	5	9 (23)	8 (20)
Elk	11	13	20	69 (169)	46 (114)
Deer	5	5	13	5 (12)	5 (13)
Cattle	-	-	1	-	4 (9)

BROWSE CHARACTERISTICS --
Management unit 11B, Study no: 15

		Age class distribution (plants per acre)					Utilization					
Year	Plants per Acre (excluding seedlings)	Seedling	Young	Mature	Decadent	Dead	% moderate	% heavy	% decadent	% dying	% poor vigor	Average Height Crown (in)
Amelanchier utahensis												
94	**1180**	20	60	1100	20	20	10	0	2	-	0	42/49
00	**1160**	60	200	940	20	20	34	0	2	2	50	44/51
05	**1000**	-	280	700	20	-	24	40	2	-	0	46/56
Artemisia frigida												
94	**20**	-	-	20	-	-	0	0	-	-	0	-/-
00	**0**	-	-	-	-	-	0	0	-	-	0	-/-
05	**0**	-	-	-	-	-	0	0	-	-	0	-/-
Artemisia nova												
94	**820**	20	180	620	20	80	15	0	2	-	0	11/13
00	**1180**	-	80	1100	-	40	2	0	0	-	0	10/14
05	**600**	140	40	540	20	160	10	0	3	-	0	10/13
Artemisia tridentata vaseyana												
94	**7300**	80	720	6340	240	180	3	.82	3	1	1	16/17
00	**6380**	80	620	5140	620	220	11	0	10	1	2	16/22
05	**4740**	60	200	4040	500	380	22	23	11	3	3	21/27
Cercocarpus montanus												
94	**2540**	340	1280	1000	260	40	24	0	10	8	8	44/48
00	**2520**	3560	1440	1020	60	-	32	2	2	.79	2	46/47
05	**2440**	980	1720	620	100	40	44	28	4	2	2	53/56
Chrysothamnus depressus												
94	**1700**	-	60	1640	-	20	0	0	0	-	0	5/6
00	**1300**	-	-	1260	40	-	2	0	3	3	3	3/5
05	**1120**	-	40	1060	20	-	27	11	2	2	2	5/8

		Age class distribution (plants per acre)					Utilization					
Year	Plants per Acre (excluding seedlings)	Seedling	Young	Mature	Decadent	Dead	% moderate	% heavy	% decadent	% dying	% poor vigor	Average Height Crown (in)
Chrysothamnus viscidiflorus viscidiflorus												
94	**5560**	-	320	5220	20	-	0	0	0	-	0	8/7
00	**1580**	-	-	1500	80	-	0	0	5	5	5	11/10
05	**2140**	-	440	1700	-	-	9	.93	0	-	0	12/10
Gutierrezia sarothrae												
94	**1340**	-	160	1180	-	-	0	0	0	-	0	6/5
00	**780**	-	-	780	-	-	0	0	0	-	0	4/4
05	**640**	40	60	560	20	-	0	0	3	-	0	9/8
Opuntia sp.												
94	**40**	-	20	20	-	-	0	0	0	-	0	2/11
00	**20**	-	-	-	20	-	0	0	100	-	0	-/-
05	**60**	-	-	60	-	-	0	0	0	-	0	4/8
Purshia tridentata												
94	**40**	-	20	20	-	-	0	0	-	-	0	-/-
00	**40**	-	-	40	-	-	0	0	-	-	0	18/40
05	**100**	-	40	60	-	-	60	0	-	-	0	19/28
Symphoricarpos oreophilus												
94	**2420**	-	160	2240	20	-	3	0	1	-	2	12/19
00	**1560**	-	240	1240	80	-	0	0	5	5	8	10/18
05	**1440**	-	240	1200	-	-	0	0	0	-	0	13/22
Tetradymia canescens												
94	**40**	-	-	40	-	-	0	0	-	-	0	7/7
00	**0**	-	-	-	-	-	0	0	-	-	0	6/10
05	**0**	-	-	-	-	-	0	0	-	-	0	14/11

Trend Study 11B-16-05

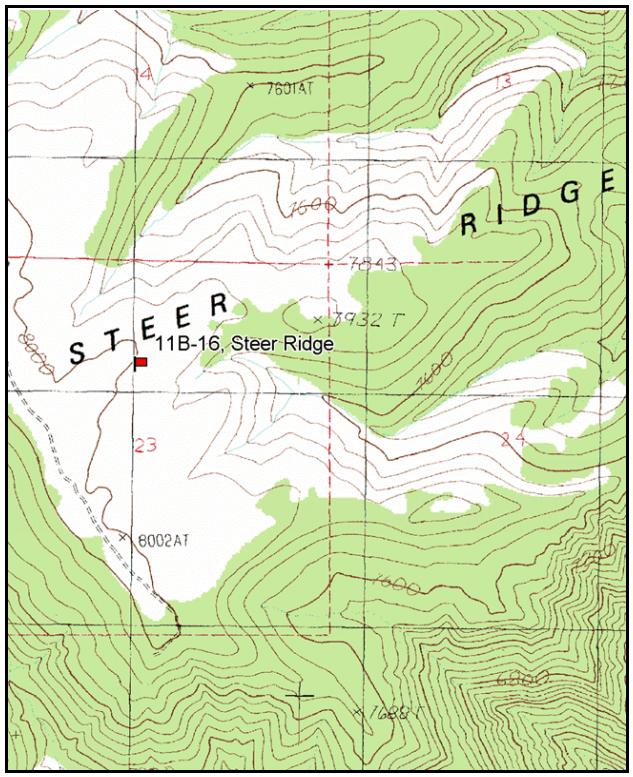
Study site name: Steer Ridge . Vegetation type: Mountain Brush .

Compass bearing: frequency baseline 234 degrees magnetic.

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

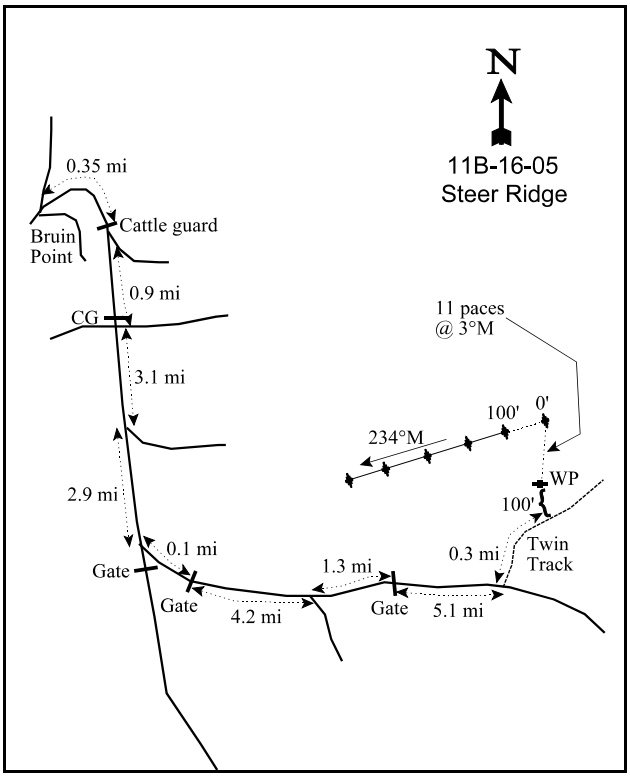
LOCATION DESCRIPTION

From Sunnyside, go up Water Canyon to the summit (Bruin Point). At the summit take the middle fork and go 0.35 miles. Stay right at the fork just beyond a cattle guard and go 0.9 miles. Go through an intersection beyond another cattle guard and go 3.1 miles to a fork. Stay right and travel another 2.9 miles to a fork and turn left just before a gate. Proceed 0.1 miles to a gate. Continue 4.2 miles to a fork. Stay left and continue an additional 1.3 miles to another gate. Continue 5.1 miles and turn left on a twin track road. Drive north 0.3 miles to a witness post 100 ft off the left side of the road. The 0 ft stake is 11 paces away at 3°M and is marked with browse tag number 32.



Map Name: Steer Ridge Canyon

Township 14S , Range 16E , Section 23



Diagrammatic Sketch

GPS: NAD 27, UTM 12S 4383080 N, 578008 E

DISCUSSION

Steer Ridge - Trend Study No. 11B-16

The Steer Ridge trend study was established in 1994. It samples a mountain shrub community near the end of the ridge just before it drops off into the Green River. Elevation is 8,000 feet and the site slopes slightly (8%) to the south. The mountain brush community type here is noticeably shorter in stature than that of the Twin Hollow (11B-15) study. The area is used heavily by wintering elk and deer. Deer are forced to move to lower elevations when snows get deeper, but elk are often seen in the area all winter. Pellet group data from 2000 was estimated at 82 elk and 19 deer use days/acre (203 edu/ha and 47 ddu/ha) In 2005, the estimated pellet group data was 76 elk and 13 deer use days/acre (188 edu/ha and 31 ddu/ha). There was also some light use by horses and cattle in 1994, although there has been no livestock use since. Multiple elk antler sheds were found on the site in 2000.

The soils on this site are moderately shallow and rocky with bed rock found at a depth of only 10 to 12 inches. Average effective rooting depth is estimated at just 10 inches. There appears to be enough cracks in the rock to allow deeper rooted shrubs like serviceberry, bitterbrush, and mountain big sagebrush to establish. The deepest soil readings occurred near the base of shrubs. Parent material is sandstone and the soil texture is a sandy clay loam with a neutral soil reaction (pH of 7.2). Phosphorus was measured at 5.5 ppm and values less than 6 ppm may limit normal plant growth and development in wildland soils (Tiedemann and Lopez 2004). The soil profile is rocky throughout with a relative surface rock and pavement cover of 9% in 1994, 15% in 2000, and 14% in 2005. Vegetation and litter cover are moderately low for a high elevation site. This suggests a lower site potential due to the more shallow soil than would normally be expected for a site at this elevation. In 2005, the soil was rated as stable by the erosion index assessment.

Key browse on this site consist of mountain big sagebrush and bitterbrush, which provided a combined cover between 10-18% in 1994, 2000, and 2005. Bitterbrush had mostly good vigor with a density of 1,120 plants/acre and only 9% classified as decadent in 2000. The growth form is short with an average of just over 2 feet in height with a crown diameter of 4.5 feet. Use was mostly light to moderate. In 2005, the density was 1,080 plants/acre with only 4% decadent and a similar growth form as in 2000, but utilization had increased to heavy (72%). Mountain big sagebrush has had a moderate density of 2,740 plants/acre, 2,160 in 2000, and 3,480 in 2005. The increase in density in 2005 came from a great increase of young plants (1,740/acre; 50% of population). Seedlings were also very abundant in 2005. Decadence was 13% in 1994, 22% in 2000, then 8% in 2005. Use has been mostly light to moderate. The more shallow soil and reduced site potential makes this area a more marginal site for mountain big sagebrush. Very high abundance of ants, associated with the presence of aphids, also appears to be effecting the vigor of some sagebrush plants.

There is also a small population of serviceberry which has provided less than 2% cover all years. These shrubs are more heavily utilized than sagebrush or bitterbrush. Individual serviceberry are small in stature due to the shallow, rocky soil and the heavy use. Average height for 1994, 2000, and 2005 is 34 inches, which allows most plants to be available to hedging. Other common shrubs include dwarf and mountain low rabbitbrush. There are also a few scattered rubber rabbitbrush, mountain mahogany, snowberry, and gray horsebrush.

The herbaceous understory is abundant and diverse. There are several co-dominant grass species, which include: thickspike, bluebunch wheatgrass, mutton bluegrass, Sandberg bluegrass, and needle-and-thread. This abundance of key grass species is advantageous for elk winter use. Forbs are diverse but they do not provide very much forage. In 1994 and 2000, perennial forb cover was less than 4%. In 2005, this had increased to 6%. Only 6 of the 31 species sampled in 2005 were annuals.

1994 APPARENT TREND ASSESSMENT

Soil trend for the site appears stable with good herbaceous vegetation cover (60% of the vegetation cover) which provides the best protection from high intensity summer storms. The trend for key browse would also appear stable with good age distributions, excellent vigor, and low rates of decadence which are not bad for the length and severity of the current drought. The herbaceous understory is also very good, with excellent production from more than five species of grasses. The forb component has many species (25), but only contributes 11% of the total vegetation cover. The Desirable Components Index score is good due to moderate browse cover, low browse decadence, and excellent perennial grass cover.

winter range condition (DC Index) - Good (69) Moderate Potential scale

2000 TREND ASSESSMENT

Trend for soil is stable. Herbaceous vegetation, which better protects the soil from high intensity storms, accounts for nearly 60% of the total vegetation cover. Trend for browse is down. Mountain big sagebrush and bitterbrush, the key browse species, both decreased in density. Sagebrush decreased from 2,740 to 2,160 plants/acre. Decadence increased from 13 to 22%. Bitterbrush density decreased from 1,400 to 1,120 plants/acre, while decadence remained unchanged. Strip frequency and cover of sagebrush increased, while bitterbrush changed little on both accounts. Use of these shrubs was light to moderate, vigor good, and percent decadence was low. Trend for the herbaceous understory is stable. Sum of nested frequency of perennial grasses declined slightly, but cover increased from 14% to almost 18%. Nested frequency of mutton bluegrass increased significantly while the less desirable Salina wildrye declined significantly. Prairie junegrass was abundant in 1994, but decreased significantly in 2000 as well. It appears that the extremely dry conditions this summer have contributed to this decline. Sum of nested frequency of perennial forbs also declined slightly with only two species, sego lily and desert parsley, declined significantly. Total cover of forbs is almost identical to 1994. The DCI score remained good, although browse cover increased some.

TREND ASSESSMENT
soil - stable (0)
browse - down (-2)
herbaceous understory - stable (0)
winter range condition (DC Index) - Good (74) Moderate Potential scale

2005 TREND ASSESSMENT

The trend for soil is stable. The ratio of protective ground cover (vegetation, litter and cryptogams) to bare ground remained relatively unchanged from 2000 to 2005. The trend for browse is up. The key browse species mountain big sagebrush density increased 38% from 2,160 plants/acre in 2000 to 3,480 plants/acre in 2005. The proportion of decadent individuals decreased from 22% to 8% and those classified as dying decreased from 7% to 3%. The recruitment of the site is very high with 50% of the population classified as young. This was an increase from 16% in 2000. There were also nearly 7,000 seedlings/acre on the site. The population of bitterbrush, also a key browse species on the site, remained stable from 2000 to 2005, despite an increase of use from light-moderate to heavy. The population decreased slightly from 1,120 plants/acre in 2000 to 1,080 plants/acre in 2005. The number of decadent individuals decreased from 9% to 4% and individuals classified as dying decreased from 2% to 0%. The trend for herbaceous understory is slightly down. The nested frequency of perennial grasses, very important for winter range, decreased by 11%. A significant increase in cheatgrass nested frequency and a substantial increase of cheatgrass cover negatively influenced the trend. In 2000, cheatgrass was identified in 1% of the quadrats, but in 26% of the quadrats in 2005. The nested frequency of perennial forbs also increased slightly, but not enough to stabilize the trend. The DCI score was excellent due to an increases in browse cover, recruitment, and perennial grass cover.

TREND ASSESSMENT
soil - stable (0)
browse - up (+2)
herbaceous understory - slightly down (-1)
winter range condition (DC Index) - Excellent (93) Moderate Potential scale

HERBACEOUS TRENDS --
Management unit 11B, Study no: 16

Type	Species	Nested Frequency			Average Cover %		
		'94	'00	'05	'94	'00	'05
G	Agropyron dasystachyum	ab146	b160	a108	1.61	3.76	2.34
G	Agropyron spicatum	151	147	131	4.19	4.91	3.67
G	Bouteloua gracilis	-	4	6	-	.18	.33
G	Bromus tectorum (a)	a-	a1	b71	-	.00	.62
G	Carex sp.	-	-	2	-	-	.00
G	Elymus salina	b69	a25	ab42	2.32	.63	2.34
G	Koeleria cristata	c86	a5	b41	1.81	.03	.67
G	Oryzopsis hymenoides	b32	a9	ab19	.28	.19	.60
G	Poa fendleriana	a72	b187	a53	1.15	4.67	.76
G	Poa secunda	a27	a39	b57	.17	.24	1.02
G	Sitanion hystrix	1	1	-	.00	.03	-
G	Stipa comata	a67	ab78	b111	1.95	3.06	6.06
G	Stipa lettermani	b27	a-	ab10	.72	.00	.07
Total for Annual Grasses		0	1	71	0	0.00	0.62
Total for Perennial Grasses		678	655	580	14.25	17.73	17.91
Total for Grasses		678	656	651	14.25	17.73	18.53
F	Agoseris glauca	12	6	9	.06	.05	.04
F	Allium sp.	-	-	3	-	-	.01
F	Antennaria rosea	14	8	8	.13	.15	.21
F	Arabis sp.	3	-	2	.00	-	.03
F	Arenaria fendleri	10	-	1	.18	-	.00
F	Astragalus convallarius	-	3	3	-	.00	.00
F	Aster sp.	-	5	-	-	.01	-
F	Astragalus sp.	3	7	-	.01	.34	-
F	Balsamorhiza sagittata	7	3	2	.86	.33	1.06
F	Castilleja flava	-	-	1	-	-	.00
F	Castilleja linariaefolia	b23	b22	a-	.14	.12	-
F	Calochortus nuttallii	b17	a-	ab7	.05	-	.02
F	Chenopodium fremontii (a)	1	-	6	.00	-	.06
F	Chenopodium leptophyllum(a)	5	-	4	.01	-	.01

Type	Species	Nested Frequency			Average Cover %		
		'94	'00	'05	'94	'00	'05
F	Comandra pallida	$_{a}$4	$_{b}$18	$_{ab}$11	.03	.32	.36
F	Collinsia parviflora (a)	-	4	-	-	.01	-
F	Crepis acuminata	10	9	15	.07	.19	.16
F	Delphinium nuttallianum	$_{a}$-	$_{a}$-	$_{b}$16	-	-	.05
F	Eriogonum alatum	13	9	7	.08	.09	.34
F	Erigeron eatonii	18	15	14	.16	.28	.16
F	Erigeron flagellaris	-	-	5	-	-	.21
F	Eriogonum umbellatum	23	14	19	.29	.08	.14
F	Gayophytum ramosissimum(a)	$_{a}$2	$_{a}$4	$_{b}$25	.00	.01	.05
F	Hedysarum boreale	-	-	4	-	-	.45
F	Lappula occidentalis (a)	$_{a}$-	$_{a}$-	$_{b}$58	-	-	.30
F	Linum lewisii	-	7	-	-	.02	-
F	Lithospermum ruderale	12	5	8	.19	.18	.40
F	Lomatium sp.	$_{b}$33	$_{a}$1	$_{b}$20	.08	.00	.11
F	Machaeranthera canescens	-	-	1	-	-	.03
F	Oenothera sp.	-	3	1	-	.00	.00
F	Penstemon caespitosus	$_{b}$10	$_{ab}$2	$_{a}$-	.24	.04	-
F	Penstemon sp.	2	2	1	.01	.01	.01
F	Phlox longifolia	$_{a}$58	$_{a}$53	$_{b}$70	.11	.32	1.22
F	Polygonum douglasii (a)	$_{b}$45	$_{a}$16	$_{c}$302	.10	.03	2.26
F	Sphaeralcea coccinea	$_{b}$78	$_{b}$62	$_{a}$43	.77	.67	.62
F	Taraxacum officinale	-	3	-	-	.03	-
F	Tragopogon dubius	$_{a}$-	$_{a}$-	$_{b}$15	.00	-	.11
F	Trifolium sp.	$_{a}$-	$_{ab}$6	$_{b}$11	-	.01	.05
Total for Annual Forbs		53	24	395	0.12	0.05	2.69
Total for Perennial Forbs		350	263	297	3.50	3.29	5.89
Total for Forbs		403	287	692	3.63	3.34	8.59

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

BROWSE TRENDS --
Management unit 11B, Study no: 16

Type	Species	Strip Frequency			Average Cover %		
		'94	'00	'05	'94	'00	'05
B	Amelanchier utahensis	4	5	4	.03	1.19	1.75
B	Artemisia tridentata vaseyana	78	62	81	3.79	6.40	7.29
B	Chrysothamnus depressus	52	33	44	1.45	.74	1.27
B	Chrysothamnus viscidiflorus lanceolatus	16	15	12	.29	.18	.09
B	Gutierrezia sarothrae	3	1	6	.00	-	.00
B	Opuntia sp.	1	0	2	.00	-	.03
B	Purshia tridentata	43	41	42	6.48	6.65	10.98
B	Symphoricarpos oreophilus	2	2	1	.03	.00	.18
B	Tetradymia canescens	7	4	7	.03	.18	.18
Total for Browse		206	163	199	12.13	15.35	21.80

CANOPY COVER, LINE INTERCEPT --
Management unit 11B, Study no: 16

Species	Percent Cover '05
Amelanchier utahensis	.95
Artemisia tridentata vaseyana	8.78
Chrysothamnus depressus	.90
Chrysothamnus viscidiflorus lanceolatus	.20
Gutierrezia sarothrae	.06
Purshia tridentata	15.19
Tetradymia canescens	.25

KEY BROWSE ANNUAL LEADER GROWTH --
Management unit 11B, Study no: 16

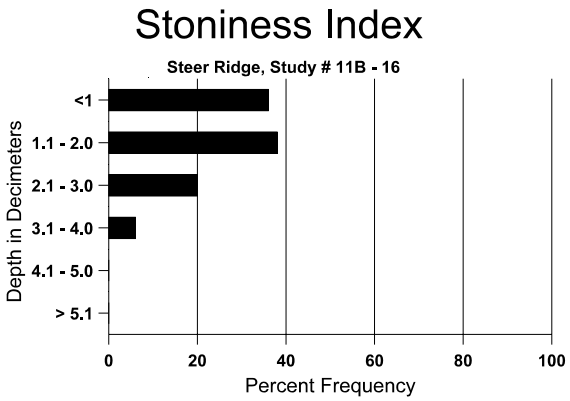
Species	Average leader growth (in) '05
Amelanchier utahensis	5.2
Artemisia tridentata vaseyana	3.7
Purshia tridentata	4.2

BASIC COVER --
Management unit 11B, Study no: 16

Cover Type	Average Cover %		
	'94	'00	'05
Vegetation	38.01	41.91	43.37
Rock	6.60	6.08	5.86
Pavement	2.01	9.07	8.09
Litter	20.10	46.68	31.25
Cryptogams	.06	.30	1.00
Bare Ground	20.32	18.44	25.35

SOIL ANALYSIS DATA --
Herd Unit 11B, Study # 16, Study Name: Steer Ridge

Effective rooting depth (in)	Temp °F (depth)	pH	%sand	%silt	%clay	%0M	ppm P	ppm K	dS/m
10.8	66.8 (12.7)	7.2	52.0	25.4	22.6	3.3	5.5	176.0	0.7



PELLET GROUP DATA --
Management unit 11B, Study no: 16

Type	Quadrat Frequency			Days use per acre (ha)	
	'94	'00	'05	'00	'05
Rabbit	7	7	9	-	-
Moose	-	-	3	-	-
Horse	1	-	-	-	-
Grouse	-	-	2	-	-
Elk	44	53	78	82 (202)	76 (187)
Deer	37	21	29	20 (48)	13 (31)
Cattle	2	-	-	-	-

BROWSE CHARACTERISTICS --
Management unit 11B, Study no: 16

		Age class distribution (plants per acre)					Utilization					
Year	Plants per Acre (excluding seedlings)	Seedling	Young	Mature	Decadent	Dead	% moderate	% heavy	% decadent	% dying	% poor vigor	Average Height Crown (in)
Amelanchier utahensis												
94	**100**	-	40	60	-	-	20	0	-	-	0	30/42
00	**160**	-	20	140	-	-	50	0	-	-	25	31/46
05	**80**	-	-	80	-	-	0	100	-	-	0	41/65
Artemisia tridentata vaseyana												
94	**2740**	40	520	1860	360	460	18	4	13	2	2	19/26
00	**2160**	60	340	1340	480	200	26	2	22	7	8	17/26
05	**3480**	6980	1740	1460	280	320	16	8	8	3	3	23/29
Cercocarpus montanus												
94	**0**	-	-	-	-	-	0	0	-	-	0	38/38
00	**0**	-	-	-	-	-	0	0	-	-	0	37/44
05	**0**	-	-	-	-	-	0	0	-	-	0	43/53
Chrysothamnus depressus												
94	**3440**	-	-	3380	60	-	8	0	2	2	2	6/9
00	**1780**	-	100	1460	220	140	1	0	12	4	4	4/7
05	**2260**	380	120	2020	120	160	42	6	5	3	6	7/10
Chrysothamnus nauseosus hololeucus												
94	**0**	-	-	-	-	-	0	0	-	-	0	-/-
00	**0**	-	-	-	-	-	0	0	-	-	0	11/24
05	**0**	-	-	-	-	-	0	0	-	-	0	-/-
Chrysothamnus viscidiflorus lanceolatus												
94	**500**	-	20	480	-	-	4	0	0	-	0	10/12
00	**460**	-	-	440	20	20	0	0	4	-	0	10/10
05	**380**	-	40	320	20	-	53	11	5	5	5	12/16
Gutierrezia sarothrae												
94	**60**	-	-	60	-	-	0	0	0	-	0	6/8
00	**20**	-	-	-	20	-	0	0	100	-	0	4/7
05	**160**	-	-	160	-	-	0	0	0	-	0	8/12
Opuntia sp.												
94	**20**	-	-	20	-	-	0	0	-	-	0	-/-
00	**0**	-	-	-	-	-	0	0	-	-	0	3/23
05	**40**	-	-	40	-	-	0	0	-	-	0	5/18

		Age class distribution (plants per acre)					Utilization					
Year	Plants per Acre (excluding seedlings)	Seedling	Young	Mature	Decadent	Dead	% moderate	% heavy	% decadent	% dying	% poor vigor	Average Height Crown (in)
Purshia tridentata												
94	**1400**	-	140	1120	140	40	31	3	10	-	0	20/51
00	**1120**	-	60	960	100	20	43	2	9	2	5	26/56
05	**1080**	-	20	1020	40	-	28	72	4	-	0	28/63
Symphoricarpos oreophilus												
94	**60**	-	-	60	-	-	0	0	-	-	0	20/41
00	**40**	-	-	40	-	-	0	0	-	-	0	15/29
05	**20**	-	-	20	-	-	0	0	-	-	0	23/48
Tetradymia canescens												
94	**160**	-	20	140	-	-	13	0	0	-	0	8/12
00	**80**	-	-	60	20	-	25	0	25	-	0	8/13
05	**140**	-	-	140	-	-	71	0	0	-	0	9/16

Trend Study 11B-17-05

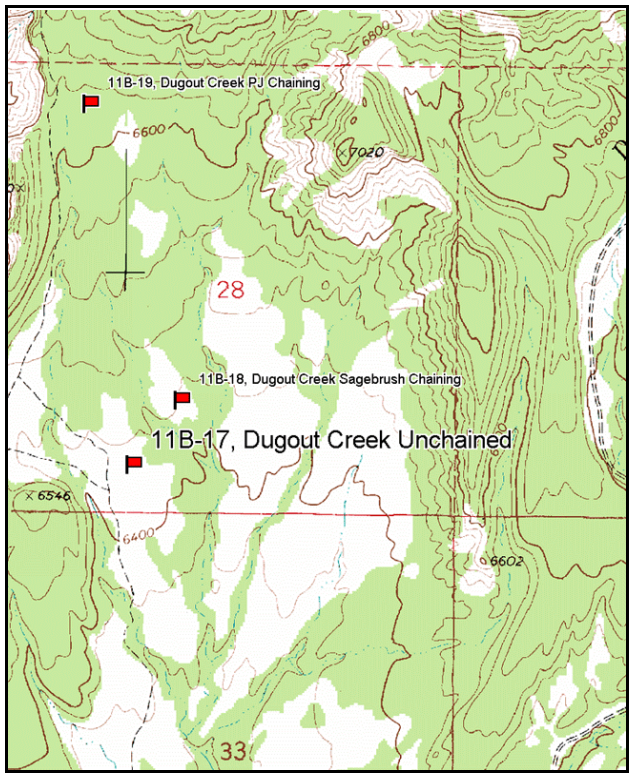
Study site name: Dugout Creek Unchained . Vegetation type: Mountain big sagebrush .

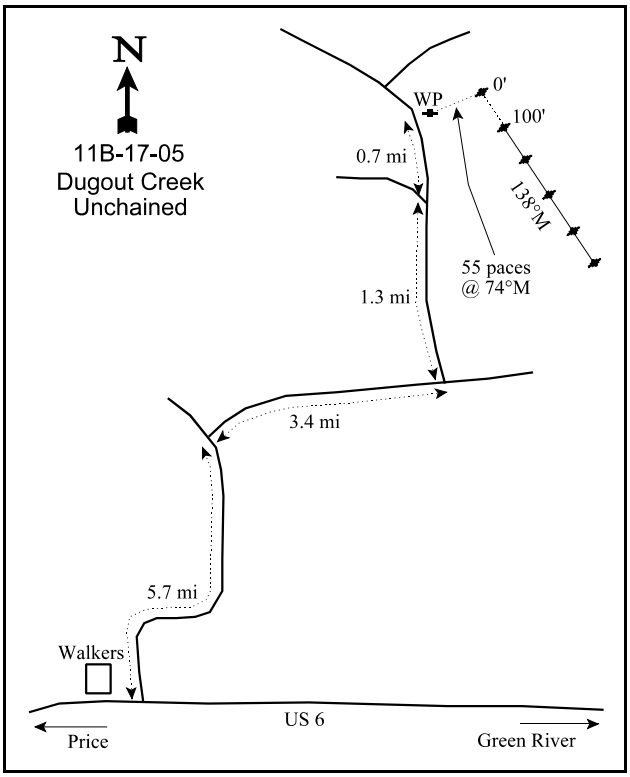
Compass bearing: frequency baseline 138 degrees magnetic.

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

LOCATION DESCRIPTION

From US 6 just outside of Price turn north by the Walkers up Ninemile Canyon. Drive 5.7 miles to a fork in the road. Take the right fork onto a dirt road and go 3.4 miles to another fork. Turn left here and go 1.3 miles to another fork. Go right for 0.7 miles to a witness post on the right (east) side of the road. (0.1 miles further is the turnoff to 11B-17). From the witness post walk 55 paces at an azimuth of 74 degrees magnetic. The study is marked by green, steel fenceposts approximately 12-18 inches in height.





Map name: Pine Canyon

Diagrammatic Sketch

Township 13S , Range 12E , Section 28

GPS: NAD 27, UTM 12S 4389921 N, 535751 E

DISCUSSION

Dugout Creek Unchained - Trend Study No. 11B-17

The Dugout Creek Unchained site was established to compare with two chaining treatments performed in 1996. Three monitoring sites were established following the treatments: one on a Wyoming sagebrush chaining (Dugout Creek Sagebrush Chaining, 11B-18), one on a pinyon-juniper woodland chaining (Dugout Creek P-J Chaining, 11B-19), and this site on an unchained Wyoming big sagebrush park being encroached of pinyon and juniper. This winter range study is located on the foothills 12 miles northeast of Wellington at an elevation of 6,400 feet. It is located on flat with a 3% slope and southeast aspect within the Soldier Canyon grazing allotment. Winter and spring cattle use the site from November through May. Deer use is moderate to heavy and there is some evidence of elk use the site. Pellet group data was estimated at 94 deer and 4 elk days use/acre (233 ddu/ha and 10 edu/ha) in 1997. In 2005, estimated pellet group data was 60 deer and 4 elk days use/acre (147 ddu/ha and 9 edu/ha).

The soils are shallow with moderate stoniness in the top 8 inches, with a hardpan of compacted soil at 8 inches. The average effective rooting depth was measured at 10 inches. Although hard, the hardpan must be penetrated by the roots of the Wyoming big sagebrush. The soil texture is sandy clay loam with a neutral pH of 6.9. Phosphorus was measured at 9.8 ppm, values less than 6 ppm appear to limit plant growth and development (Tiedemann and Lopez 2004). Combined rock and pavement cover are low. The ratio of protective cover to bare ground changed quite drastically from 1997 to 2005. In 1997, the relative bare ground cover was 15%, but had increased drastically to 34% in 2005. Conversely, cryptogamic crust cover was 26% in 1997 and had decreased to 8% by 2005. Erosion was very minimal in 1997, but had increased slightly in 2005. The erosion index measurement in 2005 rated the soil erosion as slight, mainly because of moderate pedestaling around shrubs and perennial grasses, minor soil and litter movement, and small rills and flow patterns between perennial species.

Browse on the site consists mainly of Wyoming big sagebrush, which, along with pinyon and juniper, is dominant. The sagebrush density was measured at 4,040 plants/acre in 1997 and 3,660 in 2005. The population health has been progressively worsening, with 20% of population classed with poor vigor in 1997 and 32% in 2005. Decadence has been moderately high with 38% in 1997 and 40% in 2005. The number of individuals classified as dying increased from 20% of the population in 1997 to 32% in 2005. Use on the sagebrush was light to moderate in 1997 and 2005. Broom snakeweed is also on the site in moderate numbers. The snakeweed population was estimated to be 3,220 plants/acre in 1997 and 1,420 in 2005.

A substantial population of pinyon and juniper appears to be increasing. Point-center quarter data taken on the site in 1997 estimated 24 pinyon/acre and 28 juniper/acre. The average pinyon diameter was 1.9 inches and juniper diameter was 4.7 inches. In 2005, 25 pinyon/acre and 79 juniper/acre were estimated with an average pinyon diameter of 3.9 inches and juniper diameter of 5.9 inches. In 1997, the combined cover of pinyon and juniper made up 6% of the total ground cover. That cover in 2005 had increased to 8% and canopy cover was 14%.

The herbaceous understory makes up an average of 12% cover, perennial grass species alone made up 7% cover in 1997 and 10% in 2005. Of the 22 herbaceous species on the site, 7 of them are perennial grasses and 8 are perennial forbs. The dominant grass species include blue grama, Salina wildrye, and bottlebrush squirreltail. These species made up 6% total cover in 1997 and 10% in 2005. Cheatgrass is on the site, but makes up less than one-tenth of a percent cover. Only one forb species, timber poisonvetch, contributed much to the herbaceous understory (around 1% cover both years).

1997 APPARENT TREND ASSESSMENT

The soils appear stable with moderate vegetation cover and low bare ground cover. The browse density is quite high, especially for a Wyoming big sagebrush site. Decadence and percent dying are high. Utilization is light to moderate. The herbaceous understory has a moderate perennial grass component and cheatgrass nested frequency and cover are low. The forb component provides little cover and diversity. The Desirable Components Index score was good due to moderate browse cover, excellent recruitment of young shrubs, and moderate perennial grass cover.

winter range condition (DC Index) - Good (48) Lower Potential scale

2005 TREND ASSESSMENT

The trend for soils is down. The ratio of protective ground cover (vegetation, litter and cryptogams) to bare ground decreased substantially from 1997 to 2005, a 45% decrease. This change is due to a drastic decrease in cryptogamic crust cover, a slight decrease in the vegetation cover, and percent bare ground cover more than doubled. The trend for browse is slightly down. The population of Wyoming big sagebrush, the key browse species, decreased from 4,040 plants/acre in 1997 to 3,660 in 2005, a decrease solely in the young population. Those individuals classified as having poor vigor/dying increased from 20% in 1997 to 32% in 2005. The percentage of decadent individuals remained around 40%. This year the number of young was exceeded by the number classified as dying. This decline in the overall sagebrush health is likely due to an increase in pinyon and juniper trees. Pinyon-juniper density more than doubled from 28 trees/acre in 1997 to 79 trees/acre in 2005 and pinyon-juniper cover increased from 6% to 8%. The herbaceous understory trend is stable. The nested frequency of perennial grasses, the most important herbaceous component on this winter range, changed little. Perennial forb nested frequency decreased, but there were few important forage species sampled. Therefore, the herbaceous trend remains stable. The DCI score was good, although browse cover and browse recruitment had decreased some.

TREND ASSESSMENT
soil - down (-2)
browse - slightly down (-1)
herbaceous understory - stable (0)
winter range condition (DC Index) - Good (45) Lower Potential scale

HERBACEOUS TRENDS --
Management unit 11B, Study no: 17

Type	Species	Nested Frequency		Average Cover %	
		'97	'05	'97	'05
G	Agropyron spicatum	8	-	.01	-
G	Bouteloua gracilis	140	126	2.91	3.92
G	Bromus tectorum (a)	14	9	.03	.01
G	Elymus salina	78	73	2.12	3.31
G	Oryzopsis hymenoides	8	14	.33	.38
G	Poa secunda	-	2	-	.00
G	Sitanion hystrix	$_{a}$94	$_{b}$131	1.01	2.56
G	Stipa comata	$_{b}$41	$_{a}$13	.31	.05

Type	Species	Nested Frequency '97	Nested Frequency '05	Average Cover % '97	Average Cover % '05
G	Vulpia octoflora (a)	$_{b}$245	$_{a}$137	1.40	.51
Total for Annual Grasses		259	146	1.43	0.52
Total for Perennial Grasses		369	359	6.73	10.25
Total for Grasses		628	505	8.16	10.78
F	Alyssum alyssoides (a)	7	7	.04	.03
F	Arabis sp.	$_{b}$32	$_{a}$5	.08	.01
F	Astragalus convallarius	43	35	1.25	.88
F	Calochortus nuttallii	15	2	.02	.01
F	Castilleja sp.	8	-	.19	-
F	Chenopodium fremontii (a)	-	4	-	.01
F	Gayophytum ramosissimum(a)	-	6	-	.01
F	Lappula occidentalis (a)	31	49	.07	.12
F	Penstemon sp.	15	20	.14	.58
F	Phlox longifolia	$_{b}$45	$_{a}$16	.17	.03
F	Plantago patagonica (a)	$_{b}$85	$_{a}$72	.60	.13
F	Schoencrambe linifolia	$_{a}$-	$_{b}$17	-	.05
F	Sphaeralcea coccinea	1	-	.00	-
Total for Annual Forbs		123	138	0.71	0.31
Total for Perennial Forbs		159	95	1.87	1.57
Total for Forbs		282	233	2.58	1.88

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

BROWSE TRENDS --
Management unit 11B, Study no: 17

Type	Species	Strip Frequency '97	Strip Frequency '05	Average Cover % '97	Average Cover % '05
B	Artemisia tridentata wyomingensis	83	80	9.92	6.84
B	Gutierrezia sarothrae	59	36	.65	1.66
B	Juniperus osteosperma	6	8	4.02	6.22
B	Opuntia sp.	3	5	-	-
B	Pinus edulis	1	6	2.25	2.04
Total for Browse		152	135	16.85	16.77

CANOPY COVER, LINE INTERCEPT --
Management unit 11B, Study no: 17

Species	Percent Cover	
	'97	'05
Artemisia tridentata wyomingensis	-	10.56
Gutierrezia sarothrae	-	2.11
Juniperus osteosperma	6.6	9.61
Opuntia sp.	-	.05
Pinus edulis	2.2	4.66

KEY BROWSE ANNUAL LEADER GROWTH --
Management unit 11B, Study no: 17

Species	Average leader growth (in)
	'05
Artemisia tridentata wyomingensis	3.2

POINT-QUARTER TREE DATA --
Management unit 11B, Study no: 17

Species	Trees per Acre	
	'97	'05
Juniperus osteosperma	28	79
Pinus edulis	24	25

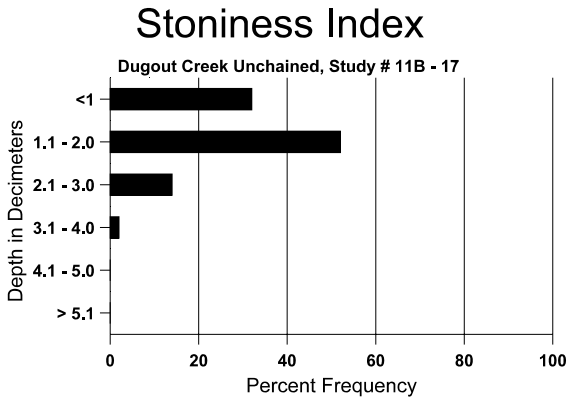
Average diameter (in)	
'97	'05
4.7	5.9
1.9	3.9

BASIC COVER --
Management unit 11B, Study no: 17

Cover Type	Average Cover %	
	'97	'05
Vegetation	29.86	27.03
Rock	2.27	.86
Pavement	2.75	.26
Litter	27.56	37.13
Cryptogams	27.79	8.55
Bare Ground	16.48	38.59

SOIL ANALYSIS DATA --
Herd Unit 11B, Study # 17, Study Name: Dugout Creek Unchained

Effective rooting depth (in)	Temp °F (depth)	pH	%sand	%silt	%clay	%0M	ppm P	ppm K	dS/m
10.4	69.8 (11.1)	6.9	52.7	20.7	26.6	1.6	9.8	92.8	0.5



PELLET GROUP DATA --
Management unit 11B, Study no: 17

Type	Quadrat Frequency '97	Quadrat Frequency '05	Days use per acre (ha) '97	Days use per acre (ha) '05
Rabbit	21	50	-	-
Elk	5	-	4 (10)	-
Deer	31	25	94 (223)	60 (147)
Cattle	-	1	-	4 (9)

BROWSE CHARACTERISTICS --
Management unit 11B, Study no: 17

		Age class distribution (plants per acre)					Utilization					
Year	Plants per Acre (excluding seedlings)	Seedling	Young	Mature	Decadent	Dead	% moderate	% heavy	% decadent	% dying	% poor vigor	Average Height Crown (in)
Artemisia tridentata wyomingensis												
97	**4040**	2660	1040	1480	1520	860	45	12	38	20	20	24/34
05	**3660**	5100	600	1600	1460	1480	26	16	40	32	32	22/26
Gutierrezia sarothrae												
97	**3220**	300	680	2520	20	60	0	0	1	-	0	10/8
05	**1420**	60	-	1420	-	20	0	0	0	-	0	12/16
Juniperus osteosperma												
97	**120**	40	60	60	-	-	0	0	-	-	0	-/-
05	**180**	20	100	80	-	-	0	0	-	-	0	-/-
Opuntia sp.												
97	**60**	-	-	60	-	-	0	0	-	-	0	4/6
05	**100**	-	-	100	-	-	0	0	-	-	0	4/10
Pinus edulis												
97	**20**	20	-	20	-	-	0	0	-	-	0	-/-
05	**140**	-	120	20	-	-	0	0	-	-	0	-/-

Trend Study 11B-18-05

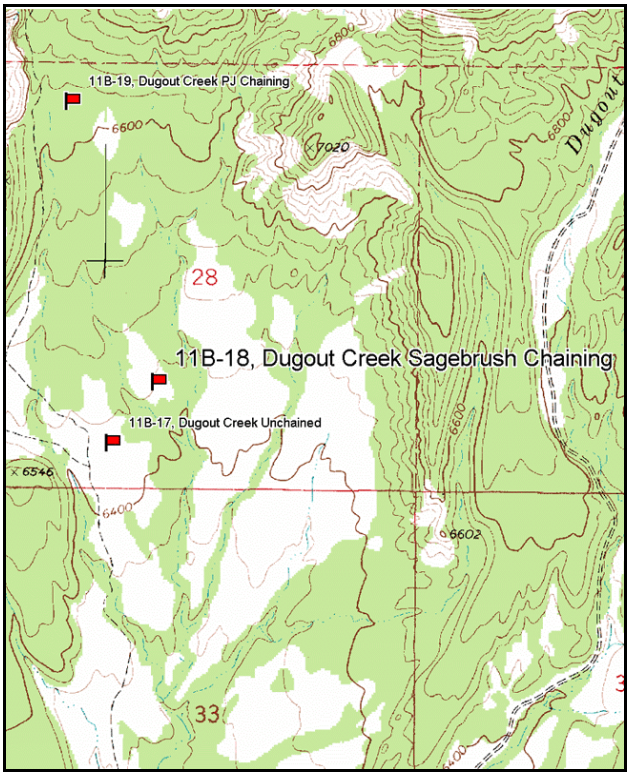
Study site name: Dugout Creek Sagebrush Chaining . Vegetation type: Wyoming big sagebrush .

