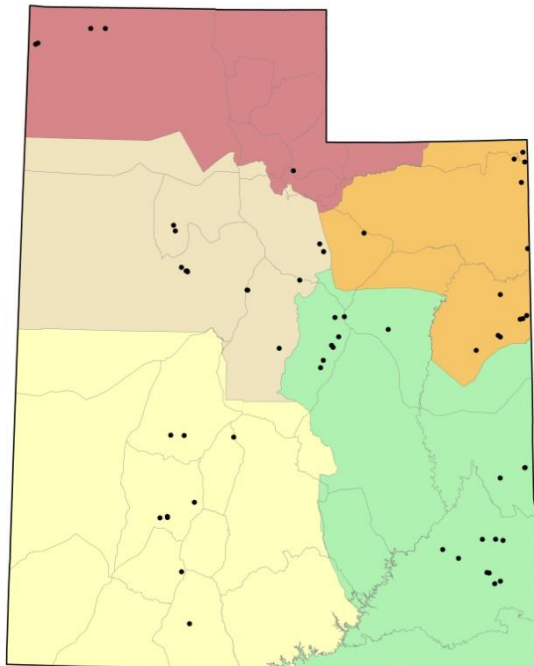


Watershed Restoration Initiative Vegetation Monitoring Report 2014



**PUBLICATION NUMBER 15-09
REPORT FOR FEDERAL AID PROJECT W-82-R-59**

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

2014 Watershed Restoration Initiative Vegetation Monitoring Report

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Performance Report for Federal Aid Project W-82-R-59

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PROGRAM NARRATIVE

State: UTAH

Project Number: W-82-R-59

Grant Title: Wildlife Habitat and Monitoring

Project Title: Wildlife Habitat Monitoring/Watershed Restoration Initiative

Need: Utah's Watershed Restoration Initiative (WRI) is a partnership-driven effort to conserve, restore and manage ecosystems in priority areas across the state. The WRI focuses on enhancing Utah's water quality and yield as well as its biological diversity. To achieve these results, WRI partners fund and perform physical and mechanical habitat manipulation, negotiate administrative changes in land management, and strengthen communication and team-building among the public and stakeholders. As part of the habitat manipulation projects, range trend data is collected on selected treatment areas. Pre-treatment and post-treatment data is collected. The WRI range trend studies are used to evaluate the success and failure of land treatment projects. The health and vigor of big game populations are closely correlated to the quality and quantity of forage in key areas. Range trend data are used by Utah Division of Wildlife Resources (DWR) biologists, public land managers and private landowners for habitat improvement planning purposes.

Objective: Monitor, evaluate, and report results of habitat treatment projects conducted under the WRI throughout the state, and inform DWR biologists, public land managers and private landowners of significant changes in plant community composition in these areas.

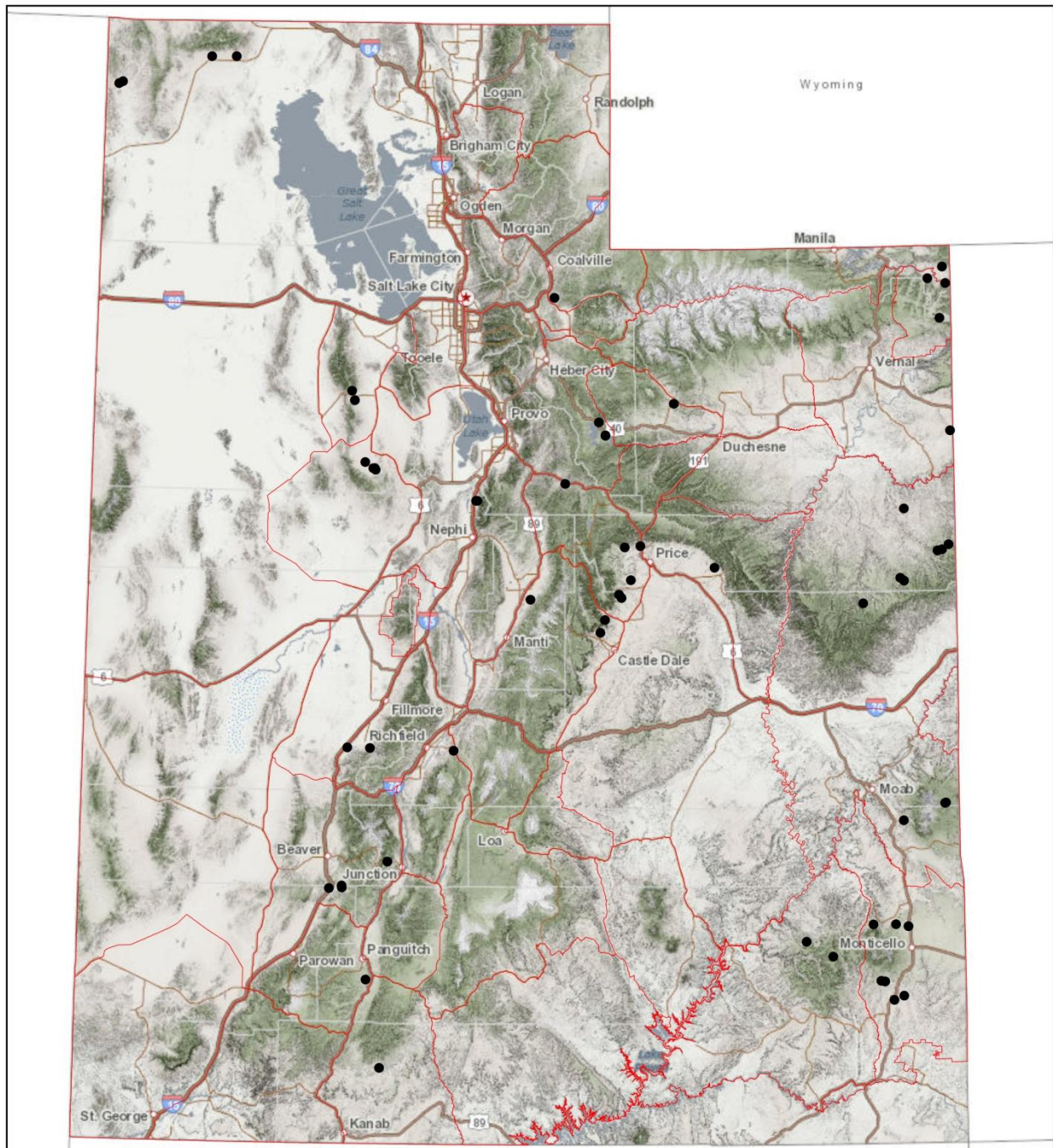
Expected Results and Benefits: WRI range trend studies in each region will be reread, and vegetation condition and trend assessments will be made for project areas. DWR biologists, land management personnel from the United States Forest Service (USFS) and Bureau of Land Management (BLM), and private landowners will use the WRI database to evaluate the impact of land management programs on big game habitat. Annual reports will be readily available on the DWR website, on CDs, and in hard copies located in DWR regional offices, BLM and USFS offices, and public libraries.

REMARKS

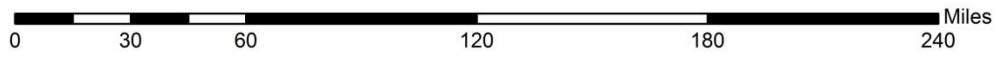
The work completed during the 2014 field season and reported in this publication is vegetation monitoring data of habitat restoration projects initiated as part of the Watershed Restoration Initiative, which occurred throughout the state of Utah.

The BLM and USFS offices provided information and/or assistance in completion of the trend studies, which add to the value of this interagency report. Private landowners were cooperative in allowing access to study sites located on their land.

WRI STUDY SITES SURVEYED IN 2014



● Study Location



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 vegetation 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 has demonstrated a definite pattern of use during normal climatic conditions over a long period. Trend studies are located within these areas of high use and/or crucial 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. Half-high steel fence posts or similar material permanently marks all sampling baselines. The first, or “0 foot baseline stake”, is marked with a metal tag for proper identification of the transect.

Vegetation Composition

Determining vegetation characteristics for each “key” area is determined by setting up five consecutive 100 foot 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 predetermined footmarks and centered on the 50-foot mark of the belt. A rebar stake is placed at the beginning of each belt to ensure that future sampling is in consistent alignment with the originally sampled belt. A 1/4 m² quadrat is centered every 5 feet along the same side of the belt, starting at the 5-foot mark. Cover and nested frequency values are determined for vegetation, litter, rock, pavement, cryptogams, and bare ground. Cover and nested frequency values are also estimated for all plant species occurring within a quadrat, including annual species. However, prior to 1992 no data was collected for annual species.

Percent Cover: Cover is determined using an ocular cover estimation procedure using seven cover classes (Bailey and Poulton 1968, Daubenmire 1959). 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% (Figure 1). For example, to estimate vegetation 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 percent cover for a given site.

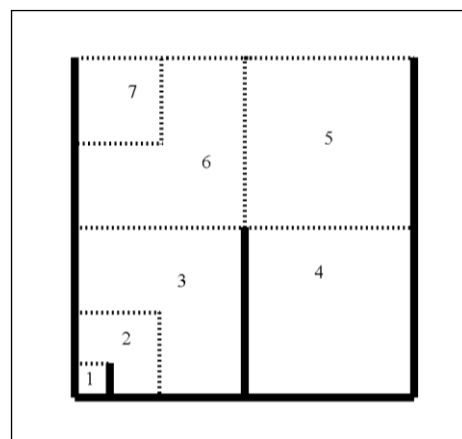


Figure 1. Cover classes of the 1/4 m² sampling quadrat.

Total canopy cover of shrubs or trees is also estimated using the line-intercept method (¹U.S. Department of Interior Bureau of Land Management 1999). The total distance intersecting the line by a particular species of tree or shrub along each belt is divided by the total length of the line to give percent canopy cover. A six-inch gap rule was used in measuring intercept; gaps less than six inches between the same tree or shrub species were included in total measurement (Boyd, Bates, & Miller 2007).

Nested Frequency: 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 (Figure 2).

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 independently and do not necessarily indicate changes in composition and/or distribution of key plant species.

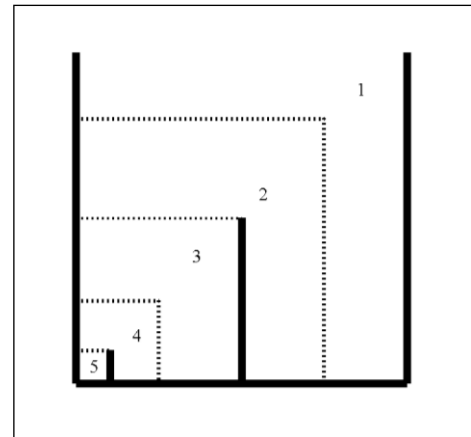


Figure 2. Nested frequency sub-quadrats of the 1/4 m² sampling quadrat.

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

Shrub Density & Characterization: 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 categorized using a modified Cole Browse Method (²U.S. Department of Interior Bureau of Land Management 1999):

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 that is no longer living.

Data Collection for Aspen Density by Size Class: Starting in 2011, aspen density was estimated using an aspen classification method by Jones, Burton, and Tate (2005). All aspen stems within 67 cm of each side of 100 ft distance tape are counted and recorded in the following size classes:

Size Class I = less than or equal to 1.5 feet (18 inches). Scan as *Seedling*

This class size represents the annual or recent recruitment of suckers due to suckering at root buds.

Size Class II = greater than 1.5 feet to 5 feet. Scan as *Young*

This class size represents the survival of suckers and the progression of recruitment of existing suckers that are vulnerable to browsing of the terminal leader.

Size Class III = greater than 5 feet and up to 1 inch dbh. Scan as *Mature*

This class size represents the aspen regeneration grown above the height range that is vulnerable to browsing; the minimum height for size class III represents the maximum browse line height for herbivores present.

Size Class IV = greater than 1 inch dbh. Scan as *Decadent*

Class IV captures information for all remaining cohorts in the plot.

Shrubs are also rated according to their availability and the amount of use they display, and placed in one of nine 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.

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

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

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

*Degree of hedging is based on leader use over the past three years: current annual growth is not included.

Shrubs are also rated on their health and placed into one of four 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.

Point-Center Quadrat Method: Tree density is determined using the point-center quarter method (Mitchell 2007, Dahdouh-Guebas and Koedam 2006, Pollard 1971, Cottam and Curtis 1956) at 100-foot intervals along the baseline measuring to a maximum of 15 meters. If trees are rare due to a treatment or wildfire, the sampling area is extended to 200 foot intervals measuring to a maximum of 30 meters, and 300 feet is 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 distributed.

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 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.

In order to assess and interpret the landscape in a more effective way, trend assessments are no longer formally addressed within the report and have been replaced by the Desirable Components Index (DCI), Woodland Succession Phase models, and State-and-Transition Models that are associated with their Ecological Site as described by the National Resources Conservation Service (NRCS). Using these three methods in conjunction will give land managers a more complete assessment of the area of interest, and what measures, if any, need to be taken in order to improve the ecology of a site.

Desirable Components Index: Range Trend Program personnel created the desirable components index (DCI) for deer 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 vegetation components (i.e., preferred browse cover, shrub decadence, shrub young recruitment, cover of perennial grasses, cover of perennial forbs, and cover of annual grasses and presence of noxious weeds). Although the index may be useful for assessing habitat for other species (i.e. 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 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. 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 grass cover, 5% perennial forb cover, and less than 5% annual grass cover. Based on these criteria, communities are scored in a 100-point scale using the following system:

Preferred Browse (60 points)

(Preferred Browse species are favorable or crucial to deer and are broken into three categories; Highly Preferred, Preferred and Key).

Preferred Browse Cover (30 pts. possible)

- Highly Preferred species = 1.5 points for each 1% of cover, Preferred species = 1.25 points for each 1% of cover and Key species = 1 point for each 1% of cover (maximum 30 points)

Percent Decadence (15 points possible)

- 0.3 points for each 1% under 50% decadence and -0.3 points for each 1% over 50% decadence (maximum 15 points or minimum -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

The Desirable Components Index ratings are divided into three categories because each community has a different ecological potential. These categories include low potential (Semidesert Ecological Site), mid-level potential (Upland Ecological Site) and high potential (Mountain and High Mountain Ecological Sites) categories. The three categories are scored based on the above criteria as follows:

Low potential scale (Semidesert Ecological Site)

> 65	Excellent
45-64	Good
25-44	Fair
10-24	Poor
< 10	Very Poor

Mid-level potential scale (Upland Ecological Site)

> 80	Excellent
79-65	Good
64-50	Fair
49-35	Poor
< 35	Very Poor

High potential scale (Mountain and High Mountain Ecological Site)

> 90	Excellent
89-70	Good
69-55	Fair
54-40	Poor
< 39	Very Poor

Once a DCI score has been determined for a particular site, the score can be compared to previous sample years in order to determine a quality trend and better assess conditions that may need to be addressed within the community for mule deer habitat (i.e. .increasing preferred browse cover, decreasing the decadence to young ratio, increasing perennial herbaceous cover, or control/removal of noxious weeds etcetera).

Woodland Succession: Although pinyon-juniper woodlands are an import community within their own ecotype, sagebrush steppe, mixed shrub, and grassland communities have experienced significant encroachment of pinyon-juniper woodlands. As active encroachment within these communities continues abiotic and biotic structures and functions are interrupted, which lead to the reduction of wildlife habitat, forage production, and biodiversity. Moreover, encroachment increases fuel load and fire frequency jeopardizing remnant shrub and grass communities to future loss. In attempt to describe the succession or maturation of pinyon-juniper, phases of succession are presented within the report to aid managers in identifying the progress of infilling on a particular site and what type of input may be necessary for site rehabilitation (Tausch, Miller, Roundy, & Chambers, 2009).

Phase I - is described as having an open canopy where crown lift is absent, there is active recruitment of young pinyon-juniper trees to the community with low seed production, and an intact shrub understory (Tausch, Miller, Roundy, & Chambers, 2009).

Phase II - is described by the expansion of the pinyon-juniper canopy where crown lift is absent, there is active recruitment of young pinyon-juniper trees to the community with moderate to high seed production, and a shrub understory that ranges from nearly intact to one that is significantly thinning (Tausch, Miller, Roundy, & Chambers, 2009).

Phase III - is described by the stabilization of the pinyon-juniper canopy where crown lift is present and lower limbs are dying, recruitment of young trees is limited with low to moderate seed production, and the shrub understory exhibits 75% or greater dead plants throughout the respective population (Tausch, Miller, Roundy, & Chambers, 2009).

State-and-Transition: Ecological sites are individual land types that have the ability to support specific plant species or communities based on the characteristic for their respective land type. Each ecological site therefore has its own potential and responds according to that potential when a site is influenced by natural or anthropomorphic inputs. State-and-Transition modeling attempts to describe an individual ecological site's response to these inputs by dividing the plant communities into states that are comprised of one to multiple community phases and to potentially predict the direction of a community transitioning from one state to another. Although State-and-Transitions are not per se trends, but rather an illustration of a community's current state in which it has the potential to respond positively or negatively to triggers and thresholds specific to that ecological site. As a tool, State-and-Transition models can provide a way for land managers to interpret a landscape and provide meaningful assessment and monitoring for landscape management. This report identifies each site's potential by supplying the ecological site name and corresponding number, and where available, verifying the provided NRCS state-and-transition models with range trend's quinquennial data, and a description of the transitions between states and phases over the duration of each study. Where not available, state-and-transition models are not referenced, but an attempt is made to describe the transitional processes that have occurred over the duration of a particular study not referenced to a model.

Report Interpretation

The following tables and partial tables that are taken from study number 22-12 help illustrate how to interpret the data and some basic comparisons that can be made with the data.

Site Information: The "Disturbance History" table summarizes what type of treatments and/or disturbances that have affected the site over its history. Where available, historic treatments have been listed that have occurred on the site prior to establishment. If applicable, treatment projects that are associated with the Utah Watershed Restoration Initiative (WRI) are referenced by their project number and are hyperlinked to the completion form of that particular project. Finalization dates or the date in which a particular disturbance occurred are listed with reported affected acreage of the respective disturbance. Seed mix tables are also published when a seed mix is made available and are referenced to a particular project by hyperlink to the associated WRI project title page. Additionally, multiple seed mixes are often associated with one particular treatment and are combined to simplify the appearance of the report. The disturbance history for 22-12 indicates that the Milford Flat fire occurred in 2007 and affected 356,665 acres, and in response to the fire, a chaining with two seedings were performed as part of the Milford Flat Fire Rehabilitation and Contracting project. The project is associated with the WRI project #1218 and was completed in the fall of 2007. The Chaining treatment area encompassed 76,454 acres.

DISTURBANCE HISTORY--

Management unit 22, Study no: 12

<i>Treatment/Disturbance</i>	<i>Name</i>	<i>WRI DB #</i>	<i>Date</i>	<i>Size (acres)</i>
Fire	Milford Flat		2007	356,665
Chaining	Milford Flat Fire Rehabilitation and Contracting	1218	Fall 2007	76,454
Seeding Before	Milford Flat Fire Rehabilitation and Contracting	1218	Fall 2007	12,917
Seeding After	Milford Flat Fire Rehabilitation and Contracting	1218	Fall 2007	7,100

The table is a recorded disturbance history of the study site.

SEED MIX--

Management unit 22, Study no: 12

Project Name: Milford BLM Mix 2 WRI Database #: 1218			Project Name: Milford BLM Mix 2 Wyoming Sage WRI Database #: 1218				
Application: Aerial Seed		Acres	12917	Application: Aerial Seed		Acres	7100
Seed Type		lbs in mix	lbs/acre	Seed Type		lbs in mix	lbs/acre
G	Crested Wheatgrass 'Hycrest'	26500	2.05	F	Alfalfa 'Ladak'	3550	0.50
G	Indian Ricegrass 'Rimrock'	10850	0.84	B	Sagebrush, Wyoming	3550	0.50
G	Intermediate Wheatgrass 'Rush'	10150	0.79	Total Pounds		7100	1.00
G	Pubescent Wheatgrass 'Luna'	16100	1.25	PLS Pounds			0.55
G	Siberian Wheatgrass 'P-27'	1200	0.09				
G	Siberian Wheatgrass 'Vavilov'	1500	0.12				
G	Thickspike Wheatgrass 'Bannock'	16350	1.27				
F	Alfalfa 'Ladak'	7150	0.55				
F	Blue Flax 'Appar'	3600	0.28				
F	Sainfoin 'Eski'	2200	0.17				
F	Small Burnett 'Delar'	19550	1.51				
F	Western Wheatgrass 'Arriba'	20400	1.58				
Total Pounds		135550	10.49				

Habitat and Vegetation Information: Summarized within this section is habitat for big game and other species of interest, and further categorizes the habitat into seasonal range and its value description of the habitat for the allied species. The “Vegetation History” table summarizes what major vegetation types have occurred on the site over the duration of the study. Ranges of sample years provide what length of time the dominant vegetation type has persisted on the site with its corresponding species listed in the adjacent cell. Most vegetation types will have one dominant species listed, which is usually a shrub species. For example, some sites will have a shrub canopy that dominates the site with a perennial herbaceous understory that has similar average cover as the canopy, but occurs infrequently. In this case, precedence is given to the shrub layer. Vegetation type can also be shared in the case of co-dominance. Using the example above, if the herbaceous understory had a high cover then the shrub layer would likely share the vegetation type with the perennial understory. The history of pinyon-juniper encroachment is characterized within the table stating the phase(s) of succession for the corresponding years of persistence. Phases of woodland succession may also influence the vegetation type. For example, pinyon-juniper encroachments in phase I are subordinate to the dominant vegetation type and are not considered co-dominant and may not be listed within the vegetation type column. Trees in phase II are considered co-dominant with the co-dominant understory counterpart, and under these circumstances tree species is then listed with the understory counterpart within the vegetation type column. The following “Vegetation History” table indicates that Wyoming big sagebrush was the dominant vegetation type on the site from 1985 to 2008, but transitioned to an annual-perennial grass community from 2008 to 2013, and woodland succession has remained in phase I over the sample years. The transition from Wyoming big sagebrush to an annual-perennial grass community that occurred between the 2003 and 2008 sample years indicates that a trigger mechanism has occurred and a threshold has been crossed that lead to the change in community composition, and in this case is related to the Milford Flat fire that occurred in 2007.

VEGETATION HISTORY--

Management unit 22, Study no: 12

<i>Year</i>	<i>Vegetation Type</i> ¹	<i>Woodland Succession</i> ²
1985-2003	Wyoming Big Sagebrush	Phase I
2008-2013	Annual-Perennial Grass	Phase I

¹Vegetation Type (Appendix A - Vegetation Type), ²Woodland Succession (Tausch, Miller, Roundy, & Chambers, 2009).

Site Potential: This section is prefaced by the listing of the average annual precipitation, NRCS ecological site name, and NRCS ecological site number. The ecological site name and numbers are determined by range trend personnel by digging a pit on site to establish the soil characteristics of the site, which is then dichotomized to establish the name of the ecological site and number.

Chemical and textural characteristics are also listed and were determined by laboratory analysis from a composite soil sample taken near each of the five baseline starting stakes (Allison and Moode 1965, Day 1965, Kenney and Nelson 1982, Normandin et. al. 1998, Olsen et. al. 1954, Rhodes 1982, Schoenau and Karamonos 1993, Sims and Jackson 1934, Walkley and Black 1971).

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

Ultra acidic	< 3.5
Extremely Acidic	3.5-4.4
Very Strong Acidic	4.5-5.0
Strongly Acidic	5.1-5.5
Moderately Acidic	5.6-6.0
Slightly Acidic	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) and potassium (K) are also included. Values for phosphorus and potassium less than 6 ppm and 60 ppm, respectively, are considered to have low availability for plant growth and development (Tiedemann and Lopez 2004).

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

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

SOIL ANALYSIS DATA--

Management unit 22, Study no: 12

<i>Texture</i>	<i>Sand (%)</i>	<i>Silt (%)</i>	<i>Clay (%)</i>	<i>pH</i>	<i>ds/m</i>	<i>OM (%)</i>	<i>PPM P</i>	<i>PPM K</i>	<i>Year Sampled</i>
Sandy Loam	62.7	20.7	16.6	6.7	0.6	1.8	7.5	96.0	1998

State-and Transitions: The state-and-transitions section will be prefaced by whether or not a site has a defined state-and-transitions model proposed for the ecological site. If a model is not proposed, an attempt is made to find a similar ecological site that has a proposed state-and transition model, but is not directly correlated to the site being evaluated. When state-and-transition models are available, an effort is made to summarize the community transitions that have occurred over the duration of the study in conjunction with the referenced state-and-transition diagram provided by the NRCS. This section closely reflects the transitions captured in the “vegetation history” table, but an emphasis is placed on the states and community phases of a particular vegetation type, and what community pathway (mechanism) drove the community phase to its current ecological state. States are identified in the diagram by whole numbers. For example, the reference state is referred to by 1, the current potential state by 2, and subsequent states are labeled 3, 4 and etc. while community phases are nested within a state and are identified by rational numbers. For example, community phases in state 1 would be identified by 1.1, 1.2, 1.3 etc. Transitions are labeled alpha-numerically and are preceded by the letter “T”. This section of the report does not stand alone and care must be taken by the reader to reference the provided state-and-transition model in order to understand the driving factors within the community.

A defined [state and transition model](#) is available for study 22-12. The site was in a Wyoming big sagebrush community defined within Community Phase 2.2. Since the Milford Flat fire, the site has transitioned to Community Phase 6.1 by means of fire and intentional seeding, which is similar to the T3a pathway leading from State 3 to State 6, but a transition is not described leading from State 2 to State 6.

Herbaceous Understory: The “Herbaceous Trends” table summarizes the average cover and nested frequency data for individual grass and forb species. The partial table contains the grass and forb species that have been sampled on study 22-12. Beginning in 19 July 1992, annual species data was collected, as well as quadrat cover estimates for individual species occurring within the quadrat.

A non-parametric statistical test, the Friedman test (analogous to analysis of variance) (Conover 1980), is conducted on nested frequencies of each species to determine significant changes at alpha = 0.10.

As shown in the “Herbaceous Trends” table, the invasive annual species cheatgrass (*Bromus tectorum*) was the most common species in nested frequency for all sample years, but 1998. The subscript letters indicate that the nested frequency value for *B. tectorum* declined significantly between 2003 and 2008. Cover of *B. tectorum* was estimated at a high of 7.98% in 2013 to a low of 3.15% in 2008. Trend for this grass species has gone up over the duration of the study due to a significant increase in frequency and cover; however, the increase in this species is undesirable for the resilience of the site. Crested wheatgrass (*Agropyron cristatum*) has increased significantly in nested frequency since 2008. Grasses had a combined total cover value of 11.81% in 1999, 10.02% in 2003, 7.03% in 2008 and 23.13% in 2013. These changes would indicate an upward perennial grass trend following the fire, but is mostly attributed to seeded species crested wheatgrass and intermediate wheatgrass (*Agropyron intermedium*) which were seed following the fire. The forb trend can be determined in a similar manner.

HERBACEOUS TRENDS--
Management unit 22, Study no: 12

T y P e	Species	Nested Frequency				Average Cover %			
		'98	'03	'08	'13	'98	'03	'08	'13
G	Agropyron cristatum	a-	a-	b ⁸⁴	c ¹³⁸	-	-	1.35	6.47
G	Agropyron dasystachyum	a-	a-	a-	b ⁴¹	-	-	-	1.43
G	Agropyron intermedium	a-	a-	b ¹⁰⁹	b ¹¹³	-	-	1.87	3.75
G	Agropyron spicatum	-	-	-	6	-	-	-	.18
G	Aristida purpurea	b ²²	b ¹⁷	a-	a ⁶	.66	.31	-	.03
G	Bromus tectorum (a)	c ³⁶⁹	b ³²⁹	a ⁶⁷	c ³⁹¹	4.59	4.50	3.15	7.98
G	Hilaria jamesii	b ⁷¹	ab ⁴⁷	a ³⁰	ab ⁵¹	1.18	.31	.26	1.28

Type	Species	Nested Frequency				Average Cover %			
		'98	'03	'08	'13	'98	'03	'08	'13
G	<i>Oryzopsis hymenoides</i>	a ⁵	a ³	ab ¹⁴	b ²⁶	.19	.06	.08	1.00
G	<i>Poa fendleriana</i>	-	-	3	5	-	-	.00	.03
G	<i>Poa secunda</i>	b ¹⁵⁰	b ¹⁵⁹	a ²⁸	a ²⁷	3.09	2.23	.16	.44
G	<i>Sitanion hystrix</i>	b ⁷²	b ⁸⁴	a ⁵	a ¹⁴	1.93	2.40	.06	.05
G	<i>Stipa comata</i>	15	9	7	10	.16	.18	.07	.45
Total for Annual Grasses		369	329	67	391	4.59	4.50	3.15	7.98
Total for Perennial Grasses		335	319	280	437	7.22	5.52	3.88	15.15
Total for Grasses		704	648	347	828	11.81	10.02	7.03	23.13
F	<i>Agoseris glauca</i>	-	4	7	-	-	.01	.06	-
F	<i>Alyssum alyssoides</i> (a)	a ⁻	ab ⁶	ab ⁴	b ²¹	-	.01	.01	.05
F	<i>Arabis demissa</i>	2	-	-	-	.00	-	-	-
F	<i>Astragalus</i> sp.	8	-	1	-	.06	-	.03	-
F	<i>Calochortus nuttallii</i>	1	-	1	-	.00	-	.00	-
F	<i>Castilleja chromosa</i>	3	-	-	-	.03	-	-	-
F	<i>Chenopodium album</i> (a)	-	-	3	-	-	-	.03	-
F	<i>Cryptantha</i> sp.	-	-	-	1	-	-	-	.00
F	<i>Draba</i> sp. (a)	a ⁻	b ¹¹	ab ⁴	a ⁻	-	.02	.00	-
F	<i>Erigeron pumilus</i>	11	-	2	-	.59	-	.00	-
F	<i>Erodium cicutarium</i> (a)	a ⁻	a ⁻	a ⁻	b ¹⁶	-	-	.03	.57
F	<i>Gayophytum ramosissimum</i> (a)	-	-	-	-	-	-	.00	-
F	<i>Gilia</i> sp. (a)	a ⁻	b ²⁶	b ²¹	b ⁹	-	.09	1.12	.03
F	<i>Helianthus annuus</i> (a)	-	-	5	-	-	-	.18	-
F	<i>Lappula occidentalis</i> (a)	-	-	2	-	-	-	.00	-
F	<i>Linum perenne</i>	-	-	3	-	-	-	.03	-
F	<i>Lomatium</i> sp.	2	-	-	3	.01	-	-	.00
F	<i>Lupinus argenteus</i>	1	-	-	-	.00	-	-	-
F	<i>Medicago sativa</i>	a ⁻	a ⁻	b ²⁴	b ¹⁷	-	-	.11	.48
F	<i>Mentzelia</i> sp.	-	-	-	-	-	-	.03	-
F	<i>Microsteris gracilis</i> (a)	1	-	-	-	.00	-	-	-
F	<i>Navaretia intertexta</i> (a)	b ¹³	b ²⁸	b ⁷	a ⁻	.05	.08	.02	-
F	<i>Onobrychis viciaefolia</i>	-	-	1	-	-	-	.03	-
F	<i>Phlox hoodii</i>	-	-	4	-	-	-	.03	-
F	<i>Phlox longifolia</i>	b ²⁴	a ⁹	a ¹¹	a ¹³	.11	.01	.05	.03
F	<i>Phlox</i> sp.	a ⁻	b ⁹⁴	a ⁻	a ⁻	-	.47	-	-
F	<i>Ranunculus testiculatus</i> (a)	-	3	-	-	-	.00	-	-
F	<i>Sanguisorba minor</i>	a ⁻	a ⁻	b ⁷	ab ¹⁰	-	-	.13	.38
F	<i>Sisymbrium altissimum</i> (a)	-	-	-	5	-	-	-	.18
F	<i>Sphaeralcea coccinea</i>	-	-	-	-	.00	-	-	-
Total for Annual Forbs		14	74	46	51	0.05	0.21	1.41	0.84
Total for Perennial Forbs		52	107	61	44	0.84	0.49	0.51	0.91
Total for Forbs		66	181	107	95	0.89	0.71	1.92	1.75

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

Browse: The following “Browse Trends” table summarizes percent average quadrat cover and percent average line intercept cover for all shrub species occurring on this site. All of the shrubs encountered at study number 22-12 are listed. Average quadrat cover is determined using cover classes in conjunction with the 1/4m²

quadrat to estimate percent quadrat cover. In the 22-12 “Browse Trend” example, Wyoming big sagebrush (*Artemisia tridentata* ssp. *wyomingensis*) cover was estimated to be 16.49% in 1998, 14.27% in 2003, 0.00% in 2008 and 0.94% in 2013.

To more accurately estimate canopy cover of trees and shrubs, the line-intercept method is used along each 100-foot belt. In the following example, Wyoming big sagebrush had a cover of 16.78% in 2003 and 0.00% in 2008, and 1.60% in 2013.

The dramatic decrease in cover for browse species during the 2008 sample year is an indicator that something noteworthy occurred on the site and is likely due to a disturbance that occurred between 2003 and 2008, and in this case was related to a Milford Flat fire and subsequent chaining in the fall of 2007.

BROWSE TRENDS--

Management unit 22, Study no: 12

Type	Species	Quadrat Cover %				Line Intercept Cover%		
		'98	'03	'08	'13	'03	'08	'13
B	<i>Artemisia tridentata wyomingensis</i>	16.49	14.27	.00	.94	16.78	-	1.60
B	<i>Chrysothamnus nauseosus</i>	-	-	-	.00	-	-	.45
B	<i>Chrysothamnus viscidiflorus stenophyllus</i>	1.01	1.76	-	-	1.15	-	-
B	<i>Ephedra nevadensis</i>	.74	1.72	-	.44	1.25	-	.75
B	<i>Gutierrezia sarothrae</i>	3.37	3.38	.00	1.09	4.46	-	2.13
B	<i>Juniperus osteosperma</i>	-	-	-	-	.03	-	-
B	<i>Kochia prostrata</i>	-	-	.09	-	-	.06	-
B	<i>Opuntia</i> sp.	-	-	-	-	.13	-	-
B	<i>Pinus edulis</i>	.58	1.56	-	-	.73	-	-
Total for Browse		22.21	22.70	0.10	2.48	24.53	0.06	4.93

The following “Point-Quarter Tree Data” table displays tree density estimates using the point-center quarter method, which better estimates density of widely distributed trees than the shrub density strips. Average basal diameter is also listed in inches. Point-quarter tree data for pinyon estimated 54 trees/acre in 1998, 68 trees/acre in 2003, and less than 18 trees/acre in 2008 and 2013, with average basal diameters of 2.7 inches, 1.7 inches, 0.0 inches, and 0.0 inches, respectively. Once again, the sudden decrease in tree densities and basal diameters of the tree species on this site is indicative of dramatic change that occurred across the landscape and was related to the aforementioned wildfire and chaining.

POINT-QUARTER TREE DATA--

Management unit 22, Study no: 12

Species	Trees per Acre				Average diameter (in)			
	'98	'03	'08	'13	'98	'03	'08	'13
<i>Juniperus osteosperma</i>	19	21	<18	<18	4.7	5.7	-	-
<i>Pinus edulis</i>	54	68	<18	<18	2.7	1.7	-	-

The “Browse Characteristics” table summarizes characteristics of the shrub community. Only Wyoming big sagebrush is included in this example. Density is reported for the sagebrush population and is characterized by age class distribution, which is further subdivided into its corresponding age class demographics. Seedlings are excluded from the population estimate due to their susceptibility to seasonal variability that causes large swings in population estimates. The sagebrush population is then characterized by utilization, which is subcategorized by percentages of moderate and heavily hedged plants. Poor vigor and average height crown measurements for mature plants conclude the table. Total density in plants/acre for Wyoming big sagebrush,

excluding seedlings, was 3,480 plants/acre in 1998, 3,420 plants/acre in 2003, 40 plants/acre in 2008, and 260 plants/acre in 2013.

BROWSE CHARACTERISTICS--

Management unit 22, Study no: 12

Year	Plants per Acre (excluding seedlings)	Age class distribution			Seedling (plants/acre)	Utilization		% poor vigor	Average Height Crown (in)
		% Young	% Mature	% Decadent		% moderate	% heavy		
Artemisia tridentata wyomingensis									
98	3480	1	61	37	100	30	2	11	22/34
03	3420	0	48	52	-	18	.58	25	21/34
08	40	100	0	0	60	0	0	0	-/-
13	260	23	77	0	-	8	0	8	16/23

Data for Wyoming big sagebrush from study 22-12 shows the proportion of decadent shrubs in the population increased from 37% in 1998 to 52% in 2003. Few seedlings were encountered over the sample years. The proportion of young plants in the population reached 100% in 2008. However, this number should be viewed in context. With only 40 plants/acre reported (each plant sampled on the site equates to 20 plants/acre), only 2 plants were encountered during the sampling in 2008 and both of which were classified as young. The percentage of plants displaying poor vigor increased from 11% of the population in 1998 to 25% in 2003.

The table again illustrates that a disturbance has influenced the site considerably by reducing sagebrush densities drastically, and has transitioned the sagebrush population from a decadent population displaying poor vigor to a young and mature population that is vigorous. Reestablishment of sagebrush will likely be slow, which is indicated by the lack of seedlings and young within the population. Also important is the lack of utilization occurring on the site. The lack of utilization is good in that stress is removed from the population allowing it to reestablish, but due to the very low sagebrush densities forage availability is scarce for wildlife, and thus the infrequent utilization of the site.

The “Aspen Characteristics” table summarizes characteristics of the aspen community. Only aspen is included in this table that was sampled using the size class distribution method, aspen sampled using the modified Cole Browse method are include in the “Browse Characteristics” table. Density is reported for the aspen population and is characterized by age class distribution, which is further subdivided into its corresponding age class demographics.

- Class I - Trees are less than or equal to 1.5 ft tall
- Class II - Trees are greater than 1.5 ft to 5 ft
- Class III - Trees are greater than 5ft and up to 1 in. dbh
- Class IV - Trees are greater than 1 in. dbh

The aspen population is then characterized by utilization, which is subcategorized by percentages of moderate and heavily hedged plants, and concluded with the percentage of plants displaying poor vigor. Total density in plants/acre for aspen was 1,820 plants/acre in 2014 on the Dickson Gulch Study (14-35).

ASPEN CHARACTERISTICS--
Management unit 14, Study no: 35

		Size class distribution				Utilization		
Year	Plants per Acre	%	%	%	%	%	%	%
		Class I	Class II	Class III	Class IV	moderate	heavy	poor vigor
Populus tremuloides								
14	1820	25	58	4	12	10	6	1

Class I= less than or equal to 1.5 ft; Class II=greater than 1.5 ft to 5 ft; Class III=greater than 5ft and up to 1 in. dbh; Class IV=greater than 1 in. dbh

Soil: The “Basic Cover” table summarizes average cover of vegetation, rock, pavement, litter, cryptogams, and bare ground. Vegetation crown cover estimates are projected vertically while the remaining cover types’ cover estimates are a planer projection and when combined will usually exceed 100%. Therefore, comparisons can be made for all cover measurements except for general vegetation cover. Vegetation cover remained similar most sample years, but decreased dramatically in 2008 from 34.36% in 2003 to 9.57% in 2008. Pavement cover remained similar from 1998 to 2003 at 43.72% and 42.49%, respectively. However, pavement increased to 57.20% in 2008. Litter cover was high in 1998 and 2003 at 36.46% and 22.28%, respectively. Litter decreased considerably in 2008 to 5.55%. The “Basic Cover” table illustrates again that a dramatic change took place between the 2003 and 2008 sample years and can be referenced back “Disturbance History” table to the Milford Flat fire in 2007.

BASIC COVER--
Management unit 22, Study no: 12

Cover Type	Average Cover %			
	'98	'03	'08	'13
Vegetation	31.45	34.36	9.57	33.83
Rock	5.43	2.76	6.60	6.56
Pavement	43.72	42.49	57.20	11.92
Litter	36.46	22.28	5.55	40.57
Cryptogams	1.37	.29	0	0
Bare Ground	13.13	8.24	27.41	21.42

Wildlife Occupancy: 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 rabbit or big game pellets indicates a relative amount of presence by a particular animal. This data can help characterize changes in wildlife occupancy patterns on a site. The example illustrated in the table for study site 22-12 shows that rabbit pellets were found to be similar in 1998 to 2003 at 28% and 21% of the quadrats sampling rabbit pellet groups for their respective years. However, rabbit pellet groups decreased considerably in 2008 to 3%.

The data presented in the “Days Use per Acre” table is reported from the pellet group transect in conjunction with the vegetation transects. The pellet group transect utilizes 50, 100ft² circular plots that are placed through the study area. These are usually two parallel transects of 25 plots on each side of the vegetation transect which runs 400 feet to 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 (hectare) (Neff 1968). Rabbit pellet groups are not included in this sample. In the example, deer was estimated at 12 days use/acre in 1998, increased to 27 deer days use/acre in 2003, but was absent to nearly absent in 2008 and 2013, respectively. As with the utilization portion of the “Browse Characteristics” table, the “Pellet Groups Data” table demonstrates a significant decrease in wildlife occupancy in 2008 and 2013 and again is likely due to the wildfire removing much of the forage for wildlife.

PELLET GROUP DATA--

Management unit 22, Study no: 12

Type	Quadrat Frequency			
	'98	'03	'08	'13
Rabbit	28	21	3	-
Deer	21	9	-	3
Cattle	1	2	-	2

Days use per acre (ha)			
'98	'03	'08	'13
-	-	-	-
12 (30)	27 (66)	-	5 (13)
6 (15)	4 (11)	-	5 (13)

Other Information: Management background information, photographs, and knowledgeable plant identification add to the dataset for each site. Management and background information for each site is obtained from the administering agency. Repeat 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. 2003). In some cases, most notably *Agropyron spp.* and *Purshia spp.*, the species names used are those found in the Range Trend Study Plant Species List (Giunta 1983), Intermountain Flora (Cronquist et al. 1977), and the Intermountain Range Plant Names and Symbols (Plummer et al. 1977) and are retained to maintain continuity and alleviate confusion with earlier published reports.

As indicated by many, if not all, of the tables for this study a significant disturbance occurred between the 2003 and 2008 sample years. Study 22-12 was a straightforward illustration of how change can occur on a site at a community level; however, change occurring on some of the studies presented throughout this report will likely have more nuanced compositional changes occurring on a population level rather than a community or landscape level. Combining the numerical and statistical observations found within the tables with the disturbance history, vegetation history, and the site's state-and-transition model, the reader can produce an accurate picture of the site's community and population transitions and their causes for each individual study.

Pre-1992 Data

Data collected before 19 July 1992 has been excluded from the individual site summaries, due to differences in sampling techniques and changes in sample size and area. This pre-1992 data can be found in the Utah Big Game Range Trend Studies 1982-1992 report. The following explanations address some of the major changes that occurred with data collection. Nested frequency quadrat divisions and zones were different with four divisions as compared to the five divisions and zones. In addition, nested frequency data for annual species was not collected. Shrub density was collected along a separate transect that was adjacent to the nested frequency transect within three circular plots (radius of 8.3 or 11.7 ft) centered on three permanently marked stakes. 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 decadence, percent poor vigor, percent heavy hedging, young recruitment, etc., are given more weight in determining shrub population transitions when comparing survey years where sample sizes were different.

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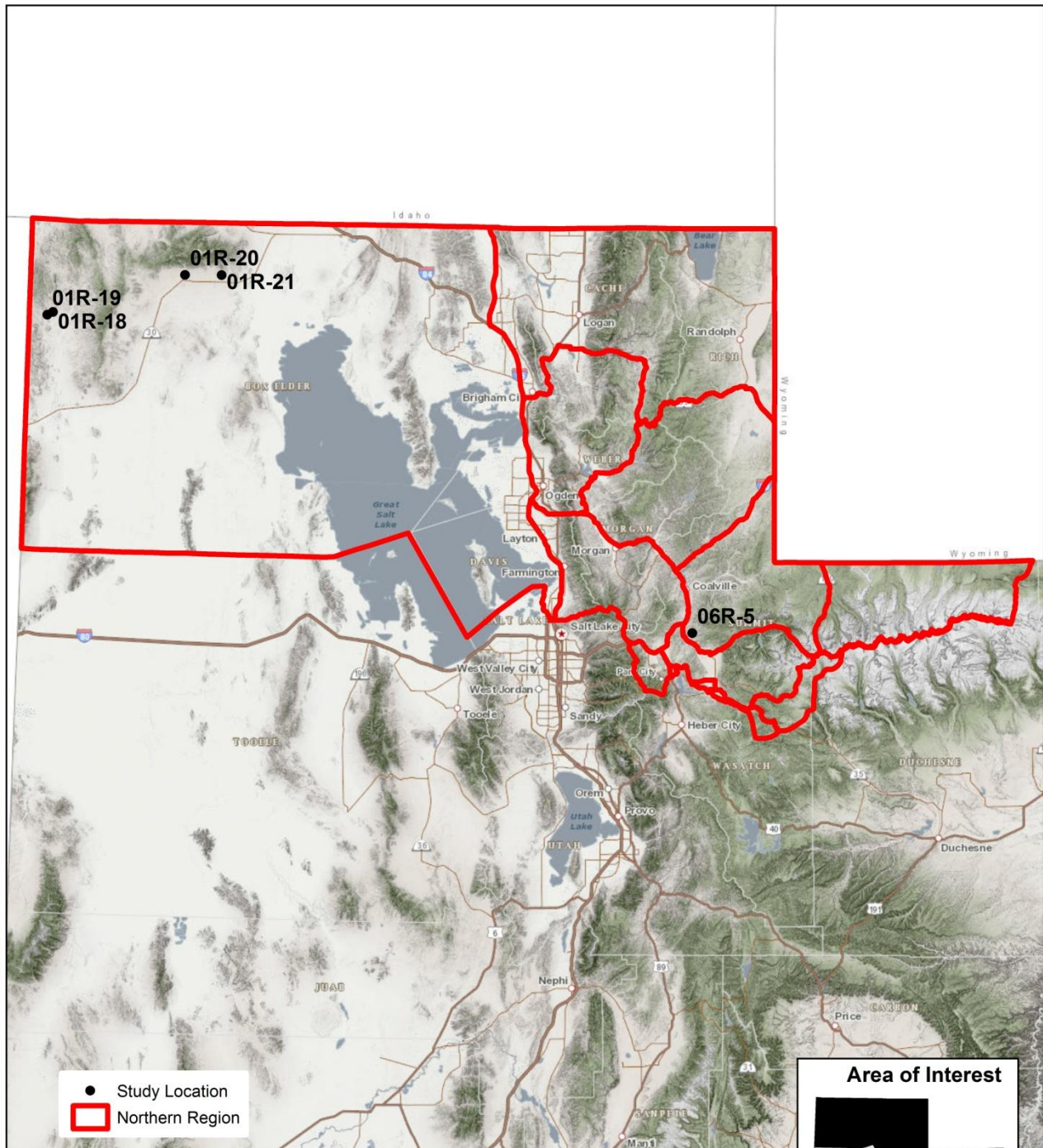
REPORT FORMAT

The name and directions for locating a site are given on the location page. A topographical map and diagrammatic sketch are provided to show spatial reference of site location and arrangement. A 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). Directions to a site and baseline are provided starting from a prominent location on a mileage and turn-by-turn basis that is closely referenced to the diagrammatic sketch. Also included on this page are the identification and dimensions of the specified transect, which include the browse tag number by which the transect is identified, transect bearing and length, belt placement as it relates to the baseline and belt marker placement as it relates to the belt itself.

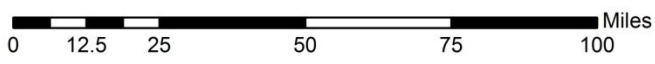
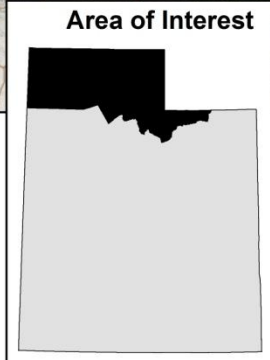
Discussions of the study site are addressed by several topics that include *Site Information*, *Habitat and Vegetation Information*, *Site Notes*, *Site Potential*, and *Trend Summary*. Site information contains geographic information such as land ownership, allotment, elevation, aspect, slope, and sample dates. Following the geographic information will be a *Disturbance History* contains all known disturbances that have occurred on the site. Known seed mixes will also listed within the table named *Seed Mix*. Habitat and Vegetation Information section contains wildlife habitat that the site falls within for specific big game and other species of interest. *Vegetation History* follows *Wildlife Habitat* and evaluates any major compositional transitions within the vegetation community. Site notes will discuss any miscellaneous information as it relates to the site and immediate area. Site potential presents a table containing average annual precipitation, NRCS taxonomical soil classification, NRCS ecological site, and NRCS ecological site number. If available, the name of the NRCS ecological site will be hyperlinked to the NRCS' website for additional features concerning ecological site. The table "Soil Analysis Data" presents texture and chemical characteristics found on the site. The *States and Transitions* portion of the section will state if the site has a defined state and transition model available and will be followed by, if available, descriptions of any state or phase transitions that have occurred on the site as it relates to the State-and-Transition diagram modeled by the NRCS. Additional assessment is made by comparing photographs from year to year and can be referred to in the accompanying CD.

The "Trend Summary" contains compiled vegetation data for each site. 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.

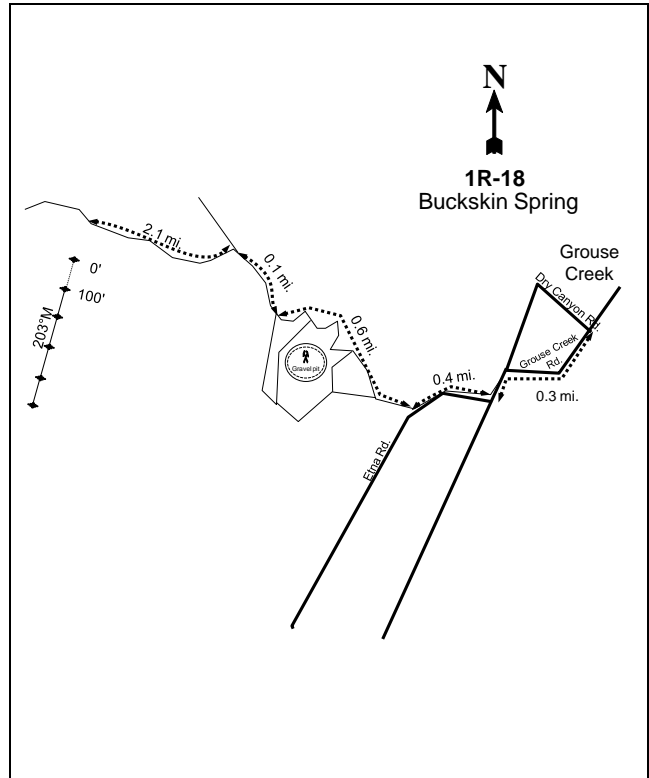
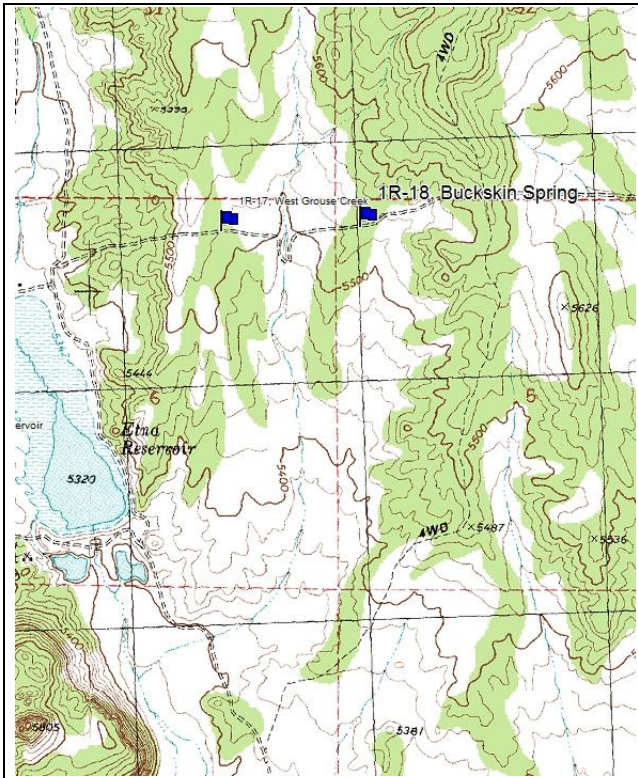
NORTHERN REGION



● Study Location
□ Northern Region



BUCKSKIN SPRING - TREND STUDY NO. 1R-18



Location Information

USGS 7.5 min Map Info Grouse Creek; Township 11N, Range 18W, Section 05
 GPS (0' Stake) NAD 83, UTM Zone 12, 254950 East 4621838 North

Transect Information

Browse Tag # (0' Stake) Not Available
 Transect Bearing 203° magnetic
 Length 500ft
 Belt Placement Line 1 (11ft), Line 2 (34ft), Line 3 (59ft), Line 4 (71ft), Line 5 (95ft)
 Belt Marker Placement No Rebar or Stakes

Directions to Site

From the intersection of Dry Canyon Rd. and Grouse Creek Rd. in the town of Grouse Creek, travel southwest on Grouse Creek Rd. for 0.3 miles. Turn right and continue for 0.4 miles. Make another right and drive for 0.6 miles, going around some gravel pits. While there are many side roads stick to the main road for 0.1 miles until there is a fork in the road. At the fork, head left and drive for 2.1 miles. The site is south of this road.

Site Information

Land Ownership BLM
 Allotment Grouse Creek
 Elevation 5,538ft (1,688m)
 Aspect South
 Slope 4%
 Sample Dates 09/03/2014

DISTURBANCE HISTORY--

Management unit 01R, Study no: 18

<i>Treatment/Disturbance</i>	<i>Name</i>	<i>WRI DB #</i>	<i>Date</i>	<i>Size (acres)</i>
*Seeding: Aerial Before	West Grouse Creek Bullhog Phase 3	2900	2015	959
*Bullhog	West Grouse Creek Bullhog Phase 3	2900	2015	950

The table is a recorded disturbance history of the study site.

*Proposed treatment

SEED MIX--

Management unit 1R, Study no: 18

Project Name: West Grouse Creek Bullhog Phase 3			
WRI Database #: 2900			
Application: Aerial Before		Acres: 959	
Seed type		lbs in mix	lbs/acre
G	Bluebunch Wheatgrass 'Anatone'	1000	0.90
G	Canby Bluegrass 'Canbar'	500	0.40
G	Crested Wheatgrass 'Hycrest II'	950	0.85
G	Indian Ricegrass 'Rimrock'	500	0.44
G	Russian Wildrye 'Bozoisky II'	500	0.43
G	Snake River Wheatgrass 'Secar'	1000	0.95
G	Thickspike Wheatgrass 'Critana'	1900	1.72
F	Alfalfa 'Ladak'	201	0.20
F	Alfalfa 'Ladak +'	500	0.49
F	Blue Flax 'Appar'	200	0.18
F	Sainfoin 'Eski'	1950	1.97
F	Small Burnet	1950	1.68
Total Pounds:		11151	11.63
PLS Pounds:			10.21

Habitat and Vegetation Information

Wildlife Habitat Deer, Substantial Winter; Elk, Crucial Year-long; Sage-Grouse, Occupied, Brood-Rearing

VEGETATION HISTORY--

Management unit 01R, Study no: 18

<i>Year</i>	<i>Vegetation Type¹</i>	<i>Woodland Succession²</i>
2014	Juniper	Phase II transitioning to Phase III

¹Vegetation Type (Appendix - Vegetation Type), ²Woodland Succession (Tausch, Miller, Roundy, & Chambers, 2009).

Site Notes

There is very little use on this site.

Site Potential

1981-2010 Average Annual Precipitation 11 inches
 NRCS Ecological Site Semidesert Loam (Wyoming Big Sagebrush)
 NRCS Ecological Site # [R028AY220UT](#)

States and Transitions

No state and transition model is available for the above ecological site.

This site was established in 2014 and was dominated by Utah Juniper (*Juniperus osteosperma*) with a small component of black sagebrush (*Artemisia nova*) (Table – Browse Trends). This site was in phase II of encroachment and will likely continue to phase III unless a planned or natural tree removing disturbance halts its progress. Herbaceous cover was low likely due to competition with the juniper (Table – Herbaceous Trends).

Trend Summary

HERBACEOUS TRENDS--
 Management unit 01R, Study no: 18

Type	Species	Nested	Average
		Frequency	Cover %
		'14	'14
G	Agropyron spicatum	3	.15
G	Bromus tectorum (a)	26	.06
G	Oryzopsis hymenoides	31	.90
G	Poa secunda	60	.88
G	Sitanion hystrix	47	.50
Total for Annual Grasses		26	0.06
Total for Perennial Grasses		141	2.43
Total for Grasses		167	2.49
F	Antennaria dimorpha	1	.03
F	Arabis sp.	6	.01
F	Astragalus calycosus	24	.09
F	Astragalus anserinus	1	.00
F	Cryptantha sp.	15	.08
F	Descurainia pinnata (a)	23	.07
F	Eriogonum sp.	26	.23
F	Lesquerella sp.	2	.00
F	Penstemon sp.	1	.00
F	Phlox austromontana	75	2.92
F	Phlox longifolia	3	.01
Total for Annual Forbs		23	0.07
Total for Perennial Forbs		154	3.40
Total for Forbs		177	3.47

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

BROWSE TRENDS--

Management unit 01R, Study no: 18

Type	Species	Quadrat Cover %	Line Intercept Cover %
		'14	'14
B	Artemisia nova	3.08	3.38
B	Artemisia tridentata wyomingensis	.07	.98
B	Chrysothamnus viscidiflorus stenophyllus	.47	.48
B	Juniperus osteosperma	14.31	29.51
B	Leptodactylon pungens	.40	.63
B	Opuntia sp.	.41	.05
Total for Browse		18.75	35.03

POINT-QUARTER TREE DATA--

Management unit 01R, Study no: 18

Species	Trees per Acre	Average diameter (in)
	'14	'14
Juniperus osteosperma	306	8.5

BASIC COVER--

Management unit 01R, Study no: 18

Cover Type	Average Cover %
	'14
Vegetation	22.54
Rock	3.17
Pavement	30.53
Litter	39.75
Cryptogams	5.73
Bare Ground	18.11

PELLET GROUP DATA--

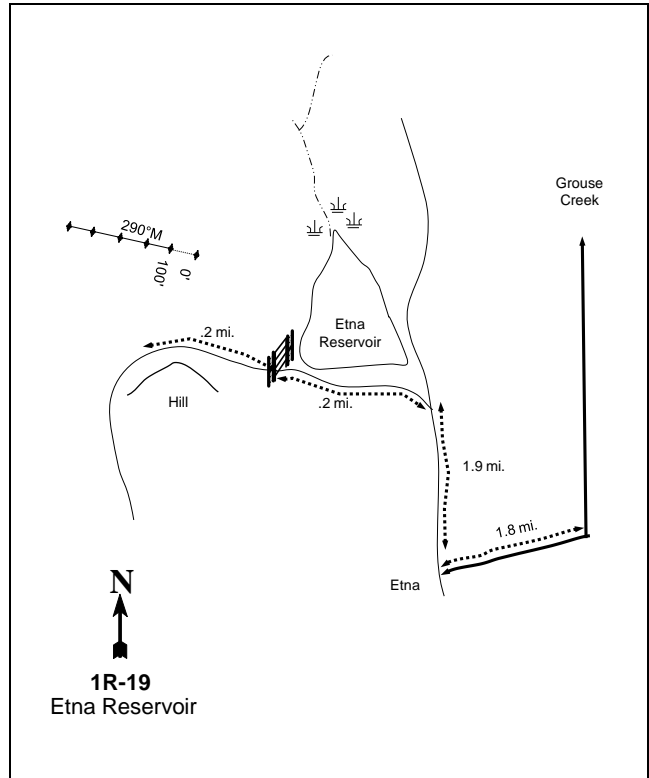
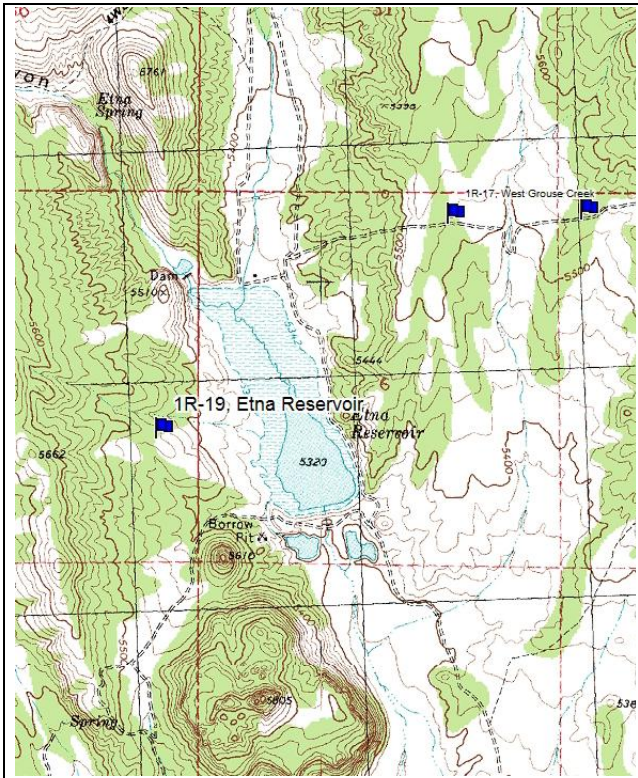
Management unit 01R, Study no: 18

Type	Quadrat Frequency	Days use per acre (ha)
	'14	'14
Rabbit	2	-
Cattle	2	-

BROWSE CHARACTERISTICS--
 Management unit 01R, Study no: 18

		Age class distribution					Utilization			
Year	Plants per Acre (excluding seedlings)	% Young	% Mature	% Decadent	Seedling (plants/acre)	% moderate	% heavy	% poor vigor	Average Height Crown (in)	
Artemisia nova										
14	1780	24	39	37	20	15	8	56	11/22	
Artemisia tridentata wyomingensis										
14	300	33	20	47	20	47	0	60	16/20	
Chrysothamnus viscidiflorus stenophyllus										
14	800	5	83	13	20	8	0	65	7/10	
Juniperus osteosperma										
14	700	54	37	9	80	3	0	29	-/-	
Leptodactylon pungens										
14	1080	2	74	24	40	11	2	65	7/9	
Opuntia sp.										
14	220	0	91	9	-	0	0	18	4/10	

ETNA RESERVOIR - TREND STUDY NO. 1R-19



Location Information

USGS 7.5 min Map Info Grouse Creek; Township 11N, Range 19W, Section 01
 GPS (0' Stake) NAD 83, UTM Zone 12, 253054 East 4620946 North

Transect Information

Browse Tag # (0' Stake) Not Available
 Transect Bearing 290° magnetic
 Length 500ft
 Belt Placement Line 1 (11ft), Line 2 (34ft), Line 3 (59ft), Line 4 (71ft), Line 5 (95ft)
 Belt Marker Placement No Rebar or Stakes

Directions to Site

From the town of Grouse Creek drive south on Grouse Creek road for approximately 0.3 miles. Turn right on Etna road and drive for 1.8 miles. Turn right again, heading toward Etna reservoir. Turn left on the road just south of the reservoir for 0.6 miles at which point you will come to a gate. Drive through the gate for another 0.2 miles. The site is located just northwest of the road.