Compass bearing: frequency baseline 333 degrees magnetic.

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

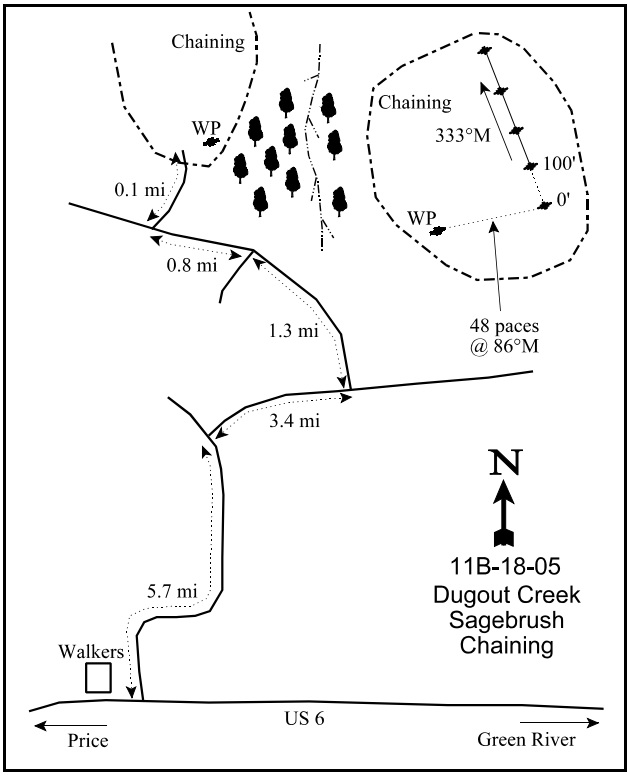
LOCATION DESCRIPTION

From US 6 just outside of Price, turn north by the Walkers up Ninemile Canyon. Drive 5.7 miles to a fork in the road. Take the right fork onto a dirt road and go 3.4 miles to another fork. Turn left here and go 1.3 miles to another fork. Turn right (straight) and go 0.8 miles to a road to the right. Turn here and drive 0.1 mile into the sagebrush chaining. There is a witness post to the right. From this witness post walk east through the P-J to another witness post on the edge of another chaining. From this witness post walk 48 paces at an azimuth of 86 degrees magnetic to the 0-foot stake. The 0-foot stake is marked with browse tag number 62.



Map name: Pine Canyon

Township 13S , Range 12E , Section 28



Diagrammatic Sketch

GPS: NAD 27, UTM 12S 4390147 N, 535921 S

DISCUSSION

Dugout Creek Sagebrush Chaining - Trend Study No. 11B-18

The Dugout Creek Sagebrush Chaining site is located about 1,000 feet northeast of the Dugout Creek Unchained (11B-17) study. This winter range site is in a Wyoming big sagebrush flat surrounded by encroaching pinyon-juniper woodland. The study is within an area that was chained the fall of 1996. It is located in the southwest-facing foothills 12 miles northeast of Wellington. It is located on an east aspect with a 2% slope at an elevation of 6,600 feet. Grazing takes place in the BLM Soldier Canyon grazing allotment where it receives winter and spring cattle use November through May. Little animal use was reported in 1997. Pellet group data taken in 1997 was estimated to be 23 deer days use/acre (56 ddu/ha). During the 2005 reading, more use was noted. The 2005 pellet group data estimated 3 elk, 54 deer, and 9 cow days use/acre (7 edu/ha, 132 ddu/ha, and 22 cdu/ha).

The soil is a shallow sandy loam. The majority of stone sampled was found within the upper 4 inches of the soil profile. The average effective rooting depth was measured at 10 inches. The soil pH is neutral at 6.9. Phosphorus was measured at 11 ppm, not likely a limiting factor in normal plant growth and development (Tiedemann and Lopez 2004). The relative combined rock and pavement cover only constituted 4% cover in 1997 and 2005. Bare ground cover is moderate on the site. The relative bare ground cover was 26% in 1997 and 32% in 2005. The ratio of protective ground cover to bare ground was 3.7:1 in 1997 and 2.4:1 in 2005. Erosion on the site was minimal in 1997 and 2005, largely due to the levelness of the surrounding area. Two large gullies are located in the pinyon-juniper woodland west and east of the study. The erosion index measurement in 2005 rated the soil erosion as slight, mainly due to moderate pedestals surrounding shrubs and perennial grasses, minor soil and litter movement, and small rills between perennial species.

Browse is dominated by Wyoming big sagebrush and some encroaching pinyon and juniper trees. The sagebrush density was estimated to be 2,920 plants/acre in 1997 and 4,460 plants/acre in 2005. Although density only increased 35% from 1997 to 2005, cover increased 3-fold (from 4 to 12%). Both years, vigor was good and use was light. The population of decadent individuals was fairly low in 1997 at 14% and 12% in 2005. The number of individuals classified as dying only made up 10% of the population in 1997 and 4% in 2005. Broom snakeweed was also found in moderate population densities on the site. In 1997, 2,160 plants/acre of broom snakeweed were estimated and 1,480 plants/acre were estimated in 2005.

The pinyon-juniper population on the site is substantial despite the 1997 chaining. The estimated juniper density, based on data taken using the point-center quarter method, in 1997 was 32 trees/acre with an average trunk diameter of 4.8 inches. The pinyon density in 1997 was estimated to be 25 trees/acre with an average trunk diameter of 2.5 inches. In 2005, the juniper density was estimated to be 60 trees/acre and the trunk diameter to be 5.1 inches. The 2005 pinyon estimates were 45 trees/acre with a diameter of 1.5 inches. Pinyon and juniper seeds and seedlings tend to be “released” following a chaining. This “release” appears to be a product of reduced competition with other trees and shrubs following a chaining. In fact, in 2005 86% of pinyon trees sampled were young individuals 4 feet tall or less. Part of the increase in densities between 1997 and 2005 might also be due to an increase in sample size for the point-center quarter method after the 1997 reading.

The herbaceous understory of the site made up 12% cover in 1997 and 13% in 2005. In 1997, annual species provided 9% cover and perennial species made up only 3%. In 2005, perennial species made up 11% cover and annual species made up only 2%. In 1997, the bulk of herbaceous understory was annual grasses, particularly sixweeks fescue with 7% cover. In 2005, the sixweeks fescue had been displaced by the perennial squirreltail bottlebrush and blue grama, which made up a combined cover of nearly 8%. Cheatgrass is present on the site, but only made up less than one-quarter of 1% cover in 1997 and 2005.

1997 APPARENT TREND ASSESSMENT

The soil appears stable with moderate bare ground cover, high litter cover, moderate vegetation cover, and little signs of erosion. The browse appears healthy with low decadence, good recruitment of young individuals, a low percent dying, and light use of Wyoming big sagebrush. Pinyon and juniper densities are low and the sagebrush appears slightly disturbed by the chaining. The herbaceous understory is dominated by annual grasses and forbs. Fortunately, cheatgrass does not dominate the site. The Desirable Components Index score is fair due to browse decadence and excellent browse recruitment, although there is low browse and perennial grass cover.

winter range condition (DC Index) - Fair (33) Lower Potential scale

2005 TREND ASSESSMENT

The trend for soil is stable, but bare groung has increased slightly and the ratio of protective ground cover (vegetation, litter and cryptogams) to bare ground decreased slightly in 2005. This is a product of a decrease in the relative cover of litter and cryptogamic crust. The trend for browse is up. The density of Wyoming big sagebrush, the key browse species, increased 35% from 2,920 plants/acre in 1997 to 4,460 plant/acre in 2005. It appears that sagebrush has recovered from the chaining. Use remained light from 1997 to 2005. The density of pinyon and juniper trees nearly doubled from 1997 to 2005, but is still low enough that it has not affected browse or understory health. The herbaceous understory trend is up. The combined nested frequencies of perennial grasses and forbs increased 23% from 1997 to 2005. The majority of this increase is due to an 84% increase in perennial grasses, the majority of which was an increase in squirreltail bottlebrush. The nested frequency of perennial forbs decreased, but this was overshadowed by the substantial increase in perennial grasses. The nested frequency of annual grasses also decreased 81% from 1997 to 2005, which promoted the establishment of more perennial individuals. The DCI score increased to excellent due to an increase in browse cover, increased perennial grass cover, and decreased annual grass cover.

TREND ASSESSMENT
soil - stable (0)
browse - up (+2)
herbaceous understory - up (+2)
winter range condition (DC Index) - Excellent (67) Lower Potential scale

HERBACEOUS TRENDS --
Management unit 11B, Study no: 18

Type	Species	Nested Frequency		Average Cover %	
		'97	'05	'97	'05
G	Agropyron cristatum	-	3	-	.15
G	Agropyron spicatum	11	10	.06	.37
G	Agropyron trachycaulum	21	15	.15	.48
G	Bouteloua gracilis	75	73	1.32	2.59
G	Bromus inermis	2	-	.00	-
G	Bromus tectorum (a)	[b]44	[a]25	.20	.11
G	Carex sp.	3	-	.00	-
G	Oryzopsis hymenoides	3	6	.01	.21

Type	Species	Nested Frequency '97	Nested Frequency '05	Average Cover % '97	Average Cover % '05
G	Poa fendleriana	$_{a}$-	$_{b}$15	-	.45
G	Sitanion hystrix	$_{a}$36	$_{b}$156	.16	5.24
G	Vulpia octoflora (a)	$_{b}$357	$_{a}$50	7.02	.18
Total for Annual Grasses		401	75	7.22	0.30
Total for Perennial Grasses		151	278	1.73	9.50
Total for Grasses		552	353	8.95	9.81
F	Alyssum alyssoides (a)	$_{b}$56	$_{a}$17	.14	.11
F	Astragalus convallarius	49	38	.98	1.60
F	Astragalus sp.	-	3	-	.00
F	Calochortus nuttallii	6	3	.02	.00
F	Castilleja sp.	-	1	-	.00
F	Chenopodium album (a)	$_{a}$-	$_{b}$26	-	.29
F	Chenopodium fremontii (a)	$_{a}$-	$_{b}$35	-	.38
F	Cryptantha sp.	10	-	.02	-
F	Descurainia pinnata (a)	$_{b}$69	$_{a}$34	.44	.13
F	Erigeron sp.	2	-	.03	-
F	Gayophytum ramosissimum(a)	$_{a}$11	$_{b}$44	.02	.44
F	Gilia hutchinifolia (a)	$_{b}$67	$_{a}$10	.35	.02
F	Lappula occidentalis (a)	$_{b}$54	$_{a}$13	.77	.02
F	Linum lewisii	$_{b}$15	$_{a}$-	.03	-
F	Melilotus officinalis	1	-	.00	-
F	Penstemon palmeri	4	2	.03	.01
F	Phlox longifolia	9	1	.04	.00
F	Plantago patagonica (a)	$_{b}$40	$_{a}$9	.31	.02
F	Polygonum douglasii (a)	2	1	.01	.00
F	Schoencrambe linifolia	$_{b}$18	$_{a}$4	.14	.07
F	Sphaeralcea coccinea	5	3	.02	.00
Total for Annual Forbs		299	189	2.05	1.43
Total for Perennial Forbs		119	55	1.33	1.71
Total for Forbs		418	244	3.39	3.14

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

BROWSE TRENDS --
Management unit 11B, Study no: 18

Type	Species	Strip Frequency '97	Strip Frequency '05	Average Cover % '97	Average Cover % '05
B	Artemisia tridentata wyomingensis	70	81	3.97	12.42
B	Gutierrezia sarothrae	46	35	.80	.96
B	Juniperus osteosperma	2	4	2.00	4.44
B	Pediocactus simpsonii	0	1	-	-
B	Pinus edulis	2	2	.53	.03
Total for Browse		120	123	7.32	17.87

CANOPY COVER, LINE INTERCEPT --
Management unit 11B, Study no: 18

Species	Percent Cover '05
Artemisia tridentata wyomingensis	17.33
Gutierrezia sarothrae	1.58
Juniperus osteosperma	2.40

KEY BROWSE ANNUAL LEADER GROWTH --
Management unit 11B, Study no: 18

Species	Average leader growth (in) '05
Artemisia tridentata wyomingensis	2.8

POINT-QUARTER TREE DATA --
Management unit 11B, Study no: 18

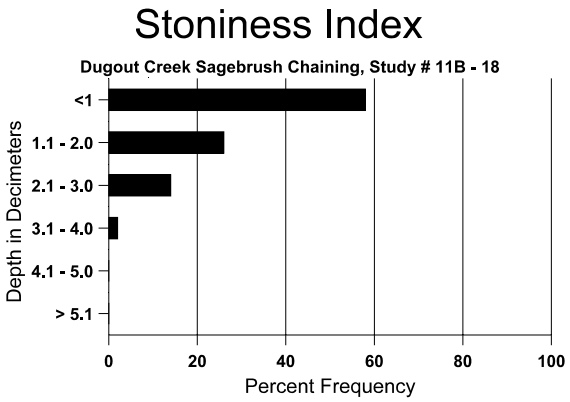
Species	Trees per Acre '97	Trees per Acre '05	Average diameter (in) '97	Average diameter (in) '05
Juniperus osteosperma	32	60	2.5	5.1
Pinus edulis	25	45	4.8	1.5

BASIC COVER --
Management unit 11B, Study no: 18

Cover Type	Average Cover %	
	'97	'05
Vegetation	23.48	28.86
Rock	3.23	4.72
Pavement	.67	.53
Litter	41.75	38.47
Cryptogams	6.75	.41
Bare Ground	27.04	35.60

SOIL ANALYSIS DATA --
Herd Unit 11B, Study # 18, Study Name: Dugout Creek Sagebrush Chaining

Effective rooting depth (in)	Temp °F (depth)	pH	%sand	%silt	%clay	%0M	ppm P	ppm K	dS/m
10.2	77.4 (12.3)	6.9	59.7	18.8	21.4	1.4	11.1	83.2	0.6



PELLET GROUP DATA --
Management unit 11B, Study no: 18

Type	Quadrat Frequency	
	'97	'05
Rabbit	17	61
Elk	-	5
Deer	12	33
Cattle	-	1

Days use per acre (ha)	
'97	'05
-	-
-	3 (7)
23 (56)	54 (132)
-	9 (22)

BROWSE CHARACTERISTICS --
Management unit 11B, Study no: 18

		Age class distribution (plants per acre)					Utilization					
Year	Plants per Acre (excluding seedlings)	Seedling	Young	Mature	Decadent	Dead	% moderate	% heavy	% decadent	% dying	% poor vigor	Average Height Crown (in)
Artemisia tridentata wyomingensis												
97	**2920**	200	1020	1480	420	1580	9	0	14	10	10	19/30
05	**4460**	3520	1580	2360	520	560	13	0	12	4	4	26/33
Gutierrezia sarothrae												
97	**2160**	260	320	1840	-	-	0	0	-	-	0	12/16
05	**1480**	-	40	1440	-	-	0	0	-	-	0	11/14
Juniperus osteosperma												
97	**40**	-	40	-	-	20	0	0	-	-	0	-/-
05	**120**	-	80	40	-	20	0	0	-	-	0	-/-
Opuntia sp.												
97	**0**	-	-	-	-	-	0	0	-	-	0	-/-
05	**0**	-	-	-	-	-	0	0	-	-	0	3/8
Pediocactus simpsonii												
97	**0**	-	-	-	-	-	0	0	-	-	0	-/-
05	**20**	-	-	20	-	-	0	0	-	-	0	-/-
Pinus edulis												
97	**40**	-	40	-	-	20	0	0	-	-	0	-/-
05	**40**	-	40	-	-	20	0	0	-	-	0	-/-
Purshia tridentata												
97	**0**	-	-	-	-	-	0	0	-	-	0	-/-
05	**0**	-	-	-	-	-	0	0	-	-	0	17/23

Trend Study 11B-19-05

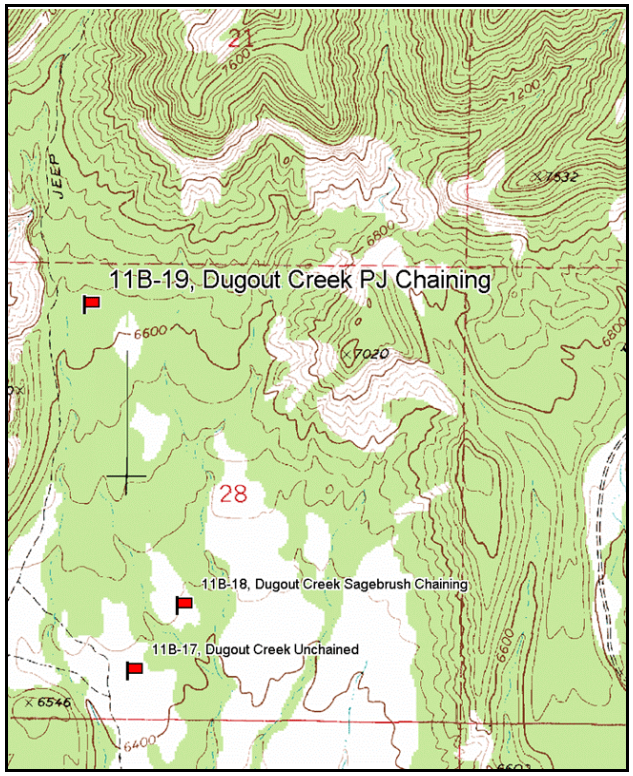
Study site name: Dugout Creek P-J Chaining . Vegetation type: Chained P-J .

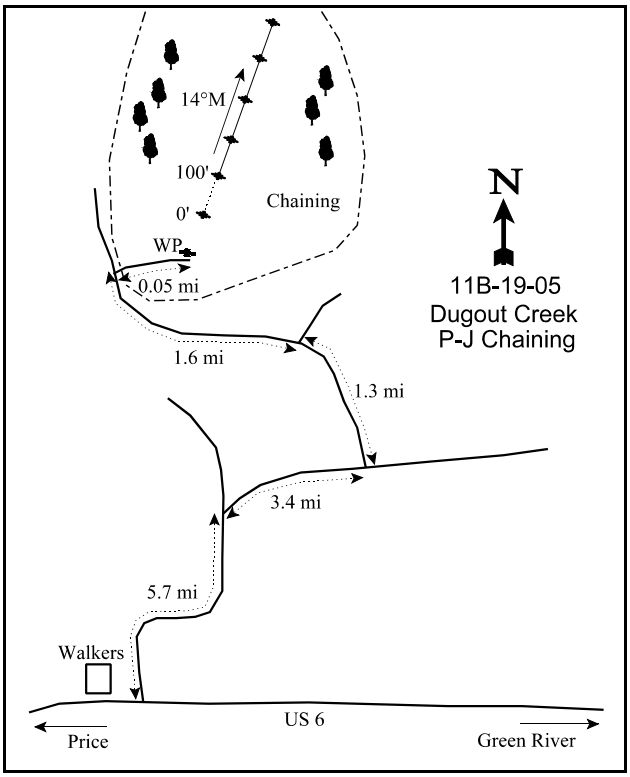
Compass bearing: frequency bearing 14 degrees magnetic.

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

LOCATION DESCRIPTION

From US 6 just outside of Price turn north by the Walkers up Ninemile Canyon. Drive 5.7 miles to a fork in the road. Take the right fork onto a dirt road and go 3.4 miles to another fork. Turn left here and go 1.3 miles to another fork. Stay right and drive 1.6 miles to a faint road on the right. Go 0.05 miles into the chaining to a witness post on the left side of the road. From the witness post walk 42 paces at 14 degrees magnetic to the 0-foot stake. The 0-foot stake is marked by browse tag number 70. The study is marked by green, steel fenceposts approximately 12-18 inches in height.





Map name: Pine Canyon

Diagrammatic Sketch

Township 13S , Range 12E , Section 21

GPS: NAD 27, UTM 12S 4391194 N, 535591 E

DISCUSSION

Dugout Creek Pinyon-Juniper Chaining - Trend Study No. 11B-19

The Dugout Creek Pinyon-Juniper Chaining site is located 2/3 mile northwest of the Dugout Creek Sagebrush Chaining study (11B-18). This winter range site is located at the base of the plateau. Aspect is to the southeast and the elevation is 6,600 feet. The slope ranges from 1-13% as the landscape undulates through the sampling area. The site is located on a pinyon-juniper woodland that was chained in the fall of 1996. Grazing is within the Soldier Canyon allotment, which receives winter and spring cattle use November through May. During the original reading (1997), little animal use was measured on the site. Estimated pellet group data in 1997 was 5 elk and 15 deer days use/acre (12 edu/ha and 36 ddu/ha). Animal use increased before the second reading. In 2005, estimated pellet group data was 13 elk, 41 deer, and 7 cow days use/acre (31 edu/ha, 101 ddu/ha, and 16 cdu/ha).

The soil on the site is a shallow sandy clay loam. Stone was about 15% of the soil surface and is quite prominent in the upper 4 inches of the soil profile. The effective rooting depth of the soil is around 12 inches with a very high stone concentration. The soil reaction is neutral with a pH of 7.2. The phosphorus was measured at 9.8 ppm, values less than 6 ppm may limit normal plant growth and development in wildland soils (Tiedemann and Lopez 2004). In both 1997 and 2005 readings, bare ground only made up 19% of the relative percent cover. The site is covered with a moderate to high percent cover of litter, much of it remains from the chaining treatment. Several large gullies cross the site. Erosion was of little concern during the 1997 reading, but had increased some by 2005. The erosion index measurement in 2005 rated the soil erosion as slight, mainly because of moderate pedestaling around the base of shrubs and perennial grasses, minor soil and litter movement, some small flow patterns, and large gullies which made up around 5% of the site area.

Preferred browse species on the site include black sagebrush, Wyoming big sagebrush, true mountain mahogany, Stansbury cliffrose, bitterbrush, fourwing saltbush, and utah serviceberry. Black sagebrush is the key browse species on the site and the other preferred browse species are relatively few in number. In 1997, the black sagbrush density was 1,720 plants/acre and had increased to 2,940 in 2005. Young individuals made up 7% of the population in 1997 and 20% in 2005. Decadent individuals made up only 2% of the population in both 1997 and 2005. Individuals classified as dying made up 1% of the population in 1997 and none were observed in 2005. Black sagebrush use was light in 1997 and increased to light-moderate, with some heavy, in 2005.

Pinyon and juniper trees still grow on the site, despite the chaining treatment. The estimated pinyon density in 1997, based on the point-center quarter method, was 72 trees/acre with an average stump diameter of 2.0 inches. The juniper density in 1997 was 77 trees/acre with an average stump diameter of 8.0 inches. In 2005, the juniper density was estimated at 85 trees/acre with an average diameter of 5.4 inches. Pinyon density in 2005 was 116 trees/acre with an average diameter of 1.8 inches. It appears that the pinyon population had a large number of young individuals before the 2005 reading, 80% of the trees measured were less than 4 feet tall.

The herbaceous understory is made up of mainly perennial species. In 1997, perennial species made up nearly 6% cover; perennial grasses contributed 1% and perennial forbs 5%.In 2005, perennial species made up 15% cover; perennial grasses made up nearly 10% and perennial forbs nearly 6%. Crested wheatgrass, slender wheatgrass, and squirreltail bottlebrush are the dominant grasses. Milkvetch species, timber poisonvetch, and Palmer's pestemon are the dominant forb species. Annual grasses were negligible both years. Annual forbs made up 2% cover in 1997 and less than 1% in 2005.

1997 APPARENT TREND ASSESSMENT

Despite the chaining treatment, bare ground cover is quite low. Litter cover is high and is providing good soil stabilization. There also appears to be little erosion. Browse is composed mainly of black sagebrush. Some mountain mahogany and bitterbrush are scattered throughout the treatment, but provide little cover. Black sagebrush appears to be healthy with a healthy population of young individuals. The herbaceous understory is dominated by forbs although some perennial grasses are established. The Desirable Components Index score is fair due to low browse cover, moderate decadence, low perennial grass cover, and excellent perennial forb cover.

winter range condition (DC Index) - Fair (26) Lower Potential scale

2005 TREND ASSESSMENT

The soil trend is stable. The ratio of protective ground cover (vegetation, litter and cryptogams) to bare ground decreased slightly, but not enough to have affected the trend. The relative cover of bare ground remained unchanged and vegetation cover increased. The trend for browse is up. The density of the key browse species, black sagebrush, increased 41% from 1,720 plants/acre in 1997 to 2,940 in 2005. These increased occurred in the young, mature, and decadent age classes. The percentage of decadent and dying individuals remained the same. The percentage of young individuals increased from 7% to 20%. Black sagebrush use increased from 93% light use in 1997 to 71% light use in 2005 (16% moderate and 13 heavy use), which is relatively low. The densities of the other preferred browse species Wyoming big sagebrush, Stansbury cliffrose, and bitterbrush were low and had little impact on the browse trend. The trend for herbaceous understory is slightly up. The nested frequency of the sum of perennial grasses and perennial forbs increased 17% from 1997 to 2005. This is due to a substantial increase in the nested frequency of perennial grasses. Crested wheatgrass and squirreltail bottlebrush nested frequencies increased significantly and slender wheatgrass also increased some. Perennial forb nested frequency decreased 40%, but this was compensated by the large increase in perennial grasses. Cheatgrass appeared on the site for the first time from 1997 to 2005, although it was only sampled in 5 quadrats and had a relatively low nested frequency. The DCI score increased to good to excellent due to improvements in browse cover, browse decadence, browse recruitment, and perennial grass cover.

TREND ASSESSMENT
soil - stable (0)
browse - up (+2)
herbaceous understory - slightly up (+1)
winter range condition (DC Index) - Good to Excellent (63) Lower Potential scale

HERBACEOUS TRENDS --
Management unit 11B, Study no: 19

Type	Species	Nested Frequency		Average Cover %	
		'97	'05	'97	'05
G	Agropyron cristatum	a50	b112	.30	4.65
G	Agropyron trachycaulum	44	49	.28	1.14
G	Bromus tectorum (a)	a-	b11	-	.05
G	Dactylis glomerata	b16	a3	.13	.01
G	Oryzopsis hymenoides	-	3	-	.06

Type	Species	Nested Frequency		Average Cover %	
		'97	'05	'97	'05
G	Poa fendleriana	2	3	.03	.03
G	Poa secunda	-	-	-	.00
G	Sitanion hystrix	$_{a}$27	$_{b}$140	.19	3.73
Total for Annual Grasses		0	11	0	0.05
Total for Perennial Grasses		139	310	0.94	9.63
Total for Grasses		139	321	0.94	9.68
F	Arabis sp.	2	1	.00	.03
F	Astragalus convallarius	52	41	.62	1.27
F	Astragalus sp.	$_{b}$92	$_{a}$51	2.47	2.19
F	Chenopodium fremontii (a)	$_{a}$5	$_{b}$18	.04	.23
F	Cryptantha sp.	9	6	.05	.06
F	Descurainia pinnata (a)	$_{b}$109	$_{a}$28	2.29	.31
F	Eriogonum cernuum (a)	-	5	-	.01
F	Euphorbia sp.	15	18	.24	.66
F	Gilia hutchinifolia (a)	5	-	.04	-
F	Helianthus annuus (a)	1	-	.00	-
F	Lappula occidentalis (a)	-	15	-	.11
F	Lactuca serriola	9	4	.09	.18
F	Lesquerella sp.	2	-	.03	-
F	Linum lewisii	$_{b}$20	$_{a}$-	.10	-
F	Machaeranthera canescens	$_{a}$-	$_{b}$9	-	.13
F	Melilotus officinalis	2	-	.04	-
F	Medicago sativa	3	6	.03	.06
F	Penstemon palmeri	34	20	.59	1.00
F	Phlox longifolia	-	1	-	.00
F	Sanguisorba minor	$_{b}$19	$_{a}$-	.45	-
F	Trifolium sp.	3	1	.00	.00
Total for Annual Forbs		120	66	2.38	0.67
Total for Perennial Forbs		262	158	4.75	5.61
Total for Forbs		382	224	7.13	6.29

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

BROWSE TRENDS --
Management unit 11B, Study no: 19

Type	Species	Strip Frequency '97	Strip Frequency '05	Average Cover % '97	Average Cover % '05
B	Artemisia nova	37	50	1.64	7.40
B	Artemisia tridentata wyomingensis	0	4	.59	.15
B	Cercocarpus montanus	12	10	.21	.79
B	Cowania mexicana stansburiana	0	2	-	1.00
B	Gutierrezia sarothrae	0	1	-	-
B	Juniperus osteosperma	5	8	2.02	3.72
B	Opuntia sp.	1	4	-	.15
B	Pinus edulis	10	8	.03	.33
B	Purshia tridentata	3	3	.39	.18
Total for Browse		68	90	4.90	13.74

CANOPY COVER, LINE INTERCEPT --
Management unit 11B, Study no: 19

Species	Percent Cover '05
Artemisia nova	8.61
Artemisia tridentata wyomingensis	.68
Cercocarpus montanus	.53
Cowania mexicana stansburiana	.50
Juniperus osteosperma	3.33
Pinus edulis	.18
Purshia tridentata	.88

KEY BROWSE ANNUAL LEADER GROWTH --
Management unit 11B, Study no: 19

Species	Average leader growth (in) '05
Artemisia nova	1.3
Cercocarpus montanus	5.7
Purshia tridentata	5.5

POINT-QUARTER TREE DATA --
Management unit 11B, Study no: 19

Species	Trees per Acre	
	'97	'05
Juniperus osteosperma	77	85
Pinus edulis	72	116

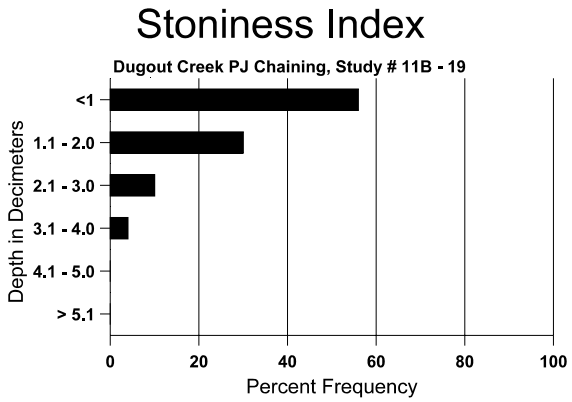
Average diameter (in)	
'97	'05
8.0	5.4
2.1	1.8

BASIC COVER --
Management unit 11B, Study no: 19

Cover Type	Average Cover %	
	'97	'05
Vegetation	13.62	28.79
Rock	8.58	15.13
Pavement	6.74	4.48
Litter	50.34	39.88
Cryptogams	.87	0
Bare Ground	18.39	20.82

SOIL ANALYSIS DATA --
Herd Unit 11B, Study # 19, Study Name: Dugout Creek PJ Chaining

Effective rooting depth (in)	Temp °F (depth)	pH	%sand	%silt	%clay	%0M	ppm P	ppm K	dS/m
11.8	73.2 (11.8)	7.2	54.4	23.8	21.8	3.8	9.8	134.4	0.7



PELLET GROUP DATA --
Management unit 11B, Study no: 19

Type	Quadrat Frequency	
	'97	'05
Rabbit	6	43
Elk	-	2
Deer	6	14
Cattle	-	-

Days use per acre (ha)	
'97	'05
-	-
5 (12)	13 (31)
15 (36)	41 (101)
-	7 (16)

BROWSE CHARACTERISTICS --
Management unit 11B, Study no: 19

		Age class distribution (plants per acre)					Utilization					
Year	Plants per Acre (excluding seedlings)	Seedling	Young	Mature	Decadent	Dead	% moderate	% heavy	% decadent	% dying	% poor vigor	Average Height Crown (in)
Amelanchier utahensis												
97	**0**	-	-	-	-	-	0	0	-	-	0	-/-
05	**0**	-	-	-	-	-	0	0	-	-	0	22/23
Artemisia nova												
97	**1720**	20	120	1560	40	140	7	0	2	1	1	10/19
05	**2940**	120	580	2300	60	20	16	13	2	-	0	17/27
Artemisia tridentata wyomingensis												
97	**0**	-	-	-	-	-	0	0	-	-	0	-/-
05	**120**	-	20	100	-	20	33	0	-	-	0	18/28
Atriplex canescens												
97	**0**	-	-	-	-	-	0	0	-	-	0	-/-
05	**0**	-	-	-	-	-	0	0	-	-	0	26/23
Cercocarpus montanus												
97	**320**	-	180	140	-	20	19	19	0	-	0	29/43
05	**240**	-	80	60	100	20	0	58	42	25	25	34/33
Chrysothamnus nauseosus												
97	**0**	-	-	-	-	-	0	0	-	-	0	-/-
05	**0**	-	-	-	-	-	0	0	-	-	0	27/36
Cowania mexicana stansburiana												
97	**0**	-	-	-	-	-	0	0	-	-	0	40/86
05	**40**	-	-	40	-	-	50	0	-	-	0	33/35
Echinocereus sp.												
97	**0**	-	-	-	-	-	0	0	-	-	0	-/-
05	**0**	-	-	-	-	-	0	0	-	-	0	2/3

		Age class distribution (plants per acre)					Utilization					
Year	Plants per Acre (excluding seedlings)	Seedling	Young	Mature	Decadent	Dead	% moderate	% heavy	% decadent	% dying	% poor vigor	Average Height Crown (in)
Gutierrezia sarothrae												
97	**0**	-	-	-	-	-	0	0	-	-	0	-/-
05	**20**	-	-	20	-	-	0	0	-	-	0	12/19
Juniperus osteosperma												
97	**100**	-	60	40	-	560	0	0	-	-	0	-/-
05	**200**	-	80	120	-	-	0	0	-	-	0	-/-
Opuntia sp.												
97	**20**	-	-	20	-	-	0	0	0	-	0	5/21
05	**100**	-	-	80	20	40	0	0	20	-	20	4/17
Pinus edulis												
97	**200**	20	180	20	-	180	0	0	-	-	10	-/-
05	**180**	-	160	20	-	-	0	0	-	-	0	-/-
Purshia tridentata												
97	**100**	-	20	60	20	-	20	0	20	20	20	-/-
05	**140**	-	-	140	-	-	0	0	0	-	0	26/42

Trend Study 11R-6-05

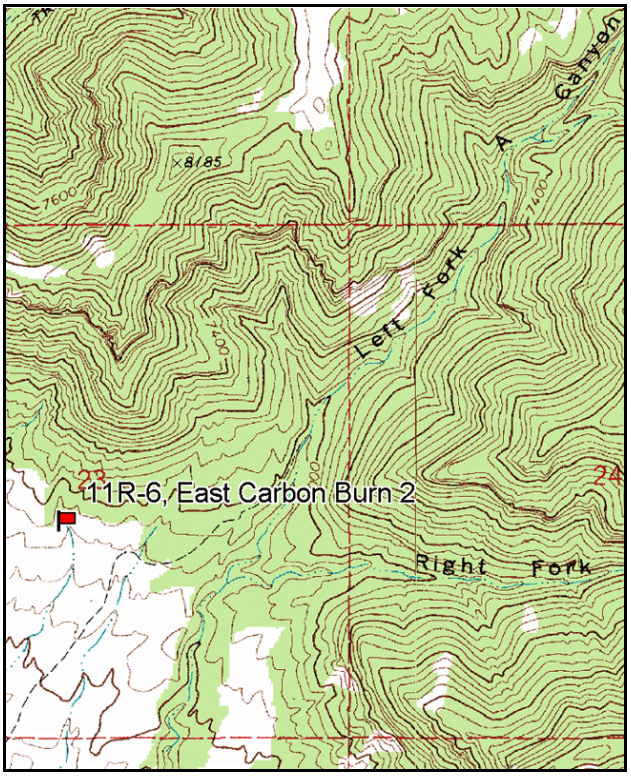
Study site name: East Carbon Burn 2 . Vegetation type: Burned-Seeded-Chained .

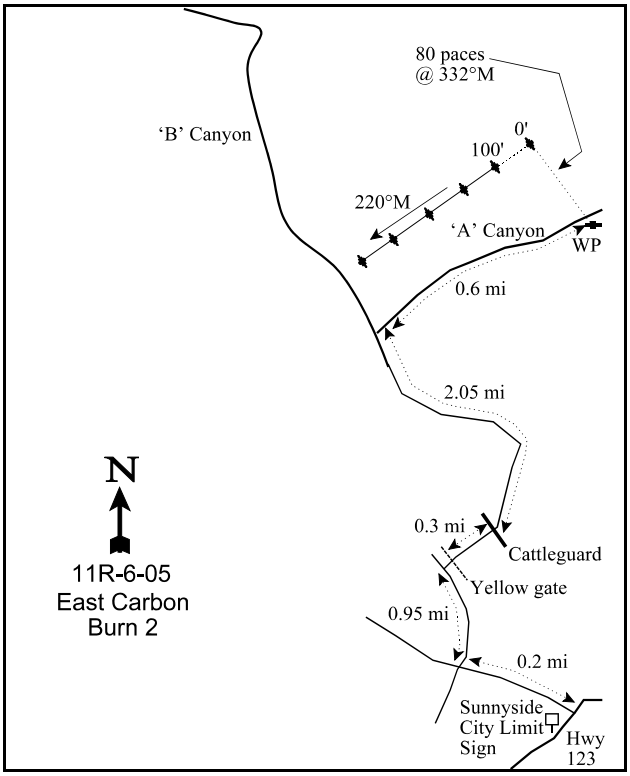
Compass bearing: frequency baseline 220 degrees magnetic.

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

LOCATION DESCRIPTION

From the Sunnyside City limit sign on Highway 123 at the west end of town, turn north and go 0.2 miles, passing the East Carbon High School football field. Turn right and go 0.95 miles. Turn right and pass through a yellow metal gate, continuing 0.3 miles to another gate. Stay on the main road and go north 2.05 miles to an intersection. Stay right at the fork and go 0.6 miles to a witness post on the right side of the road. Walk 80 paces from the witness post at an azimuth of 332 degrees magnetic to the 0-foot stake. The study is marked by 12-18 inch high, green, steel fenceposts.





Map name: Sunnyside .

Diagrammatic Sketch

Township 14S , Range 13S , Section 23

GPS: NAD 27, UTM 12S 4382381 N, 548978 E

DISCUSSION

East Carbon Burn 2 - Trend Study No. 11R-6

The East Carbon Burn 2 study was initially established following an approximately 900 acre fire 2 miles northwest of East Carbon City. The fire occurred in 1996 and 300 acres of the burn area was chained and seeded (either aerially or with a dribbler) the following autumn. The seed mix included 'Hycrest' crested wheatgrass, 'Paiute' orchardgrass, 'Bozoisky' Russian wildrye, intermediate wheatgrass, 'Ladak' alfalfa, 'Delar' small burnet, fourwing saltbush, and bitterbrush. This site was established on the chained and seeded treatment area. A second site, East Carbon Burn 3 (11R-7), was established on the burned and untreated area. The 'B' Canyon site (11B-5) was also in the burn and treatment area, but is much more heavily grazed than 11R-6 and 11R-7.

The study is located on winter range 3 miles northwest of East Carbon City on southwest-facing 8% slope at an elevation of 6,900 ft. Before the burn, the area was dominated by pinyon-juniper. The site is within the Mud Springs grazing allotment, which receives 338 cattle grazing the allotment from mid-October to mid-June. Animal use has steadily increased since the burn. In 1997, the estimated pellet group data was 3 deer and 1 cow days use/acre (7ddu/ha and 2 cdu/ha). The 2000 pellet group data was estimated at 11 deer and 2 elk days use/acre (28 ddu/ha and 2 edu/ha). In 2005, cows were on the site during the reading. The 2005 estimated data was 24 deer, 8 elk, and 12 cow days use/acre (60 ddu/ha, 20 edu/ha, and 29 cdu/ha).

The soil is a shallow sandy clay loam with a stony layer at around 14 inches. Rock and pavement make up 15-23% of the ground cover and 78% of the stone found in the soil profile is located in the upper 8 inches. The soil pH was neutral (7.3). Phosphorus levels were measured at 16.5 ppm in 1997, which is higher than average in a pinyon-juniper woodland (Tiedemann and Lopez 2004). This high phosphorus level is likely due to the high release of nutrients by the fire the previous year. Calcium deposits were reported on the rocks during the 2000 reading of the site. The relative percent bare ground cover has fluctuated from 54% in 1997, to 23% in 2000, to 43% in 2005. The relative litter cover fluctuated from 9% in 1997, to 34% in 2000, to 18% in 2005. The relative vegetation cover has increased steadily from 9% in 1997, to 24% in 2000, and 25% in 2005. Large gullies, one on each side of the site, run parallel to the baseline transect. Erosion has been minor on the site and the erosion index assessment in 2005 rated the soil erosion state as stable.

Browse is very sparse. Fourwing saltbush, true mountain mahogany, green ephedra, broom snakeweed, and bitterbrush grow on the site, but only broom snakeweed and bitterbrush were measured in the density strips. Bitterbrush was measured for the first time in 2005 at a density of 20 plants/acre, all of which were mature individuals. Broom snakeweed was also measured for the first time in 2005. Snakeweed density was estimated to be 60 plants/acre, all of which were young. In 1997 and 2000, true mountain mahogany were measured using the point-center quarter method. Mahogany numbers were estimated to be 19 plants/acre both years. Utilization on all browse species was light in 2005, with the exception of bitterbrush which showed 100% heavy utilization. Bitterbrush and, possibly, fourwing saltbush were the only browse species seeded on the site after the fire and both established.

The herbaceous understory of the site is dominated by perennial grasses, particularly crested wheatgrass. Perennial grasses constituted 6% cover in 1997 and 26% in 2000 and 2005. Perennial forbs make up the majority of the rest of the herbaceous understory. Annual grasses were only observed in one quadrat during the 1997 reading, and were not sampled at all in 2000 and 2005. Annual forbs constituted less than one-tenth of 1% cover in 1997, 0% in 2000, and 1% in 2005. Crested wheatgrass was the only prominent grass species in 1997 and 2000, but intermediate wheatgrass and slender wheatgrass were also prominent in 2005. The prominent forb species fluctuated between timber poisonvetch, looseflower milkvetch, and Utah sweetvetch. Crested wheatgrass and intermediate wheatgrass were the only species seeded on the treatment which became established. The crested wheatgrass was on the site previous to the burn and might have been simply supplemented by the seeding.

1997 APPARENT TREND ASSESSMENT

Soil condition is poor. Vegetation, litter, and cryptogamic crust cover are very low and bare ground cover is very high. There is a high potential for erosion with so little protective ground cover. There were no browse species in density strips. Point-center quarter data for mountain mahogany reflect very low densities. The herbaceous understory is dominated with crested wheatgrass with some scattered forbs. The Desirable Components Index score is poor due to no browse cover, moderate perennial grass cover, and no perennial forb cover.

1997 winter range condition (DC Index) - Poor (15) Lower Potential scale

2000 TREND ASSESSMENT

The trend for soil is up. The ratio of protective ground cover (vegetation, litter and cryptogams) to bare ground increased substantially since 1997. Relative bare ground cover decreased from 54 to 23%, relative litter cover increased from 9 to 34%, and vegetation cover increased from 9 to 24%. The trend for browse is stable. The only browse species measured on the site was true mountain mahogany, which remained at an estimated 20 plants/acre in both 1997 and 2000. The herbaceous understory trend is slightly up. The nested frequency of perennial grasses increased slightly. The nested frequency of perennial forbs decreased, but are of secondary importance on this winter range. Crested wheatgrass, particularly, is the most important herbaceous species and it showed no significant change nested frequeny. It did increase in cover nearly 5-fold. The DCI score improved to fair due to higher perennial grass and perennial forb cover.

TREND ASSESSMENT
soil - up (+2)
browse - stable (0)
herbaceous understory - slightly up (+1)
2000 winter range condition (DC Index) - Fair (36) Lower Potential scale

2005 TREND ASSESSMENT

The trend for soil is down. The ratio of protective ground cover (vegetation, litter and cryptogams) to bare ground remained about the same from 2000 to 2005. Relative bare ground cover increased from 23% to 43%. However, the erosion condition class rated the soil as stable. The trend for browse is stable. The only preferred browse species measured in density strips in 2005 was bitterbrush, which were in very low numbers. True mountain mahogany was not measured using the point-center quarter method. The herbaceous understory trend is up. The nested frequency of herbaceous species increased 55% from 2000 to 2005. Perennial grasses increased 37% from 2000 to 2005 and no annual grasses were measured either year. Perennial forbs increased 30% from 2000 to 2005. Annual forbs consisted mainly of Russian thistle, which increased substantially from a nested frequency of 0 to 64 from 2000 to 2005. This increase of Russian thistle only slightly affected the herbaceous understory. The DCI score remained fair with only a slight decrease in perennial forb cover.