Site Information

Land Ownership BLM
 Allotment Grouse Creek
 Elevation 5,460ft (1,664m)
 Aspect Southeast
 Slope 4%
 Sample Dates 09/03/2014

DISTURBANCE HISTORY--

Management unit 01R, Study no: 19

Treatment/Disturbance	Name	WRI DB #	Date	Size (acres)
*Seeding: Aerial Before	West Grouse Creek Bullhog Phase 3	2900	2015	959
*Bullhog	West Grouse Creek Bullhog Phase 3	2900	2015	950

The table is a recorded disturbance history of the study site.

*Proposed treatment

SEED MIX--

Management unit 1R, Study no: 19

Project Name: West Grouse Creek Bullhog Phase 3			
WRI Database #: 2900			
Application: Aerial Before		Acres: 959	
Seed type		lbs in mix	lbs/acre
G	Bluebunch Wheatgrass 'Anatone'	1000	0.90
G	Canby Bluegrass 'Canbar'	500	0.40
G	Crested Wheatgrass 'Hycrest II'	950	0.85
G	Indian Ricegrass 'Rimrock'	500	0.44
G	Russian Wildrye 'Bozoisky II'	500	0.43
G	Snake River Wheatgrass 'Secar'	1000	0.95
G	Thickspike Wheatgrass 'Critana'	1900	1.72
F	Alfalfa 'Ladak'	201	0.20
F	Alfalfa 'Ladak +'	500	0.49
F	Blue Flax 'Appar'	200	0.18
F	Sainfoin 'Eski'	1950	1.97
F	Small Burnet	1950	1.68
Total Pounds:		11151	11.63
PLS Pounds:			10.21

Habitat and Vegetation Information

Wildlife Habitat Deer, Substantial Winter; Elk, Crucial Year-long; Pronghorn, Substantial Summer; Sage-Grouse, Occupied, Brood-Rearing

VEGETATION HISTORY--

Management unit 1R, Study no: 19

Year	Vegetation Type ¹	Woodland Succession ²
2014	Juniper	Phase I transitioning to Phase II

¹Vegetation Type (Appendix - Vegetation Type), ²Woodland Succession (Tausch, Miller, Roundy, & Chambers, 2009).

Site Notes

There is little use on this site.

Site Potential

1981-2010 Average Annual Precipitation 10 inches
 NRCS Ecological Site Semidesert Loam (Wyoming Big Sagebrush)
 NRCS Ecological Site # [R028AY220UT](#)

States and Transitions

No state and transition model is available for the above ecological site, but it is likely similar to the [Semidesert Loam \(Wyoming Big Sagebrush\), R035XY209UT](#) ecological site, which does have a defined state and transition model (USDA-NRCS, 2011).

This site was established in 2014 and was dominated by Utah Juniper (*Juniperus osteosperma*) with a component of black sagebrush (*Artemisia nova*) (Table – Browse Trends). This site is in phase I of encroachment and will likely continue to phase II unless a planned or natural tree removing disturbance halts its progress. Herbaceous cover was low likely due to competition with the juniper (Table – Herbaceous Trends).

Trend Summary

HERBACEOUS TRENDS--
 Management unit 01R, Study no: 19

T y p e	Species	Nested Frequency	Average Cover %
		'14	'14
G	Agropyron spicatum	27	.58
G	Bromus tectorum (a)	3	.00
G	Oryzopsis hymenoides	12	.40
G	Poa secunda	122	1.89
G	Sitanion hystrix	54	.75
Total for Annual Grasses		3	0.00
Total for Perennial Grasses		215	3.62
Total for Grasses		218	3.62
F	Antennaria dimorpha	56	1.30
F	Aster sp.	8	.15
F	Astragalus calycosus	8	.05
F	Astragalus anserinus	4	.03
F	Crepis acuminata	4	.01
F	Cryptantha sp.	10	.05
F	Descurainia pinnata (a)	15	.06
F	Erigeron sp.	29	.23
F	Eriogonum sp.	3	.00
F	Haplopappus acaulis	5	.33
F	Lappula occidentalis (a)	1	.00
F	Lesquerella sp.	12	.03
F	Leucelene ericoides	4	.03
F	Petradoria pumila	13	.16
F	Phlox austromontana	107	2.16
F	Phlox longifolia	12	.05
F	Tragopogon dubius (a)	1	.03

Type	Species	Nested Frequency '14	Average Cover % '14
	Total for Annual Forbs	17	0.10
	Total for Perennial Forbs	275	4.62
	Total for Forbs	292	4.72

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

BROWSE TRENDS--

Management unit 01R, Study no: 19

Type	Species	Quadrat Cover % '14	Line Intercept Cover % '14
B	Artemisia nova	4.56	5.70
B	Artemisia tridentata wyomingensis	.18	.41
B	Chrysothamnus viscidiflorus stenophyllus	.33	.76
B	Eriogonum microthecum	.03	
B	Juniperus osteosperma	7.49	16.88
B	Leptodactylon pungens	.00	-
B	Opuntia sp.	.22	.01
B	Pinus edulis	.03	-
	Total for Browse	12.86	23.76

POINT-QUARTER TREE DATA--

Management unit 01R, Study no: 19

Species	Trees per Acre '14	Average diameter (in) '14
Juniperus osteosperma	342	6.7

BASIC COVER--

Management unit 01R, Study no: 19

Cover Type	Average Cover % '14
Vegetation	20.22
Rock	4.65
Pavement	38.02
Litter	30.25
Cryptogams	1.23
Bare Ground	21.04

PELLET GROUP DATA--

Management unit 01R, Study no: 19

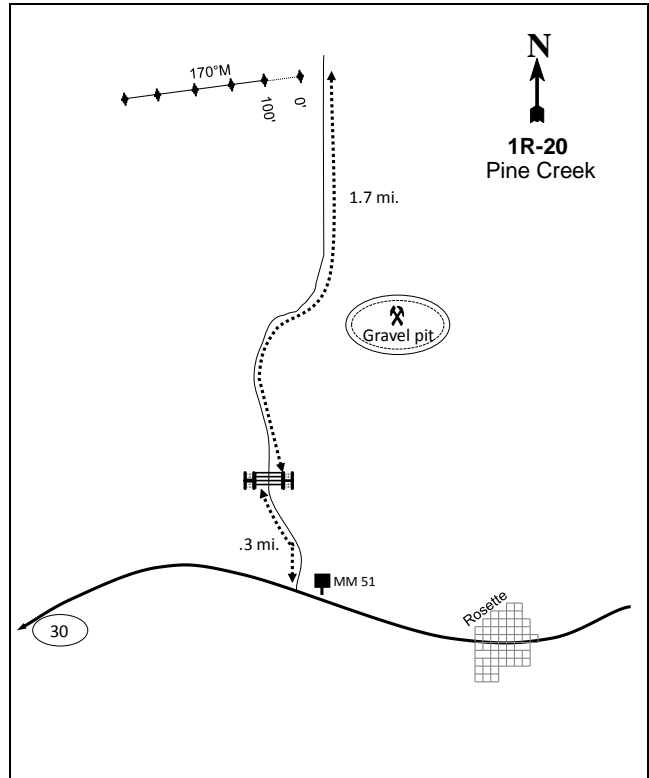
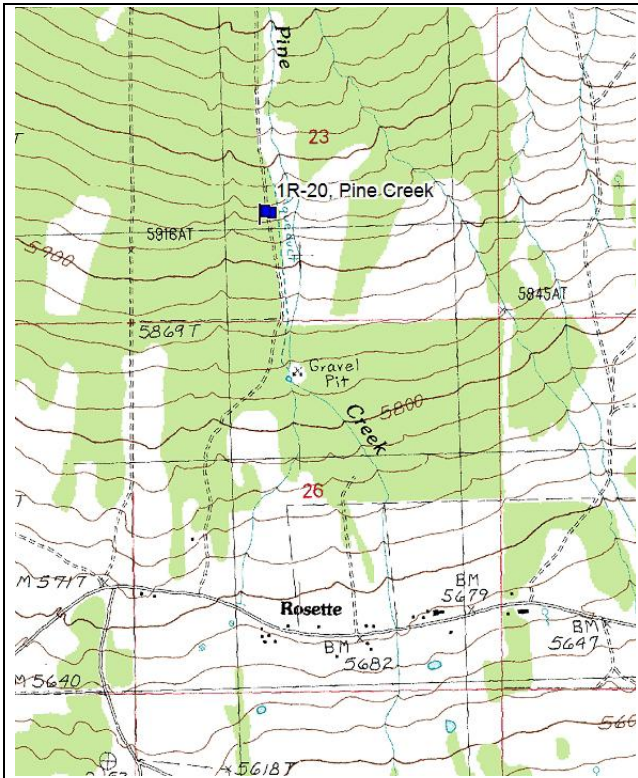
Type	Quadrat Frequency	Days use per acre (ha)
	'14	'14
Rabbit	10	-
Cattle	3	-

BROWSE CHARACTERISTICS--

Management unit 01R, Study no: 19

		Age class distribution				Utilization				
Year	Plants per Acre (excluding seedlings)	% Young	% Mature	% Decadent	Seedling (plants/acre)	% moderate	% heavy	% poor vigor	Average Height Crown (in)	
<i>Artemisia nova</i>										
14	5460	54	33	14	80	23	10	16	13/22	
<i>Artemisia tridentata wyomingensis</i>										
14	440	18	45	36	-	5	5	77	15/23	
<i>Chrysothamnus viscidiflorus stenophyllus</i>										
14	780	31	38	31	-	8	8	67	6/8	
<i>Eriogonum microthecum</i>										
14	20	0	100	-	-	0	100	100	-/-	
<i>Juniperus osteosperma</i>										
14	340	18	82	-	20	0	0	76	-/-	
<i>Leptodactylon pungens</i>										
14	80	0	100	-	-	0	0	0	5/9	
<i>Opuntia sp.</i>										
14	260	8	92	-	40	0	0	15	5/10	

PINE CREEK - TREND STUDY NO. 1R-20



Location Information

USGS 7.5 min Map Info Rosette; Township 13N, Range 14W, Section 23
 GPS (0' Stake) NAD 83, UTM Zone 12, 299088 East 4634216 North

Transect Information

Browse Tag # (0' Stake) Not Available
 Transect Bearing 170° magnetic
 Length 500ft
 Belt Placement Line 1 (11ft), Line 2 (34ft), Line 3 (59ft), Line 4 (71ft), Line 5 (95ft)
 Belt Marker Placement No Rebar or Stakes

Directions to Site

From the town of Rosette drive until you reach mile marker 51. Just west of this sign, there should be a dirt road off to the right. Take this road and drive for 0.3 miles until you reach a gate. You will need to **ask for the combination** for this gate. Continue to follow this road for another 1.7 miles. The study site will be to the left of the road.

Site Information

Land Ownership Private
 Allotment Not Available
 Elevation 5,931ft (1,807m)
 Aspect South
 Slope 5%
 Sample Dates 09/03/2014

DISTURBANCE HISTORY--

Management unit 01R, Study no: 20

Treatment/Disturbance	Name	WRI DB #	Date	Size (acres)
*Seeding: Aerial Before	West Grouse Creek Bullhog Phase 3	2900	2015	959
*Bullhog	West Grouse Creek Bullhog Phase 3	2900	2015	950

The table is a recorded disturbance history of the study site.

*Proposed treatment

SEED MIX--

Management unit 1R, Study no: 20

Project Name: West Grouse Creek Bullhog Phase 3			
WRI Database #: 2900			
Application: Aerial Before		Acres:	959
Seed type		lbs in mix	lbs/acre
G	Bluebunch Wheatgrass 'Anatone'	1000	0.90
G	Canby Bluegrass 'Canbar'	500	0.40
G	Crested Wheatgrass 'Hycrest II'	950	0.85
G	Indian Ricegrass 'Rimrock'	500	0.44
G	Russian Wildrye 'Bozoisky II'	500	0.43
G	Snake River Wheatgrass 'Secar'	1000	0.95
G	Thickspike Wheatgrass 'Critana'	1900	1.72
F	Alfalfa 'Ladak'	201	0.20
F	Alfalfa 'Ladak +'	500	0.49
F	Blue Flax 'Appar'	200	0.18
F	Sainfoin 'Eski'	1950	1.97
F	Small Burnet	1950	1.68
Total Pounds:		11151	11.63
PLS Pounds:			10.21

Habitat and Vegetation Information

Wildlife Habitat Sage-Grouse, Occupied & Winter, Brood-Rearing

VEGETATION HISTORY--

Management unit 01R, Study no: 20

Year	Vegetation Type ¹	Woodland Succession ²
2014	Juniper	Phase III

¹Vegetation Type (Appendix - Vegetation Type), ²Woodland Succession (Tausch, Miller, Roundy, & Chambers, 2009).

Site Notes

There is very little use on this site.

Site Potential

1981-2010 Average Annual Precipitation 12 inches
 NRCS Ecological Site Upland Gravelly Loam (Bonneville Big Sagebrush)
 NRCS Ecological Site # R028AY306UT

States and Transitions

A defined [state and transition model](#) is available.

This site was established in 2014 and was in phase III encroachment by Utah juniper (*Juniperus Osteosperma*), putting it in community phase 3.1 (Table – Browse Trends). The understory was comprised mainly of native perennial grass species with some annual grass present (Table – Herbaceous Trends). There was very little woody or herbaceous understory on this site and it will continue to degrade unless a planned or natural tree removing disturbance, such as fire, transition the site back to the current potential state (USDA-NRCS, 2011).

Trend Summary

HERBACEOUS TRENDS--

Management unit 01R, Study no: 20

Type	Species	Nested Frequency	Average Cover %
		'14	'14
G	Bromus tectorum (a)	227	2.35
G	Oryzopsis hymenoides	2	.00
G	Poa fendleriana	4	.18
G	Poa secunda	198	6.12
G	Sitanion hystrix	55	1.96
G	Vulpia octoflora (a)	10	.02
Total for Annual Grasses		237	2.37
Total for Perennial Grasses		259	8.28
Total for Grasses		496	10.65
F	Cryptantha sp.	3	.00
F	Descurainia pinnata (a)	18	.05
F	Lappula occidentalis (a)	13	.03
F	Penstemon sp.	1	.00
F	Phlox longifolia	28	.20
Total for Annual Forbs		31	0.08
Total for Perennial Forbs		32	0.21
Total for Forbs		63	0.29

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

BROWSE TRENDS--

Management unit 01R, Study no: 20

Type	Species	Quadrat Cover %	Line Intercept Cover %
		'14	'14
B	Juniperus osteosperma	15.99	38.93
B	Opuntia sp.	2.48	1.66
B	Phlox longifolia	.02	-
Total for Browse		18.49	40.59

POINT-QUARTER TREE DATA--
Management unit 01R, Study no: 20

Species	Trees per Acre	Average diameter (in)
	'14	'14
Juniperus osteosperma	488	9.7

BASIC COVER--
Management unit 01R, Study no: 20

Cover Type	Average Cover %
	'14
Vegetation	28.47
Rock	1.95
Pavement	29.72
Litter	46.05
Cryptogams	3.55
Bare Ground	9.95

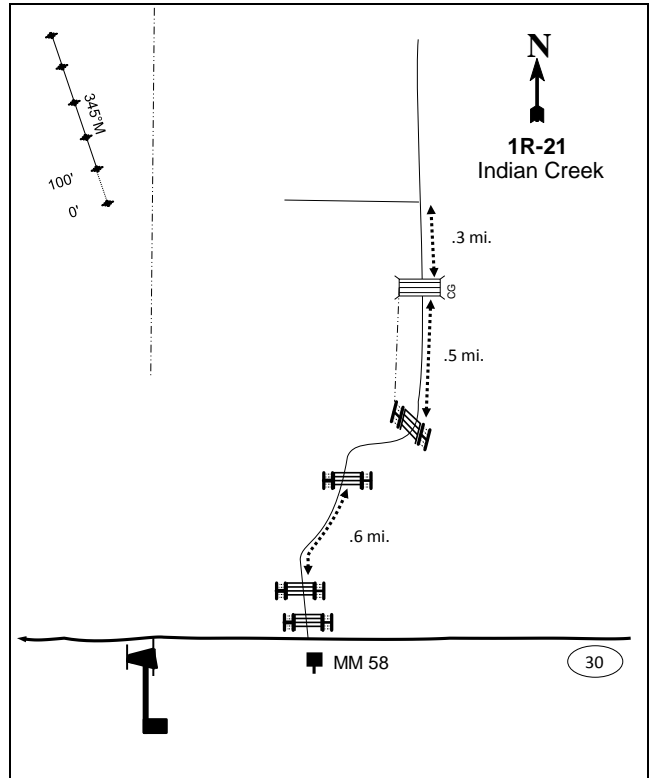
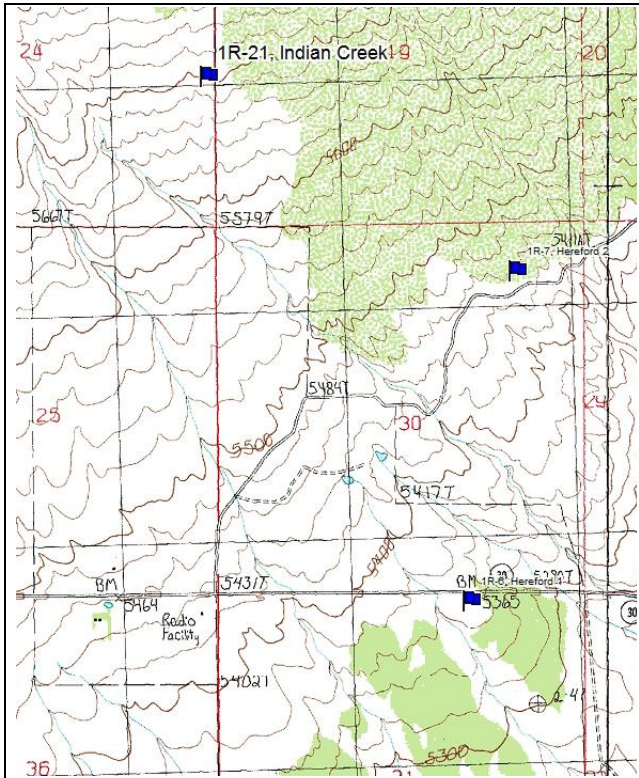
PELLET GROUP DATA--
Management unit 01R, Study no: 20

Type	Quadrat Frequency	Days use per acre (ha)
	'14	'14
Rabbit	8	
Deer	1	1.3 (3.3)

BROWSE CHARACTERISTICS--
Management unit 01R, Study no: 20

		Age class distribution					Utilization			
Y	Plants per Acre (excluding seedlings)	% Young	% Mature	% Decadent	Seedling (plants/acre)	% moderate	% heavy	% poor vigor	Average Height Crown (in)	
Juniperus osteosperma										
14	540	11	85	4	-	0	4	26	-/-	
Opuntia sp.										
14	2780	2	98	-	-	0	0	.71	4/13	

INDIAN CREEK - TREND STUDY NO. 1R-21



Location Information

USGS 7.5 min Map Info Park Valley; Township 13N, Range 13W, Section 24
 GPS (0' Stake) NAD 83, UTM Zone 12, 311333 East 4634184 North

Transect Information

Browse Tag # (0' Stake) Not Available
 Transect Bearing 345° magnetic
 Length 500ft
 Belt Placement Line 1 (11ft), Line 2 (34ft), Line 3 (59ft), Line 4 (71ft), Line 5 (95ft)
 Belt Marker Placement No Rebar or Stakes

Directions to Site

Drive east on hwy 30 from the town of Park Valley for a little over 3.5 miles. Turn north at mile marker 58 onto a dirt road with two gates. Head through both gates and drive for 0.6 miles where there will be another gate. Pass through this gate, turn the corner and then go through yet another gate. Drive 0.5 miles from this gate and cross over a cattle guard. Drive 0.3 miles and turn left (west) and cut across the field. The site is on the other side of the fence.

Site Information

Land Ownership BLM
 Allotment Fisher Creek
 Elevation 5,696ft (1,736m)
 Aspect West
 Slope 4%
 Sample Dates 09/04/2014

DISTURBANCE HISTORY--

Management unit 01R, Study no: 21

<i>Treatment/Disturbance</i>	<i>Name</i>	<i>WRI DB #</i>	<i>Date</i>	<i>Size (acres)</i>
*Seeding: Aerial Before	Park Valley PJ Treatment Project Phase 1	2874	2015	707
*Bullhog	Park Valley PJ Treatment Project Phase 1	2874	2015	1471

The table is a recorded disturbance history of the study site.

*Proposed treatment

SEED MIX--

Management unit 01R, Study no: 21

Project Name: Park Valley PJ Treatment Project Phase 1			
WRI Database #: 2874			
Application: Aerial Before		Acres:	707
Seed type		lbs in mix	lbs/acre
G	Bluebunch Wheatgrass 'Anatone'	750	1.1
G	Canby Bluegrass 'Canbar'	350	.5
G	Crested Wheatgrass 'Hycrest II'	700	1
G	Indian Ricegrass 'Rimrock'	700	1
G	Russian Wildrye 'Bozoisky II'	700	1
G	Snake River Wheatgrass 'Secar'	750	1.1
G	Western Wheatgrass 'Arriba'	700	1
F	Alfalfa 'Ladak +'	700	1
F	Blue Flax 'Appar'	200	.28
F	Fernleaf Biscuitroot	110	.15
F	Sainfoin 'Eski'	1400	2
F	Small Burnet	1400	2
F	Western Yarrow	70	.01
Total Pounds:		8530	12.07
PLS Pounds:			10.64

Habitat and Vegetation Information

Wildlife Habitat Deer, Substantial Winter; Pronghorn, Substantial Summer: Sage-Grouse, Occupied & Winter, Brood-Rearing

VEGETATION HISTORY--

Management unit 01R, Study no: 21

<i>Year</i>	<i>Vegetation Type¹</i>	<i>Woodland Succession²</i>
2014	Juniper	Phase II transitioning to Phase III

¹Vegetation Type (Appendix - Vegetation Type), ²Woodland Succession (Tausch, Miller, Roundy, & Chambers, 2009).

Site Notes

There was moderate use by cattle in 2014 (Table – Pellet Group Data). Additionally, a dead deer fawn was found on the site.

Site Potential

1981-2010 Average Annual Precipitation 12 inches
 NRCS Ecological Site Upland Stony Loam (Black Sagebrush)
 NRCS Ecological Site # [R025XY318UT](#)

States and Transitions

No state and transition model is available for the above ecological site, but it is likely similar to the [Upland Stony Loam \(Black Sagebrush\), R047XA332UT](#) ecological site, which does have a defined state and transition model (USDA-NRCS, 2011).

This site was established in 2014 and was dominated by Utah Juniper (*Juniperus osteosperma*) with a small component of black sagebrush (*Artemisia nova*) (Table – Browse Trends). This site is in phase II of encroachment and will likely continue to phase III unless a planned or natural tree removing disturbance halts its progress. Herbaceous cover was low likely due to competition with the juniper (Table – Herbaceous Trends).

Trend Summary

HERBACEOUS TRENDS--

Management unit 01R, Study no: 21

Type	Species	Nested Frequency	Average Cover %
		'14	'14
G	Agropyron smithii	3	.03
G	Agropyron spicatum	54	.84
G	Bromus tectorum (a)	98	.23
G	Oryzopsis hymenoides	2	.03
G	Poa secunda	85	2.09
G	Sitanion hystrix	1	.00
Total for Annual Grasses		98	0.23
Total for Perennial Grasses		145	3.00
Total for Grasses		243	3.24
F	Antennaria dimorpha	17	.13
F	Arenaria sp.	2	.03
F	Astragalus beckwithii	4	.00
F	Astragalus calycosus	1	.00
F	Chaenactis douglasii	1	.00
F	Cordylanthus sp. (a)	9	.06
F	Cryptantha sp.	12	.07
F	Descurainia pinnata (a)	8	.02
F	Eriogonum caespitosum	4	.18
F	Eriogonum racemosum	3	.01
F	Eriogonum sp.	8	.04
F	Eriogonum umbellatum	4	.06
F	Lesquerella sp.	6	.01
F	Phlox austromontana	62	.99
F	Phlox longifolia	7	.01
F	Ranunculus testiculatus (a)	7	.01

Type	Species	Nested Frequency	Average Cover %
		'14	'14
F	Streptanthus cordatus	3	.01
Total for Annual Forbs		24	0.09
Total for Perennial Forbs		134	1.58
Total for Forbs		158	1.67

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

BROWSE TRENDS--

Management unit 01R, Study no: 21

Type	Species	Quadrat Cover %	Line Intercept Cover %
		'14	'14
B	Artemisia nova	5.52	5.31
B	Chrysothamnus viscidiflorus stenophyllus	.54	.15
B	Eriogonum microthecum	.03	-
B	Gutierrezia sarothrae	.27	.16
B	Juniperus osteosperma	17.89	27.18
B	Leptodactylon pungens	.26	.30
Total for Browse		24.53	33.1

POINT-QUARTER TREE DATA--

Management unit 01R, Study no: 21

Species	Trees per Acre	Average diameter (in)
	'14	'14
Juniperus osteosperma	430	4.3

BASIC COVER--

Management unit 01R, Study no: 21

Cover Type	Average Cover %
	'14
Vegetation	28.05
Rock	6.67
Pavement	36.29
Litter	33.48
Cryptogams	1.26
Bare Ground	17.54

PELLET GROUP DATA--

Management unit 01R, Study no: 21

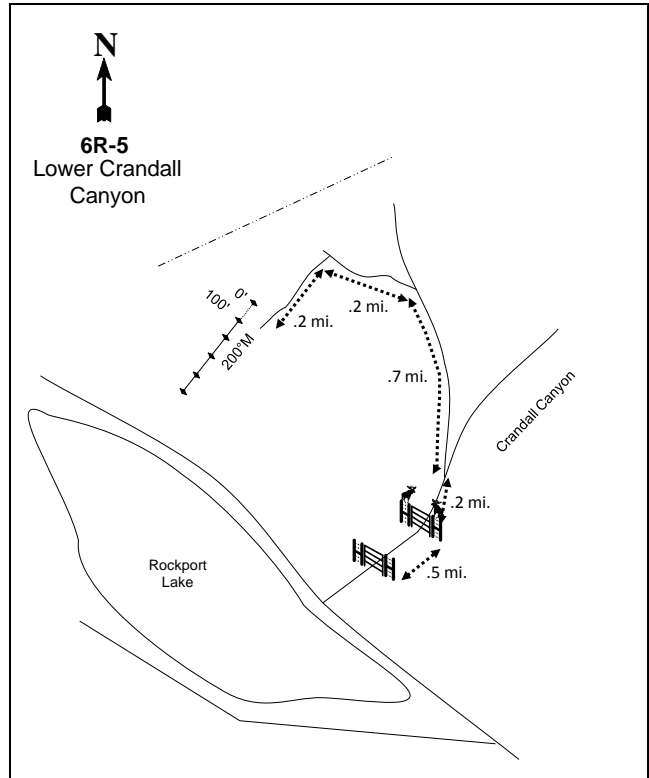
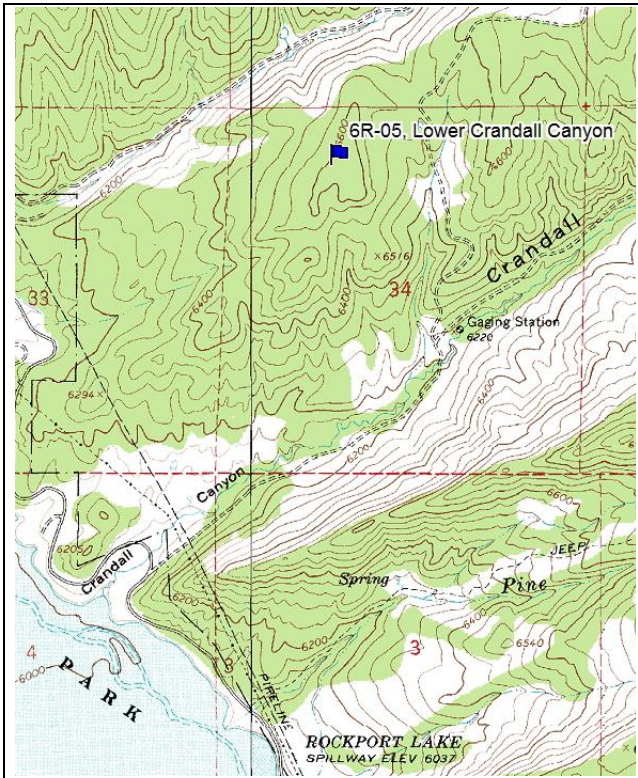
Type	Quadrat Frequency	Days use per acre (ha)
	'14	'14
Rabbit	20	-
Deer	1	12 (29)
Cattle	-	1 (3)

BROWSE CHARACTERISTICS--

Management unit 01R, Study no: 21

Year	Plants per Acre (excluding seedlings)	Age class distribution			Seedling (plants/acre)	Utilization		% poor vigor	Average Height Crown (in)
		% Young	% Mature	% Decadent		% moderate	% heavy		
<i>Artemisia nova</i>									
14	3200	18	66	17	320	26	13	27	9/18
<i>Chrysothamnus viscidiflorus stenophyllus</i>									
14	740	46	54	-	60	3	0	3	6/9
<i>Eriogonum microthecum</i>									
14	40	0	50	50	-	0	0	50	4/11
<i>Gutierrezia sarothrae</i>									
14	580	14	83	3	40	0	0	7	7/8
<i>Juniperus osteosperma</i>									
14	420	71	29	-	80	0	0	43	-/-
<i>Leptodactylon pungens</i>									
14	1000	10	78	12	-	6	0	42	5/7
<i>Opuntia sp.</i>									
14	120	0	100	-	-	0	0	0	4/11

LOWER CRANDALL CANYON - TREND STUDY NO. 6R-5



Location Information

USGS 7.5 min Map Info Crandall Canyon; Township 1N, Range 5E, Section 34
 GPS (0' Stake) NAD 83, UTM Zone 12, 468648 East 4514551 North

Transect Information

Browse Tag # (0' Stake) 105
 Transect Bearing 200° magnetic
 Length 500ft
 Belt Placement Line 1 (11ft), Line 2 (34ft), Line 3 (59ft), Line 4 (95ft), Line 5 (71ft)
 Belt Marker Placement Standard

Directions to Site

Head northwest on State Road 32 toward River Valley Drive. Take a right onto State Road 302 and take the first left to stay on the 302. Continue to follow this road for approximately 1.07 miles and turn right onto Crandall Canyon Rd. Pass through the first gate and drive for 0.5 miles to a larger gate on private property. Contact the land owner for entry. After 0.2 miles the road will fork, continue on to the left side of the fork for 0.7 miles. At this point the road will fork again and again stay left. Drive 0.2 miles at which point there will be a road off to the left, take this road for another 0.2 miles. The site is on the right (northwest) side of the road.

Site Information

Land Ownership Private
 Allotment Not Available
 Elevation 6,603ft (2,012m)
 Aspect Southwest
 Slope 6%
 Sample Dates 09/02/2014

DISTURBANCE HISTORY--

Management unit 06R, Study no: 5

Treatment/Disturbance	Name	WRI DB #	Date	Size (acres)
Two-Way Ely Chaining	Crandall Canyon Juniper Thinning	2360	November 2013	400
Seeding: Aerial After	Crandall Canyon Juniper Thinning	2360	December 2013	400
Seeding: ATV	Crandall Canyon Juniper Thinning	2360	December 2013	-

The table is a recorded disturbance history of the study site.

Management unit 06R, Study no: 5

Project Name: Crandall Canyon Juniper Thinning				Project Name: Crandall Canyon Juniper Thinning			
WRI Database #: 2360				WRI Database #: 2360			
Application: Aerial Seed		Acres: 400		Application: ATV		Acres: -	
Seed Type		lbs in mix	lbs/acre	Seed Type		lbs in mix	lbs/acre
G	Big Bluegrass 'Sherman'	200	.5	B	Bitterbrush	-	-
G	Canby Bluegrass 'Canbar'	300	.75				
G	Orchardgrass 'Paiute'	196	.49				
G	Snake River Wheatgrass 'Secar'	400	1				
F	Alfalfa 'Ranger'	470	1.2				
F	Blue Flax 'Appar'	200	.5				
F	Sainfoin 'Eski'	770	1.9				
F	Small Burnet	800	2				
F	Western Yarrow	40	.1				
B	Forage Kochia	400	1				
B	Sagebrush, Mountain Big	220	.55				
B	Sagebrush, Wyoming Big	350	.88				
Total Pounds:		4346	10.9				
PLS Pounds:			8.35				

Habitat and Vegetation Information

Wildlife Habitat Deer, Substantial Winter; Elk, Crucial Winter

VEGETATION HISTORY--

Management unit 16R, Study no: 5

Year	Vegetation Type ¹	Woodland Succession ²
2014	Perennial Grass	Phase I

¹Vegetation Type (Appendix - Vegetation Type), ²Woodland Succession (Tausch, Miller, Roundy, & Chambers, 2009).

Site Notes

Deer use is moderate on this site (Table – Pellet Groups). Following the chaining, bitterbrush seed was drilled into a portion of the area using an ATV pulled bitterbrush seed drill.

Site Potential

1981-2010 Average Annual Precipitation 17 inches
 NRCS Ecological Site Mountain Loam (Mountain Big Sagebrush)
 NRCS Ecological Site # [R047XA430UT](#)

States and Transitions

A defined [state and transition model](#) is available.

This site was established in 2014 and primarily consisted of native perennial grasses such as Sandberg bluegrass (*Poa secunda*), bluebunch wheatgrass (*Agropyron spicatum*), and mutton bluegrass (*Poa fendleriana*) (Table - Herbaceous Trends). Forb cover was low but somewhat diverse (Table – Herbaceous Trends). Browse cover and diversity were low, with the dominant species being stickyleaf low rabbitbrush (*Chrysothamnus viscidiflorus* ssp. *viscidiflorus*) (Table – Browse Trends). Cover of Utah juniper (*Juniperus osteosperma*) is low due to the recent chaining and currently does not pose a threat to the resilience of this site. This state is not currently covered in the state and transition model (USDA-NRCS, 2011).

Trend Summary

HERBACEOUS TRENDS--

Management unit 06R, Study no: 5

T y p e	Species	Nested Frequency	Average Cover %
		'14	'14
G	Agropyron cristatum	68	1.49
G	Agropyron dasystachyum	2	.00
G	Agropyron spicatum	89	2.53
G	Bromus tectorum (a)	11	.03
G	Dactylis glomerata	5	.03
G	Oryzopsis hymenoides	18	.43
G	Poa fendleriana	47	.89
G	Poa pratensis	21	.25
G	Poa secunda	106	1.23
G	Sitanion hystrix	19	.30
Total for Annual Grasses		11	0.03
Total for Perennial Grasses		375	7.17
Total for Grasses		386	7.20
F	Achillea millefolium	16	.36
F	Agoseris glauca	4	.00
F	Antennaria dimorpha	30	.20
F	Arenaria sp.	50	.19
F	Aster sp.	4	.01
F	Astragalus convallarius	8	.04
F	Astragalus sp.	6	.01
F	Astragalus tenellus	5	.03
F	Balsamorhiza sagittata	-	.00
F	Chenopodium leptophyllum(a)	5	.03
F	Cirsium sp.	4	.01
F	Collinsia parviflora (a)	1	.00
F	Comandra pallida	8	.05
F	Descurainia pinnata (a)	6	.01
F	Erigeron engelmannii	13	.03
F	Eriogonum umbellatum	39	.22
F	Lepidium sp. (a)	4	.18

Type	Species	Nested Frequency	Average Cover %
		'14	'14
F	Lithospermum incisum	4	.01
F	Phlox hoodii	27	.28
F	Phlox longifolia	11	.02
F	Polygonum douglasii (a)	9	.02
F	Sanguisorba minor	7	.02
F	Solanum triflorum (a)	-	.00
F	Trifolium sp.	16	.07
Total for Annual Forbs		25	0.25
Total for Perennial Forbs		252	1.60
Total for Forbs		277	1.85

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

BROWSE TRENDS--

Management unit 06R, Study no: 5

Type	Species	Quadrat Cover %	Line Intercept Cover %
		'14	'14
B	Amelanchier utahensis	.00	-
B	Artemisia tridentata vaseyana	.43	.76
B	Chrysothamnus viscidiflorus viscidiflorus	1.42	1.75
B	Juniperus osteosperma	.33	1.82
B	Kochia prostrata	.03	.10
B	Opuntia sp.	.07	.13
B	Purshia tridentata	.02	-
B	Symphoricarpos oreophilus	.04	-
B	Tetradymia canescens	.03	.18
Total for Browse		2.39	4.74

POINT-QUARTER TREE DATA--

Management unit 06R, Study no: 5

Species	Trees per Acre	Average diameter (in)
	'14	'14
Juniperus osteosperma	79	1.8

BASIC COVER--

Management unit 06R, Study no: 5

Cover Type	Average Cover % '14
Vegetation	12.36
Rock	.98
Pavement	.55
Litter	53.44
Cryptogams	.04
Bare Ground	38.79

PELLET GROUP DATA--

Management unit 06R, Study no: 5

Type	Quadrat Frequency '14	Days use per acre (ha) '14
Rabbit	41	-
Elk	1	3 (7)
Deer	20	12 (30)

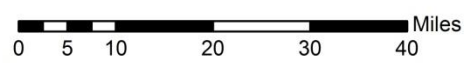
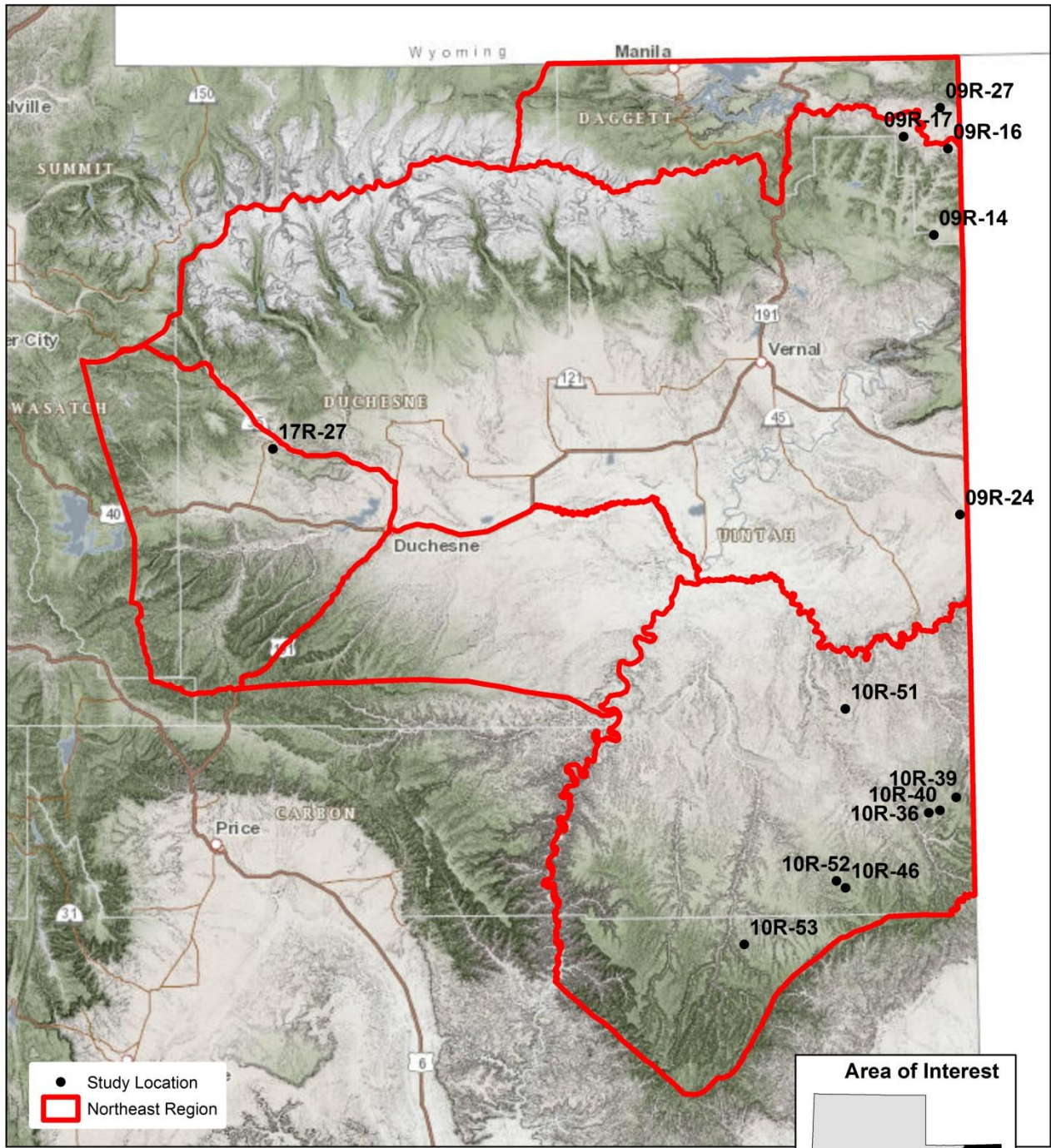
BROWSE CHARACTERISTICS--

Management unit 06R, Study no: 5

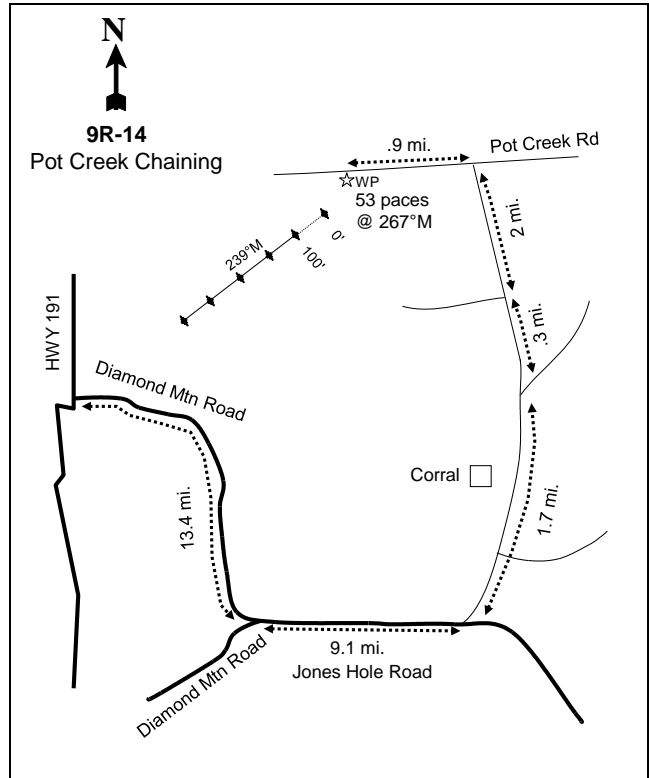
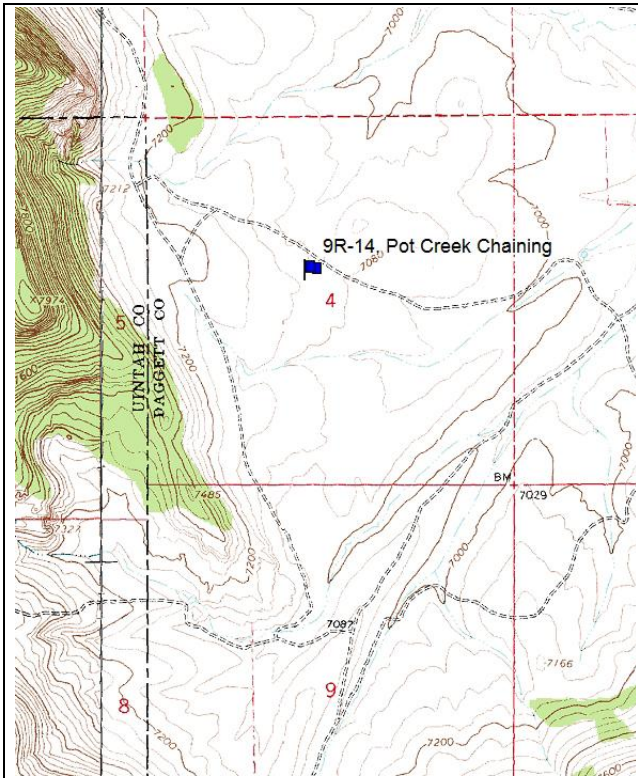
Year	Plants per Acre (excluding seedlings)	Age class distribution			Seedling (plants/acre)	Utilization		% poor vigor	Average Height Crown (in)
		% Young	% Mature	% Decadent		% moderate	% heavy		
<i>Amelanchier utahensis</i>									
14	100	100	0	-	20	40	0	0	11/11
<i>Artemisia tridentata vaseyana</i>									
14	320	13	19	69	80	13	19	25	13/18
<i>Chrysothamnus viscidiflorus viscidiflorus</i>									
14	3980	40	60	-	540	4	.50	0	8/7
<i>Gutierrezia sarothrae</i>									
14	0	0	0	-	-	0	0	0	9/6
<i>Juniperus osteosperma</i>									
14	100	80	0	20	60	0	0	40	-/-
<i>Kochia prostrata</i>									
14	380	26	74	-	200	0	0	0	3/7
<i>Opuntia sp.</i>									
14	860	42	58	-	-	0	0	5	4/5
<i>Purshia tridentata</i>									
14	60	100	0	-	660	0	0	0	2/2
<i>Symphoricarpos oreophilus</i>									
14	540	78	15	7	100	7	0	19	7/9

		Age class distribution					Utilization			
Year	Plants per Acre (excluding seedlings)	% Young	% Mature	% Decadent	Seedling (plants/acre)	% moderate	% heavy	% poor vigor	Average Height Crown (in)	
Tetradymia canescens										
14	480	58	42	-	-	29	8	0	7/8	

NORTHEASTERN REGION



POT CREEK CHAINING - TREND STUDY NO. 9R-14



Location Information

USGS 7.5 min Map Info Hoy Mountain; Township 2S, Range 25E, Section 4
 GPS (0' Stake) NAD 83, UTM Zone 12, 659297 East 4504682 North

Transect Information

Browse Tag # (0' Stake) 132
 Transect Bearing 239° magnetic
 Length 500ft
 Belt Placement Line 1 (11ft), Line 2 (34ft), Line 3 (59ft), Line 4 (71ft), Line 5 (95ft)
 Belt Marker Placement Standard

Directions to Site

Drive north from Vernal on US 191 to mile marker 225. Turn right (east) to the Diamond Mountain road. Drive for 13.4 miles to a fork. Take the left fork and drive east on Jones Hole road for 9.1 miles to a fork to the right and a sign that reads "Pot Creek Turnoff". Turn left and drive 1.7 miles to a fork. Stay left at the fork and drive 2.3 miles to Pot Creek Rd. Turn left and go 0.9 miles to the witness post. From the witness post, the 0-foot stake is 53 paces at 267 degrees magnetic, and marked with browse tag # 132.

Site Information

Land Ownership BLM
 Allotment Ruple Cabin
 Elevation 7,100ft (2,164m)
 Aspect Northeast
 Slope 2-5%
 Sample Dates 08/02/2007, 08/09/2011, 08/19/2014

DISTURBANCE HISTORY--

Management unit 09R, Study no: 14

Treatment/Disturbance	Name	WRI DB #	Date	Size (acres)
Wildfire	Pot Hole	-	2006	1396
One-Way Ely Chaining	Ruple Cabin Wildfire Rehabilitation	608	September 2006	1200
Seeding: Aerial Before	Ruple Cabin Wildfire Rehabilitation	608	September 2006	1200
Seeding: Dribbler	Ruple Cabin Wildfire Rehabilitation	608	September 2006	1200
Seeding: Aerial After	Ruple Cabin Wildfire Rehabilitation	608	December 2006	1200

The table is a recorded disturbance history of the study site.

SEED MIX--

Management unit 09R, Study no: 14

Project Name: Ruple Cabin Wildfire Rehabilitation WRI Database #: 608				Project Name: Ruple Cabin Wildfire Rehabilitation Dribbler WRI Database #: 608			
Application: Aerial Seed		Acres: 1200		Application: Dribbler		Acres: 1200	
Seed Type		lbs in mix	lbs/acre	Seed Type		lbs in mix	lbs/acre
G	Big Bluegrass 'Sherman'	250	0.21	B	Bitterbrush	181	0.15
G	Bluebunch Wheatgrass 'Goldar'	601	0.50	B	Small Burnet 'Delar'	300	0.25
G	Canby Bluegrass 'Canbar'	250	0.21	Total Pounds:		481	0.40
G	Hard Fescue	300	0.25	PLS Pounds:			0.35
G	Hard Fescue 'Durar'	30	0.03	Project Name: Ruple Cabin Sagebrush			
G	Orchardgrass 'Paiute'	300	0.25	WRI Database #: 608			
G	Snake River Wheatgrass 'Secar'	600	0.50	Application: Aerial Seed		Acres: 1150	
F	Alfalfa 'Ladak'	900	0.75	Seed Type		lbs in mix	lbs/acre
F	Alfalfa 'Nomad'	900	0.75	B	Sagebrush, Wyoming	1151	1.00
F	Cicer Milkvetch 'Lutana'	900	0.75	Total Pounds:		1151	1.00
F	Sainfoin 'Eski'	6217	5.18	PLS Pounds:			0.23
F	Small Burnet 'Delar'	3000	2.50				
F	Western Yarrow 'SID Columbia'	50	0.04				
Total Pounds:		14298	11.92				
PLS Pounds:			10.85				

Habitat and Vegetation Information

Wildlife Habitat Deer, Crucial Summer; Elk, Crucial Winter; Sage-Grouse, Occupied, Brood-Rearing

VEGETATION HISTORY--

Management unit 09R, Study no: 14

Year	Vegetation Type ¹	Woodland Succession ²
2007-2014	Perennial Grass	No Encroachment

¹Vegetation Type (Appendix - Vegetation Type), ²Woodland Succession (Tausch, Miller, Roundy, & Chambers, 2009).

Site Notes

The study was established following the Pot Hole Wildfire that burned 1,396 acres in 2006, and was established following the rehabilitation treatment. The area is important peripheral breeding and brood-rearing habitat for the Diamond Mountain sage-grouse population. The objectives of the project are to prevent the spread of cheatgrass (*Bromus tectorum*), reestablish a sagebrush/bitterbrush canopy, and create a diverse understory to benefit sage-grouse, big game, and cattle grazing (WRI Database 2015).

Site Potential

1981-2010 Average Annual Precipitation 12 inches
 NRCS Ecological Site Mountain Loam (Mountain Big Sagebrush)
 NRCS Ecological Site # [R047XC430UT](#)

SOIL ANALYSIS DATA--

Management unit 09R, Study no: 14

Texture	Sand (%)	Silt (%)	Clay (%)	pH	ds/m	OM (%)	PPM P	PPM K	Year Sampled
Sandy Clay Loam	50.2	25.4	24.4	6.6	0.6	2.6	17.4	195.2	2007

Soil specific normal values are described in the ecological site description (USDA-NRCS, 2011) and by Tiedeman and Lopez (2004).

States and Transitions

A defined [state and transition model](#) is available.

Since establishment in 2007, perennial grasses such as thickspike wheatgrass (*Agropyron dasystachyum*) and Sandberg bluegrass (*Poa secunda*) have dominated this site. Forb cover decreased substantially in 2014 but remains a mix of annuals and perennials (Table – Herbaceous Trends). Although mountain big sagebrush (*Artemisia tridentata* ssp. *vaseyana*) cover was very low at establishment due to fire, there has been a steady increase in cover and density over the study years. This site will likely continue to increase in sagebrush cover so that it is once again the dominant species. This state is not currently defined within this state and transition model (USDA-NRCS, 2011).

Trend Summary

HERBACEOUS TRENDS--

Management unit 09R, Study no: 14

T y P e	Species	Nested Frequency			Average Cover %		
		'07	'11	'14	'07	'11	'14
G	<i>Agropyron dasystachyum</i>	_a 278	_b 364	_a 218	7.35	15.52	3.97
G	<i>Agropyron spicatum</i>	_a 11	_{ab} 19	_b 49	.05	.70	.54
G	<i>Bromus tectorum</i> (a)	_a 4	_a 20	_b 128	.04	.06	2.20
G	<i>Carex</i> sp.	_b 28	_{ab} 13	_a 2	.10	.08	.00
G	<i>Dactylis glomerata</i>	-	3	-	-	.00	-
G	<i>Festuca ovina duriuscula</i>	_a -	_b 34	_c 84	-	1.66	2.53
G	<i>Koeleria cristata</i>	-	1	-	-	.03	-
G	<i>Poa fendleriana</i>	_b 30	_a 3	_{ab} 21	.40	.03	.24
G	<i>Poa secunda</i>	_a 216	_a 251	_b 398	9.01	7.62	22.66
G	<i>Sitanion hystrix</i>	-	1	1	-	.03	.00
Total for Annual Grasses		4	20	128	0.04	0.06	2.20
Total for Perennial Grasses		563	689	773	16.92	25.69	29.95

Type	Species	Nested Frequency			Average Cover %		
		'07	'11	'14	'07	'11	'14
	Total for Grasses	567	709	901	16.96	25.75	32.15
F	<i>Achillea millefolium</i>	_a 14	_c 81	_b 52	.11	2.08	.84
F	<i>Agoseris glauca</i>	_b 70	_b 94	_a 19	.91	2.23	.11
F	<i>Arabis</i> sp.	3	-	-	.00	-	-
F	<i>Aster</i> sp.	5	-	-	.01	-	-
F	<i>Astragalus convallarius</i>	_b 140	_b 147	_a 50	4.14	9.22	.36
F	<i>Astragalus tenellus</i>	-	3	9	-	.15	.07
F	<i>Calochortus nuttallii</i>	_b 31	_a 2	_a -	.13	.01	-
F	<i>Castilleja linariaefolia</i>	7	-	-	.01	-	-
F	<i>Chaenactis douglasii</i>	-	1	-	-	.00	-
F	<i>Chorispora tenella</i> (a)	_{ab} 18	_a 1	_b 25	.71	.00	.12
F	<i>Collinsia parviflora</i> (a)	_c 223	_b 179	_a 82	2.84	.90	.22
F	<i>Collomia linearis</i> (a)	_a 7	_b 28	_a 1	.09	.24	.00
F	<i>Crepis acuminata</i>	_a 13	_b 39	_{ab} 23	.45	1.13	.15
F	<i>Cymopterus</i> sp.	7	4	-	.07	.05	-
F	<i>Delphinium nuttallianum</i>	_b 41	_a -	_a 4	.17	-	.01
F	<i>Descurainia pinnata</i> (a)	1	2	-	.00	.03	-
F	<i>Erigeron eatonii</i>	_a -	_a 5	_b 13	-	.06	.09
F	<i>Eriogonum</i> sp.	-	3	-	-	.03	-
F	<i>Gayophytum ramosissimum</i> (a)	7	4	-	.22	.03	-
F	<i>Lactuca serriola</i> (a)	-	2	3	-	.01	.03
F	<i>Lepidium</i> sp. (a)	3	-	-	.00	-	-
F	<i>Lupinus argenteus</i>	-	1	-	-	.15	-
F	<i>Machaeranthera grindelioides</i>	-	4	-	-	.04	-
F	<i>Medicago sativa</i>	_b 49	_a 14	_{ab} 32	.36	1.20	.86
F	<i>Microsteris gracilis</i> (a)	_b 21	_c 62	_a 3	.18	.69	.00
F	<i>Onobrychis viciaefolia</i>	_b 122	_a 54	_a 26	1.83	2.92	.29
F	<i>Phlox austromontana</i>	5	11	8	.04	.27	.22
F	<i>Phlox longifolia</i>	_b 149	_b 150	_a 6	1.10	2.73	.03
F	<i>Polygonum douglasii</i> (a)	_b 41	_c 101	_a -	.23	.40	-
F	<i>Sanguisorba minor</i>	_c 82	_b 62	_a -	.65	1.74	-
F	<i>Sisymbrium altissimum</i> (a)	-	7	-	-	.15	-
F	<i>Sphaeralcea coccinea</i>	_a 14	_b 34	_b 45	.41	.65	.30
F	<i>Tragopogon dubius</i> (a)	_a -	_b 64	_b 79	-	1.59	.45
F	<i>Trifolium</i> sp.	_c 101	_b 4	_a -	.45	.01	-
F	<i>Zigadenus paniculatus</i>	1	7	3	.06	.04	.03
	Total for Annual Forbs	321	450	193	4.28	4.08	0.84
	Total for Perennial Forbs	854	720	290	10.96	24.76	3.38
	Total for Forbs	1175	1170	483	15.24	28.84	4.22

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

BROWSE TRENDS--

Management unit 09R, Study no: 14

Type	Species	Quadrat Cover %			Line Intercept Cover %		
		'07	'11	'14	'07	'11	'14
B	Artemisia tridentata vaseyana	.01	.39	1.24	-	1.08	2.11
B	Opuntia sp.	.00	-	-	-	-	-
B	Purshia tridentata	.38	.38	.15	.05	.05	-
B	Tetradymia canescens	-	.03	.00	-	-	-
Total for Browse		0.39	0.79	1.40	.05	1.13	2.11

BASIC COVER--

Management unit 09R, Study no: 14

Cover Type	Average Cover %		
	'07	'11	'14
Vegetation	33.59	50.53	45.60
Rock	.05	.03	.04
Pavement	.73	.09	.43
Litter	11.78	36.96	59.78
Cryptogams	.05	2.09	.00
Bare Ground	65.52	22.72	16.78

PELLET GROUP DATA--

Management unit 09R, Study no: 14

Type	Quadrat Frequency			Days use per acre (ha)		
	'07	'11	'14	'07	'11	'14
Rabbit	8	1	1	-	-	-
Elk	6	3	11	3 (8)	12 (30)	8 (20)
Deer/Antelope	1	6	10	3 (8)	6 (15)	13 (32)
Cattle	2	14	19	2 (4)	7 (18)	2 (4)

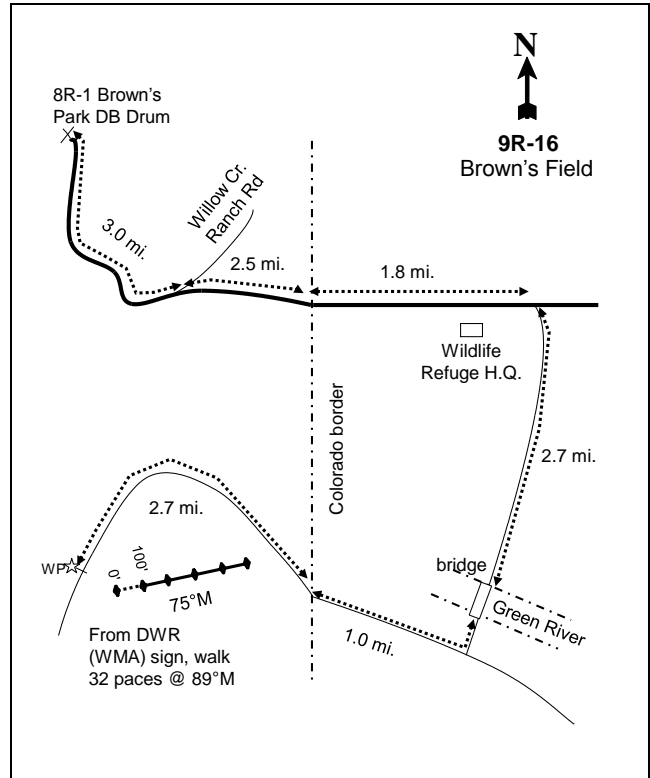
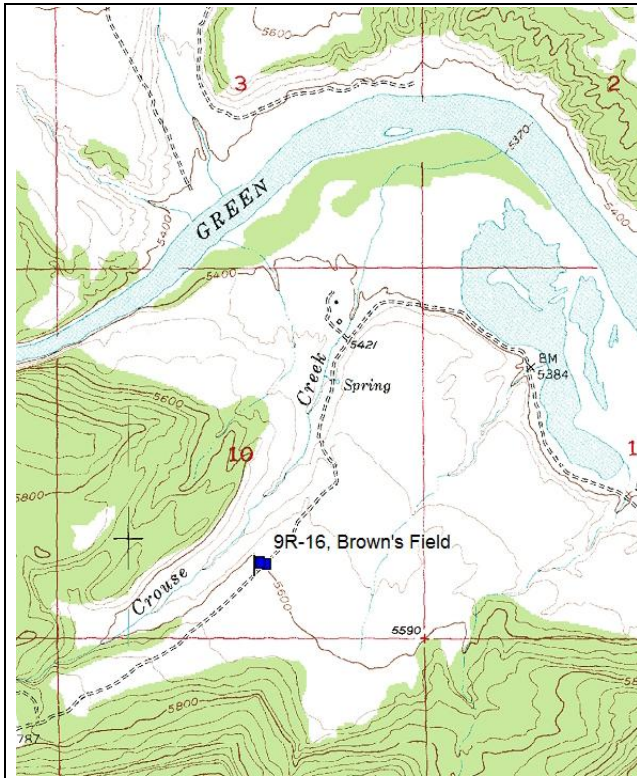
BROWSE CHARACTERISTICS--

Management unit 09R, Study no: 14

Year	Plants per Acre (excluding seedlings)	Age class distribution			Seedling (plants/acre)	Utilization			Average Height Crown (in)
		% Young	% Mature	% Decadent		% moderate	% heavy	% poor vigor	
Artemisia tridentata vaseyana									
07	20	100	0	-	340	0	0	0	-/-
11	620	45	55	-	-	0	0	0	13/14
14	800	10	90	-	-	40	35	8	16/23
Eriogonum microthecum									
07	20	0	100	-	-	0	0	0	7/9
11	20	0	100	-	-	0	0	0	7/10
14	0	0	0	-	-	0	0	0	5/8

Year	Plants per Acre (excluding seedlings)	Age class distribution			Seedling (plants/acre)	Utilization			Average Height Crown (in)
		% Young	% Mature	% Decadent		% moderate	% heavy	% poor vigor	
<i>Opuntia</i> sp.									
07	40	0	100	-	20	0	0	0	3/7
11	0	0	0	-	-	0	0	0	3/8
14	20	0	100	-	-	0	0	0	4/13
<i>Purshia tridentata</i>									
07	20	0	100	-	-	0	100	0	6/28
11	20	0	100	-	-	0	100	0	17/40
14	20	0	100	-	-	0	100	0	7/30
<i>Symphoricarpos oreophilus</i>									
07	0	0	0	-	-	0	0	0	19/35
11	0	0	0	-	-	0	0	0	19/38
14	0	0	0	-	-	0	0	0	16/29
<i>Tetradymia canescens</i>									
07	0	0	0	-	-	0	0	0	9/12
11	40	0	100	-	-	0	0	0	12/25
14	20	0	100	-	-	100	0	0	11/19

BROWN'S FIELD - TREND STUDY NO. 9R-16



Location Information

USGS 7.5 min Map Info Swallow Canyon; Township 1N, Range 25E, Section 10
 GPS (0' Stake) NAD 83, UTM Zone 12, 662108 East 4521861 North

Transect Information

Browse Tag # (0' Stake) 232
 Transect Bearing 75° magnetic
 Length 500ft
 Belt Placement Line 1 (11ft), Line 2 (34ft), Line 3 (59ft), Line 4 (71ft), Line 5 (95ft)
 Belt Marker Placement Standard

Directions to Site

From Dutch John, proceed north towards Antelope Flat on Highway U.S. 191 for approximately 8 miles, before the Wyoming border, turn east on the Antelope Flat Road. Drive for 21 miles to a fork. Continue south on the main road for 1.4 miles to the turnoff to Brown's Park DB Drum. Continue 3 miles to the Willow Creek Ranch road intersection and stay right. Drive for 2.5 miles on a dirt road to a cattle guard (on the state line). From the cattle guard drive 1.8 miles on paved road and turn right at the Wildlife Refuge Headquarters. Go 2.7 miles to the bridge crossing the Green River and turn right. Drive 1.0 mile to a cattle guard (on the state line) and go 2.7 miles, passing the Brown's Park DWR Field Station on the right, to the witness post on the left side. The 0-foot stake is 32 paces from the DWR (Wildlife Management Area) sign at 89 degrees magnetic. The 0-foot stake is marked with browse tag # 232.

Site Information

Land Ownership UDWR
 Allotment Watson-DM
 Elevation 5,617ft (1,712m)
 Aspect Northwest
 Slope 5%
 Sample Dates 07/08/2008, 08/09/2011, 08/19/2014

DISTURBANCE HISTORY--

Management unit 09R, Study no: 16

Treatment/Disturbance	Name	WRI DB #	Date	Size (acres)
Herbicide: 2,4-D/Tordon	Brown's Park Ag Field Rehabilitation	26	June 2005	141
Aerator (Double Drum)/Seed	Brown's Park Ag Field Rehabilitation	26	September 2006	141
Seeding: Truax Drill	Brown's Park Ag Field Rehabilitation	26	Fall 2006	200
Herbicide: Plateau	Brown's Park Fields	1152	Fall 2008	143
Seeding: Rangeland Drill	Brown's Park Fields	1152	January 2009	161

The table is a recorded disturbance history of the study site.

SEED MIX--

Management unit 09R, Study no: 16

Project Name: Brown's Park Fields WRI Database #: 1152				Project Name: Brown's Park Ag Field Rehabilitation WRI Database #: 26			
Application: Rangeland Drill		Acres: 161		Application: Truax Drill		Acres: 200	
Seed type		lbs in mix	lbs/acre	Seed type		lbs in mix	lbs/acre
G	Bluebunch Wheatgrass 'Anatone'	100	0.62	G	Thickspike Wheatgrass 'Bannock'	225	1.40
G	Bottlebrush Squirreltail 'Toe Jam'	50	0.31	G	Orchardgrass 'Paiute'	55	0.34
G	Canby Bluegrass 'Canbar'	50	0.31	G	Canby Bluegrass 'Canbar'	55	0.34
G	Crested Wheatgrass 'Douglas'	100	0.62	F	Alfalfa 'Nomad'	450	2.80
G	Crested Wheatgrass 'Hycrest'	100	0.62	F	Sainfoin 'Eski'	900	5.59
G	Crested Wheatgrass 'Nordan'	100	0.62	F	Small Burnet 'Delar'	675	4.19
G	Intermediate Wheatgrass 'Oahe'	200	1.24	B	Sagebrush, Wyoming	225	1.40
G	Russian Wildrye 'Bozoiisky'	150	0.93	B	Forage Kochia	225	1.40
G	Siberian Wheatgrass 'Vavilov'	150	0.93	Total Pounds:		2810	12.49
G	Snake River Wheatgrass 'Secar'	100	0.62	PLS Pounds:			10.57
G	Western Wheatgrass 'Arriba'	200	1.24				
F	Alfalfa 'Ladak'	150	0.93				
F	Alfalfa 'Ranger'	200	1.24				
B	Forage Kochia	157	0.98				
B	Fourwing Saltbush	50	0.31				
B	Sagebrush, Wyoming	160	0.99				
Total Pounds:		2017	12.53				
PLS Pounds:			10.15				

Habitat and Vegetation Information

Wildlife Habitat Deer, Crucial Winter; Moose, Crucial Summer; Big Horn Sheep, Crucial Year-long; Sage-Grouse, Substantial Occupied, Brood-Rearing

VEGETATION HISTORY--

Management unit 09R, Study no: 16

Year	Vegetation Type ¹	Woodland Succession ²
2008	Annual-Perennial Grass	No Encroachment
2011	Annual Grass-Forb	No Encroachment
2014	Annual Grass	No Encroachment

¹Vegetation Type (Appendix - Vegetation Type), ²Woodland Succession (Tausch, Miller, Roundy, & Chambers, 2009).

Site Notes

The study site was established to monitor the effects of a rangeland drill seeding and Plateau (Imazapic) herbicide treatment within an abandoned agricultural field on Crouse bench. The objectives of the projects are to improve the vegetation component, provide additional forage, and add valuable habitat for wildlife species (WRI Database 2015).

Site Potential

1981-2010 Average Annual Precipitation 9 inches
 NRCS Ecological Site Semidesert Gravelly Loam (Wyoming Big Sagebrush)
 NRCS Ecological Site # R034XY205UT

SOIL ANALYSIS DATA--

Management unit 09R, Study no: 17

Texture	Sand (%)	Silt (%)	Clay (%)	pH	ds/m	OM (%)	PPM P	PPM K	Year Sampled
Sandy Loam	64	16.4	19.6	7.2	0.8	0.8	5.9	198.4	2008

Soil specific normal values are described in the ecological site description (USDA-NRCS, 2011) and by Tiedeman and Lopez (2004).

States and Transitions

No state and transition model is available for the above ecological site, but it is likely similar to the [Semidesert Gravelly Loam \(Wyoming Big Sagebrush\) South, R028AY214UT](#) ecological site, which does have a defined state and transition model (USDA-NRCS, 2011).

When established in 2008, this site was a mixture of annual and perennial grasses, namely cheatgrass (*Bromus tectorum*) and intermediate wheatgrass (*Agropyron intermedium*). While these species have fluctuated over the study years, cheatgrass is always one of the most abundant species. In 2014, cheatgrass accounted for the majority of the plant cover on this site. Forb cover varied from year to year with the most abundant species being belvedere summer cypress (*Kochia scoparia*) and tumbled mustard (*Sisymbrium altissimum*) (Table – Herbaceous Trends). Since site establishment, browse cover has been less than 1% (Table – Browse Trends). The high amount of cheatgrass increases the fire potential as well as poses a risk to the resilience of this site.

Trend Summary

HERBACEOUS TRENDS--

Management unit 09R, Study no: 16

Type	Species	Nested Frequency			Average Cover %		
		'08	'11	'14	'08	'11	'14
G	<i>Agropyron cristatum</i>	57	61	42	1.24	1.47	1.44
G	<i>Agropyron dasystachyum</i>	-	-	4	-	-	.03
G	<i>Agropyron fragile</i>	-	1	-	-	.15	-
G	<i>Agropyron intermedium</i>	_c 199	_b 57	_a 8	5.67	2.55	.02
G	<i>Agropyron smithii</i>	_a -	_b 89	_b 114	-	3.34	1.55
G	<i>Bromus tectorum</i> (a)	_b 371	_a 202	_c 433	9.93	9.69	37.95
G	<i>Elymus junceus</i>	_a 6	_a 5	_b 32	.19	.19	.96
G	<i>Festuca ovina</i>	-	-	2	-	-	.00
G	<i>Oryzopsis hymenoides</i>	2	-	1	.15	-	.03
G	<i>Poa secunda</i>	-	-	4	-	-	.00
G	<i>Sitanion hystrix</i>	-	-	-	-	.00	-
G	<i>Sporobolus cryptandrus</i>	_b 36	_a -	_a -	.38	-	-

Type	Species	Nested Frequency			Average Cover %		
		'08	'11	'14	'08	'11	'14
	Total for Annual Grasses	371	202	433	9.93	9.69	37.95
	Total for Perennial Grasses	300	213	207	7.64	7.71	4.06
	Total for Grasses	671	415	640	17.58	17.41	42.01
F	Chenopodium fremontii (a)	-	2	-	-	.03	-
F	Chenopodium leptophyllum(a)	ab1	b8	a-	.00	.55	-
F	Descurainia pinnata (a)	a-	a-	b10	-	-	.02
F	Helianthus annuus (a)	-	6	-	-	.21	-
F	Iva axillaris	a13	b26	a5	.22	1.08	.04
F	Kochia scoparia (a)	c269	b136	a13	5.29	14.90	.62
F	Lactuca serriola (a)	-	-	2	-	-	.01
F	Medicago sativa	1	-	-	.00	-	-
F	Penstemon sp.	b25	a-	b25	.13	-	.21
F	Salsola iberica (a)	b163	a8	a25	.32	.60	.60
F	Sisymbrium altissimum (a)	c164	a5	b45	2.91	.23	.95
F	Sphaeralcea coccinea	b2	b3	a-	.01	.03	-
F	Tragopogon dubius (a)	3	-	4	.03	-	.03
	Total for Annual Forbs	600	165	99	8.55	16.53	2.24
	Total for Perennial Forbs	41	29	30	0.36	1.11	0.25
	Total for Forbs	641	194	129	8.92	17.65	2.49

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

BROWSE TRENDS--

Management unit 09R, Study no: 16

Type	Species	Quadrat Cover %			Line Intercept Cover %		
		'08	'11	'14	'08	'11	'14
B	Gutierrezia sarothrae	-	-	.00	-	-	-
B	Kochia prostrata	.00	-	-	.06	.20	.13
B	Opuntia sp.	.15	.15	.38	-	.18	.51
	Total for Browse	0.15	0.15	0.38	.06	.38	.64

BASIC COVER--

Management unit 09R, Study no: 16

Cover Type	Average Cover %		
	'08	'11	'14
Vegetation	35.78	33.80	47.03
Rock	.30	.00	.16
Pavement	.61	0	.29
Litter	33.20	24.56	47.99
Bare Ground	43.50	43.92	34.46

PELLET GROUP DATA--

Management unit 09R, Study no: 16

Type	Quadrat Frequency		
	'08	'11	'14
Rabbit	69	1	36
Grouse	-	-	2
Elk	31	12	22
Deer/Antelope	61	15	42

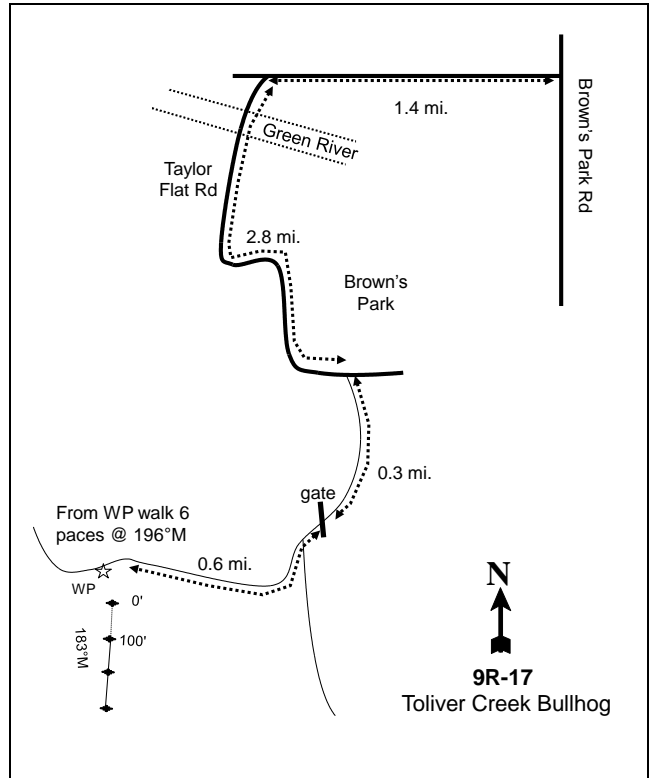
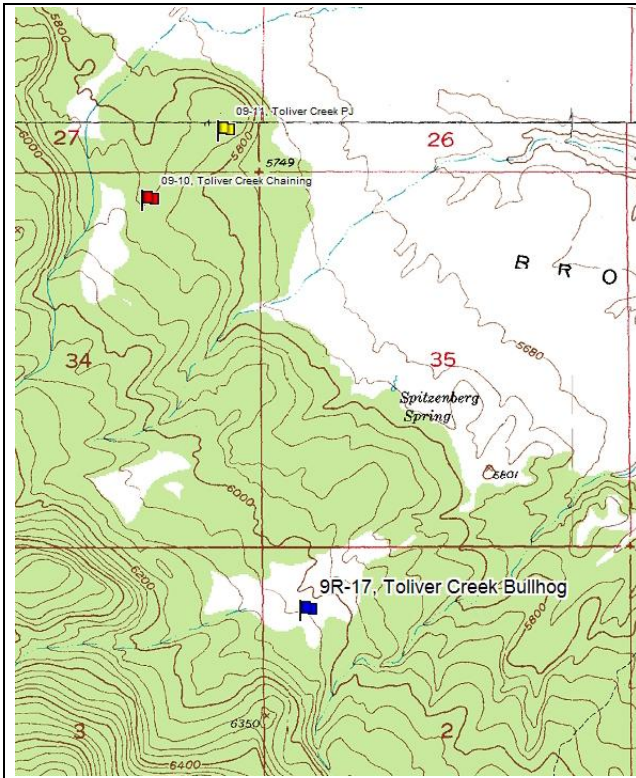
Days use per acre (ha)		
'08	'11	'14
-	-	-
-	-	-
28 (69)	23 (56)	13 (33)
86 (213)	11 (28)	65 (160)

BROWSE CHARACTERISTICS--

Management unit 09R, Study no: 16

Year	Plants per Acre (excluding seedlings)	Age class distribution			Seedling (plants/acre)	Utilization		% poor vigor	Average Height Crown (in)
		% Young	% Mature	% Decadent		% moderate	% heavy		
<i>Artemisia tridentata wyomingensis</i>									
08	0	0	0	-	-	0	0	0	-/-
11	20	100	0	-	-	0	0	0	-/-
14	0	0	0	-	-	0	0	0	-/-
<i>Atriplex canescens</i>									
08	0	0	0	-	-	0	0	0	21/28
11	0	0	0	-	-	0	0	0	34/42
14	0	0	0	-	-	0	0	0	34/55
<i>Chrysothamnus nauseosus</i>									
08	0	0	0	-	-	0	0	0	26/50
11	0	0	0	-	-	0	0	0	24/36
14	0	0	0	-	-	0	0	0	21/28
<i>Gutierrezia sarothrae</i>									
08	0	0	0	-	-	0	0	0	8/13
11	0	0	0	-	-	0	0	0	-/-
14	0	0	0	-	20	0	0	0	-/-
<i>Kochia prostrata</i>									
08	0	0	0	-	-	0	0	0	3/9
11	20	0	100	-	-	0	0	0	-/-
14	20	0	100	-	-	0	0	0	11/16
<i>Opuntia sp.</i>									
08	100	0	100	-	-	0	0	0	3/8
11	80	0	100	-	-	0	0	0	4/15
14	100	0	100	-	-	0	0	0	3/22

TOLIVER CREEK BULLHOG - TREND STUDY NO. 9R-17



Location Information

USGS 7.5 min Map Info Warren Draw; Township 1N, Range 24E, Section 2
 GPS (0' Stake) NAD 83, UTM Zone 12, 653277 East 4524286 North

Transect Information

Browse Tag # (0' Stake) 261
 Transect Bearing 183° magnetic
 Length 300ft
 Belt Placement Line 1 (11ft & 95ft), Line 2 (54ft), Line 3 (34ft & 71 ft)
 Belt Marker Placement Standard, Line 3: 85ft Long

Directions to Site

From Brown's Park Road, turn west and drive 1.4 miles toward Toliver Flat Road. Following Toliver Flat Road, cross the bridge over the Green River, and continue 2.8 miles to an intersection, passing Bridge Hollow campground and Brown's Park on the left. Stay right at the intersection and drive 0.3 miles to a gate. From the gate, take the road to the right (not Outlaw Trail) and drive 0.6 miles to the half-high witness post on the left. The 0-foot stake is six paces from the witness post at 196 degrees magnetic. The 0-foot stake is marked with browse tag # 261.

Site Information

Land Ownership SITLA
 Allotment Taylor Flat
 Elevation 6,050ft (1,844m)
 Aspect Northeast
 Slope 4%
 Sample Dates 07/29/2008, 08/09/2011, 08/20/2014

DISTURBANCE HISTORY--

Management unit 09R, Study no: 17

Treatment/Disturbance	Name	WRI DB #	Date	Size (acres)
Bullhog	Toliver’s Creek Bullhog	1084	Fall 2008	195
Seeding: Aerial Before	Toliver’s Creek Bullhog	1084	October 2008	195

The table is a recorded disturbance history of the study site.

Habitat and Vegetation Information

Wildlife Habitat Deer, Crucial Winter; Elk, Crucial Winter; Rocky Mountain Bighorn Sheep, Crucial Year-long

VEGETATION HISTORY--

Management unit 09R, Study no: 17

Year	Vegetation Type ¹	Woodland Succession ²
2008	Pinyon-Juniper	Phase I
2011-2014	Mountain Big Sagebrush	No Encroachment

¹Vegetation Type (Appendix - Vegetation Type), ²Woodland Succession (Tausch, Miller, Roundy, & Chambers, 2009).

Site Notes

The objectives of the project are to increase the amount of available forage by reducing competition from pinyon and juniper trees, and establishing desirable seeded species (WRI Database 2015).

Site Potential

1981-2010 Average Annual Precipitation 10 inches
 NRCS Ecological Site Upland Loam (Mountain Big Sagebrush)
 NRCS Ecological Site # [R047XC310UT](#)

SOIL ANALYSIS DATA--

Management unit 09R, Study no: 17

Texture	Sand (%)	Silt (%)	Clay (%)	pH	ds/m	OM (%)	PPM P	PPM K	Year Sampled
Sandy Loam	62	19.4	18.6	6.4	0.6	0.8	8	140.8	2008

Soil specific normal values are described in the ecological site description (USDA-NRCS, 2011) and by Tiedeman and Lopez (2004).

States and Transitions

No state and transition model is available for the above ecological site.

When established in 2008, this site was a mixed stand of mountain big sagebrush (*Artemisia tridentata* ssp. *vaseyana*), Utah juniper (*Juniperus osteosperma*), and pinyon pine (*Pinus edulis*) (Table – Browse Trend). Herbaceous cover was low and only perennial grasses were diverse (Table – Herbaceous Trend). After treatment, mountain big sagebrush remained the dominant species, but pinyon and juniper cover were reduced to less than 1%. Perennial grasses have increased in cover and diversity since treatment. Cheatgrass (*Bromus tectorum*) has been present on the site since the first reading of the study; however, it remains low in cover and currently does not pose a threat to the resilience of this site.

Trend Summary

HERBACEOUS TRENDS--

Management unit 09R, Study no: 17

T y p e	Species	Nested Frequency			Average Cover %		
		'08	'11	'14	'08	'11	'14
G	Agropyron cristatum	a18	ab22	b43	.36	1.10	2.12
G	Agropyron smithii	a108	b155	a91	1.29	2.94	.62
G	Agropyron spicatum	a-	ab14	b18	-	.34	.19
G	Bromus tectorum (a)	a172	b325	b327	1.67	7.81	4.17
G	Carex obtusata	39	44	26	.94	.93	.11
G	Festuca ovina	a-	ab11	b16	-	.02	.09
G	Oryzopsis hymenoides	14	9	9	.07	1.15	.49
G	Poa fendleriana	2	-	-	.01	-	-
G	Poa secunda	b90	a31	b85	1.21	.63	1.00
G	Sitanion hystrix	2	11	13	.06	.36	.11
G	Sporobolus airoides	ab7	a-	b21	.01	-	.22
G	Stipa comata	a94	ab111	b127	2.22	5.14	5.63
G	Vulpia octoflora (a)	b104	a44	c165	.26	.16	.98
Total for Annual Grasses		276	369	492	1.93	7.97	5.15
Total for Perennial Grasses		374	408	449	6.20	12.63	10.59
Total for Grasses		650	777	941	8.13	20.60	15.74
F	Alyssum alyssoides (a)	b12	c45	a-	.03	.19	-
F	Astragalus convallarius	a-	c9	b3	-	.60	.00
F	Calochortus nuttallii	-	7	-	-	.03	-
F	Chenopodium leptophyllum(a)	-	8	-	-	.02	-
F	Cirsium sp.	-	1	-	-	.03	-
F	Cymopterus sp.	1	-	-	.00	-	-
F	Descurainia pinnata (a)	2	4	13	.01	.01	.02
F	Gayophytum ramosissimum(a)	a-	b21	a-	-	.05	-
F	Gilia sp. (a)	b8	b20	a-	.05	.04	-
F	Iva axillaris	a15	b37	ab27	.02	.63	.14
F	Lactuca serriola (a)	-	2	-	-	.00	-
F	Lappula occidentalis (a)	3	-	5	.01	-	.01
F	Mentzelia albicaulis (a)	-	2	-	-	.00	-
F	Orobanche fasciculata	5	-	-	.02	-	-
F	Phlox hoodii	-	-	3	-	-	.00
F	Plantago patagonica (a)	-	2	-	-	.01	-
F	Senecio multilobatus	-	-	2	-	-	.00
F	Sphaeralcea coccinea	ab20	b42	a17	.20	.42	.03
F	Tragopogon dubius (a)	-	2	-	-	.03	-
Total for Annual Forbs		25	106	18	0.11	0.36	0.03
Total for Perennial Forbs		41	96	52	0.25	1.72	0.19
Total for Forbs		66	202	70	0.36	2.08	0.22

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

BROWSE TRENDS--

Management unit 09R, Study no: 17

Type	Species	Quadrat Cover %			Line Intercept Cover %		
		'08	'11	'14	'08	'11	'14
B	Amelanchier utahensis	-	.03	-	-	-	-
B	Artemisia tridentata vaseyana	10.83	9.68	9.92	12.41	14.70	9.38
B	Gutierrezia sarothrae	.45	1.08	.25	.35	1.20	.25
B	Juniperus osteosperma	7.64	-	.03	5.90	.23	.28
B	Opuntia sp.	.79	.51	.70	.58	.60	1.10
B	Pinus edulis	3.64	-	-	4.35	-	-
Total for Browse		23.35	11.31	10.90	23.59	16.73	11.01

CANOPY COVER, LINE INTERCEPT--

Management unit 09R, Study no: 17

Species	Percent Cover		
	'08	'11	'14
Artemisia tridentata vaseyana	12.41	14.70	9.38
Gutierrezia sarothrae	.35	1.20	.25
Juniperus osteosperma	5.90	.23	.28
Opuntia sp.	.58	.60	1.10
Pinus edulis	4.35	-	-

POINT-QUARTER TREE DATA--

Management unit 09R, Study no: 17

Species	Trees per Acre			Average diameter (in)		
	'08	'11	'14	'08	'11	'14
Juniperus osteosperma	77	21	31	9	4.5	2.8
Pinus edulis	53	8	20	5.2	2.1	2.4

BASIC COVER--

Management unit 09R, Study no: 17

Cover Type	Average Cover %		
	'08	'11	'14
Vegetation	29.13	32.37	28.86
Rock	.07	.06	.41
Pavement	6.02	.09	4.42
Litter	42.23	38.32	49.50
Cryptogams	1.98	1.41	.93
Bare Ground	42.22	36.63	29.96

PELLET GROUP DATA--

Management unit 09R, Study no: 17

Type	Quadrat Frequency		
	'08	'11	'14
Rabbit	73	10	24
Elk	10	12	11
Deer	20	25	59
Cattle	7	-	4

Days use per acre (ha)		
'08	'11	'14
-	-	-
26 (65)	12 (30)	3 (8)
76 (187)	46 (114)	5 (12)
27 (66)	-	-

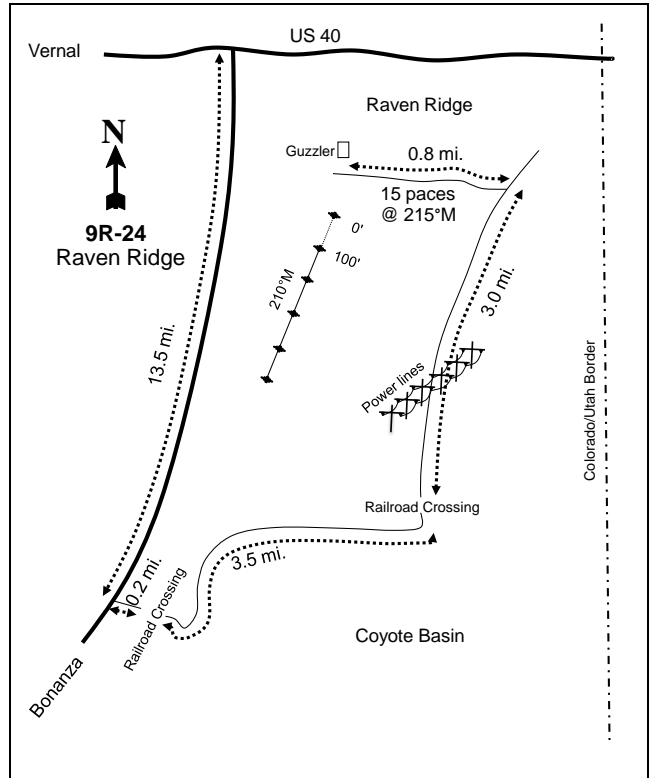
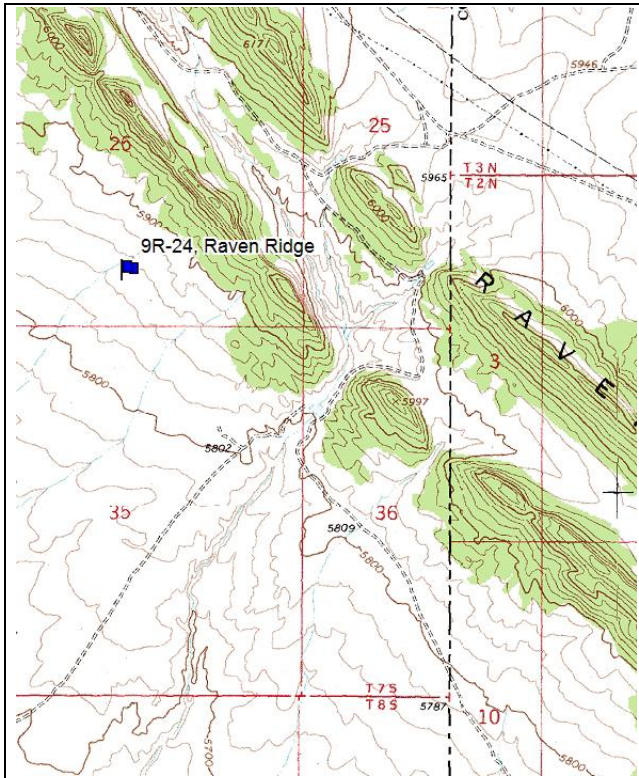
BROWSE CHARACTERISTICS--

Management unit 09R, Study no: 17

Year	Plants per Acre (excluding seedlings)	Age class distribution			Seedling (plants/acre)	Utilization		% poor vigor	Average Height Crown (in)
		% Young	% Mature	% Decadent		% moderate	% heavy		
Amelanchier utahensis									
08	0	0	0	-	-	0	0	0	-/-
11	20	100	0	-	-	0	0	0	22/26
14	0	0	0	-	-	0	0	0	-/-
Artemisia tridentata vaseyana									
08	4120	3	63	33	160	21	65	17	14/23
11	4800	14	80	6	240	27	30	6	13/23
14	4340	7	77	16	80	32	60	15	13/24
Chrysothamnus nauseosus									
08	0	0	0	-	-	0	0	0	-/-
11	0	0	0	-	-	0	0	0	14/15
14	0	0	0	-	-	0	0	0	-/-
Gutierrezia sarothrae									
08	420	0	90	10	-	0	5	5	7/9
11	860	9	84	7	-	0	0	9	8/13
14	380	32	68	0	-	0	0	0	5/9
Juniperus osteosperma									
08	120	17	67	17	-	0	0	33	-/-
11	20	0	100	0	-	0	0	0	-/-
14	20	100	0	0	-	0	0	0	-/-
Opuntia sp.									
08	660	6	88	6	40	0	0	3	4/15
11	660	0	100	0	-	0	0	0	4/11
14	880	2	95	2	20	0	0	5	4/14
Pinus edulis									
08	120	17	83	-	-	0	0	0	-/-
11	20	100	0	-	-	0	0	0	-/-
14	20	100	0	-	-	0	0	0	-/-

		Age class distribution					Utilization			
Year	Plants per Acre (excluding seedlings)	% Young	% Mature	% Decadent	Seedling (plants/acre)	% moderate	% heavy	% poor vigor	Average Height Crown (in)	
Rhus trilobata										
08	0	0	0	-	-	0	0	0	-/-	
11	20	100	0	-	-	0	0	0	6/5	
14	0	0	0	-	-	0	0	0	-/-	
Rosa woodsii										
08	0	0	0	-	-	0	0	0	14/14	
11	0	0	0	-	-	0	0	0	11/9	
14	0	0	0	-	-	0	0	0	15/11	

RAVEN RIDGE - TREND STUDY NO. 9R-24



Location Information

USGS 7.5 min Map Info Dinosaur; Township 7S, Range 25E, Section 26
 GPS (0' Stake) NAD 83, UTM Zone 12, 664514 East 4448961 North

Transect Information

Browse Tag # (0' Stake) 181
 Transect Bearing 210° magnetic
 Length 500ft
 Belt Placement Line 1 (11ft), Line 2 (34ft), Line 3 (59ft), Line 4 (71ft), Line 5 (95ft)
 Belt Marker Placement Standard

Directions to Site

At the intersection of State Road 45 and US 40, take state road 45 and drive south for 13.5 miles. Turn right (east) and drive for 0.2 miles to a railroad crossing. Cross the railroad staying left and follow the railroad tracks for 3.7 miles. Cross the railroad track heading north and go 3 miles to a road on the left. At this point turn left (west) and drive 0.9 miles to a wildlife guzzler. The transect is 15 paces from the guzzler at 215 degrees magnetic. The browse tag is #181.

Site Information

Land Ownership BLM
 Allotment Raven Ridge
 Elevation 5,790ft (1,765m)
 Aspect South
 Slope 5%
 Sample Dates 08/10/2011, 08/18/2014

DISTURBANCE HISTORY--

Management unit 09R, Study no: 24

Treatment/Disturbance	Name	WRI DB #	Date	Size (acres)
Herbicide: Plateau	Raven Ridge Harrow Project	1989	September 2011	500
One-Way Chain Harrow	Raven Ridge Harrow Project	1989	Fall 2011	500
Seeding: Broadcast Before	Raven Ridge Harrow Project	1989	Fall 2011	500

The table is a recorded disturbance history of the study site.

SEED MIX--

Management unit 9R, Study no: 24

Project Name: Raven Ridge			
WRI Database #: 1989			
Application: Broadcast Seed		Acres: 500	
Seed Type		lbs in mix	lbs/acre
G	Bottlebrush Squirreltail	250	0.50
G	Canby Bluegrass 'Canbar'	125	0.25
G	Crested Wheatgrass 'Ephraim'	750	1.50
G	Indian Ricegrass	387	0.77
G	Russian Wildrye 'Bozoisky'	750	1.50
G	Siberian Wheatgrass 'Vavilov' NC	500	1.00
G	Snake River Wheatgrass 'Secar'	750	1.50
G	Western Wheatgrass 'Arriba'	1000	2.00
F	Blue Flax 'Appar'	250	0.50
F	Rocky Mountain Beeplant	250	0.50
F	Scarlet Globemallow	100	0.20
F	Western Yarrow 'Eagle Mountain'	50	0.10
B	Fourwing Saltbush	750	1.50
Total Pounds:		5912	11.82
PLS Pounds:			9.29

Habitat and Vegetation Information

Wildlife Habitat Pronghorn, Crucial Year-Long, Fawning habitat; Sage-Grouse, Crucial Occupied & Winter, Brood-Rearing

VEGETATION HISTORY--

Management unit 09R, Study no: 24

Year	Vegetation Type ¹	Woodland Succession ²
2011-2014	Wyoming Big Sagebrush	No Encroachment

¹Vegetation Type (Appendix - Vegetation Type), ²Woodland Succession (Tausch, Miller, Roundy, & Chambers, 2009).

Site Notes

The objectives of the project are to improve habitat quality for sage-grouse and big game, control the spread of cheatgrass (*Bromus tectorum*), and decrease the density of the sagebrush community (WRI Database 2015).

Site Potential

1981-2010 Average Annual Precipitation 11 inches
 NRCS Ecological Site Semidesert Loam (Wyoming Big Sagebrush)
 NRCS Ecological Site # R034XY212UT

States and Transitions

No state and transition model is available for the above ecological site, but it is likely similar to the [Semidesert Loam \(Wyoming Big Sagebrush\), R035XY209UT](#) ecological site, which does have a defined state and transition model (USDA-NRCS, 2011).

This site was established in 2011 and has remained a stable Wyoming big sagebrush (*Artemisia tridentata* ssp. *wyomingensis*) community. Although sagebrush cover decreased after the treatment, the number of decadent shrubs decreased and the number of mature shrubs increased (Table – Browse Characteristics). There were very few other browse species on the site which provided limited cover (Table – Browse Trends). The herbaceous understory was comprised mainly of the annual grass cheatgrass and annual forbs such as tumbled mustard (*Sisymbrium altissimum*), which have increased over time (Table – Herbaceous Trends). Additional treatments may be necessary in order to restore the herbaceous understory of this site.

Trend Summary

HERBACEOUS TRENDS--

Management unit 09R, Study no: 24

Type	Species	Nested Frequency		Average Cover %	
		'11	'14	'11	'14
G	Agropyron cristatum	-	3	-	.06
G	Agropyron smithii	_a 47	_b 107	.63	3.02
G	Bromus tectorum (a)	_b 375	_a 267	8.96	9.08
G	Sitanion hystrix	10	5	.09	.04
G	Vulpia octoflora (a)	_a -	_b 58	-	.30
Total for Annual Grasses		375	325	8.96	9.38
Total for Perennial Grasses		57	115	0.72	3.12
Total for Grasses		432	440	9.69	12.50
F	Achillea millefolium	-	2	-	.00
F	Alyssum alyssoides (a)	8	-	.01	-
F	Cryptantha sp.(a)	-	2	-	.00
F	Descurainia pinnata (a)	_a 1	_b 208	.00	6.09
F	Eriastrum diffusum (a)	18	29	.34	.22
F	Erysimum sp.	_b 20	_a -	.32	-
F	Lappula occidentalis (a)	_a 4	_b 126	.01	1.36
F	Machaeranthera canescens	10	4	.10	.04
F	Salsola iberica (a)	_a -	_b 62	-	.93
F	Sisymbrium altissimum (a)	_a 22	_b 94	1.40	5.21
F	Sphaeralcea grossulariifolia	_a 1	_b 21	.00	.07
Total for Annual Forbs		53	521	1.77	13.83
Total for Perennial Forbs		31	27	0.42	0.11
Total for Forbs		84	548	2.19	13.95

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

BROWSE TRENDS--

Management unit 09R, Study no: 24

Type	Species	Quadrat Cover %		Line Intercept Cover %	
		'11	'14	'11	'14
B	Artemisia tridentata wyomingensis	18.11	9.82	23.38	14.56
B	Gutierrezia sarothrae	.15	.15	-	.21
B	Opuntia sp.	.03	.30	.21	-
Total for Browse		18.29	10.27	23.59	14.77

POINT-QUARTER TREE DATA--

Management unit 09R, Study no: 24

Species	Trees per Acre		Average diameter (in)	
	'11	'14	'11	'14
Juniperus osteosperma	5	-	2.8	-

BASIC COVER--

Management unit 09R, Study no: 24

Cover Type	Average Cover %	
	'11	'14
Vegetation	30.02	36.35
Rock	.02	.10
Pavement	.34	.82
Litter	32.49	46.07
Cryptogams	2.12	.14
Bare Ground	40.24	39.72

PELLET GROUP DATA--

Management unit 09R, Study no: 24

Type	Quadrat Frequency		Days use per acre (ha)	
	'11	'14	'11	'14
Rabbit	7	20	-	-
Elk	2	-	-	1 (3)
Deer/Antelope	6	3	11 (26)	5 (13)

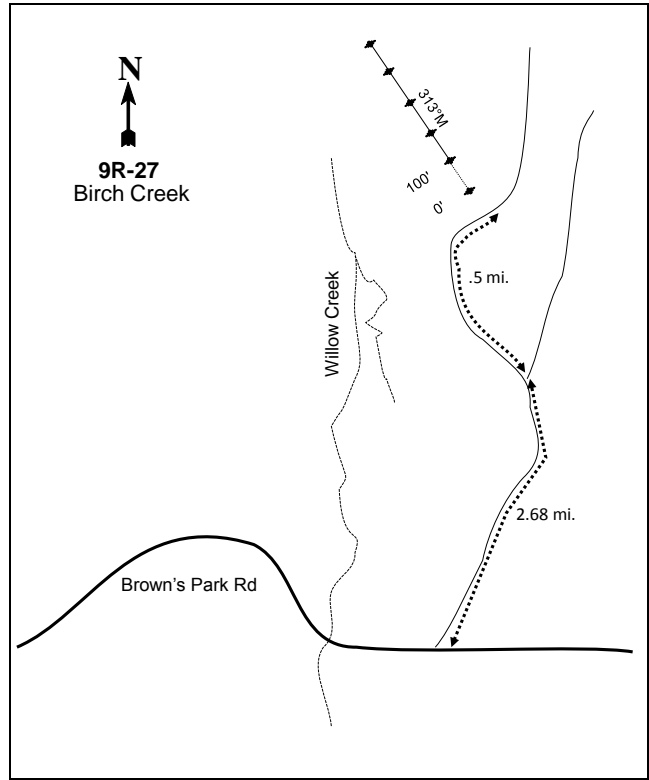
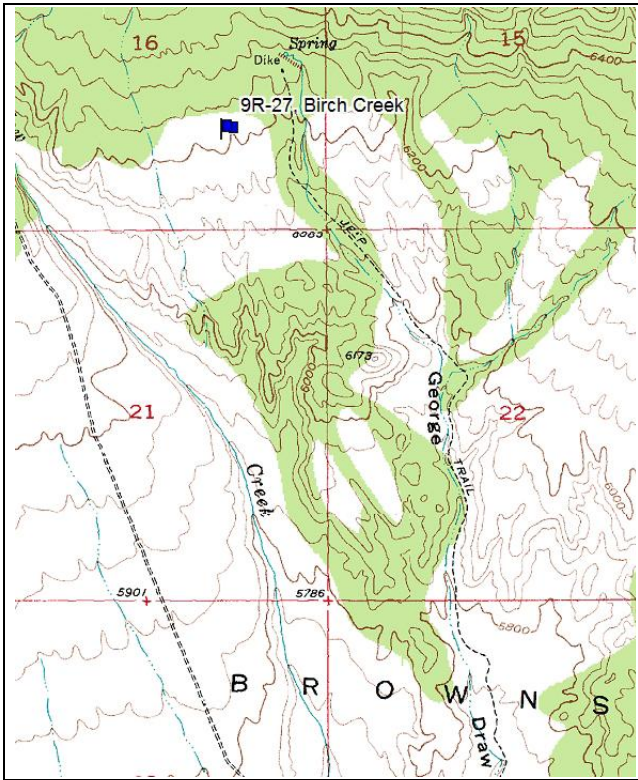
BROWSE CHARACTERISTICS--

Management unit 09R, Study no: 24

Year	Plants per Acre (excluding seedlings)	Age class distribution			Seedling (plants/acre)	Utilization			Average Height Crown (in)
		% Young	% Mature	% Decadent		% moderate	% heavy	% poor vigor	
Artemisia tridentata wyomingensis									
11	4120	2	67	32	2060	62	13	29	21/31
14	2180	1	67	32	-	27	18	19	17/30

		Age class distribution					Utilization			
Year	Plants per Acre (excluding seedlings)	% Young	% Mature	% Decadent	Seedling (plants/acre)	% moderate	% heavy	% poor vigor	Average Height Crown (in)	
<i>Gutierrezia sarothrae</i>										
11	120	0	100	-	-	0	0	0	11/21	
14	800	88	13	-	-	0	0	0	9/15	
<i>Opuntia sp.</i>										
11	60	0	100	-	-	0	0	0	4/14	
14	80	0	100	-	-	0	0	0	5/17	

BIRCH CREEK - TREND STUDY NO. 9R-27



Location Information

USGS 7.5 min Map Info Willow Creek Butte; Township 2N, Range 25E, Section 16
 GPS (0' Stake) NAD 83, UTM Zone 12, 660583 East 4530053 North

Transect Information

Browse Tag # (0' Stake) Not Available
 Transect Bearing 313° magnetic
 Length 500ft
 Belt Placement Line 1 (11ft), Line 2 (34ft), Line 3 (59ft), Line 4 (71ft), Line 5 (95ft)
 Belt Marker Placement No Rebar or Stakes

Directions to Site

Head southeast on Brown's Park Rd. (UT-1364), crossing over Willow Creek. Approximately 900ft after the creek, turn left (north) and drive 2.68 miles where at which point the road will fork. Stay left for 0.5 miles. The site will be on the left side of the road (northwest).

Site Information

Land Ownership SITLA
 Allotment Monticello Cowboy
 Elevation 6,220ft (1,895m)
 Aspect South
 Slope 3%
 Sample Dates 08/20/2014

DISTURBANCE HISTORY--

Management unit 09R, Study no: 27

Treatment/Disturbance	Name	WRI DB #	Date	Size (acres)
*Seeding: Aerial Before	Birch Creek Pinyon and Juniper Removal	2913	Fall 2014	300
*Bullhog	Birch Creek Pinyon and Juniper Removal	2913	Fall 2014	300
*Seeding: Aerial After	Birch Creek Pinyon and Juniper Removal	2913	Fall 2014	300

The table is a recorded disturbance history of the study site.

*Proposed treatment

SEED MIX--

Management unit 9R, Study no: 27

Project Name: Birch Creek Pinyon and Juniper Removal							
WRI Database #: 2913							
Application: Aerial Before		Acres: 300		Application: Aerial Before		Acres: 300	
Seed type		lbs in mix	lbs/acre	Seed type		lbs in mix	lbs/acre
G	Big Bluegrass 'Sherman'	50	.17	B	Black Sagebrush	228	.76
G	Blue Grama 'Hachita'	50	.17	B	Wyoming Big Sagebrush	332	1.1
G	Bluebunch Wheatgrass 'Anatone'	300	1	Total Pounds:		560	1.87
G	Canby Bluegrass 'Canbar'	50	.17	PLS Pounds:			0.36
G	Crested Wheatgrass 'Nordan'	100	.33				
G	Great Basin Wildrye 'Magnar'	150	.5				
G	Great Basin Wildrye 'Trailhead'	100	.33				
G	Green Needlegrass 'Lodorm'	225	.75				
G	Russian Wildrye 'Bozoisky II'	100	.33				
G	Snake River Wheatgrass 'Discovery'	300	1				
G	Western Wheatgrass 'Arriba'	400	1.33				
F	Alfalfa 'Ladak +'	275	.92				
F	Blue Flax 'Appar'	200	.67				
F	Western Yarrow	28	.09				
B	Fourwing Saltbush	275	.92				
Total Pounds:		2603	8.68				
PLS Pounds:			7.79				

Habitat and Vegetation Information

Wildlife Habitat Deer, Crucial Winter; Elk, Substantial Winter; Sage-Grouse, Occupied, Brood-Rearing

VEGETATION HISTORY--

Management unit 09R, Study no: 27

Year	Vegetation Type ¹	Woodland Succession ²
2014	Juniper	Phase II transitioning to Phase III

¹Vegetation Type (Appendix - Vegetation Type), ²Woodland Succession (Tausch, Miller, Roundy, & Chambers, 2009).

Site Notes

There is very little use on this site.

Site Potential

1981-2010 Average Annual Precipitation 10 inches
 NRCS Ecological Site Semidesert Gravelly Sandy Loam (Wyoming Big Sagebrush)
 NRCS Ecological Site # R034XY206UT

States and Transitions

No state and transition model is available for the above ecological site.

When this site was established in 2014 it was in phase II of woodland succession, with Utah juniper (*Juniperus osteosperma*) as the dominant component of the site. Wyoming big sagebrush (*Artemisia tridentata* ssp. *wyomingensis*) made up the majority of the understory, though it was dying off as evident by a large number of decadent shrubs (Table – Browse Characteristics). Herbaceous cover was less than one percent, likely due to competition with the juniper. This site will continue to phase III, increasing community degradation, unless a planned or natural tree removing disturbance sets back the successional trajectory.

Trend Summary

HERBACEOUS TRENDS--
 Management unit 09R, Study no: 27

T y P e	Species	Nested Frequency	Average Cover %
		'14	'14
G	Poa secunda	1	.00
G	Sitanion hystrix	27	.25
Total for Annual Grasses		0	0
Total for Perennial Grasses		28	0.25
Total for Grasses		28	0.25
F	Arabis sp.	2	.00
F	Descurainia pinnata (a)	33	.08
F	Penstemon sp.	3	.00
F	Phlox hoodii	3	.00
Total for Annual Forbs		33	0.08
Total for Perennial Forbs		8	0.01
Total for Forbs		41	0.09

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

BROWSE TRENDS--

Management unit 09R, Study no: 27

Type	Species	Quadrat Cover %	Line Intercept Cover %
		'14	'14
B	Artemisia tridentata wyomingensis	1.64	3.40
B	Gutierrezia sarothrae	.01	-
B	Juniperus osteosperma	13.11	26.56
B	Opuntia sp.	2.75	2.36
B	Pinus edulis	.85	1.10
Total for Browse		18.36	33.42

POINT-QUARTER TREE DATA--

Management unit 09R, Study no: 27

Species	Trees per Acre	Average diameter (in)
	'14	'14
Juniperus osteosperma	127	3.1
Pinus edulis	95	1.5

BASIC COVER--

Management unit 09R, Study no: 27

Cover Type	Average Cover %
	'14
Vegetation	19.36
Rock	2.97
Pavement	16.15
Litter	33.40
Cryptogams	2.70
Bare Ground	41.59

PELLET GROUP DATA--

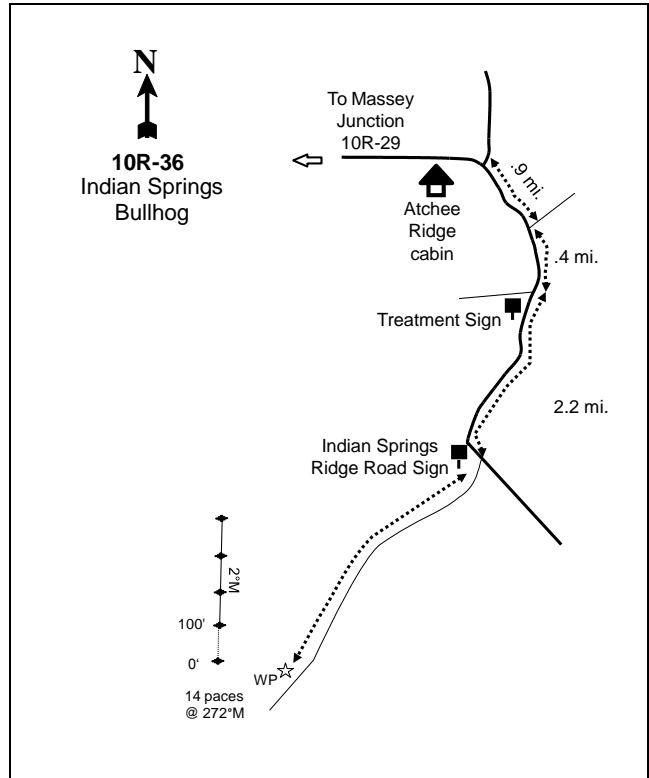
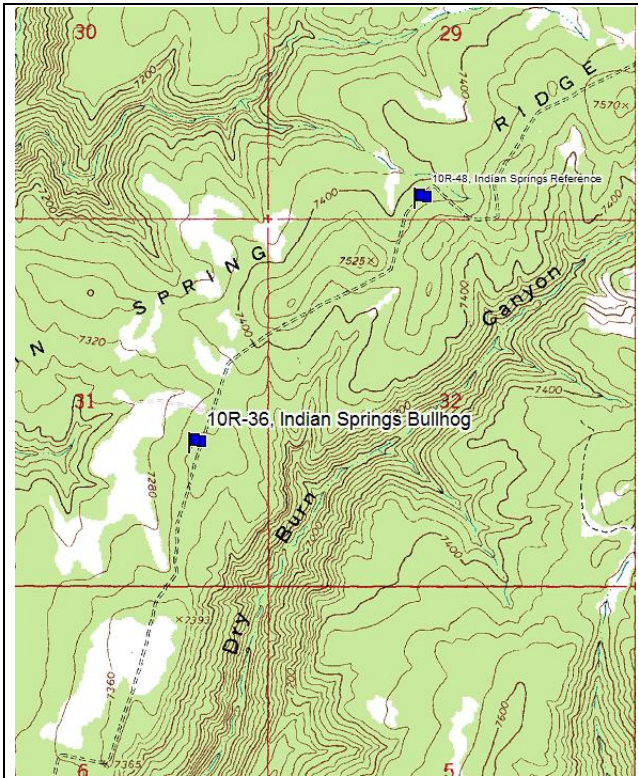
Management unit 09R, Study no: 27

Type	Quadrat Frequency	Days use per acre (ha)
	'14	'14
Rabbit	7	-
Deer	5	1 (3)

BROWSE CHARACTERISTICS--
 Management unit 09R, Study no: 27

		Age class distribution					Utilization			
Year	Plants per Acre (excluding seedlings)	% Young	% Mature	% Decadent	Seedling (plants/acre)	% moderate	% heavy	% poor vigor	Average Height Crown (in)	
<i>Artemisia tridentata wyomingensis</i>										
14	1140	2	11	88	20	9	47	95	12/22	
<i>Echinocereus sp.</i>										
14	0	0	0	-	-	0	0	0	5/12	
<i>Gutierrezia sarothrae</i>										
14	120	33	67	-	420	0	0	67	6/8	
<i>Juniperus osteosperma</i>										
14	460	43	52	4	-	0	4	4	-/-	
<i>Opuntia sp.</i>										
14	1340	1	66	33	-	18	0	46	4/17	
<i>Pinus edulis</i>										
14	80	75	25	-	40	0	0	0	-/-	
<i>Symphoricarpos oreophilus</i>										
14	0	0	0	-	-	0	0	0	3/13	

INDIAN SPRINGS BULLHOG - TREND STUDY NO. 10R-36



Location Information

USGS 7.5 min Map Info Burnt Timber Canyon; Township 13S, Range 25E, Section 31
 GPS (0' Stake) NAD 83, UTM Zone 12, 658300 East 4389574 North

Transect Information

Browse Tag # (0' Stake) 156
 Transect Bearing 2° magnetic
 Length 400ft
 Belt Placement Line 1 (11ft & 95ft), Line 2 (34ft), Line 3 (59ft), Line 4 (71ft)
 Belt Marker Placement No Rebar

Directions to Site

From Atchee Ridge cabin head east on Big Park Rd and take a slight right onto Atchee Ridge Rd. Drive 0.9 miles to another junction and stay right for 0.4 miles to another fork and a treatment sign. From there, stay left for 2.2 miles to a junction with a sign reading “Indian Springs Ridge Road”. Turn right and drive for 3.4 miles; the site is on the right side of the road. The 0-foot stake is approximately 60 ft from the road with a browse tag #156.

Site Information

Land Ownership BLM
 Allotment Atchee Ridge AMP
 Elevation 7,350ft (2,240m)
 Aspect West
 Slope 1%
 Sample Dates 06/27/2006, 07/15/2009, 06/09/2010, 08/19/2014

DISTURBANCE HISTORY--

Management unit 10R, Study no: 36

Treatment/Disturbance	Name	WRI DB #	Date	Size (acres)
Seeding: Aerial Before	Indian Springs Ridge Bullhog	362	December 2006	320
Bullhog	Indian Springs Ridge Bullhog	362	Jan-Feb 2007	320

The table is a recorded disturbance history of the study site.

SEED MIX--

Management unit 10R, Study no: 36

Project Name: Indian Springs Ridge Bullhog			
WRI Database #: 362			
Application: Aerial Seed		Acres:	350
Seed type		lbs in mix	lbs/acre
G	Crested Wheatgrass 'Douglas'	200	0.57
G	Canby Bluegrass 'Canbar'	100	0.29
G	Thickspike Wheatgrass 'Bannock'	250	0.71
G	Western Wheatgrass 'Arriba'	250	0.71
G	Sandberg Bluegrass 'Toole MT'	175	0.50
G	Bluebunch WG 'Anatone'	175	0.50
G	Orchardgrass 'Paiute'	70	0.20
G	Slender Wheatgrass 'San Luis'	175	0.50
G	Blue Grama	90	0.26
F	Western Yarrow	20	0.06
F	Blue Flax 'Appar'	100	0.29
F	Small Burnet 'Delar'	700	2.00
F	Alfalfa 'Ladak'	350	1.00
F	Sainfoin 'Eski'	1050	3.00
B	Fourwing Saltbush	350	1.00
B	Sagebrush, Wyoming	350	1.00
B	Forage Kochia	100	0.29
Total Pounds:		4505	12.87
PLS Pounds:			10.23

Habitat and Vegetation Information

Wildlife Habitat Deer, Crucial Summer; Elk, Crucial Winter; Bison, Crucial Year-long

VEGETATION HISTORY--

Management unit 10R, Study no: 36

Year	Vegetation Type ¹	Woodland Succession ²
2006	Pinyon	Phase III
2009-2014	Black Sagebrush/Bitterbrush	No Encroachment

¹Vegetation Type (Appendix - Vegetation Type), ²Woodland Succession (Tausch, Miller, Roundy, & Chambers, 2009).

Site Notes

The objectives were to release the mountain browse remaining in the understory and to establish grasses, forbs and additional browse in the understory. In 2009, the baseline was moved slightly south and east of the original location to keep the study within the treatment area. However, the new location makes it so that the ends of the belts cross the road. The treatment area receives heavy use by wintering elk, and is an important early fall/late spring mule deer transition range/migration corridor (WRI Database 2015).

Site Potential

1981-2010 Average Annual Precipitation 17 inches
 NRCS Ecological Site Upland Shallow Loam (Pinyon-Utah Juniper)
 NRCS Ecological Site # R034XY322UT

SOIL ANALYSIS DATA--

Management unit 10R, Study no: 36

Texture	Sand (%)	Silt (%)	Clay (%)	pH	ds/m	OM (%)	PPM P	PPM K	Year Sampled
Clay Loam	27.3	38.4	34.3	9	1.2	6.3	12.6	115.2	2006

Soil specific normal values are described in the ecological site description (USDA-NRCS, 2011) and by Tiedeman and Lopez (2004).

States and Transitions

No state and transition model is available for the above ecological site, but it is likely similar to the [Upland Shallow Loam \(Pinyon-Utah Juniper\), R036XY315UT](#) ecological site, which does have a defined state and transition model (USDA-NRCS, 2011).

When this site was established in 2006, it was in phase III encroachment with pinyon pine (*Pinus edulis*) being the dominant plant. There were a number of other browse species also present but their cover was low (Table – Browse Trends). Herbaceous cover for both grasses and forbs was low as well, likely due to competition with the pinyon (Table – Herbaceous Trends). Since treatment, tree cover decreased while other browse and herbaceous species increased. Overall, perennial grasses increased, though there is variation from year to year. Cheatgrass (*Bromus tectorum*) was present, but the cover is so low that it doesn't pose a threat at this time. Forbs were diverse, but individual species contributed little cover (Table – Herbaceous Trends). Black sagebrush (*Artemisia nova*) and bitterbrush (*Purshia tridentata*) became the dominant browse species after the pinyon and juniper trees were removed. There were other browse species present, but they contributed little cover. The browse and herbaceous species are currently increasing on this site. However, the area surrounding this site still has PJ trees and will require continual monitoring if it is to be maintained.