TREND ASSESSMENT
soil - down (-2)
browse - stable (0)
herbaceous understory - up (+2)
winter range condition (DC Index) - Fair (34) Lower Potential scale

HERBACEOUS TRENDS --
Management unit 11R, Study no: 6

Type	Species	Nested Frequency			Average Cover %		
		'97	'00	'05	'97	'00	'05
G	Agropyron cristatum	$_{a}$259	$_{a}$279	$_{b}$315	5.30	24.45	22.97
G	Agropyron dasystachyum	-	6	8	-	.53	.30
G	Agropyron intermedium	14	19	36	.03	.51	1.34
G	Agropyron trachycaulum	$_{b}$19	$_{a}$-	$_{b}$29	.19	-	1.57
G	Bromus inermis	-	-	2	-	-	.03
G	Bromus tectorum (a)	1	-	-	.00	-	-
G	Festuca ovina	-	-	1	-	-	.00
G	Oryzopsis hymenoides	$_{a}$3	$_{a}$5	$_{b}$36	.03	.15	.16
G	Poa fendleriana	-	3	-	-	.03	-
Total for Annual Grasses		1	0	0	0.00	0	0
Total for Perennial Grasses		295	312	427	5.56	25.68	26.40
Total for Grasses		296	312	427	5.56	25.68	26.40
F	Arabis sp.	2	-	1	.00	-	.00
F	Astragalus convallarius	38	32	44	.52	1.04	.48
F	Astragalus tenellus	$_{a}$-	$_{b}$28	$_{b}$21	-	1.61	1.01
F	Chenopodium fremontii (a)	-	-	5	-	-	.00
F	Descurainia pinnata (a)	4	-	5	.04	-	.04
F	Euphorbia fendleri	6	1	2	.06	.03	.00
F	Hedysarum boreale	$_{b}$55	$_{a}$8	$_{a}$18	1.10	.42	.30
F	Lesquerella sp.	$_{b}$12	$_{a}$-	$_{a}$-	.06	-	.00
F	Linum lewisii	$_{b}$19	$_{a}$-	$_{a}$-	.13	.00	.00
F	Machaeranthera grindelioides	-	-	-	-	-	.00
F	Pedicularis centranthera	-	-	-	-	-	.00
F	Penstemon cyanocaulis	-	-	5	-	-	.01
F	Penstemon sp.	6	2	3	.01	.00	.04
F	Salsola iberica (a)	$_{a}$-	$_{a}$-	$_{b}$64	-	-	.89
F	Unknown forb-perennial	-	1	-	-	.03	-
Total for Annual Forbs		4	0	74	0.04	0	0.94
Total for Perennial Forbs		138	72	94	1.90	3.16	1.88
Total for Forbs		142	72	168	1.95	3.16	2.82

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

BROWSE TRENDS --
Management unit 11R, Study no: 6

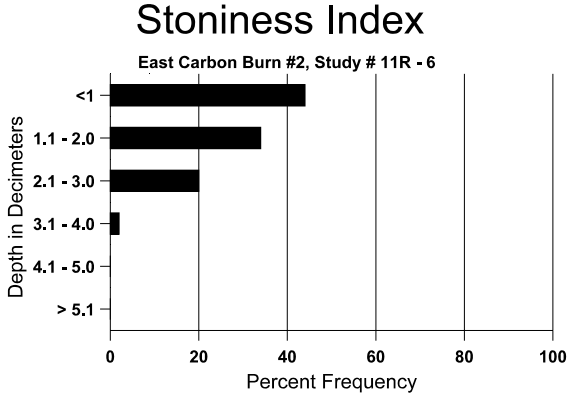
Type	Species	Strip Frequency			Average Cover %		
		'97	'00	'05	'97	'00	'05
B	Gutierrezia sarothrae	0	0	2	-	-	.03
B	Purshia tridentata	0	0	1	-	-	-
Total for Browse		0	0	3	0	0	0.03

BASIC COVER --
Management unit 11R, Study no: 6

Cover Type	Average Cover %		
	'97	'00	'05
Vegetation	7.75	29.59	26.93
Rock	8.47	11.21	11.07
Pavement	13.86	11.69	4.07
Litter	7.52	41.92	19.63
Cryptogams	.18	.12	.05
Bare Ground	43.87	28.53	47.15

SOIL ANALYSIS DATA --
Herd Unit 11R, Study # 6, Study Name: East Carbon Burn 2

Effective rooting depth (in)	Temp °F (depth)	pH	%sand	%silt	%clay	%0M	ppm P	ppm K	dS/m
13.7	47.3 (16.0)	7.3	46.0	27.4	26.6	2.4	16.5	76.8	0.6



PELLET GROUP DATA --
Management unit 11R, Study no: 6

Type	Quadrat Frequency		
	'97	'00	'05
Rabbit	-	42	23
Elk	-	-	8
Deer	-	2	9
Cattle	-	-	3

Days use per acre (ha)		
'97	'00	'05
-	-	-
-	2 (5)	8 (20)
3 (7)	11 (28)	24 (60)
1 (2)	-	12 (29)

BROWSE CHARACTERISTICS --
Management unit 11R, Study no: 6

		Age class distribution (plants per acre)					Utilization					
Year	Plants per Acre (excluding seedlings)	Seedling	Young	Mature	Decadent	Dead	% moderate	% heavy	% decadent	% dying	% poor vigor	Average Height Crown (in)
Atriplex canescens												
97	**0**	-	-	-	-	-	0	0	-	-	0	-/-
00	**0**	-	-	-	-	-	0	0	-	-	0	-/-
05	**0**	-	-	-	-	-	0	0	-	-	0	40/30
Cercocarpus montanus												
97	**0**	-	-	-	-	-	0	0	-	-	0	-/-
00	**0**	-	-	-	-	-	0	0	-	-	0	-/-
05	**0**	-	-	-	-	-	0	0	-	-	0	27/28
Ephedra viridis												
97	**0**	-	-	-	-	-	0	0	-	-	0	-/-
00	**0**	-	-	-	-	-	0	0	-	-	0	-/-
05	**0**	-	-	-	-	-	0	0	-	-	0	38/53
Gutierrezia sarothrae												
97	**0**	-	-	-	-	-	0	0	-	-	0	-/-
00	**0**	-	-	-	-	-	0	0	-	-	0	-/-
05	**60**	100	60	-	-	-	0	0	-	-	0	-/-
Opuntia sp.												
97	**0**	-	-	-	-	-	0	0	-	-	0	-/-
00	**0**	-	-	-	-	-	0	0	-	-	0	-/-
05	**0**	-	-	-	-	-	0	0	-	-	0	4/17
Purshia tridentata												
97	**0**	-	-	-	-	-	0	0	-	-	0	-/-
00	**0**	-	-	-	-	-	0	0	-	-	0	-/-
05	**20**	-	-	20	-	-	0	100	-	-	0	8/7

Trend Study 11R-7-05

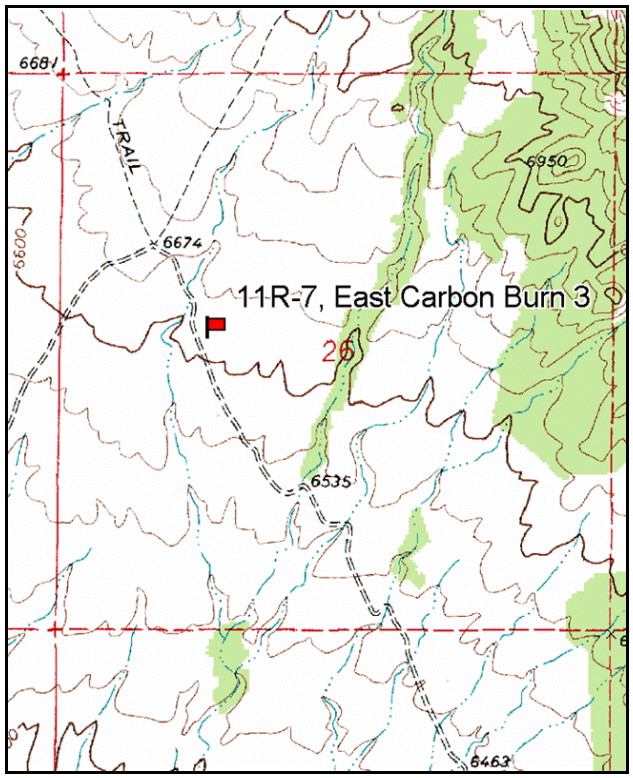
Study site name: East Carbon Burn 3 . Vegetation type: Burn

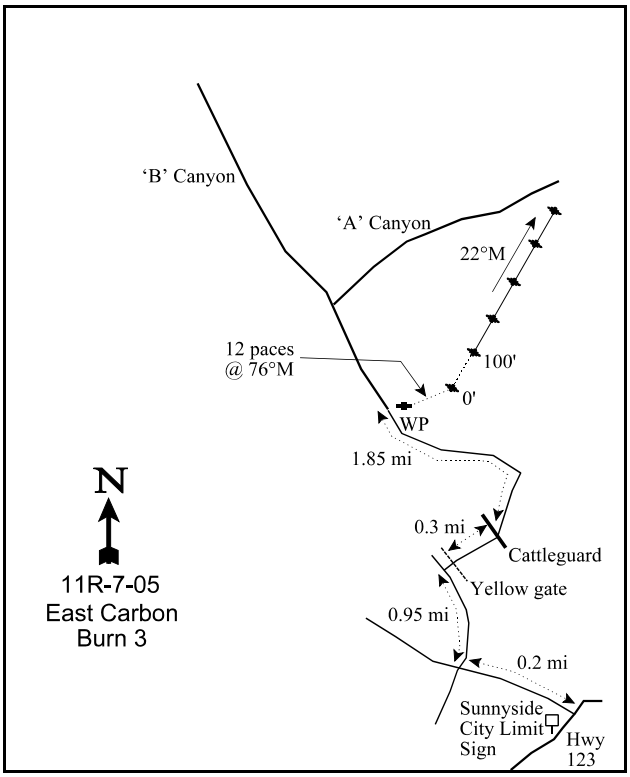
Compass bearing: frequency baseline 22 degrees magnetic.

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

LOCATION DESCRIPTION

From the Sunnyside City limit sign on Highway 123 at the west end of town, turn north and go 0.2 miles, passing the East Carbon High School football field. Turn right and go 0.95 miles. Turn right and pass through a yellow metal gate, continuing 0.3 miles to another gate. Stay on the main road and go north 1.85 miles to a witness post on the right. (This is 0.2 miles before the fork to "A" and "B" Canyons.) From the witness post walk 12 paces at 76 degrees magnetic to the 0-foot stake. The study is marked with green, steel fenceposts approximately 12-18 inches in height.





Map name: Sunnyside .

Diagrammatic Sketch

Township 14S , Range 13E , Section 26

GPS: NAD 27, UTM 12S 4380962 N, 548706 E

DISCUSSION

East Carbon Burn 3 - Trend Study No. 11R-7

The East Carbon Burn 3 study was established in the unseeded and unchained area of the East Carbon pinyon-juniper burn of 1996. It was established in 1997 to monitor natural revegetation and to compare the revegetation success of this site with that of the seeded East Carbon Burn 2 (11R-6) site. It is located on winter range 3 miles northwest of East Carbon City at an elevation of 6,600 feet. It is located on a southern aspect with a 6% slope. It is within the Mud Springs grazing allotment, which receives 338 cattle grazing the allotment from mid-October to mid-June. During the 1997 survey, little big game use was measured, but had steadily increased by the 2005 reading. In 1997, the pellet group data was estimated at 1 deer day use/acre (2 ddu/ha). The estimated pellet group data in 2000was 11 deer and 3 elk days use/acre (26 ddu/ha and 8 edu/ha). The 2005 pellet group data estimated 18 deer, 5 elk, and 10 cow days use/acre (45 ddu/ha, 12 edu/ha, and 25 cdu/ha).

The soil is a shallow sandy loam with stony layer at 11 inches. The combined relative cover of rock and pavement has decreased from 38% in 1997, to 23% in 2000, to 15% in 2005. The soil has a neutral pH of 7.2. The phosphorus concentration was measured at 17.2 ppm in 1997, which is higher than required for most wildland plants (Tiedemann and Lopez 2004). This high phosphorus level is likely due to the high nutrient release caused by the fire the previous year. The relative cover of bare ground fluctuated from 47% in 1997, to 19% in 2000, to 39% in 2005. Despite the lack of vegetation following the fire, there was little erosion on the site all years that the site was sampled. The erosion index assessment in 2005 rated the soil erosion as slight, mainly because of moderate to high numbers of pedestals surrounding shrubs and perennial grasses, minor surface rock and litter movement, minor soil movement, a few rills less than ½ inch deep, and small gullies which made up around 2% of the site area.

The browse is very limited. True mountain mahogany and green ephedra are the only preferred browse species left on the site after the fire. Green ephedra individuals were not measured in any density strips. Mountain mahogany densities were estimated at 160 young plants/acre in 1997. In 2000, 140 young plants/acre were estimated (14% less individuals than 1997). In 2005, no young plants were sampled, but 80 mature plants/acre were estimated (a 43% decrease from the 2000 estimates). No dying or decadent plants were sampled any of the years, most of which were likely killed in the fire. Utilization on mahogany increase from 100% light use in 1997, to 86% light and 14% heavy use in 2000, to 100% heavy use in 2005.

The herbaceous understory of this site is dominated by crested wheatgrass. In 1997, crested wheatgrass provided 3% cover, 26% in 2000 and 24% in 2005. There are no annual grasses on the site and other perennial grass species combined make up less than one-half percent cover each year sampled. Perennial forbs contributed around one-fourth of 1% cover in 1997 and 2005 and 2% in 2000. Similarly, annual forbs provided less than 2% cover all years.

1997 APPARENT TREND ASSESSMENT

The soil is in poor condition. Relative bare ground cover is high and vegetation cover low. The current soil condition is a product of the fire that occurred the previous year and should improve as vegetation reestablishes. The browse is also in poor condition with very few young true mountain mahogany individuals. The herbaceous understory is dominated by crested wheatgrass that had been seeded before the burn. Indian ricegrass and a handful of forbs are the only other herbaceous species sampled. The Desirable Components Index score is very poor to poor due to a lack of browse and perennial forb cover and low perennial grass cover.

1997 winter range condition (DC Index) - Very Poor to Poor (8) Lower Potential scale

2000 TREND ASSESSMENT

The trend for soil is up. The ratio of protective ground cover (vegetation, litter and cryptogams) to bare ground increased since 1997. Relative bare ground cover decreased substantially while relative cover for vegetation and litter both increased substantially. The trend for browse is stable. There are very few preferred browse species. True mountain mahogany is present in a small number of young and decadent individuals. The herbaceous understory trend is up. The nested frequency for perennials increased 67%. Crested wheatgrass was the only species to increase significantly. Unfortunately, the annual species on the site are weedy and increased nearly four-fold, but could be out-competed by competitive perennial grasses. The DCI score increased to fair due to a substantial increase in perennial grass cover.

TREND ASSESSMENT
soil - up (+2)
browse - stable (0)
herbaceous understory - up (+2)
2000 winter range condition (DC Index) - Fair (35) Lower Potential scale

2005 TREND ASSESSMENT

The trend for soils is slightly down. The ratio of protective ground cover (vegetation, litter and cryptogams) to bare ground changed little since 2000. Relative cover of bare ground increased from 19 to 39% and relative litter cover decreased from 32 to 23%. The erosion index measurement also rated the soil erosion as slight. Therefore, the soil trend is slightly down despite the relatively small protective cover ratio change. The trend for browse is stable. The density of the only measured preferred browse species, mountain mahogany, changed little. The handful of plants measure changed from the young and decadent age classes to mature. The trend for herbaceous understory is up. The nested frequency of perennial grasses, in actuality crested wheatgrass, increased significantly. Unfortunately, the other four perennial grass species sampled in 2000 were not sampled again in 2005, which decreases the ecological resilience of the habitat to extended drought, intense grazing pressure, as well as other ecological stresses. The nested frequency of perennial forbs decreased, but there are very few perennial forbs of forage value. Therefore, the trend is based on increases in crested wheatgrass. The DCI score remained fair with a slight decrease in perennial forb cover.

TREND ASSESSMENT
soil - slightly down (-1)
browse - stable (0)
herbaceous understory - up (+2)
winter range condition (DC Index) - Fair (32) Lower Potential scale

HERBACEOUS TRENDS --
Management unit 11R, Study no: 7

Type	Species	Nested Frequency			Average Cover %		
		'97	'00	'05	'97	'00	'05
G	Agropyron cristatum	[a]147	[b]249	[c]334	3.19	25.75	24.26
G	Aristida purpurea	-	5	-	-	.03	-
G	Oryzopsis hymenoides	9	2	-	.07	.36	-
G	Poa fendleriana	-	4	-	-	.03	-
G	Poa secunda	-	1	-	-	.00	-

Type	Species	Nested Frequency			Average Cover %		
		'97	'00	'05	'97	'00	'05
Total for Annual Grasses		0	0	0	0	0	0
Total for Perennial Grasses		156	261	334	3.26	26.18	24.26
Total for Grasses		156	261	334	3.26	26.18	24.26
F	Astragalus convallarius	-	6	-	-	.04	-
F	Chenopodium fremontii (a)	-	-	1	-	-	.00
F	Descurainia pinnata (a)	$_{b}$10	$_{a}$-	$_{b}$25	.09	-	.11
F	Euphorbia fendleri	$_{a}$24	$_{b}$52	$_{a}$26	.25	1.81	.15
F	Lesquerella sp.	-	-	1	-	-	.01
F	Machaeranthera grindelioides	2	-	3	.00	-	.03
F	Penstemon sp.	13	5	14	.03	.04	.06
F	Salsola iberica (a)	$_{a}$-	$_{b}$47	$_{c}$163	.03	2.08	.37
F	Sisymbrium altissimum (a)	-	1	1	-	.00	.03
F	Sphaeralcea coccinea	-	2	-	-	.00	-
F	Townsendia sp.	-	-	4	-	-	.00
Total for Annual Forbs		10	48	190	0.12	2.09	0.52
Total for Perennial Forbs		39	65	48	0.28	1.90	0.25
Total for Forbs		49	113	238	0.40	3.99	0.77

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

BROWSE TRENDS --
Management unit 11R, Study no: 7

Type	Species	Strip Frequency			Average Cover %		
		'97	'00	'05	'97	'00	'05
B	Cercocarpus montanus	8	7	4	.53	.56	1.16
B	Opuntia sp.	0	2	0	-	.15	-
Total for Browse		8	9	4	0.53	0.72	1.16

CANOPY COVER, LINE INTERCEPT --
Management unit 11R, Study no: 7

Species	Percent Cover '05
Cercocarpus montanus	1.75

KEY BROWSE ANNUAL LEADER GROWTH --
Management unit 11R, Study no: 7

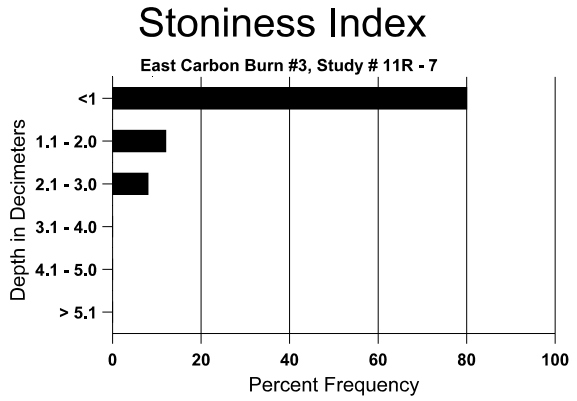
Species	Average leader growth (in) '05
Cercocarpus montanus	0.9

BASIC COVER --
Management unit 11R, Study no: 7

Cover Type	Average Cover % '97	'00	'05
Vegetation	4.58	31.79	25.25
Rock	11.64	15.44	13.18
Pavement	20.40	14.51	3.57
Litter	8.85	40.99	25.78
Cryptogams	.18	.12	0
Bare Ground	40.02	24.60	42.45

SOIL ANALYSIS DATA --
Herd Unit 11R, Study # 7, Study Name: East Carbon Burn 3

Effective rooting depth (in)	Temp °F (depth)	pH	%sand	%silt	%clay	%0M	ppm P	ppm K	dS/m
10.6	51.3 (11.0)	7.2	64.0	17.4	18.6	3.3	17.2	83.2	0.7



PELLET GROUP DATA --
Management unit 11R, Study no: 7

Type	Quadrat Frequency		
	'97	'00	'05
Rabbit	21	31	55
Elk	-	-	4
Deer	-	2	16
Cattle	-	-	2

Days use per acre (ha)		
'97	'00	'05
-	-	-
-	3 (8)	5 (45)
1 (2)	11 (26)	18 (45)
-	-	10 (25)

BROWSE CHARACTERISTICS --
Management unit 11R, Study no: 7

		Age class distribution (plants per acre)					Utilization					
Year	Plants per Acre (excluding seedlings)	Seedling	Young	Mature	Decadent	Dead	% moderate	% heavy	% decadent	% dying	% poor vigor	Average Height Crown (in)
Cercocarpus montanus												
97	**160**	-	160	-	-	-	0	0	-	-	0	-/-
00	**140**	-	140	-	-	340	0	14	-	-	0	37/22
05	**80**	-	-	80	-	-	0	100	-	-	0	26/28
Ephedra viridis												
97	**0**	-	-	-	-	-	0	0	-	-	0	-/-
00	**0**	-	-	-	-	-	0	0	-	-	0	-/-
05	**0**	-	-	-	-	-	0	0	-	-	0	35/73
Juniperus osteosperma												
97	**0**	-	-	-	-	-	0	0	-	-	0	-/-
00	**0**	-	-	-	-	20	0	0	-	-	0	-/-
05	**0**	-	-	-	-	-	0	0	-	-	0	-/-
Opuntia sp.												
97	**0**	-	-	-	-	-	0	0	-	-	0	-/-
00	**40**	-	-	40	-	-	0	0	-	-	0	3/7
05	**0**	-	-	-	-	-	0	0	-	-	0	4/10

SUMMARY OF THE EAST CARBON BURN REHABILITATION

Results of the burn rehabilitation varied, even between the two sites in the chaining and seeding treatment area, East Carbon Burn 2 (11R-6) and 'B' Canyon (11B-5). Relatively few seeded species became established. On both treated sites crested wheatgrass, intermediate wheatgrass, fourwing saltbush, and bitterbrush established to some degree. Intermediate wheatgrass and bitterbrush established successfully on both sites. This can be inferred from the fact that intermediate wheatgrass and bitterbrush were not sampled on the 'B'Canyon site previous to the 1996 burn and likely was not on the East Carbon Burn 2 site before the seeding in 1996.

Crested wheatgrass, however, was on the 'B' Canyon site before the burn; it had been seeded during a 1966 chaining treatment. After the burn, the nested frequency of crested wheatgrass was unchanged from the pre-fire nested frequencies. However, the percent cover of crested wheatgrass doubled. This could be due to either a stimulation of growth of plants from the release of nutrients by the fire, a supplementation to the existing crested wheatgrass community with new seed, or both. In the case of East Carbon Burn 2, which was also seeded, crested wheatgrass also successfully established. When compared to East Carbon Burn 3, which was not seeded, the increase in nested frequencies and percent cover for crested wheatgrass were very similar. Therefore, the question is presented of whether crested wheatgrass was already present on the East Carbon Burn 2 site (as it was on 'B' Canyon and apparently was on East Carbon Burn 3) or if it had been seeded in 1996. If the crested wheatgrass was present before the fire, it is difficult to determine the success of establishment. If it was not present before the fire, it was a quite successful seeding, to the magnitude of success similar to the regeneration of the established crested wheatgrass populations of 'B' Cayon and East Carbon Burn 3.

Fourwing saltbush appears to have established from the seeding. It was measured on the 'B' Canyon site before the 1996 fire as well as after, which means that it is a natural component of the community. In 1986, some seedlings were measured on the site. During the 1994 reading, only two years before the fire, no fourwing individuals were measured, but 40 plants/acre were estimated in 2000 and 2005. Therefore, it can be assumed that these shrubs were not there before the fire and were established from seed. Because there was some success seeding fourwing on 'B' Canyon, it is likely that the fourwing saltbush individuals measured on East Carbon Burn 2 are from the seeding.

No other seed mix species were found growing on the East Carbon Burn 2 site besides the two mentioned above. On the 'B' Canyon site, however, three other species established after the seeding: Paiute orchardgrass, 'Ladak' alfalfa, and 'Delar' small burnet. The alfalfa is disputable because it was sampled with the same quadrat frequency two readings before the burn, although it was not sampled during the reading directly before the burn. It is possible that it had died out before the burn and was reseeded during the 1996 treatment. Orchardgrass and small burnet were only sampled after the seeding. Both of these species were sampled in 2000, the first sampling after the treatment, but were not sampled again in 2005. This could be due to the heavy grazing pressure on the site at the time of the 2005 reading. The plants may have been on the site, but merely too overgrazed to identify.

The only species included in the seed mix which was not sampled was 'Bozoisky' Russian wildrye. It is likely that this species did establish on the treatment area, but not within the sampled area.

In comparison, the East Carbon Burn 2 and East Carbon Burn 3 sites show little difference. Both produced enough herbaceous understory cover to stabilize the soil. There would have been a much larger difference between the herbaceous understory of the two sites had crested wheatgrass not been planted on the unseeded site previous to the fire. The unseeded site would have had less herbaceous cover and more erosion. The seeded site did have slightly more diversity in the understory and considerably more browse diversity. The seeded East Carbon Burn 2 site had fourwing saltbush and bitterbrush as browse species, where the East Carbon Burn 3 site did not.

SUMMARY

WILDLIFE MANAGEMENT UNIT 11B - RANGE CREEK

Of the 13 trend study sites read in 2000, eleven were re-read in 2005. The sites Upper Cottonwood (11B-6) and Little Park Exclosure (11B-11) were not read this year. Five other sites were read this year, all of which were special study sites established in 1997. The sites Dugout Creek Unchained (11B-17), Dugout Creek Sagebrush Chaining (11B-18), and Dugout Creek Pinyon-Juniper Chaining (11B-19) were added to the regular rotation and had only been read in 1997. The sites East Carbon Burn 2 (11R-6) and East Carbon Burn 3 (11B-7) were read to finalize their special studies and had been read in 1997 and 2000. All sites sampled deer and/or elk winter ranges.

In 2000, the browse component on the majority of the studies in this unit showed negative characteristics due to drought. This trend continued in 2005 to a greater extent with decreases in sagebrush density observed. The herbaceous vegetation cover was very low in 2000, but typically increased with above normal precipitation in 2005. Of the trend studies read in 2005 (excluding new studies):

The key browse species mountain big sagebrush, Wyoming big sagebrush, and black sagebrush are of primary importance during the critical months of winter. These principal species have shown continuing increases in decadence and loss of plants. Their respective perennial understories have also shown similar downward changes. Mountain big sagebrush and Wyoming big sagebrush have showed similar increases in decadence and dying. However, Wyoming big sagebrush, which is of a lower site potential, has showed a more stable population density than mountain big sagebrush. Black sagebrush, which has had lower percent decadence and dying experienced the largest decrease in population density. The following series of values are averages listed in order of year sampled (1994 (or 1997 on some sites), 2000, and 2005). These values help illustrate best the differences between the two species of sagebrush. These averages are as follows:

- percent decadence... 10%, 20%, and 19% for mountain big sagebrush
- percent decadence... 15%, 20%, and 24% for Wyoming big sagebrush
- percent decadence... 8%, 9%, and 13% for black sagebrush
- percent dying..... 1%, 8%, and 9% for mountain big sagebrush
- percent dying..... 6%, 9%, and 10% for Wyoming big sagebrush
- percent dying..... 2%, 2%, and 2% for black sagebrush
- population changes. 3,224 (1994) and 2,760 plants/acre for mountain big sagebrush (-14% change)
- population changes. 2,363 (1994) and 2,593 plants/acre for Wyoming big sagebrush (+10% change)
- population changes. 8,295 (1994) and 4,130 plants/acre for black sagebrush (-50% change)

The perennial herbaceous understories associated with mountain big sagebrush and Wyoming big sagebrush have similar downward trends with regard to the site potentials of the two sagebrush subspecies communities. Black sagebrush, on the other hand, has showed a decrease in perennial forbs, but an increase in perennial grasses. The following values show percent change in nested frequency for perennial grasses and forbs for the three sagebrush from 1994 (1997) and 2005:

- percent change for perennial grasses..... -14% for mountain big sagebrush
- percent change for perennial grasses..... -7% for Wyoming big sagebrush
- percent change for perennial grasses..... +24% for black sagebrush
- percent change for perennial forbs..... -32% for mountain big sagebrush
- percent change for perennial forbs..... -30% for Wyoming big sagebrush
- percent change for perennial forbs..... -19% for black sagebrush

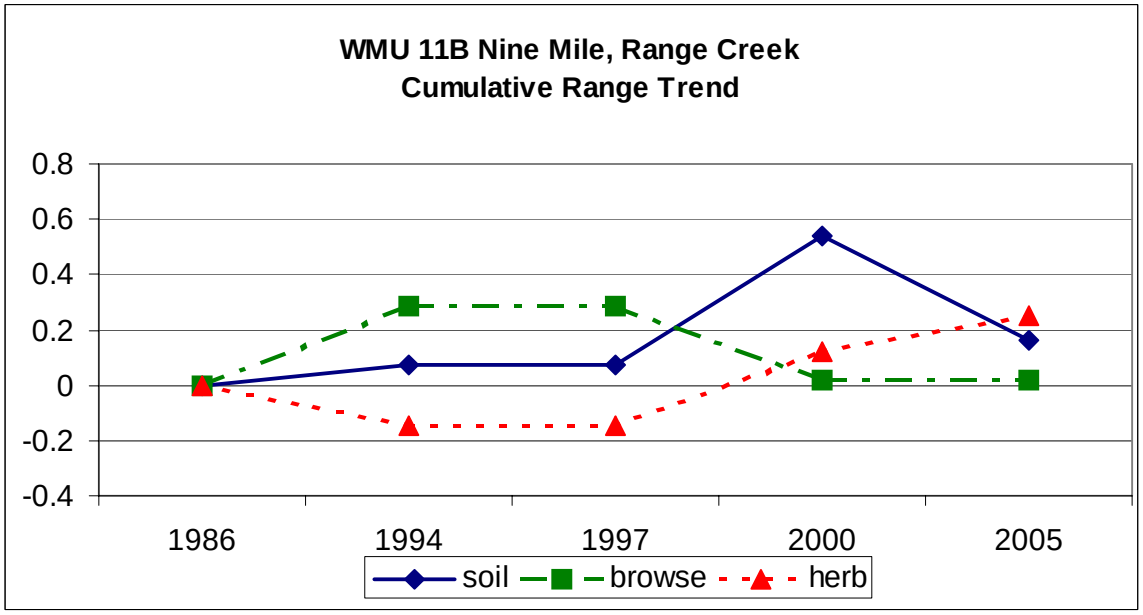
Cheatgrass can greatly effect the sagebrush community when present. It was sampled on 8 study sites in 2005, 3 of which were sampled for the first time in 2005 (1 Wyoming big sagebrush and 2 black sagebrush sites). The following is information concerning cheatgrass:

- Four of the 10 studies under 7,000 feet have cheatgrass
- Four of the 6 studies over 7,000 feet have cheatgrass
- Cheatgrass was sampled on 3 Wyoming big sagebrush and 3 black sagebrush studies
- The other 2 sites were mountain big sagebrush and mountain browse studies
- 50% of those with cheatgrass show a significant increase of cheatgrass nested frequency since 2000

The soil trends were down or slightly down on 4 of the 16 sites (25%), the others were all stable in 2005. The browse trends were down or slightly down on 6 of the 16 sites sampled in 2005 (38%). Herbaceous trends were down on 5 of the 16 sites (31%). However, due do the extremely dry conditions, sum of nested frequency of perennial forbs declined on 10 of the 13 sites (77%).

Cumulative Range Trends -- WMU 11B Nine Mile, Range Creek

	1986	1994	1997	2000	2005
soil	0	0.1	0.1	0.5	0.2
browse	0	0.3	0.3	0.0	0.0
herb	0	-0.1	-0.1	0.1	0.2
	12 sites	14 sites	5 sites	15 sites	16 sites



TREND SUMMARY

	Category	1986	1994	2000	2005
11B-1 Deadman	soil	est	-2	0	0
	browse	est	0	-2	-1
	herbaceous understory	est	-2	0	-2
11B-2 Airport Bench	soil	est	-1	+1	0
	browse	est	-1	-1	+1
	herbaceous understory	est	-1	+1	-2
11B-3 Airport	soil	est	-1	0	0
	browse	est	0	+2	+2
	herbaceous understory	est	0	0	-2
11B-4 Coal Creek	soil	est	0	0	0
	browse	est	+2	+2	-2
	herbaceous understory	est	+2	+2	+2
11B-5 ‘B’ Canyon	soil	est	0	-2	-1
	browse	est	0	-2	0
	herbaceous understory	est	0	+2	0
11B-6 Upper Cottonwood	soil	est	+1	0	NR
	browse	est	-1	0	NR
	herbaceous understory	est	+1	0	NR
11B-7 Cottonwood	soil	est	+1	+1	0
	browse	est	0	0	-2
	herbaceous understory	est	+1	0	0
11B-8 Cedar Corral	soil	est	0	+1	0
	browse	est	+1	0	-2
	herbaceous understory	est	-1	-1	-1
11B-9 Cedar Ridge	soil	est	+1	+1	0
	browse	est	+2	0	0
	herbaceous understory	est	0	0	+1

(-2) = down, (-1) = slightly down, (0) = stable, (+1) = slightly up, (+2) = up
est = site established, NR = site not read

	Category	1994	2000	2005
11B-10 Upper Little Park	soil	+1	NR	NR
	browse	+2	NR	NR
	herbaceous understory	-2	NR	NR
11B-11 Little Park Exclosure	soil	est	+1	NR
	browse	est	-1	NR
	herbaceous understory	est	+1	NR
11B-12 Williams Draw	soil	est	NR	NR
	browse	est	NR	NR
	herbaceous understory	est	NR	NR
11B-14 Prickly Pear	soil	est	0	0
	browse	est	0	0
	herbaceous understory	est	-2	-1
11B-15 Twin Hollow	soil	est	0	0
	browse	est	0	-1
	herbaceous understory	est	-2	+1
11B-16 Steer Ridge	soil	est	0	0
	browse	est	-2	+2
	herbaceous understory	est	0	-1
	Category	1997	2000	2005
11B-17 Dugout Creek Unchained	soil	est	NR	-2
	browse	est	NR	-1
	herbaceous understory	est	NR	0
11B-18 Dugout Creek Sagebrush Chaining	soil	est	NR	0
	browse	est	NR	+2
	herbaceous understory	est	NR	+2
11B-19 Dugout Creek Pinyon-Juniper Chaining	soil	est	NR	0
	browse	est	NR	+2
	herbaceous understory	est	NR	+1

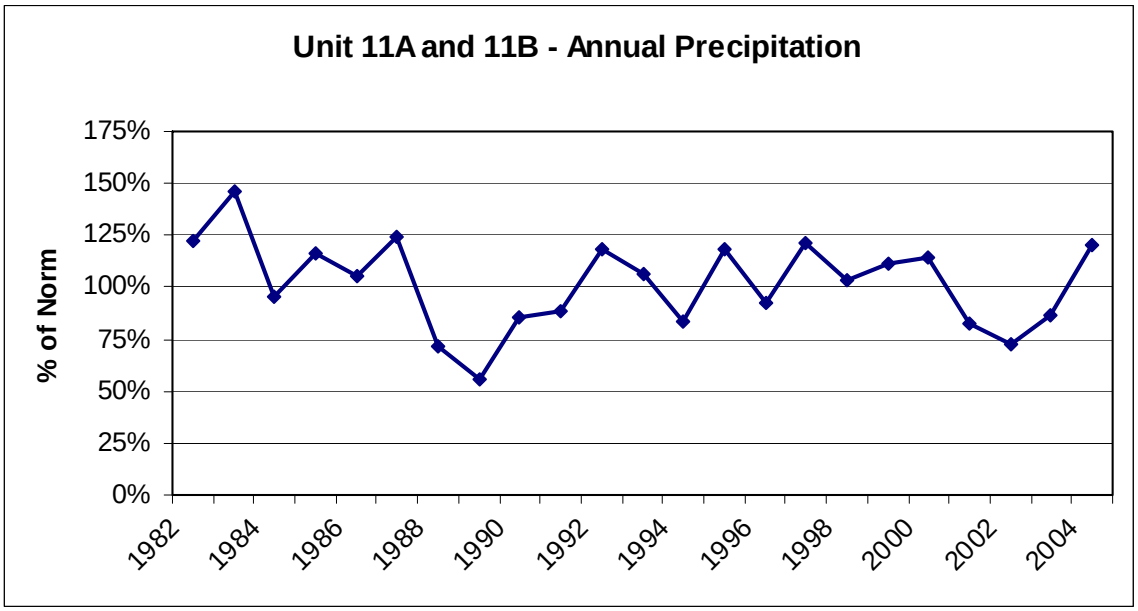
(-2) = down, (-1) = slightly down, (0) = stable, (+1) = slightly up, (+2) = up
est = site established, NR = site not read

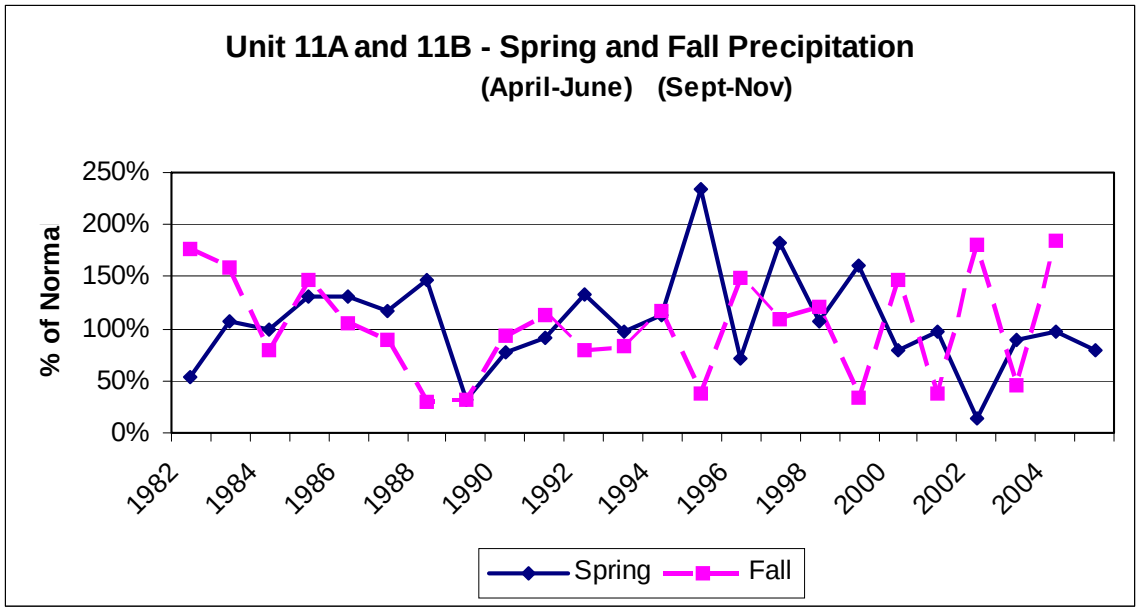
	Category	1997	2000	2005
11R-6 East Carbon Burn 2	soil	est	+2	-2
	browse	est	0	0
	herbaceous understory	est	+1	+2
11R-7 East Carbon Burn 3	soil	est	+2	-1
	browse	est	0	0
	herbaceous understory	est	+2	+2

	Category	1994	1997	2000	2005
Average Range Trend	soil	0.1	0.0	0.5	-0.4
	browse	0.3	0.0	-0.3	0.0
	herbaceous understory	-0.1	0.0	0.3	0.1
Number of sites read		14	5	15	16

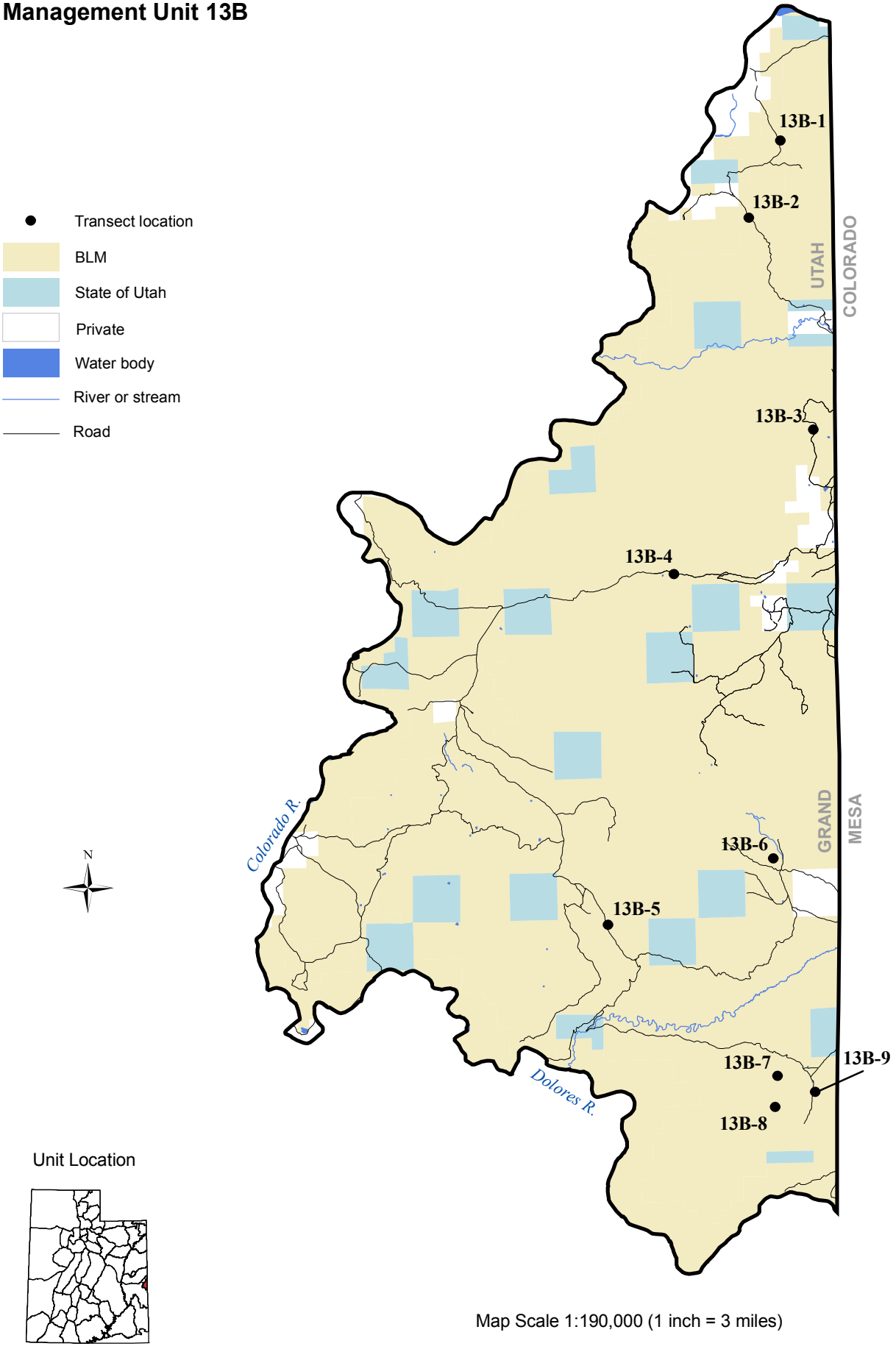
(-2) = down, (-1) = slightly down, (0) = stable, (+1) = slightly up, (+2) = up
est = site established, NR = site not read

Precipitation graphs for the Anthro and Range Creek units. Data is percent of normal precipitation averaged for weather stations in Sunnyside, Wellington, and Duchesne (Utah Climate Summaries 2005).