Trend Summary

HERBACEOUS TRENDS--

Management unit 10R, Study no: 36

Type	Species	Nested Frequency				Average Cover %			
		'06	'09	'10	'14	'06	'09	'10	'14
G	Agropyron cristatum	a-	ab8	ab2	b15	-	.06	.03	.45
G	Agropyron dasystachyum	a-	a6	a9	b69	-	.30	.19	4.10
G	Agropyron smithii	a-	a2	b25	b22	-	.03	.23	.61
G	Agropyron spicatum	a11	ab27	a23	b52	.13	1.30	.88	2.67
G	Agropyron trachycaulum	a-	b48	a16	a4	-	3.89	.57	.15
G	Bouteloua gracilis	-	4	6	1	-	.00	.01	.00
G	Bromus tectorum (a)	a-	a4	ab12	b19	-	.03	.21	.12

Type	Species	Nested Frequency				Average Cover %			
		'06	'09	'10	'14	'06	'09	'10	'14
G	Carex sp.	57	34	-	40	1.18	1.30	-	2.49
G	Koeleria cristata	a38	ab58	c113	bc92	.50	1.46	3.63	2.43
G	Oryzopsis hymenoides	2	14	20	28	.01	.79	.66	.83
G	Poa fendleriana	a15	b77	b91	b62	.39	3.34	2.74	3.83
G	Poa secunda	9	29	16	14	.05	.97	.38	.20
G	Sitanion hystrix	a-	a4	a3	b21	-	.21	.03	.32
G	Stipa comata	a-	a23	a11	b52	-	.72	.21	3.30
Total for Annual Grasses		0	4	12	19	0	0.03	0.21	0.12
Total for Perennial Grasses		132	334	335	472	2.27	14.41	9.58	21.42
Total for Grasses		132	338	347	491	2.27	14.44	9.80	21.54
F	Agoseris glauca	a-	a2	b33	a5	-	.03	.21	.01
F	Antennaria microphylla	a-	b15	b25	b19	-	.20	.44	.13
F	Arabis sp.	7	-	1	-	.04	-	.00	-
F	Aster sp.	a-	b18	a-	a-	-	.64	-	-
F	Astragalus spatulatus	a19	b73	b99	b89	.09	.95	1.69	1.59
F	Astragalus utahensis	-	2	1	-	-	.00	.03	-
F	Castilleja linariaefolia	a-	b25	b54	b34	-	.75	.82	.27
F	Collinsia parviflora (a)	2	-	-	-	.00	-	-	-
F	Comandra pallida	15	37	44	21	.06	.33	.26	.10
F	Cordylanthus sp. (a)	a9	a-	a-	b26	.24	-	-	.31
F	Crepis acuminata	a-	b14	ab2	a-	-	.13	.06	-
F	Delphinium nuttallianum	-	-	3	-	-	-	.03	-
F	Descurainia pinnata (a)	-	-	-	3	-	-	-	.03
F	Erigeron eatonii	a-	a-	ab5	b11	-	-	.06	.16
F	Erigeron pumilus	8	9	24	11	.07	.07	.14	.10
F	Eriogonum alatum	11	7	3	13	.15	.06	.03	.09
F	Haplopappus acaulis	a-	a2	a7	b36	-	.03	.68	.85
F	Hymenoxys acaulis	a-	b12	ab7	a-	-	.25	.10	-
F	Ipomopsis aggregata	1	-	-	-	.00	-	-	-
F	Lepidium sp. (a)	-	-	-	2	-	-	-	.00
F	Lesquerella sp.	a19	ab48	b64	ab48	.10	.50	.55	.29
F	Linum lewisii	-	-	10	9	-	.30	.04	.04
F	Machaeranthera grindelioides	1	-	4	-	.00	-	.09	-
F	Medicago sativa	a-	ab6	ab13	b6	-	.04	.21	.36
F	Onobrychis viciaefolia	a-	b15	a-	a-	-	.19	-	-
F	Penstemon sp.	6	10	5	24	.02	.21	.06	.29
F	Penstemon watsonii	a-	ab9	b14	ab4	-	.10	.28	.06
F	Petrorhiza pumila	41	36	30	59	1.35	1.52	.67	1.51
F	Phlox austromontana	77	88	92	90	2.28	3.45	3.56	3.34
F	Phlox longifolia	a-	b18	b11	ab2	-	.05	.02	.00
F	Potentilla gracilis	-	1	-	-	-	.00	-	-
F	Sanguisorba minor	a-	b14	b11	ab8	-	.49	.03	.24
F	Senecio multilobatus	a1	b32	b29	b27	.00	.34	.14	.21
F	Sphaeralcea coccinea	-	-	-	1	-	-	-	.00

Type	Species	Nested Frequency				Average Cover %			
		'06	'09	'10	'14	'06	'09	'10	'14
F	Taraxacum officinale	-	-	1	-	-	-	.00	-
F	Tragopogon dubius (a)	-	-	3	-	-	-	.00	-
F	Zigadenus paniculatus	a-	a ³	b ⁸	a-	-	.00	.06	-
Total for Annual Forbs		11	0	3	31	0.24	0	0.00	0.34
Total for Perennial Forbs		206	496	600	517	4.20	10.71	10.35	9.71
Total for Forbs		217	496	603	548	4.44	10.71	10.36	10.05

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

BROWSE TRENDS--

Management unit 10R, Study no: 36

Type	Species	Quadrat Cover %				Line Intercept Cover %			
		'06	'09	'10	'14	'06	'09	'10	'14
B	Amelanchier utahensis	3.38	.30	.06	.63	4.50	.16	.45	.41
B	Artemisia nova	4.00	4.23	2.85	3.60	1.61	4.61	4.45	5.98
B	Artemisia tridentata vaseyana	-	.03	1.05	-	-	.05	.13	-
B	Cercocarpus montanus	1.49	.38	-	-	.88	-	.16	.08
B	Chrysothamnus depressus	.35	2.95	2.64	3.63	.46	2.83	1.83	2.18
B	Chrysothamnus viscidiflorus viscidiflorus	-	.51	.18	.03	-	.63	.98	-
B	Eriogonum microthecum	-	.00	-	-	-	-	-	-
B	Gutierrezia sarothrae	-	-	-	.90	-	-	-	1.03
B	Juniperus osteosperma	1.16	.15	.53	1.08	3.75	.81	.65	2.08
B	Juniperus scopulorum	-	-	-	-	-	-	-	.05
B	Leptodactylon pungens	.00	-	-	-	-	-	-	-
B	Pediocactus simpsonii	-	.00	.03	-	-	-	-	-
B	Pinus edulis	13.64	.19	.09	.06	42.68	-	.03	-
B	Pseudotsuga menziesii	.15	-	-	-	.06	-	-	-
B	Purshia tridentata	.88	2.84	2.55	3.40	.73	4.30	4.71	5.81
B	Quercus gambelii	.98	-	-	-	1.96	-	-	-
B	Symphoricarpos oreophilus	.15	-	.15	.03	.25	-	-	.10
Total for Browse		26.21	11.61	10.14	13.38	56.88	13.39	13.39	17.72

POINT-QUARTER TREE DATA--

Management unit 10R, Study no: 36

Species	Trees per Acre			
	'06	'09	'10	'14
Juniperus osteosperma	212	47	84	71
Pinus edulis	608	120	103	186

Average diameter (in)			
'06	'09	'10	'14
1.1	0.8	0.9	1.2
3.2	0.8	0.7	0.9

BASIC COVER--

Management unit 10R, Study no: 36

Cover Type	Average Cover %			
	'06	'09	'10	'14
Vegetation	28.15	37.67	35.74	41.00
Rock	11.41	1.83	1.83	1.83
Pavement	14.43	12.55	5.87	6.38
Litter	50.68	43.13	39.34	44.35
Cryptogams	2.67	.46	.05	.08
Bare Ground	16.11	19.71	24.06	27.16

PELLET GROUP DATA--

Management unit 10R, Study no: 36

Type	Quadrat Frequency				Days use per acre (ha)			
	'06	'09	'10	'14	'06	'09	'10	'14
Rabbit	27	9	2	3	-	-	-	-
Grouse	-	-	-	1	-	-	-	-
Elk	11	10	4	10	17 (41)	21 (51)	12 (30)	27 (66)
Deer	1	2	3	10	10 (25)	9 (22)	14 (35)	18 (45)
Cattle	-	1	-	-	-	1 (2)	2 (5)	4 (11)

BROWSE CHARACTERISTICS--

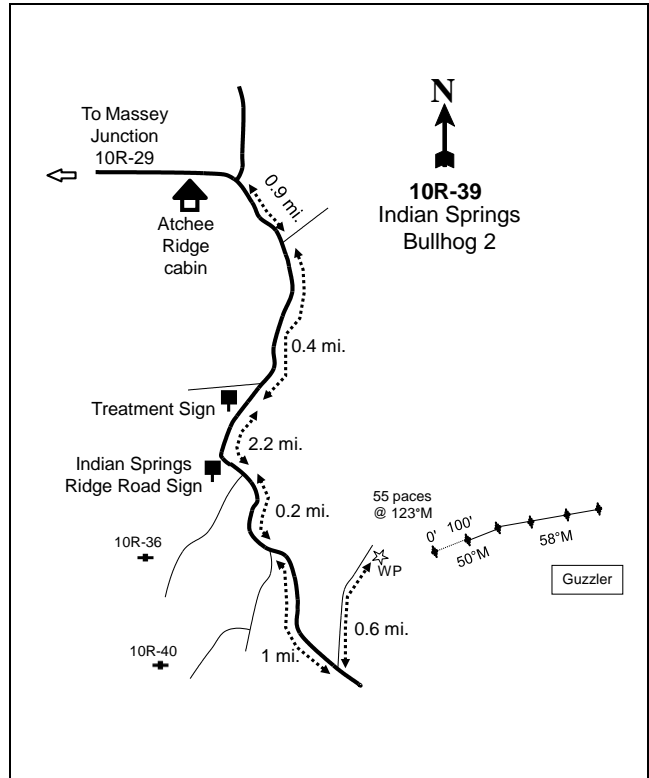
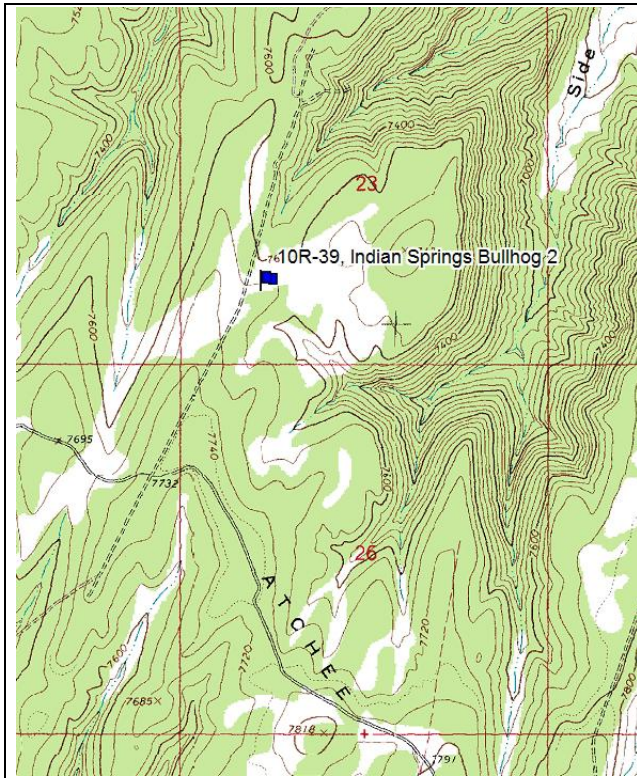
Management unit 10R, Study no: 36

Year	Plants per Acre (excluding seedlings)	Age class distribution			Seedling (plants/acre)	Utilization			Average Height Crown (in)
		% Young	% Mature	% Decadent		% moderate	% heavy	% poor vigor	
Amelanchier utahensis									
06	860	26	70	5	220	21	0	0	58/50
09	No Density Collected								15/29
10	40	50	50	0	40	50	0	0	23/33
14	60	33	67	0	-	33	33	33	19/24
Artemisia nova									
06	1720	3	49	48	80	3	1	29	12/19
09	No Density Collected								13/19
10	2460	25	68	7	520	11	2	6	9/20
14	5960	39	54	8	120	31	12	7	9/16
Artemisia tridentata vaseyana									
06	0	0	0	0	-	0	0	0	-/-
09	No Density Collected								6/4
10	1340	48	49	3	320	7	15	0	7/10
14	0	0	0	0	-	0	0	0	15/20
Atriplex canescens									
06	0	0	0	-	-	0	0	0	-/-
09	No Density Collected								-/-
10	20	0	100	-	-	0	100	0	18/19
14	0	0	0	-	-	0	0	0	-/-

Year	Plants per Acre (excluding seedlings)	Age class distribution			Seedling (plants/acre)	Utilization			Average Height Crown (in)
		% Young	% Mature	% Decadent		% moderate	% heavy	% poor vigor	
Ceratoides lanata									
06	0	0	0	-	-	0	0	0	-/-
09	No Density Collected								7/12
10	0	0	0	-	-	0	0	0	-/-
14	0	0	0	-	-	0	0	0	-/-
Cercocarpus montanus									
06	280	7	64	29	-	50	14	14	37/31
09	No Density Collected								11/11
10	180	78	22	0	-	44	11	0	12/14
14	40	0	100	0	-	100	0	0	21/30
Chrysothamnus depressus									
06	1260	0	86	14	-	16	62	10	4/8
09	No Density Collected								6/12
10	3900	4	96	0	-	0	0	0	4/10
14	4260	5	93	2	-	28	3	2	6/12
Chrysothamnus viscidiflorus viscidiflorus									
06	0	0	0	-	-	0	0	0	-/-
09	No Density Collected								10/12
10	440	0	100	-	-	0	0	0	11/15
14	80	0	100	-	-	0	0	0	12/15
Eriogonum microthecum									
06	0	0	0	-	-	0	0	0	-/-
09	No Density Collected								1/4
10	0	0	0	-	-	0	0	0	-/-
14	0	0	0	-	-	0	0	0	-/-
Gutierrezia sarothrae									
06	0	0	0	-	-	0	0	0	-/-
09	No Density Collected								8/10
10	0	0	0	-	-	0	0	0	-/-
14	1520	1	99	-	20	21	0	0	6/9
Juniperus osteosperma									
06	180	67	33	-	80	0	0	11	-/-
09	No Density Collected								-/-
10	100	100	0	-	20	0	0	0	-/-
14	140	100	0	-	20	14	0	0	-/-
Kochia prostrata									
06	0	0	0	-	-	0	0	0	-/-
09	No Density Collected								8/14
10	0	0	0	-	-	0	0	0	-/-
14	0	0	0	-	-	0	0	0	-/-

Year	Plants per Acre (excluding seedlings)	Age class distribution			Seedling (plants/acre)	Utilization		% poor vigor	Average Height Crown (in)
		% Young	% Mature	% Decadent		% moderate	% heavy		
Leptodactylon pungens									
06	20	0	100	-	-	0	0	0	-/-
09	No Density Collected								-/-
10	0	0	0	-	-	0	0	0	-/-
14	0	0	0	-	-	0	0	0	-/-
Pediocactus simpsonii									
06	40	0	100	-	-	0	0	0	1/2
09	No Density Collected								-/-
10	20	0	100	-	-	0	0	0	1/2
14	0	0	0	-	-	0	0	0	-/-
Pinus edulis									
06	1200	65	32	3	980	0	3	2	-/-
09	No Density Collected								-/-
10	80	100	0	0	60	0	0	0	-/-
14	100	100	0	0	20	0	0	0	-/-
Pseudotsuga menziesii									
06	80	100	0	-	20	0	0	0	-/-
09	No Density Collected								-/-
10	0	0	0	-	-	0	0	0	-/-
14	0	0	0	-	-	0	0	0	-/-
Purshia tridentata									
06	340	24	47	29	-	47	0	18	16/31
09	No Density Collected								15/39
10	460	0	100	0	-	57	22	0	17/48
14	620	3	97	0	-	19	77	0	18/47
Quercus gambelii									
06	780	49	46	5	420	0	0	5	27/29
09	No Density Collected								-/-
10	0	0	0	0	-	0	0	0	-/-
14	0	0	0	0	-	0	0	0	-/-
Symphoricarpos oreophilus									
06	40	0	100	-	-	0	0	0	11/17
09	No Density Collected								30/50
10	80	25	75	-	-	0	0	0	26/50
14	40	0	100	-	-	0	0	0	16/25
Tetradymia canescens									
06	0	0	0	-	-	0	0	0	-/-
09	No Density Collected								-/-
10	20	0	100	-	-	0	0	0	6/14
14	20	0	100	-	-	0	0	0	-/-

INDIAN SPRINGS BULLHOG 2 - TREND STUDY NO. 10R-39



Location Information

USGS 7.5 min Map Info Davis Canyon; Township 13S, Range 25E, Section 23
 GPS (0' Stake) NAD 83, UTM Zone 12, 663761 East 4392637 North

Transect Information

Browse Tag # (0' Stake) 200
 Transect Bearing Lines 1-2: 50° magnetic, Lines 3-5: 58° magnetic
 Length 500ft
 Belt Placement Line 1 (11ft), Line 2 (34ft), Line 3 (59ft), Line 4 (71ft), Line 5 (95ft)
 Belt Marker Placement No Rebar

Directions to Site

From Atchee Ridge cabin head east on Big Park Rd and take a slight right onto Atchee Ridge Rd. Drive 0.9 miles to another junction and stay right for 0.4 miles to another fork and a treatment sign. From there stay left for 2.2 miles to a junction with a sign reading “Indian Springs Ridge Road?”. Stay left and continue for 0.2 miles to another fork, stay left again and go 1 mile to a road coming in from the left (north) side of the road. Turn here and drive 0.6 miles to a witness post on the right side of the road. From the witness post, the 0-foot stake is 55 paces at 123 degrees magnetic and is marked with browse tag #200.

Site Information

Land Ownership BLM
 Allotment Atchee Ridge AMP
 Elevation 7,600ft (2,316m)
 Aspect Northeast
 Slope 1-8%
 Sample Dates 07/17/2007, 08/03/2011, 08/19/2014

DISTURBANCE HISTORY--

Management unit 10R, Study no: 39

<i>Treatment/Disturbance</i>	<i>Name</i>	<i>WRI DB #</i>	<i>Date</i>	<i>Size (acres)</i>
Bullhog	Indian Spring Ridge Bullhog	-	2009	-
Wildfire	Augusi Canyon	-	2010	955
Seeding: Aerial After	Augusi Canyon Fire Rehabilitation	1885	November 2010	955

The table is a recorded disturbance history of the study site.

SEED MIX--

Management unit 10R, Study no: 39

Project Name: Augusi Canyon Fire Rehabilitation			
WRI Database #: 1885			
Application: Aerial Seed		Acres: 955	
Seed Type		lbs in mix	lbs/acre
G	Big Bluegrass 'Sherman'	500	0.52
G	Bluebunch Wheatgrass 'Anatone	950	0.99
G	Canby Bluegrass 'Canbar'	500	0.52
G	Crested Wheatgrass 'Nordan'	950	0.99
G	Green Needlegrass 'Lodorm'	390	0.41
G	Orchardgrass 'Paiute'	500	0.52
G	Russian Wildrye 'Bozoisky'	950	0.99
G	Slender Wheatgrass 'San Luis'	700	0.73
G	Thickspike Wheatgrass 'Critana'	950	0.99
F	Alfalfa 'Ladak Plus'	950	0.99
F	Alfalfa 'Spreador 4'	950	0.99
F	Blue Flax 'Appar'	500	0.52
F	Sainfoin 'Eski'	1900	1.99
F	Small Burnet 'Delar'	1900	1.99
Total Pounds:		12590	13.18
PLS Pounds:			11.56

Habitat and Vegetation Information

Wildlife Habitat Deer, Crucial Summer; Elk, Crucial Summer Calving Habitat; Bison, Crucial Year-long

VEGETATION HISTORY--

Management unit 10R, Study no: 39

<i>Year</i>	<i>Vegetation Type¹</i>	<i>Woodland Succession</i>
2007	Pinyon	Phase II
2011-2014	Perennial Grass-Forb	No Encroachment

¹Vegetation Type (Appendix - Vegetation Type), ²Woodland Succession (Tausch, Miller, Roundy, & Chambers, 2009).

Site Notes

The study was originally established in 2007 to monitor the effects of a bullhog project. Following the bullhog project in September of 2010, the study site was burned in the Augusti fire that burned approximately 955 acres. As a result of the fire, in November 2010, the area was aerially seeded with a seed mix of grass and forb species (Table - Seed Mix). The objectives of the fire restoration seeding were are to improve forage for elk and mule deer, stabilize the soil and watershed by establishing ground cover to prevent erosion and soil loss, and establish perennial vegetation to minimize invasion by cheatgrass and other weedy species (WRI Database 2015). As of the most recent visit of the site in 2014 a guzzler had been built near the 500 foot end of the base line. Additionally, the second half of belt 5 is almost entirely on a road that has been recently made.

Site Potential

1981-2010 Average Annual Precipitation 18 inches
 NRCS Ecological Site Upland Shallow Loam (Pinyon-Utah Juniper)
 NRCS Ecological Site # R034XY322UT

SOIL ANALYSIS DATA--

Management unit 10R, Study no: 39

Texture	Sand (%)	Silt (%)	Clay (%)	pH	ds/m	OM (%)	PPM P	PPM K	Year Sampled
Loam	45.2	34.4	20.4	6.8	0.8	5.5	11.1	86.4	2007

Soil specific normal values are described in the ecological site description (USDA-NRCS, 2011) and by Tiedeman and Lopez (2004).

States and Transitions

No state and transition model is available for the above ecological site, but it is likely similar to the [Upland Shallow Loam \(Pinyon-Utah Juniper\), R036XY315UT](#) ecological site, which does have a defined state and transition model (USDA-NRCS, 2011).

When established in 2007, this site was mainly pinyon pine (*Pinus edulis*) site with a robust component of mountain big sagebrush (*Artemisia tridentata* ssp. *vaseyana*) and Utah serviceberry (*Amelanchier alnifolia*). There were also a number of other browse species present but they provided little cover (Table – Browse Trends). The herbaceous understory was diverse but individual species cover was low (Table – Herbaceous Trends). After the bullhog treatment and wildfire there were few trees and shrubs left on the site. The few shrubs that survived provided limited cover (Table – Browse Trends). The herbaceous understory remains similar, with the exception of perennial grasses which increased in cover. The other exception was cheatgrass (*Bromus tectorum*) which also increased substantially in cover from 2011 to 2014 (Table – Herbaceous Trends).

Trend Summary

HERBACEOUS TRENDS--

Management unit 10R, Study no: 39

T y p e	Species	Nested Frequency			Average Cover %		
		'07	'11	'14	'07	'11	'14
G	Agropyron cristatum	a ⁻	a ⁸	b ⁵⁶	-	.37	2.86
G	Agropyron dasystachyum	a ⁸⁰	b ¹²⁸	ab ⁸⁸	1.11	6.85	4.89
G	Agropyron spicatum	a ²	a ⁻	b ³³	.00	-	2.22
G	Agropyron trachycaulum	-	-	19	-	-	.86
G	Bouteloua gracilis	23	10	24	.54	.36	.91
G	Bromus japonicus (a)	-	-	4	-	-	.01

T y P e	Species	Nested Frequency			Average Cover %		
		'07	'11	'14	'07	'11	'14
G	Bromus tectorum (a)	a40	a41	b178	.52	1.32	8.23
G	Carex rossii	b66	a30	a20	1.11	.59	.46
G	Dactylis glomerata	-	-	4	-	-	.01
G	Elymus cinereus	-	-	8	-	-	.06
G	Elymus junceus	-	-	9	-	-	.21
G	Koeleria cristata	b21	ab8	a2	.76	.15	.06
G	Oryzopsis hymenoides	4	-	10	.06	.15	.39
G	Poa canbyi	-	5	4	-	.30	.21
G	Poa fendleriana	a71	b5	b19	1.92	.53	.20
G	Poa pratensis	-	1	-	-	.03	-
G	Poa secunda	a38	b5	ab21	.28	.18	1.00
G	Sitanion hystrix	b22	a-	a2	.21	.00	.03
G	Stipa comata	b36	a12	ab29	1.62	.75	2.17
Total for Annual Grasses		40	41	182	0.52	1.32	8.24
Total for Perennial Grasses		363	212	348	7.64	10.28	16.58
Total for Grasses		403	253	530	8.17	11.60	24.83
F	Agoseris glauca	2	-	-	.00	.00	-
F	Alyssum alyssoides (a)	-	-	2	-	-	.00
F	Androsace septentrionalis (a)	-	1	-	-	.00	-
F	Antennaria sp.	b44	ab27	a11	1.16	1.02	.27
F	Arabis sp.	b20	a-	a4	.04	-	.01
F	Artemisia ludoviciana	4	-	-	.03	-	-
F	Astragalus sp.	8	7	-	.04	.48	-
F	Astragalus utahensis	a-	b10	a3	-	.07	.15
F	Balsamorhiza sagittata	1	-	-	.15	-	-
F	Calochortus nuttallii	-	1	2	-	.03	.03
F	Castilleja flava	-	1	-	-	.03	-
F	Castilleja linariaefolia	8	-	-	.05	-	-
F	Chaenactis douglasii	-	2	-	-	.00	-
F	Chenopodium fremontii (a)	-	2	4	-	.03	.01
F	Chenopodium leptophyllum(a)	a-	b15	a-	-	1.28	-
F	Cirsium sp.	-	-	-	-	-	.03
F	Collinsia parviflora (a)	2	1	-	.00	.00	-
F	Comandra pallida	11	16	11	.31	.10	.05
F	Crepis acuminata	b10	b16	a-	.18	.18	-
F	Cryptantha sp.	4	-	-	.06	-	-
F	Delphinium bicolor	6	-	-	.02	-	-
F	Descurainia pinnata (a)	a-	a-	b74	-	-	.85
F	Erigeron eatonii	-	1	-	-	.00	-
F	Erigeron pumilus	5	-	1	.03	-	.00
F	Erigeron sp.	b23	a1	a-	.21	.03	-
F	Eriogonum alatum	b15	a-	a-	.20	-	-
F	Eriogonum umbellatum	-	2	1	-	.00	.03
F	Gayophytum ramosissimum(a)	a7	b26	a7	.01	.70	.06

Type	Species	Nested Frequency			Average Cover %		
		'07	'11	'14	'07	'11	'14
F	<i>Gilia</i> sp. (a)	b19	a-	a-	.06	-	-
F	<i>Grindelia squarrosa</i>	-	-	-	-	.15	-
F	<i>Haplopappus acaulis</i>	2	-	-	.00	-	-
F	<i>Heterotheca villosa</i>	a-	a-	b7	.03	-	.25
F	<i>Ipomopsis aggregata</i>	b45	a-	a-	.17	-	-
F	<i>Lappula occidentalis</i> (a)	a-	a-	b21	-	-	.39
F	<i>Linum perenne</i>	a-	a13	b58	-	.29	.49
F	<i>Lupinus argenteus</i>	-	2	-	-	.00	-
F	<i>Machaeranthera canescens</i>	4	-	1	.01	-	.00
F	<i>Machaeranthera grindelioides</i>	-	-	3	-	-	.00
F	<i>Medicago sativa</i>	a-	b10	b15	-	.14	.78
F	<i>Microsteris gracilis</i> (a)	a5	a-	b38	.01	-	.96
F	<i>Onobrychis viciaefolia</i>	a-	b21	b11	-	.27	.27
F	<i>Penstemon</i> sp.	c83	b45	a19	2.24	2.42	.32
F	<i>Penstemon watsonii</i>	11	10	10	.24	.96	.36
F	<i>Phlox austromontana</i>	b64	a11	a25	1.50	.12	2.17
F	<i>Phlox longifolia</i>	b65	b46	a3	.48	.52	.00
F	<i>Polygonum douglasii</i> (a)	b23	b33	a-	.05	.53	-
F	<i>Sanguisorba minor</i>	a-	b10	ab1	-	.14	.01
F	<i>Schoenocrambe linifolia</i>	a3	a-	b20	.03	-	.45
F	<i>Sedum lanceolatum</i>	5	-	-	.03	-	-
F	<i>Senecio integerrimus</i>	12	-	2	.04	-	.03
F	<i>Senecio multilobatus</i>	1	10	1	.03	.07	.00
F	<i>Sisymbrium altissimum</i> (a)	a-	a-	b32	-	-	.77
F	<i>Sphaeralcea coccinea</i>	a11	a8	b25	.07	.04	.48
F	<i>Taraxacum officinale</i>	-	3	3	-	.03	.00
F	<i>Zigadenus paniculatus</i>	2	1	-	.04	.03	-
Total for Annual Forbs		56	78	178	0.15	2.56	3.07
Total for Perennial Forbs		469	274	237	7.48	7.20	6.23
Total for Forbs		525	352	415	7.63	9.76	9.30

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

BROWSE TRENDS--

Management unit 10R, Study no: 39

Type	Species	Quadrat Cover %			Line Intercept Cover %		
		'07	'11	'14	'07	'11	'14
B	<i>Amelanchier utahensis</i>	4.25	1.81	3.47	8.05	2.66	5.18
B	<i>Artemisia tridentata vaseyana</i>	4.13	.01	.03	5.63	-	-
B	<i>Cercocarpus montanus</i>	.86	-	.00	1.41	-	-
B	<i>Chrysothamnus depressus</i>	.09	-	.00	.13	-	-
B	<i>Chrysothamnus nauseosus albicaulis</i>	.15	-	-	-	-	-
B	<i>Chrysothamnus viscidiflorus</i>	-	.38	1.20	.20	.56	1.91

Type	Species	Quadrat Cover %			Line Intercept Cover %		
		'07	'11	'14	'07	'11	'14
	viscidiflorus						
B	Gutierrezia sarothrae	.18	-	-	.06	-	-
B	Juniperus osteosperma	.38	-	-	.56	-	-
B	Pinus edulis	7.97	-	-	21.91	-	-
B	Purshia tridentata	2.14	.16	.18	2.91	.21	.73
B	Quercus gambelii	.21	1.29	1.26	.68	1.20	2.36
B	Symphoricarpos oreophilus	.80	.06	1.08	1.75	1.21	1.46
B	Tetradymia canescens	.03	-	-	-	-	-
Total for Browse		21.23	3.71	7.24	43.37	5.84	11.64

POINT-QUARTER TREE DATA--
Management unit 10R, Study no: 39

Species	Trees per Acre			Average diameter (in)		
	'07	'11	'14	'07	'11	'14
Juniperus osteosperma	34	5	-	3.4	1.2	-
Pinus edulis	152	6	-	4.6	3.9	-

BASIC COVER--
Management unit 10R, Study no: 39

Cover Type	Average Cover %		
	'07	'11	'14
Vegetation	38.42	27.58	42.64
Rock	1.85	2.76	4.96
Pavement	1.71	12.17	1.46
Litter	52.83	9.85	37.06
Cryptogams	2.29	0	0
Bare Ground	21.35	59.47	34.82

PELLET GROUP DATA--
Management unit 10R, Study no: 39

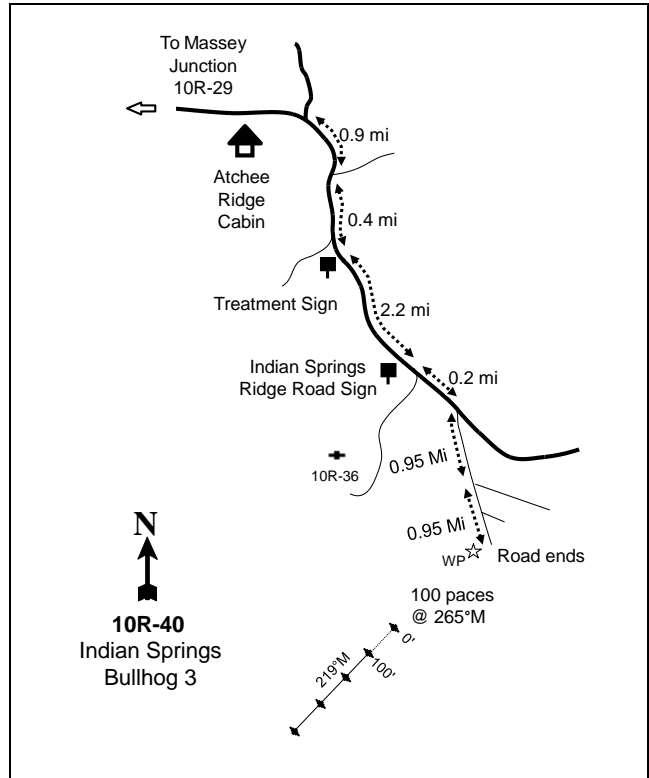
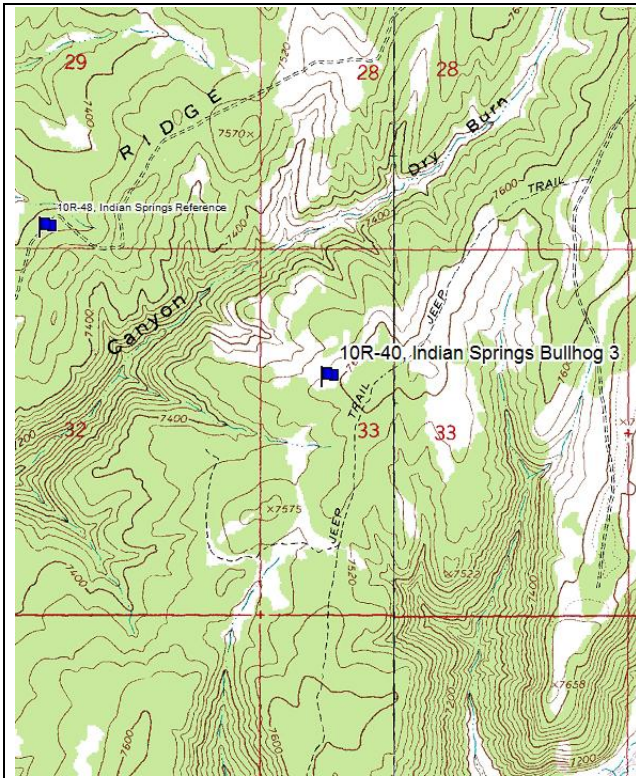
Type	Quadrat Frequency			Days use per acre (ha)		
	'07	'11	'14	'07	'11	'14
Rabbit	24	-	11	-	-	-
Elk	21	9	20	84 (208)	2 (5)	23 (58)
Deer	9	-	2	8 (20)	16 (40)	5 (13)
Cattle	1	-	1	2 (4)	-	10 (25)

BROWSE CHARACTERISTICS--
Management unit 10R, Study no: 39

Year	Plants per Acre (excluding seedlings)	Age class distribution			Seedling (plants/acre)	Utilization		% poor vigor	Average Height Crown (in)
		% Young	% Mature	% Decadent		% moderate	% heavy		
<i>Amelanchier utahensis</i>									
07	1160	29	69	2	140	28	0	3	41/39
11	800	80	20	0	400	3	10	3	19/30
14	800	15	85	0	80	60	18	0	23/33
<i>Artemisia tridentata vaseyana</i>									
07	1920	2	52	46	320	33	4	20	20/26
11	0	0	0	0	160	0	0	0	11/25
14	80	25	75	0	-	25	25	0	14/23
<i>Cercocarpus montanus</i>									
07	440	45	45	9	-	27	5	5	48/41
11	60	67	33	0	20	33	33	0	18/22
14	20	0	100	0	-	100	0	0	20/25
<i>Chrysothamnus depressus</i>									
07	280	0	93	7	20	29	29	7	6/9
11	0	0	0	0	-	0	0	0	6/12
14	20	0	100	0	-	0	0	0	5/7
<i>Chrysothamnus nauseosus</i>									
07	0	0	0	-	-	0	0	0	-/-
11	0	0	0	-	-	0	0	0	-/-
14	0	0	0	-	-	0	0	0	26/22
<i>Chrysothamnus nauseosus albicaulis</i>									
07	100	0	100	-	-	0	0	0	17/24
11	0	0	0	-	-	0	0	0	-/-
14	0	0	0	-	-	0	0	0	31/30
<i>Chrysothamnus viscidiflorus viscidiflorus</i>									
07	100	0	100	-	-	0	0	0	15/13
11	100	0	100	-	-	0	0	0	14/19
14	900	51	49	-	-	11	2	2	16/27
<i>Gutierrezia sarothrae</i>									
07	60	0	67	33	-	0	0	33	6/7
11	0	0	0	0	-	0	0	0	9/11
14	0	0	0	0	-	0	0	0	10/12
<i>Juniperus osteosperma</i>									
07	80	75	25	-	-	0	0	0	-/-
11	0	0	0	-	-	0	0	0	-/-
14	0	0	0	-	-	0	0	0	-/-

Year	Plants per Acre (excluding seedlings)	Age class distribution			Seedling (plants/acre)	Utilization		% poor vigor	Average Height Crown (in)
		% Young	% Mature	% Decadent		% moderate	% heavy		
Opuntia fragilis									
07	80	0	100	-	-	0	0	0	3/7
11	40	100	0	-	-	0	0	0	-/-
14	20	0	100	-	-	0	0	0	4/6
Pediocactus simpsonii									
07	20	0	100	-	-	0	0	0	-/-
11	0	0	0	-	-	0	0	0	2/3
14	0	0	0	-	-	0	0	0	-/-
Pinus edulis									
07	480	63	33	4	100	0	4	4	-/-
11	0	0	0	0	-	0	0	0	-/-
14	0	0	0	0	-	0	0	0	-/-
Purshia tridentata									
07	560	7	89	4	-	54	7	0	19/36
11	60	33	67	0	140	0	0	67	13/24
14	100	20	80	0	-	40	20	20	15/28
Quercus gambelii									
07	660	94	6	-	-	0	0	0	52/22
11	340	100	0	-	-	100	0	0	13/17
14	1180	8	92	-	-	37	20	0	31/25
Sambucus sp.									
07	0	0	0	-	-	0	0	0	-/-
11	0	0	0	-	-	0	0	0	-/-
14	40	0	100	-	-	50	0	0	27/28
Symphoricarpos oreophilus									
07	2040	36	64	0	40	0	0	0	13/23
11	60	0	100	0	-	0	0	0	12/27
14	440	5	91	5	-	50	14	18	14/32
Tetradymia canescens									
07	20	0	100	-	-	0	0	0	6/7
11	20	100	0	-	-	0	0	0	6/9
14	0	0	0	-	-	0	0	0	6/9

INDIAN SPRINGS BULLHOG 3 - TREND STUDY NO. 10R-40



Location Information

USGS 7.5 min Map Info Burnt Timber Canyon; Township 13S, Range 25E, Section 33
 GPS (0' Stake) NAD 83, UTM Zone 12, 660515 East 4390037 North

Transect Information

Browse Tag # (0' Stake) Not Available
 Transect Bearing 219° magnetic
 Length 400ft
 Belt Placement Line 1 (11ft & 95ft), Line 2 (34ft), Line 3 (59ft), Line 4 (71ft)
 Belt Marker Placement No Rebar

Directions to Site

Head east on Big Park Rd from Atchee Ridge cabin and take a slight right onto Atchee Ridge Rd. Drive 0.9 miles to another junction and stay right for 0.4 miles to another fork and a treatment sign. From there, stay left for 2.2 miles to a junction with a sign reading “Indian Springs Ridge Road”. Stay left and continue on for 0.2 miles to another fork; take a right and go 0.95 miles to a fork. Staying right and continue on for another 0.95 miles to where the road dead ends. The witness post is found on the left side of the road. The 0-foot stake is located 100 paces at an azimuth of 265 degrees magnetic from the witness post.

Site Information

Land Ownership BLM
 Allotment Atchee Ridge AMP
 Elevation 7,600ft (2,316m)
 Aspect Southwest
 Slope 3%
 Sample Dates 07/17/2007, 08/02/2011, 08/19/2014

DISTURBANCE HISTORY--

Management unit 10R, Study no: 40

Treatment/Disturbance	Name	WRI DB #	Date	Size (acres)
Bullhog	Indian Springs Bullhog Phase 2	677	June 2009	350

The table is a recorded disturbance history of the study site.

Habitat and Vegetation Information

Wildlife Habitat Deer, Substantial Summer; Elk, Crucial Summer Calving Habitat; Bison, Crucial Year-long

VEGETATION HISTORY--

Management unit 10R, Study no: 40

Year	Vegetation Type ¹	Woodland Succession ²
2007	Pinyon	Phase II transitioning to Phase III
2011-2014	Perennial Grass	No Encroachment

¹Vegetation Type (Appendix - Vegetation Type), ²Woodland Succession (Tausch, Miller, Roundy, & Chambers, 2009).

Site Notes

The project area was not seeded due to the amount of herbaceous understory present in the project area. Additionally, livestock grazing was not rested following the treatment. The objectives of the project were to remove pinyon and juniper trees from sagebrush and mountain browse communities, improve habitat for mule deer and elk, and reduce hazardous fuels and create fire breaks (WRI Database 2012). The last 100 feet of the transect was not treated, and as a result, belt five was moved to line one following the treatment.

Site Potential

1981-2010 Average Annual Precipitation 18 inches
 NRCS Ecological Site Upland Shallow Loam (Pinyon-Utah Juniper)
 NRCS Ecological Site # R034XY322UT

SOIL ANALYSIS DATA--

Management unit 10R, Study no: 40

Texture	Sand (%)	Silt (%)	Clay (%)	pH	ds/m	OM (%)	PPM P	PPM K	Year Sampled
Loam	42.2	35.4	22.4	6.8	1.2	6.3	27.8	185.6	2007

Soil specific normal values are described in the ecological site description (USDA-NRCS, 2011) and by Tiedeman and Lopez (2004).

States and Transitions

No state and transition model is available for the above ecological site, but it is likely similar to the [Upland Shallow Loam \(Pinyon-Utah Juniper\), R036XY315UT](#) ecological site, which does have a defined state and transition model (USDA-NRCS, 2011).

When established in 2007, this site was mainly pinyon pine (*Pinus edulis*) with a robust component of Utah juniper (*Juniperus osteosperma*) and true mountain mahogany (*Cercocarpus montanus*). There were also some other browse species present, but they provided little cover (Table – Browse Trends). The herbaceous

understory was diverse, but individual species cover was low (Table – Herbaceous Trends). After the bullhog treatment there were few trees and shrubs left on the site. The few shrubs that survived provided limited cover (Table – Browse Trends). The herbaceous understory remains similar, with the exception of perennial grasses, which increased in cover, becoming the dominant cover on the site. The other exception was cheatgrass (*Bromus tectorum*), which increased in cover from 2011 to 2014 (Table – Herbaceous Trends).

Trend Summary

HERBACEOUS TRENDS--

Management unit 10R, Study no: 40

Type	Species	Nested Frequency			Average Cover %		
		'07	'11	'14	'07	'11	'14
G	<i>Bouteloua gracilis</i>	a-	ab14	b20	-	.71	2.24
G	<i>Bromus tectorum</i> (a)	a-	ab10	b177	-	.36	5.20
G	<i>Carex rossii</i>	44	39	57	.99	2.25	5.28
G	<i>Koeleria cristata</i>	a-	b13	ab5	-	.80	.63
G	<i>Oryzopsis hymenoides</i>	a-	a4	b17	-	1.88	3.25
G	<i>Oryzopsis micrantha</i>	-	-	1	-	-	.15
G	<i>Poa fendleriana</i>	a41	a30	b94	1.14	1.46	2.90
G	<i>Sitanion hystrix</i>	a-	b12	c212	-	.50	7.55
G	<i>Stipa comata</i>	-	3	-	-	.03	-
Total for Annual Grasses		0	10	177	0	0.36	5.20
Total for Perennial Grasses		85	115	406	2.13	7.63	21.99
Total for Grasses		85	125	583	2.13	7.99	27.20
F	<i>Ambrosia repens</i>	-	-	-	-	-	.15
F	<i>Antennaria parvifolia</i>	a2	a2	b22	.03	.03	.61
F	<i>Arabis holboellii</i>	5	14	6	.02	.31	.01
F	<i>Aster</i> sp.	-	1	-	-	.03	-
F	<i>Chaenactis douglasii</i>	ab7	b27	a2	.07	.40	.00
F	<i>Chenopodium fremontii</i> (a)	-	3	6	-	.03	.03
F	<i>Cirsium vulgare</i>	a-	a-	b17	-	-	.22
F	<i>Erigeron eatonii</i>	b17	ab7	a2	.09	.01	.01
F	<i>Hymenoxys acaulis</i>	-	2	2	-	.03	.15
F	<i>Ipomopsis aggregata</i>	-	-	1	-	-	.00
F	<i>Lesquerella</i> sp.	6	17	3	.01	.25	.01
F	<i>Machaeranthera grindelioides</i>	ab1	a-	b16	.00	-	.07
F	<i>Nicotiana attenuata</i> (a)	-	-	-	-	.00	-
F	<i>Penstemon caespitosus</i>	5	5	-	.03	.18	-
F	<i>Penstemon pachyphyllus</i>	9	9	9	.02	.48	.18
F	<i>Penstemon watsonii</i>	a3	b19	ab13	.01	.55	.39
F	<i>Petradoria pumila</i>	b14	a-	ab4	.39	-	.12
F	<i>Phlox austromontana</i>	b62	a28	a34	.99	.79	.70
F	<i>Salsola iberica</i> (a)	-	-	1	-	-	.00
F	<i>Senecio multilobatus</i>	-	5	2	-	.06	.03
F	<i>Senecio spartioides</i>	-	9	-	-	.68	-
F	<i>Sisymbrium altissimum</i> (a)	-	3	5	-	.21	.38
F	<i>Sphaeralcea grossulariifolia</i>	-	-	5	-	-	.03

Type	Species	Nested Frequency			Average Cover %		
		'07	'11	'14	'07	'11	'14
F	Taraxacum officinale	-	-	1	-	-	.00
Total for Annual Forbs		0	6	12	0	0.24	0.42
Total for Perennial Forbs		131	145	139	1.67	3.83	2.73
Total for Forbs		131	151	151	1.67	4.07	3.16

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

BROWSE TRENDS--

Management unit 10R, Study no: 40

Type	Species	Quadrat Cover %			Line Intercept Cover %		
		'07	'11	'14	'07	'11	'14
B	Amelanchier utahensis	.30	1.23	.41	1.46	1.00	1.06
B	Artemisia tridentata vaseyana	.01	-	-	-	.06	.21
B	Cercocarpus montanus	2.42	.36	.69	4.83	.18	.58
B	Chrysothamnus nauseosus	-	-	.30	-	-	.45
B	Juniperus osteosperma	1.87	-	-	6.86	-	-
B	Pinus edulis	5.55	-	-	26.43	-	-
B	Purshia tridentata	.67	.51	1.27	.88	.55	.75
B	Symphoricarpos oreophilus	.45	1.03	1.26	.81	.83	1.78
Total for Browse		11.30	3.13	3.94	41.27	2.62	4.83

POINT-QUARTER TREE DATA--

Management unit 10R, Study no: 40

Species	Trees per Acre			Average diameter (in)		
	'07	'11	'14	'07	'11	'14
Juniperus osteosperma	93	18	26	9.9	0.9	3.0
Pinus edulis	403	10	18	9.6	3.0	2.2
Pseudotsuga menziesii	-	5	-	-	8.9	-

BASIC COVER--

Management unit 10R, Study no: 40

Cover Type	Average Cover %		
	'07	'11	'14
Vegetation	15.43	15.33	32.90
Rock	2.06	.06	0
Pavement	17.76	5.70	3.37
Litter	63.15	76.71	78.11
Cryptogams	.38	0	.00
Bare Ground	12.95	5.77	7.45

PELLET GROUP DATA--

Management unit 10R, Study no: 40

Type	Quadrat Frequency			Days use per acre (ha)		
	'07	'11	'14	'07	'11	'14
Rabbit	18	-	1	-	-	-
Elk	6	6	20	15 (38)	3 (7)	28 (69)
Deer	6	5	8	11 (28)	9 (22)	11 (26)
Cattle	-	1	-	-	-	2 (4)

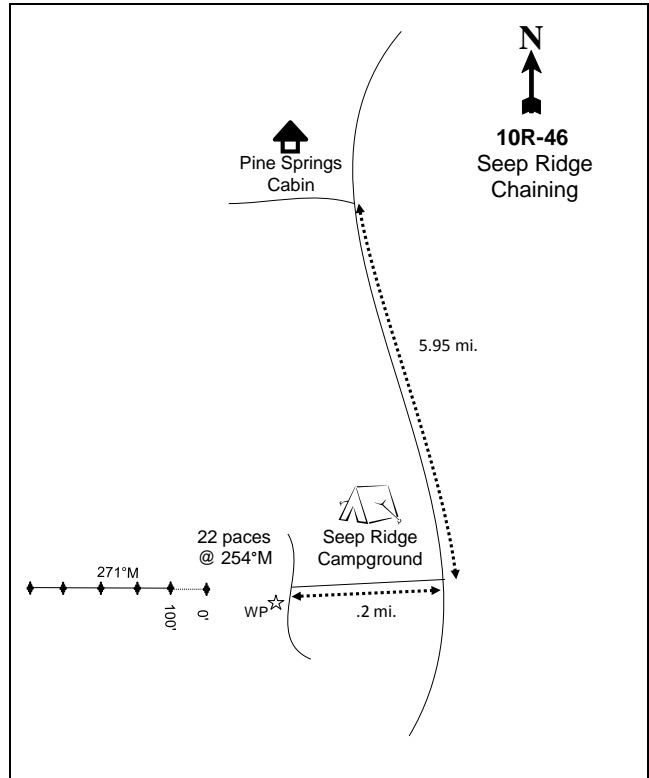
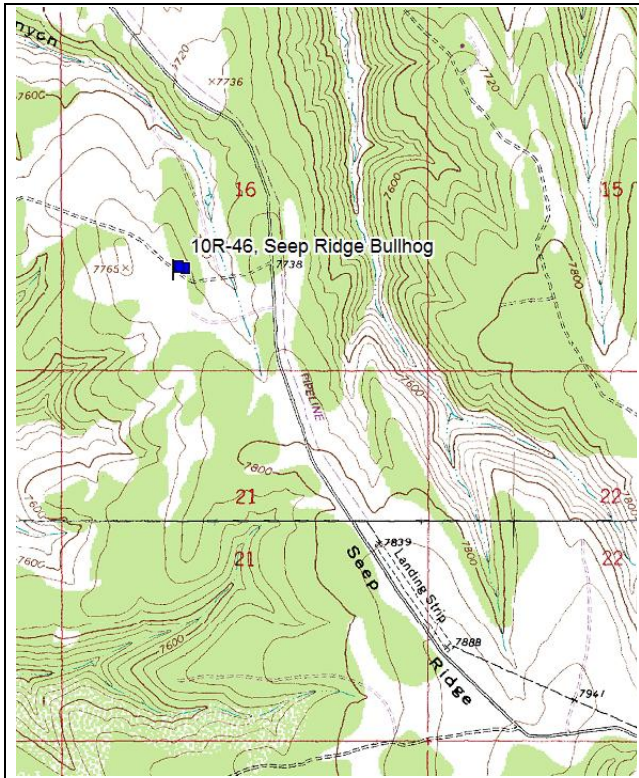
BROWSE CHARACTERISTICS--

Management unit 10R, Study no: 40

Year	Plants per Acre (excluding seedlings)	Age class distribution			Seedling (plants/acre)	Utilization		% poor vigor	Average Height Crown (in)
		% Young	% Mature	% Decadent		% moderate	% heavy		
Amelanchier utahensis									
07	80	50	50	-	-	0	25	0	59/53
11	320	94	6	-	-	0	0	0	25/30
14	300	7	93	-	20	7	60	0	23/29
Artemisia nova									
07	0	0	0	-	-	0	0	0	-/-
11	0	0	0	-	-	0	0	0	14/22
14	40	100	0	-	-	50	0	0	7/17
Artemisia tridentata vaseyana									
07	40	0	0	100	20	0	0	0	18/23
11	20	0	100	0	-	0	0	0	20/27
14	40	0	100	0	-	0	0	0	19/31
Cercocarpus montanus									
07	460	17	74	9	160	48	17	4	50/50
11	220	91	9	0	-	55	9	9	33/39
14	260	8	92	0	40	8	85	0	19/21
Chrysothamnus nauseosus									
07	0	0	0	-	-	0	0	0	-/-
11	20	100	0	-	-	0	0	0	20/26
14	80	25	75	-	-	25	0	0	29/36
Chrysothamnus viscidiflorus viscidiflorus									
07	0	0	0	-	-	0	0	0	-/-
11	0	0	0	-	-	0	0	0	-/-
14	0	0	0	-	-	0	0	0	9/11
Gutierrezia sarothrae									
07	0	0	0	-	-	0	0	0	-/-
11	0	0	0	-	-	0	0	0	-/-
14	20	0	100	-	-	0	0	0	10/20

Year	Plants per Acre (excluding seedlings)	Age class distribution			Seedling (plants/acre)	Utilization		% poor vigor	Average Height Crown (in)
		% Young	% Mature	% Decadent		% moderate	% heavy		
Juniperus osteosperma									
07	220	27	64	9	60	0	0	9	-/-
11	0	0	0	0	-	0	0	0	-/-
14	0	0	0	0	20	0	0	0	-/-
Pinus edulis									
07	420	48	48	5	540	0	0	0	-/-
11	0	0	0	0	-	0	0	0	-/-
14	0	0	0	0	-	0	0	0	-/-
Purshia tridentata									
07	380	5	74	21	-	16	0	5	20/30
11	160	88	13	0	-	38	0	0	13/32
14	300	20	80	0	40	33	67	7	15/30
Sambucus sp.									
07	0	0	0	-	-	0	0	0	-/-
11	0	0	0	-	-	0	0	0	7/10
14	0	0	0	-	-	0	0	0	-/-
Symphoricarpos oreophilus									
07	500	44	56	-	20	0	0	0	10/20
11	100	0	100	-	-	20	0	0	17/47
14	260	15	85	-	-	46	46	0	19/36

SEEP RIDGE CHAINING - TREND STUDY NO. 10R-46



Location Information

USGS 7.5 min Map Info Seep Canyon; Township 15S, Range 23E, Section 16
 GPS (0' Stake) NAD 83, UTM Zone 12, 641736 East 4374599 North

Transect Information

Browse Tag # (0' Stake) 279
 Transect Bearing 271° magnetic
 Length 500ft
 Belt Placement Line 1 (11ft), Line 2 (34ft), Line 3 (59ft), Line 4 (71ft), Line 5 (95ft)
 Belt Marker Placement Standard

Directions to Site

From the Pine Springs Cabin in the Book Cliffs, drive south on Seep Ridge Road for 5.95 miles while, passing the Seep Ridge Campground on the right. Turn right and head west for 0.2 miles to a fork, and go left to the witness post on the right. The 0-foot stake is 22 paces from the witness post at 254 degrees magnetic. The 0-foot stake is marked with browse tag #279.

Site Information

Land Ownership SITLA
 Allotment Sweet Water
 Elevation 7,711ft (2,350m)
 Aspect Northeast
 Slope 2-4%
 Sample Dates 07/10/2008, 8/20/2014

DISTURBANCE HISTORY--

Management unit 10R, Study no: 46

Treatment/Disturbance	Name	WRI DB #	Date	Size (acres)
Two-Way Ely Chaining	Seep Ridge Chaining	1951	October 2010	321
Seeding: Aerial Before	Seep Ridge Chaining	1951	October 2010	370
Seeding: Dribbler	Seep Ridge Chaining	1951	October 2010	370
Seeding: Aerial After	Seep Ridge Chaining	1951	December 2010	770

The table is a recorded disturbance history of the study site.

SEED MIX--

Management unit 10R, Study no: 46

Project Name: Seep Ridge Chaining WRI Database #: 1951			Project Name: Seep Ridge Chaining - Dribbler Mix WRI Database #: 1951				
Application: Aerial Before		Acres:	370	Application: Dribbler		Acres:	370
Seed Type	lbs in mix	lbs/acre	Seed Type	lbs in mix	lbs/acre		
G Big Bluegrass 'Sherman'	75	0.20	B Bitterbrush	150	0.41		
G Bluebunch WG 'P-7'	450	1.22	B True Mountain Mahogany	50	0.14		
G Canby Bluegrass 'Canbar'	75	0.20	Total Pounds:	200	0.54		
G Great Basin Wildrye 'Trailhead'	250	0.68	PLS Pounds:		0.38		
G Green Needlegrass 'Lodorm'	300	0.81	Project Name: Seep Ridge Chaining WRI Database #: 1951				
G Indian Ricegrass	400	1.08	Application: Aerial After		Acres:	770	
G Sandberg Bluegrass	75	0.20	Seed Type		lbs in mix	lbs/acre	
G Slender Wheatgrass 'San Luis'	550	1.49	B Sagebrush, Wyoming	770	1		
G Thickspike Wheatgrass 'Critana'	450	1.22	Total Pounds:	770	1		
F Alfalfa 'Nomad'	250	0.68	PLS Pounds:		0.19		
F Alfalfa 'Ranger'	300	0.81					
F Blue Flax 'Appar'	200	0.54					
F Sainfoin 'Eski'	750	2.03					
F Small Burnet 'Delar'	750	2.03					
Total Pounds:	4875	13.18					
PLS Pounds:		11.73					

Habitat and Vegetation Information

Wildlife Habitat Deer, Substantial Summer; Elk, Crucial Summer Calving Habitat; Bison, Crucial Year-long

VEGETATION HISTORY--

Management unit 10R, Study no: 46

Year	Vegetation Type ¹	Woodland Succession ²
2008	Pinyon-Juniper	Phase III
2014	Mountain Big Sagebrush	Phase I

¹Vegetation Type (Appendix - Vegetation Type), ²Woodland Succession (Tausch, Miller, Roundy, & Chambers, 2009).

Site Notes

The objectives of the project were to increase the cover of grass, forb, and browse species through seeding and reduce competition from conifers to improve habitat for mule deer and elk (WRI Database 2015).

Site Potential

1981-2010 Average Annual Precipitation 18 inches
 NRCS Ecological Site Upland Stony Loam (Pinyon-Utah Juniper)
 NRCS Ecological Site # R034XY322UT

SOIL ANALYSIS DATA--

Management unit 10R, Study no: 46

Texture	Sand (%)	Silt (%)	Clay (%)	pH	ds/m	OM (%)	PPM P	PPM K	Year Sampled
Sandy Clay Loam	54	25.4	20.6	6	0.4	1.4	4.6	86.4	2008

Soil specific normal values are described in the ecological site description (USDA-NRCS, 2011) and by Tiedeman and Lopez (2004).

States and Transitions

No state and transition model is available for the above ecological site.

When established in 2008, this site was in phase III pinyon-juniper encroachment. Although pinyon pine (*Pinus edulis*) and Utah juniper (*Juniperus osteosperma*) were the dominant species, mountain big sagebrush (*Artemisia tridentata* ssp. *vaseyana*) still had a significant presence on the site (Table – Browse Trends). Both grasses and forbs were diverse on the site, but individual species had low cover (Table – Herbaceous Trends). After treatment, tree cover was reduced, though not eliminated, allowing mountain big sagebrush to become the dominant species (Table – Browse Trends). Forb cover remained similar while grass cover increased. Cheatgrass (*Bromus tectorum*) is present on the site, though cover was less than one percent (Table - Herbaceous Trends). There are a number of small trees remaining on the site that will require continued maintenance to reach and keep the project objectives.

Trend Summary

HERBACEOUS TRENDS--

Management unit 10R, Study no: 46

Type	Species	Nested Frequency		Average Cover %	
		'08	'14	'08	'14
G	<i>Agropyron dasystachyum</i>	31	16	.33	.29
G	<i>Bouteloua gracilis</i>	_a 58	_b 92	1.18	3.11
G	<i>Bromus tectorum</i> (a)	_a 21	_b 45	.04	.47
G	<i>Carex</i> sp.	38	58	.11	.79
G	<i>Elymus cinereus</i>	-	-	-	.00
G	<i>Koeleria cristata</i>	_b 12	_a 5	.09	.06
G	<i>Poa fendleriana</i>	47	67	.45	1.76
G	<i>Poa secunda</i>	_b 95	_a 41	.49	.30
G	<i>Sitanion hystrix</i>	_a 90	_b 129	.80	3.05
G	<i>Stipa comata</i>	_b 17	_a 4	.09	.38
Total for Annual Grasses		21	45	0.04	0.47
Total for Perennial Grasses		388	412	3.55	9.75
Total for Grasses		409	457	3.59	10.22

Type	Species	Nested Frequency		Average Cover %	
		'08	'14	'08	'14
F	Agoseris glauca	_b 17	_a 3	.04	.00
F	Allium sp.	-	4	-	.03
F	Antennaria parvifolia	28	18	.11	.13
F	Arabis sp.	_a 11	_b 36	.05	.39
F	Aster sp.	_a 7	_b 15	.07	.14
F	Astragalus convallarius	3	-	.03	-
F	Astragalus sp.	-	3	-	.03
F	Calochortus nuttallii	7	-	.02	-
F	Camelina microcarpa (a)	16	6	.09	.02
F	Castilleja flava	2	-	.03	-
F	Chenopodium fremontii (a)	-	6	-	.01
F	Comandra pallida	2	-	.03	-
F	Cryptantha sp.	_b 17	_a 3	.12	.04
F	Erigeron eatonii	-	2	-	.03
F	Erigeron sp.	_b 21	_a 3	.11	.01
F	Eriogonum alatum	5	-	.09	-
F	Gayophytum ramosissimum(a)	13	24	.02	.16
F	Holosteum umbellatum (a)	_b 17	_a -	.03	-
F	Ipomopsis aggregata	10	3	.08	.03
F	Lepidium sp. (a)	-	1	-	.00
F	Lesquerella sp.	_a -	_b 46	-	.20
F	Linum lewisii	-	3	-	.15
F	Nicotiana attenuata (a)	-	3	-	.06
F	Oenothera pallida	1	16	.00	.07
F	Penstemon caespitosus	_a -	_b 15	.03	.20
F	Penstemon strictus	2	4	.00	.03
F	Phlox longifolia	_b 14	_a -	.04	-
F	Polygonum douglasii (a)	1	1	.00	.00
F	Ranunculus testiculatus (a)	_b 6	_a -	.01	-
F	Senecio multilobatus	9	8	.04	.04
Total for Annual Forbs		53	41	0.16	0.27
Total for Perennial Forbs		156	182	0.92	1.56
Total for Forbs		209	223	1.08	1.83

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

BROWSE TRENDS--

Management unit 10R, Study no: 46

Type	Species	Quadrat Cover %		Line Intercept Cover %	
		'08	'14	'08	'14
B	Artemisia tridentata vaseyana	7.75	7.28	11.51	12.11
B	Chrysothamnus depressus	.01	.06	.08	-
B	Coryphantha sp.	.00	-	-	-
B	Juniperus osteosperma	5.03	1.38	8.29	2.38
B	Juniperus scopulorum	-	1.01	-	.16
B	Pinus edulis	15.72	.89	34.59	2.06
B	Symphoricarpos oreophilus	.18	.53	-	.75
B	Tetradymia canescens	-	.03	-	-
Total for Browse		28.71	11.19	54.47	17.46

POINT-QUARTER TREE DATA--

Management unit 10R, Study no: 46

Species	Trees per Acre		Average diameter (in)	
	'08	'14	'08	'14
Juniperus osteosperma	123	89	3.9	3.9
Pinus edulis	223	188	4.0	1.4

BASIC COVER--

Management unit 10R, Study no: 46

Cover Type	Average Cover %	
	'08	'14
Vegetation	31.95	26.27
Rock	2.27	.89
Pavement	.11	.04
Litter	60.34	59.91
Cryptogams	4.58	.17
Bare Ground	29.87	22.68

PELLET GROUP DATA--

Management unit 10R, Study no: 46

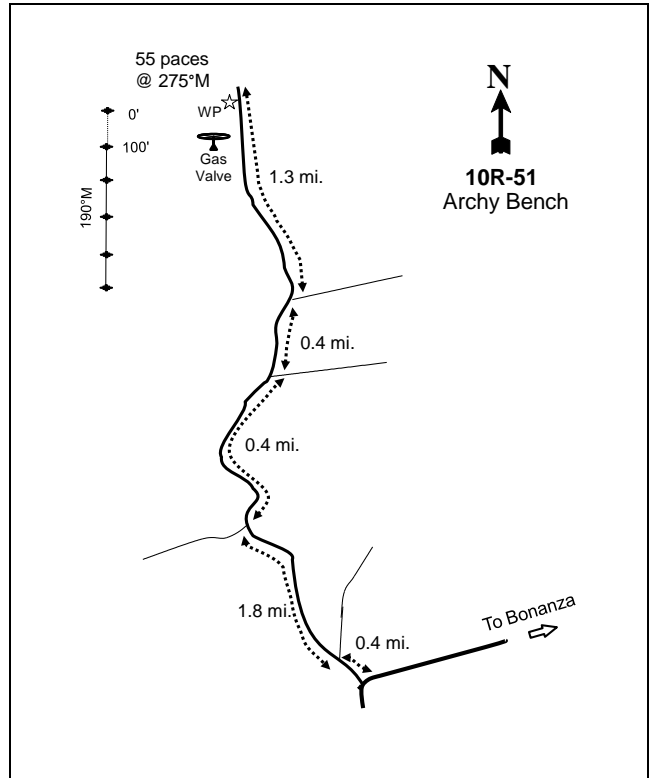
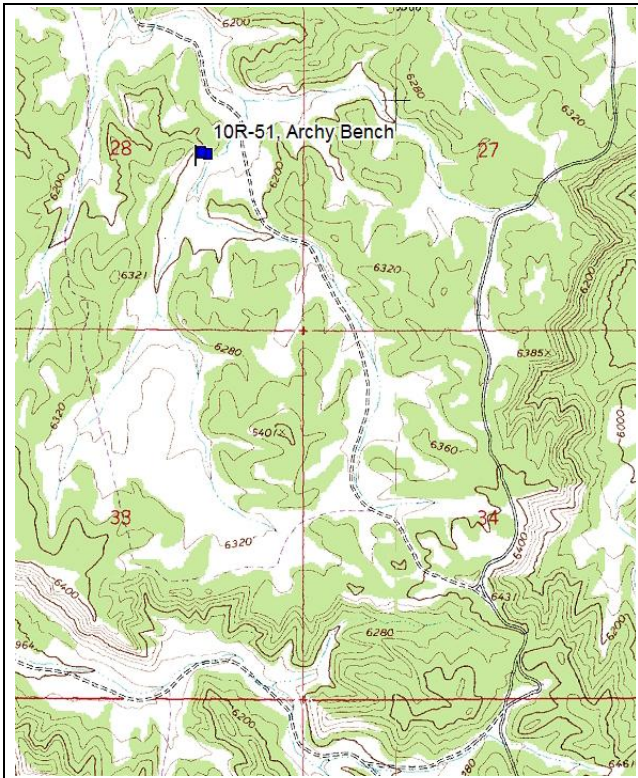
Type	Quadrat Frequency		Days use per acre (ha)	
	'08	'14	'08	'14
Rabbit	41	12	-	-
Elk	5	4	16 (40)	5 (13)
Deer	7	9	5 (13)	21 (51)
Cattle	-	5	14 (34)	4 (11)

BROWSE CHARACTERISTICS--
Management unit 10R, Study no: 46

Year	Plants per Acre (excluding seedlings)	Age class distribution			Seedling (plants/acre)	Utilization		% poor vigor	Average Height Crown (in)
		% Young	% Mature	% Decadent		% moderate	% heavy		
<i>Artemisia tridentata vaseyana</i>									
08	3220	5	17	78	200	34	1	40	26/32
14	3700	30	66	4	300	39	3	7	19/27
<i>Chrysothamnus depressus</i>									
08	540	0	85	15	-	0	15	15	4/8
14	340	71	24	6	20	59	41	35	6/10
<i>Chrysothamnus nauseosus</i>									
08	0	0	0	-	-	0	0	0	-/-
14	0	0	0	-	-	0	0	0	32/43
<i>Chrysothamnus viscidiflorus</i>									
08	0	0	0	-	-	0	0	0	16/11
14	0	0	0	-	-	0	0	0	-/-
<i>Chrysothamnus viscidiflorus viscidiflorus</i>									
08	0	0	0	-	-	0	0	0	-/-
14	0	0	0	-	-	0	0	0	17/25
<i>Coryphantha sp.</i>									
08	20	0	100	-	-	0	0	0	-/-
14	0	0	0	-	-	0	0	0	-/-
<i>Juniperus osteosperma</i>									
08	100	20	80	-	40	0	0	0	-/-
14	140	86	14	-	20	0	0	14	-/-
<i>Juniperus scopulorum</i>									
08	0	0	0	-	-	0	0	0	-/-
14	20	0	100	-	-	0	0	100	-/-
<i>Opuntia sp.</i>									
08	0	0	0	-	-	0	0	0	3/10
14	0	0	0	-	-	0	0	0	-/-
<i>Pediocactus simpsonii</i>									
08	0	0	0	-	-	0	0	0	1/1
14	0	0	0	-	-	0	0	0	-/-
<i>Pinus edulis</i>									
08	500	56	44	-	60	8	0	0	-/-
14	220	100	0	-	-	0	0	0	-/-
<i>Purshia tridentata</i>									
08	0	0	0	-	-	0	0	0	-/-
14	0	0	0	-	-	0	0	0	17/25
<i>Symphoricarpos oreophilus</i>									
08	60	0	100	-	-	0	0	0	8/11
14	120	0	100	-	-	17	0	0	18/28

		Age class distribution					Utilization			
Year	Plants per Acre (excluding seedlings)	% Young	% Mature	% Decadent	Seedling (plants/acre)	% moderate	% heavy	% poor vigor	Average Height Crown (in)	
Tetradymia canescens										
08	0	0	0	-	-	0	0	0	-/-	
14	20	0	100	-	-	0	0	0	6/6	

ARCHY BENCH - TREND STUDY NO. 10R-51



Location Information

USGS 7.5 min Map Info Archy Bench SE; Township 11S, Range 23E, Section 28
 GPS (0' Stake) NAD 83, UTM Zone 12, 641689 East 4410270 North

Transect Information

Browse Tag # (0' Stake) 186
 Transect Bearing 190° magnetic
 Length 500ft
 Belt Placement Line 1 (11ft), Line 2 (34ft), Line 3 (59ft), Line 4 (71ft), Line 5 (95ft)
 Belt Marker Placement Belt 1,4,5: No Rebar

Directions to Site

From the main gravel road in Bonanza, at the intersection in West Fork Asphalt Wash, take the road heading north towards Archy Bench. Drive 0.4 miles to an intersection while staying left and continue for another 1.8 miles. Stay right and travel another 0.4 miles; stay left for another 0.4 miles until another intersection. Again, stay left and travel another 1.3 miles to the site. The 0-foot stake is located approximately 55 paces to the west at 275 degrees magnetic from the gas valve and is marked by browse tag #186.