Management Unit 13B



Map Scale 1:190,000 (1 inch = 3 miles)

WILDLIFE MANAGEMENT UNIT 13B - DOLORES TRIANGLE

Boundary Description

Grand County - Boundary begins at the Colorado River and Utah-Colorado state line; then southwest along the Colorado River to the Dolores River; east along the Dolores River to the state line; north along the state line to the Colorado River and beginning point.

Herd Unit Description

The Dolores Triangle unit is formed by the Colorado River, the Dolores River, and the Colorado-Utah state line. Topography is varied with relatively flat mesas above 7,000 feet, large rocky rough canyons and broken country at the middle elevations, with low desert along the Colorado River. Four drainages dominate the area. Granite Creek flows into the Dolores River; Ryan Creek, Coates Creek, and Little Dolores River empty into the Colorado River. There are ranches scattered throughout the area. Fruita and Grand Junction, Colorado are the closest municipalities. Access to the unit is through Colorado by way of Glade Park or by fording the Dolores River near its confluence with the Colorado River at Dewey. However, fluctuating water levels and undulating bottom contours make crossing the river hazardous. The unit is comprised of 94,100 acres of winter range and 17,520 acres are classified as non-range. There is not any habitat within this unit that would be classified as summer range. The Bureau of Land Management manages 88% (82,900 acres) of the unit. The State of Utah owns 9% (8,600 acres) of the unit and 3% (2,600 acres) is privately owned (Evans et al.1997).

The Dolores Triangle unit serves as winter range for deer which spend the remainder of the year in Colorado's Pinon Mesa area. Few deer reside in the unit year-round, those that do are found along the Colorado River. Concentrated areas for deer during normal winters are Steamboat Mesa, Lower Steamboat Mesa, Fish Park, Big Triangle, Ryan Park, and Granite Park. Only during severe winters with abnormally heavy snowfall are deer forced to disperse into the lower desert range where forage quality is poor. Severe winter range and normal winter range are not separated into different categories because much of the land to the east is too high for normal winter range. Therefore, the whole unit could be considered critical. The ranches with agricultural land scattered throughout the herd unit offer valuable forage to the deer in the spring and fall.

Coles and Pederson (1967) identified and described five vegetation types which make up the winter range on the unit. The desert shrub type is dominated by blackbrush which occupies the lower portions of this winter range. This type is most important during severe winters although few desirable forage species are found within it. The grass type is found in the Granite Park and Steamboat Mesa areas. These were once large sagebrush parks, but have undergone a conversion to grasses (much of it cheatgrass) after overgrazing during the wrong time of the year (fall and/or spring), wildfires (reoccurring more often after the increase in weedy species), and sagebrush treatments. These areas were formerly important deer wintering areas which now receive increased use by elk. The sagebrush type is found above the desert shrub type, up to and within the pinyon-juniper woodlands. It provides important browse to both deer and livestock. The pinyon-juniper type, like the grass type, has undergone some changes due to competition with the mature trees, extended drought, and heavy use in some years. An understory of cliffrose and black sagebrush has diminished somewhat through the years and is the least productive vegetation type on the unit. This type is common on the slopes and higher mesas. The pinyon-juniper-sagebrush type occupies the upper portions of the winter range and provides important cover and forage for wildlife. In recent years, many wildfires have burned a large number of acres of this vegetation type.

Livestock Grazing

Livestock grazing is the single-most important land use in the area. Winter sheep use began in the early 1900's. Now, most of the AUM's (about 7,500) the BLM allocates for livestock use is for cattle, although some winter sheep use still occurs. The evolving dominance of pinyon-juniper along with excessive use by livestock and big game have led to deteriorating range conditions. Both livestock and deer numbers were reduced in the past to help improve the range. Although some problems still exist, range conditions appear to be slowly improving according to Jense et al (1986). Range conditions were in a state of improvement in the mid 1980s, but continued drought has caused deterioration in sagebrush communities. An increase in precipitation in the autumn of 2004 and the spring of 2005 have and will likely continue to improve declining range conditions.

This unit presents some unique deer and elk management problems. Since this unit functions primarily as winter range for big game which spend the remainder of the year in Colorado, effective management requires coordinated efforts with the Colorado Division of Wildlife. Also, since deer and elk are present mostly in the winter when snow depth may complicate access to the area, obtaining population data is often difficult. Because the presence of deer and elk depends on weather conditions prior to and during the hunt, hunting as a management tool is not always effective. If heavy snows have driven the deer onto the unit, hunter access is usually a problem. Thus, the number of deer harvested and percentage of hunter success are often more related to weather conditions than to deer abundance.

Big Game Trends

Beginning in 1969, the deer herd unit showed a significant drop in bucks harvested. Between 1969 and 1975, either-sex general season and control hunts accounted for an average yearly harvest of 403 bucks and 207 does. Previously, from 1955 through 1968, the buck harvest averaged near 1,500 bucks/year. Under buck-only hunting regulations between 1976 and 1985, the average harvest was 89 bucks/year. In 1983, control hunts for does were implemented and have accounted for an average of 122 does/year harvested through 1990. Antlerless permits have not been utilized since 1990. The buck harvest numbers decreased again in 1987, and from 1990 to 1995 the herd unit was made a draw unit with 26-27 hunters afield and an average of 22 bucks/year harvested. As of 2001, the current management objectives are a winter population objective of 6,400 deer and postseason objectives of 25 bucks/100 does and 40% of the bucks with 2 points or greater (DeBloois et al. 2001).

Elk that winter in this area come from Colorado's unit 40, which is managed for quality hunting. There have been minimal numbers of elk harvested by Utah hunters in this unit. Colorado would like to gradually increase these elk numbers from an estimated 1,700 animals in the late 1990s to 3,000 animals sometime in the future. About 50% of the elk population use Utah as winter range and are expected to continue to do so. The current management objectives are to maintain an optimum elk herd population without degrading the health of the range, and thereby complement Colorado's management goals.

Trend Study Description

Nine interagency range trend studies were established during June 1986. The study sites were selected the previous month by local interagency personnel. The studies were read again in May of 1995, 2000, and 2005.

Trend Study 13B-1-05

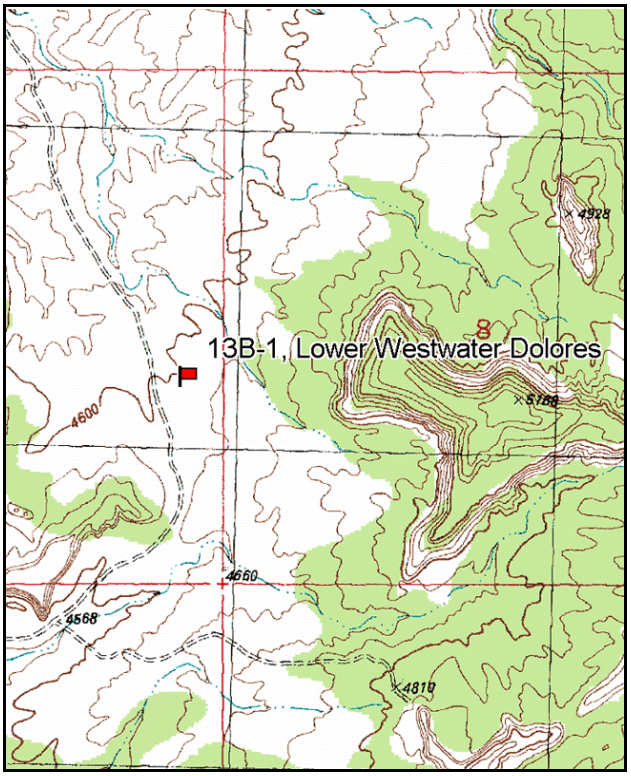
Study site name: Lower Westwater Dolores . Vegetation type: Basin big sagebrush .

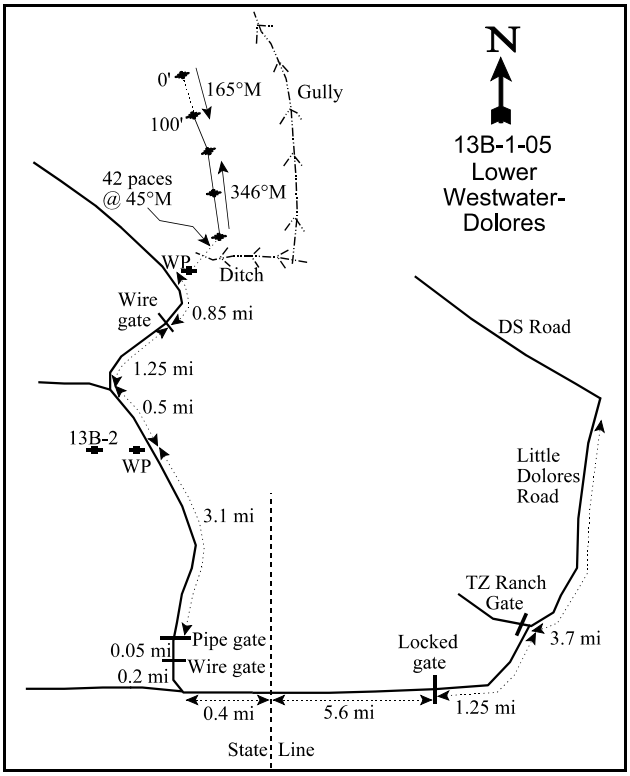
Compass bearing: frequency baseline 165 degrees magnetic.

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

LOCATION DESCRIPTION

From the intersection of the DS Road and Little Delores Road west of Glade Park, Colorado, go down Little Delores Road 3.7 miles to the TZ Ranch gate. Turn left and go 1.25 miles along the fence to another gate (permission and key necessary to get through gates). Continue 5.6 miles to the state line. Go another 0.4 miles to a cabin. Turn right along the edge of a field and go 0.2 miles to a wire gate and another .05 to a pipe gate. Go 3.1 miles to transect 13B-2. Continue 0.5 miles to a fork near a sheep corral. Keep right. Continue 1.25 miles to a wire gate, then another 0.85 miles to the witness stake, a 2 ½ foot tall fencepost off the right side of the road on top of the road cut. From the witness post, walk 42 paces at 45°M to the 400-foot baseline stake.





Map Name: Westwater 4SE

Diagrammatic Sketch

Township 20S , Range 26E , Section 7

GPS: NAD 27, UTM 12S 4327184 N, 666822 E

DISCUSSION

Lower Westwater-Dolores - Trend Study No. 13B-1

The Lower Westwater-Dolores study site is in an open valley initially dominated by basin big sagebrush and surrounded by slick rock cliffs and domes of sandstone. It is on a 10% west-facing slope, nearly 2 miles from the Colorado River at an elevation of 4,600 feet. The land is administered by the BLM out of the Grand Junction office in Colorado. The allotment is grazed by cattle and horses from November through May. This is a poor time to graze the area with respect to wildlife and it causes the eventual loss of the cool season herbaceous species. This will slowly predispose the area to the eventual conversion of the understory to winter annuals, primarily cheatgrass. Other than newly germinated cheatgrass, which is dependent upon mostly autumn precipitation levels for germination, there is little forage for both cattle and wildlife. The pellet group data estimated 79 deer days use/acre (195 ddu/ha), 12 elk days use/acre (30 edu/ha), and 27 cow days use/acre (67 cdu/ha) in 2000. In 2005, 29 deer, 1 elk, and 26 cow days use/acre (73 ddu/ha, 2 edu/ha, and 65 cdu/ha) were estimated. All droppings were estimated to be from the previous winter.

The soil is protected fairly well by the combination of vegetation and litter. Litter was moderately abundant in 1995, mostly from annuals, with a cover value estimated at 51%. With drought, litter decreased to 35% in 2000 and 31% in 2005. The soil is moderately deep with an average effective rooting depth of 19 inches. There is a compacted layer of fine sands and clay at about 6 inches, which becomes less compacted beyond 14 inches. Almost without exception, the shrub interspaces had shallower effective rooting depths than near the base of the shrubs. The soil is classified as a sandy loam and is moderately alkaline (8.2 pH). Phosphorus could be limiting with a value of only 3.9 ppm. Values less than 6 ppm may affect normal plant growth and development in wildland soils (Tiedemann and Lopez 2004). No rock or pavement was encountered on the surface or in the profile. Erosion has not been a problem. However, pedestaling around the sagebrush is about 5 to 7 inches. The erosion condition class determined soil movement as stable in 2005.

The key browse species on this site is basin big sagebrush with some apparent Wyoming big sagebrush hybrids. This stand exhibits a distinctly clumped dispersion pattern with a dense understory of annual species. Some sagebrush display a clubbed appearance and show more character traits of Wyoming sagebrush. Others, not clubbed and not as hedged by wildlife, have more traits of basin big sagebrush. In 1995, only 1% of the population were young and 66% were mature. In 2000, just below 2% of the population were young and 45% mature. In 2005, there were no young individuals, 33% of the population was mature. Decadence increased from 12% in 1986 to 32% in 1995, 53% in 2000, and 67% in 2005. No seedlings, or very few, were sampled any year due to intense competition with the high number of winter annual grasses and forbs. In 1995 and 2000, 26% of the population was classified as dying and the number of dead plants in the population (1,920 plants/acre) far outnumbered the living. In 2005, the percent of the populations dying had increased to 67%. This increase in the percent dying was related to a drastic decrease in density from 1,240 plants/acre in 2000 to only 60 plants/acre in 2005. Cover from the basin big sagebrush contributed only 2% cover in 1995 and in 2000, and decreased to about 0.2% by 2005. This decrease in sagebrush numbers and the increase in decadent and dying plant percentages was caused by the combination of drought and competition with annual species.

Other browse species include broom snakeweed and spiny hopsage which were found in very low densities. Green ephedra density was low and utilization was high in 1986. It appeared to be dying off. None were sampled in 1995, 2000, or 2005. On the opposing slope, there is a vigorous stand of sand sagebrush, which has appeared to survive the drought better than basin big sagebrush. Also observed were a few decadent spiny hopsage and a few scattered juniper.

In 1995, annual species (both grasses and forbs) contributed 83% of the herbaceous vegetation cover. Cheatgrass alone provided 67% of the herbaceous vegetation cover and 86% of the total grass cover. This changed little with the 2000 reading. In 2005, the annual species contributed 95% of the total herbaceous

cover, cheatgrass made up 56% of the herbaceous cover and 81% of the total grass cover. There were very few perennial herbaceous species present which contributed a small percent of the herbaceous cover (16% in both 1995 and 2000, and 5% in 2005). The most abundant perennial grass, galleta (a warm season grass) has significantly declined in nested frequency since 1986. Annual forbs have been very abundant. Annual forb cover was greater than 12% in 2005.

1986 APPARENT TREND ASSESSMENT

The soil trend is stable, although there are signs of some soil movement from litter and/or cryptogam cover is disturbance. The vegetation condition and trend is somewhat puzzling. There appears to have been a sagebrush die-off in recent years. This was not because of grazing pressure which has only been light to moderate use in the past. It was probably more of a response to the excessively wet years of 1983-85. Basin big sagebrush naturally experiences a fairly rapid turnover in generations and it seems to be occurring on this site at the present time. There appears to be a sufficient proportion of young plants to maintain shrub density at an acceptable level. Trend therefore appears to be stable.

1995 TREND ASSESSMENT

Due to abundant protective ground cover, decrease in percent bare ground, and no apparent erosion problems, soil trend is considered stable. Unfortunately, most of the soil cover comes from annual species and litter. Although the abundant cover of annuals helps to protect the soil, it is very detrimental to the health of the community to have such a high amount of fine fuels present. It is only a matter of time before a fire will completely destroy the sagebrush population in the immediate area. Due to the poor age class structure, large numbers of dead plants and high decadence, which has almost tripled, the trend for the key browse species is down. To further aggravate this situation, 26% of the population were classified as dying. The lack of seedlings in the area is a function of extended drought conditions as well as intense competition with the winter annuals when precipitation was adequate for establishment. The herbaceous understory does provide ground cover, but has the potential to carry a very destructive fire. The sum of nested frequency for perennial grasses declined, therefore the herbaceous understory trend is down. The Desirable Components Index rated this site as very poor with a score of 0 due to low perennial grass cover, high shrub decadence, very low recruitment of shrubs, and high annual grass cover.

TREND ASSESSMENT
soil - stable (0)
browse - down (-2)
herbaceous understory - down (-2)
winter range condition (DC Index) - Very Poor (0) Lower Potential scale

2000 TREND ASSESSMENT

With continued drought, there has been a significant drop in protective ground cover from 51% to 35%. This decrease has been mitigated somewhat by the increase of cryptogamic cover from 2 to 12%. However, the percent bare soil has increased from 18% to almost 39%. Although there still does not appear to be any apparent erosion problems, the soil trend is slightly down due to the decrease in protective cover and high percentage of annual species. The abundant cover of annuals helps to protect the soil, but is detrimental to the community in other ways. Due to the poor age class structure, large numbers of dead plants and high decadence, which has continued to increase (12% in 1986, 32% in 1995, and 53% in 2000), trend for the key browse species continues to be down. The percentage of the population that are classified as dying continues to be high at almost 26% (also 26% in 1995). The lack of seedling establishment in the area was mentioned in 1995 and continues to be the case. This is a function of extended drought conditions as well as intense competition with the winter annuals, even when normal precipitation occurs. Annuals dominate the

herbaceous understory. The nested frequency of cheatgrass declined significantly, but was still very abundant and sampled in 97% of the quadrats. Nested frequency of perennials decreased slightly. Therefore, the herbaceous understory trend is slightly down. The Desirable Components Index rated this site as very poor with a score of 0 due to low perennial grass cover, high decadence, very low recruitment of shrubs, and high annual grass cover.

TREND ASSESSMENT
soil - slightly down (-1)
browse - down (-2)
herbaceous understory - slightly down (-1)
winter range condition (DC Index) - Very Poor (0) Lower Potential scale

2005 TREND ASSESSMENT

The trend for soil is slightly down. This is due to a 17% decrease in the ratio of protective ground cover (vegetation, litter and cryptogams) to bare ground (from 2.9:1 to 2.4:1) from 2000 to 2005. This ratio decrease is a product of a drastic decrease in cryptogamic crust nested frequency. As well, the nested frequency of annual grasses increased while that of perennial grasses decreased. The trend for browse is down. The key browse species basin big sagebrush decreased from 1,240 plants/acre in 2000 to 60 plants/acre in 2005, a 95% decrease. The percentage of decadent individuals increased from 53% in 2000 to 67% in 2005. This means that 40 of the 60 plants/acre found on the site are decadent and 40 of the 60 are dying. There are no young or seedlings on the site to repopulate the community with sagebrush. As well, all of the plants sampled showed heavy use. The herbaceous understory trend is down. This is due to a substantial increase in the nested frequency of annual grasses and forbs as well as substantial decrease in the nested frequency of perennial grasses. The total percent cover for annual grasses increased from 12 to 28 % from 2000 to 2005 and the total cover for annual forbs increased from 2 to 12%. Cheatgrass increased from 12 to 24% from 2000 to 2005. The nested frequency and total percent cover of perennial forbs also increased, but not enough to counter the effects of the annual grasses and forbs. The Desirable Components Index rated this site as very poor with a score of -15 due to low perennial grass cover, high decadence, very low recruitment of shrubs, and very high annual grass cover.

TREND ASSESSMENT
soil - slightly down (-1)
browse - down (-2)
herbaceous understory - down (-2)
winter range condition (DC Index) - Very Poor (-15) Lower Potential scale

HERBACEOUS TRENDS --
Management unit 13B, Study no: 1

Type	Species	Nested Frequency				Average Cover %		
		'86	'95	'00	'05	'95	'00	'05
G	Bromus tectorum (a)	-	$_{b}$384	$_{a}$334	$_{a}$345	12.39	12.20	23.82
G	Hilaria jamesii	$_{c}$206	$_{b}$114	$_{ab}$75	$_{a}$47	1.99	1.83	.93
G	Oryzopsis hymenoides	-	-	1	-	-	.15	-
G	Sitanion hystrix	9	-	-	-	-	-	-
G	Sporobolus cryptandrus	$_{a}$1	$_{a}$-	$_{b}$23	$_{b}$25	-	.77	.47

Type	Species	Nested Frequency				Average Cover %		
		'86	'95	'00	'05	'95	'00	'05
G	Vulpia octoflora (a)	-	$_{a}$46	$_{a}$48	$_{b}$124	.09	.27	4.28
Total for Annual Grasses		0	430	382	469	12.48	12.47	28.11
Total for Perennial Grasses		216	114	99	72	1.99	2.75	1.40
Total for Grasses		216	544	481	541	14.47	15.23	29.52
F	Astragalus sp.	12	4	-	1	.01	-	.00
F	Chenopodium fremontii (a)	-	$_{a}$-	$_{b}$39	$_{a}$9	-	.14	.02
F	Chaenactis stevioides	-	3	-	2	.00	-	.01
F	Cryptantha sp.	$_{a}$-	$_{b}$12	$_{a}$-	$_{a}$-	.03	-	-
F	Draba nemorosa (a)	-	$_{a}$3	$_{b}$14	$_{a}$1	.00	.03	.00
F	Erodium cicutarium (a)	-	$_{a}$35	$_{b}$75	$_{c}$251	.45	1.25	10.16
F	Gilia sp. (a)	-	-	-	2	-	-	.00
F	Lappula occidentalis (a)	-	1	6	12	.00	.04	.03
F	Lepidium densiflorum (a)	-	$_{b}$120	$_{a}$25	$_{b}$108	.79	.18	.82
F	Leucelene ericoides	$_{a}$26	$_{b}$56	$_{a}$15	$_{a}$4	1.12	.13	.01
F	Machaeranthera canescens	-	-	1	7	-	.00	.07
F	Navarretia intertexta (a)	-	$_{b}$61	$_{a}$18	$_{a}$6	.13	.07	.01
F	Oenothera albicaulis (a)	-	9	-	3	.02	-	.00
F	Plantago patagonica (a)	-	$_{c}$191	$_{a}$10	$_{b}$149	.61	.06	.55
F	Salsola iberica (a)	-	$_{a}$-	$_{a}$-	$_{b}$68	-	-	.24
F	Sisymbrium altissimum (a)	-	$_{b}$156	$_{a}$24	$_{a}$22	.93	.24	.54
F	Sphaeralcea parvifolia	$_{a}$-	$_{a}$7	$_{a}$5	$_{b}$24	.02	.01	.76
Total for Annual Forbs		0	576	211	631	2.95	2.05	12.41
Total for Perennial Forbs		38	82	21	38	1.20	0.14	0.86
Total for Forbs		38	658	232	669	4.16	2.20	13.28

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

BROWSE TRENDS --
Management unit 13B, Study no: 1

Type	Species	Strip Frequency			Average Cover %		
		'95	'00	'05	'95	'00	'05
B	Artemisia tridentata tridentata	41	29	3	1.69	2.39	.18
B	Gutierrezia sarothrae	2	1	0	-	-	-
Total for Browse		43	30	3	1.69	2.39	0.17

CANOPY COVER, LINE INTERCEPT --
Management unit 13B, Study no: 1

Species	Percent Cover '05
Artemisia tridentata tridentata	.01

KEY BROWSE ANNUAL LEADER GROWTH --
Management unit 13B, Study no: 1

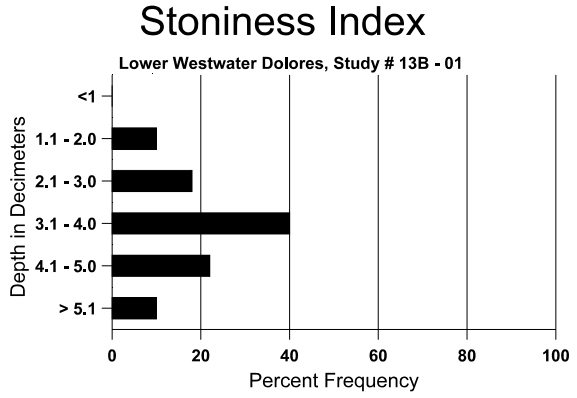
Species	Average leader growth (in) '05
Artemisia tridentata tridentata	1.2
Grayia spinosa	3.2

BASIC COVER --
Management unit 13B, Study no: 1

Cover Type	Average Cover %			
	'86	'95	'00	'05
Vegetation	11.50	29.78	22.89	42.96
Rock	0	0	0	0
Pavement	.25	0	0	0
Litter	50.50	51.34	34.70	31.29
Cryptogams	18.50	2.17	12.19	1.14
Bare Ground	19.25	17.96	38.54	31.76

SOIL ANALYSIS DATA --
Herd Unit 13B, Study # 1, Study Name: Lower Westwater Dolores

Effective rooting depth (in)	Temp °F (depth)	pH	%sand	%silt	%clay	%0M	ppm P	ppm K	dS/m
19.0	63.8 (18.1)	8.2	71.0	16.4	12.6	0.0	3.9	118.4	0.1



PELLET GROUP DATA --
Management unit 13B, Study no: 1

Type	Quadrat Frequency		
	'95	'00	'05
Rabbit	12	10	14
Elk	-	-	3
Deer	31	39	33
Cattle	3	4	11

Days use per acre (ha)	
'00	'05
-	-
12 (30)	1 (2)
79 (195)	29 (73)
27 (68)	26 (65)

BROWSE CHARACTERISTICS --
Management unit 13B, Study no: 1

		Age class distribution (plants per acre)					Utilization					
Year	Plants per Acre (excluding seedlings)	Seedling	Young	Mature	Decadent	Dead	% moderate	% heavy	% decadent	% dying	% poor vigor	Average Height Crown (in)
Artemisia tridentata tridentata												
86	**5133**	-	-	4533	600	-	60	5	12	-	0	-/-
95	**1480**	-	20	980	480	1920	15	3	32	26	26	24/30
00	**1240**	-	20	560	660	1640	52	24	53	26	26	19/26
05	**60**	-	-	20	40	1320	0	100	67	67	67	15/27
Atriplex canescens												
86	**0**	-	-	-	-	-	0	0	-	-	0	-/-
95	**0**	-	-	-	-	-	0	0	-	-	0	-/-
00	**0**	-	-	-	-	-	0	0	-	-	0	-/-
05	**0**	-	-	-	-	-	0	0	-	-	0	23/13
Grayia spinosa												
86	**0**	-	-	-	-	-	0	0	-	-	0	-/-
95	**0**	-	-	-	-	-	0	0	-	-	0	17/26
00	**0**	-	-	-	-	-	0	0	-	-	0	-/-
05	**0**	-	-	-	-	-	0	0	-	-	0	24/44
Gutierrezia sarothrae												
86	**0**	-	-	-	-	-	0	0	-	-	0	-/-
95	**40**	-	20	20	-	-	0	0	-	-	0	12/12
00	**20**	-	-	20	-	-	0	0	-	-	0	5/-
05	**0**	-	-	-	-	-	0	0	-	-	0	12/14
Opuntia sp.												
86	**66**	-	-	66	-	-	0	0	-	-	0	6/7
95	**0**	-	-	-	-	-	0	0	-	-	0	-/-
00	**0**	-	-	-	-	-	0	0	-	-	0	7/-
05	**0**	-	-	-	-	-	0	0	-	-	0	7/33

Trend Study 13B-2-05

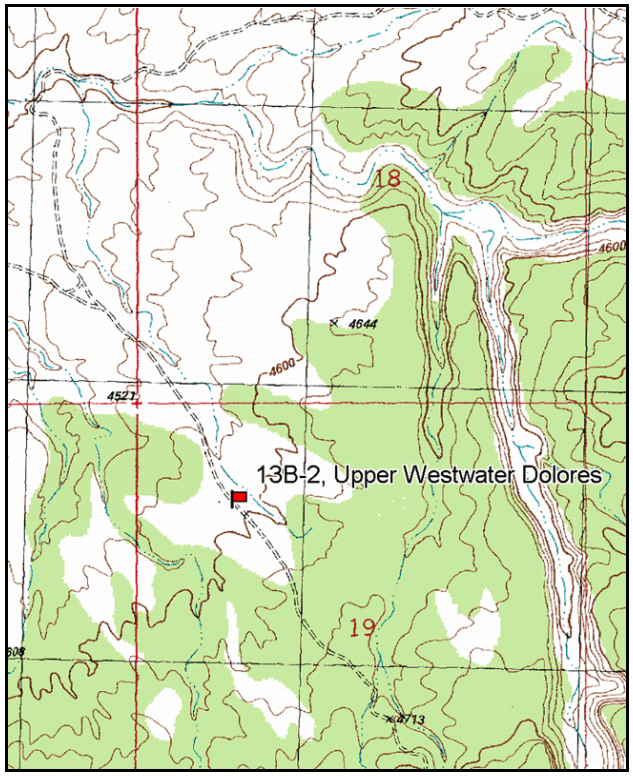
Study site name: Upper Westwater-Dolores . Vegetation type: Burn .

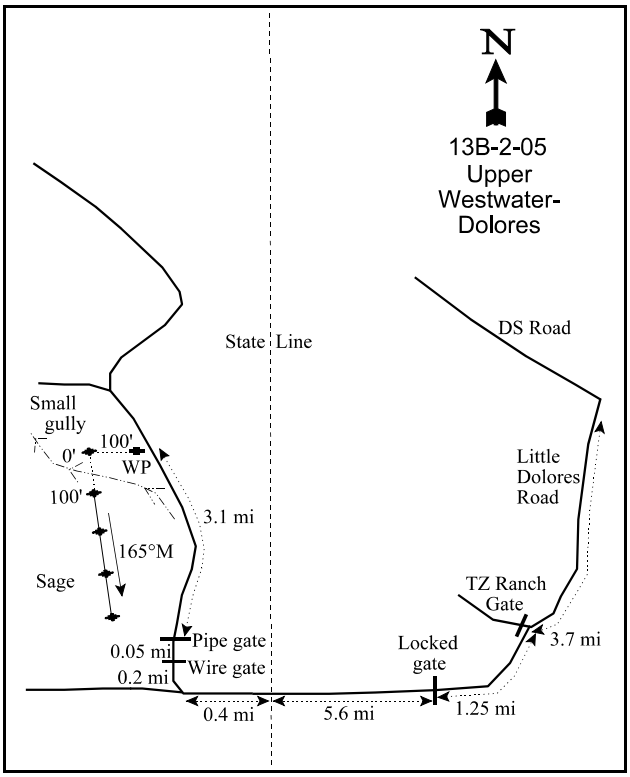
Compass bearing: frequency baseline 165 degrees magnetic.

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

LOCATION DESCRIPTION

From the intersection of the DS Road and A Road west of Glade Park, Colorado, go down A Road 3.7 miles to the TZ Ranch gate. Turn left and go 1.25 miles to a locked gate (necessary to obtain permission and key). Continue 5.6 miles through the valley to the state line. Proceed 0.4 miles to a cabin, turn right and go along the edge of a field 0.2 miles to a wire gate. Go 0.05 miles to a locked pipe gate, and then 3.1 miles on the main road to the transect. There is a witness post (rebar) off the left side of the road 10-15 feet. The 0-foot baseline stake, a rebar tagged #7957, is 100 feet due west of the witness post.





Map Name: Westwater 4SE

Diagrammatic Sketch

Township 20S , Range 26E , Section 19

GPS: NAD 27, UTM 12S 4324545 N, 665745 E

DISCUSSION

Upper Westwater - Dolores - Trend Study No. 13B-2

The Upper Westwater study is in the northeast portion of the Dolores Triangle. When this site was established in 1986 it sampled a big sagebrush flat surrounded by juniper woodland.A fire burned the site between 1986 and 1995, which has left the site as an annual grassland. The Colorado River is approximately 1.5 miles to the west. The site is at 4,600 feet with a 3-5% slope and a northwest exposure. The area is grazed by cattle in winter and early spring (2,791 AUM's are presently allocated on the allotment). The number of deer pellet groups found at the site are low and scattered. The pellet group data in 2000 estimated 8 deer days use/acre (20 ddu/ha) (winter use) and 51 cow days use/acre (126 cdu/ha) (winter and spring use). In 2005, 6 deer days use/acre (15 ddu/ha) and 57 cow days use/acre (142 cdu/ha) were estimated for this site. All of the deer pellets were from the previous winter and the cow pats were from mainly from winter with a few from spring. The livestock use appears to be quite heavy.

The soil is a reddish, sandy loam, which appears to be moderately deep with a neutral pH (7.2). The effective rooting depth is a little more than 14 inches. Phosphorus could be a limiting factor at 8.4 ppm, where levels below 6 ppm may hinder normal plant development and growth in wildland soils (Tiedemann and Lopez 2004). Relative litter cover was fairly abundant (48%) in 1995, but was essentially contributed by only annual species. This kind of cover characteristically can be lost with drought, as illustrated by the fact that continued drought attributed to decreased relative litter cover from 1995 to 2005 (48% in 1995 to 33% in 2000, then 19% in 2005). There was a low amount of relative bare ground (11%) in 1995, due to the high amounts of cover from litter and annual vegetation. Relative bare ground then more than doubled to around 27% in 2000 and 2005. No rock and very little pavement has been sampled. Cryptogamic crust only contributed 2% of the total relative cover in 1995, increased to 15% in 2000, then decreased to 6% in 2005. The erosion condition class determined soil movement as stable in 2005.

In the past, basin big sagebrush was the dominant browse species with an estimated density of 2,199 plants/acre in 1986. Sometime after the 1986 reading, the sagebrush population was lost to a wildfire. Annual species then dominated the site. The fire appears to have burned very hot with the fine fuels provided by annual species leaving very little sign that sagebrush once dominated the site. There is no indication that the sagebrush population is going to return in the future. Other associated browse species (four-wing saltbush and spiny hopsage) are also gone with no signs of reestablishment. Around the periphery of the site, there are juniper trees that survived the fire.

Annual cheatgrass dominated the understory in 1986. Although dense that year, cheatgrass appeared to be infected by a fungus that in many areas of the state had greatly reduced seed production during the wet years of 1983-85. Since the destructive wildfire, annuals have accounted for as much as 96-99% of the total vegetation cover on the site. Grasses provided 70% of the vegetation cover in 1995, decreased to 37% in 2000, then increased slightly to 44%. Forbs increased in total vegetation cover from 30% in 1995, to 63% in 2000, then decreased slightly to 56% in 2005. In 1995 and 2005, the dominant grass was cheatgrass, which accounted for 12-57% of the total vegetation cover and sixweeks fescue, also present, contributed 11-30% vegetation cover. These two grasses combined accounted for between one to two-thirds of the total vegetation cover and provided large quantities of fine fuel. Galleta and purple threeawn are also present, but in very low numbers. Tumblemustard and woolly Indian wheat have been the predominant forbs on the site and also contribute to the high fuel loads of the site. In 2000, much of the cheatgrass did not germinate due to the dry fall and winter. It decreased in total cover from 16% in 1995 to less than 1% in 2000, then increased to 6% in 2005.

1986 APPARENT TREND ASSESSMENT

Browse trend appears stable. The basin big sagebrush is healthy and it has adequate reproduction. An increase in species diversity for shrubs would be desirable to supplement the sagebrush. However, a more palatable species would be severely hedged even though browsing pressure is low on this site. The juniper appear to be increasing, but are not in densities that would form a closed canopy. There is little sign of erosion and the soil trend appears stable, although an increase in perennial grass species would provide needed diversity and a more reliable ground cover than annual cheatgrass. The high amount of annuals makes this community very susceptible to fire and loss of the critical browse component.

1995 TREND ASSESSMENT

Annual vegetation and litter provide ample cover for the soil. Although the soil is protected, they also provide abundant fine fuel to carry another destructive fire. Therefore, soil trend is stable but with poor cover composition. The recent fire removed all browse species from the area and there are apparently no seedlings at this time. The browse trend is down. Deer will likely use this area in the spring when the plants are succulent, but can no longer rely on the area as a source for browse species in moderate or severe winters. The herbaceous understory trend is stable, but with very poor composition. Perennial species diversity and abundance need to increase for the site to stabilize, which will help mitigate the effects of future wildfires. The Desirable Components Index rated this site as very poor with a score of -13 due to low perennial grass cover, no recruitment of shrubs, no browse cover, and very high annual grass cover.

TREND ASSESSMENT
soil - stable (0)
browse - down (-2)
herbaceous understory - stable (0)
winter range condition (DC Index) - Very Poor (-13) Lower Potential scale

2000 TREND ASSESSMENT

Annual vegetation and litter still provide fair protective cover for the soil. Although the soil has some protection, the annual species also provide abundant fine fuels to carry another fire. The amount of bare soil has increased (from 14% in 1995 to 29% in 2000) with significantly lower vegetation and litter cover values. The ratio of protective ground cover (vegetation, litter and cryptogams) to bare ground decreased 15%. Therefore, soil trend is slightly down because of the continued dominance of annual species and much higher amounts of bare soil. There are still no signs of any kind of browse reproduction on this site which is not surprising in light of the severe competition for soil moisture from the dominance of annual species and the moderately high soil temperatures which is very disadvantageous to the sagebrush seedlings to ever become established through the summer. It would be safe to say that we will not see sagebrush reestablished here in our lifetime. Deer will likely use this area in the spring when the plants are succulent, but can no longer rely on the area as a source for browse species in moderate or severe winters. The herbaceous understory trend is stable because of little change in the poor cover composition. The nested frequencies of annual grasses and forbs decreased slightly, a response to lower precipitation. The nested frequencies of perennial species remained relatively stable, although they could not get too much lower. Perennial species diversity and abundance need to increase for the site to improve which could mitigate the effects of future wildfires. The Desirable Components Index rated this site as very poor with a score of 1 due to low perennial grass cover, no recruitment of shrubs, no browse cover, and moderate annual grass cover.

TREND ASSESSMENT
soil - slightly down (-1)
browse - stable (0)
herbaceous understory - stable (0)
winter range condition (DC Index) - Very Poor (1) Lower Potential scale

2005 TREND ASSESSMENT

The soil trend is stable. The ratio of protective ground cover (vegetation, litter and cryptogams) to bare ground decreased slightly. This is due mainly to a substantial decrease (56%) in the cryptogamic crust cover from 2000 to 2005, which has a tendency to fluctuate according to precipitation patterns. The nested frequency and total percent cover of annual grasses and forbs increased substantially from 2000 to 2005, but this only temporarily stabilizes the soil. There continued to be no browse species on the site. The herbaceous trend is stable. The nested frequency of annual grasses increased 14% from 2000 to 2005 and annual forbs increased 50% during the same period. This change in annual population increases the risk of fire, as well as decreases the likelihood of basin big sagebrush re-establishing. The increase in nested frequency of the annual species is mirrored by a doubling of the cover of both annual grasses and forbs. Perennial grass nested frequency remained steady, but the total percent cover was half of that in 2000. There was, however, an 176% increase in the nested frequency of perennial forbs from 2000 to 2005, but this was mainly from an increase in sego lily, which has little winter range forage value. The Desirable Components Index rated this site as very poor with a score of -11 due to low perennial grass cover, low perennial forb cover, no recruitment of shrubs, no browse cover, and high annual grass cover.

TREND ASSESSMENT
soil - stable (0)
browse - stable (0)
herbaceous understory - stable (0)
winter range condition (DC Index) - Very Poor (-11) Lower Potential scale

HERBACEOUS TRENDS --
Management unit 13B, Study no: 2

Type	Species	Nested Frequency				Average Cover %		
		'86	'95	'00	'05	'95	'00	'05
G	Aristida purpurea	a-	a2	b6	a-	.03	.21	-
G	Bromus tectorum (a)	-	c371	a187	b250	16.27	.89	5.99
G	Hilaria jamesii	45	40	33	29	.65	.95	.35
G	Sporobolus cryptandrus	a-	a-	b15	b28	-	.93	.65
G	Vulpia octoflora (a)	-	a277	b326	b334	3.01	5.39	15.00
Total for Annual Grasses		0	648	513	584	19.29	6.29	20.99
Total for Perennial Grasses		45	42	54	57	0.69	2.09	1.01
Total for Grasses		45	690	567	641	19.98	8.38	22.00
F	Astragalus nuttallianus (a)	-	b15	a-	a9	.08	-	.19
F	Calochortus nuttallii	-	a3	a-	b45	.00	-	.20
F	Chenopodium fremontii (a)	-	a-	b12	a-	-	.03	-
F	Cryptantha sp.	-	1	-	-	.00	-	-

Type	Species	Nested Frequency				Average Cover %		
		'86	'95	'00	'05	'95	'00	'05
F	Descurainia pinnata (a)	-	$_{a}$-	$_{a}$-	$_{b}$35	-	-	.14
F	Draba sp. (a)	-	$_{a}$-	$_{b}$24	$_{c}$67	-	.04	.32
F	Eriogonum cernuum (a)	-	2	-	-	.00	-	-
F	Erodium cicutarium (a)	-	44	213	344	.14	9.74	20.87
F	Erigeron sp.	-	2	-	-	.00	-	-
F	Lepidium densiflorum (a)	-	$_{b}$70	$_{a}$10	$_{a}$3	.15	.05	.00
F	Machaeranthera canescens	-	6	-	5	.01	-	.04
F	Navarretia intertexta (a)	-	$_{b}$51	$_{a}$11	$_{a}$2	.15	.02	.00
F	Plantago patagonica (a)	-	$_{b}$276	$_{a}$6	$_{a}$10	1.93	.01	.02
F	Salsola iberica (a)	-	$_{a}$-	$_{a}$10	$_{b}$260	-	.02	3.79
F	Sisymbrium altissimum (a)	-	$_{c}$307	$_{b}$241	$_{a}$58	5.85	3.69	.78
F	Sphaeralcea coccinea	$_{a}$2	$_{c}$54	$_{b}$25	$_{b}$9	.27	.72	.52
F	Sphaeralcea parvifolia	$_{a}$-	$_{a}$-	$_{a}$-	$_{b}$10	-	-	.61
Total for Annual Forbs		0	765	527	788	8.33	13.62	26.12
Total for Perennial Forbs		2	66	25	69	0.30	0.72	1.38
Total for Forbs		2	831	552	857	8.63	14.35	27.50

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

BROWSE TRENDS --
Management unit 13B, Study no: 2

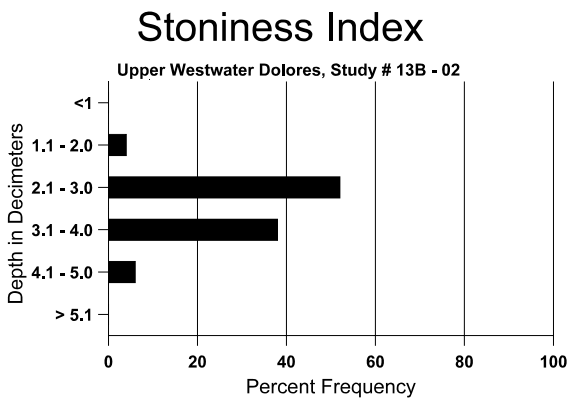
Type	Species	Strip Frequency			Average Cover %		
		'95	'00	'05	'95	'00	'05
B	Artemisia tridentata tridentata	0	0	0	-	-	-
B	Gutierrezia sarothrae	0	1	0	-	.03	-
Total for Browse		0	1	0	0	0.03	0

BASIC COVER --
Management unit 13B, Study no: 2

Cover Type	Average Cover %			
	'86	'95	'00	'05
Vegetation	10.50	47.54	26.79	49.97
Rock	0	.00	.00	0
Pavement	0	0	.01	0
Litter	69.50	59.21	36.02	20.01
Cryptogams	3.50	3.03	16.78	6.24
Bare Ground	16.50	13.90	29.22	29.78

SOIL ANALYSIS DATA --
Herd Unit 13B, Study # 2, Study Name: Upper Westwater Dolores

Effective rooting depth (in)	Temp °F (depth)	pH	%sand	%silt	%clay	%0M	ppm P	ppm K	dS/m
14.4	65.6 (17.9)	7.2	56.0	26.0	18.0	0.4	8.4	163.2	0.5



PELLET GROUP DATA --
Management unit 13B, Study no: 2

Type	Quadrat Frequency		
	'95	'00	'05
Rabbit	9	2	7
Deer	10	9	7
Cattle	9	25	29

Days use per acre (ha)	
'00	'05
-	-
8 (20)	6 (15)
51 (126)	57 (142)

BROWSE CHARACTERISTICS --
Management unit 13B, Study no: 2

		Age class distribution (plants per acre)					Utilization					
Year	Plants per Acre (excluding seedlings)	Seedling	Young	Mature	Decadent	Dead	% moderate	% heavy	% decadent	% dying	% poor vigor	Average Height Crown (in)
Artemisia tridentata tridentata												
86	**2199**	-	666	400	1133	-	0	0	52	-	0	28/27
95	**0**	-	-	-	-	-	0	0	0	-	0	-/-
00	**0**	-	-	-	-	-	0	0	0	-	0	-/-
05	**0**	-	-	-	-	-	0	0	0	-	0	-/-
Gutierrezia sarothrae												
86	**0**	-	-	-	-	-	0	0	0	-	0	-/-
95	**0**	-	-	-	-	-	0	0	0	-	0	-/-
00	**20**	-	-	-	20	-	0	0	100	100	100	6/12
05	**0**	-	-	-	-	-	0	0	0	-	0	-/-
Opuntia sp.												
86	**0**	-	-	-	-	-	0	0	-	-	0	-/-
95	**0**	-	-	-	-	-	0	0	-	-	0	-/-
00	**0**	-	-	-	-	-	0	0	-	-	0	-/-
05	**0**	-	-	-	-	-	0	0	-	-	0	7/50

Trend Study 13B-3-05

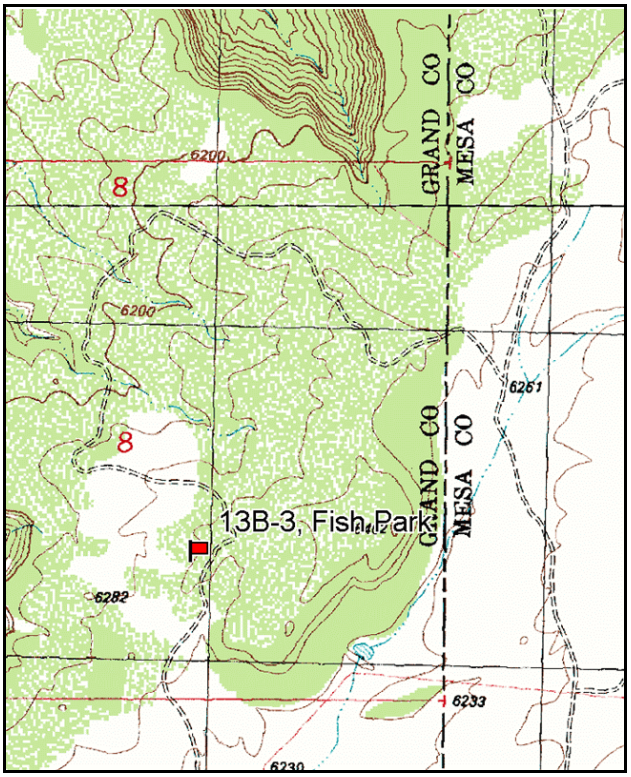
Study site name: Fish Park . Vegetation type: Chained, Seeded P-J .