Site Information

Land Ownership BLM
 Allotment Olsen AMP
 Elevation 6,107ft (1,861m)
 Aspect Southeast
 Slope 4%
 Sample Dates 08/01/2011, 08/18/2014

DISTURBANCE HISTORY--

Management unit 10R, Study no: 51

Treatment/Disturbance	Name	WRI DB #	Date	Size (acres)
Lop and Scatter	-	-	Prior to 2011	-
Seeding: Aerial Before	Archy Bench Sagebrush Restoration	2050	October 2011	607
One-Way Ely Chaining	Archy Bench Sagebrush Restoration	2050	October 2011	607
Herbicide: Plateau	Archy Bench Sagebrush Restoration	2050	October 2011	607

The table is a recorded disturbance history of the study site.

SEED MIX--

Management unit 10R, Study no: 51

Project Name: Archy Bench Sagebrush Restoration			
WRI Database #: 2050			
Application: Aerial Seed		Acres: 600	
Seed Type		lbs in mix	lbs/acre
G	Bottlebrush Squirreltail	600	1.00
G	Canby Bluegrass 'Canbar'	150	0.25
G	Crested Wheatgrass 'Ephraim'	900	1.50
G	Indian Ricegrass	600	1.00
G	Russian Wildrye 'Bozoisky'	900	1.50
G	Siberian Wheatgrass 'Vavilov'	600	1.00
G	Snake River Wheatgrass 'Secar'	900	1.50
G	Western Wheatgrass 'Arriba'	1200	2.00
F	Blue Flax 'Appar'	600	1.00
F	Rocky Mountain Beeplant	598	1.00
F	Western Yarrow 'Eagle Mountain'	75	0.13
B	Forage Kochia	150	0.25
B	Fourwing Saltbush	900	1.50
B	Winterfat	600	1.00
Total Pounds:		8773	14.62
PLS Pounds:			10.92

Habitat and Vegetation Information

Wildlife Habitat Deer, Substantial Winter; Elk, Substantial Winter; Bison, Crucial Year-Long

VEGETATION HISTORY--

Management unit 10R, Study no: 51

Year	Vegetation Type ¹	Woodland Succession ²
2011-2014	Mountain Big Sagebrush	No Encroachment

¹Vegetation Type (Appendix - Vegetation Type), ²Woodland Succession (Tausch, Miller, Roundy, & Chambers, 2009).

Site Notes

The grazing operator has agreed to defer grazing on the project area for a minimum of two growing seasons. The objective of the project is to restore the mountain big sagebrush community that has dramatically declined over the last few years (WRI Database 2015).

Site Potential

1981-2010 Average Annual Precipitation 11 inches
 NRCS Ecological Site Semidesert Loam (Wyoming Big Sagebrush)
 NRCS Ecological Site # [R034BY212UT](#)

States and Transitions

No state and transition model is available for the above ecological site, but it is likely similar to the [Semidesert Loam \(Wyoming Big Sagebrush\), R035XY209UT](#) ecological site, which does have a defined state and transition model (USDA-NRCS, 2011).

When established in 2011, this site was a mountain big sagebrush (*Artemisia tridentata* ssp. *vaseyana*) community with very few other browse species (Tables – Browse Trends). The herbaceous understory was dominated by cheatgrass (*Bromus tectorum*) while perennial grasses and forbs had very low cover (Table – Herbaceous Trends). After treatment, mountain big sagebrush cover decreased, but remained the dominant species (Table – Browse Trends). Cheatgrass increased in cover to almost double what it was in 2011 (Table – Herbaceous Trends). Additional management may be necessary to control cheatgrass that currently poses a threat to the resilience of this site.

Trend Summary

HERBACEOUS TRENDS--

Management unit 10R, Study no: 51

Type	Species	Nested Frequency		Average Cover %	
		'11	'14	'11	'14
G	Agropyron cristatum	a-	b12	-	.22
G	Agropyron dasystachyum	41	31	1.56	.79
G	Bromus tectorum (a)	a317	b364	16.86	20.26
G	Oryzopsis hymenoides	5	4	.18	.03
G	Poa secunda	-	3	-	.00
G	Sitanion hystrix	b28	a11	1.12	.09
G	Stipa comata	3	-	.00	-
Total for Annual Grasses		317	364	16.86	20.26
Total for Perennial Grasses		77	61	2.86	1.14
Total for Grasses		394	425	19.73	21.40
F	Astragalus convallarius	5	-	.03	-
F	Astragalus sp.	8	-	.06	-
F	Chenopodium fremontii (a)	8	-	.07	-
F	Cryptantha sp.	6	7	.03	.04
F	Descurainia pinnata (a)	a6	b25	.06	.50
F	Eriogonum cernuum (a)	7	-	.16	-
F	Euphorbia albomarginata	24	36	.33	.12
F	Halogeton glomeratus (a)	a2	b33	.15	.09
F	Lappula occidentalis (a)	a1	b34	.03	.36
F	Machaeranthera canescens	8	10	.07	.38
F	Phacelia sp. (a)	-	1	-	.03
F	Phlox austromontana	5	-	.16	-
F	Phlox longifolia	b12	a4	.03	.00
F	Salsola iberica (a)	55	27	3.54	.45

Type	Species	Nested Frequency		Average Cover %	
		'11	'14	'11	'14
F	<i>Sisymbrium altissimum</i> (a)	17	18	.63	.55
F	<i>Townsendia</i> sp.	-	3	-	.03
Total for Annual Forbs		96	138	4.65	2.00
Total for Perennial Forbs		68	60	0.73	0.58
Total for Forbs		164	198	5.38	2.58

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

BROWSE TRENDS--

Management unit 10R, Study no: 51

Type	Species	Quadrat Cover %		Line Intercept Cover %	
		'11	'14	'11	'14
B	<i>Artemisia tridentata vaseyana</i>	18.58	10.68	22.20	13.71
B	<i>Grayia spinosa</i>	.98	-	.83	-
B	<i>Gutierrezia sarothrae</i>	2.33	1.17	1.73	1.55
B	<i>Opuntia</i> sp.	.03	.15	-	-
B	<i>Sarcobatus vermiculatus</i>	1.32	.91	3.46	3.00
Total for Browse		23.26	12.91	28.22	18.26

POINT-QUARTER TREE DATA--

Management unit 10R, Study no: 51

Species	Trees per Acre		Average diameter (in)	
	'11	'14	'11	'14
<i>Juniperus osteosperma</i>	7	-	2.5	-
<i>Pinus edulis</i>	5	-	0.8	-

BASIC COVER--

Management unit 10R, Study no: 51

Cover Type	Average Cover %	
	'11	'14
Vegetation	45.07	36.67
Rock	1.44	4.10
Pavement	35.29	24.48
Litter	27.35	37.54
Cryptogams	2.00	.39
Bare Ground	7.87	17.05

PELLET GROUP DATA--

Management unit 10R, Study no: 51

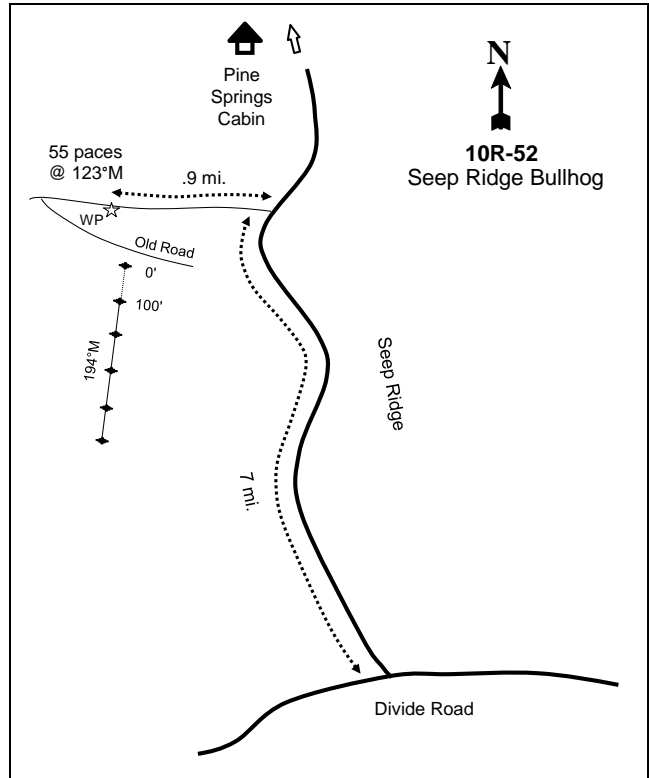
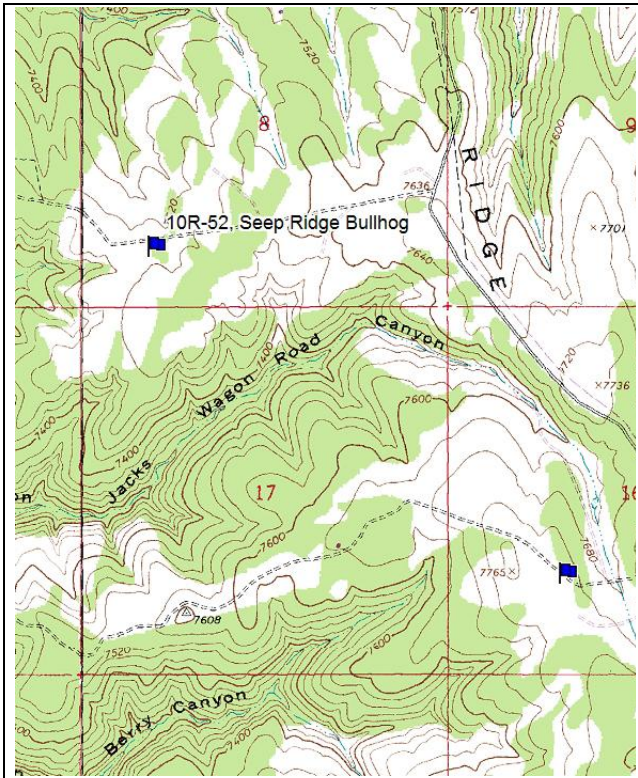
Type	Quadrat Frequency		Days use per acre (ha)	
	'11	'14	'11	'14
Rabbit	2	-	-	-
Elk	8	7	7 (18)	24 (60)
Deer	6	5	24 (60)	9 (22)

BROWSE CHARACTERISTICS--

Management unit 10R, Study no: 51

Year	Plants per Acre (excluding seedlings)	Age class distribution			Seedling (plants/acre)	Utilization			Average Height Crown (in)
		% Young	% Mature	% Decadent		% moderate	% heavy	% poor vigor	
<i>Artemisia tridentata vaseyana</i>									
11	3460	3	71	25	40	60	18	18	28/38
14	2920	9	66	25	-	51	7	17	21/30
<i>Chrysothamnus nauseosus</i>									
11	0	0	0	-	-	0	0	0	23/21
14	0	0	0	-	-	0	0	0	32/41
<i>Chrysothamnus viscidiflorus</i>									
11	20	0	100	-	-	0	0	0	18/31
14	0	0	0	-	-	0	0	0	18/31
<i>Grayia spinosa</i>									
11	40	50	50	-	-	100	0	0	28/42
14	0	0	0	-	-	0	0	0	-/-
<i>Gutierrezia sarothrae</i>									
11	1140	35	65	0	240	0	0	0	14/30
14	1900	44	54	2	3820	0	0	0	11/14
<i>Juniperus osteosperma</i>									
11	0	0	0	-	20	0	0	0	-/-
14	0	0	0	-	-	0	0	0	-/-
<i>Opuntia sp.</i>									
11	20	0	100	-	-	0	0	0	4/12
14	40	0	100	-	-	0	0	0	4/9
<i>Sarcobatus vermiculatus</i>									
11	180	11	89	-	20	22	44	0	44/65
14	180	0	100	-	-	33	0	0	29/54

SEEP RIDGE BULLHOG - TREND STUDY NO. 10R-52



Location Information

USGS 7.5 min Map Info Seep Canyon; Township 15S, Range 23E, Section 8
 GPS (0' Stake) NAD 83, UTM Zone 12, 639910 East 4375992 North

Transect Information

Browse Tag # (0' Stake) 186
 Transect Bearing 194° magnetic
 Length 500ft
 Belt Placement Line 1 (11ft), Line 2 (34ft), Line 3 (95ft), Line 4 (71ft), Line 5 (95ft)
 Belt Marker Placement Standard

Directions to Site

From the intersection of the Divide Road and Seep Ridge Road, drive north on the Seep Ridge Road for 7 miles then turn left (west). Drive 0.9 miles to the witness post on the left side of the road. The 0-foot stake is 24 paces at 170 degrees magnetic. The 0-foot stake is identified by browse tag is #183.

Site Information

Land Ownership BLM
 Allotment Sweet Water
 Elevation 7,550ft (2,301m)
 Aspect Northwest
 Slope 4%
 Sample Dates 08/04/2011, 08/20/2014

DISTURBANCE HISTORY--

Management unit 10R, Study no: 52

Treatment/Disturbance	Name	WRI DB #	Date	Size (acres)
Seeding: Aerial Before	Seep Ridge Bullhog Phase II	1950	Fall 2011	390
Bullhog	Seep Ridge Bullhog Phase II	1950	Nov 2011- Feb 2012	390
Seeding: Aerial After	Seep Ridge Bullhog Phase II	1950	Dec 2011	390

The table is a recorded disturbance history of the study site.

SEED MIX--

Management unit 10R, Study no: 52

Project Name: Seep Ridge Bullhog Phase II WRI Database #: 1950				Project Name: Seep Ridge Bullhog Phase II WRI Database #: 1950			
Application: Aerial Before		Acres: 475		Application: Aerial After		Acres: 400	
Seed Type		lbs in mix	lbs/acre	Seed Type		lbs in mix	lbs/acre
G	Big Bluegrass 'Sherman'	100	0.74	B	Sagebrush, Wyoming	400	1.00
G	Bluebunch Wheatgrass 'P-7'	600	0.21	Total Pounds:		400	1.00
G	Canby Bluegrass 'Canbar'	100	1.26	PLS Pounds:			0.16
G	Great Basin Wildrye 'Trailhead'	350	0.21				
G	Green Needlegrass 'Lodorm'	350	0.74				
G	Indian Ricegrass	500	0.74				
G	Sandberg Bluegrass	100	1.05				
G	Slender Wheatgrass 'San Luis'	700	0.21				
F	Alfalfa 'Nomad'	350	1.47				
G	Thickspike Wheatgrass 'Bannock'	600	1.26				
F	Alfalfa 'Spreader 4'	350	0.74				
F	Blue Flax 'Appar'	200	0.42				
F	Sainfoin 'Eski'	950	2.00				
F	Small Burnet 'Delar'	950	2.00				
B	Bitterbrush	200	0.42				
B	True Mountain Mahogany	100	0.21				
Total Pounds:		6500	13.68				
PLS Pounds:			12.07				

Habitat and Vegetation Information

Wildlife Habitat Deer, Substantial Winter; Elk, Crucial Summer Calving Habitat; Bison Crucial Year-long

VEGETATION HISTORY--

Management unit 10R, Study no: 52

Year	Vegetation Type ¹	Woodland Succession ²
2011	Pinyon-Juniper	Phase III
2014	Perennial Grass-Forb	Phase I

¹Vegetation Type (Appendix - Vegetation Type), ²Woodland Succession (Tausch, Miller, Roundy, & Chambers, 2009).

Site Notes

The treatment area will be rested from grazing for two growing seasons to allow seed establishment. The objectives of the project are to increase cover of grasses, forbs, and browse species through seeding, and reduced competition from PJ trees (WRI Database 2015).

Site Potential

1981-2010 Average Annual Precipitation 17 inches
 NRCS Ecological Site Upland Shallow Loam (Pinyon-Utah Juniper)
 NRCS Ecological Site # R034XY322UT

States and Transitions

No state and transition model is available for the above ecological site, but it is likely similar to the [Upland Shallow Loam \(Pinyon-Juniper\), R036XY315UT](#) ecological site, which does have a defined state and transition model (USDA-NRCS, 2011).

When this site was established in 2011, it was in phase III encroachment from pinyon pine (*Pinus edulis*) and Utah juniper (*Juniper osteosperma*) with other browse species such as antelope bitterbrush (*Purshia tridentata*) and mountain big sagebrush (*Artemisia tridentata ssp. vaseyana*) also being present. The herbaceous understory contributed little cover; forb cover was less than 1 percent. After treatment the herbaceous understory became the dominant component on the site with both forbs and grasses being fairly diverse. Cheatgrass (*Bromus tectorum*) is present on the site, but cover is so low that it does not pose a significant risk at this time. Tree cover decreased dramatically after treatment as expected. Although tree cover is less than 1 percent, tree seedlings were prevalent on the site posing a threat of re-encroachment if they persist. Other browse species also declined with treatment but are expected to recover with time.

Trend Summary

HERBACEOUS TRENDS--
 Management unit 10R, Study no: 52

Type	Species	Nested Frequency		Average Cover %	
		'11	'14	'11	'14
G	Agropyron dasystachyum	a-	b115	-	2.98
G	Agropyron spicatum	a-	b38	-	.78
G	Agropyron trachycaulum	a-	b38	-	1.11
G	Bouteloua gracilis	20	24	.26	.81
G	Bromus tectorum (a)	-	6	-	.06
G	Carex sp.	3	6	.03	.18
G	Elymus cinereus	-	1	-	.03
G	Koeleria cristata	11	13	.16	.18
G	Oryzopsis hymenoides	-	6	-	.07
G	Poa fendleriana	b102	a49	3.25	1.33
G	Poa secunda	a-	b19	-	.28
G	Sitanion hystrix	a25	b164	.20	4.27
Total for Annual Grasses		0	6	0	0.06
Total for Perennial Grasses		161	473	3.91	12.04
Total for Grasses		161	479	3.91	12.11
F	Antennaria parvifolia	4	18	.01	.30
F	Arabis holboellii	17	11	.04	.04

Type	Species	Nested Frequency		Average Cover %	
		'11	'14	'11	'14
F	Arabis microphylla	-	3	-	.03
F	Astragalus sp.	-	1	-	.00
F	Chenopodium leptophyllum(a)	5	5	.18	.04
F	Cryptantha sp.	3	-	.00	-
F	Descurainia pinnata (a)	1	7	.00	.03
F	Eriogonum alatum	-	3	-	.03
F	Lappula occidentalis (a)	-	4	-	.00
F	Lesquerella sp.	a ⁴	b ¹⁴	.01	.06
F	Linum lewisii	2	-	.00	-
F	Linum perenne	a ⁻	b ¹⁰⁵	-	4.35
F	Medicago sativa	a ⁻	b ²⁰	-	.50
F	Monolepis nuttalliana (a)	-	6	-	.30
F	Onobrychis viciaefolia	-	5	-	.04
F	Penstemon caespitosus	1	1	.00	.00
F	Penstemon pachyphyllus	2	7	.03	.15
F	Phacelia sp. (a)	-	1	-	.00
F	Phlox longifolia	3	3	.00	.01
F	Polygonum douglasii (a)	21	6	.05	.01
F	Sanguisorba minor	a ⁻	b ⁶⁶	-	2.17
F	Sphaeralcea coccinea	-	4	-	.06
Total for Annual Forbs		27	29	0.23	0.40
Total for Perennial Forbs		36	261	0.12	7.78
Total for Forbs		63	290	0.36	8.18

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

BROWSE TRENDS--

Management unit 10R, Study no: 52

Type	Species	Quadrat Cover %		Line Intercept Cover %	
		'11	'14	'11	'14
B	Artemisia tridentata vaseyana	3.84	2.78	5.05	2.06
B	Cercocarpus montanus	1.23	-	.80	-
B	Gutierrezia sarothrae	.15	.30	-	-
B	Juniperus osteosperma	5.37	.18	20.31	-
B	Juniperus scopulorum	.18	-	.18	-
B	Opuntia fragilis	-	.06	.01	-
B	Pinus edulis	12.04	.18	34.08	.03
B	Purshia tridentata	9.00	2.17	6.85	2.21
B	Symphoricarpos oreophilus	.44	.85	.50	.93
Total for Browse		32.28	6.54	67.78	5.23

POINT-QUARTER TREE DATA--
Management unit 10R, Study no: 52

Species	Trees per Acre		Average diameter (in)	
	'11	'14	'11	'14
Juniperus osteosperma	285	-	3.7	-
Juniperus scopulorum	34	-	3.1	-
*Juniperus ssp.	-	77	-	2.3
Pinus edulis	811	111	2.4	0.7
Pseudotsuga menziesii	21	-	1.4	-

*Juniper species were combined due to difficulty in telling them apart at a young age

BASIC COVER--
Management unit 10R, Study no: 52

Cover Type	Average Cover %	
	'11	'14
Vegetation	30.91	26.36
Rock	2.23	1.19
Pavement	8.06	.73
Litter	51.68	78.29
Cryptogams	4.67	.04
Bare Ground	23.19	7.39

PELLET GROUP DATA--
Management unit 10R, Study no: 52

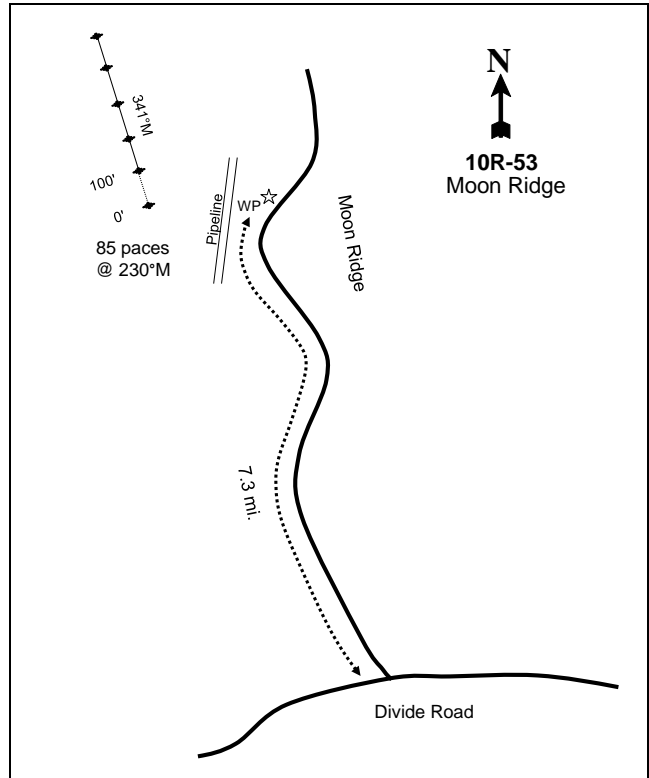
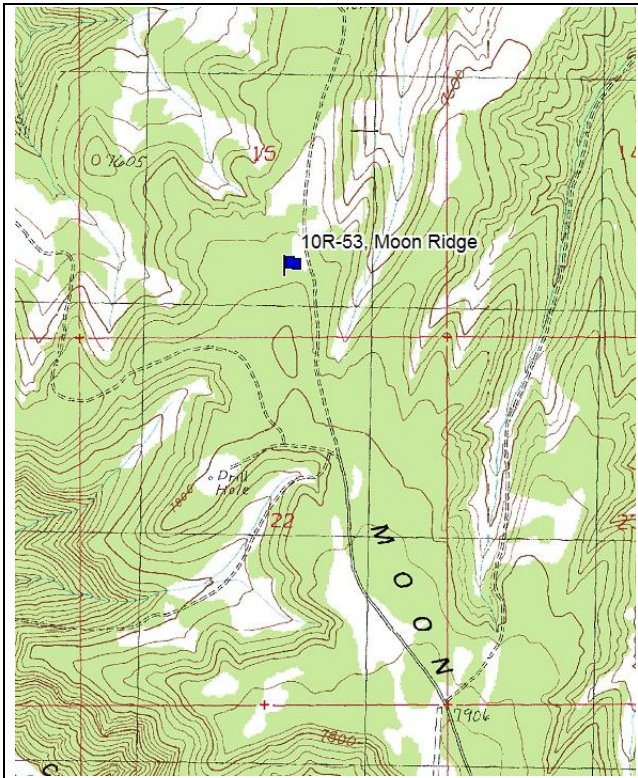
Type	Quadrat Frequency		Days use per acre (ha)	
	'11	'14	'11	'14
Rabbit	-	5	-	-
Elk	6	12	20 (50)	25 (61)
Deer	4	14	13 (33)	9 (23)
Cattle	-	4	3 (7)	22 (54)

BROWSE CHARACTERISTICS--
Management unit 10R, Study no: 52

		Age class distribution					Utilization			
Year	Plants per Acre (excluding seedlings)	% Young	% Mature	% Decadent	Seedling (plants/acre)	% moderate	% heavy	% poor vigor	Average Height Crown (in)	
Amelanchier utahensis										
11	0	0	0	-	-	0	0	0	3/10	
14	0	0	0	-	-	0	0	0	-/-	
Artemisia tridentata vaseyana										
11	1060	15	53	32	20	19	2	23	26/32	
14	760	32	68	0	-	34	3	13	21/25	

Year	Plants per Acre (excluding seedlings)	Age class distribution			Seedling (plants/acre)	Utilization		% poor vigor	Average Height Crown (in)
		% Young	% Mature	% Decadent		% moderate	% heavy		
Cercocarpus montanus									
11	60	33	67	-	-	0	0	0	41/53
14	60	33	67	-	-	0	100	0	17/20
Chrysothamnus viscidiflorus viscidiflorus									
11	0	0	0	-	-	0	0	0	-/-
14	20	0	100	-	-	0	100	0	10/5
Gutierrezia sarothrae									
11	20	0	100	-	-	0	0	0	-/-
14	60	0	100	-	-	67	0	0	13/19
Juniperus osteosperma									
11	220	55	45	-	80	0	0	0	-/-
14	80	100	0	-	20	0	0	0	-/-
Juniperus scopulorum									
11	40	100	0	-	20	0	0	0	-/-
14	20	100	0	-	-	0	0	0	-/-
Opuntia fragilis									
11	100	0	100	-	-	0	0	0	4/11
14	120	33	67	-	-	0	0	0	4/13
Pediocactus simpsonii									
11	0	0	0	-	-	0	0	0	2/2
14	0	0	0	-	-	0	0	0	-/-
Pinus edulis									
11	580	55	45	-	480	0	0	0	-/-
14	40	100	0	-	40	0	0	0	-/-
Purshia tridentata									
11	1440	31	67	3	80	11	10	3	19/27
14	1040	21	79	0	60	33	40	2	12/23
Symphoricarpos oreophilus									
11	560	71	29	-	-	0	0	4	11/20
14	760	5	95	-	-	26	3	0	14/27

MOON RIDGE - TREND STUDY NO. 10R-53



Location Information

USGS 7.5 min Map Info Tenmile Canyon North; Township 16S, Range 21E, Section 15
 GPS (0' Stake) NAD 83, UTM Zone 12, 621556 East 4363326 North

Transect Information

Browse Tag # (0' Stake) 182
 Transect Bearing 341° magnetic
 Length 500ft
 Belt Placement Line 1 (11ft), Line 2 (34ft), Line 3 (59ft), Line 4 (71ft), Line 5 (95ft)
 Belt Marker Placement Standard

Directions to Site

Starting at the intersection of the Divide Road and Moon Ridge Road, turn north onto Moon Ridge Road. Drive for 7.3 miles to the witness post on the left (west) side of the road. The 0-foot stake is 85 paces at 230 degrees magnetic. The 0-foot stake is identified by browse tag #182.

Site Information

Land Ownership BLM
 Allotment Sweet Water
 Elevation 7,754ft (2,357m)
 Aspect Southwest
 Slope 6%
 Sample Dates 08/04/2011, 08/20/2014

DISTURBANCE HISTORY--

Management unit 10R, Study no: 53

Treatment/Disturbance	Name	WRI DB #	Date	Size (acres)
Two-Way Ely Chaining	Moon Ridge Chaining	2218	Fall 2012	1165
Seeding: Aerial Before	Moon Ridge Chaining	2218	Fall 2012	1100
Seeding: Dribbler	Moon Ridge Chaining	2218	Fall 2012	1100
Seeding: Aerial After	Moon Ridge Chaining	2218	Fall 2012	920

The table is a recorded disturbance history of the study site.

SEED MIX--

Management unit 10R, Study no: 53

Project Name: Moon Ridge WRI Database #: 2218				Project Name: Moon Ridge WRI Database #: 2218			
Application: Aerial Before		Acres: 1100		Application: Dribbler		Acres: 1100	
Seed Type		lbs in mix	lbs/acre	Seed Type		lbs in mix	lbs/acre
G	Big Bluegrass 'Sherman'	220	.19	B	Bitterbrush	440	.38
G	Bluebunch Wheatgrass 'Anatone'	1350	1.16	B	True Mountain Mahogany	225	.19
G	Canby Bluegrass 'Canbar'	220	.19	Total Pounds:		665	.6
G	Great Basin Wildrye 'Magnar'	900	.77	PLS Pounds:			.5
G	Green Needlegrass 'Lodorm'	937	.8	Project Name: Moon Ridge WRI Database #: 2218			
G	Indian Ricegrass 'White River'	500	.43	Application: Aerial After		Acres: 920	
G	Indian Ricegrass	600	.56	Seed Type		lbs in mix	lbs/acre
G	Sandberg Bluegrass	220	.19	B	Sagebrush, Wyoming	926	1.01
G	Slender Wheatgrass 'First Strike'	1650	1.42	Total Pounds:			1.01
G	Thickspike Wheatgrass 'Bannock'	1300	1.12	PLS Pounds:			.23
F	Alfalfa 'Ladak'	1650	1.42				
F	Blue Flax 'Appar'	550	.42				
F	Sainfoin 'Delaney'	2200	1.89				
F	Small Burnet	2200	1.89				
Total Pounds:		14497	13.18				
PLS Pounds:			11.81				

Habitat and Vegetation Information

Wildlife Habitat Deer, Substantial Summer; Elk, Crucial Winter; Bison, Crucial Year-Long; Rocky Mountain Bighorn Sheep, Crucial Year-Long; Sage-Grouse, Crucial Occupied, Brood-Rearing

VEGETATION HISTORY--

Management unit 10R, Study no: 53

Year	Vegetation Type ¹	Woodland Succession ²
2011	Pinyon-Juniper	Phase III
2014	Pinyon-Juniper	Phase I

¹Vegetation Type (Appendix - Vegetation Type), ²Woodland Succession (Tausch, Miller, Roundy, & Chambers, 2009).

Site Notes

Following the treatment, dense and large chained over pinyon and juniper trees have made it difficult to traverse site, which may hinder use by big game. Additional treatments may be needed to reduce woody debris.

Site Potential

1981-2010 Average Annual Precipitation 16 inches
 NRCS Ecological Site Upland Shallow Loam (Pinyon-Utah Juniper)
 NRCS Ecological Site # R034XY322UT

States and Transitions

No state and transition model is available for the above ecological site, but it is likely similar to the [Upland Shallow Loam \(Pinyon-Utah Juniper\), R036XA315UT](#) ecological site, which does have a defined state and transition model (USDA-NRCS, 2011).

When established in 2011, the site was in phase III encroachment by pinyon pine (*Pinus edulis*) and Utah juniper (*Juniperus osteosperma*) with mountain big sagebrush (*Artemisia tridentata* ssp. *vaseyana*) being the only other browse species. There was a fair amount of herbaceous understory; however; grasses and forbs were not very diverse. Although tree cover decreased dramatically after treatment, the site remained dominated by pinyon-Utah juniper. Tree persistence could be attributed to the vast amount of trees on the site's pretreatment. Both grasses and forbs decreased in cover, which may be caused by the chained trees that now cover the ground. This site will require further tree removal in order to delay further encroachment.

Trend Summary

HERBACEOUS TRENDS--

Management unit 10R, Study no: 53

Type	Species	Nested Frequency		Average Cover %	
		'11	'14	'11	'14
G	Agropyron dasystachyum	9	4	.04	.04
G	Carex sp.	33	13	.65	.24
G	Koeleria cristata	41	-	.97	-
G	Poa fendleriana	87	109	3.80	1.91
G	Poa secunda	41	22	2.03	.38
G	Sitanion hystrix	16	30	.14	.68
G	Stipa comata	1	-	.00	-
Total for Annual Grasses		0	0	0	0
Total for Perennial Grasses		228	178	7.64	3.26
Total for Grasses		228	178	7.64	3.26
F	Agoseris glauca	9	-	.05	-
F	Androsace septentrionalis (a)	-	4	-	.03
F	Antennaria parvifolia	46	28	1.52	1.02
F	Arabis holboellii	4	10	.00	.07
F	Astragalus convallarius	-	1	-	.00
F	Astragalus sp.	4	2	.06	.00
F	Astragalus tenellus	2	-	.03	-
F	Crepis acuminata	1	1	.00	.00
F	Erigeron eatonii	19	4	.15	.15

Type	Species	Nested Frequency		Average Cover %	
		'11	'14	'11	'14
F	Gayophytum ramosissimum(a)	-	5	-	.03
F	Linum perenne	-	1	-	.00
F	Lupinus argenteus	6	11	.71	.25
F	Medicago sativa	-	23	-	.04
F	Onobrychis viciaefolia	-	2	-	.00
F	Penstemon comarrhenus	3	6	.00	.04
F	Penstemon watsonii	94	73	3.20	1.84
F	Phlox austromontana	9	3	.45	.00
F	Phlox longifolia	2	9	.03	.04
F	Polygonum douglasii (a)	8	22	.01	.06
F	Sanguisorba minor	-	25	-	.12
F	Senecio multilobatus	-	3	-	.00
Total for Annual Forbs		8	31	0.01	0.13
Total for Perennial Forbs		199	202	6.24	3.61
Total for Forbs		207	233	6.26	3.75

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

BROWSE TRENDS--

Management unit 10R, Study no: 53

Type	Species	Quadrat Cover %		Line Intercept Cover %	
		'11	'14	'11	'14
B	Amelanchier utahensis	-	-	-	-
B	Artemisia tridentata vaseyana	1.57	.18	1.90	1.00
B	Cercocarpus montanus	.15	-	-	.03
B	Chrysothamnus depressus	.00	.06	-	-
B	Juniperus osteosperma	1.72	3.48	19.98	4.30
B	Juniperus scopulorum	.15	-	1.18	.43
B	Opuntia sp.	.15	-	-	-
B	Pinus edulis	13.96	.93	42.80	2.60
Total for Browse		17.71	4.67	65.86	8.36

POINT-QUARTER TREE DATA--

Management unit 10R, Study no: 53

Species	Trees per Acre		Average diameter (in)	
	'11	'14	'11	'14
Juniperus osteosperma	442	-	9.5	-
Pinus edulis	793	-	2.2	-

BASIC COVER--

Management unit 10R, Study no: 53

Cover Type	Average Cover %	
	'11	'14
Vegetation	26.47	9.97
Rock	0	.03
Pavement	.31	.07
Litter	63.65	77.64
Cryptogams	7.89	1.28
Bare Ground	16.59	16.48

PELLET GROUP DATA--

Management unit 10R, Study no: 53

Type	Quadrat Frequency		Days use per acre (ha)	
	'11	'14	'11	'14
Rabbit	-	1	-	-
Deer	-	-	-	3 (8)
Elk	-	-	-	2 (5)

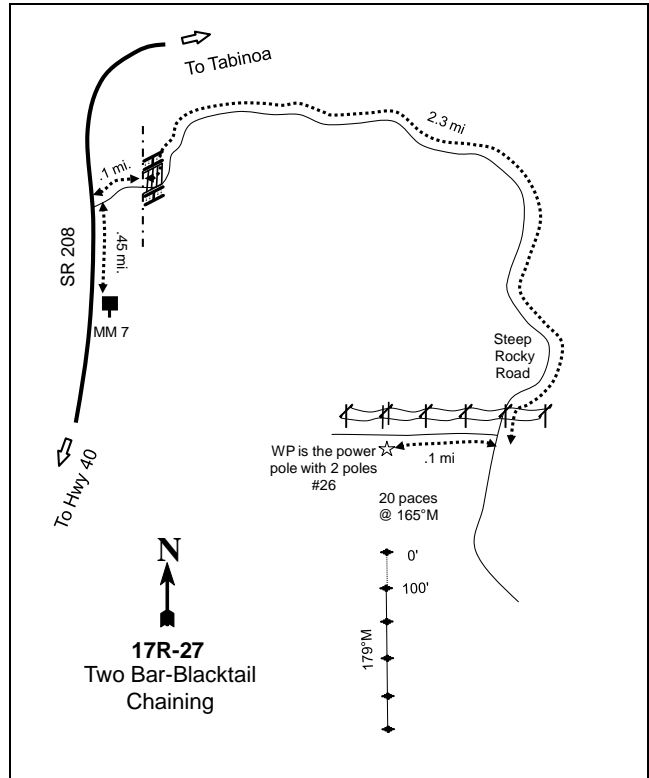
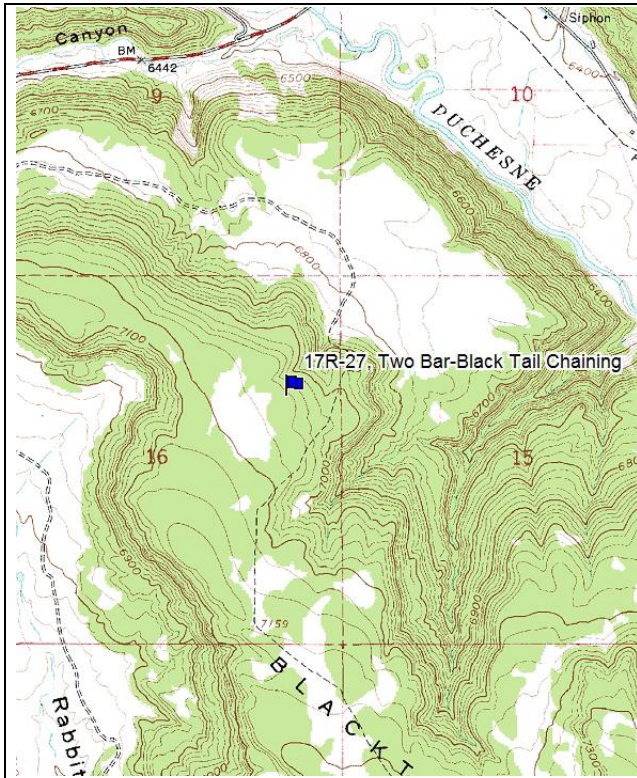
BROWSE CHARACTERISTICS--

Management unit 10R, Study no: 53

Year	Plants per Acre (excluding seedlings)	Age class distribution			Seedling (plants/acre)	Utilization			Average Height Crown (in)
		% Young	% Mature	% Decadent		% moderate	% heavy	% poor vigor	
Amelanchier utahensis									
11	0	0	0	-	-	0	0	0	6/11
14	0	0	0	-	-	0	0	0	-/-
Artemisia tridentata vaseyana									
11	280	29	64	7	-	0	0	7	23/26
14	220	18	82	0	-	9	9	0	18/21
Cercocarpus montanus									
11	0	0	0	-	-	0	0	0	33/33
14	20	0	100	-	-	0	0	0	20/44
Chrysothamnus depressus									
11	60	0	100	-	20	0	0	0	5/7
14	40	50	50	-	-	0	0	0	4/6
Chrysothamnus viscidiflorus viscidiflorus									
11	40	50	50	-	-	0	0	0	25/24
14	40	0	100	-	-	0	0	0	16/16
Juniperus osteosperma									
11	160	63	38	-	100	0	0	13	-/-
14	160	100	0	-	-	0	0	13	-/-

		Age class distribution					Utilization			
Year	Plants per Acre (excluding seedlings)	% Young	% Mature	% Decadent	Seedling (plants/acre)	% moderate	% heavy	% poor vigor	Average Height Crown (in)	
<i>Opuntia fragilis</i>										
11	0	0	0	-	-	0	0	0	-/-	
14	120	0	100	-	-	0	0	0	4/11	
<i>Opuntia sp.</i>										
11	60	33	67	-	-	0	0	0	5/19	
14	0	0	0	-	-	0	0	0	-/-	
<i>Pinus edulis</i>										
11	500	36	64	0	480	0	0	0	-/-	
14	100	60	20	20	40	0	20	40	-/-	
<i>Purshia tridentata</i>										
11	0	0	0	-	-	0	0	0	14/26	
14	0	0	0	-	-	0	0	0	13/14	
<i>Symphoricarpos oreophilus</i>										
11	0	0	0	-	-	0	0	0	16/33	
14	80	0	100	-	-	0	0	0	10/20	

TWO BAR-BLACKTAIL CHAINING - TREND STUDY NO. 17R-27



Location Information

USGS 7.5 min Map Info Tabinoia; Township 2S, Range 7W, Section 16
 GPS (0' Stake) NAD 83, UTM Zone 12, 527707 East 4462075 North

Transect Information

Browse Tag # (0' Stake) 137
 Transect Bearing 179° magnetic
 Length 500ft
 Belt Placement Line 1 (11ft), Line 2 (34ft), Line 3 (59ft), Line 4 (71ft), Line 5 (95ft)
 Belt Marker Placement No Rebar

Directions to Site

From Highway 40 drive north on State Road 208 and travel to mile marker 7. Travel north from mile marker 7 and go 0.65 miles to a road coming in from the right (east). Turn right and travel 0.1 miles to a gate and proceed another 2.3 miles to a power line. Park at the power line service road (In past readings of the study, the road up the steep rocky hill was impassable, so be cautious, you may have to park at bottom). From the service road walk 0.1 miles to the double power pole marked with pole #26. The 0-foot stake is 20 paces at 165 degrees magnetic. The 0-foot stake is marked with browse tag #137.

Site Information

Land Ownership UDWR
 Allotment Not Available
 Elevation 7,050ft (2,149m)
 Aspect Northeast
 Slope 4%
 Sample Dates 07/26/2007, 07/06/2009, 08/08/2011, 08/06/2014

DISTURBANCE HISTORY--

Management unit 17R, Study no: 27

<i>Treatment/Disturbance</i>	<i>Name</i>	<i>WRI DB #</i>	<i>Date</i>	<i>Size (acres)</i>
Two-Way Ely Chaining	2-bar Pinyon and Juniper Thinning	368	October 2007	978
Seeding: Aerial Before	2-bar Pinyon and Juniper Thinning	368	October 2007	600
Seeding: Dribbler	2-bar Pinyon and Juniper Thinning	368	October 2007	1000
Seeding: Aerial After	2-bar Pinyon and Juniper Thinning	368	January 2008	925

The table is a recorded disturbance history of the study site.

SEED MIX--

Management unit 17R, Study no: 27

Project Name: 2-bar Pinyon and Juniper Thinning WRI Database #: 368				Project Name: 2-bar Pinyon and Juniper Thinning WRI Database #: 368			
Application: Aerial Before		Acres: 600		Application: Aerial After		Acres: 925	
Seed Type		lbs in mix	lbs/acre	Seed Type		lbs in mix	lbs/acre
G	Blue Grama	300	0.50	B	Sagebrush, Wyoming	960	1.04
G	Canby Bluegrass 'Canbar'	150	0.25	Total Pounds:		960	1.04
G	Crested Wheatgrass 'Douglas'	300	0.50	PLS Pounds:			0.22
G	Crested Wheatgrass 'Ephraim'	300	0.50	Project Name: 2-bar Pinyon and Juniper Thinning WRI Database #: 368			
G	Great Basin Wildrye 'Trailhead'	300	0.50	Application: Dribbler		Acres: 1000	
G	Orchardgrass 'Paiute'	300	0.50	Seed Type		lbs in mix	lbs/acre
G	Russian Wildrye	450	0.75	B	Bitterbrush	150	0.15
G	Sandberg Bluegrass	150	0.25	B	Fourwing Saltbush	200	0.20
G	Snake River Wheatgrass 'Secar'	300	0.50	B	True Mountain Mahogany	50	0.05
G	Thickspike Wheatgrass 'Bannock'	600	1.00	Total Pounds:		400	0.40
F	Blue Flax ' Appar	150	0.25	PLS Pounds:			0.26
F	Sainfoin 'Eski'	1500	2.50				
F	Small Burnet 'Delar'	1200	2.00				
Total Pounds:		6000	10.00				
PLS Pounds:			8.85				

Habitat and Vegetation Information

Wildlife Habitat Deer, Substantial Winter; Elk, Crucial Winter;

VEGETATION HISTORY--

Management unit 17R, Study no: 27

<i>Year</i>	<i>Vegetation Type¹</i>	<i>Woodland Succession²</i>
2007	Pinyon-Juniper	Phase II
2009-2014	Perennial Grass	Phase I

¹Vegetation Type (Appendix - Vegetation Type), ²Woodland Succession (Tausch, Miller, Roundy, & Chambers, 2009).

Site Notes

The study was established to monitor a pinyon pine (*Pinus edulis*) and Utah juniper (*Juniperus osteosperma*) thinning project. The objective of the project is to improve crucial winter habitat for mule deer and elk by removing pinyon and juniper from important browse and sagebrush communities. The project area was rested from livestock grazing for two growing seasons following the treatment (WRI Database 2015).

Site Potential

1981-2010 Average Annual Precipitation 13 inches
 NRCS Ecological Site Upland Loam (Wyoming Big Sagebrush)
 NRCS Ecological Site # R047XA312UT

SOIL ANALYSIS DATA--

Management unit 17R, Study no: 27

Texture	Sand (%)	Silt (%)	Clay (%)	pH	ds/m	OM (%)	PPM P	PPM K	Year Sampled
Loam	41.4	44	14.6	7	0.6	1.6	9.1	67.2	2007

Soil specific normal values are described in the ecological site description (USDA-NRCS, 2011) and by Tiedeman and Lopez (2004).

States and Transitions

No state and transition model is available for the above ecological site, but it is likely similar to the [Upland Loam \(Wyoming Big Sagebrush\), R025XY314UT](#) ecological site, which does have a defined state and transition model (USDA-NRCS, 2011).

When established in 2007, this site was in phase II encroachment by pinyon with some juniper present. There were a few other browse species, but they offered little cover (Table – Browse Trends). The herbaceous understory was generally sparse likely due to competition with the trees (Table – Herbaceous Trends). After treatment, tree cover was greatly reduced and some browse species increased in cover (Table – Browse Trends). The herbaceous understory has increased and perennial grasses have become the dominant plant cover (Table – Herbaceous Trends). Over time the shrubs will likely increase in cover and become dominant.

Trend Summary

HERBACEOUS TRENDS--

Management unit 17R, Study no: 27

Type	Species	Nested Frequency				Average Cover %			
		'07	'09	'11	'14	'07	'09	'11	'14
G	Agropyron cristatum	a-	b30	bc55	c56	-	1.66	2.01	2.92
G	Agropyron dasystachyum	a-	a8	c105	b31	-	.07	4.60	1.19
G	Agropyron smithii	a19	a2	a23	b61	.09	.03	1.13	1.76
G	Agropyron spicatum	101	96	105	127	3.01	6.53	4.87	9.02
G	Bromus tectorum (a)	a-	b19	c128	b30	-	.24	1.44	.13
G	Carex sp.	5	-	1	5	.03	-	.00	.03
G	Dactylis glomerata	a-	b28	b17	a-	-	.83	.99	-
G	Elymus cinereus	a-	ab10	b11	b16	-	.07	.84	2.57
G	Elymus junceus	a-	a1	a-	b17	-	.00	.00	.88
G	Oryzopsis hymenoides	b23	a2	ab12	b22	.36	.03	.42	.99
G	Poa fendleriana	a4	b30	a10	a1	.38	.70	.33	.00
G	Poa secunda	b115	a56	a49	a50	1.18	.62	.52	.43
G	Sitanion hystrix	a4	a2	ab16	b25	.04	.06	.58	.38

Type	Species	Nested Frequency				Average Cover %			
		'07	'09	'11	'14	'07	'09	'11	'14
G	<i>Sporobolus cryptandrus</i>	-	-	1	-	-	-	.03	-
G	<i>Stipa comata</i>	_a 5	_a 2	_b 32	_a 2	.03	.90	1.00	.06
Total for Annual Grasses		0	19	128	30	0	0.24	1.44	0.13
Total for Perennial Grasses		276	267	437	413	5.13	11.54	17.36	20.28
Total for Grasses		276	286	565	443	5.13	11.78	18.80	20.41
F	<i>Antennaria</i> sp.	-	-	4	-	-	-	.03	-
F	<i>Arabis</i> sp.	_b 9	_a -	_a 2	_a -	.03	-	.00	-
F	<i>Astragalus convallarius</i>	-	3	-	-	-	.18	-	-
F	<i>Astragalus</i> sp.	-	1	4	-	-	.00	.01	-
F	<i>Chaenactis douglasii</i>	_a 3	_a -	_b 20	_{ab} 3	.00	-	.38	.01
F	<i>Chenopodium album</i> (a)	-	1	2	-	-	.00	.06	-
F	<i>Chenopodium fremontii</i> (a)	_a 3	_c 77	_b 32	_a 1	.00	1.99	.68	.00
F	<i>Chenopodium leptophyllum</i> (a)	_a -	_{ab} 2	_b 11	_a -	-	.01	.05	-
F	<i>Crepis acuminata</i>	-	3	-	-	-	.03	-	-
F	<i>Cryptantha</i> sp.	-	1	10	-	-	.00	.10	-
F	<i>Cymopterus</i> sp.	_b 15	_{ab} 10	_a -	_a -	.03	.09	-	-
F	<i>Descurainia pinnata</i> (a)	1	5	11	9	.00	.19	.09	.05
F	<i>Eriogonum</i> sp.	_a -	_b 10	_{ab} 3	_a -	-	.34	.03	-
F	<i>Gayophytum ramosissimum</i> (a)	_a -	_b 29	_b 17	_a -	-	.71	.10	-
F	<i>Holosteum umbellatum</i> (a)	-	-	2	-	-	-	.00	-
F	<i>Hymenoxys acaulis</i>	-	3	-	-	-	.00	-	-
F	<i>Ipomopsis aggregata</i>	-	3	8	1	-	.15	.06	.00
F	<i>Lactuca serriola</i> (a)	-	-	12	-	-	-	.19	-
F	<i>Lappula occidentalis</i> (a)	_b 31	_b 42	_b 37	_a -	.09	2.92	.07	-
F	<i>Linum perenne</i>	_a -	_b 18	_c 56	_b 22	-	1.10	2.76	.23
F	<i>Machaeranthera canescens</i>	_a -	_a 5	_b 47	_b 34	-	.21	.48	.80
F	<i>Medicago sativa</i>	-	-	4	-	-	-	.01	-
F	<i>Onobrychis viciaefolia</i>	_a -	_b 9	_b 12	_a -	-	.69	.52	-
F	<i>Penstemon humilis</i>	_b 23	_b 19	_b 26	_a 6	.18	.20	.24	.03
F	<i>Phlox hoodii</i>	_{ab} 24	_{ab} 20	_b 25	_a 11	.58	.32	1.40	.24
F	<i>Phlox longifolia</i>	-	4	1	-	-	.01	.03	-
F	<i>Polygonum douglasii</i> (a)	_a -	_b 2	_b 48	_a -	-	.15	.35	-
F	<i>Sanguisorba minor</i>	_a -	_{ab} 9	_b 10	_a -	-	.54	.51	-
F	<i>Tragopogon dubius</i> (a)	-	-	1	-	-	-	.03	-
Total for Annual Forbs		35	158	173	10	0.09	5.99	1.64	0.05
Total for Perennial Forbs		74	118	232	77	0.83	3.88	6.57	1.33
Total for Forbs		109	276	405	87	0.93	9.88	8.22	1.38

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

BROWSE TRENDS--

Management unit 17R, Study no: 27

Type	Species	Quadrat Cover %				Line Intercept Cover %			
		'07	'09	'11	'14	'07	'09	'11	'14
B	Artemisia nova	1.49	1.43	3.10	1.82	2.26	1.38	4.80	2.85
B	Artemisia tridentata wyomingensis	.18	.18	.36	1.71	.05	.18	.55	.70
B	Cercocarpus montanus	-	-	-	-	-	-	.78	-
B	Chrysothamnus depressus	.38	.98	1.41	-	.18	-	.21	-
B	Chrysothamnus viscidiflorus viscidiflorus	-	-	-	.00	-	-	-	-
B	Juniperus osteosperma	-	1.08	.98	-	3.30	2.36	1.26	-
B	Leptodactylon pungens	-	-	.03	-	-	.50	-	-
B	Opuntia fragilis	.01	.04	-	.07	-	-	-	-
B	Opuntia sp.	.03	.09	.06	.06	.01	.01	.10	-
B	Pinus edulis	4.91	2.45	1.04	.15	21.41	1.25	1.31	-
Total for Browse		7.02	6.28	7.00	3.82	27.21	5.68	9.01	3.55

POINT-QUARTER TREE DATA--

Management unit 17R, Study no: 27

Species	Trees per Acre			
	'07	'09	'11	'14
Juniperus osteosperma	34	23	22	22
Pinus edulis	185	32	38	33

Average diameter (in)			
'07	'09	'11	'14
11.6	6.0	5.0	1.2
5.3	3.0	2.2	1.2

BASIC COVER--

Management unit 17R, Study no: 27

Cover Type	Average Cover %			
	'07	'09	'11	'14
Vegetation	12.70	28.27	31.73	27.90
Rock	3.20	3.06	3.36	3.23
Pavement	1.17	.06	.31	.51
Litter	58.05	65.05	55.79	74.00
Cryptogams	10.45	.58	.22	.28
Bare Ground	23.96	19.63	16.77	13.70

PELLET GROUP DATA--

Management unit 17R, Study no: 27

Type	Quadrat Frequency			
	'07	'09	'11	'14
Rabbit	38	4	8	9
Elk	31	6	9	11
Deer	35	14	9	3

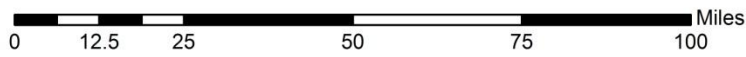
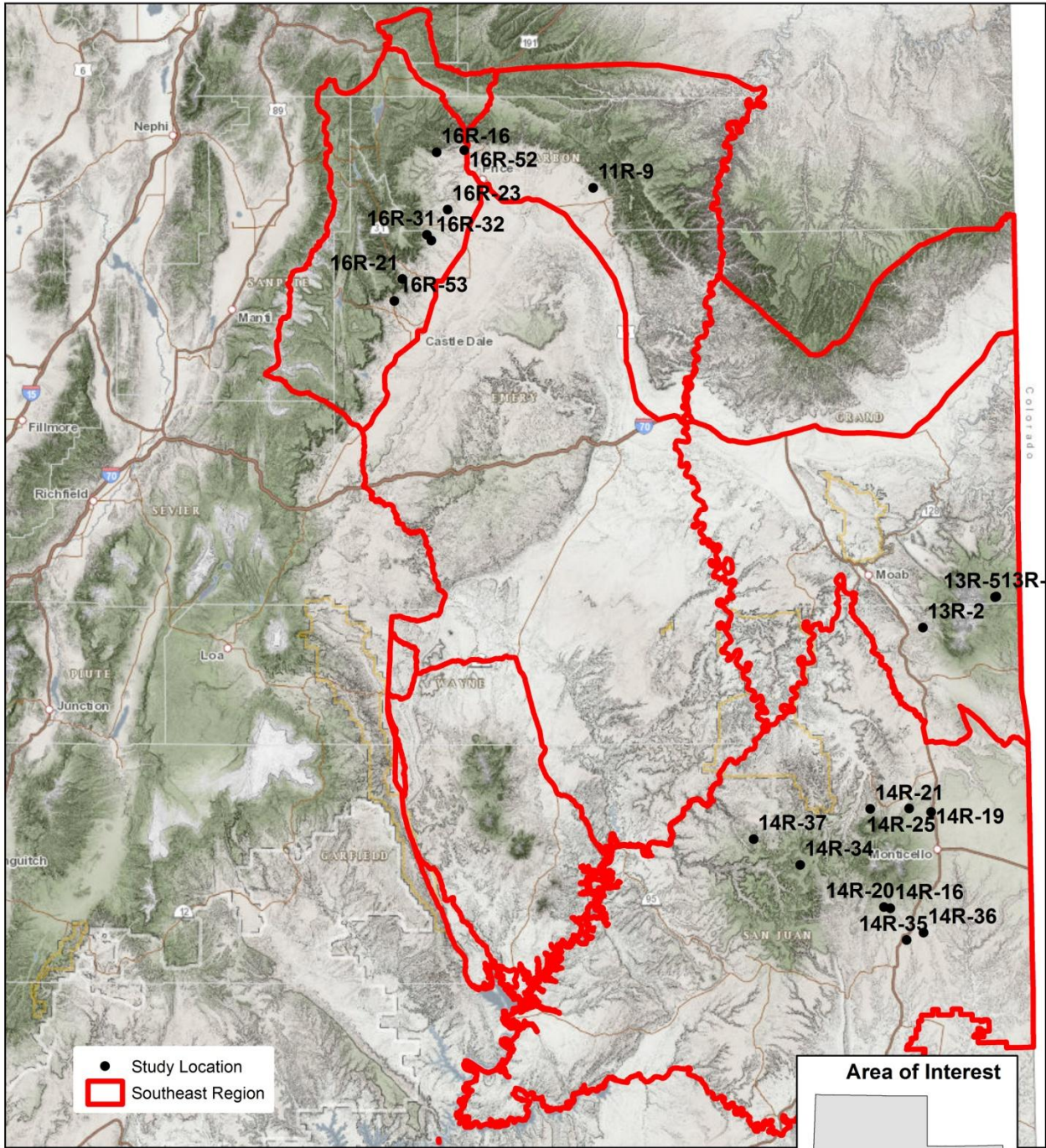
Days use per acre (ha)			
'07	'09	'11	'14
-	-	-	-
42 (104)	31 (76)	13 (33)	29 (73)
25 (63)	16 (40)	17 (43)	3 (8)

BROWSE CHARACTERISTICS--
Management unit 17R, Study no: 27

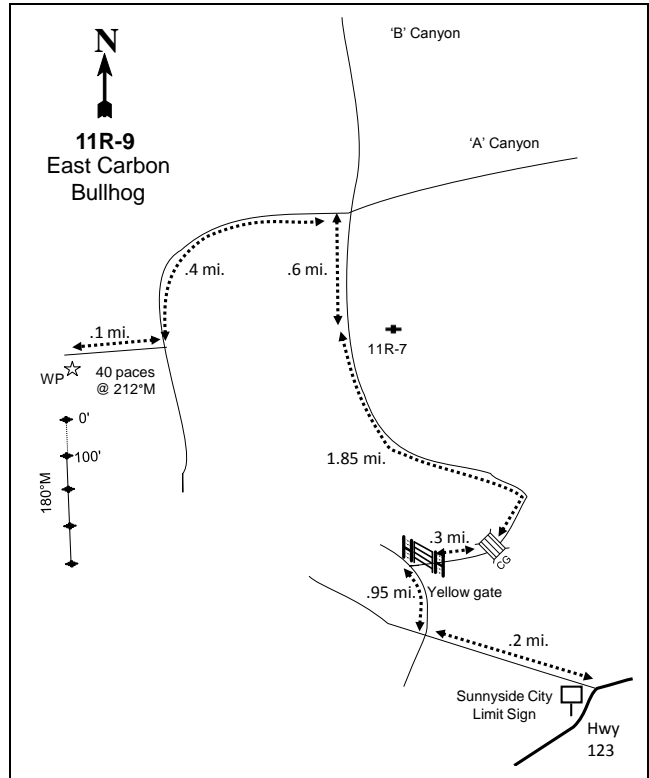
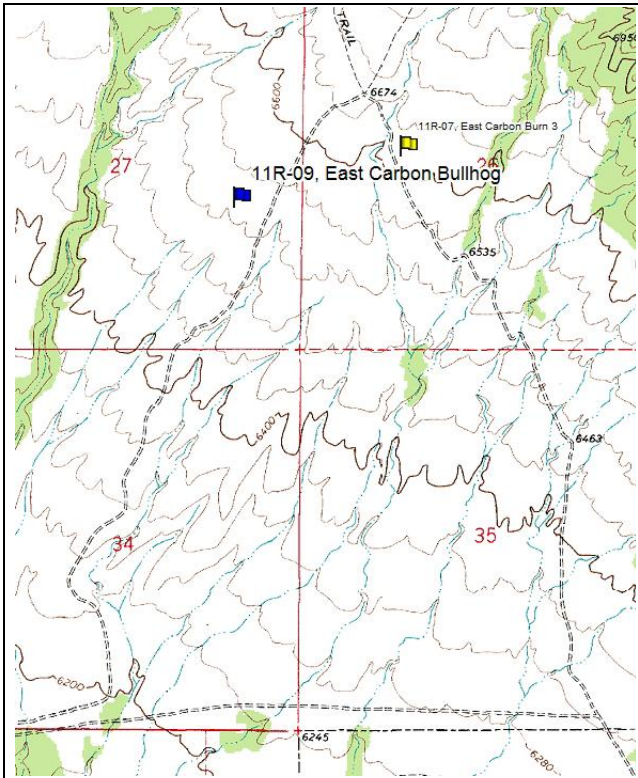
Year	Plants per Acre (excluding seedlings)	Age class distribution			Seedling (plants/acre)	Utilization		% poor vigor	Average Height Crown (in)
		% Young	% Mature	% Decadent		% moderate	% heavy		
<i>Artemisia nova</i>									
07	1400	21	39	40	220	9	39	21	10/19
09	No Density Collected								14/22
11	1720	42	55	3	4020	8	0	5	8/17
14	1720	60	36	3	120	17	14	3	9/20
<i>Artemisia tridentata wyomingensis</i>									
07	180	0	33	67	-	0	56	56	17/26
09	No Density Collected								17/24
11	280	29	71	0	420	0	0	0	15/22
14	680	76	24	0	160	6	9	0	18/27
<i>Cercocarpus montanus</i>									
07	20	0	0	100	-	0	100	100	19/22
09	No Density Collected								22/27
11	40	0	100	0	-	50	0	0	21/26
14	20	0	100	0	-	100	0	0	25/304
<i>Chrysothamnus depressus</i>									
07	900	0	84	16	440	40	49	7	3/9
09	No Density Collected								7/15
11	680	9	91	0	80	3	0	0	5/13
14	140	43	43	14	-	43	0	14	4/11
<i>Chrysothamnus nauseosus</i>									
07	0	0	0	-	-	0	0	0	-/-
09	No Density Collected								-/-
11	0	0	0	-	-	0	0	0	19/19
14	0	0	0	-	-	0	0	0	10/39
<i>Chrysothamnus viscidiflorus viscidiflorus</i>									
07	0	0	0	0	-	0	0	0	8/10
09	No Density Collected								15/17
11	40	0	100	0	-	0	0	0	9/18
14	100	20	60	20	-	0	20	60	13/19
<i>Juniperus osteosperma</i>									
07	0	0	0	-	-	0	0	0	-/-
09	No Density Collected								-/-
11	20	100	0	-	20	0	0	0	-/-
14	40	100	0	-	20	0	0	0	-/-
<i>Leptodactylon pungens</i>									
07	100	0	0	100	-	0	0	100	-/-
09	No Density Collected								5/9
11	180	0	100	0	-	0	0	0	4/7
14	20	0	100	0	-	0	0	0	-/-

Year	Plants per Acre (excluding seedlings)	Age class distribution			Seedling (plants/acre)	Utilization			Average Height Crown (in)
		% Young	% Mature	% Decadent		% moderate	% heavy	% poor vigor	
<i>Opuntia fragilis</i>									
07	320	19	81	-	-	0	0	0	2/6
09	No Density Collected								2/9
11	0	0	0	-	-	0	0	0	-/-
14	300	67	33	-	-	0	0	0	2/6
<i>Opuntia sp.</i>									
07	260	8	62	31	-	0	0	8	5/13
09	No Density Collected								4/13
11	220	0	91	9	20	0	0	9	3/8
14	60	0	100	0	20	0	0	0	5/10
<i>Pediocactus simpsonii</i>									
07	20	0	100	-	-	0	0	0	1/2
09	No Density Collected								-/-
11	0	0	0	-	-	0	0	0	-/-
14	0	0	0	-	-	0	0	0	2/3
<i>Pinus edulis</i>									
07	140	43	57	-	20	0	0	0	-/-
09	No Density Collected								-/-
11	40	100	0	-	20	0	0	0	-/-
14	40	100	0	-	20	0	0	0	-/-
<i>Purshia tridentata</i>									
07	0	0	0	-	-	0	0	0	-/-
09	No Density Collected								-/-
11	0	0	0	-	-	0	0	0	-/-
14	0	0	0	-	-	0	0	0	24/81

SOUTHEASTERN REGION



EAST CARBON BULLHOG - TREND STUDY NO. 11R-9



Location Information

USGS 7.5 min Map Info Sunnyside; Township 14S, Range 13E, Section 27
 GPS (0' Stake) NAD 83, UTM Zone 12, 547915 East 4380935 North

Transect Information

Browse Tag # (0' Stake) Not Available
 Transect Bearing 180° magnetic
 Length 400ft
 Belt Placement Line 1 (11ft & 95ft), Line 2 (34ft), Line 3 (59ft), Line 4 (71ft)
 Belt Marker Placement No Rebar

Directions to Site

From Highway 123, turn left after passing the Sunnyside city limits sign on the west side of town. Drive for 0.2 miles to an intersection and turn right, continue 0.95 miles to a right turn through a yellow gate. Continue 0.3 miles to a cattle guard and 1.45 miles to another intersection (of A and B canyons). Turn left and continue for 0.4 miles to a right turn, continue another 0.1 miles to the witness post on the south side of the road. From the witness post walk 40 paces at 212 degrees magnetic to the 0-foot stake.

Site Information

Land Ownership BLM
 Allotment Mud Springs
 Elevation 6,550ft (1,996m)
 Aspect South
 Slope 7%
 Sample Dates 08/23/2006, 05/20/2010, 08/04/2014

DISTURBANCE HISTORY--

Management unit 11R, Study no: 9

Treatment/Disturbance	Name	WRI DB #	Date	Size (acres)
Bullhog	East Carbon Phase II	510	December 2006	1953

The table is a recorded disturbance history of the study site.

Habitat and Vegetation Information

Wildlife Habitat Deer, Crucial Winter; Elk, Crucial Year-Long

VEGETATION HISTORY--

Management unit 11R, Study no: 9

Year	Vegetation Type ¹	Woodland Succession ²
2006	Pinyon-Juniper	Phase I transitioning to Phase II
2010-2014	Perennial Grass	Phase I

¹Vegetation Type (Appendix - Vegetation Type), ²Woodland Succession (Tausch, Miller, Roundy, & Chambers, 2009).

Site Notes

The seed mix was applied aerially to the west half of the bullhog project and as a result the study site was not part of the seeded portion. Many individual mature trees were left scattered across the landscape to provide escape or thermal cover (WRI Database 2015). Incidentally, the second half of belt one had some mature trees present.

Site Potential

1981-2010 Average Annual Precipitation 13 inches
 NRCS Ecological Site Upland Stony Loam (Pinyon-Utah Juniper)
 NRCS Ecological Site # [R034BY330UT](#)

SOIL ANALYSIS DATA--

Management unit 11R, Study no: 9

Texture	Sand (%)	Silt (%)	Clay (%)	pH	ds/m	OM (%)	PPM P	PPM K	Year Sampled
Sandy Clay Loam	48.2	27.3	24.5	7.8	0.6	3.5	17.1	83.2	2006

Soil specific normal values are described in the ecological site description (USDA-NRCS, 2011) and by Tiedeman and Lopez (2004).

States and Transitions

No state and transition model is available for the above ecological site.

When established in 2006, the site was dominated by pinyon pine (*Pinus edulis*) and Utah juniper (*Juniperus osteosperma*) with little cover provided by other browse species (Table – Browse Trends). Herbaceous cover was low; especially forbs (Table – Herbaceous Trends). After treatment there were still trees present on the site. However perennial grass, mainly crested wheatgrass (*Agropyron cristatum*), was the dominant cover type. Forb cover did not change after treatment (Table – Herbaceous Trends). Other than tree cover decreasing, browse cover was unaffected by the treatment (Table – Browse Trends).

Trend Summary

HERBACEOUS TRENDS--

Management unit 11R, Study no: 9

T y p e	Species	Nested Frequency			Average Cover %		
		'06	'10	'14	'06	'10	'14
G	<i>Agropyron cristatum</i>	_a 204	_a 212	_b 282	7.39	18.40	18.93
G	<i>Aristida purpurea</i>	3	7	12	.15	.18	.39
G	<i>Elymus junceus</i>	-	2	-	-	.03	-
G	<i>Oryzopsis hymenoides</i>	1	3	1	.15	.03	.15
G	<i>Sitanion hystrix</i>	-	2	2	-	.15	.00
Total for Annual Grasses		0	0	0	0	0	0
Total for Perennial Grasses		208	226	297	7.70	18.80	19.47
Total for Grasses		208	226	297	7.70	18.80	19.47
F	<i>Descurainia pinnata</i> (a)	-	-	5	-	-	.01
F	<i>Draba</i> sp. (a)	-	-	5	-	-	.01
F	<i>Euphorbia</i> sp.	_a 8	_a 16	_b 42	.12	.05	.39
F	<i>Lesquerella</i> sp.	-	5	3	-	.00	.00
F	<i>Lithospermum</i> sp.	_a -	_b 12	_a -	-	.05	-
F	<i>Lomatium</i> sp.	-	3	1	-	.03	.00
F	<i>Machaeranthera canescens</i>	-	7	2	-	.21	.00
F	<i>Penstemon</i> sp.	_a 6	_b 31	_a 6	.02	.23	.01
F	<i>Phlox longifolia</i>	1	-	-	.00	-	-
F	<i>Physaria</i> sp.	-	3	-	-	.00	-
F	<i>Senecio multilobatus</i>	-	-	3	-	-	.00
F	<i>Townsendia</i> sp.	-	3	-	-	.01	-
Total for Annual Forbs		0	0	10	0	0	0.02
Total for Perennial Forbs		15	80	57	0.14	0.60	0.42
Total for Forbs		15	80	67	0.14	0.60	0.45

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

BROWSE TRENDS--

Management unit 11R, Study no: 9

T y p e	Species	Quadrat Cover %			Line Intercept Cover %		
		'06	'10	'14	'06	'10	'14
B	<i>Cercocarpus montanus</i>	1.36	.78	.19	1.75	2.83	1.35
B	<i>Ephedra viridis</i>	.38	.88	.66	.85	.50	.65
B	<i>Gutierrezia sarothrae</i>	.00	.03	.57	-	.05	.20
B	<i>Juniperus osteosperma</i>	3.26	.15	1.54	2.45	.98	1.50
B	<i>Pinus edulis</i>	6.14	2.50	3.12	14.88	3.70	3.75
Total for Browse		11.15	4.34	6.09	19.93	8.06	7.45

POINT-QUARTER TREE DATA--
Management unit 11R, Study no: 9

Species	Trees per Acre			Average diameter (in)		
	'06	'10	'14	'06	'10	'14
<i>Juniperus osteosperma</i>	232	75	111	3.9	2.5	2.5
<i>Pinus edulis</i>	116	29	30	4.9	3.8	4.5

BASIC COVER--
Management unit 11R, Study no: 9

Cover Type	Average Cover %		
	'06	'10	'14
Vegetation	18.99	23.95	26.04
Rock	13.50	12.82	13.14
Pavement	4.66	5.01	5.08
Litter	45.75	44.58	54.78
Cryptogams	1.08	.33	.09
Bare Ground	31.98	18.61	20.31

PELLET GROUP DATA--
Management unit 11R, Study no: 9

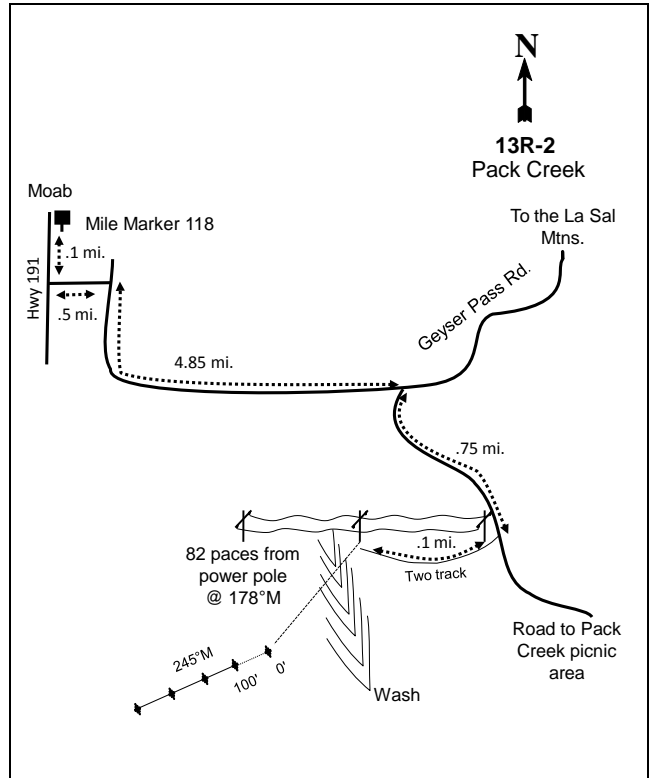
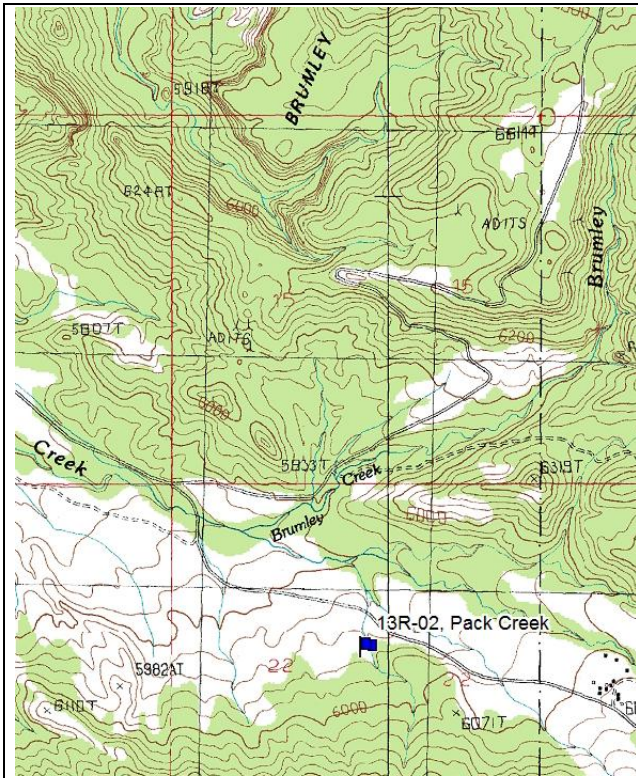
Type	Quadrat Frequency			Days use per acre (ha)		
	'06	'10	'14	'06	'10	'14
Rabbit	82	11	19	-	-	-
Elk	-	3	-	2 (5)	13 (31)	1 (3)
Deer	22	8	2	36 (89)	21 (53)	11 (28)
Cattle	-	2	2	-	7 (18)	4 (9)
Horse	-	-	-	-	-	1 (1)

BROWSE CHARACTERISTICS--
Management unit 11R, Study no: 9

		Age class distribution			Utilization				
Year	Plants per Acre (excluding seedlings)	% Young	% Mature	% Decadent	Seedling (plants/acre)	% moderate	% heavy	% poor vigor	Average Height Crown (in)
<i>Cercocarpus montanus</i>									
06	120	0	33	67	-	67	17	67	59/59
10	60	67	33	0	60	0	0	0	48/51
14	140	43	43	14	-	43	29	14	43/49
<i>Echinocereus coccineus</i>									
06	0	0	0	-	-	0	0	0	-/-
10	0	0	0	-	-	0	0	0	4/9
14	0	0	0	-	-	0	0	0	4/9
<i>Ephedra viridis</i>									
06	140	0	100	-	-	0	100	0	39/45
10	320	88	13	-	60	0	0	0	38/39
14	320	19	81	-	-	69	25	0	31/31
<i>Gutierrezia sarothrae</i>									

		Age class distribution					Utilization			
Year	Plants per Acre (excluding seedlings)	% Young	% Mature	% Decadent	Seedling (plants/acre)	% moderate	% heavy	% poor vigor	Average Height Crown (in)	
06	0	0	0	-	20	0	0	0	2/2	
10	220	36	64	-	-	0	0	0	5/9	
14	1720	3	97	-	560	0	0	0	5/5	
<i>Juniperus osteosperma</i>										
06	240	25	75	-	20	0	0	0	-/-	
10	60	67	33	-	20	0	0	0	-/-	
14	60	67	33	-	-	0	0	0	-/-	
<i>Opuntia sp.</i>										
06	0	0	0	-	-	0	0	0	4/9	
10	0	0	0	-	-	0	0	0	4/9	
14	0	0	0	-	-	0	0	0	4/13	
<i>Pinus edulis</i>										
06	220	18	82	-	20	0	0	0	-/-	
10	40	0	100	-	-	0	0	0	-/-	
14	0	0	0	-	-	0	0	0	-/-	
<i>Yucca sp.</i>										
06	0	0	0	-	-	0	0	0	-/-	
10	0	0	0	-	-	0	0	0	11/22	
14	0	0	0	-	-	0	0	0	-/-	

PACK CREEK - TREND STUDY NO. 13R-2



Location Information

USGS 7.5 min Map Info Kane Springs; Township 27S, Range 23E, Section 22
 GPS (0' Stake) NAD 83, UTM Zone 12, 641639 East 4255899 North

Transect Information

Browse Tag # (0' Stake) 158
 Transect Bearing 245° magnetic
 Length 400ft
 Belt Placement Line 1 (11ft & 95ft), Line 2 (34ft), Line 3 (59ft), Line 4 (71ft)
 Belt Marker Placement No Rebar

Directions to Site

Travel south from Moab on Highway 191 to mile marker 118. From here continue 0.1 and turn left (east) and travel 0.5 miles to a T in the road. Here take a right and travel 4.85 miles to a fork. Take the right fork toward the Pack Creek picnic area. Go 0.75 miles to a faint 2 track road on the right, turn here and go 0.1 miles to where the road ends. There is a power pole at the end of the 2 track. From the pole the 0-foot stake is 82 paces at 178 degrees magnetic and is marked with browse tag #158.

Site Information

Land Ownership BLM
 Allotment Black Ridge
 Elevation 5,900ft (1,798m)
 Aspect North
 Slope 7%
 Sample Dates 06/14/2007, 06/16/2010, 08/04/2014

DISTURBANCE HISTORY--

Management unit 13R, Study no: 2

Treatment/Disturbance	Name	WRI DB #	Date	Size (acres)
Lop and Scatter	Pack Creek	-	2003	-
Bullhog	Pack Creek	907	April 2007	127
Prescribed Fire	Pack Creek	907	October 2007	127
Seeding: Broadcast	Pack Creek	907	October 2007	127

The table is a recorded disturbance history of the study site.

SEED MIX--

Management unit 13R, Study no: 2

Project Name: Pack Creek			
WRI Database #: 907			
Application: Broadcast		Acres: 171	
Seed type		lbs in mix	lbs/acre
G	Canby Bluegrass 'Canbar'	150	0.88
G	Indian Ricegrass 'Rimrock'	200	1.17
G	Sandberg Bluegrass	100	0.58
G	Sand Dropseed	50	0.29
G	Siberian Wheatgrass 'Vavilov'	450	2.63
G	Thickspike Wheatgrass 'Bannock'	400	2.34
G	Western Wheatgrass 'Arriba'	300	1.75
F	Palmer Penstemon	8	0.05
B	Fourwing Saltbush	100	0.58
Total Pounds:		1758	10.28
PLS Pounds:			8.74

Habitat and Vegetation Information

Wildlife Habitat Deer, Crucial Winter

VEGETATION HISTORY--

Management unit 13R, Study no: 2

Year	Vegetation Type ¹	Woodland Succession ²
2007	Annual Grass	Phase I
2010-2014	Blackbrush	Phase I

¹Vegetation Type (Appendix - Vegetation Type), ²Woodland Succession (Tausch, Miller, Roundy, & Chambers, 2009).

Site Notes

The study was established to monitor a project implemented by the BLM thirteen miles southeast of Moab. Pinyon pine (*Pinus edulis*) and Utah juniper (*Juniperus osteosperma*) trees were thinned and the slash was piled and burned. However, many of the remaining trees continued to die as a result of bark beetle (*Ips sp.*) infestation and fire damage.

Site Potential

1981-2010 Average Annual Precipitation 13 inches
 NRCS Ecological Site Upland Stony Loam (Pinyon-Utah Juniper)
 NRCS Ecological Site # R035XY321UT

SOIL ANALYSIS DATA--

Management unit 13R, Study no: 2

Texture	Sand (%)	Silt (%)	Clay (%)	pH	ds/m	OM (%)	PPM P	PPM K	Year Sampled
Loam	48.2	32	19.8	7.2	0.6	2.6	10.4	108.8	2007

Soil specific normal values are described in the ecological site description (USDA-NRCS, 2011) and by Tiedeman and Lopez (2004).

States and Transitions

No state and transition model is available for the above ecological site.

When established in 2007, the site was dominated by the annual grass cheatgrass (*Bromus tectorum*) with limited other grass and forb cover (Table – Herbaceous Trends). After treatment the site became a mixed stand of blackbrush (*Coleogyne ramosissima*), Wyoming big sagebrush (*Artemisia tridentata* ssp. *wyomingensis*), and other browse species that contributed limited cover (Table – Browse Trends). Forb cover stayed the same while perennial grass cover increased slightly. Cheatgrass cover decreased significantly; improving the resilience of the site (Table – Herbaceous Trends).

Trend Summary

HERBACEOUS TRENDS--

Management unit 13R, Study no: 2

Type	Species	Nested Frequency			Average Cover %		
		'07	'10	'14	'07	'10	'14
G	<i>Agropyron dasystachyum</i>	-	-	3	-	-	.19
G	<i>Agropyron fragile</i>	a-	a5	b13	-	.01	.84
G	<i>Aristida purpurea</i>	b-	b1	a17	-	.18	.42
G	<i>Bouteloua gracilis</i>	-	3	7	-	.15	.33
G	<i>Bromus tectorum</i> (a)	c457	b262	a163	26.22	3.22	1.90
G	<i>Hilaria jamesii</i>	5	4	4	.01	.66	.06
G	<i>Oryzopsis hymenoides</i>	ab3	a1	b11	.16	.85	1.02
G	<i>Poa secunda</i>	23	16	28	.67	.72	.27
G	<i>Sitanion hystrix</i>	68	83	85	2.62	2.76	1.25
G	<i>Sporobolus cryptandrus</i>	a-	a-	b19	-	-	.98
G	<i>Stipa comata</i>	-	-	2	-	-	.06
G	<i>Vulpia octoflora</i> (a)	b35	a10	a3	.09	.19	.01
Total for Annual Grasses		492	272	166	26.31	3.41	1.91
Total for Perennial Grasses		99	113	189	3.46	5.33	5.43
Total for Grasses		591	385	355	29.77	8.74	7.34
F	<i>Astragalus flexuosus</i>	a3	a-	b20	.24	-	.14
F	<i>Astragalus</i> sp.	a4	b17	a-	.00	.87	-
F	<i>Astragalus zionis</i>	b52	a21	a21	.20	.13	.35
F	<i>Calochortus nuttallii</i>	2	6	-	.01	.02	-
F	<i>Chenopodium leptophyllum</i> (a)	a-	ab1	b10	-	.00	.02

Type	Species	Nested Frequency			Average Cover %		
		'07	'10	'14	'07	'10	'14
F	<i>Collinsia parviflora</i> (a)	a-	b11	a-	-	.05	-
F	<i>Cryptantha</i> sp.	42	22	48	.56	.68	.43
F	<i>Cymopterus</i> sp.	3	1	-	.01	.00	-
F	<i>Delphinium nuttallianum</i>	1	-	-	.00	-	-
F	<i>Descurainia pinnata</i> (a)	-	-	5	-	-	.01
F	<i>Draba</i> sp. (a)	b58	a3	a16	.14	.00	.06
F	<i>Eriogonum cernuum</i> (a)	a4	b40	a4	.03	.14	.00
F	<i>Eriogonum ovalifolium</i>	3	14	4	.01	.03	.03
F	<i>Gilia</i> sp. (a)	b106	a32	a11	.74	.10	.02
F	<i>Helianthus annuus</i> (a)	a1	b14	ab3	.01	.13	.01
F	<i>Holosteum umbellatum</i> (a)	1	-	12	.00	-	.04
F	<i>Hymenoxys acaulis</i>	1	4	4	.04	.19	.38
F	<i>Lactuca serriola</i> (a)	6	7	-	.01	.01	-
F	<i>Lesquerella</i> sp.	a4	a17	b46	.04	.18	.12
F	<i>Linum lewisii</i>	1	-	-	.00	-	-
F	<i>Lygodesmia spinosa</i>	5	-	-	.01	-	-
F	<i>Machaeranthera canescens</i>	ab3	a1	b11	.01	.03	.10
F	<i>Microsteris gracilis</i> (a)	-	1	-	-	.00	-
F	<i>Penstemon cyanocaulis</i>	27	17	17	1.28	.04	.36
F	<i>Penstemon</i> sp.	-	22	-	-	.75	-
F	<i>Petradoria pumila</i>	a4	a4	b17	.66	.63	.49
F	<i>Phlox longifolia</i>	c51	b20	a-	.21	.06	-
F	<i>Ranunculus testiculatus</i> (a)	b66	a10	a1	.31	.09	.00
F	<i>Salsola iberica</i> (a)	a100	b154	c250	.42	3.05	3.20
F	<i>Sisymbrium altissimum</i> (a)	-	-	3	-	-	.00
F	<i>Sphaeralcea grossularifolia</i>	12	25	24	.34	.92	.31
F	<i>Townsendia</i> sp.	31	19	25	.13	.19	.62
F	<i>Tragopogon dubius</i> (a)	-	1	4	-	.15	.03
F	<i>Zigadenus paniculatus</i>	-	1	1	-	.00	.00
Total for Annual Forbs		342	274	319	1.68	3.75	3.42
Total for Perennial Forbs		249	211	238	3.79	4.75	3.36
Total for Forbs		591	485	557	5.47	8.51	6.78

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

BROWSE TRENDS--

Management unit 13R, Study no: 2

Type	Species	Quadrat Cover %			Line Intercept Cover %		
		'07	'10	'14	'07	'10	'14
B	Artemisia tridentata wyomingensis	1.91	2.45	2.06	1.66	1.95	1.56
B	Atriplex canescens	-	.01	-	-	-	-
B	Chrysothamnus nauseosus	.59	-	.09	-	-	.76
B	Coleogyne ramosissima	4.85	4.88	5.71	4.50	7.03	6.41
B	Echinocereus triglochidatus	.03	.03	-	-	-	-
B	Ephedra torreyana	-	.03	.03	-	.35	.30
B	Eriogonum corymbosum	.31	.33	.28	.03	.08	.10
B	Gutierrezia sarothrae	4.45	3.23	1.35	4.46	1.93	2.21
B	Juniperus osteosperma	.85	-	-	3.20	2.98	2.00
B	Opuntia sp.	-	.03	.03	-	-	-
B	Pinus edulis	.15	.03	.00	-	.06	-
B	Sclerocactus sp.	-	.03	.00	-	-	-
Total for Browse		13.16	11.07	9.57	13.85	14.38	13.34

POINT-QUARTER TREE DATA--

Management unit 13R, Study no: 2

Species	Trees per Acre			Average diameter (in)		
	'07	'10	'14	'07	'10	'14
Juniperus osteosperma	32	18	61	13.7	6.1	1.0
Pinus edulis	20	2	21	0.7	3.8	1.8

BASIC COVER--

Management unit 13R, Study no: 2

Cover Type	Average Cover %		
	'07	'10	'14
Vegetation	49.04	28.95	23.88
Rock	13.73	13.38	14.45
Pavement	13.09	13.64	14.99
Litter	22.51	38.91	25.70
Cryptogams	1.72	.32	1.49
Bare Ground	13.86	18.81	26.21

PELLET GROUP DATA--

Management unit 13R, Study no: 2

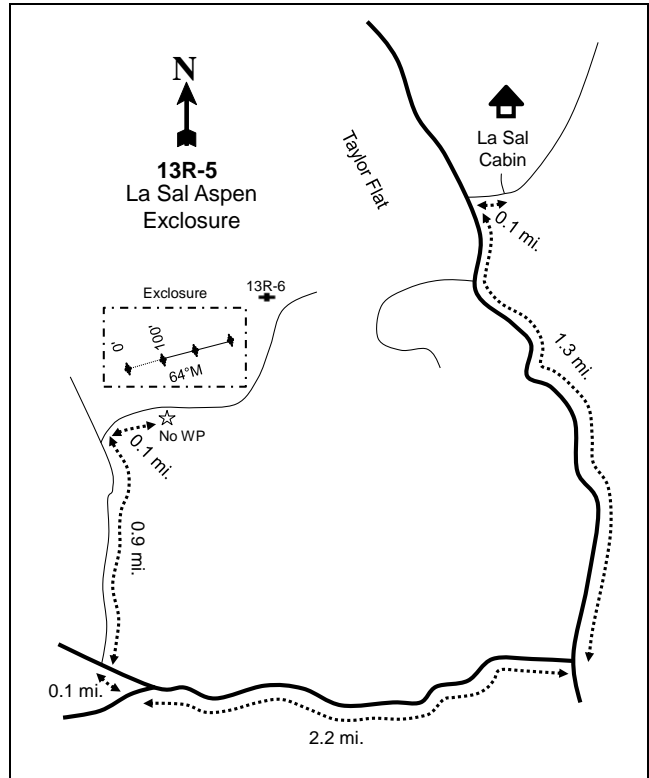
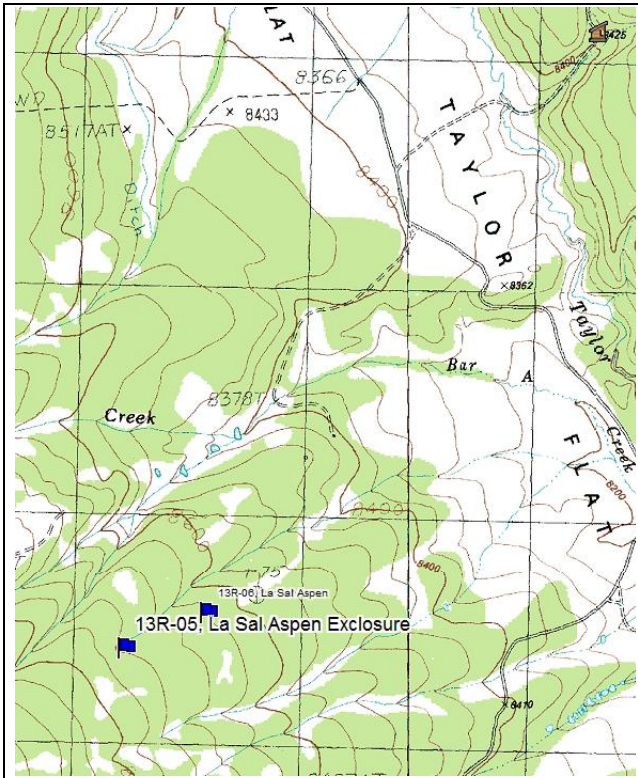
Type	Quadrat Frequency			Days use per acre (ha)		
	'07	'10	'14	'07	'10	'14
Rabbit	16	9	12	-	-	-
Elk	3	1	2	85 (210)	1 (3)	-
Deer	36	30	33	32 (79)	60 (147)	22 (55)
Cattle	-	-	-	-	1 (10)	-

BROWSE CHARACTERISTICS--
Management unit 13R, Study no: 2

Year	Plants per Acre (excluding seedlings)	Age class distribution			Seedling (plants/acre)	Utilization		% poor vigor	Average Height Crown (in)
		% Young	% Mature	% Decadent		% moderate	% heavy		
<i>Artemisia tridentata wyomingensis</i>									
07	1100	5	38	56	40	29	2	44	15/25
10	960	0	81	19	-	17	4	13	16/27
14	1300	3	74	23	-	32	62	15	16/28
<i>Atriplex canescens</i>									
07	0	0	0	-	-	0	0	0	36/54
10	0	0	0	-	-	0	0	0	-/-
14	0	0	0	-	-	0	0	0	-/-
<i>Chrysothamnus nauseosus</i>									
07	740	0	97	3	-	3	0	8	20/27
10	180	89	11	0	-	0	0	0	35/45
14	140	14	86	0	-	0	0	0	28/40
<i>Coleogyne ramosissima</i>									
07	1680	6	71	23	-	39	0	4	10/21
10	1880	3	96	1	-	13	3	0	9/21
14	2120	0	99	1	-	22	69	0	11/21
<i>Echinocereus triglochidatus</i>									
07	80	0	100	-	-	0	0	0	4/3
10	40	0	100	-	-	0	0	0	5/5
14	0	0	0	-	-	0	0	0	-/-
<i>Ephedra torreyana</i>									
07	40	0	100	-	-	0	0	0	17/22
10	60	0	100	-	-	0	33	0	21/29
14	80	0	100	-	-	25	50	50	20/34
<i>Eriogonum corymbosum</i>									
07	160	50	50	-	20	0	0	0	12/13
10	80	0	100	-	-	0	0	0	7/10
14	420	14	86	-	40	24	43	0	5/7
<i>Gutierrezia sarothrae</i>									
07	4340	12	84	3	3180	0	0	3	10/15
10	3140	14	86	0	20	0	0	0	8/11
14	2260	10	88	2	1280	0	0	2	9/11
<i>Juniperus osteosperma</i>									
07	20	0	100	-	-	0	0	0	-/-
10	40	50	50	-	-	0	0	0	-/-
14	60	67	33	-	-	0	0	0	-/-

Year	Plants per Acre (excluding seedlings)	Age class distribution			Seedling (plants/acre)	Utilization		% poor vigor	Average Height Crown (in)
		% Young	% Mature	% Decadent		% moderate	% heavy		
Opuntia sp.									
07	0	0	0	-	-	0	0	0	5/8
10	60	100	0	-	-	0	0	0	5/15
14	60	33	67	-	-	0	0	0	5/19
Pinus edulis									
07	20	100	0	-	-	0	0	0	-/-
10	0	0	0	-	20	0	0	0	-/-
14	0	0	0	-	40	0	0	0	-/-
Rhus sp.									
07	0	0	0	-	-	0	0	0	-/-
10	0	0	0	-	-	0	0	0	27/50
14	0	0	0	-	-	0	0	0	-/-
Sclerocactus sp.									
07	0	0	0	-	-	0	0	0	-/-
10	20	0	100	-	-	0	0	0	4/4
14	80	0	100	-	-	0	0	0	3/4
Symphoricarpos oreophilus									
07	0	0	0	-	-	0	0	0	-/-
10	0	0	0	-	-	0	0	0	-/-
14	0	0	0	-	-	0	0	0	-/-
Yucca sp.									
07	0	0	0	-	-	0	0	0	27/53
10	0	0	0	-	-	0	0	0	4/13
14	0	0	0	-	-	0	0	0	7/18

LA SAL ASPEN ENCLOSURE - TREND STUDY NO. 13R-5



Location Information

USGS 7.5 min Map Info 2014
 GPS (0' Stake) NAD 83, UTM Zone 12, 662148 East 4264560 North

Transect Information

Browse Tag # (0' Stake) 189
 Transect Bearing 64° magnetic
 Length 300ft
 Belt Placement Line 1 (11ft & 95ft), Line 2 (34ft & 71ft), Line 3 (59ft)
 Belt Marker Placement No Rebar

Directions to Site

Drive down the canyon from the La Sal cabin to the southwest for 0.7 miles. Turn left heading south in Taylors Flat. Drive 1.3 miles turn right and drive another 2.2 miles. At the intersection drive a short 0.1 miles and turn right and drive another 0.9 miles and turn right. Drive 0.1 mile to the enclosure. The study is on the north side of the road inside the enclosure. The 0-foot stake is approximately 12 paces to the north from the road. The 0-foot stake is marked with browse tag #189.

Site Information

Land Ownership SITLA
Allotment Not Available
Elevation 8,682ft (2,646m)
Aspect Northeast
Slope 9%
Sample Dates 07/08/2011, 08/06/2014

DISTURBANCE HISTORY--

Management unit 13R, Study no: 5

<i>Treatment/Disturbance</i>	<i>Name</i>	<i>WRI DB #</i>	<i>Date</i>	<i>Size (acres)</i>
Logging: Clear Cut	La Sal Mountain Aspen Enhancement	1990	Sept.-Nov. 2011	124

The table is a recorded disturbance history of the study site.

Habitat and Vegetation Information

Wildlife Habitat Deer, Crucial Summer; Elk, Crucial Summer Calving Habitat

VEGETATION HISTORY--

Management unit 13R, Study no: 5

<i>Year</i>	<i>Vegetation Type¹</i>
2011-2014	Quaking Aspen/Snowberry

¹Vegetation Type (Appendix - Vegetation Type)

Site Notes

The study was established in 2011 to monitor an aspen regeneration project. Three temporary fences were constructed in areas known to experience heavy browsing within the project. Exclosure size ranged from three to eight acres. The study is located within an exclosure portion of the project. Livestock grazing occurs from June 15 to Oct 20. Management efforts will address current grazing practices and find ways to develop pastures for extended resting. The objectives of the project are to decrease the density of snowberry (*Symphoricarpos oreophilus*) following aspen clearfell-coppice harvest and protect aspen suckers in known heavily browsed areas with temporary fences (WRI Database 2015). Density of snowberry was not taken in 2011 due to high density and difficulty distinguishing individual plants. It was noted that pellet groups were hard to see due to thick vegetation on the site. Cattle were on the site at the time of sampling, but no cattle pellet groups were sampled on the study site in 2011 (Table - Pellet Group Data).

Site Potential

1981-2010 Average Annual Precipitation 26 inches
NRCS Ecological Site High Mountain Loam (Aspen)
NRCS Ecological Site # R048AY506UT

States and Transitions

No state and transition model is available for the above ecological site.

Since site establishment in 2011, this site has remained in a stable aspen (*Populus tremuloides*)/mountain snowberry community (Table – Browse Trends). Although browse cover has remained similar, the age structure of the aspen community has changed. The mature aspen trees were removed from the site, which has stimulated suckering of a dense stand of young aspen. Perennial grass and forb cover have also remained similar pre and post treatment, with cover decreasing slightly after treatment. The herbaceous species that provide the most cover are Kentucky bluegrass (*Poa pratensis*) and fendler meadowrue (*Thalictrum fendleri*).

Trend Summary

HERBACEOUS TRENDS--

Management unit 13R, Study no: 5

Type	Species	Nested Frequency		Average Cover %	
		'11	'14	'11	'14
G	Agropyron trachycaulum	129	88	3.75	4.81
G	Bromus anomalus	23	37	.19	.79
G	Bromus carinatus	_a 18	_b 58	.66	1.80
G	Bromus inermis	-	8	-	.56
G	Carex sp.	84	68	4.31	4.04
G	Festuca thurberi	8	6	.36	.41
G	Poa pratensis	_b 391	_a 278	23.65	15.21
G	Stipa columbiana	_b 45	_a 15	1.37	.27
Total for Annual Grasses		0	0	0	0
Total for Perennial Grasses		698	558	34.30	27.92
Total for Grasses		698	558	34.30	27.92
F	Achillea millefolium	71	48	1.99	.96
F	Artemisia ludoviciana	3	3	.00	.00
F	Aster sp.	_b 17	_a 1	.31	.06
F	Calochortus gunnisoni	2	1	.00	.03
F	Crepis acuminata	-	2	-	.03
F	Cymopterus lemmonii	_b 14	_a 1	.34	.00
F	Galium sp.	_b 58	_a -	1.50	-
F	Gilia sp. (a)	3	-	.03	-
F	Grindelia squarrosa	-	4	-	.03
F	Helenium hoopesii	-	-	-	.00
F	Heracleum lanatum	24	20	1.68	.82
F	Lathyrus lanszwertii	_a 206	_b 256	6.95	11.11
F	Lupinus sericeus	6	2	.23	.06
F	Phacelia heterophylla	-	-	-	.00
F	Potentilla gracilis	1	-	.00	-
F	Stellaria jamesiana	10	16	.07	.42
F	Taraxacum officinale	_b 33	_a 2	.50	.03
F	Thalictrum fendleri	301	307	26.61	31.67
F	Vicia americana	_b 204	_a 55	9.58	.99
Total for Annual Forbs		3	0	0.03	0
Total for Perennial Forbs		950	718	49.83	46.25
Total for Forbs		953	718	49.85	46.25

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

BROWSE TRENDS--

Management unit 13R, Study no: 5

Type	Species	Quadrat Cover %		Line Intercept Cover %	
		'11	'14	'11	'14
B	Populus tremuloides	3.28	16.07	29.18	35.20
B	Rosa woodsii	.15	.36	.40	.51
B	Symphoricarpos oreophilus	25.27	22.24	38.68	27.76
Total for Browse		28.71	38.68	68.26	63.47

POINT-QUARTER TREE DATA--

Management unit 13R, Study no: 5

Species	Trees per Acre		Average diameter (in)	
	'11	'14	'11	'14
Populus tremuloides	67	2157	15.4	0.8

BASIC COVER--

Management unit 13R, Study no: 5

Cover Type	Average Cover %	
	'11	'14
Vegetation	86.98	86.25
Litter	56.17	62.32
Cryptogams	.15	.15
Bare Ground	.04	0

PELLET GROUP DATA--

Management unit 13R, Study no: 5

Type	Quadrat Frequency		Days use per acre (ha)	
	'11	'14	'11	'14
Elk	-	-	1 (3)	-
Deer	-	-	11 (26)	-
Cattle	1	-	-	-

BROWSE CHARACTERISTICS--

Management unit 13R, Study no: 5

Year	Plants per Acre (excluding seedlings)	Age class distribution			Seedling (plants/acre)	Utilization		% poor vigor	Average Height Crown (in)
		% Young	% Mature	% Decadent		% moderate	% heavy		
Artemisia tridentata vaseyana									
11	0	0	0	-	60	0	0	0	-/-
14	0	0	0	-	-	0	0	0	-/-
Quercus gambelii									
11	40	0	100	-	-	0	0	0	-/-
14	40	0	100	-	-	0	0	0	-/-

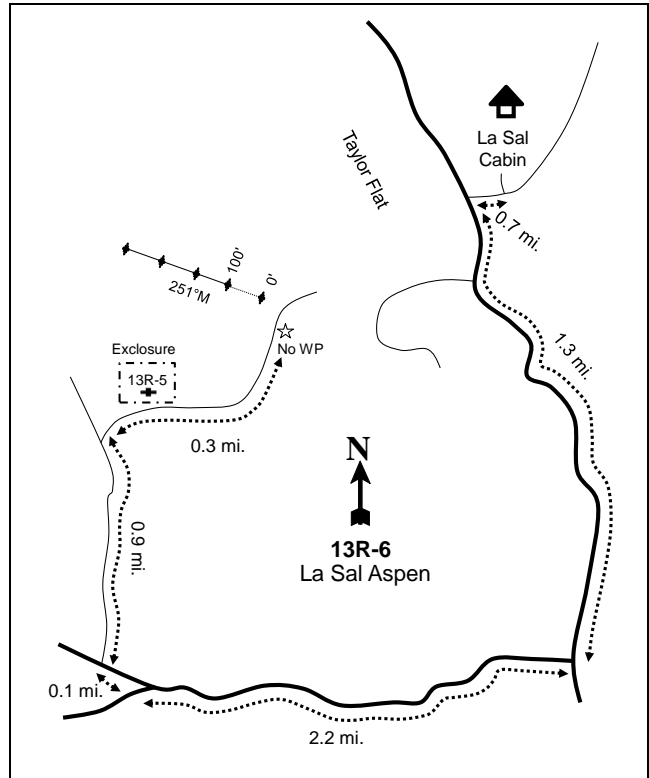
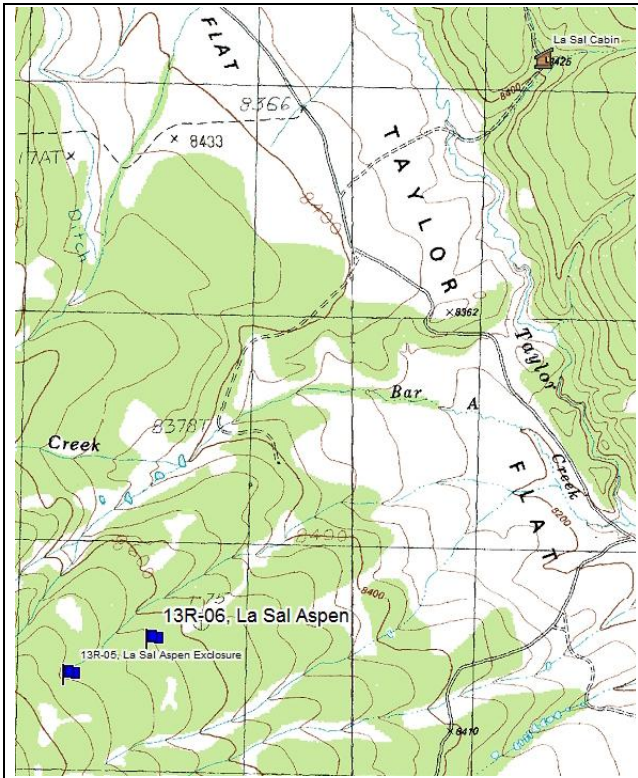
		Age class distribution					Utilization			
Year	Plants per Acre (excluding seedlings)	% Young	% Mature	% Decadent	Seedling (plants/acre)	% moderate	% heavy	% poor vigor	Average Height Crown (in)	
<i>Rosa woodsii</i>										
11	180	33	67	-	-	0	0	0	19/12	
14	260	0	100	-	-	0	0	0	21/11	
<i>Symphoricarpos oreophilus</i>										
11	No density taken								-/-	
14	8580	0	100	-	-	0	0	0	32/26	

ASPEN CHARACTERISTICS--
Management unit 13R, Study no: 5

		Size class distribution				Utilization			
Year	Plants per Acre	% Class I	% Class II	% Class III	% Class IV	% moderate	% heavy	% poor vigor	
<i>Populus tremuloides</i>									
11	4740	21	77	0	2	24	11	.53	
14	10080	0	35	65	0	0	0	0	

Class I= less than or equal to 1.5 ft; Class II=greater than 1.5 ft to 5 ft; Class III=greater than 5ft and up to 1 in. dbh; Class IV=greater than 1 in. dbh

LA SAL ASPEN - TREND STUDY NO. 13R-6



Location Information

USGS 7.5 min Map Info Mount Waas; Township 26S, Range 25E, Section 26
 GPS (0' Stake) NAD 83, UTM Zone 12, 662507 East 4264723 North

Transect Information

Browse Tag # (0' Stake) 188
 Transect Bearing 251° magnetic
 Length 400ft
 Belt Placement Line 1 (11ft & 95ft), Line 2 (34ft), Line 3 (59ft), Line 4 (71ft)
 Belt Marker Placement No Rebar

Directions to Site

Drive down the canyon from the La Sal cabin to the southwest for 0.7 miles. Turn left heading south in Taylors Flat. Drive 1.3 miles turn right and drive another 2.2 miles. At the intersection drive a short 0.1 miles and turn right and drive another 0.9 miles and turn right. Drive 0.3 miles. The study is on the west side of the road. The 0-foot stake is approximately 12 paces west of the road. The 0-foot stake is marked with browse tag #188.

Site Information

Land Ownership SITLA
 Allotment Not Available
 Elevation 8,593ft (2,619m)
 Aspect East
 Slope 10%
 Sample Dates 07/19/2011, 08/06/2014

DISTURBANCE HISTORY--

Management unit 13R, Study no: 6

Treatment/Disturbance	Name	WRI DB #	Date	Size (acres)
Logging: Clear Cut	La Sal Mountain Aspen Enhancement	1990	Sept. –Nov. 2011	124

The table is a recorded disturbance history of the study site.

Habitat and Vegetation Information

Wildlife Habitat Deer, Crucial Summer; Elk, Crucial Summer Calving Habitat

VEGETATION HISTORY--

Management unit 13R, Study no: 6

Year	Vegetation Type ¹
2011	Aspen/Snowberry
2014	Snowberry

¹Vegetation Type (Appendix - Vegetation Type)

Site Notes

The study was established in 2011 to monitor a quaking aspen (*Populus tremuloides*) regeneration project. Following the logging treatment, mountain snowberry (*Symphoricarpos oreophilus*) was planned to be thinned by a dozer or a skidsteer equipped with a brush rake; however, due to timing and limited access from winter storms, the snowberry was not thinned. Density was not taken on snowberry in 2011 due to the large number of plants and the difficulty in distinguishing between individual plants. Three temporary fences were constructed in areas known to experience heavy browsing within the project. Exclosure size ranged from three to eight acres. The study is located outside of the exclosure portion of the project. Livestock grazing occurs from June 15 to Oct 20. Management efforts will address current grazing practices and find ways to develop pastures for extended resting. The objectives of the project are to decrease the density of snowberry following aspen clearfell-coppice harvest and protect aspen suckers in known heavily browsed areas with temporary fences (WRI Database 2015). It was noted that pellet groups were hard to see due to thick vegetation on the site.

Site Potential

1981-2010 Average Annual Precipitation 25 inches
 NRCS Ecological Site High Mountain Loam (Aspen)
 NRCS Ecological Site # R048AY506UT

States and Transitions

No state and transition model is available for the above ecological site.

When established in 2011, the site was a mixed stand of aspen and snowberry with some Gambel oak (*Quercus gambelii*). There were very few other browse species (Table – Browse Trends). The herbaceous understory was abundant with the dominant grass being Kentucky bluegrass (*Poa pratensis*) and the dominant forb fendler meadowrue (*Thalictrum fendleri*) (Table – Herbaceous Trends). After treatment, aspen cover decreased and left snowberry as the dominant species. The majority of the aspen trees were young and less

than five feet in height. Snowberry cover did not change after treatment (Table – Browse Trends). Perennial forb cover decreased slightly after treatment, whereas perennial grass cover increased slightly.

Trend Summary

HERBACEOUS TRENDS--

Management unit 13R, Study no: 6

Type	Species	Nested Frequency		Average Cover %	
		'11	'14	'11	'14
G	Agropyron trachycaulum	94	55	3.70	1.96
G	Bromus anomalus	_b 35	_a 4	.48	.15
G	Bromus carinatus	_a 24	_b 95	1.24	3.65
G	Bromus inermis	6	17	.06	.27
G	Carex sp.	11	-	.21	-
G	Festuca ovina	7	10	.21	.12
G	Festuca thurberi	_a 28	_b 64	1.93	5.06
G	Poa pratensis	374	368	25.08	26.49
G	Stipa columbiana	_b 82	_a 35	3.02	1.30
Total for Annual Grasses		0	0	0	0
Total for Perennial Grasses		661	648	35.94	39.03
Total for Grasses		661	648	35.94	39.03
F	Achillea millefolium	204	205	9.62	11.18
F	Androsace septentrionalis (a)	3	-	.00	-
F	Artemisia ludoviciana	-	3	-	.00
F	Aster sp.	12	14	.07	.39
F	Chenopodium fremontii (a)	8	6	.07	.03
F	Cirsium sp.	1	-	.03	-
F	Cymopterus lemmonii	3	-	.03	-
F	Dracocephalum parviflorum	-	2	-	.00
F	Erigeron flagellaris	2	-	.03	-
F	Erigeron speciosus	-	7	-	.30
F	Galium sp.	12	6	.22	.06
F	Grindelia squarrosa	-	1	-	.00
F	Helenium hoopesii	-	-	-	.03
F	Heracleum lanatum	10	6	.30	.07
F	Lathyrus lanszwertii	232	207	9.82	6.51
F	Lupinus sericeus	15	12	.90	.87
F	Machaeranthera canescens	-	4	-	.00
F	Potentilla gracilis	-	2	-	.03
F	Taraxacum officinale	34	24	.70	.21
F	Thalictrum fendleri	257	191	20.85	9.68
F	Tragopogon dubius (a)	-	1	-	.00
F	Vicia americana	_b 138	_a 86	4.84	1.48
Total for Annual Forbs		11	7	0.07	0.04
Total for Perennial Forbs		920	770	47.44	30.86
Total for Forbs		931	777	47.51	30.90

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

BROWSE TRENDS--

Management unit 13R, Study no: 6

Type	Species	Quadrat Cover %		Line Intercept Cover %	
		'11	'14	'11	'14
B	Mahonia repens	.00	-	-	-
B	Populus tremuloides	2.44	2.21	17.50	2.95
B	Quercus gambelii	.30	.91	7.61	3.13
B	Rosa woodsii	-	.06	.11	-
B	Symphoricarpos oreophilus	24.66	19.20	30.68	30.30
Total for Browse		27.41	22.39	55.9	36.38

POINT-QUARTER TREE DATA--

Management unit 13R, Study no: 6

Species	Trees per Acre		Average diameter (in)	
	'11	'14	'11	'14
Populus tremuloides	39	196	14.5	0.9

BASIC COVER--

Management unit 13R, Study no: 6

Cover Type	Average Cover %	
	'11	'14
Vegetation	82.78	79.50
Pavement	0	.00
Litter	50.04	63.92
Cryptogams	.06	.03
Bare Ground	.84	.11

PELLET GROUP DATA--

Management unit 13R, Study no: 6

Type	Quadrat Frequency		Days use per acre (ha)	
	'11	'14	'11	'14
Elk	-	4	2 (5)	-
Deer	-	-	1 (2)	-
Cattle	1	2	9 (22)	-

BROWSE CHARACTERISTICS--
Management unit 13R, Study no: 6

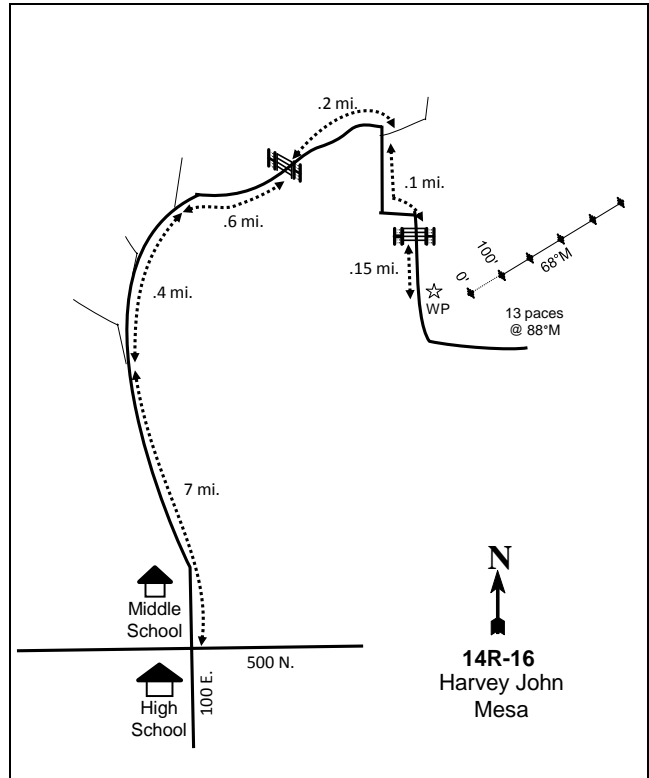
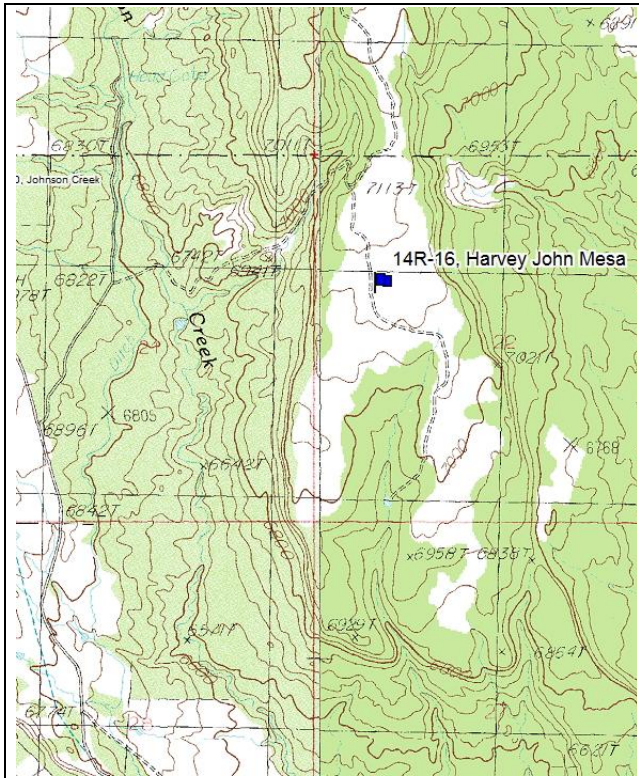
		Age class distribution					Utilization			
Year	Plants per Acre (excluding seedlings)	% Young	% Mature	% Decadent	Seedling (plants/acre)	% moderate	% heavy	% poor vigor	Average Height Crown (in)	
<i>Quercus gambelii</i>										
11	620	90	10	-	-	52	0	0	-/-	
14	760	100	0	-	-	0	92	0	-/-	
<i>Rosa woodsii</i>										
11	60	0	100	-	-	0	0	0	25/19	
14	120	0	100	-	-	33	0	0	28/17	
<i>Symphoricarpos oreophilus</i>										
11	0	0	0	-	-	0	0	0	-/-	
14	6680	0	100	-	-	65	0	0	29/33	

ASPEN CHARACTERISTICS--
Management unit 13R, Study no: 6

		Age class distribution				Utilization			
Year	Plants per Acre	% Class I	% Class II	% Class III	% Class IV	% moderate	% heavy	% poor vigor	
<i>Populus tremuloides</i>									
11	1920	33	64	2	1	31	38	0	
14	2400	4	95	1	0	37	0	0	

Class I= less than or equal to 1.5 ft; Class II=greater than 1.5 ft to 5 ft; Class III=greater than 5ft and up to 1 in. dbh; Class IV=greater than 1 in. dbh

HARVEY JOHN MESA - TREND STUDY NO. 14R-16



Location Information

USGS 7.5 min Map Info Blanding North; Township 35S, Range 22E, Section 22
 GPS (0' Stake) NAD 83, UTM Zone 12, 632384 East 4176097 North

Transect Information

Browse Tag # (0' Stake) 179
 Transect Bearing 68° magnetic
 Length 500ft
 Belt Placement Line 1 (11ft), Line 2 (34ft), Line 3 (59ft), Line 4 (71ft), Line 5 (95ft)
 Belt Marker Placement No Rebar

Directions to Site

Drive north for 7.0 miles to a fork from the intersection of 500 north and 100 e in Blanding. Take the right fork staying right through another small fork for 0.4 miles to another fork. Go right for 0.6 miles to a locked gate that provides access to the private property. Proceed through the gate and go 0.2 miles following the road around as it bends south to another fork. Take the right fork for 0.1 miles to another gate. Drive past the gate and travel for 0.15 miles to a witness post on the left side of the road. Walk 13 paces at 92 degrees magnetic to the 0-foot stake marked with browse tag #179.

Site Information

Land Ownership Private
 Allotment Not Available
 Elevation 7,100ft (2,164m)
 Aspect Southwest
 Slope 6%
 Sample Dates 08/21/2006, 06/15/2010, 08/05/2014

DISTURBANCE HISTORY--

Management unit 14R, Study no: 16

Treatment/Disturbance	Name	WRI DB #	Date	Size (acres)
One-Way Dixie Harrow	Harvey John Kratcher Mesa	526	Fall 2006	270
Seeding: Broadcast Before	Harvey John Kratcher Mesa	526	Fall 2006	150

The table is a recorded disturbance history of the study site.

SEED MIX--

Management unit 14R, Study no: 16

Project Name: Harvey John Kratcher Mesa			
WRI Database #: 526			
Application: Broadcast Seeder		Acres: 150	
Seed type		lbs in mix	lbs/acre
G	Big Bluegrass 'Sherman'	50	0.33
G	Canby Bluegrass 'Canbar'	50	0.33
G	Bluebunch WG 'Goldar'	300	2.00
G	Slender Wheatgrass 'San Luis'	150	1.00
G	Indian Ricegrass 'Rimrock'	150	1.00
G	Mountain Brome	150	1.00
G	Sheep Fescue	50	0.33
F	Alfalfa 'Ladak'	150	1.00
F	Palmer Penstemon	15	0.10
F	Sainfoin 'Eski'	300	2.00
F	Forage Kochia	50	0.33
F	Small Burnet 'Delar'	300	2.00
F	Cicer Milkvetch 'Lutana'	150	1.00
F	Blue Flax	75	0.50
F	American Vetch	30	0.20
Total Pounds:		1970	13.13
PLS Pounds:			12.04

Habitat and Vegetation Information

Wildlife Habitat Deer, Crucial Summer; Elk, Crucial Winter

VEGETATION HISTORY--

Management unit 14R, Study no: 16

Year	Vegetation Type ¹	Woodland Succession ²
2006-2014	Mountain Big Sagebrush	No Encroachment

¹Vegetation Type (Appendix - Vegetation Type), ²Woodland Succession (Tausch, Miller, Roundy, & Chambers, 2009).

Site Notes

This study was established to monitor a one-way Dixie harrow sagebrush reduction treatment on a private pasture on Harvey Kartchner Mesa. The Dixie harrow treatment was completed in mosaics and strips. The objectives of the project were to improve diversity of the herbaceous understory on 250 acres of mountain big sagebrush (*Artemisia tridentata* ssp. *vaseyana*) and remove 20 acres of encroaching pinyon pine (*Pinus edulis*) and Utah juniper (*Juniperus osteosperma*) (WRI Database 2015).

Site Potential

1981-2010 Average Annual Precipitation 16 inches
 NRCS Ecological Site Upland Sand (Mountain Big Sagebrush)
 NRCS Ecological Site # R035XY307UT

SOIL ANALYSIS DATA--

Management unit 14R, Study no: 16

<i>Texture</i>	<i>Sand (%)</i>	<i>Silt (%)</i>	<i>Clay (%)</i>	<i>pH</i>	<i>ds/m</i>	<i>OM (%)</i>	<i>PPM P</i>	<i>PPM K</i>	<i>Year Sampled</i>
Loam	36.2	44	19.8	7.1	0.5	1.3	22.7	112	2006

Soil specific normal values are described in the ecological site description (USDA-NRCS, 2011) and by Tiedeman and Lopez (2004).