Compass bearing: frequency baseline 255 degrees magnetic.

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

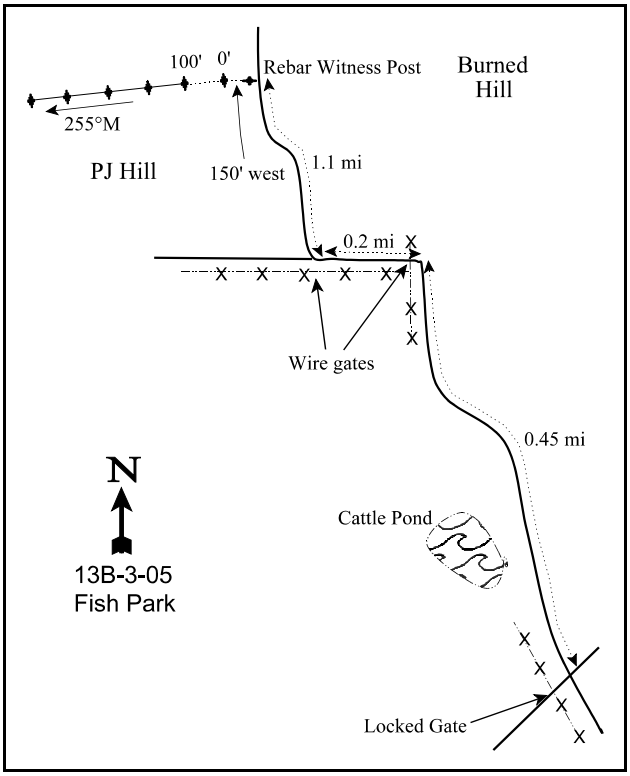
LOCATION DESCRIPTION

Starting from the turnoff to the Picture Gallery Ranch (approximately 0.75 miles west of the Utah-Colorado state line out of Glade Park, CO), turn right off the main road and drive 0.1 mile to a fork. Take the right (upper) fork, go 1.2 miles to a ranch. Just past the first house, turn right and proceed northeast towards a hill. You are heading basically north-northwest towards the Juniper-covered hills. At 0.6 miles beyond the house, go through a gate and continue north 0.4 miles to another gate. Call Belle Chesnick to open this gate. After going through the locked gate turn left and go 0.45 miles to another wire gate. Go through the wire gate and continue 0.2 miles. Turn right onto a faint road that has been seeded over. This turn is opposite a gate in the fence. Continue 1.1 miles gradually climbing the hill. The road becomes very rocky toward the top. Pass a fencepost which is not the witness post. Once in the P-J look for a rebar witness post on the left side of the road. The 0-foot baseline stake, a rebar tagged #7874, is 150 feet west of the witness post.



Map Name: Marble Canyon

Township 21S , Range 26E , Section 8



Diagrammatic Sketch

GPS: NAD 27, UTM 12S 4317291 N, 667944 E

DISCUSSION

Fish Park - Trend Study No. 13B-3

The Fish Park study is at an elevation of 6,300 feet on the upper, eastern edge of a 2,600 acre BLM chaining and seeding completed in 1968. To the south and east are the pastures and fields in Fish Park. The gentle west-sloping country is cut by intermittent canyons which flow directly into the Colorado River. To accommodate the increased sample size and stay within the same vegetation type, the transect had to be repositioned. The chaining is part of the Fish Park allotment, which is administered by the Grand Junction BLM office. Livestock grazing pressure appears moderately light in the study area. Deer pellet groups were rarely encountered. Pellet group data estimated an average of 11 deer days use/acre (27 ddu/ha) from 1986 and 1995. The average for the whole herd unit is 15 deer days use/acre (37 ddu/ha) for the same period. A pellet-group transect read along the study site baseline in 2000 estimated 14 deer days use/acre (6 ddu/ha), less than 1 elk days use/acre (<1edu/ha), and 3 cow days use/acre (1 cdu/ha). In 2005, pellet group data estimated 13 deer, 23 elk, and 2 cow days use/acre (33 ddu/ha, 58 edu/ha, and 5 cdu/ha). Rabbit pellet group quadrat frequency was quite high in 1995 and 2005.

The soil is a loam with a neutral soil reaction (pH of 6.8). Effective rooting depth is almost 16 inches, at which depth is a bedrock of sandstone. The soil surface contains very few rocks or pavement, although there are large amounts of rock throughout the profile to about 16 inches. Phosphorus is 5.9 ppm and potassium is 61 ppm, where levels below 6 ppm of phosphorus and 60 ppm of potassium may hinder plant development and growth in wildland soils (Tiedemann and Lopez 2004). There is good vegetation cover on this site with some scattered bare interspaces between clumps of basin big sagebrush and pinyon-juniper trees. In the bare interspaces, erosion does not appear to be a problem. Annual plants and slight erosion can be found near the roadside where the soil has been disturbed. The erosion condition class determined soil movement as stable in 2005.

The size of the pinyon and juniper trees has noticeably increased since 1986 as evidenced by comparing photographs from each year. The point-center quarter method estimated 73 juniper and 13 pinyon trees/acre in 2000, which are very similar to the 1995 estimates. In 2005, 41 juniper and 34 pinyon trees/acre were estimated with average diameters between 5 and 6 inches. These densities are moderately low for a chaining this old. Much of the herbaceous understory on this site appeared to be around the drip line of the mature trees.

Basin big sagebrush is the key browse species on this chained site. Browse seed was provided by the Utah Division of Wildlife Resources, which included big sagebrush and four-wing saltbush. However, which sagebrush subspecies was included in the seed mix is not clear because both basin big sagebrush and Wyoming big sagebrush are present on the site. Basin big sagebrush appears dominant, therefore the data tables refer to all sagebrush as basin big sagebrush. In general, the sagebrush has been lightly hedged and vigorous with good seed production. The age structure has shifted from a young population to a more mature population with many decadent individuals. Sixty three percent of the plants were classified as mature in 1995, compared to only 24% in 1986. In 2000, the mature plants had increased to 75%, then decreased to 41% in 2005. The plants classified as decadent decreased in 1995 from 6 to 2%, increased slightly to 9% in 2000, and increased drastically to 57% in 2005. Young plants have decreased from 71% of the population in 1986 to 35% in 1995, to 16% in 2000, to 2% in 2005. Plants classified as dying have increased from 0% in 1995 to 2% in 2000, and up to 38% in 2005. The percentage of seedlings in the population has fluctuated over the years, but remains quite high (between 19 and 44%). Broom snakeweed and cactus are present. Their numbers have fluctuated through the years, yet these populations together have made up less than 1% total cover.

The sum of nested frequency for perennial grasses decreased from 1986 to 1995, increased slightly in 2000, then decreased again in 2005. Crested wheatgrass and galleta were the dominant perennial grasses in 1995 and

made up 50% of the total grass cover. Galleta decreased significantly from 1995 to 2005, giving way for other perennial species. The annual species, cheatgrass and sixweeks fescue, accounted for nearly all of the rest of the grass cover. With the dry fall of 1999 and the dry winter and summer of 2000, cheatgrass and sixweeks fescue did not do well, but had higher nested frequencies and percent covers in 2005 than ever before. The combined cover of cheatgrass and sixweeks fescue was only about 1% in 2000, but was nearly 19 times higher in 2005.

Forbs occur infrequently and account for only a small amount of the total vegetation cover (5-7%). Alfalfa was reported as large and vigorous in 1986, yet with the extended drought, it was not sampled in 1995, 2000, or 2005. Other forbs sampled include: timber milkvetch, longleaf phlox, scarlet globemallow, and woolly milkvetch. From 2000 to 2005, the nested frequencies for perennial forbs had decreased 20% while annual forbs increased 250%.

1986 APPARENT TREND ASSESSMENT

The area is currently in good condition. All signs indicate it will stay that way except for the possible gradual increase in juniper and pinyon. Selective hedging on the more palatable big sagebrush hybrids with Wyoming big sagebrush, may affect its reproductive potential. The pinyon and juniper are not dense enough to warrant chaining especially since basal diameters are mostly less than 4 inches, but other treatments such as selective application of herbicides, roller-chopping, or individual tree cutting could be practical alternatives. The entire chaining is in similar condition and treatment should be considered within the next 20 years. The soil appears stable because of good vegetation and litter cover.

1995 TREND ASSESSMENT

Vegetation cover and litter cover are moderately high with each having high nested frequency values indicating good distribution of protective cover, which appears to provide adequate soil protection. In areas where bare interspaces appear, there are no signs of erosion, therefore soil trend is considered stable. The sagebrush community has shifted to a more mature population with many seedlings and a decreased percentage of decadent plants. These combined factors indicate an upward browse trend. If the sagebrush population continues to expand it may begin to affect herbaceous understory when cover starts to exceed 15%. The sum of nested frequency of perennial grasses has decreased, nearly half of the grass cover is made up of annuals. Forbs are infrequent and add very little to the herbaceous understory. This leads to a slightly downward herbaceous understory trend. The decrease in perennials is likely due to the extended drought as well as competition with annuals and browse species. The Desirable Components Index rated this site as good with a score of 61 due to moderate perennial grass cover, low perennial forb cover, excellent recruitment of shrubs, moderate browse cover, low shrub decadence, and moderately low annual grass cover.

TREND ASSESSMENT
soil - stable (0)
browse - up (+2)
herbaceous understory - slightly down (-1)
winter range condition (DC Index) - Good (61) Lower Potential scale

2000 TREND ASSESSMENT

Vegetation and litter cover are still moderately high. The amount of bare soil has increased slightly with the extremely dry year, however the ratio of protective cover to bare soil is still more than 3:1, indicating that there is still very good protection from erosion. In areas where bare interspaces appear, there are no signs of erosion, and this is usually where crested wheatgrass occurs. Soil trend is considered stable at this time. The sagebrush community has shifted to an even more mature population (75% classified as mature).

The browse density has increased 20% from 3,240 to 4,040 plants/acre. Sagebrush cover also increased from 12 to 17%. Seedlings were also moderately high and percentage of decadent plants has risen slightly, but still lower than 10%. All these combined factors indicate an upward browse trend. The perennial grass sum of nested frequency has increased about 9%, while both annual grasses and forbs were much less abundant due to the dry conditions. Cheatgrass sum of nested frequency decreased significantly. Perennial forbs are infrequent and add little to the herbaceous understory. The increase of perennial grasses combined with the decline of cheatgrass more than compensates for the slight losses to the perennial forbs. The trend for the herbaceous understory is stable. The Desirable Components Index rated this site as good with a score of 61 due to good perennial grass cover, low perennial forb cover, moderate recruitment of shrubs, moderate browse cover, low shrub decadence, and low annual grass cover.

TREND ASSESSMENT
soil - stable (0)
browse - up (+2)
herbaceous understory - stable (0)
winter range condition (DC Index) - Good (61) Lower Potential scale

2005 TREND ASSESSMENT

The soil trend is considered stable with relative percent bare soil remaining nearly the same as 2000. The ratio of protective ground cover (vegetation, litter and cryptogams) to bare ground increased slightly. These slight changes were not enough to warrant a change in trend. The browse trend is down. The population decreased from 4,040 plants/acre in 2000 to 2,340 plants/acre in 2005, a decrease of 42%. As well, the percentage of decadent plants in the population increased from 9% in 2000 to 57% in 2005. Plants classified as dying increased from 2% of the population in 2000 to 38% in 2005, with only 2% young individuals in the population to replace the dying (16% of the population was young in 2000). Previous to 2000, the use on the shrubs was light, but has become moderate to heavy. seedlings were abundant and could provide a new population of young individuals if they survive the dry summer. The herbaceous understory trend is slightly down. The total nested frequency of annual grasses and forbs increased two and a half times from 2000 to 2005. The total cover of annual grasses and forbs increased from 1% in 2000 to 23% in 2005. The annual grasses cheatgrass and sixweek fescue increased significantly, as did a few annual forb species. This increase in annual grasses and forbs is coupled with a substantial decrease in the nested frequency of perennial grasses and forbs (a decrease of 16% from 2000 to 2005). The Desirable Components Index rated this site as poor with a score of 21 due to good perennial grass cover, low perennial forb cover, low recruitment of shrubs, fair browse cover, very high shrub decadence, and high annual grass cover.

TREND ASSESSMENT
soil -stable (0)
browse - down (-2)
herbaceous understory - slightly down (-1)
winter range condition (DC Index) - Poor (21) Lower Potential scale

HERBACEOUS TRENDS --
Management unit 13B, Study no: 3

Type	Species	Nested Frequency				Average Cover %		
		'86	'95	'00	'05	'95	'00	'05
G	Agropyron cristatum	$_{bc}$169	$_{a}$115	$_{c}$171	$_{ab}$131	3.70	5.76	7.48
G	Agropyron intermedium	-	-	-	2	-	-	.03
G	Bromus tectorum (a)	-	$_{b}$278	$_{a}$125	$_{b}$264	4.42	.77	12.88
G	Hilaria jamesii	$_{b}$76	$_{b}$97	$_{b}$65	$_{a}$27	3.12	.49	.38
G	Poa bulbosa	-	-	-	5	-	-	.04
G	Poa fendleriana	$_{a}$-	$_{b}$38	$_{b}$24	$_{b}$23	1.05	.12	.63
G	Poa secunda	$_{a}$-	$_{a}$-	$_{a}$-	$_{b}$27	-	-	1.50
G	Sitanion hystrix	9	1	-	8	.00	-	.21
G	Sporobolus cryptandrus	-	-	2	-	-	.00	-
G	Stipa comata	$_{b}$70	$_{a}$8	$_{a}$21	$_{a}$23	.02	.35	.66
G	Vulpia octoflora (a)	-	$_{b}$186	$_{a}$77	$_{b}$234	1.23	.36	8.05
Total for Annual Grasses		0	464	202	498	5.65	1.13	20.94
Total for Perennial Grasses		324	259	283	246	7.91	6.74	10.95
Total for Grasses		324	723	485	744	13.57	7.88	31.89
F	Agoseris glauca	-	2	-	-	.00	-	-
F	Allium sp.	-	-	-	3	-	-	.00
F	Astragalus convallarius	$_{b}$10	$_{b}$14	$_{ab}$9	$_{a}$-	.44	.12	-
F	Astragalus mollissimus	$_{a}$-	$_{b}$13	$_{ab}$4	$_{ab}$5	.18	.06	.16
F	Astragalus sp.	-	-	-	5	-	-	.03
F	Castilleja linariaefolia	-	2	-	-	.03	.03	-
F	Calochortus nuttallii	-	2	-	5	.00	-	.01
F	Cryptantha fulvocanescens	5	-	-	-	-	-	-
F	Cryptantha sp.(a)	-	-	-	6	-	-	.04
F	Cymopterus sp.	-	2	-	2	.00	-	.00
F	Descurainia pinnata (a)	-	$_{b}$22	$_{a}$1	$_{ab}$12	.04	.00	.66
F	Draba nemorosa (a)	-	$_{b}$95	$_{a}$6	$_{a}$14	.20	.01	.03
F	Erodium cicutarium (a)	-	-	-	3	-	-	.03
F	Erigeron pumilus	5	8	8	8	.02	.05	.24
F	Gayophytum ramosissimum(a)	-	$_{b}$31	$_{a}$-	$_{a}$7	.08	-	.01
F	Gilia hutchinifolia (a)	-	$_{b}$43	$_{a}$-	$_{b}$42	.08	-	.13
F	Haplopappus acaulis	-	3	-	-	.00	-	-
F	Ipomopsis aggregata	-	1	-	-	.03	-	-
F	Lappula occidentalis (a)	-	$_{b}$18	$_{a}$-	$_{b}$9	.06	-	.08
F	Lepidium densiflorum (a)	-	$_{b}$21	$_{a}$2	$_{a}$4	.04	.00	.01
F	Lithospermum sp.	-	6	-	-	.01	-	-

Type	Species	Nested Frequency				Average Cover %		
		'86	'95	'00	'05	'95	'00	'05
F	Lygodesmia spinosa	-	2	-	-	.00	-	-
F	Medicago sativa	4	-	-	-	-	-	-
F	Microsteris gracilis (a)	-	$_{a}$-	$_{ab}$2	$_{b}$12	-	.00	.08
F	Petradoria pumila	-	-	8	-	-	.06	-
F	Phlox hoodii	$_{a}$-	$_{a}$-	$_{b}$23	$_{a}$-	-	.26	-
F	Phlox longifolia	87	92	91	81	.33	.69	.93
F	Plantago patagonica (a)	-	$_{b}$114	$_{a}$51	$_{b}$108	.27	.21	1.04
F	Polygonum douglasii (a)	-	9	-	-	.02	-	-
F	Sisymbrium altissimum (a)	-	8	-	-	.01	-	-
F	Sphaeralcea coccinea	$_{ab}$23	$_{b}$30	$_{a}$14	$_{a}$16	.27	.32	.14
F	Streptanthus cordatus	-	1	-	-	.00	-	-
F	Trifolium sp.	-	3	-	-	.00	-	-
Total for Annual Forbs		0	361	62	217	0.82	0.24	2.13
Total for Perennial Forbs		134	181	157	125	1.35	1.60	1.52
Total for Forbs		134	542	219	342	2.17	1.84	3.65

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

BROWSE TRENDS --
Management unit 13B, Study no: 3

Type	Species	Strip Frequency			Average Cover %		
		'95	'00	'05	'95	'00	'05
B	Artemisia tridentata tridentata	56	63	56	11.60	16.71	8.27
B	Gutierrezia sarothrae	8	17	5	.05	.64	.03
B	Juniperus osteosperma	0	7	8	6.21	6.83	7.33
B	Opuntia sp.	4	4	3	.38	.30	.30
B	Pinus edulis	0	3	2	2.67	5.52	1.86
Total for Browse		68	94	74	20.93	30.02	17.79

CANOPY COVER, LINE INTERCEPT --
Management unit 13B, Study no: 3

Species	Percent Cover	
	'00	'05
Artemisia tridentata tridentata	-	10.85
Juniperus osteosperma	6.59	12.10
Opuntia sp.	-	.16
Pinus edulis	3.00	3.54

KEY BROWSE ANNUAL LEADER GROWTH --
Management unit 13B, Study no: 3

Species	Average leader growth (in)
	'05
Artemisia tridentata tridentata	1.3

POINT-QUARTER TREE DATA --
Management unit 13B, Study no: 3

Species	Trees per Acre	
	'00	'05
Juniperus osteosperma	73	41
Pinus edulis	13	34

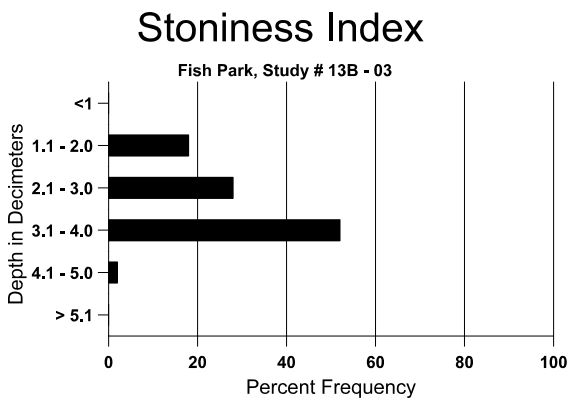
Average diameter (in)	
'00	'05
5.0	5.7
6.2	5.1

BASIC COVER --
Management unit 13B, Study no: 3

Cover Type	Average Cover %			
	'86	'95	'00	'05
Vegetation	16.50	37.57	40.97	50.97
Rock	0	.12	.33	.06
Pavement	0	.04	.18	.05
Litter	68.50	44.53	48.42	35.73
Cryptogams	0	5.65	10.93	2.52
Bare Ground	15.00	24.65	31.86	25.11

SOIL ANALYSIS DATA --
Herd Unit 13B, Study # 3, Study Name: Fish Park

Effective rooting depth (in)	Temp °F (depth)	pH	%sand	%silt	%clay	%0M	ppm P	ppm K	dS/m
15.5	57.2 (16.1)	6.8	48.0	30.0	22.0	1.0	5.9	60.8	0.6



PELLET GROUP DATA --
Management unit 13B, Study no: 3

Type	Quadrat Frequency		
	'95	'00	'05
Rabbit	48	20	49
Elk	-	-	11
Deer	3	7	20
Cattle	5	1	-

Days use per acre (ha)	
'00	'05
-	-
1 (2)	23 (58)
14 (35)	13 (33)
3 (8)	2 (5)

BROWSE CHARACTERISTICS --
Management unit 13B, Study no: 3

		Age class distribution (plants per acre)					Utilization					
Year	Plants per Acre (excluding seedlings)	Seedling	Young	Mature	Decadent	Dead	% moderate	% heavy	% decadent	% dying	% poor vigor	Average Height Crown (in)
Artemisia tridentata tridentata												
86	**2266**	933	1600	533	133	-	7	0	6	-	3	24/20
95	**3240**	1440	1140	2040	60	40	2	.61	2	-	4	29/42
00	**4040**	760	640	3040	360	40	29	8	9	2	2	28/38
05	**2340**	800	40	960	1340	400	44	10	57	38	38	29/41
Gutierrezia sarothrae												
86	**533**	-	100	400	33	-	0	0	6	-	0	7/8
95	**200**	-	60	140	-	-	0	0	0	-	0	10/12
00	**1640**	20	-	1640	-	20	0	0	0	-	0	7/9
05	**240**	-	40	200	-	-	0	0	0	-	0	9/11

		Age class distribution (plants per acre)					Utilization					
Year	Plants per Acre (excluding seedlings)	Seedling	Young	Mature	Decadent	Dead	% moderate	% heavy	% decadent	% dying	% poor vigor	Average Height Crown (in)
Juniperus osteosperma												
86	**33**	-	-	33	-	-	0	0	0	-	0	61/44
95	**0**	-	-	-	-	-	0	0	0	-	0	-/-
00	**160**	-	20	140	-	20	0	0	0	-	0	-/-
05	**160**	-	20	120	20	-	0	0	13	13	13	-/-
Opuntia sp.												
86	**0**	-	-	-	-	-	0	0	0	-	0	-/-
95	**200**	-	-	180	20	-	0	0	10	10	10	4/18
00	**380**	-	-	380	-	-	0	0	0	-	0	4/10
05	**120**	-	-	120	-	-	0	0	0	-	0	5/24
Pinus edulis												
86	**0**	-	-	-	-	-	0	0	0	-	0	-/-
95	**0**	-	-	-	-	-	0	0	0	-	0	-/-
00	**100**	-	-	100	-	-	0	0	0	-	0	-/-
05	**40**	-	-	20	20	-	0	0	50	50	50	-/-

Trend Study 13B-4-05

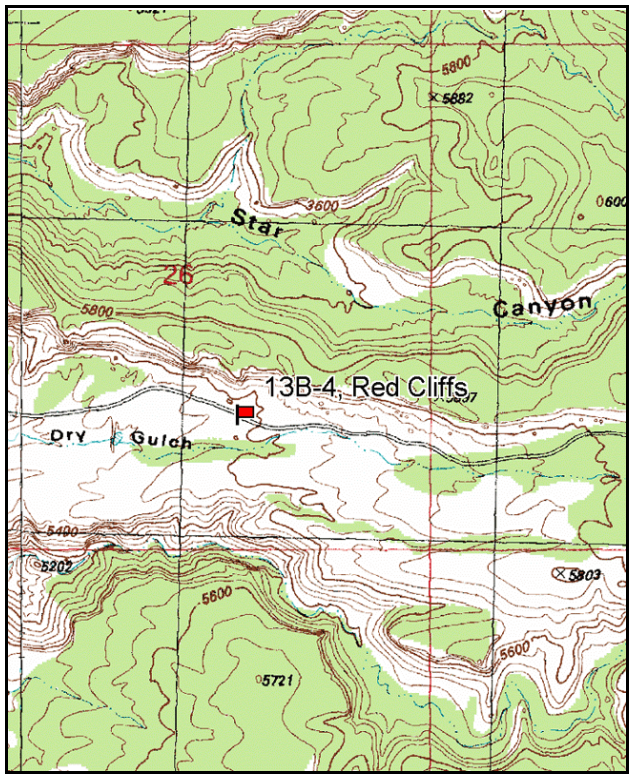
Study site name: Red Cliffs . Vegetation type: B1ackbrush .

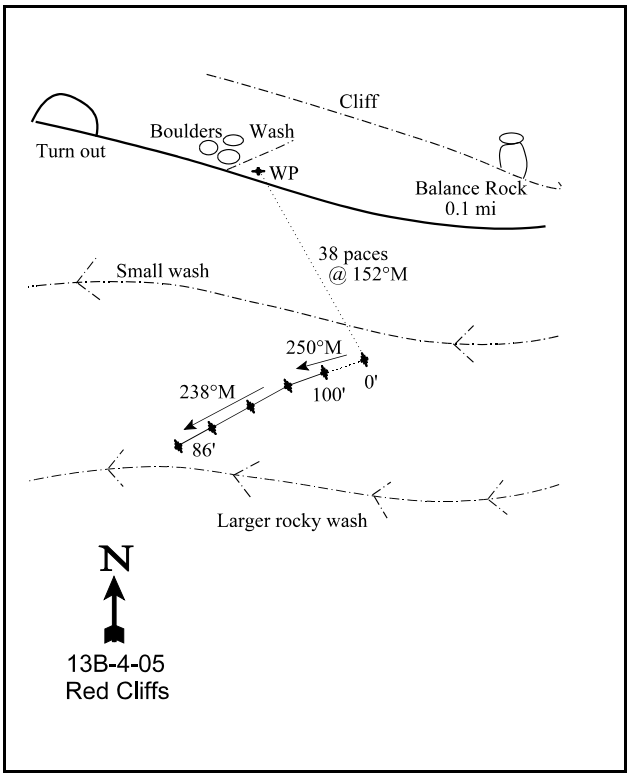
Compass bearing: frequency baseline 250 degrees magnetic.

Frequency belt placement: line 1 (11ft), line 2 (34ft), line 3 (59ft), line 4 (71ft), line 5 (86ft). Belt rebar placement: belt 2@1ft, belt 3@2ft, belt 5@5ft.

LOCATION DESCRIPTION

From the Utah-Colorado state line west of Glade Park, go west 2.1 miles on the Coates Creek Road to a cattle guard. Continue on the main road 2.1 miles to a P-J area bordered on the right by large sandstone cliffs. Here you will find a witness stake (fence post) on the right (north) side of the road. The baseline starts 140 feet south (across the road) from the witness post. A short rebar, tagged #7816, marks the 0-foot end.





Map Name: Marble Canyon

Diagrammatic Sketch

Township 21S , Range 25E , Section 26

GPS: NAD 27, UTM 12S 4312350 N, 663181 E

DISCUSSION

Red Cliffs - Trend Study No. 13B-4

The Red Cliffs study site is located along the Coates Creek Road at an elevation of 5,600 feet. The area is dominated by pinyon-juniper and blackbrush. Steep red sandstone cliffs are located just north and across the road from the site. The transect samples slightly rolling topography with exposures varying from north to south and west. Overall, the area drains to the west with a 3-4% slope. There is a stock pond down the wash about one-tenth of a mile from the transect, although livestock do not appear to utilize this site. Deer and rabbit pellet groups are usually common in the area. To accommodate the increased sample size and stay within the same vegetation type, the position of the transect extension was slightly altered in 1995. The pellet-group data in 2000 estimated 44 deer days use/acre (18 ddu/ha), cow and elk were not sampled. In 2005, the pellet group data estimated 80 deer and 3 elk days use/acre (197 ddu/ha and 8 edu/ha) and no cow pats were sampled.

The moderately shallow soil is light orange in color and is composed of very fine particles which is loosely compacted on the surface. The soil texture is a sandy clay loam with a soil reaction that is mildly alkaline (pH 7.6). The amount of phosphorus in the soil is 5.9 ppm, where values less than 6 ppm may hinder normal plant growth and development in wildland soils (Tiedemann and Lopez 2004). Black rock and pavement are scattered throughout the site with an average combined relative cover of 14%. Relative vegetation cover has been estimated at 31% in 1995, 21% in 2000, and 35% in 2005. Around half of the vegetation cover is contributed by blackbrush, and most of the other half is annual species. Relative litter cover has been estimated at 21% in 1995, 18% in 2000, and 12% in 2005. Most of the litter is beneath the crown of blackbrush. The bare soil interspaces between the blackbrush plants is protected mainly by cryptogamic crust. Some slight erosion, as well as pedestaling under the shrubs, was noted in 1995 and 2000. The erosion condition class determined soil movement as slight in 2005 due to common pedestalling under the shrubs, a small amount recent soil and rock movement, small rills on the site, and a large gully north of the site near the road.

The key browse species on this site is blackbrush which provided 17% cover in 1995, 14% in 2000, and 15% in 2005. Age class structure has changed little since 1986. This is a mature population (86-94%) with few young (2-3%) or decadent plants (4-12%). There were no seedlings encountered in either 1986 or 1995, however a few were classified in 2000 and several in 2005. Utilization is light to moderate and plants exhibit good vigor. Several other browse species were present but infrequently encountered. These include: broom snakeweed, Wyoming big sagebrush, cliffrose, prickly pear cactus, spiny hopsage, and green ephedra. Point-center quarter data in 2000 estimated 33 juniper trees/acre and 8 pinyon trees/acre, and 36 pinyon-juniper trees/acre in 2005.

Cheatgrass is the most abundant grass. Cheatgrass was sampled in 96% of the quadrats in 1995 with 5% cover. Sum of nested frequency declined significantly in 2000, but was still sampled in 84% of the quadrats. In 2005, sum of nested frequency significantly increased, quadrat frequency was 92%, and cover was nearly 15%. Since 1995, only one perennial grass has contributed more than 1% total cover in any sampling year, which was Sandberg bluegrass in 2005 at 2% cover. The remaining grasses include: mutton bluegrass, purple three-awn, sand dropseed, bottlebrush squirreltail, indian ricegrass, sixweeks fescue, and needle-and-thread grass none of which are common. Perennial forbs have rarely been found and a few annual forbs are abundant, such as Nuttall milkvetch.

1986 APPARENT TREND ASSESSMENT

The vegetation appears stable. Because of its abundance, blackbrush is the key browse species on this critical winter range. The browse density and population characteristics represent a healthy stand that appears to be stable. The site has potential to support a diverse perennial grass component. The soil trend appears to be slightly down due to some signs of erosion. Cryptogams are especially important on this site in reducing soil loss on the north-facing slope.

1995 TREND ASSESSMENT

The soil trend appears stable at this time, but in poor condition. The interspaces between the shrubs are protected by cryptogamic crusts which hold the soil in place. If these crusts are disturbed, erosion will likely be accelerated. Vegetation and litter are provide some soil cover. Blackbrush has a stable population with increased vigor and decreased decadence. Other browse species do not appear to be expanding, therefore, the browse trend is stable. The herbaceous understory is almost exclusively annual species. Perennial species in the interspaces would be more dependable at stopping erosion. There is not really a concern for destructive fires because the annual species are mainly located under shrub crowns, leaving the interspaces with little fuel to carry a fire. The decrease in perennial nested frequency and the overall lack of perennial species leads to a downward herbaceous understory trend. The Desirable Components Index rated this site as fair with a score of 38 due to low perennial grass cover, low perennial forb cover, low recruitment of shrubs, good browse cover, low shrub decadence, and low annual grass cover.

TREND ASSESSMENT
soil - stable (0)
browse - stable (0)
herbaceous understory - down (-2)
winter range condition (DC Index) - Fair (38) Lower Potential scale

2000 TREND ASSESSMENT

The soil trend is stable. The ratio of protective ground cover (vegetation, litter and cryptogams) to bare ground decreased a little. Percent relative bare soil increased slightly but not enough to warrant a change in trend. The interspaces between the shrubs are protected by cryptogamic crusts which help to hold the soil in place. Cryptogams still provide an important protective ground cover for this blackbrush community. Currently cryptogams provide 20% cover. If these crusts are disturbed, erosion will likely be accelerated with high intensity summer storms. Blackbrush continues to have a fairly stable population with improved vigor and stable decadency. Other browse species do not appear to be increasing, therefore the browse trend continues to be stable. Herbaceous perennial species in the interspaces would be more dependable at stopping erosion, however the perennial understory currently provides less than 1% total cover. There is no real concern for destructive fires because the annual species are mostly associated with the shrub crowns, leaving the interspaces with little fine fuels to carry a fire. There was an increase in the sum of nested frequency of perennial grasses but nested frequency of perennial forbs remained stable. There is, however, an overall lack of herbaceous perennial species. Annuals make up almost 75% of the total herbaceous cover. Herbaceous trend is up due to the decrease of cheatgrass and increase of perennial grasses. The Desirable Components Index rated this site as fair with a score of 36 due to low perennial grass cover, low perennial forb cover, low recruitment of shrubs, good browse cover, low shrub decadence, and low annual grass cover.

TREND ASSESSMENT
soil - stable (0)
browse - stable (0)
herbaceous understory - up (+2)
winter range condition (DC Index) - Fair (36) Lower Potential scale

2005 TREND ASSESSMENT

The soil trend is stable. The ratio of protective ground cover (vegetation, litter and cryptogams) to bare ground increased slightly. The percent relative bare soil decreased slightly from 26 to 21%. There was not enough change to warrant a change in trend at this time. The increase in vegetation cover was due to a drastic increase in annuals. The browse trend for the key browse species, blackbrush, is stable. The population increased only

4% from 2000 to 2005. With this increase in population, the percentage of decadent individuals increased from 5% in 2000 to 12% in 2005, which shows little negative effect on the population at this time. The percentages of young and dying individuals remained similar to 2000. The number of seedlings on the site increased in 2005, which may become established as young plants. Spiny hopsage density increased from 20 plants/acre to 80 plants/acre in 2005. Other browse species made up very little of the community. The herbaceous trend is down. The nested frequency of perennial grasses remained stable, but cheatgrass increased significantly to the same level as 1995. Also, cheatgrass cover increased to 15%, which fills the interspaces between shrubs. This creates a fire hazard that could eliminate the shrub component. The Desirable Components Index rated this site as fair with a score of 30 due to low perennial grass cover, low perennial forb cover, low recruitment of shrubs, good browse cover, low shrub decadence, and moderately high annual grass cover.

TREND ASSESSMENT
soil - stable (0)
browse - stable (0)
herbaceous understory - down (-2)
winter range condition (DC Index) - Fair (30) Lower Potential scale

HERBACEOUS TRENDS --
Management unit 13B, Study no: 4

Type	Species	Nested Frequency				Average Cover %		
		'86	'95	'00	'05	'95	'00	'05
G	Aristida purpurea	3	3	6	-	.30	.06	-
G	Bromus tectorum (a)	-	b336	a264	b308	4.56	2.24	14.91
G	Oryzopsis hymenoides	-	-	5	-	-	.03	-
G	Poa fendleriana	c110	b21	b11	a-	.15	.13	-
G	Poa secunda	a-	a-	b31	c57	-	.68	1.98
G	Sitanion hystrix	5	-	-	1	-	-	.01
G	Sporobolus cryptandrus	3	-	-	-	-	-	-
G	Stipa comata	-	3	-	-	.03	-	-
G	Vulpia octoflora (a)	-	a-	b24	b33	-	.05	.44
Total for Annual Grasses		0	336	288	341	4.56	2.28	15.35
Total for Perennial Grasses		121	27	53	58	0.48	0.91	1.99
Total for Grasses		121	363	341	399	5.04	3.20	17.34
F	Astragalus nuttallianus (a)	-	c242	a-	b177	6.36	-	1.54
F	Calochortus nuttallii	-	-	1	5	-	.00	.01
F	Chaenactis stevioides	-	-	-	12	-	-	.21
F	Cryptantha sp.	a-	a2	a-	b14	.00	-	.03
F	Cymopterus sp.	-	-	1	1	-	.00	.01
F	Delphinium nuttallianum	-	-	-	4	-	-	.02
F	Delphinium occidentale	-	-	-	3	-	-	.00
F	Draba nemorosa (a)	-	a12	b33	a16	.02	.08	.05
F	Erodium cicutarium (a)	-	a18	a20	b41	.19	.07	.38

Type	Species	Nested Frequency				Average Cover %		
		'86	'95	'00	'05	'95	'00	'05
F	Erigeron sp.	-	1	-	-	.00	-	-
F	Gilia hutchinifolia (a)	-	$_{a}$14	$_{a}$10	$_{b}$88	.03	.64	.45
F	Lappula occidentalis (a)	-	3	-	4	.01	-	.01
F	Lepidium sp. (a)	-	$_{b}$12	$_{a}$-	$_{ab}$7	.02	-	.02
F	Machaeranthera glabriusculas	3	-	-	-	-	-	-
F	Mentzelia sp.	-	$_{a}$-	$_{b}$20	$_{c}$43	-	.03	.36
F	Navarretia intertexta (a)	-	-	7	8	-	.01	.04
F	Phlox longifolia	$_{a}$-	$_{b}$9	$_{a}$-	$_{a}$3	.04	-	.00
F	Plantago patagonica (a)	-	8	-	4	.01	-	.01
F	Schoencrambe linifolia	-	1	-	-	.00	-	-
F	Unknown forb-annual (a)	-	2	-	-	.00	-	-
Total for Annual Forbs		0	311	70	345	6.68	0.81	2.51
Total for Perennial Forbs		3	13	22	85	0.05	0.04	0.66
Total for Forbs		3	324	92	430	6.73	0.86	3.17

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

BROWSE TRENDS --
Management unit 13B, Study no: 4

Type	Species	Strip Frequency			Average Cover %		
		'95	'00	'05	'95	'00	'05
B	Artemisia tridentata wyomingensis	2	5	2	-	.84	.00
B	Coleogyne ramosissima	81	72	76	16.70	13.51	14.83
B	Ephedra viridis	0	1	1	-	-	.53
B	Grayia spinosa	0	1	2	-	.38	.93
B	Gutierrezia sarothrae	3	2	0	.04	.15	-
B	Juniperus osteosperma	0	3	2	4.65	4.22	4.43
B	Opuntia sp.	2	5	4	.03	.15	.38
B	Pinus edulis	0	0	0	.38	-	-
B	Sclerocactus sp.	1	8	3	-	.06	-
Total for Browse		89	97	90	21.80	19.30	21.12

CANOPY COVER, LINE INTERCEPT --
Management unit 13B, Study no: 4

Species	Percent Cover	
	'00	'05
Coleogyne ramosissima	-	18.73
Grayia spinosa	-	1.10
Juniperus osteosperma	3.40	5.19
Opuntia sp.	-	.16

KEY BROWSE ANNUAL LEADER GROWTH --
Management unit 13B, Study no: 4

Species	Average leader growth (in)
	'05
Artemisia tridentata wyomingensis	1.8
Coleogyne ramosissima	1.5

POINT-QUARTER TREE DATA --
Management unit 13B, Study no: 4

Species	Trees per Acre	
	'00	'05
Juniperus osteosperma	33	36
Pinus edulis	8	-

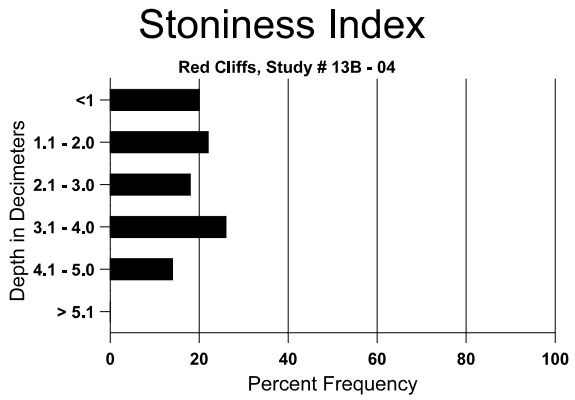
Average diameter (in)	
'00	'05
11.9	9.1
6.2	-

BASIC COVER --
Management unit 13B, Study no: 4

Cover Type	Average Cover %			
	'86	'95	'00	'05
Vegetation	13.75	33.59	24.73	39.10
Rock	16.25	11.28	13.46	10.78
Pavement	3.00	.08	6.66	5.07
Litter	25.00	23.32	20.85	13.35
Cryptogams	23.50	15.57	20.23	20.57
Bare Ground	18.50	25.61	30.77	24.21

SOIL ANALYSIS DATA --
Herd Unit 13B, Study # 4, Study Name: Red Cliffs

Effective rooting depth (in)	Temp °F (depth)	pH	%sand	%silt	%clay	%0M	ppm P	ppm K	dS/m
13.8	58.6 (13.5)	7.6	60.0	19.4	20.6	0.7	5.8	147.2	0.5



PELLET GROUP DATA --
Management unit 13B, Study no: 4

Type	Quadrat Frequency		
	'95	'00	'05
Rabbit	23	11	24
Elk	-	-	1
Deer	34	29	37

Days use per acre (ha)	
'00	'05
-	-
-	3 (8)
44 (108)	80 (197)

BROWSE CHARACTERISTICS --
Management unit 13B, Study no: 4

		Age class distribution (plants per acre)					Utilization					
Year	Plants per Acre (excluding seedlings)	Seedling	Young	Mature	Decadent	Dead	% moderate	% heavy	% decadent	% dying	% poor vigor	Average Height Crown (in)
Artemisia tridentata wyomingensis												
86	**0**	-	-	-	-	-	0	0	0	-	0	-/-
95	**40**	-	-	20	20	-	50	0	50	-	0	26/41
00	**100**	-	20	80	-	-	20	40	0	-	0	27/44
05	**40**	-	20	20	-	20	50	50	0	-	0	29/37
Chrysothamnus nauseosus albicaulis												
86	**0**	-	-	-	-	-	0	0	-	-	0	-/-
95	**0**	-	-	-	-	-	0	0	-	-	0	-/-
00	**0**	-	-	-	-	-	0	0	-	-	0	15/42
05	**0**	-	-	-	-	-	0	0	-	-	0	19/43
Chrysothamnus viscidiflorus stenophyllus												
86	**133**	-	-	-	133	-	0	0	100	-	0	-/-
95	**0**	-	-	-	-	-	0	0	0	-	0	-/-
00	**0**	-	-	-	-	-	0	0	0	-	0	-/-
05	**0**	-	-	-	-	-	0	0	0	-	0	-/-

		Age class distribution (plants per acre)					Utilization					
Year	Plants per Acre (excluding seedlings)	Seedling	Young	Mature	Decadent	Dead	% moderate	% heavy	% decadent	% dying	% poor vigor	Average Height Crown (in)
Coleogyne ramosissima												
86	**11200**	-	400	9600	1200	-	27	5	11	-	11	15/16
95	**4560**	-	120	4280	160	60	20	2	4	.87	1	16/30
00	**4280**	20	80	4000	200	120	12	0	5	1	1	15/26
05	**4460**	240	80	3840	540	40	21	0	12	2	2	16/31
Ephedra viridis												
86	**0**	-	-	-	-	-	0	0	-	-	0	-/-
95	**0**	-	-	-	-	-	0	0	-	-	0	26/33
00	**20**	-	-	20	-	-	0	0	-	-	0	26/43
05	**220**	-	100	120	-	-	55	0	-	-	0	36/49
Grayia spinosa												
86	**0**	-	-	-	-	-	0	0	-	-	0	-/-
95	**0**	-	-	-	-	-	0	0	-	-	0	-/-
00	**20**	-	-	20	-	-	0	0	-	-	0	23/59
05	**80**	-	-	80	-	-	0	0	-	-	0	23/48
Gutierrezia sarothrae												
86	**66**	-	-	66	-	-	0	0	-	-	0	10/5
95	**100**	-	-	100	-	-	0	0	-	-	0	10/12
00	**40**	-	-	40	-	-	0	0	-	-	0	7/13
05	**0**	-	-	-	-	-	0	0	-	-	0	10/10
Juniperus osteosperma												
86	**0**	-	-	-	-	-	0	0	0	-	0	-/-
95	**0**	-	-	-	-	-	0	0	0	-	0	-/-
00	**60**	20	20	40	-	20	0	0	0	-	0	22/48
05	**40**	-	-	20	20	-	0	0	50	50	50	-/-
Opuntia sp.												
86	**0**	-	-	-	-	-	0	0	0	-	0	-/-
95	**40**	-	-	40	-	-	0	0	0	-	0	5/26
00	**220**	-	-	220	-	-	0	0	0	-	0	5/23
05	**160**	-	-	60	100	20	0	0	63	63	63	6/24
Sclerocactus sp.												
86	**66**	-	-	66	-	-	0	0	-	-	0	7/3
95	**20**	-	-	20	-	-	0	0	-	-	0	4/3
00	**260**	-	-	260	-	-	0	0	-	-	0	5/3
05	**80**	-	-	80	-	40	0	0	-	-	0	5/7

Trend Study 13B-5-05

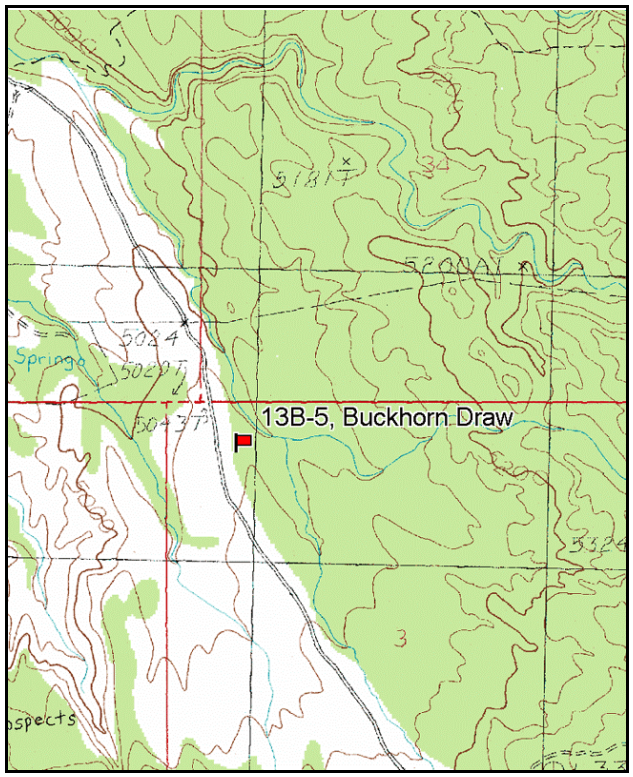
Study site name: Buckhorn Draw . Vegetation type: Desert Shrub .

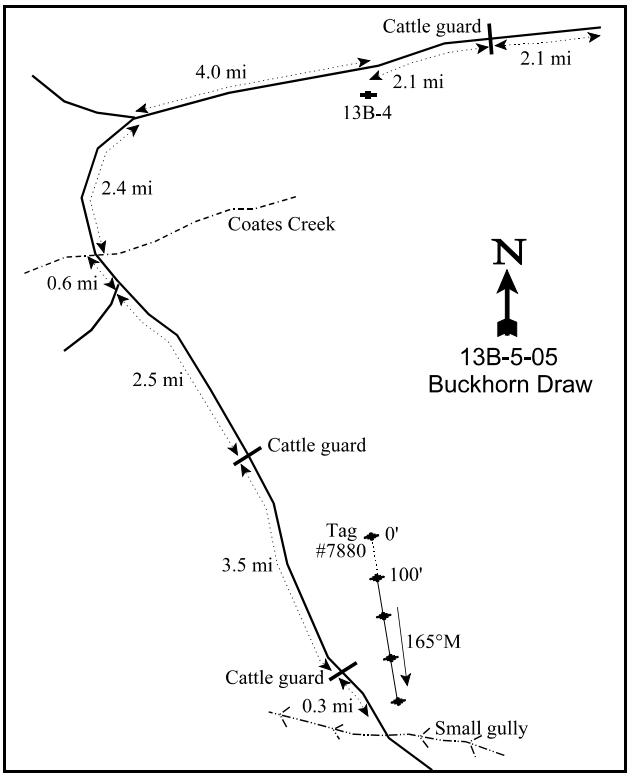
Compass bearing: frequency baseline 165 degrees magnetic.

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

LOCATION DESCRIPTION

From the Utah-Colorado state line west of Glade Park travel 2.1 miles to a cattle guard. Continue west 2.1 miles to the Red Cliffs transect(13B-4). Continue west on the main road 4.0 miles to a fork. Stay left and go 2.4 miles to Coates Creek. Cross the creek and continue 0.6 miles to a fork. Stay left, go 2.5 miles to a cattle guard. Proceed 3.5 miles to another cattle guard. Go 0.3 miles past the cattle guard and stop. The transect is on the left (east) side of the road. The 0-foot end of the baseline (found 400 feet north) is also marked by a fence post, tagged #7880. All other plot markers are short rebar stakes.





Map Name: Blue Chief Mesa

Diagrammatic Sketch

Township 23S , Range 25E , Section 3

GPS: NAD 27, UTM 12S 4300371 N, 660934 E

DISCUSSION

Buckhorn Draw - Trend Study No. 13B-5

The Buckhorn Draw site is a open bench at an elevation of about 5,100 feet. It is gently sloping (8%) to the north. Deep washes to the east and west intermittently carry water and drain to the north. The area supports a mixed desert shrub community dominated by broom snakeweed, Wyoming big sagebrush, spiny hopsage and perennial grasses with some scattered junipers. It is grazed by cattle and used as winter range for deer and elk. The area is within the Buckhorn allotment. This is a very large allotment consisting of 12 pastures. Grazing occurs on a deferred rotational basis from October 1 to May 30 using a holistic grazing plan of high intensity and short duration. In 1986, the BLM estimated use of sagebrush to be heavy (60%-80%), but much of this could be cow use, because it is a winter cattle allotment. Deer pellet groups were scattered throughout the area at moderate levels as well as moderate numbers for rabbit, with low counts for cattle and very low numbers for elk. Pellet-group data from 2000 estimated 1 elk day use/acre (<1edu/ha), 27 deer days use/acre (11 ddu/ha), and 20 cow days use/acre (8 cdu/ha). Pellet-group data in 2005 estimated 3 elk, 20 deer, and 6 cow days use/acre (8edu/ha, 50 ddu/ha, and 16 cdu/ha).

The soil is a fine sandy loam, well drained, and deep with an effective rooting depth of 19 inches. There is a compacted layer of fine silty sand at about 12 inches with a noticeable accumulation of calcium carbonate. The soil reaction is mildly alkaline (pH 7.6). The amount of phosphorus in the soil is low at only 2.3 ppm, where levels below 6 ppm may hinder normal plant growth and development in wildland soils (Tiedemann and Lopez 2004). Percent bare ground decreased between 1986 to 1995. However, with severe drought, relative percent bare soil increased to a high of 50% in 2000, which decreased to 31% in 2005. Protective ground cover constituted an almost equal percent of vegetation and litter until 2005, when vegetation far exceeded litter. Most of the vegetation cover consisted of grasses, especially cheatgrass. No rock or pavement cover was encountered on the site. The gentle slope mitigates erosion from becoming excessive, although there is one small gully running southwest of the study site. The erosion condition class determined soil movement as slight in 2005 due to excessive pedestaling around shrubs and perennial grasses as well as some soil movement between perennial species.

The key browse species are Wyoming big sagebrush and spiny hopsage. In 1986, Wyoming big sagebrush had about as many decadent plants as mature plants in the population and use was extremely heavy with 87% of the plants sampled exhibiting heavy hedging. Then in 1995, there was a higher proportion of mature plants and a decreased percentage of decadent plants (from 40% in 2000 to 12%). In 1995, one-third of the population was classified as young with a slightly higher proportion of seedlings compared to 1986. Mature plants also increased in height and crown measurements nearly doubled. In 1995 and 2000, density increased 12% from 1,020 plants/acre to 1,160 plants/acre. Use was mostly light to moderate with heavy use at only 6%-9%. The mature individuals increased from 55% in 1995 to 76% in 2000, with a decrease of decadent individuals from 12% to 9%. From 2000 to 2005, the population decreased by 43%, mature individuals decreased to 39% of the population, and the number of decadent individuals increased to 39%. The dying population decreased from 8% in 1995 to 2% in 2000, to 15% in 2005. Despite this increase in dying individuals, recruitment of young individuals represented 21% of the population in 2005.

The spiny hopsage population has been mature with moderate to heavy hedging and high decadence. In exceptionally dry years, spiny hopsage tends to lose its leaves which makes it difficult to determine its true condition. Vigor was classified as poor on all plants sampled in 1986. In 2000, only about one-forth of the plants sampled displayed poor vigor. Spiny hopsage is utilized primarily in the spring by livestock and wildlife with its usefulness decreasing as the summer progresses. In 2005, the spiny hopsage population decreased 20%, although the percentage of mature individuals increased and the percentage of decadent individuals decreased. Broom snakeweed was the most abundant browse species until 2005, when it decreased from 4060 plants/acre in 2000 to 440 plants/acre. Other less abundant shrubs include: cactus, green ephedra, and blackbrush. Junipers

are scattered throughout the area with the point-center quarter method estimates of only about 28 trees/acre in 2000 and 25 trees/acre in 2005.

Historically, sand dropseed provided most of the perennial herbaceous cover on this site with 5% cover in 1995 and 7% in 2000, but had decreased to nearly nothing by 2005. The other common perennial grass was three-awn, a warm season grass that has poor forage value most of the year. It is an increaser and most often indicates long term range deterioration. A small amount of Indian ricegrass has been present also. Cheatgrass provided 36% of the grass cover in 1995 with a 100% quadrat frequency. In 2000, because of a lack of precipitation the previous year, it provided only about 20% of the grass cover and had a quadrat frequency of only 86%. In 2005, perennials declined to less than 1% cover and cheatgrass increased to 38% cover (quadrat frequency of 100%). All forbs combined contributed less than 1% total cover before 2005, but contributed 2% in 2005.

1986 APPARENT TREND ASSESSMENT

The deteriorating population of the palatable spiny hopsage is an indication of a future downward browse trend. Sagebrush vigor is generally good, but this species may be harmed by increasing future use as hopsage becomes unavailable. Broom snakeweed is likely to increase, but numbers of this species fluctuate so much with precipitation they are not a good indicator of trend. Little soil movement is detectable, although there is a large amount of bare soil in the shrub interspaces. There is room for improvement in litter and vegetation cover. The soil trend appears to be stable at this time.

1995 TREND ASSESSMENT

The relative amount of bare soil has decreased since 1986, but is still moderately high. No signs of erosion are present now, but this is more likely due to the almost level terrain of the site which lends itself to a more stable soil trend. Although there is ample grass cover, most of the grasses are increasers or invaders. Since the nested frequency for perennial grasses has stayed nearly the same and forbs comprise less than 3% of the vegetation cover, the herbaceous understory is stable but characterized by a poor species composition. The browse trend is slightly up with a more vigorous spiny hopsage population. The Wyoming big sagebrush population has fewer decadent plants and a higher proportion are classified as young plants. The broom snakeweed population should be monitored and could easily increase with poor management. The Desirable Components Index rated this site as fair with a score of 28 due to fair perennial grass cover, low perennial forb cover, low recruitment of shrubs, low browse cover, high shrub decadence, and low annual grass cover.

TREND ASSESSMENT
soil - stable (0)
browse - slightly up (+1)
herbaceous understory - stable (0)
winter range condition (DC Index) - Fair (28) Lower Potential scale

2000 TREND ASSESSMENT

Trend for soil is slightly down. The ratio of protective ground cover (vegetation, litter and cryptogams) to bare ground decreased. The amount of bare soil increased slightly from 39% to 50%. This slightly downward soil trend is due to an increase in the amount of bare ground and decreases of vegetation and litter cover. However, there are no signs of erosion present, but this is more likely due to the well drained characteristics of the sandy soil and almost level terrain of the site. The browse trend is stable with improvement to Wyoming big sagebrush but spiny hopsage is slightly down. The broom snakeweed population should be monitored and could easily increase with poor management. The herbaceous understory trend is slightly up. The nested frequency of perennial grasses increased very slightly and the nested frequency of cheatgrass decreased significantly (33%). The nested frequency of perennial forbs decreased, but perennial forbs are in such small numbers and are of

little importance on this winter range. The Desirable Components Index rated this site as fair with a score of 34 due to fair perennial grass cover, low perennial forb cover, low recruitment of shrubs, low browse cover, high shrub decadence, and low annual grass cover.

TREND ASSESSMENT
soil - slightly down (-1)
browse - stable (0)
herbaceous understory - slightly up (+1)
winter range condition (DC Index) - Fair (34) Lower Potential scale

2005 TREND ASSESSMENT

The soil trend is up. The ratio of protective ground cover (vegetation, litter and cryptogams) to bare ground increased substantially. This is due to a decrease in bare ground as well an increase of cryptogamic crust cover. The majority of the soil trend is due to an increase in annual vegetation, which is caused by a drastic increase of cheatgrass. Although cheatgrass cover and nested frequency are very ephemeral and dependent upon precipitation, it does help prevent erosion. The trend for browse is down. The individual trends for both key browse species, Wyoming big sagebrush and spiny hopsage, are down. Wyoming big sagebrush declined 43% in density from 2000 to 2005 from 1,160 to 660 plants/acre. This is coupled with an increase of decadent plants from 9% of the population in 2000 to 39% in 2005. The percentage of the population classified as dying also increased from 2% in 2000 to 15% in 2005. An increase of young plants in the population, which represented 16% of the population in 2000, increased to 21% in 2005. This may provide enough recruitment for the population to increase. The browse species highest in numbers in 2005 was spiny hopsage. This population has also decreased from 1,020 plants/acre in 2000 to 820 in 2005, a 20% decrease. In contrast to this drastic population decrease, the percentage of the population classified as mature increased from 12% in 2000 to 51% in 2005. Decadence decreased from 88% in 2000 to 49% in 2005 and the plants classified as dying also decreased from 24% in 2000 to 20% in 2005. This change from decadent and dying individuals is likely a product of leaf drop during the 2000 reading. The trend for herbaceous understory is down. This is due mainly to a 60% increase in the nested frequency of annual grasses from 2000 to 2005, 59% of which is due to an increase in cheatgrass. This is coupled with a 87% decrease (from 2000 to 2005) in the nested frequency of perennial grasses like purple-three-awn, Indian ricegrass, and sand dropseed. Annual forb nested frequency increased by nearly five times from 2000 to 2005. Perennial forbs increased, but made up a minuscule percentage of the herbaceous understory and are a less-important component of this winter range. The Desirable Components Index rated this site as very poor with a score of -4 due to very poor perennial grass cover, very poor perennial forb cover, low recruitment of shrubs, low browse cover, very high shrub decadence, and very high annual grass cover.

TREND ASSESSMENT
soil - up (+2)
browse - down (-2)
herbaceous understory - down (-2)
winter range condition (DC Index) - Very Poor (-4) Lower Potential scale

HERBACEOUS TRENDS --
Management unit 13B, Study no: 5

Type	Species	Nested Frequency				Average Cover %		
		'86	'95	'00	'05	'95	'00	'05
G	Aristida purpurea	$_{b}$68	$_{b}$73	$_{b}$75	$_{a}$-	2.42	3.20	-
G	Bromus tectorum (a)	-	$_{b}$353	$_{a}$237	$_{c}$376	4.07	2.65	38.47
G	Oryzopsis hymenoides	$_{ab}$18	$_{b}$35	$_{b}$32	$_{a}$7	.20	.46	.03
G	Sporobolus cryptandrus	$_{b}$156	$_{b}$137	$_{b}$160	$_{a}$27	4.66	6.79	.17
G	Vulpia octoflora (a)	-	20	18	31	.04	.07	.06
Total for Annual Grasses		0	373	255	407	4.11	2.72	38.53
Total for Perennial Grasses		242	245	267	34	7.28	10.46	0.20
Total for Grasses		242	618	522	441	11.40	13.18	38.73
F	Calochortus nuttallii	-	-	4	-	-	.00	-
F	Cryptantha sp.	-	$_{b}$24	$_{a}$-	$_{a}$1	.05	-	.00
F	Cymopterus sp.	-	$_{a}$6	$_{a}$14	$_{b}$35	.01	.03	.07
F	Erodium cicutarium (a)	-	$_{a}$5	$_{ab}$12	$_{b}$16	.01	.03	.62
F	Eriogonum sp.	-	$_{b}$15	$_{a}$-	$_{a}$-	.03	-	-
F	Gilia sp. (a)	-	-	3	-	-	.00	-
F	Lappula occidentalis (a)	-	-	1	-	-	.00	-
F	Lepidium densiflorum (a)	-	$_{b}$37	$_{a}$3	$_{c}$55	.08	.00	.17
F	Lygodesmia grandiflora	-	7	3	3	.04	.00	.15
F	Navarretia intertexta (a)	-	-	-	1	-	-	.00
F	Plantago patagonica (a)	-	$_{b}$147	$_{a}$29	$_{b}$146	.32	.06	.46
F	Sphaeralcea coccinea	-	$_{b}$19	$_{a}$-	$_{a}$3	.06	-	.01
Total for Annual Forbs		0	189	48	218	0.41	0.10	1.27
Total for Perennial Forbs		0	71	21	42	0.19	0.04	0.23
Total for Forbs		0	260	69	260	0.61	0.15	1.51

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

BROWSE TRENDS --
Management unit 13B, Study no: 5

Type	Species	Strip Frequency			Average Cover %		
		'95	'00	'05	'95	'00	'05
B	Artemisia tridentata wyomingensis	31	28	20	.82	1.63	1.04
B	Coleogyne ramosissima	3	5	6	-	1.63	1.01
B	Grayia spinosa	33	28	27	3.76	4.67	3.93
B	Gutierrezia sarothrae	65	71	15	3.95	1.60	.37
B	Opuntia sp.	4	8	8	.06	.33	.31
B	Sclerocactus sp.	0	1	0	-	-	-
Total for Browse		136	141	76	8.60	9.89	6.67

CANOPY COVER, LINE INTERCEPT --
Management unit 13B, Study no: 5

Species	Percent Cover '05
Artemisia tridentata wyomingensis	.30
Coleogyne ramosissima	1.38
Grayia spinosa	3.61
Gutierrezia sarothrae	.08
Opuntia sp.	.21

KEY BROWSE ANNUAL LEADER GROWTH --
Management unit 13B, Study no: 5

Species	Average leader growth (in) '05
Artemisia tridentata wyomingensis	1.6
Coleogyne ramosissima	1.5
Grayia spinosa	3.5

POINT-QUARTER TREE DATA --
Management unit 13B, Study no: 5

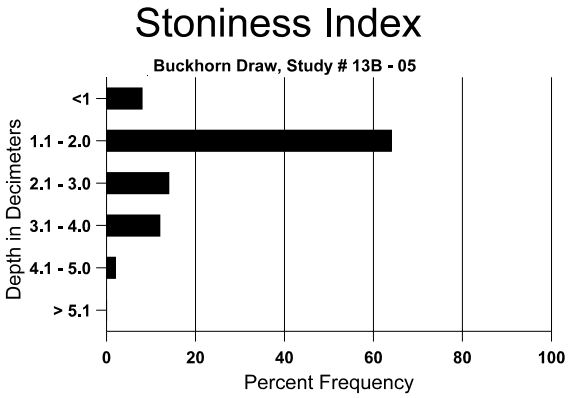
Species	Trees per Acre		Average diameter (in)	
	'00	'05	'00	'05
Juniperus osteosperma	16	25	8.6	13.5

BASIC COVER --
Management unit 13B, Study no: 5

Cover Type	Average Cover %			
	'86	'95	'00	'05
Vegetation	8.50	24.78	23.74	45.62
Rock	0	0	0	0
Pavement	0	0	.00	.00
Litter	42.00	25.71	24.92	20.39
Cryptogams	.75	2.11	5.05	9.43
Bare Ground	48.75	33.26	54.67	34.37

SOIL ANALYSIS DATA --
Herd Unit 13B, Study # 5, Study Name: Buckhorn Draw

Effective rooting depth (in)	Temp °F (depth)	pH	%sand	%silt	%clay	%0M	ppm P	ppm K	dS/m
18.9	60.4 (18.0)	7.6	64.0	18.0	18.0	0.3	2.3	99.2	0.6



PELLET GROUP DATA --
Management unit 13B, Study no: 5

Type	Quadrat Frequency		
	'95	'00	'05
Rabbit	21	19	30
Elk	2	1	2
Deer	28	23	21
Cattle	5	9	23

Days use per acre (ha)	
'00	'05
-	-
1 (2)	3 (8)
27 (67)	20 (50)
20 (49)	6 (16)

BROWSE CHARACTERISTICS --
Management unit 13B, Study no: 5

		Age class distribution (plants per acre)					Utilization					
Year	Plants per Acre (excluding seedlings)	Seedling	Young	Mature	Decadent	Dead	% moderate	% heavy	% decadent	% dying	% poor vigor	Average Height Crown (in)
Artemisia tridentata wyomingensis												
86	**499**	66	66	233	200	-	13	87	40	-	0	11/13
95	**1020**	200	340	560	120	40	47	6	12	8	8	16/24
00	**1160**	-	180	880	100	40	24	9	9	2	2	17/22
05	**660**	-	140	260	260	260	30	55	39	15	15	15/21
Chrysothamnus nauseosus												
86	**0**	-	-	-	-	-	0	0	-	-	0	-/-
95	**0**	-	-	-	-	-	0	0	-	-	0	-/-
00	**0**	-	-	-	-	-	0	0	-	-	0	6/14
05	**0**	-	-	-	-	-	0	0	-	-	0	-/-
Chrysothamnus viscidiflorus stenophyllus												
86	**0**	-	-	-	-	-	0	0	-	-	0	-/-
95	**0**	-	-	-	-	-	0	0	-	-	0	-/-
00	**0**	-	-	-	-	-	0	0	-	-	0	18/35
05	**0**	-	-	-	-	-	0	0	-	-	0	13/15
Coleogyne ramosissima												
86	**166**	-	-	166	-	-	0	100	-	-	0	15/31
95	**60**	-	20	40	-	-	33	0	-	-	0	27/50
00	**160**	-	40	120	-	-	0	0	-	-	0	21/36
05	**120**	-	20	100	-	-	17	0	-	-	0	19/38
Ephedra viridis												
86	**0**	-	-	-	-	-	0	0	-	-	0	-/-
95	**0**	-	-	-	-	-	0	0	-	-	0	27/27
00	**0**	-	-	-	-	-	0	0	-	-	0	-/-
05	**0**	-	-	-	-	-	0	0	-	-	0	25/31
Grayia spinosa												
86	**300**	-	-	-	300	-	0	100	100	-	100	-/-
95	**880**	-	-	600	280	-	66	16	32	11	27	17/33
00	**1020**	-	-	120	900	-	2	29	88	24	24	18/33
05	**820**	-	-	420	400	120	34	7	49	20	20	19/32
Gutierrezia sarothrae												
86	**7765**	-	866	5733	1166	-	.85	.42	15	-	0	9/5
95	**3260**	100	580	2680	-	-	0	0	0	-	0	11/15
00	**4060**	60	700	3140	220	840	0	0	5	5	5	6/8
05	**440**	-	20	420	-	60	0	0	0	-	0	9/10

		Age class distribution (plants per acre)					Utilization					
Year	Plants per Acre (excluding seedlings)	Seedling	Young	Mature	Decadent	Dead	% moderate	% heavy	% decadent	% dying	% poor vigor	Average Height Crown (in)
Juniperus osteosperma												
86	**33**	-	-	33	-	-	0	0	-	-	0	63/63
95	**0**	-	-	-	-	-	0	0	-	-	0	-/-
00	**0**	-	-	-	-	-	0	0	-	-	0	-/-
05	**0**	-	-	-	-	-	0	0	-	-	0	-/-
Opuntia sp.												
86	**66**	-	-	66	-	-	0	0	0	-	0	4/6
95	**120**	-	-	120	-	-	0	0	0	-	33	6/17
00	**220**	-	-	220	-	-	0	0	0	-	0	7/12
05	**200**	-	-	140	60	-	0	0	30	30	30	7/25
Sclerocactus sp.												
86	**0**	-	-	-	-	-	0	0	-	-	0	-/-
95	**0**	-	-	-	-	-	0	0	-	-	0	-/-
00	**20**	-	20	-	-	-	0	0	-	-	0	5/3
05	**0**	-	-	-	-	-	0	0	-	-	0	6/7

Trend Study 13B-6-05

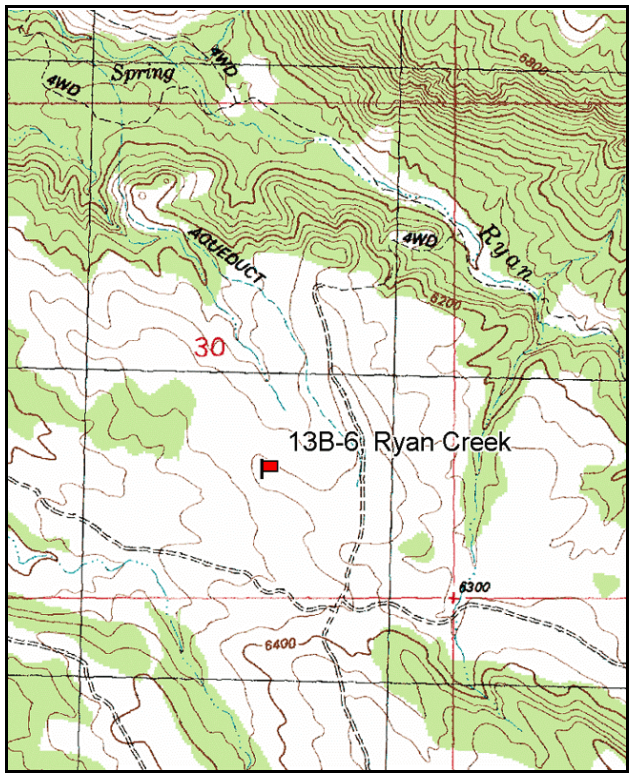
Study site name: Ryan Creek . Vegetation type: Chained, Seeded P-J .

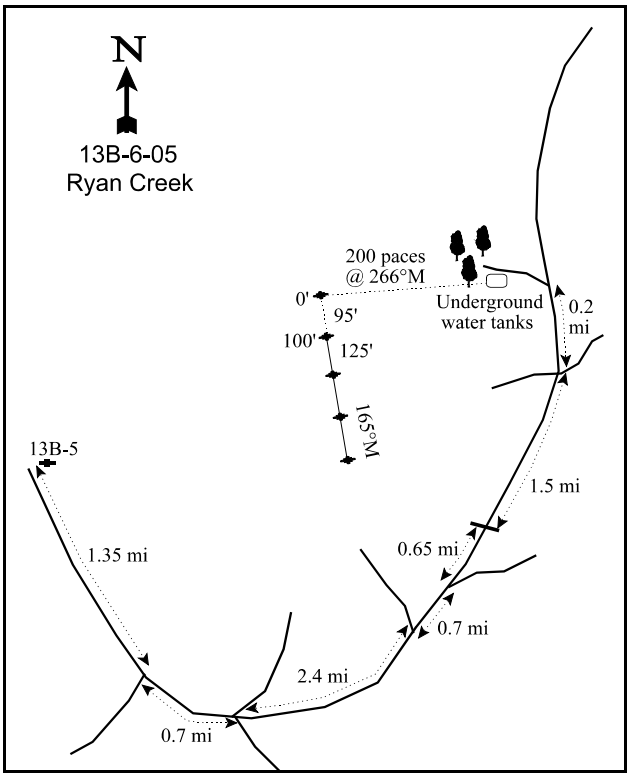
Compass bearing: frequency baseline 165 degrees magnetic.

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

LOCATION DESCRIPTION

At the "Granary" intersection just 1.35 miles south of Buckhorn Draw, 13B-5 (Coates Creek 15-minute Quad; T23S, R25E, southeast quarter of section 3) bear left and go east 0.7 miles to a fork. Take the middle fork, go 2.4 miles and turn right at the next fork. Continue 0.7 miles to another fork. Turn left. Go 0.65 miles to a cattle guard. Continue 1.5 miles to a fork. Continue straight (north) and go 0.2 miles to a water development and a few lone junipers on the left. From here, walk up the small ridge to the west for 200 paces at 266°M to a full high fence post with browse tag #7678 attached. The transect runs south from the start of the baseline. All other plots are marked by rebar stakes.





Map Name: Steamboat Mesa

Diagrammatic Sketch

Township 22S , Range 26E , Section 30

GPS: NAD 27, UTM 12S 4302647 N, 666582 E

DISCUSSION

Ryan Creek - Trend Study No. 13B-6

The Ryan Creek study site is located within an old 1,800 acre pinyon-juniper chaining, which has been considered an important big game winter range. The area was chained and aerially seeded with crested wheatgrass, four-wing saltbush, big sagebrush, alfalfa, and bitterbrush in 1968. To help maintain the integrity of the chaining, the BLM used the herbicide tebuthiuron to eliminate the released population of pinyon-juniper trees on 300 acres of the chaining. The area burned in 1989, which eliminated nearly all of the browse on the site. The study is located near the top of a south-facing aspect with a slope averaging 10%, and an elevation of 6,300 feet. A nearby deer pellet group transect in Ryan Park, on the Utah side, averaged 8 deer days use/acre (20 ddu/ha) between 1986 and 1996. Pellet group data taken along the trend study site base line in 2000 estimated 20 deer days use/acre (49 ddu/ha), 9 elk days use/acre (22 edu/ha), and 10 cow day use/acre (25 cdu/ha). In 2005, the pellet group data estimated 27 deer, 9 elk, and 7 cow days use/acre (68 ddu/ha, 21 edu/ha, and 16 cdu/ha). Cattle grazing is managed as part of the large Buckhorn allotment.

The area is characterized as an upland shallow loam site. The surface soil has a sandy clay loam texture with an effective rooting depth just over 14 inches. Soil reaction is neutral (pH 7.3). Phosphorus levels are marginal at 7.7 ppm. Levels below 6 ppm may limit normal plant development and growth in wildland soils (Tiedemann and Lopez 2004). The relative cover of bare ground increased substantially from 11% in 1995 to 34% in 2000, and decreased slightly to 29% in 2005. However, the vegetation and litter have provided adequate protection for the soil and there has been no evidence of noticeable erosion. In fact, in 2005 the erosion condition class determined soil movement as stable.

Pinyon and juniper trees and a very low density of miscellaneous browse species, were eliminated from the site when it burned. Previously the estimated combined density of pinyon and juniper trees was about 198 trees/acre. The most numerous shrubs on the site after the burn were Harriman's yucca, broom snakeweed, white stemmed rabbitbrush, and a few scattered fourwing saltbush. The estimated cover for all browse species combined was about 1% in 2000 and 2005. Little change has occurred with the browse species since the fire. With the loss of the browse species, this site became less valuable critical winter range for wildlife.

In 1995, the dominant understory species was cheatgrass. At that time, it contributed 19% cover and had the potential of carrying another destructive fire. In 2000, it contributed to only 2% cover due to drought, but with increased fall and spring precipitation, it had increased to 9% cover in 2005. Crested wheatgrass is the dominant perennial species. Without the competition from cheatgrass and/or the timing of precipitation events, crested wheatgrass abundance was higher in 2000 than 1995 or 2005. Other grass species include: Indian ricegrass, galleta, purple threeawn, mutton bluegrass, sand dropseed, and bottlebrush squirreltail. In 1995, forbs were composed primarily of annual species (51% forb cover). In 2000, with dry conditions, only 14% of the forb cover were annual species. After increased precipitation in 2005, annual forb cover made up 77% of the total forb cover. The dominant perennial forb in 1995 was heath aster, which does not provide much forage for wildlife or livestock. In 2000 and 2005, alfalfa was the dominant perennial forb, providing about 2% cover. Alfalfa sum of nested frequency increased significantly in 2005.

1986 APPARENT TREND ASSESSMENT

Density of desirable browse species for deer is very low with little recruitment into their respective populations. However, there are good quantities of forage produced by the crested wheatgrass for the spring and fall. It will be interesting to follow the effects of the Savory grazing system on this particular chaining. Continued maintenance of the pinyon-juniper trees on this chaining is desirable for improving the health of the understory vegetation. Apparent trend for the site is stable, but will be greatly affected by ongoing management decisions and weather patterns.

1995 TREND ASSESSMENT

There is adequate cover provided by vegetation and litter to protect the soil surface from erosion. Therefore, the soil trend is considered stable. The herbaceous understory is comprised mostly of annual forbs and grasses, the majority of which is cheatgrass. Crested wheatgrass is abundant as well and may provide some forage later into the fall with some late precipitation. Tumble mustard is quite prevalent and most were knee-high in height. The vegetation provides abundant fine fuels for another wildfire. Trend for the herbaceous understory is stable. The perennial grasses declined slightly, while perennial forbs increased. There are very few, if any browse species that could provide winter forage for wildlife, so the trend for browse is down. The Desirable Components Index rated this site as very poor with a score of 4 due to fair perennial grass cover, fair perennial forb cover, no recruitment of shrubs, no browse cover, and high annual grass cover.

TREND ASSESSMENT
soil - stable (0)
browse - down (-2)
herbaceous understory - stable (0)
winter range condition (DC Index) - Very Poor (4) Lower Potential scale

2000 TREND ASSESSMENT

Protective ground cover has declined since 1995 while percent cover of bare ground has more than doubled from 13% to 35%. The ratio of protective cover to bare ground decreased. Most of this change in cover can be explained by the decline in annual grasses and forbs. Cover of cheatgrass declined from 19% in 1995 to only 2%. Annual forbs declined from 6% cover to 3% cover. At the same time perennial grass cover increased from 6% to 17%. Sum of nested frequency for perennial grasses remained similar. There appears to be adequate cover provided by vegetation and litter to prevent most erosion but due to the increase in unprotected bare ground the soil trend is considered down. Trend for the herbaceous understory is slightly up because the perennial component of the grasses showed slight improvement with a substantial decrease in the abundance annual species. The forbs showed a decrease, however they only make up 14% of the herbaceous cover and this loss was easily compensated by the increase in perennial grass nested frequency values. There are very few, if any browse species that could provide winter forage for wildlife. Trend is considered stable but in very poor condition. The Desirable Components Index rated this site as fair with a score of 34 due to excellent perennial grass cover, fair perennial forb cover, no recruitment of shrubs, no browse cover, no shrub decadence, and low annual grass cover.

TREND ASSESSMENT
soil - down (-2)
browse - stable (0)
herbaceous understory - slightly up (+1)
winter range condition (DC Index) - Fair (34) Lower Potential scale

2005 TREND ASSESSMENT

The trend for soil is stable. The ratio of protective ground cover (vegetation, litter and cryptogams) to bare ground increased somewhat. Relative bare ground declined from 34% to 29% in 2005. This is not enough change to warrant a change in trend for soils. This reduction of bare ground is due to the increase of cheatgrass. The trend for browse is stable due to a lack of change in browse species, densities, and vigor. As of 2005, there continues to be few preferred browse species. The herbaceous understory trend is considered stable. Cheatgrass sum of nested frequency increased significantly and cover increased from 2 to 9%. This increases the potential for future wildfires. Despite this increase in cheatgrass, the weighted sum of nested frequency for perennial grasses and forbs have increased only by 3%. The Desirable Components Index rated this site as poor to fair

with a score of 22 due to good perennial grass cover, excellent perennial forb cover, no recruitment of shrubs, no browse cover, no shrub decadence, and moderate annual grass cover.

TREND ASSESSMENT
soil - stable (0)
browse - stable (0)
herbaceous understory - stable (0)
winter range condition (DC Index) - Poor to Fair (22) Lower Potential scale

HERBACEOUS TRENDS --
Management unit 13B, Study no: 6

Type	Species	Nested Frequency				Average Cover %		
		'86	'95	'00	'05	'95	'00	'05
G	Agropyron cristatum	b286	a215	b255	a194	5.60	14.70	9.10
G	Aristida purpurea	a-	a1	b7	a-	.00	.24	-
G	Bromus tectorum (a)	-	c365	a138	b273	18.56	1.72	9.25
G	Hilaria jamesii	-	3	7	7	.15	.53	.21
G	Oryzopsis hymenoides	a-	a12	a12	b80	.57	1.10	.52
G	Poa fendleriana	-	2	-	-	.03	-	-
G	Sitanion hystrix	2	4	4	-	.00	.18	-
G	Sporobolus cryptandrus	-	-	2	2	-	.15	.00
G	Stipa comata	-	-	-	-	-	-	.01
G	Vulpia octoflora (a)	4	3	-	-	.00	-	-
Total for Annual Grasses		4	368	138	273	18.57	1.72	9.25
Total for Perennial Grasses		288	237	287	283	6.37	16.90	9.85
Total for Grasses		292	605	425	556	24.95	18.63	19.10
F	Astragalus mollissimus	2	7	1	7	.02	.00	.05
F	Astragalus nuttallianus (a)	-	6	-	5	.02	-	.01
F	Calochortus nuttallii	-	-	-	2	-	-	.01
F	Chenopodium fremontii (a)	-	-	3	-	-	.00	-
F	Chorispora tenella (a)	-	-	-	2	-	-	.06
F	Cryptantha sp.	-	-	-	7	-	-	.21
F	Cymopterus sp.	-	3	6	6	.00	.01	.06
F	Descurainia pinnata (a)	-	a-	a-	b22	-	-	.06
F	Draba nemorosa (a)	-	a6	a2	b105	.01	.00	.59
F	Erodium cicutarium (a)	-	b125	a24	c246	1.60	.39	13.15
F	Erigeron sp.	-	-	-	3	-	-	.03
F	Euphorbia sp.	-	14	13	15	.03	.10	.40
F	Gilia sp. (a)	-	a-	a-	b33	-	-	.21
F	Heterotheca villosa	-	-	-	8	-	-	.16

Type	Species	Nested Frequency				Average Cover %		
		'86	'95	'00	'05	'95	'00	'05
F	Lappula occidentalis (a)	-	$_{a}$5	$_{a}$3	$_{b}$62	.01	.00	.65
F	Lactuca serriola	-	6	4	-	.02	.01	-
F	Leucelene ericoides	-	28	38	29	1.46	.79	1.60
F	Machaeranthera spp	-	$_{b}$127	$_{a}$-	$_{a}$7	.28	-	.01
F	Medicago sativa	$_{a}$1	$_{bc}$24	$_{ab}$12	$_{c}$34	.84	1.60	2.12
F	Phlox longifolia	-	-	3	-	-	.00	-
F	Ranunculus testiculatus (a)	-	$_{a}$-	$_{a}$-	$_{b}$49	-	-	.40
F	Salsola iberica (a)	-	$_{a}$1	$_{a}$-	$_{b}$42	.00	-	.12
F	Sisymbrium altissimum (a)	-	$_{c}$150	$_{a}$2	$_{b}$50	1.22	.01	.80
F	Silene sp.	-	5	-	2	.01	-	.01
F	Sphaeralcea coccinea	-	-	3	4	-	.03	.03
F	Unknown forb-perennial	2	-	-	-	-	-	-
Total for Annual Forbs		0	293	34	616	2.87	0.41	16.06
Total for Perennial Forbs		5	214	80	124	2.68	2.55	4.70
Total for Forbs		5	507	114	740	5.56	2.97	20.77

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

BROWSE TRENDS --
Management unit 13B, Study no: 6

Type	Species	Strip Frequency			Average Cover %		
		'95	'00	'05	'95	'00	'05
B	Chrysothamnus nauseosus hololeucus	1	1	1	.15	.15	.85
B	Gutierrezia sarothrae	1	4	3	.15	.15	.21
B	Yucca harrimaniae	5	4	0	.30	.30	-
Total for Browse		7	9	4	0.60	0.61	1.06

CANOPY COVER, LINE INTERCEPT --
Management unit 13B, Study no: 6

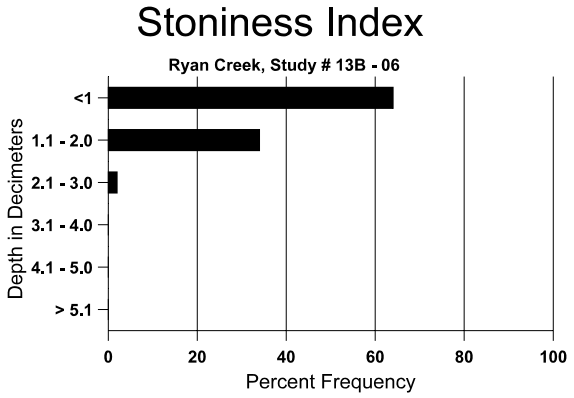
Species	Percent Cover '05
Chrysothamnus nauseosus hololeucus	.96

BASIC COVER --
Management unit 13B, Study no: 6

Cover Type	Average Cover %			
	'86	'95	'00	'05
Vegetation	7.25	41.22	23.49	35.27
Rock	4.00	13.35	16.52	17.92
Pavement	4.00	1.11	3.95	1.92
Litter	53.00	45.07	22.25	21.54
Cryptogams	2.25	.61	1.08	.71
Bare Ground	29.50	13.15	34.65	30.96

SOIL ANALYSIS DATA --
Herd Unit 13B, Study # 6, Study Name: Ryan Creek

Effective rooting depth (in)	Temp °F (depth)	pH	%sand	%silt	%clay	%0M	ppm P	ppm K	dS/m
14.3	58.6 (15.9)	7.3	64.0	15.4	20.6	4.9	7.7	80.0	1.0



PELLET GROUP DATA --
Management unit 13B, Study no: 6

Type	Quadrat Frequency		
	'95	'00	'05
Rabbit	6	38	23
Elk	12	4	12
Deer	17	29	20
Cattle	3	4	8

Days use per acre (ha)	
'00	'05
-	-
9 (24)	9 (22)
20 (50)	27 (68)
10 (26)	7 (16)

BROWSE CHARACTERISTICS --
Management unit 13B, Study no: 6

		Age class distribution (plants per acre)					Utilization					
Year	Plants per Acre (excluding seedlings)	Seedling	Young	Mature	Decadent	Dead	% moderate	% heavy	% decadent	% dying	% poor vigor	Average Height Crown (in)
Artemisia tridentata wyomingensis												
86	**33**	-	-	-	33	-	0	100	100	-	0	-/-
95	**0**	-	-	-	-	-	0	0	0	-	0	-/-
00	**0**	-	-	-	-	-	0	0	0	-	0	-/-
05	**0**	-	-	-	-	-	0	0	0	-	0	-/-
Atriplex canescens												
86	**0**	-	-	-	-	-	0	0	-	-	0	-/-
95	**0**	-	-	-	-	-	0	0	-	-	0	28/27
00	**0**	-	-	-	-	-	0	0	-	-	0	39/34
05	**0**	-	-	-	-	-	0	0	-	-	0	38/55
Chrysothamnus nauseosus hololeucus												
86	**0**	-	-	-	-	-	0	0	-	-	0	-/-
95	**20**	-	-	20	-	-	0	0	-	-	0	30/46
00	**20**	-	-	20	-	-	0	0	-	-	0	36/63
05	**20**	-	-	20	-	-	0	0	-	-	0	42/64
Ephedra viridis												
86	**0**	-	-	-	-	-	0	0	-	-	0	-/-
95	**0**	-	-	-	-	-	0	0	-	-	0	-/-
00	**0**	-	-	-	-	-	0	0	-	-	0	-/-
05	**0**	-	-	-	-	-	0	0	-	-	0	16/17
Gutierrezia sarothrae												
86	**66**	-	-	66	-	-	0	0	-	-	0	10/11
95	**20**	-	-	20	-	-	0	0	-	-	0	7/22
00	**280**	-	60	220	-	-	0	0	-	-	0	7/7
05	**180**	20	40	140	-	-	0	0	-	-	0	12/20
Juniperus osteosperma												
86	**66**	-	-	66	-	-	0	0	-	-	0	98/79
95	**0**	-	-	-	-	-	0	0	-	-	0	-/-
00	**0**	-	-	-	-	-	0	0	-	-	0	-/-
05	**0**	-	-	-	-	-	0	0	-	-	0	-/-
Opuntia sp.												
86	**0**	-	-	-	-	-	0	0	-	-	0	-/-
95	**0**	-	-	-	-	-	0	0	-	-	0	-/-
00	**0**	-	-	-	-	-	0	0	-	-	0	-/-
05	**0**	-	-	-	-	-	0	0	-	-	0	4/11

		Age class distribution (plants per acre)					Utilization					
Year	Plants per Acre (excluding seedlings)	Seedling	Young	Mature	Decadent	Dead	% moderate	% heavy	% decadent	% dying	% poor vigor	Average Height Crown (in)
Pinus edulis												
86	**132**	-	66	66	-	-	0	0	-	-	0	78/50
95	**0**	-	-	-	-	-	0	0	-	-	0	-/-
00	**0**	-	-	-	-	-	0	0	-	-	0	-/-
05	**0**	-	-	-	-	-	0	0	-	-	0	-/-
Yucca harrimaniae												
86	**0**	-	-	-	-	-	0	0	0	-	0	-/-
95	**680**	-	-	660	20	80	0	0	3	-	0	10/14
00	**240**	-	-	100	140	40	0	0	58	33	33	13/19
05	**0**	-	-	-	-	200	0	0	0	-	0	-/-

Trend Study 13B-7-05

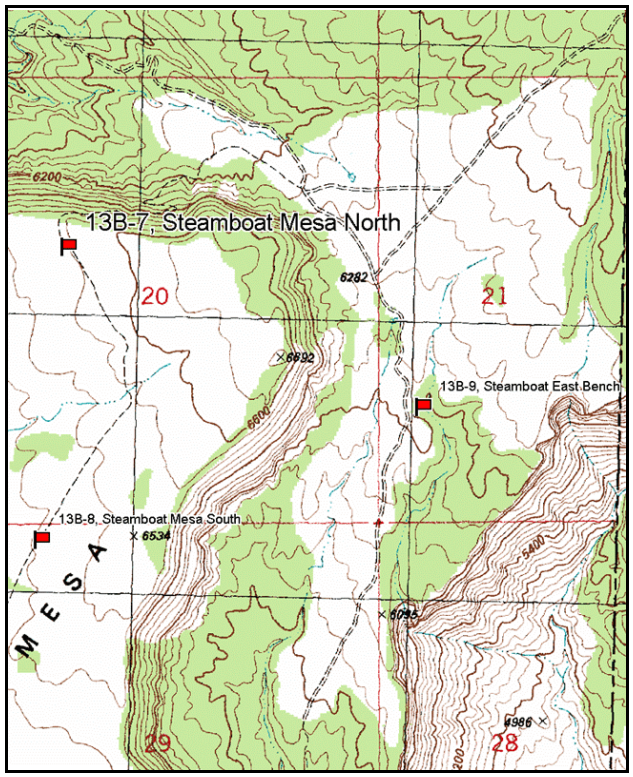
Study site name: Steamboat Mesa North . Vegetation type: Chained, Seeded P-J .