States and Transitions

No state and transition model is available for the above ecological site.

Since site establishment in 2006, this site has remained in a stable mountain big sagebrush state. Although sagebrush cover declined with treatment, it remained the dominant plant cover. Additionally, after the treatment the number of decadent sagebrush plants decreased. There are a few other browse species but they contribute little cover (Table – Browse Trends). There is very little herbaceous understory on this site. Total grass cover was highest before treatment; however, over half of this cover came from the introduced annual grass cheatgrass (*Bromus tectorum*). Grass and forb cover remain low, even after the treatment (Table – Herbaceous Trends). As time continues, the age structure of sagebrush on this site should continue to diversify and cover should also increase.

Trend Summary

HERBACEOUS TRENDS--

Management unit 14R, Study no: 16

Type	Species	Nested Frequency			Average Cover %		
		'06	'10	'14	'06	'10	'14
G	Agropyron cristatum	_b 81	_a 41	_a 36	2.25	.85	.50
G	Bouteloua gracilis	-	-	2	-	-	.03
G	Bromus tectorum (a)	_c 262	_b 62	_a 5	6.33	.19	.01
G	Sitanion hystrix	_{ab} 96	_b 117	_a 82	1.97	2.10	1.03
G	Vulpia octoflora (a)	1	-	-	.00	-	-
Total for Annual Grasses		263	62	5	6.33	0.19	0.01
Total for Perennial Grasses		177	158	120	4.23	2.95	1.56
Total for Grasses		440	220	125	10.57	3.15	1.57
F	Arabis sp.	1	3	2	.00	.00	.00
F	Artemesia sp.	-	-	2	-	-	.00
F	Aster sp.	-	-	-	-	.15	-
F	Astragalus convallarius	-	1	-	-	.15	-
F	Calochortus nuttallii	1	5	-	.00	.01	-
F	Cirsium sp.	-	-	1	-	-	.03
F	Cordylanthus sp. (a)	_a 12	_b 130	_a 1	.09	1.88	.00
F	Descurainia pinnata (a)	3	-	-	.00	-	-
F	Erigeron bellidiastrm (a)	6	-	2	.04	-	.00
F	Eriogonum racemosum	3	1	-	.03	.03	-

Type	Species	Nested Frequency			Average Cover %		
		'06	'10	'14	'06	'10	'14
F	<i>Grindelia squarrosa</i>	-	4	-	-	.18	-
F	<i>Heterotheca villosa</i>	3	-	5	.03	-	.06
F	<i>Hymenoxys acaulis</i>	-	1	-	-	.03	-
F	<i>Linum perenne</i>	a-	b19	a-	-	.46	-
F	<i>Machaeranthera grindelioides</i>	-	3	2	-	.00	.00
F	<i>Microsteris gracilis</i> (a)	-	5	2	-	.01	.00
F	<i>Penstemon comarrhenus</i>	16	13	32	.11	.18	.21
F	<i>Phlox longifolia</i>	a12	b34	a5	.03	.19	.01
F	<i>Polygonum douglasii</i> (a)	b4	c184	a-	.00	.66	-
F	<i>Ranunculus testiculatus</i> (a)	-	5	-	-	.01	-
F	<i>Senecio multilobatus</i>	1	-	-	.00	-	-
F	<i>Sphaeralcea coccinea</i>	1	5	-	.00	.01	-
F	<i>Tragopogon dubius</i> (a)	-	3	-	-	.03	-
Total for Annual Forbs		25	327	5	0.14	2.60	0.01
Total for Perennial Forbs		38	89	49	0.22	1.41	0.33
Total for Forbs		63	416	54	0.36	4.01	0.34

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

BROWSE TRENDS--

Management unit 14R, Study no: 16

Type	Species	Quadrat Cover %			Line Intercept Cover %		
		'06	'10	'14	'06	'10	'14
B	<i>Artemisia tridentata vaseyana</i>	30.22	31.63	21.71	40.05	36.08	34.63
B	<i>Chrysothamnus depressus</i>	.09	.83	.06	-	.11	.46
B	<i>Chrysothamnus nauseosus</i>	.53	.03	-	.68	.30	-
B	<i>Gutierrezia sarothrae</i>	.67	.23	.17	.45	.06	-
B	<i>Tetradymia canescens</i>	-	.04	-	-	.03	-
Total for Browse		31.52	32.77	21.95	41.18	36.58	35.12

BASIC COVER--

Management unit 14R, Study no: 16

Cover Type	Average Cover %		
	'06	'10	'14
Vegetation	35.42	39.30	24.23
Rock	.49	.01	.06
Pavement	.23	.01	.09
Litter	20.50	35.26	32.09
Cryptogams	.91	.00	.03
Bare Ground	53.70	44.54	49.03

PELLET GROUP DATA--

Management unit 14R, Study no: 16

Type	Quadrat Frequency		
	'06	'10	'14
Rabbit	50	2	6
Horse	5	-	2
Elk	1	-	2
Deer	6	2	11

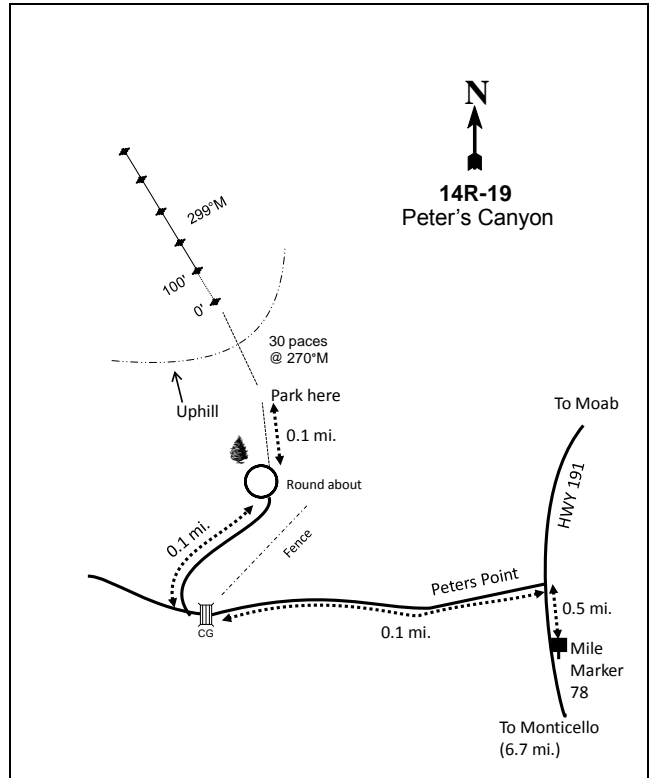
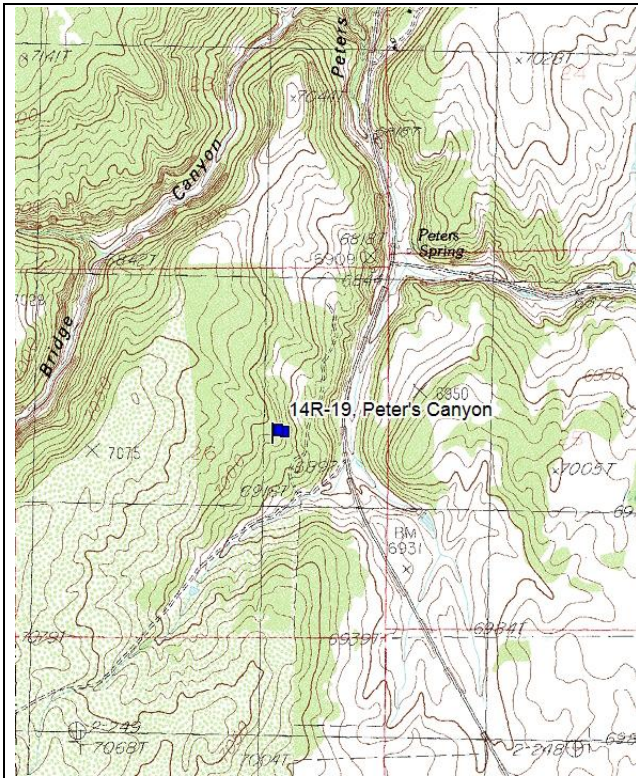
Days use per acre (ha)		
'06	'10	'14
-	-	-
7 (17)	2 (4)	3 (7)
11 (28)	1 (3)	-
11 (28)	4 (10)	6 (15)

BROWSE CHARACTERISTICS--

Management unit 14R, Study no: 16

		Age class distribution					Utilization			
Year	Plants per Acre (excluding seedlings)	% Young	% Mature	% Decadent	Seedling (plants/acre)	% moderate	% heavy	% poor vigor	Average Height Crown (in)	
<i>Artemisia tridentata vaseyana</i>										
06	24060	18	65	17	60	.74	19	6	14/27	
10	12980	8	91	2	640	43	20	1	14/25	
14	12060	13	78	8	40	17	52	13	14/25	
<i>Chrysothamnus depressus</i>										
06	280	0	100	-	-	0	71	21	6/8	
10	320	0	100	-	20	0	0	0	5/12	
14	360	0	100	-	-	0	0	0	6/10	
<i>Chrysothamnus nauseosus</i>										
06	60	0	0	100	-	0	0	100	45/53	
10	60	67	33	0	-	0	0	0	19/25	
14	20	0	100	0	-	0	0	0	29/30	
<i>Gutierrezia sarothrae</i>										
06	880	2	98	-	-	0	0	0	7/10	
10	220	9	91	-	-	0	0	0	7/8	
14	340	0	100	-	-	0	0	0	6/7	
<i>Juniperus osteosperma</i>										
06	0	0	0	-	-	0	0	0	-/-	
10	0	0	0	-	-	0	0	0	-/-	
14	0	0	0	-	20	0	0	0	-/-	
<i>Opuntia fragilis</i>										
06	40	0	50	50	-	0	0	50	2/3	
10	40	0	100	0	-	0	0	0	2/3	
14	20	0	100	0	-	0	0	0	7/13	
<i>Tetradymia canescens</i>										
06	0	0	0	-	-	0	0	0	-/-	
10	40	100	0	-	20	0	0	0	-/-	
14	0	0	0	-	-	0	0	0	-/-	

PETER'S CANYON - TREND STUDY NO. 14R-19



Location Information

USGS 7.5 min Map Info Monticello North; Township 32S, Range 23E, Section 26
 GPS (0' Stake) NAD 83, UTM Zone 12, 643989 East 4203465 North

Transect Information

Browse Tag # (0' Stake) Not Available
 Transect Bearing 299° magnetic
 Length 500ft
 Belt Placement Line 1 (11ft), Line 2 (34ft), Line 3 (59ft), Line 4 (71ft), Line 5 (95ft)
 Belt Marker Placement No Rebar

Directions to Site

Travel north from Monticello on US 191, for about 6.7 miles, or until mile marker 78. Continue 0.5 miles from the mile marker to a road (Peters Point) that comes in from the left. Turn here and follow this road for 0.1 miles to a cattle guard, immediately following the cattle-guard there will be a road that comes in from the right. Turn here and travel north for 0.1 miles to a roundabout. The 0-foot stake is 57 paces at 304 degrees magnetic from an old dead Pinion on the northwest part of the roundabout, or 0.1 miles from the northwest corner of the roundabout and is 30 paces at 270 degrees magnetic from the new witness post.

Site Information

Land Ownership BLM
 Allotment Spring Creek
 Elevation 9,700ft (2,957m)
 Aspect Southeast
 Slope 2%
 Sample Dates 06/11/2007, 06/14/2010, 06/25/2014

DISTURBANCE HISTORY--

Management unit 14R, Study no: 19

Treatment/Disturbance	Name	WRI DB #	Date	Size (acres)
Bullhog	Peter's Canyon	906	December 2006	170
Prescribed Fire	Peter's Canyon	906	October 2007	170
Seeding: Broadcast	Peter's Canyon	906	December 2007	170

The table is a recorded disturbance history of the study site.

SEED MIX--

Management unit 14R, Study no: 19

Project Name: Peter's Canyon			
WRI Database #: 906			
Application: Broadcast Seeder		Acres: 170	
Seed type		lbs in mix	lbs/acre
G	Blue Grama	200	1.18
G	Canby Bluegrass 'Canbar'	150	0.88
G	Indian Ricegrass 'Rimrock'	300	1.76
G	Sand Dropseed	50	0.29
G	Siberian Wheatgrass 'Vavilov'	350	2.06
G	Thickspike Wheatgrass 'Bannock'	250	1.47
G	Sandberg Bluegrass	100	0.59
B	Bitterbrush	50	0.29
B	Fourwing Saltbush	50	0.29
Total Pounds:		1500	8.82
PLS Pounds:			7.42

Habitat and Vegetation Information

Wildlife Habitat Deer, Crucial Spring/Fall

VEGETATION HISTORY--

Management unit 14R, Study no: 19

Year	Vegetation Type ¹	Woodland Succession ²
2007-2014	Pinyon-Juniper	Phase I transitioning to Phase II

¹Vegetation Type (Appendix - Vegetation Type), ²Woodland Succession (Tausch, Miller, Roundy, & Chambers, 2009).

Site Notes

The study was established to monitor a fuels reduction project. Following years of grazing management and fire suppression of pinyon pine (*Pinus edulis*) and Utah juniper (*Juniperus osteosperma*), encroachment was increasing on the site and reducing the herbaceous understory. After an extended drought, an infestation of bark beetles (*Ips sp.*) killed 40% of the pinyon pine in the area (WRI Database 2015).

Site Potential

1981-2010 Average Annual Precipitation 16 inches
 NRCS Ecological Site Upland Loam (Mountain Big Sagebrush)
 NRCS Ecological Site # R035XY308UT

SOIL ANALYSIS DATA--

Management unit 14R, Study no: 19

Texture	Sand (%)	Silt (%)	Clay (%)	pH	ds/m	OM (%)	PPM P	PPM K	Year Sampled
Loam	38.2	35	26.8	7.2	0.6	2.5	8.7	112	2007

Soil specific normal values are described in the ecological site description (USDA-NRCS, 2011) and by Tiedeman and Lopez (2004).

States and Transitions

No state and transition model is available for the above ecological site.

Since establishment in 2007, and despite treatment, this site has remained a pinyon-juniper community. There are a few other browse species on site, but they contributed little cover (Table – Browse Trends). The annual grass cheatgrass (*Bromus tectorum*) made up the majority of the grass cover pretreatment, but has decreased in cover following treatment. Conversely, perennial grass increased in cover after treatment. Forb cover remains very low following treatment; however (Table – Herbaceous Trends).

Trend Summary

HERBACEOUS TRENDS--

Management unit 14R, Study no: 19

Type	Species	Nested Frequency			Average Cover %		
		'07	'10	'14	'07	'10	'14
G	<i>Agropyron dasystachyum</i>	a ⁻	b ¹⁰	ab ¹	-	.07	.00
G	<i>Agropyron fragile</i>	a ⁻	ab ³	b ¹²	-	.21	.48
G	<i>Bouteloua gracilis</i>	11	11	17	.10	.71	.48
G	<i>Bromus tectorum</i> (a)	c ²⁶²	b ²¹⁶	a ¹⁴	8.19	5.54	.15
G	<i>Carex</i> sp.	b ¹³	a ⁻	b ¹⁹	.03	-	.13
G	<i>Koeleria cristata</i>	7	-	-	.04	-	-
G	<i>Oryzopsis hymenoides</i>	13	23	18	.17	1.12	.32
G	<i>Poa fendleriana</i>	ab ⁸³	a ⁵⁶	b ⁹¹	2.81	2.73	4.06
G	<i>Poa secunda</i>	ab ⁷	b ¹⁷	a ⁻	.04	.25	-
G	<i>Sitanion hystrix</i>	a ¹¹⁵	b ¹⁷⁰	ab ¹²⁶	3.83	8.30	4.40
G	<i>Sporobolus cryptandrus</i>	-	-	9	-	-	.33
G	<i>Stipa comata</i>	2	3	-	.15	.18	-
G	<i>Vulpia octoflora</i> (a)	5	-	1	.03	-	.00
Total for Annual Grasses		267	216	15	8.22	5.54	0.16
Total for Perennial Grasses		251	293	293	7.18	13.58	10.23
Total for Grasses		518	509	308	15.40	19.12	10.39
F	<i>Arabis</i> sp.	1	-	-	.00	-	-
F	<i>Astragalus humistratus</i>	1	3	2	.15	.03	.00
F	<i>Castilleja</i> sp.	4	-	-	.01	-	-
F	<i>Chaenactis douglasii</i>	4	-	-	.01	-	-
F	<i>Chenopodium fremontii</i> (a)	a ⁷	b ²⁷	a ⁻	.01	.07	-
F	<i>Cirsium</i> sp.	-	5	-	.00	.33	-
F	<i>Cryptantha</i> sp.	a ³	ab ⁸	c ¹²	.03	.13	.08
F	<i>Descurainia pinnata</i> (a)	b ⁷⁷	a ¹³	b ⁴⁶	3.12	.61	1.06
F	<i>Draba</i> sp. (a)	b ²¹	a ⁴	ab ¹⁵	.07	.00	.05

Type	Species	Nested Frequency			Average Cover %		
		'07	'10	'14	'07	'10	'14
F	Erigeron pumilus	7	9	2	.05	.56	.01
F	Eriogonum alatum	-	-	1	-	-	.00
F	Erodium cicutarium (a)	8	-	-	.04	-	-
F	Erysimum sp.	5	-	-	.01	-	-
F	Gayophytum ramosissimum(a)	1	1	-	.00	.00	-
F	Gilia sp. (a)	_b 18	_b 11	_a -	.14	.40	-
F	Halogeton glomeratus (a)	1	-	-	.00	-	-
F	Haplopappus acaulis	5	-	-	.03	-	-
F	Ipomopsis aggregata	10	-	1	.09	-	.00
F	Lactuca serriola (a)	-	3	-	-	.03	-
F	Lappula occidentalis (a)	64	44	46	.52	.87	1.05
F	Lesquerella sp.	1	-	-	.15	-	-
F	Leucelene ericoides	11	-	13	.33	-	.21
F	Linum lewisii	3	-	-	.00	-	-
F	Machaeranthera grindelioides	-	2	3	-	.03	.00
F	Microsteris gracilis (a)	_b 41	_a 3	_a 3	.08	.00	.00
F	Pedicularis centranthera	_b 17	_a -	_a 3	.42	-	.03
F	Penstemon cyanocaulis	4	4	-	.10	.18	-
F	Petroradia pumila	9	3	-	.18	.00	-
F	Phlox hoodii	1	-	-	.00	-	-
F	Phlox longifolia	_b 44	_a 14	_a 16	.14	.07	.06
F	Polygonum douglasii (a)	_a 6	_b 15	_a -	.01	.06	-
F	Ranunculus testiculatus (a)	_b 26	_a 3	_a -	.05	.00	-
F	Salsola iberica (a)	_a -	_b 20	_b 30	-	.20	.11
F	Senecio multilobatus	1	-	1	.00	-	.00
F	Trifolium sp.	11	10	11	.02	.05	.02
Total for Annual Forbs		270	144	140	4.07	2.28	2.30
Total for Perennial Forbs		142	58	65	1.78	1.40	0.44
Total for Forbs		412	202	205	5.85	3.68	2.74

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

BROWSE TRENDS--

Management unit 14R, Study no: 19

Type	Species	Quadrat Cover %			Line Intercept Cover %		
		'07	'10	'14	'07	'10	'14
B	Artemisia tridentata wyomingensis	.18	.06	1.05	.20	.18	1.10
B	Echinocereus triglochidatus	.00	-	-	-	-	-
B	Gutierrezia sarothrae	.66	.92	1.27	2.01	.90	.95
B	Juniperus osteosperma	-	1.00	.15	10.00	8.21	9.28
B	Opuntia sp.	.30	.33	.33	.01	.06	.10
B	Pinus edulis	2.23	2.55	3.33	9.38	8.78	6.60
Total for Browse		3.38	4.88	6.15	21.6	18.13	18.03

POINT-QUARTER TREE DATA--
Management unit 14R, Study no: 19

Species	Trees per Acre			Average diameter (in)		
	'07	'10	'14	'07	'10	'14
Juniperus osteosperma	60	50	50	10	10.1	11.3
Pinus edulis	44	42	46	6.1	5.7	4.8

BASIC COVER--
Management unit 14R, Study no: 19

Cover Type	Average Cover %		
	'07	'10	'14
Vegetation	24.65	26.52	18.39
Rock	2.01	2.05	2.48
Pavement	.39	.66	.67
Litter	61.55	55.85	53.64
Cryptogams	.93	.07	0
Bare Ground	16.95	24.85	40.59

PELLET GROUP DATA--
Management unit 14R, Study no: 19

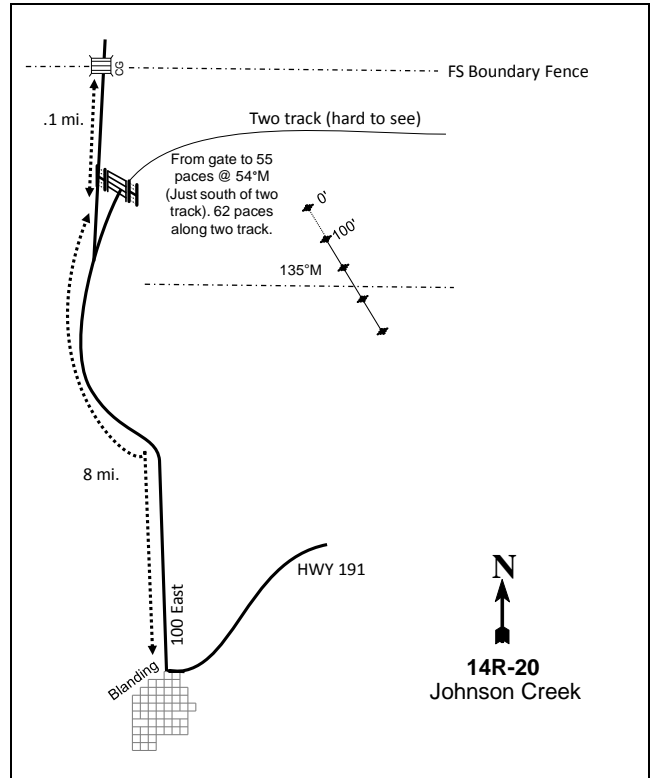
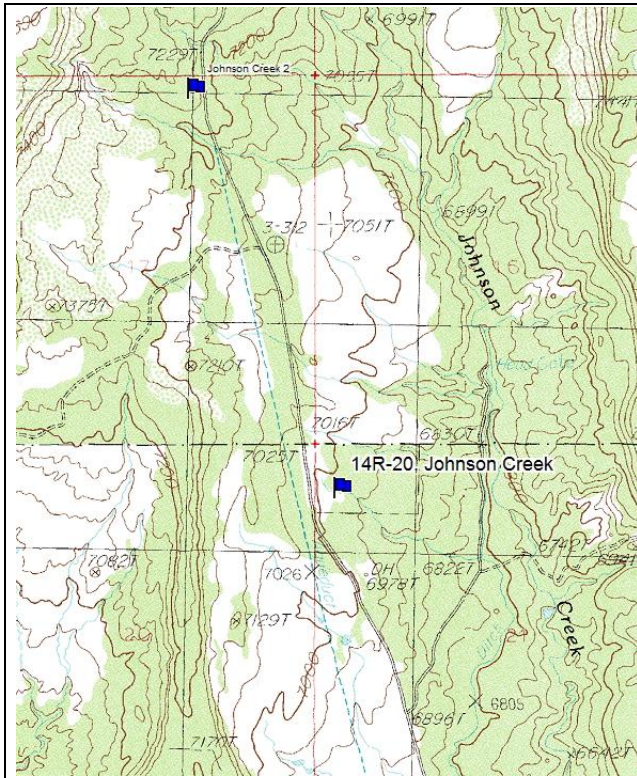
Type	Quadrat Frequency			Days use per acre (ha)		
	'07	'10	'14	'07	'10	'14
Rabbit	71	2	-	-	-	-
Elk	1	4	-	7 (17)	7 (17)	3 (7)
Deer	5	6	1	5 (12)	3 (7)	1 (3)
Cattle	1	1	2	2 (4)	7 (16)	9 (23)

BROWSE CHARACTERISTICS--
Management unit 14R, Study no: 19

Year	Plants per Acre (excluding seedlings)	Age class distribution			Seedling (plants/acre)	Utilization		% poor vigor	Average Height Crown (in)
		% Young	% Mature	% Decadent		% moderate	% heavy		
<i>Artemisia tridentata wyomingensis</i>									
07	140	29	43	29	200	29	0	29	21/32
10	260	15	54	31	-	0	0	31	16/23
14	360	39	56	6	-	28	6	0	17/23
<i>Cowania mexicana stansburiana</i>									
07	0	0	0	-	-	0	0	0	26/42
10	0	0	0	-	-	0	0	0	17/41
14	0	0	0	-	-	0	0	0	-/-
<i>Echinocereus triglochidatus</i>									
07	0	0	0	-	-	0	0	0	2/15
10	0	0	0	-	-	0	0	0	-/-
14	0	0	0	-	-	0	0	0	-/-

Year	Plants per Acre (excluding seedlings)	Age class distribution			Seedling (plants/acre)	Utilization		% poor vigor	Average Height Crown (in)
		% Young	% Mature	% Decadent		% moderate	% heavy		
<i>Gutierrezia sarothrae</i>									
07	3480	32	66	2	2200	0	0	1	9/11
10	1300	15	83	2	20	0	0	2	7/9
14	2360	49	51	0	3440	8	0	0	8/10
<i>Juniperus osteosperma</i>									
07	100	0	100	-	40	0	0	0	-/-
10	80	25	75	-	-	0	0	0	-/-
14	80	25	75	-	-	0	0	0	-/-
<i>Opuntia sp.</i>									
07	340	12	82	6	-	0	0	6	4/14
10	140	14	86	0	-	0	0	0	5/10
14	140	0	100	0	-	0	0	14	5/14
<i>Pinus edulis</i>									
07	140	29	71	-	20	0	0	0	-/-
10	60	33	67	-	20	0	0	0	-/-
14	80	50	50	-	60	0	0	0	-/-
<i>Purshia tridentata</i>									
07	0	0	0	-	-	0	0	0	-/-
10	0	0	0	-	-	0	0	0	-/-
14	40	100	0	-	-	0	0	0	21/49
<i>Yucca sp.</i>									
07	0	0	0	-	-	0	0	0	32/69
10	0	0	0	-	-	0	0	0	33/34
14	0	0	0	-	-	0	0	0	10/35

JOHNSON CREEK - TREND STUDY NO. 14R-20



Location Information

USGS 7.5 min Map Info Mancos Jim Butte; Township 35S, Range 22E, Section 21
 GPS (0' Stake) NAD 83, UTM Zone 12, 630588 East 4176434 North

Transect Information

Browse Tag # (0' Stake) 181
 Transect Bearing 135° magnetic
 Length 400ft
 Belt Placement Line 1 (11ft & 95ft), Line 2 (34ft), Line 3 (59ft), Line 4 (71ft)
 Belt Marker Placement Standard

Directions to Site

Travel south on Highway 191 to 100 E in Blanding. Turn right and travel north for about 8 miles to a cattle-guard. There is a turn off to the right about 0.1 miles before reaching the cattle guard. Turn right coming to a gate and a two-track after the gate. Walk 320 ft (55 paces) at 46 degrees magnetic from the gate to the 0-foot stake. The 0-stake is just south of the two-track and is marked with browse tag #181.

Site Information

Land Ownership BLM
 Allotment Tank Bench Brushy Basin
 Elevation 7,000ft (2,134m)
 Aspect Southeast
 Slope 7%
 Sample Dates 06/12/2007, 06/15/2010, 06/25/2014

DISTURBANCE HISTORY--

Management unit 14R, Study no: 20

Treatment/Disturbance	Name	WRI DB #	Date	Size (acres)
Lop and Scatter	Johnson Creek	905	Fall 2007	300
Seeding: Broadcast	Johnson Creek	905	Fall 2007	326

The table is a recorded disturbance history of the study site.

SEED MIX--

Management unit 14R, Study no: 20

Project Name: Johnson Creek			
WRI Database #: 905			
Application: Broadcast		Acres: 326	
Seed type		lbs in mix	lbs/acre
G	Canby Bluegrass 'Canbar'	400	1.23
G	Indian Ricegrass 'Rimrock'	350	1.07
G	Sand Dropseed	150	0.46
G	Sandberg Bluegrass	350	1.07
G	Siberian Wheatgrass 'Vavilov'	800	2.45
G	Thickspike Wheatgrass 'Bannock'	550	1.69
G	Western Wheatgrass 'Arriba'	400	1.23
F	Palmer Penstemon	50	0.15
Total Pounds:		3050	9.36
PLS Pounds:			8.23

Habitat and Vegetation Information

Wildlife Habitat Deer, Crucial Summer; Elk, Crucial Winter

VEGETATION HISTORY--

Management unit 14R, Study no: 20

Year	Vegetation Type ¹	Woodland Succession ²
2007	Pinyon-Juniper	Phase III
2010	Pinyon-Juniper	Phase I
2014	Wyoming Big Sagebrush	Phase I

¹Vegetation Type (Appendix - Vegetation Type), ²Woodland Succession (Tausch, Miller, Roundy, & Chambers, 2009).

Site Notes

The study was established to monitor a fuels reduction project. Following years of grazing management and fire suppression of pinyon pine (*Pinus edulis*) and Utah juniper (*Juniperus osteosperma*), encroachment and growth created a closed canopy system that reduced the herbaceous understory. Following an extended drought, an infestation of bark beetles (*Ips sp.*) killed 40% of the pinyon pine in the area. The project objectives were to decrease hazardous fuels, increase shrub and herbaceous components, and diversify the age of trees within the area (WRI Database 2015).

Site Potential

1981-2010 Average Annual Precipitation 17 inches
 NRCS Ecological Site Upland Loam (Mountain Big Sagebrush)
 NRCS Ecological Site # R035XY308UT

SOIL ANALYSIS DATA--

Management unit 14R, Study no: 20

Texture	Sand (%)	Silt (%)	Clay (%)	pH	ds/m	OM (%)	PPM P	PPM K	Year Sampled
Loam	42.2	40	17.8	6.2	0.5	2.2	9.9	115.2	2007

Soil specific normal values are described in the ecological site description (USDA-NRCS, 2011) and by Tiedeman and Lopez (2004).

States and Transitions

No state and transition model is available for the above ecological site.

When established in 2007, this site was in phase III encroachment by pinyon-juniper. There were other browse species but they contributed little cover (Table – Browse Trends). Herbaceous cover was moderate and diverse before treatment. Pinyon-juniper cover decreased after treatment to phase I. Wyoming big sagebrush (*Artemisia tridentata* ssp. *wyomingensis*) cover has increased since treatment and became the dominant plant on the site in 2014 (Table – Browse Trends). There was an increase in cheatgrass (*Bromus tectorum*) cover post treatment, but it decreased again in 2014. Cheatgrass still remains a threat to the resilience of this site and additional maintenance is required to reduce it. Perennial grasses and forbs have increased since treatment while annual forbs have decreased (Table – Herbaceous Trends).

Trend Summary

HERBACEOUS TRENDS--

Management unit 14R, Study no: 20

Type	Species	Nested Frequency			Average Cover %		
		'07	'10	'14	'07	'10	'14
G	Agropyron dasystachyum	a ⁻	a ¹⁹	b ⁵³	-	.45	1.60
G	Agropyron fragile	a ⁻	b ²¹	ab ¹¹	-	.58	.04
G	Agropyron smithii	a ⁻	ab ⁵	b ²⁶	-	.03	.13
G	Bouteloua gracilis	ab ¹⁰	a ⁶	b ²⁵	.04	.22	.66
G	Bromus tectorum (a)	a ²⁵⁷	b ³⁷⁸	a ²⁹⁴	3.07	18.28	6.91
G	Carex sp.	-	-	-	.00	-	-
G	Oryzopsis hymenoides	9	4	1	.16	.18	.03
G	Poa canbyi	-	7	5	-	.53	.00
G	Poa pratensis	3	3	14	.04	.06	.33
G	Poa secunda	b ⁴⁴	a ¹⁴	a ¹⁷	.84	.48	.25
G	Sitanion hystrix	a ²³	b ⁴⁸	b ⁴²	.07	.98	.80
G	Sporobolus cryptandrus	-	-	3	-	-	.04
G	Stipa comata	-	-	7	-	-	.06
G	Vulpia octoflora (a)	b ¹⁵⁴	a ⁻	a ⁴⁴	.88	-	.11
Total for Annual Grasses		411	378	338	3.96	18.28	7.03
Total for Perennial Grasses		89	127	204	1.17	3.54	3.97
Total for Grasses		500	505	542	5.13	21.83	11.00
F	Allium sp.	-	3	-	-	.00	-

T y p e	Species	Nested Frequency			Average Cover %		
		'07	'10	'14	'07	'10	'14
F	<i>Alyssum alyssoides</i> (a)	-	-	5	-	-	.01
F	<i>Arabis</i> sp.	b16	a-	a-	.04	-	-
F	<i>Astragalus calycosus</i>	a-	a-	b12	-	-	.03
F	<i>Astragalus convallarius</i>	b20	ab9	a6	.24	.39	.01
F	<i>Astragalus</i> sp.	3	13	3	.00	.34	.00
F	<i>Calochortus nuttallii</i>	2	-	-	.00	-	-
F	<i>Chenopodium fremontii</i> (a)	-	6	3	-	.02	.03
F	<i>Cirsium</i> sp.	-	3	-	-	.15	-
F	<i>Collinsia parviflora</i> (a)	b131	a5	a1	.63	.06	.00
F	<i>Comandra pallida</i>	-	2	-	-	.01	-
F	<i>Cryptantha bakeri</i>	-	-	1	-	-	.15
F	<i>Cryptantha</i> sp.	14	7	20	.04	.33	.06
F	<i>Descurainia pinnata</i> (a)	14	6	14	.05	.01	.17
F	<i>Draba</i> sp. (a)	c151	a-	b13	.36	-	.05
F	<i>Erigeron</i> sp.	a-	a3	b150	-	.04	.76
F	<i>Eriogonum racemosum</i>	1	6	-	.00	.03	-
F	<i>Eriogonum</i> sp.	-	4	10	-	.03	.02
F	<i>Erodium cicutarium</i> (a)	a3	a3	b33	.00	.04	.42
F	<i>Gayophytum ramosissimum</i> (a)	-	7	-	-	.04	-
F	<i>Gilia</i> sp. (a)	2	13	3	.00	.07	.01
F	<i>Holosteum umbellatum</i> (a)	1	7	2	.00	.13	.00
F	<i>Lactuca serriola</i> (a)	-	9	1	-	.02	.00
F	<i>Lappula occidentalis</i> (a)	a14	a29	b104	.03	.32	.58
F	<i>Lupinus argenteus</i>	68	81	94	3.57	12.67	5.05
F	<i>Machaeranthera grindelioides</i>	a-	a5	b17	-	.03	.04
F	<i>Mentzelia albicaulis</i> (a)	-	-	4	-	-	.01
F	<i>Microsteris gracilis</i> (a)	a-	ab13	b24	-	.04	.05
F	<i>Oenothera</i> sp.	-	-	4	-	-	.06
F	<i>Pedicularis centranthera</i>	b14	a-	a7	.50	-	.12
F	<i>Penstemon palmeri</i>	5	3	10	.04	.04	.04
F	<i>Phlox longifolia</i>	10	5	9	.02	.04	.02
F	<i>Polygonum douglasii</i> (a)	a9	b28	a5	.02	.14	.01
F	<i>Ranunculus testiculatus</i> (a)	b240	a43	a9	2.64	.36	.03
F	<i>Salsola iberica</i> (a)	2	-	-	.00	-	-
F	<i>Schoenocrambe linifolia</i>	-	-	-	-	.03	-
F	<i>Senecio multilobatus</i>	-	-	1	-	-	.03
F	<i>Tragopogon dubius</i> (a)	1	-	-	.00	-	-
F	<i>Verbascum thapsus</i>	a-	b22	c38	-	.49	3.10
Total for Annual Forbs		568	169	221	3.77	1.27	1.39
Total for Perennial Forbs		153	166	382	4.47	14.65	9.50
Total for Forbs		721	335	603	8.25	15.93	10.89

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

BROWSE TRENDS--

Management unit 14R, Study no: 20

Type	Species	Quadrat Cover %			Line Intercept Cover %		
		'07	'10	'14	'07	'10	'14
B	Amelanchier utahensis	2.60	.98	.33	3.91	1.78	1.04
B	Artemisia tridentata vaseyana	1.05	3.23	7.63	.56	1.75	6.66
B	Juniperus osteosperma	3.92	.03	.18	15.86	3.01	.86
B	Opuntia fragilis	.01	-	.15	.03	.10	.35
B	Pinus edulis	5.08	.71	.48	25.96	6.13	3.43
B	Quercus gambelii	.63	.88	.03	2.01	1.78	.26
Total for Browse		13.31	5.83	8.80	48.33	14.55	12.6

POINT-QUARTER TREE DATA--

Management unit 14R, Study no: 20

Species	Trees per Acre			Average diameter (in)		
	'07	'10	'14	'07	'10	'14
Juniperus osteosperma	102	18	55	6.9	2.8	1.3
Pinus edulis	431	44	54	2.1	4.6	2.5

BASIC COVER--

Management unit 14R, Study no: 20

Cover Type	Average Cover %		
	'07	'10	'14
Vegetation	24.34	41.50	33.07
Rock	.00	0	0
Pavement	.05	0	.04
Litter	55.96	60.87	52.90
Cryptogams	3.76	0	.01
Bare Ground	28.79	15.49	27.41

PELLET GROUP DATA--

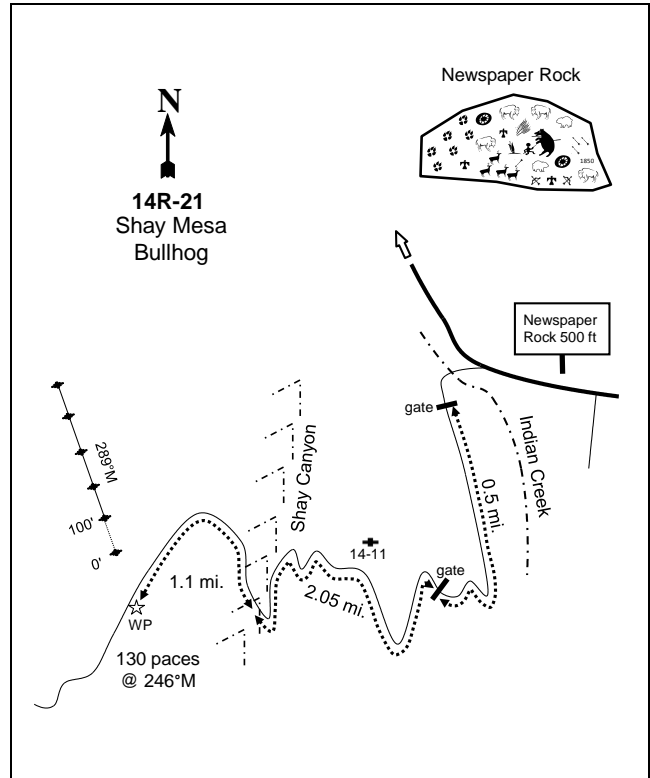
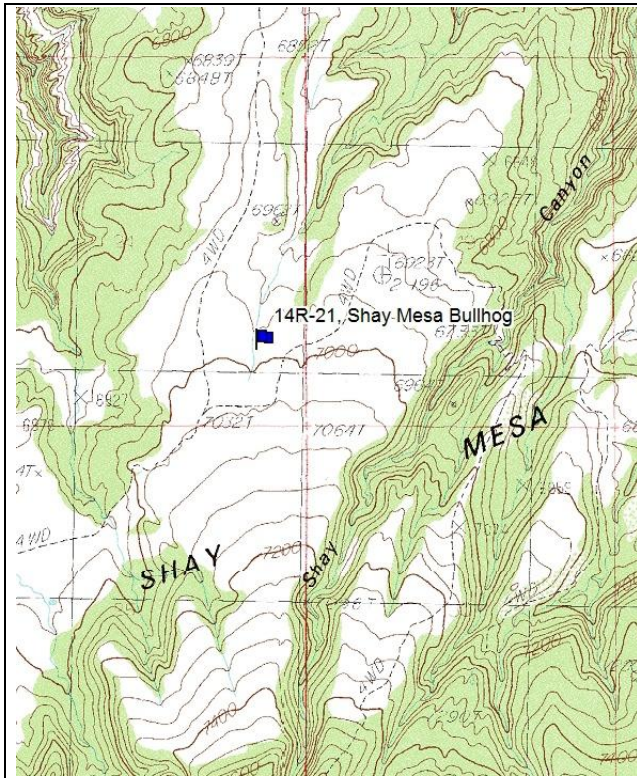
Management unit 14R, Study no: 20

Type	Quadrat Frequency			Days use per acre (ha)		
	'07	'10	'14	'07	'10	'14
Rabbit	82	2	46	-	-	-
Elk	1	1	6	1 (2)	2 (5)	-
Deer	1	5	6	11 (28)	9 (22)	1 (2)
Cattle	9	5	6	28 (68)	11 (27)	2 (4)

BROWSE CHARACTERISTICS--
Management unit 14R, Study no: 20

Year	Plants per Acre (excluding seedlings)	Age class distribution			Seedling (plants/acre)	Utilization		% poor vigor	Average Height Crown (in)
		% Young	% Mature	% Decadent		% moderate	% heavy		
<i>Amelanchier utahensis</i>									
07	320	25	69	6	60	0	38	0	60/68
10	280	36	64	0	-	29	36	0	48/53
14	200	20	80	0	-	30	30	0	27/31
<i>Artemisia tridentata vaseyana</i>									
07	700	6	17	77	200	54	23	69	19/26
10	700	20	80	0	3020	29	11	0	19/26
14	4160	33	67	0	80	47	0	0	16/22
<i>Juniperus osteosperma</i>									
07	320	25	75	-	-	0	0	6	-/-
10	120	83	17	-	-	0	0	0	-/-
14	100	80	20	-	-	0	0	0	-/-
<i>Opuntia fragilis</i>									
07	160	50	25	25	-	0	0	38	3/13
10	60	0	100	0	-	0	0	33	3/8
14	240	17	83	0	-	0	0	0	3/7
<i>Pediocactus simpsonii</i>									
07	0	0	0	-	-	0	0	0	2/4
10	40	100	0	-	-	0	0	0	1/3
14	0	0	0	-	-	0	0	0	-/-
<i>Peraphyllum ramosissimum</i>									
07	0	0	0	-	-	0	0	0	-/-
10	0	0	0	-	-	0	0	0	-/-
14	0	0	0	-	-	0	0	0	20/54
<i>Pinus edulis</i>									
07	460	57	39	4	180	0	0	4	-/-
10	60	67	33	0	40	0	0	0	-/-
14	140	86	14	0	20	0	0	0	-/-
<i>Quercus gambelii</i>									
07	660	39	55	6	20	0	0	6	96/64
10	340	53	47	0	-	0	0	0	20/47
14	60	100	0	0	-	0	0	0	97/111
<i>Tetradymia canescens</i>									
07	0	0	0	-	-	0	0	0	11/19
10	0	0	0	-	-	0	0	0	-/-
14	0	0	0	-	-	0	0	0	13/15

SHAY MESA BULLHOG - TREND STUDY NO. 14R-21



Location Information

USGS 7.5 min Map Info Shay Mountain; Township 32S, Range 21E, Section 24
 GPS (0' Stake) NAD 83, UTM Zone 12, 626684 East 4204320 North

Transect Information

Browse Tag # (0' Stake) 245
 Transect Bearing 289° magnetic
 Length 500ft
 Belt Placement Line 1 (11ft), Line 2 (34ft), Line 3 (59ft), Line 4 (71ft), Line 5 (95ft)
 Belt Marker Placement No Rebar

Directions to Site

Between Newspaper Rock and the 'Newspaper Rock 500 ft' sign, turn west onto a road that crosses Indian Creek and leads to a gate. From the gate, go 0.5 miles to second gate. From this gate, drive 2.05 miles to the first sharp turn in Shay Canyon (will probably have to back down the switchback). From here continue 1.1 miles to the witness post on the right side of the road. The 0-foot stake is 130 paces from the witness post at 264 degrees magnetic. The 0-foot stake is marked with browse tag # 245.

Site Information

Land Ownership BLM
 Allotment Hart Draw
 Elevation 7,000ft (2,134m)
 Aspect North
 Slope 6%
 Sample Dates 07/16/2008, 07/20/2011, 06/24/2014

DISTURBANCE HISTORY--

Management unit 14R, Study no: 21

Treatment/Disturbance	Name	WRI DB #	Date	Size (acres)
Chaining	-	-	1959	-
Seeding	-	-	1959	-
Bullhog	Shay Mesa Phase II	1091	Apr.-Sept. 2009	545
Seeding: Aerial Before	Shay Mesa Phase II	1091	Winter 2008	483

The table is a recorded disturbance history of the study site.

SEED MIX--

Management unit 14R, Study no: 21

Project Name: Shay Mesa Phase II			
WRI Database #: 1091			
Application: Aerial		Acres: 483	
Seed type		lbs in mix	lbs/acre
G	Crested Wheatgrass 'Douglas'	400	0.83
G	Indian Ricegrass 'White River'	750	1.55
G	Needle and Thread	250	0.52
G	Sandberg Bluegrass	250	0.52
G	Western Wheatgrass 'Arriba'	927	1.92
F	Blue Flax 'Appar'	250	0.52
F	Cicer Milkvetch 'Lutana'	500	1.04
F	Sainfoin 'Eski'	750	1.55
F	Yellow Sweetclover	500	1.04
B	Sagebrush, Mountain	440	0.91
B	Winterfat	504	1.04
B	Bitterbrush	446	0.92
Total Pounds:		5967	12.35
PLS Pounds:			9.55

Habitat and Vegetation Information

Wildlife Habitat Deer, Crucial Winter; Elk, Crucial Winter

VEGETATION HISTORY--

Management unit 14R, Study no: 21

Year	Vegetation Type ¹	Woodland Succession ²
2008	Pinyon	Phase II
2011-2014	Mountain Big Sagebrush	Phase I

¹Vegetation Type (Appendix - Vegetation Type), ²Woodland Succession (Tausch, Miller, Roundy, & Chambers, 2009).

Site Notes

Large areas of Shay Mesa were chained and seeded in 1959. The lack of maintenance has resulted in a regenerated pinyon pine (*Pinus edulis*) and Utah juniper (*Juniperus osteosperma*) forest along with sections of heavy dead and downed slash from the 1950's chaining. This combination has created a buildup of hazardous fuels with an accompanying reduction in grass and forb production. The objectives of the project were to reduce hazardous fuel loads, improve wildlife habitat by removing encroaching pinyon and juniper trees, and to increase browse and herbaceous production and diversity (WRI Database 2015). Following the treatment,

the study stakes were not found. Consequently new stakes were placed as close to the previous location of the pretreatment transect as possible.

Site Potential

1981-2010 Average Annual Precipitation 15 inches
 NRCS Ecological Site Upland Loam (Mountain Big Sagebrush)
 NRCS Ecological Site # R035XY308UT

States and Transitions

No state and transition model is available for the above ecological site.

When established in 2008, this site was in phase II encroachment from pinyon pine. Mountain big sagebrush (*Artemisia tridentata* ssp. *vaseyana*) and broom snakeweed (*Gutierrezia sarothrae*) contributed a moderate amount of cover with few other browse species present (Table – Browse Trends). Perennial herbaceous cover was very low for both forbs and grasses prior to treatment (Table – Herbaceous Trends). Since treatment mountain big sagebrush has become the dominant species on the site with limited other browse species (Table – Browse Trends). Perennial grasses have increased since treatment, as have perennial forbs though their cover remains low. Cheatgrass (*Bromus tectorum*) is present on the site, but has decreased in cover since treatment and has remained low.

Trend Summary

HERBACEOUS TRENDS--

Management unit 14R, Study no: 21

Type	Species	Nested Frequency			Average Cover %		
		'08	'11	'14	'08	'11	'14
G	Agropyron cristatum	b78	a58	ab64	.49	3.00	2.91
G	Agropyron smithii	a-	a-	b14	-	-	.07
G	Bouteloua gracilis	a-	b39	b35	-	.38	1.88
G	Bromus tectorum (a)	b141	a60	a50	2.31	.34	.50
G	Hilaria jamesii	3	-	7	.00	-	.30
G	Koeleria cristata	-	-	2	-	-	.03
G	Oryzopsis hymenoides	1	10	9	.00	.13	.57
G	Poa secunda	a-	c32	b20	-	.64	.19
G	Sitanion hystrix	a10	a35	b88	.13	1.17	2.28
G	Sporobolus cryptandrus	-	-	6	-	-	.04
G	Stipa comata	a12	b47	ab31	.06	.82	1.06
G	Vulpia octoflora (a)	a-	a2	b64	-	.00	.20
Total for Annual Grasses		141	62	114	2.31	0.35	0.70
Total for Perennial Grasses		104	221	276	0.69	6.16	9.36
Total for Grasses		245	283	390	3.01	6.51	10.06
F	Agoseris glauca	5	-	-	.00	-	-
F	Astragalus cibarius	-	8	2	-	.01	.00
F	Astragalus mollissimus	ab14	a9	b31	.09	.07	.15
F	Chenopodium leptophyllum(a)	3	-	1	.00	-	.00
F	Cryptantha sp.	-	5	-	-	.03	-
F	Descurainia pinnata (a)	b11	a-	c64	.08	-	.25
F	Draba sp. (a)	a-	a-	b29	-	-	.06

T y p e	Species	Nested Frequency			Average Cover %		
		'08	'11	'14	'08	'11	'14
F	<i>Erigeron pumilus</i>	-	6	3	-	.01	.03
F	<i>Gilia</i> sp. (a)	a ⁻	a ⁻	b ²⁹	-	-	.16
F	<i>Lappula occidentalis</i> (a)	b ²⁰	a ⁻	c ⁴⁹	.06	-	.36
F	<i>Linum perenne</i>	a ⁻	b ¹¹	a ⁻	-	.64	-
F	<i>Machaeranthera canescens</i>	-	2	2	-	.18	.01
F	<i>Melilotus officinalis</i>	-	-	-	-	.00	-
F	<i>Phlox austromontana</i>	ab ⁷	a ³	b ¹⁸	.04	.15	.45
F	<i>Phlox longifolia</i>	a ⁻	b ¹⁵	b ¹⁸	-	.08	.09
F	<i>Ranunculus testiculatus</i> (a)	b ³²	a ⁻	a ⁻	.10	-	-
F	<i>Sphaeralcea coccinea</i>	a ⁻	b ¹¹	c ²⁸	-	.13	.35
F	<i>Trifolium</i> sp.	-	1	2	-	.00	.01
Total for Annual Forbs		66	0	172	0.25	0	0.84
Total for Perennial Forbs		26	71	104	0.13	1.34	1.11
Total for Forbs		92	71	276	0.39	1.34	1.95

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

BROWSE TRENDS--

Management unit 14R, Study no: 21

T y p e	Species	Quadrat Cover %			Line Intercept Cover %		
		'08	'11	'14	'08	'11	'14
B	<i>Artemisia tridentata vaseyana</i>	5.85	11.33	15.03	6.76	17.61	16.23
B	<i>Chrysothamnus depressus</i>	.01	-	.03	-	-	-
B	<i>Chrysothamnus nauseosus</i>	.15	-	-	-	-	-
B	<i>Ephedra viridis</i>	-	.38	.38	-	.11	.06
B	<i>Eriogonum microthecum</i>	.03	.24	.10	.05	.13	.26
B	<i>Gutierrezia sarothrae</i>	5.17	1.42	.74	6.61	1.15	.23
B	<i>Juniperus osteosperma</i>	1.53	-	-	1.58	-	-
B	<i>Leptodactylon pungens</i>	-	.07	-	-	.16	-
B	<i>Pinus edulis</i>	11.06	1.15	1.26	21.21	3.31	1.63
Total for Browse		23.81	14.61	17.56	36.21	22.47	18.41

POINT-QUARTER TREE DATA--

Management unit 14R, Study no: 21

Species	Trees per Acre			Average diameter (in)		
	'08	'11	'14	'08	'11	'14
<i>Juniperus osteosperma</i>	50	20	20	9.9	4.4	3.1
<i>Pinus edulis</i>	67	25	31	6.6	3.7	2.8

BASIC COVER--

Management unit 14R, Study no: 21

Cover Type	Average Cover %		
	'08	'11	'14
Vegetation	26.22	22.36	31.37
Rock	.11	.04	.05
Pavement	5.65	.33	.58
Litter	46.15	32.44	28.50
Cryptogams	.39	.74	.36
Bare Ground	40.78	46.71	44.38

PELLET GROUP DATA--

Management unit 14R, Study no: 21

Type	Quadrat Frequency			Days use per acre (ha)		
	'08	'11	'14	'08	'11	'14
Rabbit	43	-	4	-	-	-
Horse	-	-	-	1 (1)	-	-
Elk	12	12	9	25 (63)	21 (51)	4 (10)
Deer	2	1	7	5 (12)	9 (23)	4 (10)
Cattle	3	-	3	5 (13)	1 (2)	2 (4)

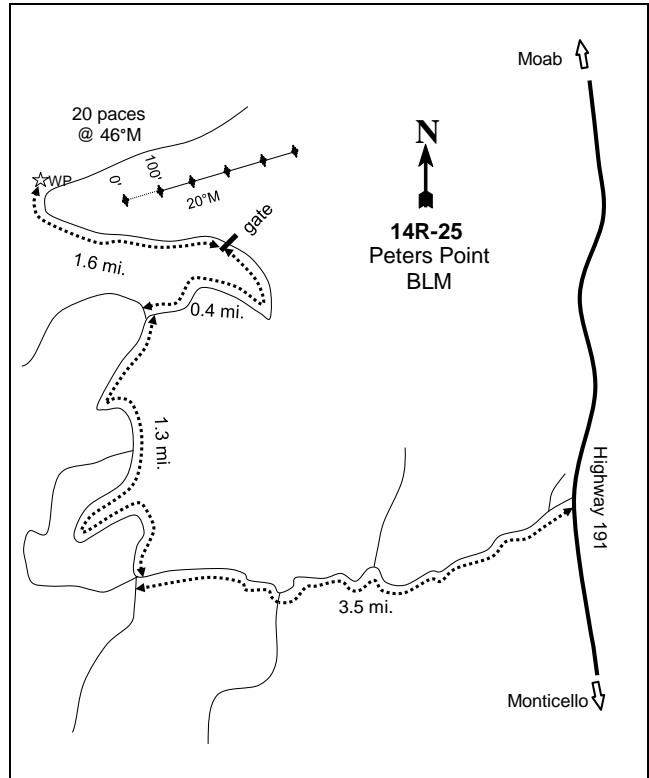
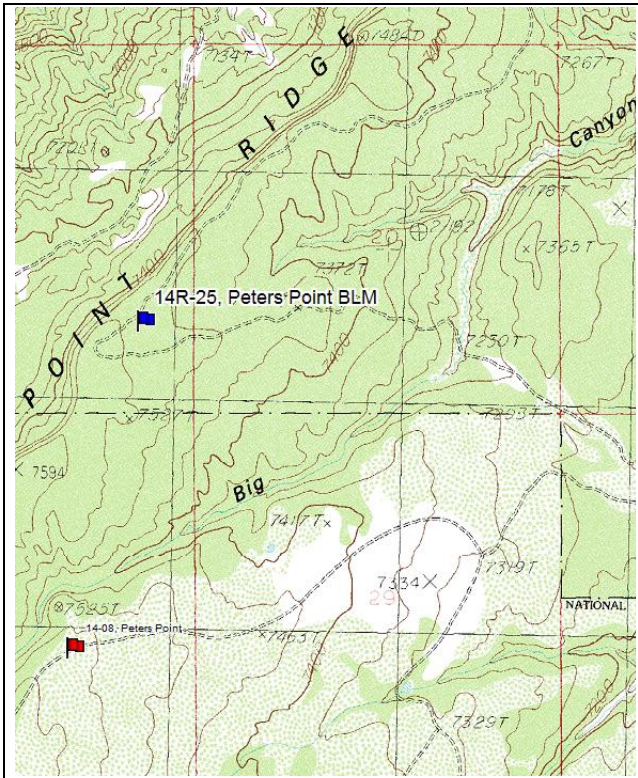
BROWSE CHARACTERISTICS--

Management unit 14R, Study no: 21

Year	Plants per Acre (excluding seedlings)	Age class distribution			Seedling (plants/acre)	Utilization			Average Height Crown (in)
		% Young	% Mature	% Decadent		% moderate	% heavy	% poor vigor	
Artemisia tridentata vaseyana									
08	2400	16	73	12	3380	14	7	3	24/30
11	3560	4	63	32	60	33	15	21	16/27
14	4520	11	86	4	-	36	56	2	17/26
Chrysothamnus depressus									
08	60	0	33	67	-	0	100	67	3/4
11	0	0	0	0	-	0	0	0	-/-
14	80	75	25	0	-	0	0	0	4/11
Chrysothamnus nauseosus									
08	20	0	100	-	-	0	0	0	17/16
11	0	0	0	-	-	0	0	0	-/-
14	80	100	0	-	-	0	0	0	-/-
Ephedra viridis									
08	0	0	0	-	-	0	0	0	15/11
11	180	0	100	-	-	0	100	0	9/10
14	140	86	14	-	-	0	86	0	20/31
Eriogonum microthecum									
08	240	42	58	-	20	17	0	0	7/5
11	460	4	96	-	-	74	9	0	6/9
14	640	38	63	-	-	9	0	0	6/7

Year	Plants per Acre (excluding seedlings)	Age class distribution			Seedling (plants/acre)	Utilization		% poor vigor	Average Height Crown (in)
		% Young	% Mature	% Decadent		% moderate	% heavy		
<i>Gutierrezia sarothrae</i>									
08	9400	24	73	4	920	0	0	.42	9/12
11	2700	8	87	5	20	.74	0	7	6/8
14	1680	38	62	0	7100	0	0	0	6/7
<i>Juniperus osteosperma</i>									
08	20	0	100	-	-	0	0	0	-/-
11	0	0	0	-	-	0	0	0	-/-
14	0	0	0	-	-	0	0	0	-/-
<i>Leptodactylon pungens</i>									
08	0	0	0	-	-	0	0	0	-/-
11	760	0	100	-	-	0	0	0	2/5
14	0	0	0	-	-	0	0	0	-/-
<i>Opuntia sp.</i>									
08	0	0	0	-	-	0	0	0	-/-
11	20	0	100	-	-	0	0	0	2/4
14	0	0	0	-	-	0	0	0	7/21
<i>Pinus edulis</i>									
08	180	0	100	-	-	0	0	0	-/-
11	80	75	25	-	-	0	0	0	-/-
14	60	100	0	-	-	0	0	0	-/-

PETERS POINT BLM - TREND STUDY NO. 14R-25



Location Information

USGS 7.5 min Map Info Monticello Lake; Township 32S, Range 23E, Section 19
 GPS (0' Stake) NAD 83, UTM Zone 12, 637776 East 4204486 North

Transect Information

Browse Tag # (0' Stake) Not Available
 Transect Bearing 20° magnetic
 Length 500ft
 Belt Placement Line 1 (11ft), Line 2 (34ft), Line 3 (59ft), Line 4 (71ft), Line 5 (95ft)
 Belt Marker Placement No Rebar

Directions to Site

From highway 191 head west on a gravel road 3.5 miles stay on main road until intersect. Turn right heading north another 1.3 miles staying right. Turn right heading to the northeast and go 2.0 miles. The study is 20 paces from the witness post at 43 degrees magnetic.

Site Information

Land Ownership BLM
Allotment Peters Point
Elevation 7,456ft (2,273m)
Aspect East
Slope 5%
Sample Dates 07/19/2011, 06/24/2014

DISTURBANCE HISTORY--

Management unit 14R, Study no: 25

<i>Treatment/Disturbance</i>	<i>Name</i>	<i>WRI DB #</i>	<i>Date</i>	<i>Size (acres)</i>
Bullhog	Peters Point-Phase I	1944	Fall 2011-Spring 2012	1253

The table is a recorded disturbance history of the study site.

Habitat and Vegetation Information

Wildlife Habitat Deer, Crucial Spring/Fall; Elk, Crucial Year-Long

VEGETATION HISTORY--

Management unit 14R, Study no: 25

<i>Year</i>	<i>Vegetation Type¹</i>	<i>Woodland Succession²</i>
2011	Pinyon-Juniper	Phase III
2014	Pinyon-Juniper	Phase I transitioning to Phase II

¹Vegetation Type (Appendix - Vegetation Type), ²Woodland Succession (Tausch, Miller, Roundy, & Chambers, 2009).

Site Notes

Treatment units of the Peters Point Phase I project were focused in areas that still had a diverse and productive understory of grass and forb species; therefore, no seeding was used on the treatment units and no impacts to grazing were anticipated. The project objectives are to prevent high intensity fire events and improve wildlife habitat (WRI Database 2015).

Site Potential

1981-2010 Average Annual Precipitation 16 inches
NRCS Ecological Site Upland Clay Loam (Pinyon-Utah Juniper)
NRCS Ecological Site # R035XY304UT

States and Transitions

No state and transition model is available for the above ecological site.

At establishment in 2011, this site was in phase III encroachment from pinyon pine (*Pinus edulis*) and Utah juniper (*Juniperus osteosperma*) with very few other browse species on the site that offered little cover (Table – Browse Trends). Perennial grass cover was moderate and diversity was low, but the majority of the cover came from mutton bluegrass (*Poa fendleriana*). Perennial forb cover was very low prior to treatment and was likely due to competition from the trees (Table – Herbaceous Trends). After treatment, tree cover was reduced from phase III to phase I and remained the dominant cover on the site while other browse species continued to decrease (Table – Browse Trends). Both perennial grass and forb cover have increased, yet perennial grasses remain lacking in diversity (Table – Herbaceous Trends).