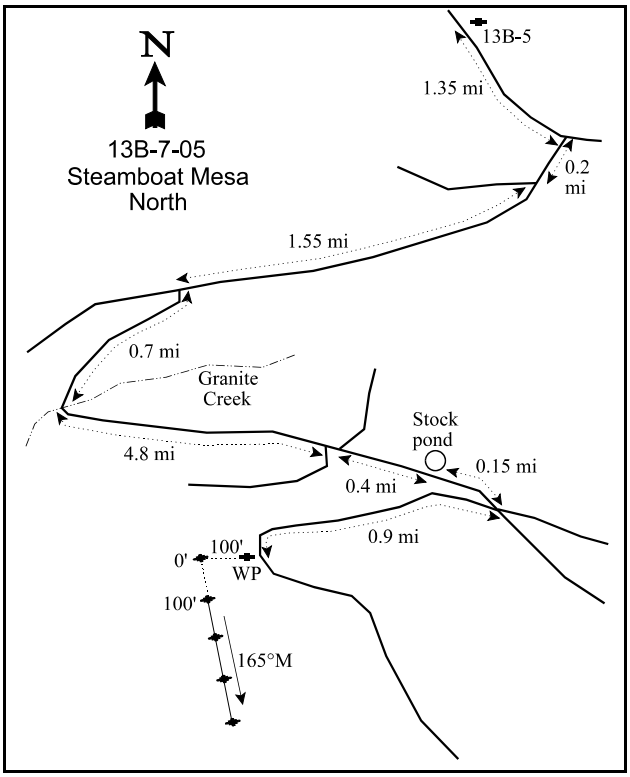
Compass bearing: frequency baseline 165 degrees magnetic.

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 the Buckhorn Draw transect (13B-5), continue southeast for 1.35 miles to the "Granary" intersection. Turn right and go 0.2 miles to a fork. Stay left and drive 1.55 miles to a road on the left (and turn left. Go down this road 0.7 miles to Granite Creek. Cross the creek and proceed 4.8 miles to a fork. Stay left, then right at another fork which connects back to the main road, traveling 0.4 miles to a stock pond. Continue 0.15 miles to a fork with many branches (the right goes up on Steamboat Mesa). It is 0.9 miles from the fork to the top of Steamboat Mesa and a witness post on the right side of the road. The witness post (a green fence post) is six feet off the road. The 0-foot baseline stake is 100 feet west of the witness post. All the transect posts are rebar.





Map Name: Steamboat Mesa

Diagrammatic Sketch

Township 23S , Range 26E , Section 20

GPS: NAD 27, UTM 12S 4295207 N, 666727 E

DISCUSSION

Steamboat Mesa North - Trend Study No. 13B-7

Steamboat Mesa is a large flat mesa located in the southeast corner of the Dolores Triangle, just north of the Dolores River and west of the Colorado border. The mesa is surrounded by steep rock cliffs and is accessible only by a rough 4-wheel drive road on the north end. The Steamboat Mesa North study site was set up in a large chaining near the north edge of the mesa. The study is located on a slight slope (3-5%) with a southwest aspect and an elevation of 6,600 feet. Managed by the BLM, this portion of the Steamboat Mesa allotment was two-way chained and seeded in 1968. Crested wheatgrass, four-wing saltbush, big sagebrush, alfalfa, and bitterbrush were seeded. The allotment is grazed by cattle from December through mid-April for 884 AUM's. Key forage and browse species are crested wheatgrass, scattered Wyoming big sagebrush, white stemmed rabbitbrush, green ephedra, and bitterbrush. Pellet group data in 2000 estimated 42 deer days use/acre (104 ddu/ha) and 17 cow days use/acre (42 cdu/ha). In 2005, pellet group data estimated 61 deer and 1 elk day use/acre (150 ddu/ha and 3 edu/ha).

The soil is a moderately shallow, well-drained, sandy clay loam derived from sandstone. It has a mildly alkaline pH of 7.7. Soil depth is variable, from very shallow to moderately deep, with rock scattered throughout the soil profile, and the effective rooting depth on average is almost 12 inches. Phosphorus levels were marginal at 8.7 ppm, where levels below 6 ppm may limit normal plant development and growth in wildland soils (Tiedemann and Lopez 2004). Litter accounted for almost 36% of the relative ground cover until 2005, much of which was left from the chaining. In 2005, this had decreased to 25% of the relative ground cover. Relative vegetation cover was about 25% with about 5 to 9% combined rock and pavement cover until 2000. In 2005, the relative vegetation cover had increased to 30% with 5% combined rock and pavement cover. Relative bare ground cover increased from 23% in 1986 to 40% in 2005. The ratio of bare soil to protective cover has remained almost the same. The erosion condition class determined soil movement as slight in 2005 due to excessive pedestaling around shrubs and perennial grasses, some flow patterns and rills between vegetation, moderate surface litter movement, and some soil movement between perennial species.

The overstory canopy cover from pinyon and juniper trees was 9% in 2000. Point-center quarter from 2000 estimated tree densities at 177 pinyon/acre and 142 juniper/acre. The overstory canopy cover of pinyon and juniper trees in 2005 was 16% with estimated tree densities of 101 pinyon/acre and 150 juniper/acre. Comparing pictures from 2000 and 2005 along with the point-center quarter data show many pinyon trees died due to drought conditions between 2000 and 2005. True mountain mahogany, antelope bitterbrush, green ephedra, rubber rabbitbrush, Wyoming big sagebrush, black sagebrush, Utah serviceberry, and fourwing saltbush, although all found at low densities, have displayed good vigor and light hedging. Green ephedra and fourwing saltbush have showed moderate hedging with some in poor condition. This is generally normal for these two species where they are found in low densities.

Crested wheatgrass is the key forage species for cattle. It has accounted for nearly all of the grass cover and forms large, distinct patches over the site. Sum of nested frequency was highest in 2000. Cheatgrass is the only other grass species that is found with much abundance. It declined significantly in frequency in 2000, but increased in 2005. Other important forage grasses are Indian ricegrass, needle-and-thread grass, and mutton bluegrass. A variety of native perennial forbs are found on the site, although none are particularly important in terms of forage value on winter range. Most common are increasers such as rock goldenrod, Hoods phlox, and hairy gold aster.

1986 APPARENT TREND ASSESSMENT

Juniper and pinyon are becoming more dominant on this site and will begin to impact the more desirable browse species. However, there is a potential for the other shrubs to increase. The BLM resource management plan

addresses the need to “maintain” this chaining. Big game habitat could be improved if maintenance involved tree removal to release the more desirable browse species. The variety of grasses and forbs currently provide good spring forage. The long-term vegetation trend would be considered down without intervention. The soil trend appears stable at this time.

1995 TREND ASSESSMENT

Bare ground has increased since 1986 although there are no signs of active erosion. The increase in bare ground is due to the lack of litter produced with drier conditions in recent years. Therefore, the soil trend is stable. Currently, grasses provide good spring forage. There is a wide variety of annual species found on the site as well. Most of the cheatgrass is found in large patches with crested wheatgrass scattered throughout. Although nested frequency for perennial forb species has increased, most are increasers and of little forage value. The herbaceous understory trend is up slightly, although a different composition may be desirable. Pinyon and juniper combine for 305 trees/acre. Browse species are scattered throughout in low densities with most showing little utilization. This leads to a stable browse trend. The Desirable Components Index rated this site as fair with a score of 27 due to fair perennial grass cover, good perennial forb cover, no recruitment of shrubs, low browse cover, and low annual grass cover.

TREND ASSESSMENT
soil - stable (0)
browse - stable (0)
herbaceous understory - slightly up (+1)
winter range condition (DC Index) - Fair (27) Lower Potential scale

2000 TREND ASSESSMENT

Bare ground has increased slightly again since 1995, yet the ratio of bare soil to protective cover is almost unchanged and there are no signs of active erosion. The increase in bare ground is due to the exceptionally dry year we have just experienced. Therefore, the soil trend is stable. Currently, grasses provide good spring forage. There is a wide variety of annual species found on the site, although they are in reduced numbers with the drought. Nested frequency for perennial forb species has decreased, while that for the perennial grasses increased. Cheatgrass also decreased significantly. Since forbs only make up 15% of the herbaceous cover, the herbaceous understory trend is considered up slightly for the perennial grasses, with the composition shifting to more perennial species. Pinyon and juniper density appears stable. Browse species are scattered throughout in low densities with most showing little utilization. This leads to a stable browse trend. The Desirable Components Index rated this site as fair with a score of 36 due to excellent perennial grass cover, fair perennial forb cover, no recruitment of shrubs, low browse cover, and no annual grass cover.

TREND ASSESSMENT
soil - stable (0)
browse - stable (0)
herbaceous understory - slightly up (+1)
winter range condition (DC Index) - Fair (36) Lower Potential scale

2005 TREND ASSESSMENT

The soil trend is slightly down. The ratio of protective ground cover (vegetation, litter and cryptogams) to bare ground is nearly the same as in 2000. The relative cover of bare ground increased from 30% in 2000 to 40% in 2005, but the relative vegetation cover also increased from 25 to 30%. Most of the increase in bare soil is because of the loss of litter cover. The trend for browse is stable. The browse species on this site have low densities. Bitterbrush increased 71% from 2000 to 2005, an increase from 40 to 140 plants/acre. The

population of green ephedra in 2000 consisted of 400 plants/acre and increased to 500 plants/acre in 2005. The percentage of young individuals increased from 5% in 2000 to 40% in 2005. The percentage of decadent ephedra individuals decreased from 30% in 2000 to 16% in 2005. The herbaceous understory trend is stable. There was a slight increase in the nested frequency of perennial species, despite the increase in cheatgrass. The nested frequency of perennial forbs increased 50% from 2000 to 2005. The nested frequency of annual grasses was 48 times higher from 2000 to 2005. This increase in cheatgrass affects the trend negatively, but not enough to justify a slightly down trend. The Desirable Components Index rated this site as fair with a score of 37 due to excellent perennial grass cover, fair perennial forb cover, no recruitment of shrubs, low browse cover, and no annual grass cover.

TREND ASSESSMENT
soil - slightly down (-1)
browse - stable (0)
herbaceous understory - stable (0)
winter range condition (DC Index) - Fair (37) Lower Potential scale

HERBACEOUS TRENDS --
Management unit 13B, Study no: 7

Type	Species	Nested Frequency				Average Cover %		
		'86	'95	'00	'05	'95	'00	'05
G	Agropyron cristatum	a155	b228	c277	b245	9.01	16.29	17.79
G	Bromus tectorum (a)	-	b163	a3	b125	1.35	.03	2.10
G	Oryzopsis hymenoides	c52	ab15	a-	b21	.14	.00	.44
G	Poa bulbosa	-	-	-	3	-	-	.15
G	Poa fendleriana	4	4	-	-	.04	-	-
G	Poa secunda	a-	ab3	ab9	b12	.03	.04	.08
G	Sitanion hystrix	b28	a-	a2	a3	-	.03	.15
G	Sporobolus cryptandrus	-	-	1	-	-	.03	-
G	Stipa comata	8	-	5	1	-	.03	.01
G	Vulpia octoflora (a)	-	a5	a-	b19	.01	-	.06
Total for Annual Grasses		0	168	3	144	1.37	0.03	2.16
Total for Perennial Grasses		247	250	294	285	9.23	16.43	18.63
Total for Grasses		247	418	297	429	10.60	16.47	20.79
F	Agoseris glauca	-	-	-	1	.01	-	.00
F	Allium sp.	-	3	-	-	.00	-	-
F	Astragalus convallarius	7	1	1	8	.01	.03	.45
F	Astragalus mollissimus	-	6	1	1	.01	.00	.03
F	Calochortus nuttallii	-	8	-	4	.01	-	.01
F	Chenopodium fremontii (a)	-	-	-	4	-	-	.01
F	Crepis acuminata	-	-	-	3	-	-	.00
F	Cryptantha sp.	-	4	-	2	.01	-	.03
F	Cymopterus sp.	a-	b16	a-	b15	.04	-	.11

Type	Species	Nested Frequency				Average Cover %		
		'86	'95	'00	'05	'95	'00	'05
F	Descurainia pinnata (a)	-	$_{a}$4	$_{a}$-	$_{b}$29	.01	-	.31
F	Draba nemorosa (a)	-	$_{b}$96	$_{a}$-	$_{b}$87	.21	-	.39
F	Erodium cicutarium (a)	-	$_{a}$8	$_{ab}$9	$_{b}$21	.16	.41	.45
F	Erigeron pumilus	$_{a}$2	$_{b}$19	$_{b}$13	$_{c}$-	.04	.05	-
F	Gilia hutchinifolia (a)	-	$_{b}$28	$_{a}$-	$_{c}$42	.07	-	.21
F	Haplopappus acaulis	3	7	3	-	.01	.00	-
F	Heterotheca villosa	$_{a}$-	$_{b}$16	$_{b}$16	$_{c}$39	.21	.29	.82
F	Hymenoxys acaulis	-	-	-	7	-	-	.16
F	Lappula occidentalis (a)	-	$_{b}$43	$_{a}$-	$_{c}$82	.15	-	1.49
F	Lactuca serriola	-	6	-	-	.15	-	-
F	Lepidium densiflorum (a)	-	$_{b}$24	$_{a}$-	$_{b}$33	.19	-	.20
F	Lesquerella sp.	-	-	-	1	-	-	.03
F	Lychnis drummondii	-	-	-	-	-	-	.00
F	Machaeranthera grindelioides	$_{a}$-	$_{b}$21	$_{a}$-	$_{a}$5	.04	-	.06
F	Medicago sativa	-	3	2	-	.00	.03	-
F	Penstemon sp.	-	1	3	1	.00	.15	.03
F	Petradoria pumila	37	41	32	26	2.21	1.35	1.08
F	Phlox hoodii	$_{b}$28	$_{b}$32	$_{ab}$13	$_{a}$11	.49	.11	.07
F	Phlox longifolia	-	2	-	-	.00	-	-
F	Plantago patagonica (a)	-	$_{a}$3	$_{a}$-	$_{b}$32	.01	-	.30
F	Polygonum douglasii (a)	-	3	-	-	.00	-	.00
F	Ranunculus testiculatus (a)	-	$_{a}$3	$_{a}$-	$_{b}$38	.01	-	.18
F	Schoencrambe linifolia	$_{a}$-	$_{b}$17	$_{a}$-	$_{a}$-	.07	-	.16
F	Sisymbrium altissimum (a)	-	$_{b}$27	$_{a}$-	$_{a}$5	.07	-	.33
F	Sphaeralcea coccinea	$_{a}$-	$_{b}$13	$_{b}$12	$_{b}$20	.13	.05	.18
F	Streptanthus cordatus	-	3	-	-	.00	-	-
F	Tragopogon dubius	$_{b}$14	$_{ab}$5	$_{a}$-	$_{a}$-	.02	-	-
Total for Annual Forbs		0	239	9	373	0.88	0.41	3.90
Total for Perennial Forbs		91	224	96	144	3.53	2.07	3.27
Total for Forbs		91	463	105	517	4.42	2.48	7.17

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

BROWSE TRENDS --
Management unit 13B, Study no: 7

Type	Species	Strip Frequency			Average Cover %		
		'95	'00	'05	'95	'00	'05
B	Amelanchier utahensis	0	0	0	-	-	.38
B	Artemisia nova	0	1	1	-	-	-
B	Artemisia tridentata wyomingensis	0	1	1	-	.38	.38
B	Atriplex canescens	1	1	1	-	.00	-
B	Chrysothamnus nauseosus	4	7	6	.98	1.62	.33
B	Ephedra viridis	9	8	7	1.35	.86	.57
B	Gutierrezia sarothrae	0	11	4	-	.02	.00
B	Juniperus osteosperma	0	6	3	2.70	3.67	2.62
B	Leptodactylon pungens	4	4	5	.01	.18	.15
B	Opuntia sp.	2	2	3	.03	.00	-
B	Pinus edulis	0	6	5	4.77	4.36	3.08
B	Purshia tridentata	1	1	2	.15	.30	.18
Total for Browse		21	48	38	9.99	11.42	7.69

CANOPY COVER, LINE INTERCEPT --
Management unit 13B, Study no: 7

Species	Percent Cover	
	'00	'05
Artemisia tridentata wyomingensis	-	.35
Atriplex canescens	-	.21
Chrysothamnus nauseosus	-	.41
Ephedra viridis	-	.26
Juniperus osteosperma	4.59	8.56
Pinus edulis	4.19	7.21
Purshia tridentata	-	.58

POINT-QUARTER TREE DATA --
Management unit 13B, Study no: 7

Species	Trees per Acre	
	'00	'05
Juniperus osteosperma	142	150
Pinus edulis	177	101

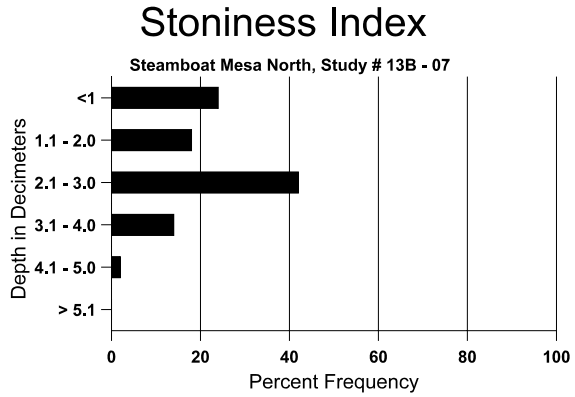
Average diameter (in)	
'00	'05
3.3	5.4
2.6	4.2

BASIC COVER --
Management unit 13B, Study no: 7

Cover Type	Average Cover %			
	'86	'95	'00	'05
Vegetation	11.25	26.70	33.01	34.45
Rock	.25	4.64	6.08	3.90
Pavement	0	.13	2.52	1.02
Litter	65.00	37.74	47.32	28.86
Cryptogams	.25	.53	2.33	.78
Bare Ground	23.25	33.34	38.60	45.54

SOIL ANALYSIS DATA --
Herd Unit 13B, Study # 7, Study Name: Steamboat Mesa North

Effective rooting depth (in)	Temp °F (depth)	pH	%sand	%silt	%clay	%0M	ppm P	ppm K	dS/m
11.5	59.0 (12.4)	7.7	56.6	25.1	21.3	1.9	8.7	92.8	0.7



PELLET GROUP DATA --
Management unit 13B, Study no: 7

Type	Quadrat Frequency			Days use per acre (ha)	
	'95	'00	'05	'00	'05
Rabbit	18	32	29	-	-
Elk	1	-	5	-	1 (3)
Deer	19	9	30	42 (105)	61 (150)
Cattle	6	8	5	17 (43)	-

BROWSE CHARACTERISTICS --
Management unit 13B, Study no: 7

		Age class distribution (plants per acre)					Utilization					
Year	Plants per Acre (excluding seedlings)	Seedling	Young	Mature	Decadent	Dead	% moderate	% heavy	% decadent	% dying	% poor vigor	Average Height Crown (in)
Amelanchier utahensis												
86	**0**	-	-	-	-	-	0	0	-	-	0	-/-
95	**0**	-	-	-	-	-	0	0	-	-	0	29/62
00	**0**	-	-	-	-	-	0	0	-	-	0	63/76
05	**0**	-	-	-	-	-	0	0	-	-	0	34/58
Artemisia nova												
86	**0**	-	-	-	-	-	0	0	0	-	0	-/-
95	**0**	-	-	-	-	-	0	0	0	-	0	-/-
00	**20**	-	-	20	-	-	0	0	0	-	0	5/13
05	**20**	-	-	-	20	20	0	100	100	-	0	7/24
Artemisia tridentata wyomingensis												
86	**66**	-	-	66	-	-	0	0	0	-	0	22/19
95	**0**	-	-	-	-	-	0	0	0	-	0	9/14
00	**20**	-	-	20	-	20	0	100	0	-	0	9/15
05	**20**	-	-	-	20	20	0	100	100	-	0	14/14
Atriplex canescens												
86	**66**	-	-	-	66	-	0	0	100	-	0	-/-
95	**20**	-	-	20	-	-	0	100	0	-	0	38/41
00	**20**	-	-	-	20	-	0	0	100	-	0	34/79
05	**40**	-	20	-	20	-	0	50	50	-	0	34/49
Cercocarpus montanus												
86	**0**	-	-	-	-	-	0	0	-	-	0	-/-
95	**0**	-	-	-	-	-	0	0	-	-	0	-/-
00	**0**	-	-	-	-	-	0	0	-	-	0	-/-
05	**0**	-	-	-	-	-	0	0	-	-	0	55/32
Chrysothamnus nauseosus												
86	**0**	-	-	-	-	-	0	0	0	-	0	-/-
95	**100**	-	-	100	-	-	0	0	0	-	0	27/34
00	**140**	-	-	120	20	-	29	0	14	-	0	37/45
05	**120**	-	-	60	60	20	17	17	50	17	17	24/30
Ephedra viridis												
86	**133**	-	-	133	-	-	0	100	0	-	0	18/11
95	**540**	-	180	300	60	60	22	7	11	-	0	17/22
00	**400**	-	20	260	120	-	15	60	30	5	5	21/29
05	**500**	-	220	200	80	20	0	20	16	8	8	25/38

		Age class distribution (plants per acre)					Utilization					
Year	Plants per Acre (excluding seedlings)	Seedling	Young	Mature	Decadent	Dead	% moderate	% heavy	% decadent	% dying	% poor vigor	Average Height Crown (in)
Gutierrezia sarothrae												
86	**66**	333	-	-	66	-	0	0	100	-	0	-/-
95	**0**	-	-	-	-	-	0	0	0	-	0	7/15
00	**560**	-	40	460	60	20	0	0	11	4	4	5/10
05	**140**	20	-	140	-	-	0	0	0	-	0	11/15
Juniperus osteosperma												
86	**66**	-	-	66	-	-	0	0	-	-	0	83/58
95	**0**	-	-	-	-	-	0	0	-	-	0	-/-
00	**120**	-	20	100	-	-	0	0	-	-	0	-/-
05	**60**	-	-	60	-	-	0	0	-	-	0	-/-
Leptodactylon pungens												
86	**0**	-	-	-	-	-	0	0	-	-	0	-/-
95	**80**	-	-	80	-	-	0	0	-	-	0	5/10
00	**120**	-	-	120	-	-	0	0	-	-	0	5/10
05	**120**	-	-	120	-	-	0	0	-	-	0	4/8
Opuntia sp.												
86	**0**	-	-	-	-	-	0	0	0	-	0	-/-
95	**60**	-	20	40	-	-	0	0	0	-	0	5/18
00	**60**	-	20	40	-	-	0	0	0	-	0	4/10
05	**60**	-	20	20	20	-	0	0	33	-	0	4/17
Pinus edulis												
86	**333**	-	200	133	-	-	0	0	-	-	0	81/47
95	**0**	-	-	-	-	-	0	0	-	-	0	-/-
00	**120**	-	-	120	-	-	0	0	-	-	0	-/-
05	**100**	-	-	100	-	20	0	0	-	-	20	-/-
Purshia tridentata												
86	**0**	-	-	-	-	-	0	0	-	-	0	-/-
95	**20**	-	-	20	-	-	0	0	-	-	0	20/40
00	**40**	-	-	40	-	-	0	100	-	-	0	24/89
05	**140**	-	-	140	-	-	0	100	-	-	0	12/37

Trend Study 13B-8-05

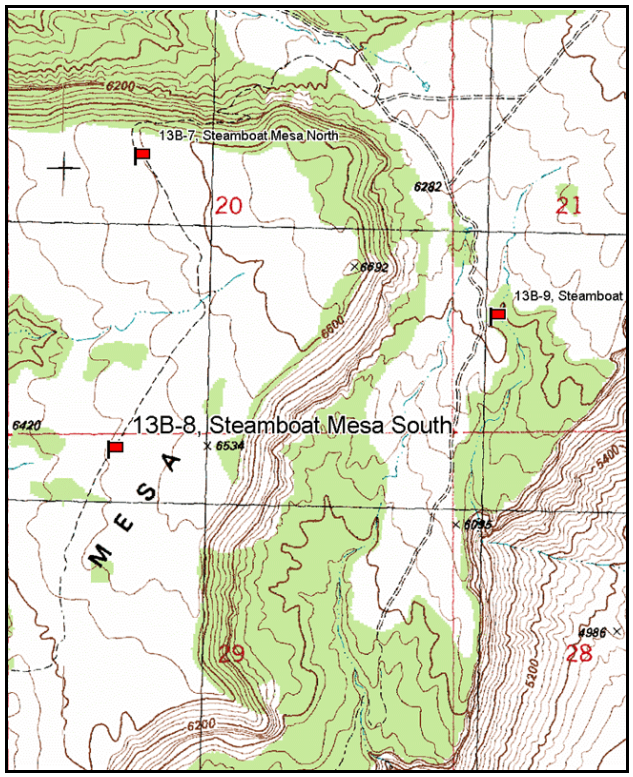
Study site name: Steamboat Mesa South . Vegetation type: Wyoming big sagebrush .

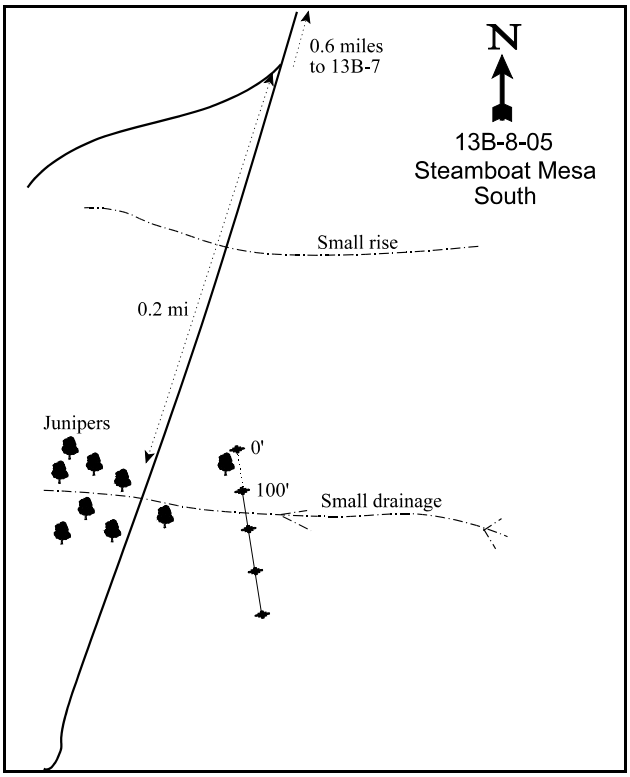
Compass bearing: frequency baseline 165 degrees magnetic..

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

LOCATION DESCRIPTION

Start from site number 13B-7, Steamboat Mesa North. Continue south on the same road for 0.6 miles to a fork. Proceed straight 0.2 miles (halfway to an exclosure) to a large Juniper in a sagebrush-grass flat. The baseline 0-foot stake (tag #7812) is located north of the tree.





Map Name: Steamboat Mesa Diagrammatic Sketch

Township 23S , Range 26E , Section 29 GPS: NAD 27, UTM 12S 4294148 N, 666651 E

DISCUSSION

Steamboat Mesa South - Trend Study No. 13B-8

Located approximately 3/4 miles south of study site 13B-7, the Steamboat Mesa South site samples a habitat type once dominated by native vegetation, although not in a completely natural condition. This open rolling site may be an example of a former sagebrush park undergoing a conversion to an annual grass-sagebrush type due to excessive livestock use. The mesa slopes gently to the west at an elevation of 6,500 feet. A large exclosure is located to the south of the study. Two pellet group transects are also located on Steamboat Mesa. The lower elevation transect (6,300 feet) showed an average of 27 deer days use/acre (67 ddu/ha) between 1986 and 1997. The pellet transect located at 6,700 feet, and closer to the this study, averaged 23 deer days use/acre (56 ddu/ha) for the same time period. Pellet group data from 2000 estimated 86 deer days use/acre (212 ddu/ha) and 46 cow days use/acre (114 cdu/ha). Pellet group data from 2005 estimated 13 deer, 2 elk, and 22 cow days use/acre (33 ddu/ha, 5 edu/ha, and 56 cdu/ha). All of the cattle and most of the deer use appeared to be from the previous winter and autumn.

The surface soil texture is a sandy clay loam with no rocks or pavement on the surface. Effective rooting depth was measured to be about 13 inches and soil reaction was neutral (pH 6.9). Low amounts of phosphorus (4.9 ppm) and marginal amounts of potassium (67.2 ppm) were measured, where 6 ppm phosphorus and 60 ppm potassium are the levels under which normal plant development and growth may be hindered in wildland soils (Tiedemann and Lopez 2004). Relative bare ground cover increased from 12% in 1995 to 35% in 2000, then decreased to 9% in 2005. Relative litter cover continually decreased from 50% in 1995 to 31% in 2005. However, relative vegetation cover decreased from 36% in 1995 to 23% in 2000, then increased to 61% in 2005. This helps illustrate the point that you cannot depend on annuals to provide consistent litter or vegetation cover from year to year. In 2005, the erosion condition class determined soil movement as stable.

Wyoming big sagebrush, the key browse species, density was estimated at 2,332 plants/acre in 1986, 1,620 plants/acre in 1995, 2,480 plants/acre in 2000, and 1,540 plants/acre in 2005. This difference in density was mainly due to the changing proportions of young individuals within the population. The population appeared vigorous with moderate to heavy use reported in 1986, light use in 1995, and heavy use in 2000 and 2005. Only 2% of the population was decadent until 2005 when it escalated to 21%. The proportion of individuals classified as dying and those with poor vigor had been low until 2005 when dying individuals contributed to 10% of the population and those with poor vigor 23%. Winterfat was also sampled on this site, but was in very low numbers, vigorous, and with no signs of utilization until 2005, when no individuals were sampled. Escape and thermal cover is provided by scattered junipers along washes and tops of ridges. Most of the trees have been highlined.

Cheatgrass was the most dominant species in 1995 and 2005. It was sampled in at least 95% of the quadrats in each of those years. Cheatgrass cover was 15% in 1995 and over 50% in 2005. In 2000 when conditions were much drier, cheatgrass was only sampled in 64% of the quadrats and cover was only 3%. In 2000 the dominant species was needle-and-thread, which had 16% cover and was sampled in 93% of the quadrats. In 2005, needle-and-thread nested frequency was significantly lower, quadrat frequency declined to 48%, and cover was only 2%. Other perennial species include galleta, Indian ricegrass, Sandberg bluegrass. Scarlet globemallow has been the only common perennial forb. It was significantly lowest in 2000, but increased in 2005 to the same level as 1995. Cover was nearly 3% in 2005. Annual forbs have been common with each reading. Wooly plantain was particularly abundant in 2005 with nearly 6% cover.

1986 APPARENT TREND ASSESSMENT

The soil appears stable with no signs of erosion on the study site. The vegetation trend appears generally stable in terms of succession, except for the form and vigor of Wyoming big sagebrush. In the past there had been

signs of sagebrush that had died, most likely from overuse and/or prolonged drought. A series of winters without constant snow cover and use by cattle could be very detrimental to the sagebrush population. Currently, the sagebrush appears healthy, but the stand density is relatively low.

1995 TREND ASSESSMENT

The soil is adequately covered by both vegetation and litter. Both adequate ground cover and no signs of erosion indicate a stable soil trend. Grass cover is good, but most comes from undesirable annual species. Cheatgrass is abundant and contributes large quantities of fine fuel and litter. Furthermore, 70% of the total herbaceous understory cover is contributed by annual species. Most forbs have little forage value, but do aid in soil stabilization. Because cheatgrass dominates the site, there is a high probability of losing the sagebrush population with a single wildfire event. The herbaceous understory trend for this site is considered stable at this time. Wyoming big sagebrush shows less utilization than in the past and exhibits characteristics of a stable population. The difference in sagebrush density is likely due to the larger sample size taken in 1995. Seedlings are very common and the young age class is 46% of the population. The winterfat population is also stable with no observable utilization. The browse trend is considered stable. The Desirable Components Index rated this site as very poor with a score of -1 due to low perennial grass cover, low perennial forb cover, no recruitment of shrubs, low browse cover, and relatively high annual grass cover.

TREND ASSESSMENT
soil - stable (0)
browse - stable (0)
herbaceous understory - stable (0)
winter range condition (DC Index) - Very Poor (-1) Lower Potential scale

2000 TREND ASSESSMENT

Percent bare soil has increased sharply since 1995 with it increasing from 15% to 44% with significant decreases in vegetation and litter cover due to inconsistencies of annual grass cover each year. The ratio of bare soil to protective cover has also deteriorated with a large decrease in protective cover. In 1995, annuals contributed to 70% of the vegetation cover, where currently they only make up 13% of the vegetation cover. Another clear example of why annual vegetation and litter cover is not an adequate or dependable source of protective cover for the soil. The trend for soil is down. Grass cover is good, with most of it coming from perennial species. The forbs have little forage value and only make up 4% of the vegetation cover. Cheatgrass does not currently dominate the site, therefore it is not a high fire hazard as it was in 1995. The herbaceous understory trend for this site is considered slightly up because of the increased values for perennial species and the decrease in the abundance of annual species. The browse trend is up. Wyoming big sagebrush shows continued moderate to heavy use. Sagebrush density increased 35% as 1,240 young plants/acre increased the population density. It has a fair amount of seedlings and the young age class makes up 50% of the population. The winterfat population is also stable with no observable utilization. The browse trend is considered stable. The Desirable Components Index rated this site as fair with a score of 33 due to excellent perennial grass cover, low perennial forb cover, good recruitment of shrubs, low browse cover, and low annual grass cover.

TREND ASSESSMENT
soil - down (-2)
browse - up (+2)
herbaceous understory - slightly up (+1)
winter range condition (DC Index) - Fair (33) Lower Potential scale

2005 TREND ASSESSMENT

The soil trend is up. The ratio of protective ground cover (vegetation, litter and cryptogams) to bare ground increased. This is due to a decrease in the relative cover of bare ground from 35% in 2000 to 9% in 2005, as well as a relative vegetation cover increase from 23% in 2000 to 61% in 2005. Although this increase of vegetation cover increases the stability of the soil, it is only temporary. Of the total vegetation cover, 74% is from cheatgrass alone, which can change from year to year based on precipitation levels. This aside, the nested frequency of perennial forbs increased 139%. The trend for browse is down. The key browse, Wyoming big sagebrush, density decreased 38%. The proportion of young plants declined from 50% of the population to 13% in 2005. Decadence increased from 2% to 21%, while plants classified as dying increased from 2% to 10% of the population. Winterfat, decreased from 100 plants/acre in 2000 to 0 in 2005. The trend for herbaceous understory is down. This trend is due to a drastic increase in cheatgrass and decrease in perennial grasses. From 2000 to 2005, the nested frequency of cheatgrass increased 109% and the total percent cover increased from 3 to 52%. The quadrat frequency of cheatgrass increased from 64% in 2000 to 97% in 2005. This cheatgrass increase correlated with a 52% decrease in the nested frequency of perennial grasses from 2000 to 2005. Although the nested frequency of perennial forbs increased 109%, this increase was minuscule compared to the cheatgrass increase. Not only does the cheatgrass make wild fire danger very high, but it also makes the establishment of young perennials very difficult to impossible. The Desirable Components Index rated this site as very poor with a score of -1 due to low perennial grass cover, moderate perennial forb cover, low recruitment of shrubs, low browse cover, and very high annual grass cover.

TREND ASSESSMENT
soil - up (+2)
browse - down (-2)
herbaceous understory - down (-2)
winter range condition (DC Index) - Very Poor (-1) Lower Potential scale

HERBACEOUS TRENDS --
Management unit 13B, Study no: 8

Type	Species	Nested Frequency				Average Cover %		
		'86	'95	'00	'05	'95	'00	'05
G	Agropyron cristatum	-	7	-	2	.01	-	.38
G	Bromus tectorum (a)	-	$_{b}$341	$_{a}$181	$_{c}$379	15.05	3.09	51.76
G	Hilaria jamesii	$_{a}$17	$_{b}$52	$_{b}$52	$_{a}$18	.79	1.58	.25
G	Oryzopsis hymenoides	6	20	7	14	.77	.21	.60
G	Poa bulbosa	-	-	-	6	-	-	.18
G	Poa fendleriana	$_{b}$26	$_{ab}$16	$_{a}$5	$_{a}$-	.05	.16	.00
G	Poa secunda	$_{a}$-	$_{c}$117	$_{b}$54	$_{b}$53	.65	.52	.78
G	Sitanion hystrix	$_{b}$11	$_{a}$-	$_{a}$-	$_{a}$-	-	-	-
G	Sporobolus cryptandrus	$_{a}$7	$_{a}$-	$_{b}$19	$_{a}$-	-	.81	-
G	Stipa comata	$_{b}$257	$_{a}$91	$_{b}$260	$_{a}$98	.70	16.47	2.30
G	Vulpia octoflora (a)	-	$_{b}$231	$_{a}$6	$_{a}$25	1.08	.01	.40
Total for Annual Grasses		0	572	187	404	16.14	3.11	52.16
Total for Perennial Grasses		324	303	397	191	2.99	19.77	4.51
Total for Grasses		324	875	584	595	19.14	22.88	56.68

Type	Species	Nested Frequency				Average Cover %		
		'86	'95	'00	'05	'95	'00	'05
F	Astragalus mollissimus	$_{a}$-	$_{b}$29	$_{a}$-	$_{b}$15	.24	-	.09
F	Calochortus nuttallii	$_{a}$-	$_{c}$59	$_{a}$-	$_{b}$14	.14	-	.04
F	Cymopterus sp.	-	6	-	-	.01	-	-
F	Descurainia pinnata (a)	-	-	-	6	-	-	.02
F	Draba nemorosa (a)	-	$_{b}$15	$_{c}$51	$_{a}$-	.02	.16	-
F	Erodium cicutarium (a)	-	$_{a}$-	$_{b}$16	$_{a}$-	-	.03	-
F	Erigeron pumilus	-	$_{a}$-	$_{b}$11	$_{a}$-	.00	.02	-
F	Gilia hutchinifolia (a)	-	$_{b}$32	$_{a}$2	$_{a}$1	.08	.00	.00
F	Grindelia squarrosa	-	1	-	-	.00	-	-
F	Hedysarum sp.	-	6	-	-	.18	-	-
F	Lappula occidentalis (a)	-	$_{b}$16	$_{a}$-	$_{a}$-	.06	-	-
F	Lactuca serriola	-	$_{b}$30	$_{a}$-	$_{a}$2	.08	-	.00
F	Lepidium densiflorum (a)	-	$_{b}$201	$_{a}$-	$_{c}$236	.95	-	2.82
F	Leucelene ericoides	-	9	10	6	.16	.33	.30
F	Machaeranthera grindelioides	$_{a}$-	$_{b}$10	$_{a}$-	$_{ab}$3	.03	-	.01
F	Phlox hoodii	-	4	-	-	.03	-	-
F	Phlox longifolia	-	4	-	2	.01	-	.00
F	Plantago patagonica (a)	-	$_{b}$232	$_{a}$64	$_{b}$248	2.34	.22	5.65
F	Polygonum douglasii (a)	-	2	-	-	.00	-	-
F	Ranunculus testiculatus (a)	-	3	-	-	.00	-	-
F	Schoencrambe linifolia	-	$_{b}$35	$_{a}$-	$_{a}$5	.08	-	.09
F	Sisymbrium altissimum (a)	-	$_{a}$50	$_{b}$-	$_{a}$58	.18	-	.59
F	Sphaeralcea coccinea	$_{c}$207	$_{b}$108	$_{a}$45	$_{b}$111	1.09	.34	2.56
F	Tragopogon dubius	$_{c}$69	$_{b}$21	$_{a}$-	$_{a}$-	.05	-	-
F	Trifolium sp.	-	2	-	-	.00	-	-
F	Unknown forb-perennial	15	24	-	-	.06	-	-
Total for Annual Forbs		0	551	133	549	3.66	0.41	9.10
Total for Perennial Forbs		291	348	66	158	2.20	0.69	3.11
Total for Forbs		291	899	199	707	5.86	1.11	12.22

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

BROWSE TRENDS --
Management unit 13B, Study no: 8

Type	Species	Strip Frequency			Average Cover %		
		'95	'00	'05	'95	'00	'05
B	Artemisia tridentata wyomingensis	40	45	40	1.53	2.34	2.50
B	Ceratoides lanata	2	2	0	-	-	.00
B	Juniperus osteosperma	0	0	0	-	-	.00
B	Gutierrezia sarothrae	0	0	1	-	-	-
B	Opuntia sp.	0	1	0	-	-	-
B	Pinus edulis	0	1	1	1.82	.98	-
Total for Browse		42	49	42	3.36	3.32	2.51

CANOPY COVER, LINE INTERCEPT --
Management unit 13B, Study no: 8

Species	Percent Cover	
	'00	'05
Artemisia tridentata wyomingensis	-	2.66
Ceratoides lanata	-	.51
Juniperus osteosperma	3.40	3.79
Pinus edulis	1.39	1.60

KEY BROWSE ANNUAL LEADER GROWTH --
Management unit 13B, Study no: 8

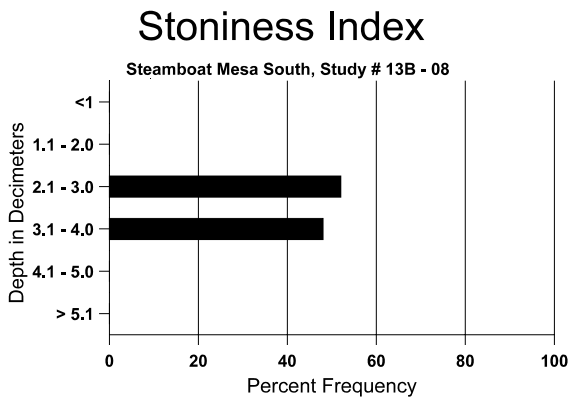
Species	Average leader growth (in)
	'05
Artemisia tridentata wyomingensis	2.1

BASIC COVER --
Management unit 13B, Study no: 8

Cover Type	Average Cover %			
	'86	'95	'00	'05
Vegetation	6.00	44.37	29.38	70.27
Rock	0	0	0	0
Pavement	0	0	0	0
Litter	67.00	60.84	51.45	35.38
Cryptogams	0	1.98	.86	.05
Bare Ground	27.00	14.81	43.76	10.03

SOIL ANALYSIS DATA --
Herd Unit 13B, Study # 8, Study Name: Steamboat Mesa South

Effective rooting depth (in)	Temp °F (depth)	pH	%sand	%silt	%clay	%0M	ppm P	ppm K	dS/m
13.0	62.4 (14.6)	6.9	54.6	23.1	25.3	1.4	4.9	67.2	0.5



PELLET GROUP DATA --
Management unit 13B, Study no: 8

Type	Quadrat Frequency		
	'95	'00	'05
Rabbit	5	41	2
Elk	-	-	1
Deer	18	33	5
Cattle	21	17	12

Days use per acre (ha)	
'00	'05
-	-
-	2 (5)
86 (212)	13 (33)
46 (113)	23 (56)

BROWSE CHARACTERISTICS --
Management unit 13B, Study no: 8

		Age class distribution (plants per acre)					Utilization					
Year	Plants per Acre (excluding seedlings)	Seedling	Young	Mature	Decadent	Dead	% moderate	% heavy	% decadent	% dying	% poor vigor	Average Height Crown (in)
Artemisia tridentata wyomingensis												
86	**2332**	133	1200	1066	66	-	46	37	3	-	0	17/12
95	**1620**	160	740	840	40	-	27	1	2	2	2	17/25
00	**2480**	20	1240	1180	60	40	28	44	2	2	2	14/21
05	**1540**	20	200	1020	320	160	10	75	21	10	23	15/21
Ceratoides lanata												
86	**66**	-	-	66	-	-	0	100	-	-	0	14/11
95	**60**	-	40	20	-	-	0	0	-	-	0	11/16
00	**100**	-	-	100	-	-	0	0	-	-	0	14/15
05	**0**	-	-	-	-	-	0	0	-	-	0	16/19

		Age class distribution (plants per acre)					Utilization					
Year	Plants per Acre (excluding seedlings)	Seedling	Young	Mature	Decadent	Dead	% moderate	% heavy	% decadent	% dying	% poor vigor	Average Height Crown (in)
Chrysothamnus nauseosus												
86	**0**	-	-	-	-	-	0	0	-	-	0	-/-
95	**0**	-	-	-	-	-	0	0	-	-	0	-/-
00	**0**	-	-	-	-	-	0	0	-	-	0	19/28
05	**0**	-	-	-	-	-	0	0	-	-	0	-/-
Gutierrezia sarothrae												
86	**0**	-	-	-	-	-	0	0	-	-	0	-/-
95	**0**	-	-	-	-	-	0	0	-	-	0	-/-
00	**0**	-	-	-	-	-	0	0	-	-	0	-/-
05	**20**	-	-	20	-	-	0	0	-	-	0	-/-
Opuntia sp.												
86	**0**	-	-	-	-	-	0	0	-	-	0	-/-
95	**0**	-	-	-	-	-	0	0	-	-	0	-/-
00	**20**	-	20	-	-	-	0	0	-	-	0	-/-
05	**0**	-	-	-	-	-	0	0	-	-	0	4/15
Pinus edulis												
86	**0**	-	-	-	-	-	0	0	-	-	0	-/-
95	**0**	-	-	-	-	-	0	0	-	-	0	-/-
00	**20**	-	-	20	-	-	0	0	-	-	0	-/-
05	**20**	-	-	20	-	-	0	0	-	-	0	-/-

Trend Study 13B-9-05

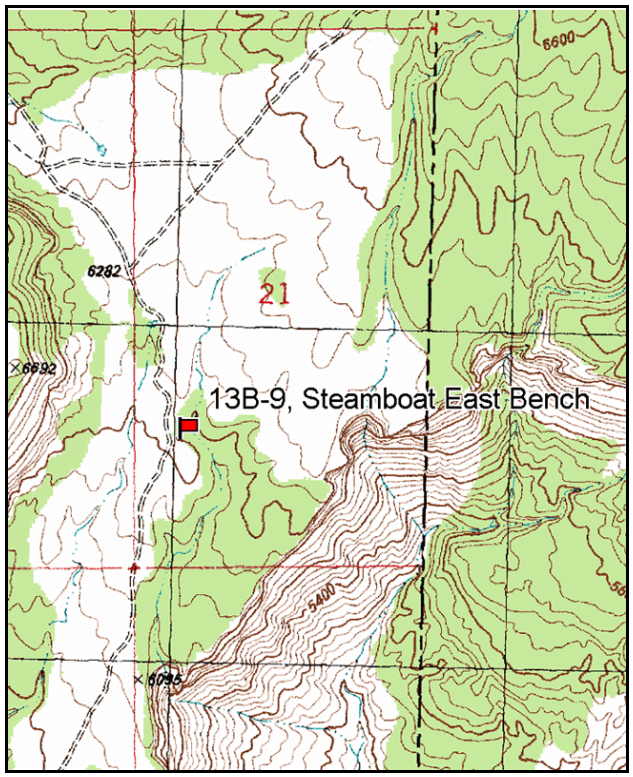
Study site name: Steamboat East Bench . Vegetation type: Chained. Seeded P-J .

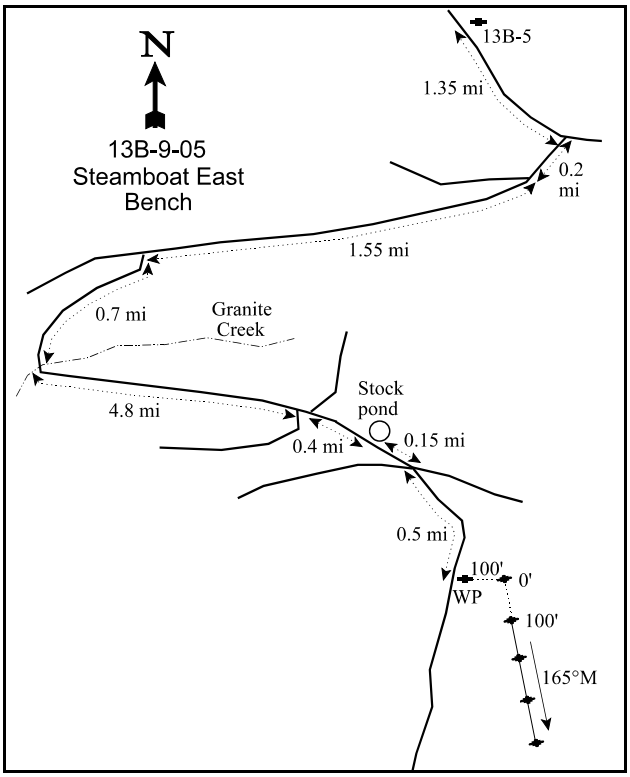
Compass bearing: frequency baseline 165 degrees magnetic.

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

LOCATION DESCRIPTION

From the Buckhorn Draw transect (13B-5), continue southeast for 1.35 miles to the "Granary" intersection. Turn right and go 0.2 miles to a fork. Stay left. Go 1.55 miles and turn left. Go down this road 0.7 miles to Granite Creek. Cross the creek and proceed 4.8 miles to a fork. Stay left, then right at another fork which connects back to the main road, traveling 0.4 miles to a stock pond. Continue 0.15 miles to a fork with many branches (the right goes up on Steamboat Mesa). Stay on the same road (straight through the intersection and up a steep hill) for 0.5 miles to an old P-J chaining and a 2 ½ foot tall rebar witness post on the left, 6 feet off the road. The 0-foot end of the baseline is 100 feet east of the witness post and is marked by a rebar tagged #7890.





Map Name: Steamboat Mesa

Diagrammatic Sketch

Township 23S , Range 26E , Section 21

GPS: NAD 27, UTM 12S 4294655 N, 668020 E

DISCUSSION

Steamboat Mesa East Bench - Trend Study No. 13B-9

This study site is located on a narrow bench (one-half mile wide) below Steamboat Mesa, bounded on the west by the sheer sandstone cliffs of Steamboat Mesa and on the east by deep canyons of the Dolores River. The northern part of the bench was included in the 1968 Steamboat Mesa allotment chaining. The area supports a moderately dense stand of pinyon-juniper and a variety of shrubs and herbaceous plants. The site is on a moderately sloping ridge with a west-southwest exposure and an elevation of 6,200 feet. Drainage off the bench is to the south. The pellet group data in 2000 estimated 17 deer days use/acre (42 ddu/ha) and 7 elk days use/acre (17 edu/ha). In 2005, the pellet group data estimated 3 deer, 7 elk, and 5 cow days use/acre (6 ddu/ha, 18 edu/ha, and 13 cdu/ha).

The soil texture is a sandy clay loam with an effective rooting depth of about 12 inches. One limiting factor could be low amounts of phosphorus (2 ppm). Values below 6 ppm may hinder normal plant growth and development in wildland soils (Tiedemann and Lopez 2004). Erosion is evident in areas disturbed by roads. Overall, the vegetation and litter cover provide adequate soil protection. Some slight pedestaling around plants and large rocks was noted between the vegetation. In 2005, the erosion condition class determined soil movement as stable.

The site supports a variety of browse species. Preferred species include: Utah serviceberry, black sagebrush, Wyoming big sagebrush, true mountain mahogany and green ephedra. These species provided a total of only 4.4% cover for preferred browse in 1995, 4.1% in 2000, and 2.0% in 2005. The browse understory is beginning to show the effects of a dominating pinyon-juniper canopy cover which is now at over 28%. Most of these key browse species occur in low densities. True mountain mahogany has provided 2-3% cover, with a density between 120 to 240 plants per acre from 1995 to 2005. Mature plants are large, averaging over 5 feet in height making them partly unavailable to browsing. Use was light to moderate in 1995 and 2000, but moderate in 2005. Black sagebrush density was estimated at about 440 plants/acre from 1995 to 2005, with about 1% cover. It showed moderate to heavy use in 1986 and 1995, light use in 2000, and light to moderate use in 2005. It displayed good vigor and low decadence until 2005, when decadence increased greatly from 0 to 35%. The proportion of young plants was relatively stable, except for 2000 when few young individuals were present. Wyoming big sagebrush was also sampled at a low density of only 132 plants/acre in 1986, declined to only 40 in 2000, and no plants were sampled in 2005. The scattered Utah serviceberry was not encountered in the shrub density strips in 2000, but 20 plants/acre were sampled in 1995 and 2005. Some surrounding mature serviceberry plants measured for height/crown were large, averaging 9 feet tall with a crown measurement of 13 feet wide.

Pinyon and juniper trees dominate the site. In 2000, densities was estimated at 274 pinyon trees/acre and 63 Utah juniper trees/acre. In 2005, density declined to 184 pinyon trees/acre and 66 juniper trees/acre. Cover (line intercept method) was estimated at 12% for pinyon and 9% in 2000 for a total of 21%. In 2005, pinyon-juniper combined cover is more than 28%. This increased dominance could have a lot to do with the overall losses to preferred browse cover.

The herbaceous understory is diverse but not abundant. Crested wheatgrass is the most abundant perennial species with an average cover of about 3% cover. Cheatgrass has been the most abundant grass species, but has not dominated the site. In 2000, it was scarcely found, but was moderately abundant in 1995 and 2005. Total grass cover has averaged about 8% since 1995. Forbs provide little forage or ground cover and most are low growing life forms. Stemless goldenweed and rock goldenrod are the most abundant forbs on the site. Other common forbs include: hairy goldaster, tumble mustard, and Hood's phlox.

1986 APPARENT TREND ASSESSMENT

Currently, browse density and diversity is promising on this winter range. However, many of the more palatable shrubs have been heavily hedged and may be receiving too much pressure to continue in the community. The most obvious downward trend indicator is the gradual increase of the pinyon-juniper trees. Many of the pinyon are suffering from an unidentified disease (or possibly an herbicide), therefore increase is difficult to predict and will be interesting to follow the changes taking place. Other trend parameters such as form, vigor, and age class distribution for key species appear stable. The overall soil trend also appears stable.

1995 TREND ASSESSMENT

Bare ground has decreased since 1986 with only slight sign of erosion. Vegetation and litter offer good protection and contribute to a stable soil trend. The herbaceous understory is comprised primarily of grasses. This includes two annual and six perennial species, of which, cover is almost equally distributed (annuals 47% vs 53% perennial). Herbaceous understory is stable, although a better composition is desired. The extensive root systems of pinyon and juniper would be affecting the understory species by being more competitive for moisture. There are several different browse species, of which, broom snakeweed is the most abundant. This population does not appear to be expanding at this time, but are becoming slightly more robust. Both sagebrush populations show a decrease in percent decadence with a few plants being heavily hedged. This is most likely due to extended drought conditions, thinning out the sagebrush populations, and competition with the pinyon and juniper trees. This combined with light use of other palatable browse species, contributes to a stable browse trend. The Desirable Components Index rated this site as poor with a score of 12 due to low perennial grass cover, low perennial forb cover, no recruitment of shrubs, low browse cover, and low annual grass cover.

TREND ASSESSMENT
soil - stable (0)
browse - stable (0)
herbaceous understory - stable (0)
winter range condition (DC Index) - Poor (12) Lower Potential scale

2000 TREND ASSESSMENT

Relative bare soil has remained fairly stable since 1995 with only almost no sign of erosion. There have been increases in both vegetation and litter cover. The ratio of protective ground cover (vegetation, litter and cryptogams) to bare ground decreased slightly. The herbaceous understory is comprised primarily of grasses. This includes mostly perennial species (crested wheatgrass, purple three-awn, galleta, and Indian ricegrass) which makes up more than 98% of the grass cover. At this time, annuals only make up less than 1% of the grass cover. Herbaceous understory is slightly down due to a slight decrease in sum of nested frequency for perennial grasses and a large decrease in the nested frequency of perennial forbs. The extensive root system of pinyon and juniper is affecting the understory species by being more competitive for moisture. This is especially true for this last year of drought. There are several different browse species, of which, broom snakeweed is still the most abundant. This population does not appear to be expanding at this time as its density is down slightly from 1995. Both sagebrush populations continue to show a decrease in percent decadency (0% in 2000). Black sagebrush and Wyoming big sagebrush are a minor component as together they only make up 5% of the browse cover. With a pinyon-juniper density of 337 trees/acre, the preferred browse will never be an important winter forage component until the competitive tree overstory is thinned. Seventy-six percent of the total browse cover comes from pinyon and juniper trees, making it difficult for any browse species to do well in this community. Browse trend is slightly down. The Desirable Components Index rated this site as fair to poor with a score of 25 due to moderate perennial grass cover, low perennial forb cover, no recruitment of shrubs, low browse cover, and low annual grass cover.

TREND ASSESSMENT
soil - stable (0)
browse - slightly down (-1)
herbaceous understory - slightly down (-1)
winter range condition (DC Index) - Fair to Poor (25) Lower Potential scale

2005 TREND ASSESSMENT

The trend for soil is slightly down. The ratio of protective ground cover (vegetation, litter and cryptogams) to bare ground declined very slightly. The relative bare ground increased from 22% to 33%. The trend for browse is stable. Black sagebrush density was stable, but percent decadence increased. True mountain mahogany density increased as many young plants were sampled. Broom snakeweed density was down by nearly half after many dry years. Pinyon and juniper density was also down, due likely to drought conditions. Overall this leads to a stable trend. The trend for herbaceous understory is slightly up. The nested frequency of perennial grasses, the most important component of the herbaceous understory increased 11%. The nested frequency of perennial forbs increased over 200%, but this has less impact on the trend because forb frequencies generally fluctuate more than grasses and are of less importance to the winter range. Cheatgrass also increased substantially, but does not dominate the site. The Desirable Components Index rated this site as poor with a score of 19 due to moderate perennial grass cover, low perennial forb cover, no recruitment of shrubs, low browse cover, and low annual grass cover.

TREND ASSESSMENT
soil - slightly down (-1)
browse - stable (0)
herbaceous understory - slightly up (+1)
winter range condition (DC Index) - Poor (19) Lower Potential scale

HERBACEOUS TRENDS --
Management unit 13B, Study no: 9

Type	Species	Nested Frequency				Average Cover %		
		'86	'95	'00	'05	'95	'00	'05
G	Agropyron cristatum	a63	b106	ab96	ab80	2.00	5.21	2.82
G	Aristida purpurea	a-	b16	b13	ab12	.40	.84	.33
G	Bromus tectorum (a)	-	c243	a6	b139	3.00	.09	2.62
G	Hilaria jamesii	a-	ab14	b18	b19	.48	1.01	1.24
G	Oryzopsis hymenoides	b29	a17	a11	a6	.46	.68	.19
G	Poa fendleriana	b15	b15	a-	b10	.03	-	.19
G	Poa secunda	a-	a-	ab2	b11	-	.00	.20
G	Sitanion hystrix	b62	a7	a4	a21	.04	.04	.45
G	Stipa comata	-	-	-	2	-	-	.00
G	Vulpia octoflora (a)	-	ab4	a-	b12	.01	-	.02
Total for Annual Grasses		0	247	6	151	3.01	0.09	2.64
Total for Perennial Grasses		169	175	144	161	3.43	7.80	5.44
Total for Grasses		169	422	150	312	6.45	7.89	8.09
F	Artemisia dracunculus	-	-	-	7	-	-	.01

Type	Species	Nested Frequency				Average Cover %		
		'86	'95	'00	'05	'95	'00	'05
F	Arabis drummondi	-	9	-	-	.02	-	-
F	Astragalus convallarius	-	-	-	9	-	-	.30
F	Astragalus mollissimus	$_{b}$15	$_{ab}$10	$_{a}$-	$_{b}$10	.05	-	.07
F	Astragalus sp.	-	4	-	-	.01	-	-
F	Calochortus nuttallii	-	5	-	2	.01	-	.00
F	Chenopodium fremontii (a)	-	-	-	2	-	-	.00
F	Cryptantha sp.	$_{a}$-	$_{b}$23	$_{a}$-	$_{b}$12	.06	-	.08
F	Cymopterus sp.	$_{a}$-	$_{b}$16	$_{a}$-	$_{a}$5	.04	-	.02
F	Descurainia pinnata (a)	-	$_{a}$-	$_{a}$-	$_{b}$17	-	-	.23
F	Draba nemorosa (a)	-	$_{a}$4	$_{a}$-	$_{b}$68	.01	-	.29
F	Erodium cicutarium (a)	-	$_{ab}$18	$_{a}$5	$_{b}$34	.04	.01	.22
F	Erigeron pumilus	2	-	-	-	-	-	-
F	Euphorbia sp.	$_{b}$13	$_{a}$4	$_{a}$-	$_{a}$-	.01	-	-
F	Gilia hutchinifolia (a)	-	$_{b}$28	$_{a}$-	$_{c}$53	.08	-	.26
F	Haplopappus acaulis	$_{c}$70	$_{b}$31	$_{b}$29	$_{a}$3	.39	.24	.04
F	Heterotheca villosa	-	12	4	4	.16	.15	.01
F	Hymenoxys acaulis	-	-	5	4	-	.06	.01
F	Lappula occidentalis (a)	-	$_{a}$2	$_{a}$-	$_{b}$10	.00	-	.02
F	Lactuca serriola	-	1	-	-	.00	-	-
F	Lepidium densiflorum (a)	-	-	-	1	-	-	.01
F	Lesquerella ludoviciana	10	-	-	-	-	-	.00
F	Lithospermum sp.	-	2	-	-	.00	-	-
F	Lychnis drummondii	$_{a}$-	$_{a}$11	$_{a}$-	$_{b}$101	.02	-	2.25
F	Machaeranthera grindelioides	10	-	-	3	-	-	.00
F	Medicago sativa	-	-	-	-	.01	-	.00
F	Penstemon sp.	3	5	-	2	.04	-	.01
F	Petradoria pumila	28	14	16	13	.47	1.12	.50
F	Phlox hoodii	$_{b}$25	$_{a}$11	$_{ab}$10	$_{ab}$18	.05	.07	.25
F	Physaria sp.	1	-	-	-	-	-	-
F	Sisymbrium altissimum (a)	$_{a}$1	$_{b}$13	$_{a}$-	$_{a}$2	.03	-	.00
F	Streptanthus cordatus	-	7	-	8	.02	-	.10
F	Townsendia incana	3	-	-	-	-	-	-
F	Tragopogon dubius	$_{b}$17	$_{a}$3	$_{a}$-	$_{a}$-	.00	-	-
Total for Annual Forbs		1	65	5	187	0.16	0.00	1.05
Total for Perennial Forbs		197	168	64	201	1.40	1.66	3.71
Total for Forbs		198	233	69	388	1.57	1.67	4.76

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

BROWSE TRENDS --
Management unit 13B, Study no: 9

Type	Species	Strip Frequency			Average Cover %		
		'95	'00	'05	'95	'00	'05
B	Amelanchier utahensis	1	0	1	-	-	-
B	Artemisia nova	13	13	12	.85	1.00	.37
B	Artemisia tridentata wyomingensis	5	1	0	.18	.15	-
B	Cercocarpus montanus	10	5	9	3.25	2.76	1.58
B	Ephedra viridis	1	1	1	.15	.15	.03
B	Gutierrezia sarothrae	30	32	21	.71	1.28	.76
B	Juniperus osteosperma	0	7	8	2.95	5.73	3.52
B	Opuntia sp.	1	2	1	-	.03	.15
B	Pinus edulis	0	16	16	11.50	12.08	5.91
B	Sclerocactus sp.	1	5	2	.00	.06	.00
B	Symphoricarpos oreophilus	1	1	2	.15	.15	.15
B	Yucca harrimaniae	1	2	1	.00	.00	-
Total for Browse		64	85	74	19.75	23.42	12.49

CANOPY COVER, LINE INTERCEPT --
Management unit 13B, Study no: 9

Species	Percent Cover	
	'00	'05
Amelanchier utahensis	-	1.39
Artemisia nova	-	.66
Cercocarpus montanus	-	3.08
Ephedra viridis	-	.26
Gutierrezia sarothrae	-	.68
Juniperus osteosperma	9.00	10.44
Opuntia sp.	-	.05
Pinus edulis	12.19	17.83
Sclerocactus sp.	-	.03
Symphoricarpos oreophilus	-	.23

KEY BROWSE ANNUAL LEADER GROWTH --
Management unit 13B, Study no: 9

Species	Average leader growth (in)
	'05
Cercocarpus montanus	3.1

POINT-QUARTER TREE DATA --
Management unit 13B, Study no: 9

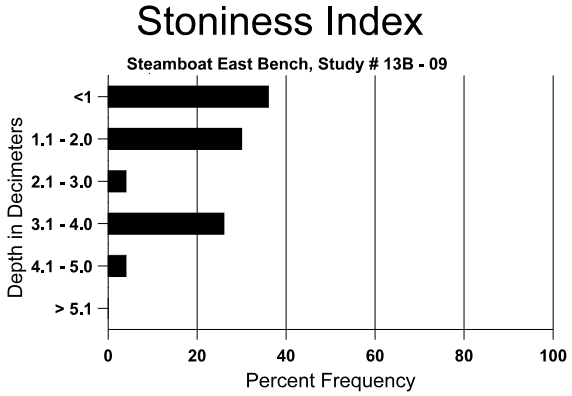
Species	Trees per Acre		Average diameter (in)	
	'00	'05	'00	'05
Juniperus osteosperma	63	66	4.9	8.2
Pinus edulis	274	184	2.4	3.9

BASIC COVER --
Management unit 13B, Study no: 9

Cover Type	Average Cover %			
	'86	'95	'00	'05
Vegetation	2.00	27.71	32.60	22.95
Rock	7.00	15.66	11.94	11.42
Pavement	1.75	.52	6.53	1.84
Litter	55.50	41.47	50.87	37.79
Cryptogams	1.00	.80	1.73	.43
Bare Ground	32.75	26.00	28.85	37.29

SOIL ANALYSIS DATA --
Herd Unit 13B, Study # 9, Study Name: Steamboat East Bench

Effective rooting depth (in)	Temp °F (depth)	pH	%sand	%silt	%clay	%0M	ppm P	ppm K	dS/m
11.7	63.4 (13.2)	7.3	57.6	17.1	25.2	2.0	2.0	80.0	0.6



PELLET GROUP DATA --
Management unit 13B, Study no: 9

Type	Quadrat Frequency		
	'95	'00	'05
Rabbit	17	15	28
Elk	9	-	8
Deer	6	10	16
Cattle	-	1	2

Days use per acre (ha)	
'00	'05
-	-
7 (19)	7 (18)
17 (42)	3 (6)
-	5 (13)

BROWSE CHARACTERISTICS --
Management unit 13B, Study no: 9

		Age class distribution (plants per acre)					Utilization					
Year	Plants per Acre (excluding seedlings)	Seedling	Young	Mature	Decadent	Dead	% moderate	% heavy	% decadent	% dying	% poor vigor	Average Height Crown (in)
Amelanchier utahensis												
86	**0**	-	-	-	-	-	0	0	-	-	0	-/-
95	**20**	40	20	-	-	-	0	0	-	-	0	119/169
00	**0**	-	-	-	-	-	0	0	-	-	0	109/167
05	**20**	-	20	-	-	-	0	0	-	-	0	89/119
Artemisia nova												
86	**1199**	-	366	433	400	-	50	6	33	3	6	8/11
95	**440**	40	120	300	20	120	55	18	5	-	0	10/18
00	**440**	-	20	420	-	180	5	0	0	-	0	7/17
05	**400**	40	40	220	140	220	5	20	35	-	0	9/21
Artemisia tridentata wyomingensis												
86	**132**	-	33	33	66	-	50	25	50	15	25	5/7
95	**120**	-	20	60	40	40	0	33	33	-	0	14/22
00	**40**	-	-	40	-	60	0	100	0	-	0	9/17
05	**0**	-	-	-	-	-	0	0	0	-	0	14/20
Atriplex canescens												
86	**0**	-	-	-	-	-	0	0	-	-	0	-/-
95	**0**	-	-	-	-	-	0	0	-	-	0	-/-
00	**0**	-	-	-	-	-	0	0	-	-	0	-/-
05	**0**	-	-	-	-	-	0	0	-	-	0	31/39
Cercocarpus montanus												
86	**0**	-	-	-	-	-	0	0	0	-	0	-/-
95	**240**	40	120	100	20	20	8	0	8	8	8	68/94
00	**120**	-	40	60	20	20	17	0	17	-	0	74/92
05	**240**	-	160	40	40	20	42	8	17	8	8	55/59

		Age class distribution (plants per acre)					Utilization					
Year	Plants per Acre (excluding seedlings)	Seedling	Young	Mature	Decadent	Dead	% moderate	% heavy	% decadent	% dying	% poor vigor	Average Height Crown (in)
Chrysothamnus nauseosus hololeucus												
86	**0**	-	-	-	-	-	0	0	-	-	0	-/-
95	**0**	-	-	-	-	-	0	0	-	-	0	43/56
00	**0**	-	-	-	-	-	0	0	-	-	0	-/-
05	**0**	-	-	-	-	-	0	0	-	-	0	-/-
Ephedra viridis												
86	**0**	-	-	-	-	-	0	0	-	-	0	-/-
95	**20**	-	-	20	-	-	0	0	-	-	0	34/35
00	**20**	-	-	20	-	-	0	0	-	-	0	33/57
05	**20**	-	-	20	-	-	100	0	-	-	0	33/57
Gutierrezia sarothrae												
86	**1566**	-	233	1300	33	-	0	0	2	-	0	8/10
95	**1680**	260	140	1480	60	80	0	0	4	1	1	9/13
00	**1300**	-	40	880	380	560	0	0	29	23	29	6/11
05	**700**	20	60	620	20	-	0	0	3	3	3	15/23
Juniperus osteosperma												
86	**0**	33	-	-	-	-	0	0	0	-	0	-/-
95	**0**	-	-	-	-	-	0	0	0	-	0	-/-
00	**140**	-	20	120	-	-	0	0	0	-	0	-/-
05	**160**	-	40	100	20	40	0	0	13	-	0	-/-
Opuntia sp.												
86	**0**	-	-	-	-	-	0	0	-	-	0	-/-
95	**20**	-	-	20	-	-	0	0	-	-	0	3/11
00	**40**	-	-	40	-	-	0	0	-	-	0	3/12
05	**40**	-	-	40	-	-	0	0	-	-	0	3/13
Pinus edulis												
86	**333**	-	100	200	33	-	0	0	10	6	10	81/39
95	**0**	20	-	-	-	-	0	0	0	-	0	-/-
00	**460**	20	240	220	-	-	0	0	0	-	0	-/-
05	**460**	-	160	300	-	160	0	0	0	-	0	-/-
Purshia tridentata												
86	**0**	-	-	-	-	-	0	0	-	-	0	-/-
95	**0**	-	-	-	-	-	0	0	-	-	0	-/-
00	**0**	-	-	-	-	-	0	0	-	-	0	-/-
05	**0**	-	-	-	-	-	0	0	-	-	0	34/48

		Age class distribution (plants per acre)					Utilization					
Year	Plants per Acre (excluding seedlings)	Seedling	Young	Mature	Decadent	Dead	% moderate	% heavy	% decadent	% dying	% poor vigor	Average Height Crown (in)
Sclerocactus sp.												
86	**0**	-	-	-	-	-	0	0	-	-	0	-/-
95	**40**	-	20	20	-	-	0	0	-	-	0	11/8
00	**160**	-	-	160	-	-	0	0	-	-	0	5/7
05	**40**	-	-	40	-	40	0	0	-	-	0	5/6
Symphoricarpos oreophilus												
86	**0**	-	-	-	-	-	0	0	-	-	0	-/-
95	**20**	-	-	20	-	-	0	0	-	-	0	30/57
00	**20**	-	-	20	-	-	0	0	-	-	0	-/-
05	**100**	-	-	100	-	-	0	0	-	-	0	32/59
Yucca harrimaniae												
86	**832**	-	233	566	33	-	0	0	4	2	4	12/16
95	**20**	-	-	20	-	-	0	0	0	-	0	4/2
00	**40**	-	40	-	-	20	0	0	0	-	0	12/13
05	**20**	-	-	20	-	-	0	0	0	-	0	11/15

SUMMARY

WILDLIFE MANAGEMENT UNIT - 13 B - DOLORES TRIANGLE

All 9 sites in the herd unit 13B, Dolores Triangle, were read in 1986, 1995, 2000, and 2005. Four of the 9 studies in the unit sample pinyon-juniper chainings completed in 1968. The chaining sites include Fish Park (13B-3), Ryan Park (13B-6), Steamboat Mesa North (13B-7), and Steamboat East Bench (13B-9). Four sites are considered sagebrush/grass sites. These sites include Lower Westwater (13B-1), Upper Westwater (13B-2), Buckhorn Draw (13B-5), and Steamboat Mesa South (13B-8). The final site, Red Cliffs (13B-4), is classified as a blackbrush site. The Trend Summary table summarizes trends for all sites for all years.

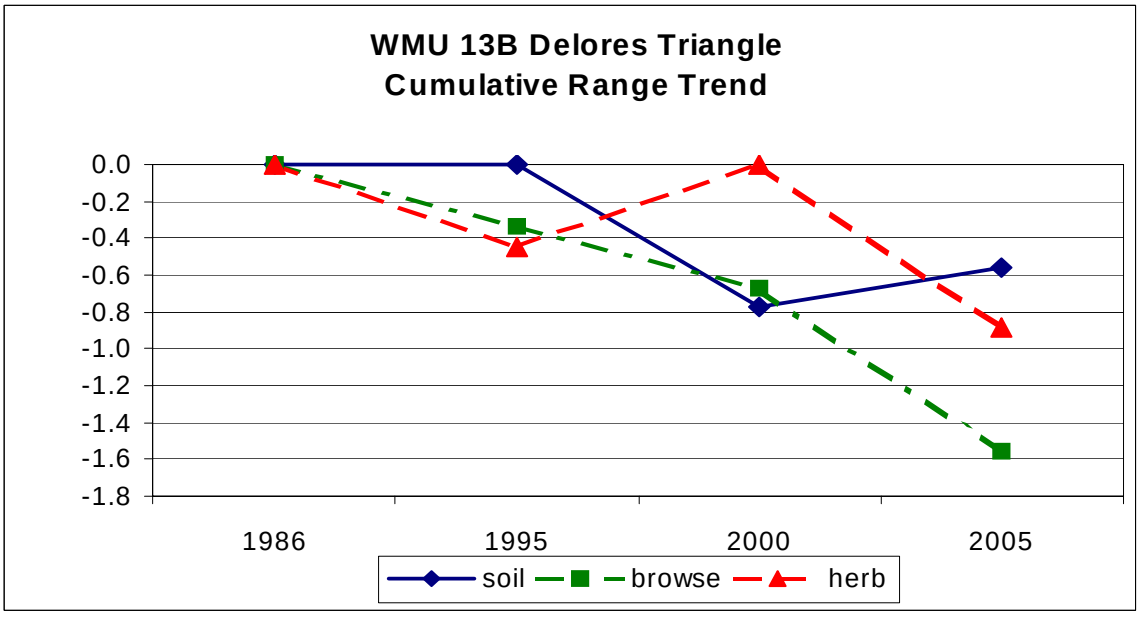
In 2005, the soil for most sites were stable or improving. This is due to improved precipitation in 2005 and higher ground cover. Browse trends have steadily declined over the past 10 years. Wildfire at Upper Westwater and Ryan Park has completely removed palatable browse species. Big sagebrush has nearly completely died out at Lower Westwater due to lack of recruitment. Wyoming Big sagebrush is the key browse species on five sites (Basin and Wyoming big sagebrush mixture at Fish Park). The following values with averaged data from 1995, 2000, and 2005 illustrate the declining trends of big sagebrush.

- Big sagebrush density (plants/acre).....1,840, 2,230, and 1,150.
- Percent decadence .....12%, 18%, and 46%.
- Percent dying.....9%, 8%, and 33%.

Herbaceous trends declined sharply in 2005. Higher precipitation resulted in higher amounts of cheatgrass. Average sum of nested frequency for perennial grasses decreased 26% from 2000 and was 67% higher for cheatgrass. Positively, sum of nested frequency of perennial forbs increased 68% from 2000-2005, but forbs make up a relatively small part of the vegetative composition in this area.

Cumulative Range Trends -- WMU 13B Delores Triangle

	1986	1995	2000	2005
soil	est	0.0	-0.8	-0.6
browse	est	-0.3	-0.7	-1.6
herb	est	-0.4	0.0	-0.9
	9 sites	9 sites	9 sites	9 sites



TREND SUMMARY

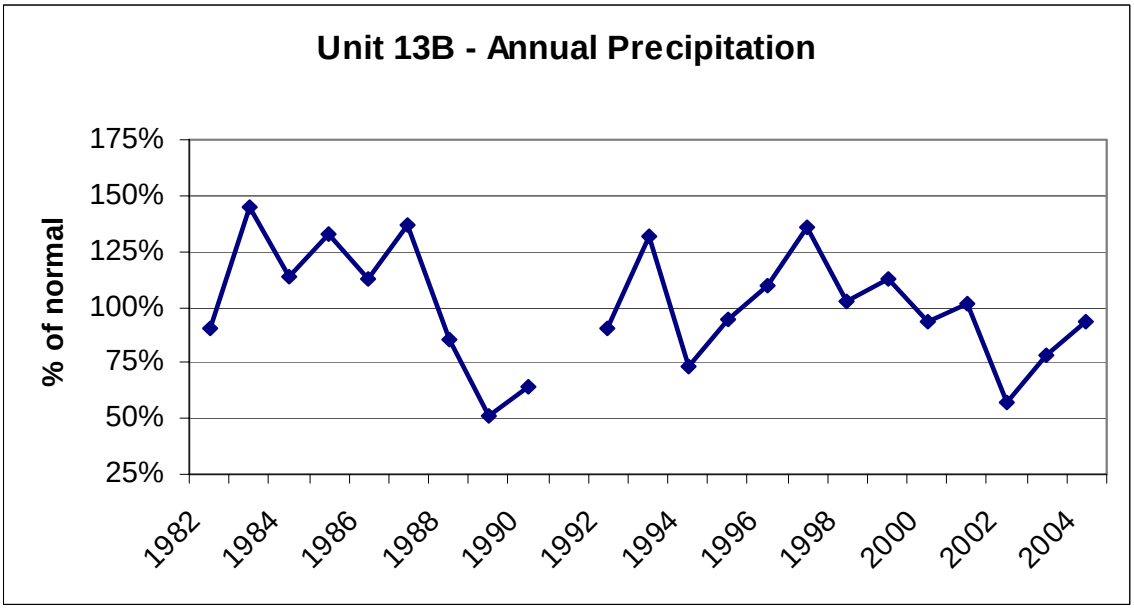
Site No. and Name	Category	1986	1995	2000	2005
13B-1 Lower Westwater	soil	est	0	-1	-1
	browse	est	-2	-2	-2
	herbaceous understory	est	-2	-1	-2
13B-2 Upper Westwater	soil	est	0	-1	0
	browse	est	-2	0	0
	herbaceous understory	est	0	0	0
13B-3 Fish Park	soil	est	0	0	0
	browse	est	+2	+2	-2
	herbaceous understory	est	-1	0	-1
13B-4 Red Cliffs	soil	est	0	0	0
	browse	est	0	0	0
	herbaceous understory	est	-2	+2	-2
13B-5 Buckhorn Draw	soil	est	0	-1	+2
	browse	est	+1	0	-2
	herbaceous understory	est	0	+1	-2
13B-6 Ryan Creek	soil	est	0	-2	0
	browse	est	-2	0	0
	herbaceous understory	est	0	+1	0
13B-7 Steamboat Mesa North	soil	est	0	0	-1
	browse	est	0	0	0
	herbaceous understory	est	+1	+1	0
13B-8 Steamboat Mesa South	soil	est	0	-2	+2
	browse	est	0	+2	-2
	herbaceous understory	est	0	+1	-2
13B-9 Steamboat Mesa East Bench	soil	est	0	0	-1
	browse	est	0	-1	0
	herbaceous understory	est	0	-1	+1

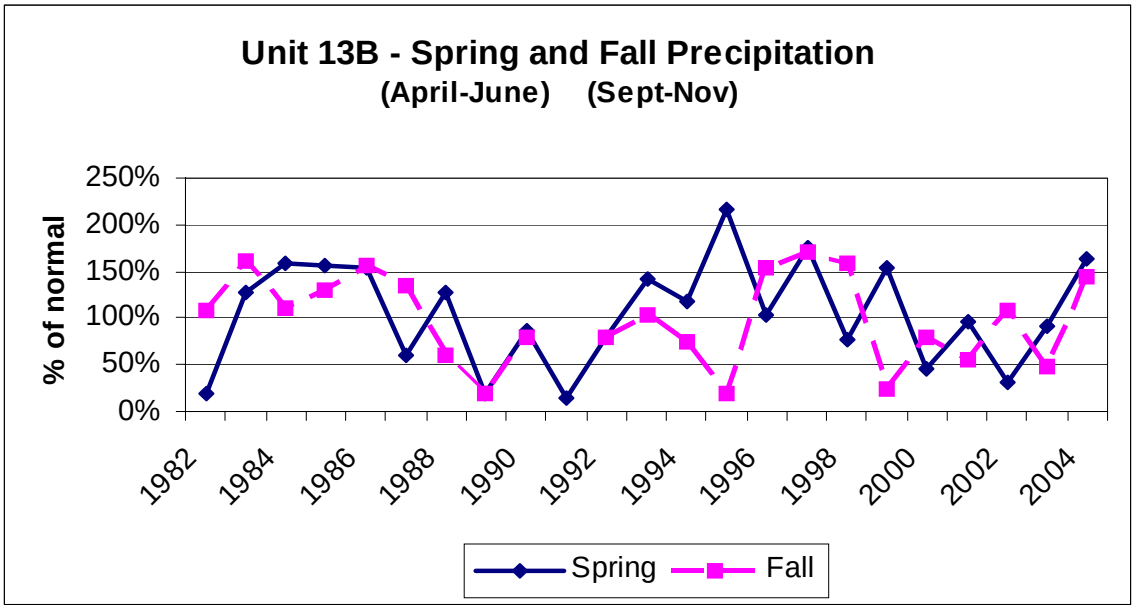
est = established, (-2) = down, (-1) = slightly down, (0) = stable, (+1) = slightly up, (+2) = up, (NA) = not applicable, no browse on site

	Category	1986	1995	2000	2005
Average Range Trend	soil	est	0.0	-0.8	0.2
	browse	est	-0.3	-0.3	-0.9
	herbaceous understory	est	-0.4	0.4	-0.9
Number of Sites Read		9	9	9	9

est = established, (-2) = down, (-1) = slightly down, (0) = stable, (+1) = slightly up, (+2) = up, (NA) = not applicable, no browse on site

Precipitation graphs for the Delores Triangle unit. Data is percent of normal precipitation averaged for weather stations in Moab and Castle Valley (Utah Climate Summaries 2005).





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