Trend Summary

HERBACEOUS TRENDS--

Management unit 14R, Study no: 25

Type	Species	Nested Frequency		Average Cover %	
		'11	'14	'11	'14
G	<i>Bouteloua gracilis</i>	6	8	.12	.33
G	<i>Bromus tectorum</i> (a)	-	1	-	.00
G	<i>Oryzopsis hymenoides</i>	10	3	.10	.57
G	<i>Poa fendleriana</i>	_b 233	_a 185	9.32	10.39
G	<i>Sitanion hystrix</i>	_a -	_b 41	-	1.47
Total for Annual Grasses		0	1	0	0.00
Total for Perennial Grasses		249	237	9.54	12.77
Total for Grasses		249	238	9.54	12.78
F	<i>Arabis holboellii</i>	13	19	.07	.66
F	<i>Chenopodium fremontii</i> (a)	-	6	-	.01
F	<i>Descurainia pinnata</i> (a)	_a -	_b 18	-	.89
F	<i>Draba</i> sp. (a)	_a -	_b 16	-	.13
F	<i>Gilia</i> sp. (a)	-	6	-	.07
F	<i>Heterotheca villosa</i>	-	2	-	.18
F	<i>Hymenoxys acaulis</i>	-	3	-	.03
F	<i>Lactuca serriola</i> (a)	-	2	-	.00
F	<i>Lappula occidentalis</i> (a)	-	1	-	.03
F	<i>Lesquerella rectipes</i>	_a 13	_b 23	.03	.69
F	<i>Pedicularis centranthera</i>	5	1	.01	.00
F	<i>Penstemon pachyphyllus</i>	3	3	.01	.00
F	<i>Petroradia pumila</i>	_b 43	_a 32	.85	1.34
F	<i>Polygonum douglasii</i> (a)	-	1	-	.00
F	<i>Tragopogon dubius</i> (a)	-	1	-	.00
Total for Annual Forbs		0	51	0	1.15
Total for Perennial Forbs		77	83	0.97	2.92
Total for Forbs		77	134	0.97	4.08

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

BROWSE TRENDS--

Management unit 14R, Study no: 25

Type	Species	Quadrat Cover %		Line Intercept Cover %	
		'11	'14	'11	'14
B	<i>Artemisia tridentata vaseyana</i>	.18	-	.10	-
B	<i>Gutierrezia sarothrae</i>	-	.09	.05	-
B	<i>Juniperus osteosperma</i>	.41	.98	21.46	4.23
B	<i>Opuntia</i> sp.	.07	.21	.21	.05
B	<i>Pinus edulis</i>	2.40	4.13	20.63	9.95
Total for Browse		3.07	5.42	42.45	14.23

POINT-QUARTER TREE DATA--
Management unit 14R, Study no: 25

Species	Trees per Acre		Average diameter (in)	
	'11	'14	'11	'14
Juniperus osteosperma	64	34	14	23.8
Pinus edulis	133	41	9	12.4

BASIC COVER--
Management unit 14R, Study no: 25

Cover Type	Average Cover %	
	'11	'14
Vegetation	15.40	22.08
Rock	4.93	3.07
Pavement	1.48	2.48
Litter	56.01	74.55
Cryptogams	4.64	.31
Bare Ground	20.78	12.96

PELLET GROUP DATA--
Management unit 14R, Study no: 25

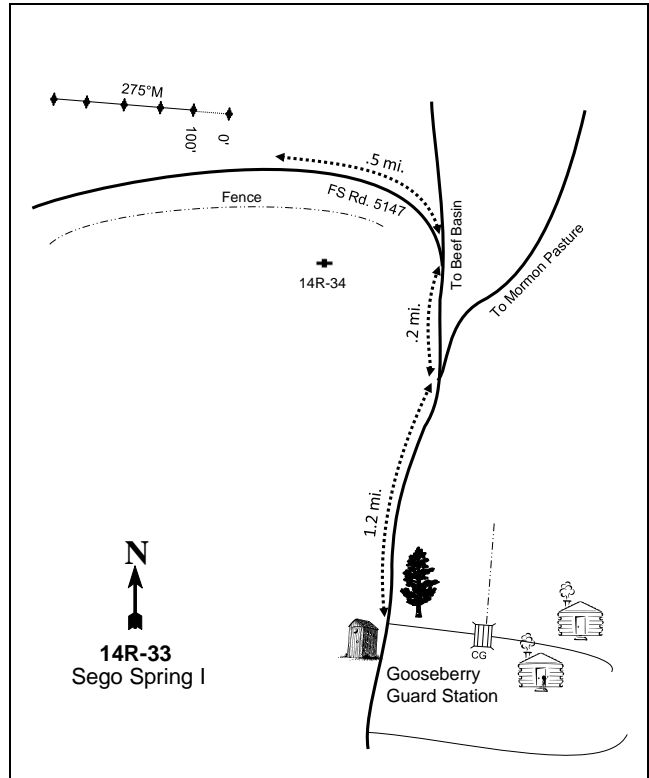
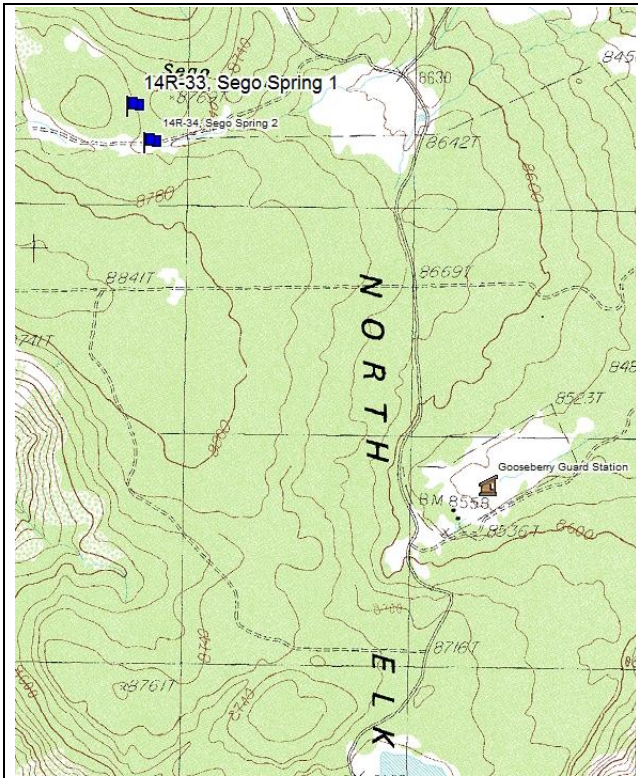
Type	Quadrat Frequency		Days use per acre (ha)	
	'11	'14	'11	'14
Rabbit	10	2	-	-
Elk	13	2	22 (55)	12 (30)
Deer	5	-	11 (28)	-
Cattle	-	1	6 (14)	-

BROWSE CHARACTERISTICS--
Management unit 14R, Study no: 25

Year	Plants per Acre (excluding seedlings)	Age class distribution			Seedling (plants/acre)	Utilization			Average Height Crown (in)
		% Young	% Mature	% Decadent		% moderate	% heavy	% poor vigor	
Artemisia tridentata vaseyana									
11	60	0	33	67	-	0	67	33	12/25
14	20	0	100	0	-	0	0	0	15/25
Cercocarpus montanus									
11	0	0	0	-	-	0	0	0	31/34
14	0	0	0	-	-	0	0	0	19/23
Echinocereus mojavnensis									
11	0	0	0	-	-	0	0	0	-/-
14	0	0	0	-	-	0	0	0	2/8
Gutierrezia sarothrae									
11	40	0	100	-	-	0	0	0	6/6
14	340	76	24	-	-	18	0	0	8/13

Year	Plants per Acre (excluding seedlings)	Age class distribution			Seedling (plants/acre)	Utilization		% poor vigor	Average Height Crown (in)
		% Young	% Mature	% Decadent		% moderate	% heavy		
<i>Juniperus osteosperma</i>									
11	100	0	0	100	-	0	0	60	-/-
14	20	0	0	100	-	0	0	100	-/-
<i>Opuntia sp.</i>									
11	320	31	69	0	-	0	0	0	3/12
14	220	36	55	9	-	0	0	9	4/10
<i>Pediocactus simpsonii</i>									
11	0	0	0	-	-	0	0	0	3/12
14	0	0	0	-	-	0	0	0	-/-
<i>Pinus edulis</i>									
11	180	22	22	56	20	11	0	11	-/-
14	60	67	33	0	40	0	0	0	-/-
<i>Yucca baccata</i>									
11	0	0	0	-	-	0	0	0	7/11
14	0	0	0	-	-	0	0	0	6/46

SEGO SPRING I - TREND STUDY NO. 14R-33



Location Information

USGS 7.5 min Map Info Poison Canyon; Township 34S, Range 19E, Section 12
 GPS (0' Stake) NAD 83, UTM Zone 12, 606679 East 4188573 North

Transect Information

Browse Tag # (0' Stake) Not Available
 Transect Bearing 275° magnetic
 Length 500ft
 Belt Placement Line 1 (11ft), Line 2 (34ft), Line 3 (59ft), Line 4 (71ft), Line 5 (95ft)
 Belt Marker Placement No Rebar or Stakes

Directions to Site

From Gooseberry Guard Station head north for 1.2 miles to Beef Basin road and take the left fork of the road. Drive for 0.2 miles to FS road 5147 and again take the left fork. After 0.5 miles, the site will be on the right (north) side of the road. Study 14R-34 is on the south side of the road.

Site Information

Land Ownership USFS
 Allotment Not Available
 Elevation 8,766ft (2,671m)
 Aspect Southeast
 Slope 4-8%
 Sample Dates 08/26/2014

DISTURBANCE HISTORY--

Management unit 14R, Study no: 33

<i>Treatment/Disturbance</i>	<i>Name</i>	<i>WRI DB #</i>	<i>Date</i>	<i>Size (acres)</i>
*Logging: Clear Cut	North Elk Ridge Aspen Restoration Phase I	3004	2015	95

The table is a recorded disturbance history of the study site.

*Proposed treatment

Habitat and Vegetation Information

Wildlife Habitat Deer, Crucial Summer; Elk, Crucial Summer

VEGETATION HISTORY--

Management unit 14R, Study no: 33

<i>Year</i>	<i>Vegetation Type¹</i>
2014	Quaking Aspen/Gambel Oak/Snowberry

¹Vegetation Type (Appendix - Vegetation Type)

Site Notes

This site is located within an enclosure. Deer, elk, and cattle use was estimated as light in 2014 (Table – Pellet Group Data).

Site Potential

1981-2010 Average Annual Precipitation 26 inches
 NRCS Ecological Site High Mountain Loam (Aspen)
 NRCS Ecological Site # R048AY506UT

States and Transitions

No state and transition model is available for the above ecological site.

This site was established in 2014, and was an aspen (*Populus tremuloides*) community with a shrub understory of Gambel oak (*Quercus gambelii*) and snowberry (*Symphoricarpos oreophilus*) (Table – Browse Trends). The perennial herbaceous understory is abundant with a diverse number of grasses and forbs (Table – Herbaceous Trends).

Trend Summary

HERBACEOUS TRENDS--

Management unit 14R, Study no: 33

T y p e	Species	Nested Frequency	Average Cover %
		'14	'14
G	Agropyron dasystachyum	84	3.10
G	Agropyron intermedium	3	.03
G	Bromus anomalus	2	.03

Type	Species	Nested	Average
		Frequency	Cover %
		'14	'14
G	Bromus inermis	193	4.66
G	Dactylis glomerata	208	8.34
G	Koeleria cristata	7	.18
G	Phleum pratense	11	.16
G	Poa fendleriana	2	.00
G	Poa pratensis	238	9.73
G	Sitanion hystrix	18	.33
G	Stipa lettermani	16	.16
Total for Annual Grasses		0	0
Total for Perennial Grasses		782	26.75
Total for Grasses		782	26.75
F	Achillea millefolium	59	1.12
F	Arabis holboellii	3	.03
F	Cirsium sp.	3	.03
F	Collinsia parviflora (a)	2	.00
F	Descurainia pinnata (a)	11	.25
F	Dracocephalum parviflorum	4	.00
F	Erigeron flagellaris	213	11.64
F	Eriogonum racemosum	1	.00
F	Eriogonum umbellatum	2	.00
F	Heterotheca villosa	5	.09
F	Lathyrus brachycalyx	108	1.48
F	Lupinus sp.	14	.22
F	Lychnis drummondii	2	.03
F	Penstemon comarrhenus	7	.16
F	Phacelia heterophylla	2	.01
F	Phlox longifolia	26	.15
F	Polygonum douglasii (a)	10	.04
F	Senecio neomexicanus	34	.47
F	Stellaria jamesiana	24	.07
F	Taraxacum officinale	146	1.52
F	Thermopsis montana	5	.06
F	Trifolium sp.	3	.01
F	Vicia americana	15	.06
Total for Annual Forbs		23	0.30
Total for Perennial Forbs		676	17.20
Total for Forbs		699	17.50

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

BROWSE TRENDS--

Management unit 14R, Study no: 33

Type	Species	Quadrat Cover %	Line Intercept Cover %
		'14	'14
B	Mahonia repens	.15	-
B	Populus tremuloides	.56	11.20
B	Quercus gambelii	1.22	17.20
B	Symphoricarpos oreophilus	8.05	12.43
Total for Browse		9.98	40.83

POINT-QUARTER TREE DATA--

Management unit 14R, Study no: 33

Species	Trees per Acre	Average diameter (in)
	'14	'14
Pinus ponderosa	19	12.6
Populus tremuloides	196	6.8
Quercus gambelii	49	5.8

BASIC COVER--

Management unit 14R, Study no: 33

Cover Type	Average Cover %
	'14
Vegetation	56.00
Rock	.59
Pavement	.19
Litter	63.56
Cryptogams	.02
Bare Ground	8.14

PELLET GROUP DATA--

Management unit 14R, Study no: 33

Type	Quadrat Frequency	Days use per acre (ha)
	'14	'14
Elk	16	18 (45)
Deer	5	17 (43)
Cattle	11	6 (14)

BROWSE CHARACTERISTICS--

Management unit 14R, Study no: 33

		Age class distribution					Utilization			
Year	Plants per Acre (excluding seedlings)	% Young	% Mature	% Decadent	Seedling (plants/acre)	% moderate	% heavy	% poor vigor	Average Height Crown (in)	
Mahonia repens										
14	60	0	100	-	-	0	0	0	4/5	
Purshia tridentata										
14	0	0	0	-	40	0	0	0	-/-	
Quercus gambelii										
14	1140	70	30	-	180	16	0	7	11/10	
Symphoricarpos oreophilus										
14	3340	25	72	3	60	29	2	10	23/32	

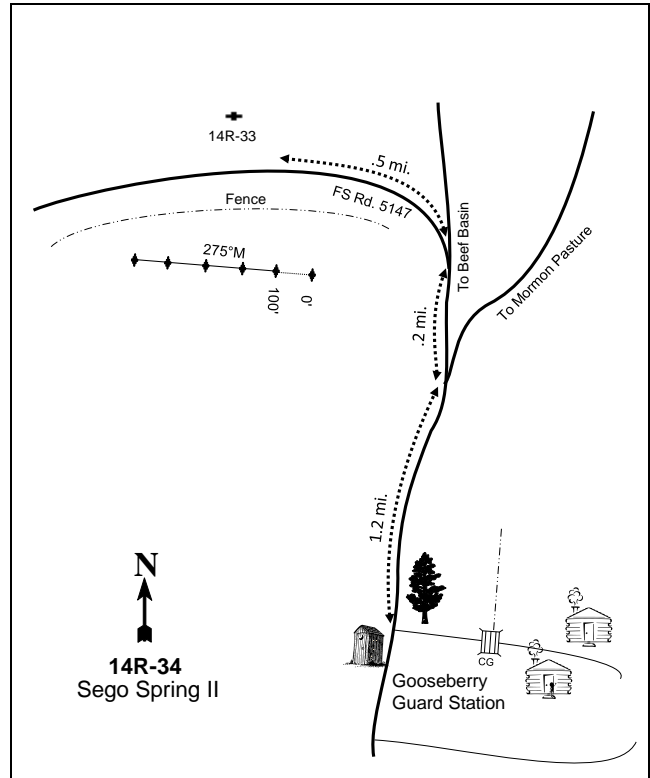
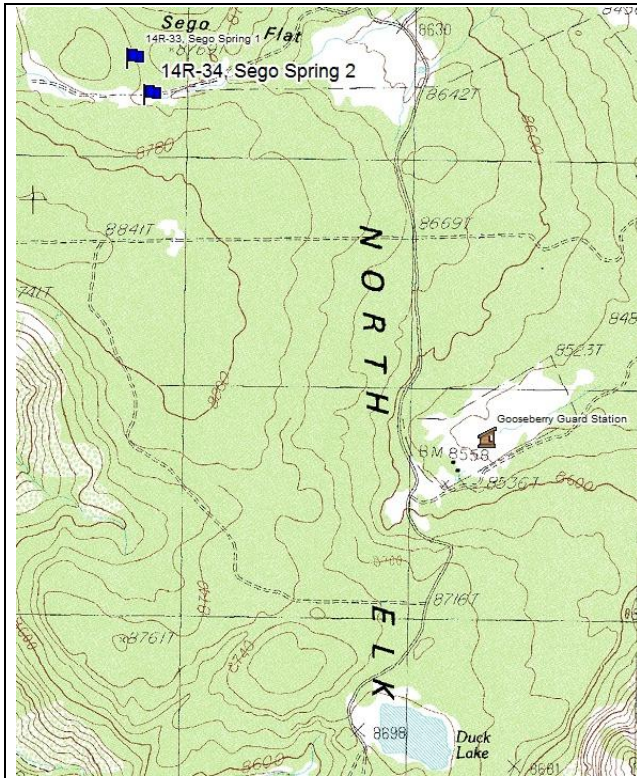
ASPEN CHARACTERISTICS--

Management unit 14R, Study no: 33

		Age class distribution						Utilization			
Year	Plants per Acre	% Class I	% Class II	% Class III	% Class IV	% moderate	% heavy	% poor vigor			
Populus tremuloides											
14	1220	38	57	0	5	45	5	11			

Class I= less than or equal to 1.5 ft; Class II=greater than 1.5 ft to 5 ft; Class III=greater than 5ft and up to 1 in. dbh; Class IV=greater than 1 in. dbh

SEGO SPRING II - TREND STUDY NO. 14R-34



Location Information

USGS 7.5 min Map Info Poison Canyon; Township 34S, Range 19E, Section 12
 GPS (0' Stake) NAD 83, UTM Zone 12, 606757 East 4188419 North

Transect Information

Browse Tag # (0' Stake) Not Available
 Transect Bearing 275° magnetic
 Length 500ft
 Belt Placement Line 1 (11ft), Line 2 (34ft), Line 3 (59ft), Line 4 (71ft), Line 5 (95ft)
 Belt Marker Placement No Rebar or Stakes

Directions to Site

From Gooseberry Guard Station head north for 1.2 miles to Beef Basin road and take the left fork of the road. Drive for 0.2 miles to FS road 5147 and again take the left fork. After 0.5 miles, the site will be on the left (south) side of the road. Study 14R-33 is on the north side of the road.

Site Information

Land Ownership USFS
 Allotment Not Available
 Elevation 8,766ft (2,671m)
 Aspect East
 Slope 2-5%
 Sample Dates 08/26/2014

Habitat and Vegetation Information

Wildlife Habitat Deer, Crucial Summer; Elk, Crucial Summer

VEGETATION HISTORY--

Management unit 14R, Study no: 34

Year	Vegetation Type ¹
2014	Quaking Aspen/Snowberry

¹Vegetation Type (Appendix - Vegetation Type)

Site Notes

This site is being read in conjunction with 14R-33 which is inside an enclosure.

Site Potential

1981-2010 Average Annual Precipitation 26 inches
 NRCS Ecological Site High Mountain Loam (Aspen)
 NRCS Ecological Site # R048AY506UT

States and Transitions

No state and transition model is available for the above ecological site.

This site was established in 2014, and was a mixed stand of quaking aspen (*Populus tremuloides*) and snowberry (*Symphoricarpos oreophilus*) with a few other browse species that offered little cover (Table – Browse Trends). The perennial herbaceous understory is abundant with a diverse number of grasses and forbs (Table – Herbaceous Trends).

Trend Summary

HERBACEOUS TRENDS--

Management unit 14R, Study no: 34

T y p e	Species	Nested Frequency	Average Cover %
		'14	'14
G	Agropyron dasystachyum	33	1.43
G	Agropyron spicatum	1	.03
G	Agropyron trachycaulum	44	1.78
G	Bromus anomalus	7	.21
G	Bromus carinatus	22	.43
G	Bromus inermis	25	1.55
G	Dactylis glomerata	62	2.95
G	Festuca thurberi	22	1.42
G	Koeleria cristata	5	.15
G	Phleum pratense	1	.03
G	Poa bulbosa	17	.17

Type	Species	Nested	Average
		Frequency	Cover %
		'14	'14
G	<i>Poa pratensis</i>	322	11.96
G	<i>Poa secunda</i>	2	.03
G	<i>Sitanion hystrix</i>	69	2.12
G	<i>Stipa columbiana</i>	6	.21
G	<i>Stipa comata</i>	8	.56
Total for Annual Grasses		0	0
Total for Perennial Grasses		646	25.06
Total for Grasses		646	25.06
F	<i>Achillea millefolium</i>	183	3.31
F	<i>Allium</i> sp.	3	.00
F	<i>Androsace septentrionalis</i> (a)	5	.02
F	<i>Aster</i> sp.	5	.18
F	<i>Castilleja linariaefolia</i>	2	.15
F	<i>Cymopterus</i> sp.	4	.03
F	<i>Erigeron flagellaris</i>	183	12.28
F	<i>Erigeron</i> sp.	17	.15
F	<i>Eriogonum racemosum</i>	2	.00
F	<i>Eriogonum umbellatum</i>	1	.00
F	<i>Heterotheca villosa</i>	19	.60
F	<i>Lathyrus brachycalyx</i>	79	2.25
F	<i>Lupinus</i> sp.	1	.00
F	<i>Lychnis drummondii</i>	6	.04
F	<i>Machaeranthera canescens</i>	3	.18
F	<i>Osmorhiza depauperata</i>	3	.03
F	<i>Phlox longifolia</i>	15	.06
F	<i>Polygonum douglasii</i> (a)	2	.01
F	<i>Senecio neomexicanus</i>	8	.09
F	<i>Stellaria jamesiana</i>	34	.19
F	<i>Taraxacum officinale</i>	204	2.31
F	<i>Tragopogon dubius</i> (a)	-	.00
F	<i>Trifolium</i> sp.	155	.83
Total for Annual Forbs		7	0.03
Total for Perennial Forbs		927	22.74
Total for Forbs		934	22.78

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

BROWSE TRENDS--

Management unit 14R, Study no: 34

Type	Species	Quadrat	Line
		Cover %	Intercept
		'14	'14
B	Amelanchier utahensis	-	.05
B	Mahonia repens	1.17	1.75
B	Pinus ponderosa	.01	-
B	Populus tremuloides	.02	37.65
B	Pseudotsuga menziesii	.15	.18
B	Quercus gambelii	.15	.66
B	Rosa woodsii	.00	.11
B	Symphoricarpos oreophilus	13.15	20.28
Total for Browse		14.65	60.68

POINT-QUARTER TREE DATA--

Management unit 14R, Study no: 34

Species	Trees per	Average
	Acre	
		(in)
		'14
Pinus ponderosa	20	17.8
Populus tremuloides	243	8.6
Quercus gambelii	19	5.5

BASIC COVER--

Management unit 14R, Study no: 34

Cover Type	Average	
		Cover %
		'14
Vegetation	58.39	
Rock	2.25	
Pavement	.28	
Litter	59.47	
Cryptogams	.10	
Bare Ground	8.39	

PELLET GROUP DATA--

Management unit 14R, Study no: 34

Type	Quadrat	Days use
	Frequency	
		(ha)
		'14
Elk	10	9 (23)
Deer	5	13 (31)
Cattle	2	2 (4)

BROWSE CHARACTERISTICS--
Management unit 14R, Study no: 34

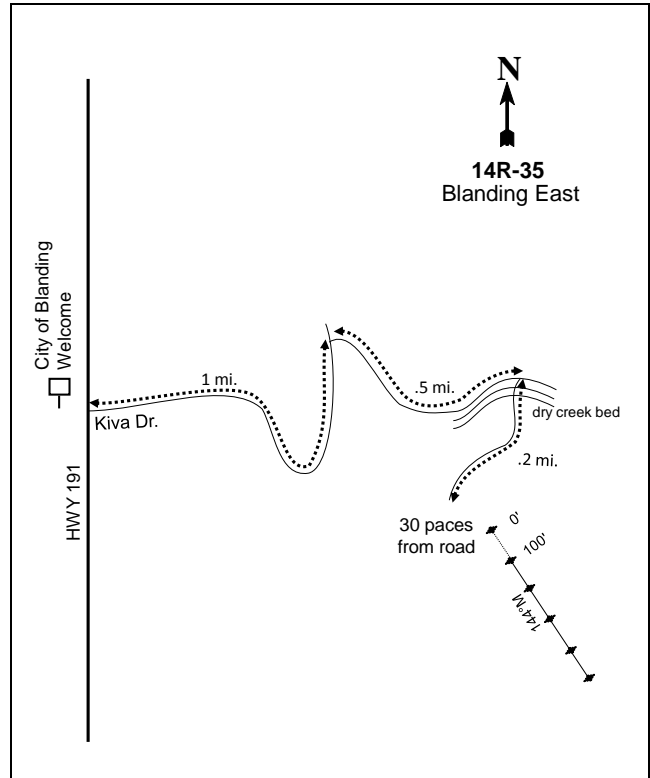
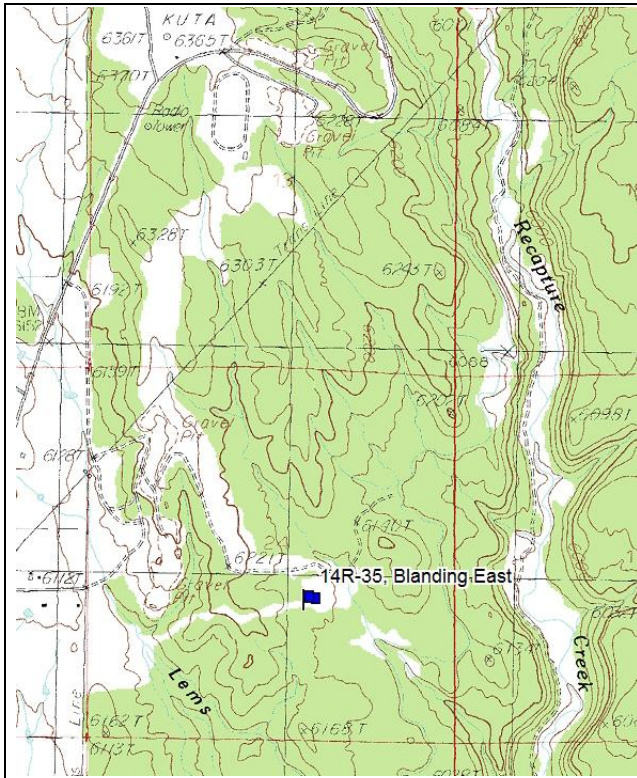
		Age class distribution					Utilization			
Year	Plants per Acre (excluding seedlings)	% Young	% Mature	% Decadent	Seedling (plants/acre)	% moderate	% heavy	% poor vigor	Average Height Crown (in)	
<i>Amelanchier utahensis</i>										
14	20	100	0	-	-	0	0	0	-/-	
<i>Mahonia repens</i>										
14	2000	7	93	-	-	0	0	55	5/6	
<i>Pinus ponderosa</i>										
14	0	0	0	-	40	0	0	0	-/-	
<i>Pseudotsuga menziesii</i>										
14	20	100	0	-	-	0	0	0	-/-	
<i>Quercus gambelii</i>										
14	80	100	0	-	80	0	0	0	11/7	
<i>Rosa woodsii</i>										
14	80	75	0	25	-	50	0	0	20/17	
<i>Symphoricarpos oreophilus</i>										
14	5740	25	75	0	120	25	5	1	19/30	

ASPEN CHARACTERISTICS--
Management unit 14R, Study no: 34

		Age class distribution						Utilization			
Year	Plants per Acre	% Class I	% Class II	% Class III	% Class IV	% moderate	% heavy	% poor vigor			
<i>Populus tremuloides</i>											
14	580	38	28	0	35	11	28	50			

Class I= less than or equal to 1.5 ft; Class II=greater than 1.5 ft to 5 ft; Class III=greater than 5ft and up to 1 in. dbh; Class IV=greater than 1 in. dbh

BLANDING EAST - TREND STUDY NO. 14R-35



Location Information

USGS 7.5 min Map Info Blanding North; Township 36S, Range 22E, Section 24
 GPS (0' Stake) NAD 83, UTM Zone 12, 637021 East 4167042 North

Transect Information

Browse Tag # (0' Stake) Not Available
 Transect Bearing 144° magnetic
 Length 500ft
 Belt Placement Line 1 (11ft), Line 2 (34ft), Line 3 (59ft), Line 4 (71ft), Line 5 (95ft)
 Belt Marker Placement No Rebar or Stakes

Directions to Site

Driving on HWY 191 out of Blanding turn east on to Kiva Dr. and drive for 1 mile. Turn right (east) and drive for 0.5 miles. Turn right (south) crossing a dry creek bed, and continue for 0.2 miles. The site is located on the east side of the road at 30 paces.

Site Information

Land Ownership BLM
Allotment Bulldog
Elevation 6,141ft (1,871m)
Aspect East
Slope 4%
Sample Dates 08/26/2014

DISTURBANCE HISTORY--

Management unit 14R, Study no: 35

<i>Treatment/Disturbance</i>	<i>Name</i>	<i>WRI DB #</i>	<i>Date</i>	<i>Size (acres)</i>
Bullhog/Lop and Scatter	Blanding East Fuel Reduction and Vegetation Restoration – Phase I	3000	Fall 2014-2015	500
Seeding: Aerial Before	Blanding East Fuel Reduction and Vegetation Restoration – Phase I	3000	Fall 2014-2015	208

The table is a recorded disturbance history of the study site.

Habitat and Vegetation Information

Wildlife Habitat Deer, Crucial Spring/Fall; Elk, Crucial Winter

VEGETATION HISTORY--

Management unit 14R, Study no: 35

<i>Year</i>	<i>Vegetation Type¹</i>	<i>Woodland Succession²</i>
2014	Pinyon-Juniper	Phase II transitioning to Phase III

¹Vegetation Type (Appendix - Vegetation Type), ²Woodland Succession (Tausch, Miller, Roundy, & Chambers, 2009).

Site Notes

Deer, elk, and cattle use was light in 2014 (Table – Pellet Group Data).

Site Potential

1981-2010 Average Annual Precipitation 14 inches
NRCS Ecological Site Upland Loam (Pinyon-Utah Juniper)
NRCS Ecological Site # [R036XY307UT](#)

States and Transitions

A defined [state and transition model](#) is available.

This site was established in 2014, and is in phase II encroachment by pinyon pine (*Pinus edulis*) and Utah juniper (*Juniperus osteosperma*). It is in the Current Potential State (State 2) due to the presence of non-native forbs. It falls within community phase 2.2 because it is pinyon-juniper woodland with very little understory and the presence of non-natives. Threats to this state are increased establishment of non-native plants, catastrophic fire, improper livestock grazing, and off highway vehicle (OHV) overuse. A frequent fire return interval could cause this site to cross a threshold into the Invasive Annual State (State 3) from which there is no documented return. Through vegetation manipulation and seeding this state would transition into the Seeded State (State 4) which is dominated by non-native perennial grasses and forbs. Since it is often difficult if not impossible to remove introduced plants, this site cannot return to the Reference State (State 1) (USDA-NRCS, 2011).

Trend Summary

HERBACEOUS TRENDS--

Management unit 14R, Study no: 35

Type	Species	Nested Frequency	Average Cover %
		'14	'14
G	<i>Oryzopsis hymenoides</i>	1	.00
G	<i>Sitanion hystrix</i>	7	.01
G	<i>Vulpia octoflora</i> (a)	2	.03
Total for Annual Grasses		2	0.03
Total for Perennial Grasses		8	0.02
Total for Grasses		10	0.05
F	<i>Arabis</i> sp.	1	.00
F	<i>Penstemon</i> sp.	3	.01
F	<i>Phlox hoodii</i>	3	.00
F	<i>Portulaca oleracea</i> (a)	2	.00
Total for Annual Forbs		2	0.00
Total for Perennial Forbs		7	0.02
Total for Forbs		9	0.02

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

BROWSE TRENDS--

Management unit 14R, Study no: 35

Type	Species	Quadrat Cover %	Line Intercept Cover %
		'14	'14
B	<i>Artemisia tridentata wyomingensis</i>	.03	.08
B	<i>Ephedra viridis</i>	-	.16
B	<i>Gutierrezia sarothrae</i>	.04	.18
B	<i>Juniperus osteosperma</i>	6.16	20.91
B	<i>Pinus edulis</i>	4.77	8.26
B	<i>Purshia tridentata</i>	.40	.48
Total for Browse		11.41	29.59

POINT-QUARTER TREE DATA--

Management unit 14R, Study no: 35

Species	Trees per Acre	Average diameter (in)
	'14	'14
<i>Juniperus osteosperma</i>	151	12.4
<i>Pinus edulis</i>	64	4.7

BASIC COVER--

Management unit 14R, Study no: 35

Cover Type	Average Cover % '14
Vegetation	10.91
Rock	5.09
Pavement	1.14
Litter	36.57
Cryptogams	1.93
Bare Ground	50.75

PELLET GROUP DATA--

Management unit 14R, Study no: 35

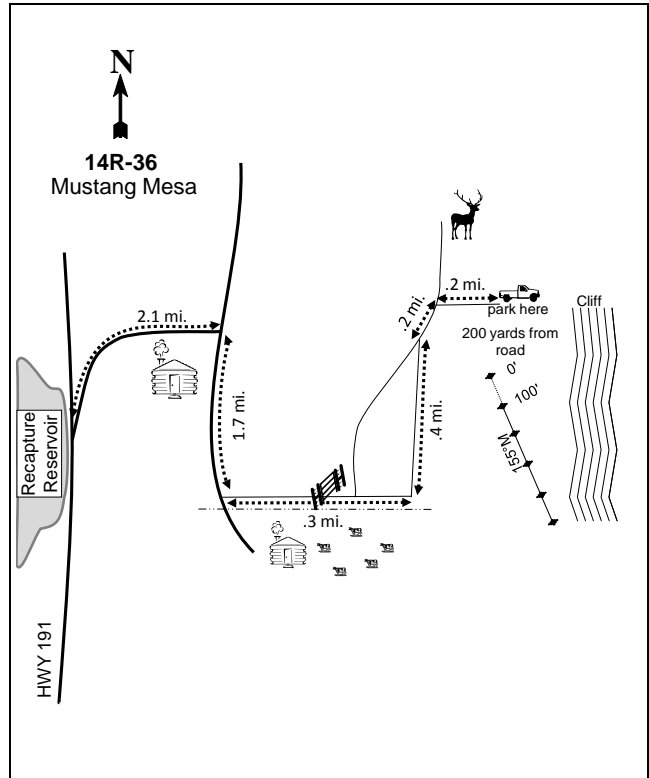
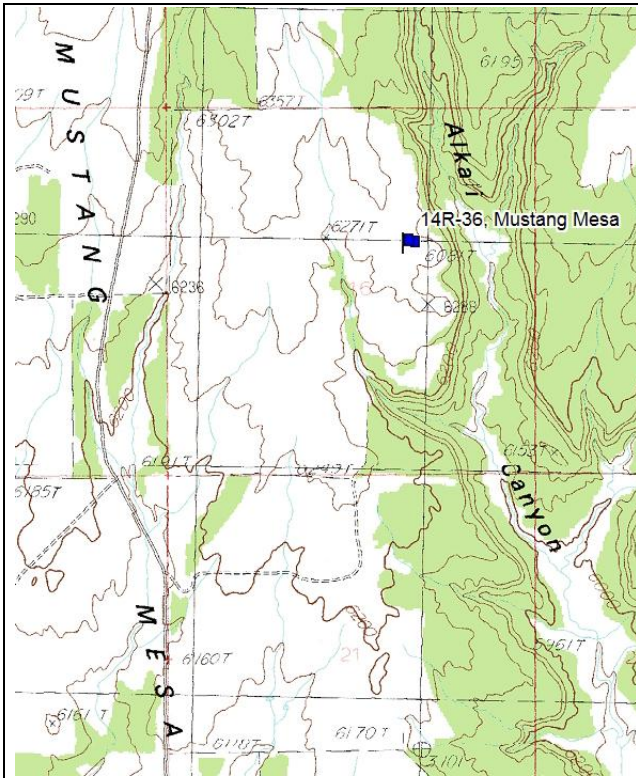
Type	Quadrat Frequency '14	Days use per acre (ha) '14
Rabbit	2	-
Elk	-	2 (5)
Deer	3	5 (12)
Cattle	-	2 (4)

BROWSE CHARACTERISTICS--

Management unit 14R, Study no: 35

Year	Plants per Acre (excluding seedlings)	Age class distribution			Seedling (plants/acre)	Utilization		% poor vigor	Average Height Crown (in)
		% Young	% Mature	% Decadent		% moderate	% heavy		
<i>Artemisia tridentata vaseyana</i>									
14	0	0	0	-	-	0	0	0	29/31
<i>Artemisia tridentata wyomingensis</i>									
14	40	0	50	50	-	0	0	50	17/16
<i>Echinocereus mojavensis</i>									
14	0	0	0	-	-	0	0	0	3/6
<i>Ephedra viridis</i>									
14	20	0	0	100	-	0	0	0	18/16
<i>Gutierrezia sarothrae</i>									
14	460	0	91	9	20	0	0	0	6/8
<i>Juniperus osteosperma</i>									
14	280	7	86	7	-	0	0	7	-/-
<i>Pinus edulis</i>									
14	100	60	40	-	-	0	0	0	-/-
<i>Purshia tridentata</i>									
14	440	0	9	91	-	0	0	5	11/26
<i>Yucca sp.</i>									
14	0	0	0	-	-	0	0	0	21/35

MUSTANG MESA - TREND STUDY NO. 14R-36



Location Information

USGS 7.5 min Map Info Blanding North; Township 36S, Range 23E, Section 16
 GPS (0' Stake) NAD 83, UTM Zone 12, 641832 East 4169137 North

Transect Information

Browse Tag # (0' Stake) Not Available
 Transect Bearing 155° magnetic
 Length 500ft
 Belt Placement Line 1 (11ft), Line 2 (34ft), Line 3 (59ft), Line 4 (71ft), Line 5 (95ft)
 Belt Marker Placement No Rebar or Stakes

Directions to Site

Driving on HWY 191 turn east across from Recapture Reservoir and follow the road around a curve until it “T’s” into another road. Turn right (south) here and follow this road for 1.7 miles. Turn left (east) and drive along the fence line for 0.3 miles, passing through a gate. After 0.3 miles take another left and head north for 0.4 miles. The road forks at this point, follow the right fork for 0.2 miles and then turn right at the following fork. Drive on this road for 0.2 miles and then park, the site is 200 yards from the road.

Site Information

Land Ownership SITLA
Allotment Alkali Point
Elevation 6,299ft (1,919m)
Aspect Southeast
Slope 3%
Sample Dates 8/26/2014

DISTURBANCE HISTORY--

Management unit 14R, Study no: 36

<i>Treatment/Disturbance</i>	<i>Name</i>	<i>WRI DB #</i>	<i>Date</i>	<i>Size (acres)</i>
*Lop and Scatter	Mustang Mesa Lop and Scatter	3050	2015	420
*Seeding: Aerial	Mustang Mesa Lop and Scatter	3050	2015	450

The table is a recorded disturbance history of the study site.

*Proposed treatment

Habitat and Vegetation Information

Wildlife Habitat Deer, Crucial Spring/Fall

VEGETATION HISTORY--

Management unit 14R, Study no: 36

<i>Year</i>	<i>Vegetation Type¹</i>	<i>Woodland Succession²</i>
2014	Pinyon-Juniper	Phase II

¹Vegetation Type (Appendix - Vegetation Type), ²Woodland Succession (Tausch, Miller, Roundy, & Chambers, 2009).

Site Notes

Deer and elk use was light in 2014 (Table – Pellet Group Data).

Site Potential

1981-2010 Average Annual Precipitation 14 inches
NRCS Ecological Site Upland Shallow Loam (Pinyon-Utah Juniper)
NRCS Ecological Site # R035XY315UT

States and Transitions

No state and transition model is available for the above ecological site, but it is likely similar to the [Upland Shallow Loam \(Pinyon-Utah Juniper\), R036XY315UT](#) ecological site, which does have a defined state and transition model (USDA-NRCS, 2011).

This site was established in 2014, and was in phase II encroachment of a pinyon pine (*Pinus edulis*) and Utah juniper (*Juniperus osteosperma*) community with a number of other browse species also present such as Wyoming big sagebrush (*Artemisia tridentata* ssp. *wyomingensis*), antelope bitterbrush (*Purshia tridentata*), and true mountain mahogany (*Cercocarpus montanus*) (Table – Browse Trends). The herbaceous understory cover was very low with total cover being less than one percent (Table – Herbaceous Trends).

Trend Summary

HERBACEOUS TRENDS--

Management unit 14R, Study no: 36

T y p e	Species	Nested Frequency	Average Cover %
		'14	'14
G	<i>Oryzopsis hymenoides</i>	3	.03
G	<i>Sitanion hystrix</i>	7	.04
Total for Annual Grasses		0	0
Total for Perennial Grasses		10	0.07
Total for Grasses		10	0.07
F	<i>Descurainia pinnata</i> (a)	1	.00
F	<i>Euphorbia</i> sp.	3	.01
F	<i>Lepidium</i> sp. (a)	39	.11
F	<i>Penstemon</i> sp.	5	.01
F	<i>Platyschkuhria integrifolia</i>	1	.15
Total for Annual Forbs		40	0.12
Total for Perennial Forbs		9	0.17
Total for Forbs		49	0.29

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

BROWSE TRENDS--

Management unit 14R, Study no: 36

T y p e	Species	Average Cover %	Line Intercept Cover %
		'14	'14
B	<i>Artemisia tridentata</i> <i>wyomingensis</i>	5.56	7.73
B	<i>Cercocarpus montanus</i>	.38	1.15
B	<i>Cowania mexicana</i> <i>stansburiana</i>	.03	.65
B	<i>Ephedra viridis</i>	.33	1.28
B	<i>Gutierrezia sarothrae</i>	1.57	1.50
B	<i>Juniperus osteosperma</i>	8.99	15.28
B	<i>Pinus edulis</i>	2.78	6.31
B	<i>Purshia tridentata</i>	1.27	1.55
Total for Browse		20.92	35.45

BASIC COVER--

Management unit 14R, Study no: 36

Cover Type	Average Cover % '14
Vegetation	22.05
Rock	.97
Pavement	.65
Litter	45.89
Cryptogams	.10
Bare Ground	46.78

PELLET GROUP DATA--

Management unit 14R, Study no: 36

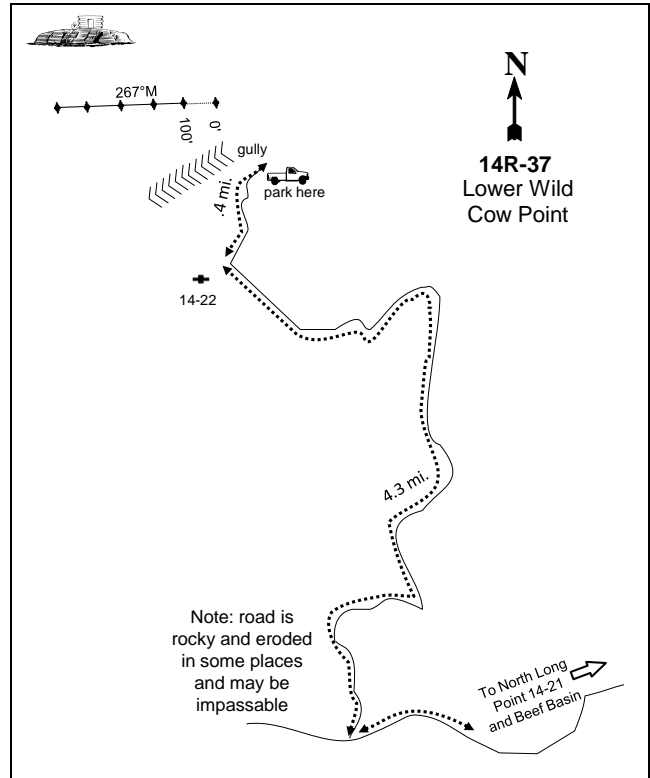
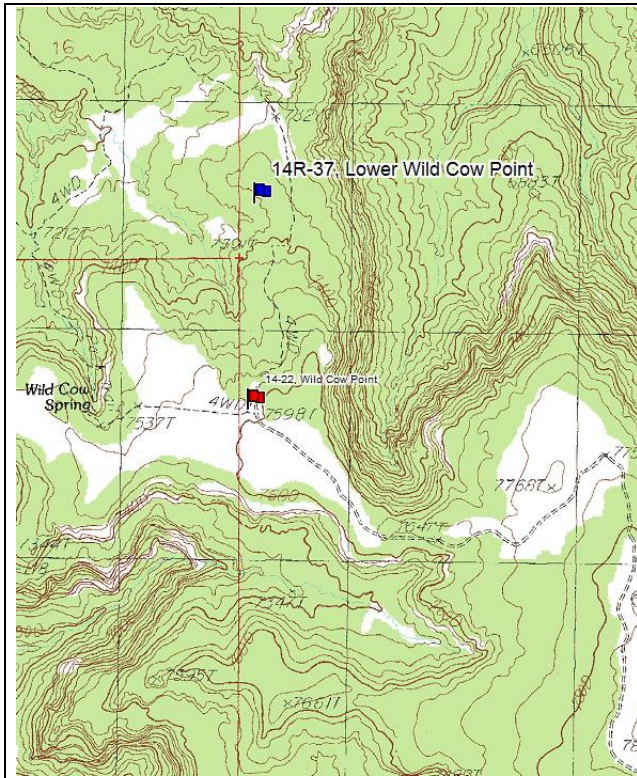
Type	Quadrat Frequency '14	Days use per acre (ha) '14
Rabbit	13	-
Elk	-	2 (5)
Deer	9	18 (45)

BROWSE CHARACTERISTICS--

Management unit 14R, Study no: 36

Year	Plants per Acre (excluding seedlings)	Age class distribution			Seedling (plants/acre)	Utilization			Average Height Crown (in)
		% Young	% Mature	% Decadent		% moderate	% heavy	% poor vigor	
<i>Amelanchier utahensis</i>									
14	0	0	0	-	-	0	0	0	76/71
<i>Artemisia tridentata wyomingensis</i>									
14	840	26	57	17	20	10	2	19	34/39
<i>Cercocarpus montanus</i>									
14	60	0	33	67	-	33	0	67	43/62
<i>Cowania mexicana stansburiana</i>									
14	80	0	25	75	-	100	0	0	62/59
<i>Ephedra viridis</i>									
14	120	33	50	17	-	0	0	33	35/45
<i>Gutierrezia sarothrae</i>									
14	3320	14	78	8	220	0	0	7	7/8
<i>Juniperus osteosperma</i>									
14	140	14	86	-	-	0	0	0	-/-
<i>Pinus edulis</i>									
14	60	33	67	-	-	0	0	0	-/-
<i>Purshia tridentata</i>									
14	520	0	27	73	-	4	0	27	24/34

LOWER WILD COW POINT - TREND STUDY NO. 14R-37



Location Information

USGS 7.5 min Map Info Fable Valley; Township 33S, Range 18E, Section 15
 GPS (0' Stake) NAD 83, UTM Zone 12, 593513 East 4195753 North

Transect Information

Browse Tag # (0' Stake) Not Available
 Transect Bearing 267° magnetic
 Length 500ft
 Belt Placement Line 1 (11ft), Line 2 (34ft), Line 3 (59ft), Line 4 (71ft), Line 5 (95ft)
 Belt Marker Placement No Rebar or Stakes

Directions to Site

Drive to the North Long Point study (14-21). From the west rim of North Long Point, proceed west down the dugway on the Dark Canyon Plateau Road for 5.4 miles. Turn north on the Wild Cow Point Road and go 4.3 miles to a chaining and a faint road to the left (west). This is the Wild Cow Point study (14-22). Continue down the road another 0.4 miles and park on the road and hike down to the study, crossing a gully.

Site Information

Land Ownership BLM
 Allotment Indian Creek
 Elevation 7,349ft (2,240m)
 Aspect Southwest
 Slope 3-6%
 Sample Dates 08/27/2014

DISTURBANCE HISTORY--

Management unit 14R, Study no: 37

Treatment/Disturbance	Name	WRI DB #	Date	Size (acres)
*Bullhog	Dark Canyon Plateau Phase II	2938	2015	-

The table is a recorded disturbance history of the study site.

*Proposed treatment

Habitat and Vegetation Information

Wildlife Habitat Deer, Crucial Year-Long; Elk, Crucial Winter

VEGETATION HISTORY--

Management unit 14R, Study no: 37

Year	Vegetation Type ¹	Woodland Succession ²
2014	Pinyon-Juniper	Phase III

¹Vegetation Type (Appendix - Vegetation Type), ²Woodland Succession (Tausch, Miller, Roundy, & Chambers, 2009).

Site Notes

Deer and elk use was light in 2014 (Table – Pellet Group Data).

Site Potential

1981-2010 Average Annual Precipitation 15 inches
 NRCS Ecological Site Upland Loam (Mountain Big Sagebrush)
 NRCS Ecological Site # R048AY306UT

States and Transitions

No state and transition model is available for the above ecological site.

This site was established in 2014, and was in phase III pinyon pine (*Pinus edulis*) and Utah juniper (*Juniperus osteosperma*) encroachment. There was also a small component of Wyoming big sagebrush (*Artemisia tridentata* ssp. *wyomingensis*) as well as other browse species that provided limited cover (Table – Browse Trends). Perennial grasses and forbs provided minimal cover on the site. Forbs were the most diverse group but individual species had little cover (Table – Herbaceous Trends). This site will continue to degrade unless treatment or a disturbance changes the current plant composition. In addition, the study’s current state provides a high potential for catastrophic fire and weed invasion.

Trend Summary

HERBACEOUS TRENDS--

Management unit 14R, Study no: 37

Type	Species	Nested Frequency '14	Average Cover % '14
G	Agropyron spicatum	3	.00

Type	Species	Nested	Average
		Frequency	Cover %
		'14	'14
G	<i>Bouteloua gracilis</i>	68	3.98
G	<i>Bromus tectorum</i> (a)	9	.01
G	<i>Oryzopsis hymenoides</i>	13	.14
G	<i>Poa fendleriana</i>	108	3.00
G	<i>Sitanion hystrix</i>	49	.59
G	<i>Stipa comata</i>	31	1.58
G	<i>Vulpia octoflora</i> (a)	29	.06
Total for Annual Grasses		38	0.08
Total for Perennial Grasses		272	9.31
Total for Grasses		310	9.39
F	<i>Arabis</i> sp.	22	.13
F	<i>Astragalus convallarius</i>	4	.04
F	<i>Astragalus mollissimus</i>	12	.05
F	<i>Chaenactis douglasii</i>	8	.09
F	<i>Cordylanthus</i> sp. (a)	2	.03
F	<i>Cryptantha</i> sp.	3	.15
F	<i>Descurainia pinnata</i> (a)	12	.06
F	<i>Erigeron pumilus</i>	1	.03
F	<i>Eriogonum racemosum</i>	11	.19
F	<i>Eriogonum umbellatum</i>	5	.06
F	<i>Gilia</i> sp. (a)	19	.04
F	<i>Haplopappus acaulis</i>	3	.03
F	<i>Ipomopsis aggregata</i>	6	.01
F	<i>Lappula occidentalis</i> (a)	7	.01
F	<i>Lesquerella</i> sp.	18	.08
F	<i>Machaeranthera canescens</i>	45	.58
F	<i>Machaeranthera grindelioides</i>	3	.01
F	<i>Petradoria pumila</i>	12	.36
F	<i>Phlox hoodii</i>	4	.07
F	<i>Polygonum douglasii</i> (a)	5	.02
F	<i>Senecio multilobatus</i>	35	.19
Total for Annual Forbs		45	0.18
Total for Perennial Forbs		192	2.09
Total for Forbs		237	2.28

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

BROWSE TRENDS--

Management unit 14R, Study no: 37

Type	Species	Quadrat	Line
		Cover %	Intercept
		'14	'14
B	Amelanchier utahensis	.00	-
B	Artemisia nova	.38	.36
B	Artemisia tridentata wyomingensis	1.33	3.91
B	Cercocarpus intricatus	.63	.83
B	Gutierrezia sarothrae	.18	.23
B	Juniperus osteosperma	1.86	13.08
B	Leptodactylon pungens	.21	.20
B	Opuntia fragilis	.16	.03
B	Pinus edulis	7.02	34.31
B	Purshia tridentata	.59	1.18
B	Sclerocactus parviflorus	.00	-
Total for Browse		12.40	54.13

POINT-QUARTER TREE DATA--

Management unit 14R, Study no: 37

Species	Trees per	Average
	Acre	
		(in)
		'14
Juniperus osteosperma	38	13.1
Pinus edulis	254	9.9

BASIC COVER--

Management unit 14R, Study no: 37

Cover Type	Average
	Cover %
Vegetation	22.24
Rock	2.87
Pavement	.46
Litter	51.13
Cryptogams	15.05
Bare Ground	26.59

PELLET GROUP DATA--

Management unit 14R, Study no: 37

Type	Quadrat Frequency '14	Days use per acre (ha) '14
Rabbit	36	-
Elk	1	8 (20)
Deer	11	3 (8)
Cattle	3	-

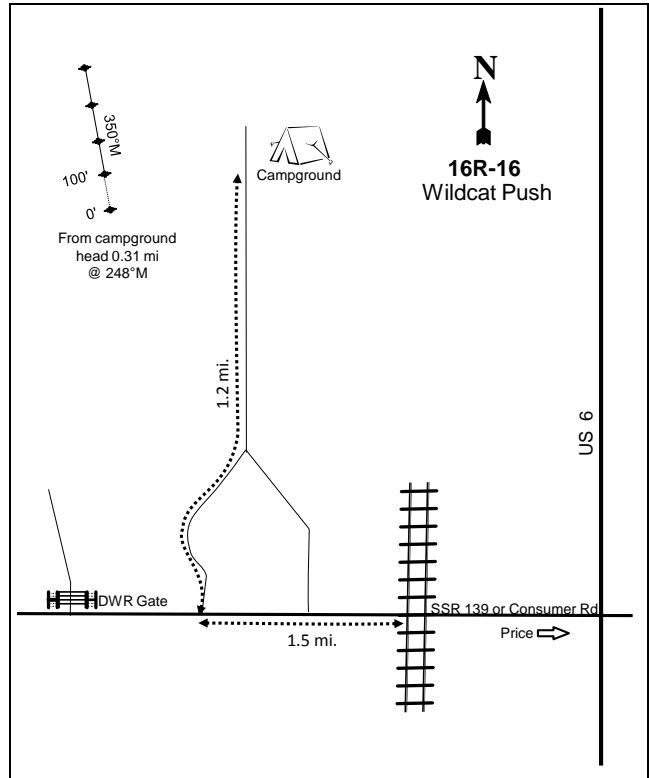
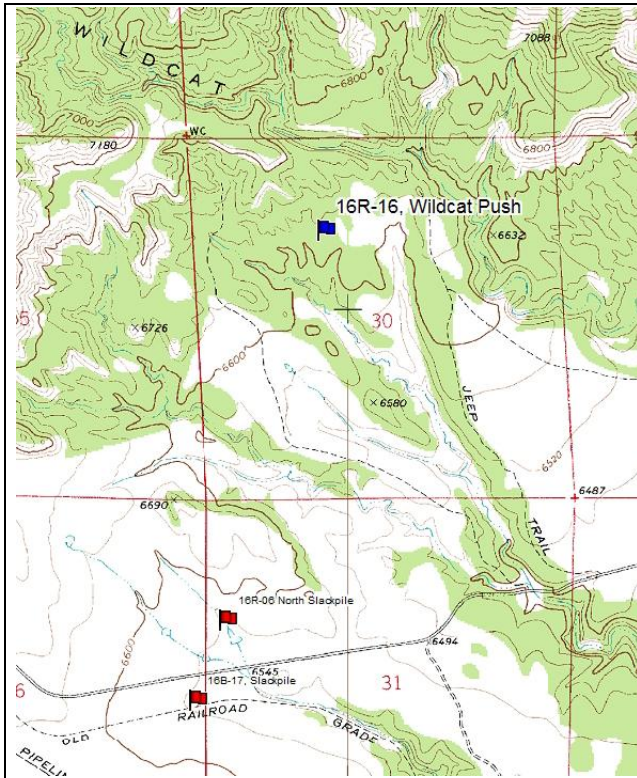
BROWSE CHARACTERISTICS--

Management unit 14R, Study no: 37

Year	Plants per Acre (excluding seedlings)	Age class distribution			Seedling (plants/acre)	Utilization		% poor vigor	Average Height Crown (in)
		% Young	% Mature	% Decadent		% moderate	% heavy		
<i>Amelanchier utahensis</i>									
14	0	0	0	-	20	0	0	0	55/54
<i>Artemisia nova</i>									
14	260	46	54	-	-	8	0	0	7/25
<i>Artemisia tridentata wyomingensis</i>									
14	400	15	65	20	-	5	0	20	18/33
<i>Cercocarpus intricatus</i>									
14	160	0	100	-	-	100	0	0	24/27
<i>Cercocarpus montanus</i>									
14	0	0	0	-	-	0	0	0	56/61
<i>Chrysothamnus nauseosus</i>									
14	0	0	0	-	-	0	0	0	16/22
<i>Chrysothamnus viscidiflorus viscidiflorus</i>									
14	0	0	0	-	-	0	0	0	12/13
<i>Gutierrezia sarothrae</i>									
14	400	60	35	5	20	0	0	0	6/10
<i>Leptodactylon pungens</i>									
14	680	0	65	35	-	6	0	3	5/10
<i>Opuntia fragilis</i>									
14	300	60	40	-	-	0	0	0	2/6
<i>Peraphyllum ramosissimum</i>									
14	0	0	0	-	-	0	0	0	34/44
<i>Pinus edulis</i>									
14	160	13	88	-	20	0	0	0	-/-
<i>Purshia tridentata</i>									
14	300	0	80	20	-	80	7	20	10/20
<i>Sclerocactus parviflorus</i>									
14	220	0	100	-	-	0	0	0	6/5

		Age class distribution						Utilization	
Year	Plants per Acre (excluding seedlings)	% Young	% Mature	% Decadent	Seedling (plants/acre)	% moderate	% heavy	% poor vigor	Average Height Crown (in)
Yucca sp.									
14	0	0	0	-	-	0	0	0	11/15

WILDCAT PUSH - TREND STUDY NO. 16R-16



Location Information

USGS 7.5 min Map Info Standardville; Township 13S, Range 9E, Section 30
 GPS (0' Stake) NAD 83, UTM Zone 12, 503387 East 4391049 North

Transect Information

Browse Tag # (0' Stake) 80
 Transect Bearing 350° magnetic
 Length 400ft
 Belt Placement Line 1 (11ft & 95ft), Line 2 (34ft), Line 3 (59ft), Line 4 (71ft)
 Belt Marker Placement Standard

Directions to Site

Drive west on State Road 139 for 3.2 miles to a railroad crossing from the junction of US 6 and State Road 139 in Price. Drive over the railroad tracks and continue 1.5 miles to road on the right (north). Turn right on this road and drive 1.2 miles to a campground on the right (east) side of the road. Park at the campground and from the west side of the road; walk 0.31 mile at 248 degrees magnetic to the 0-foot stake. The 0-foot stake is marked with browse tag #80.

Site Information

Land Ownership UDWR
 Allotment Gordon Creek Withdrawl
 Elevation 6,630ft (2,021m)
 Aspect Southeast
 Slope 5-6%
 Sample Dates 07/21/2005, 08/16/2010, 7/22/2014

DISTURBANCE HISTORY--

Management unit 16R, Study no: 16

<i>Treatment/Disturbance</i>	<i>Name</i>	<i>WRI DB #</i>	<i>Date</i>	<i>Size (acres)</i>
Roller Chopper	Wildcat Canyon P-J Removal	32	October 2007	140
Seeding: Aerial Before	Wildcat Canyon P-J Removal	32	October 2007	205
Seeding: Dribbler	Wildcat Canyon P-J Removal	32	October 2007	205

The table is a recorded disturbance history of the study site.

SEED MIX--

Management unit 16R, Study no: 16

Project Name: Wildcat Canyon P-J Removal					
WRI Database #: 32					
Application: Aerial		Acres: 205		Application: Dribbler	
Seed type		lbs in mix	lbs/acre	Acres: 205	
				Seed type	lbs in mix
					lbs/acre
G	Bluebunch WG 'Anatone'	250	1.22	B	Fourwing Saltbush
G	Blue Grama	200	0.98	B	Green Ephedra
G	Canby Bluegrass 'Canbar'	100	0.49	Total Pounds:	
G	Crested Wheatgrass 'Douglas'	100	0.49	100	
G	Crested Wheatgrass 'Ephraim'	100	0.49	PLS Pounds:	
G	Indian Ricegrass 'Rimrock'	300	1.46	0.24	
G	Pubescent Wheatgrass	200	0.98		
G	Russian Wildrye	100	0.49		
G	Sandberg Bluegrass	100	0.49		
G	Snake River Wheatgrass 'Secar'	200	0.98		
G	Tall Wheatgrass 'Alkar'	150	0.73		
G	Thickspike Wheatgrass 'Bannock'	250	1.22		
F	Alfalfa 'Ladak'	200	0.98		
F	Alfalfa 'Ranger'	200	0.98		
F	Alfalfa 'Spredor 4'	150	0.73		
F	Rocky Mountain Beeplant	50	0.24		
B	Fourwing Saltbush	25	0.12		
B	Sagebrush, Wyoming	100	0.49		
Total Pounds:		2775	13.54		
PLS Pounds:			11.42		

Habitat and Vegetation Information

Wildlife Habitat Deer, Crucial Winter; Elk, Crucial Winter

VEGETATION HISTORY--

Management unit 16R, Study no: 16

<i>Year</i>	<i>Vegetation Type¹</i>	<i>Woodland Succession²</i>
2005	Juniper	Phase I transitioning to Phase II
2010-2014	Perennial Grass	Phase I

¹Vegetation Type (Appendix - Vegetation Type), ²Woodland Succession (Tausch, Miller, Roundy, & Chambers, 2009).

Site Notes

Following a distinct Wyoming sagebrush (*Artemisia tridentata* ssp. *wyomingensis*) die-off in 2003, coupled with pinyon pine (*Pinus edulis*) and Utah juniper (*Juniperus osteosperma*) encroachment, there was a need for a habitat improvement project to release palatable browse species. The objective of the project was to improve mule deer winter habitat and potentially improve sage-grouse habitat. The project site is on the border of historic sage-grouse habitat, and is four miles northeast of a sage-grouse reintroduction site (WRI Database 2015).

Site Potential

1981-2010 Average Annual Precipitation 14 inches
 NRCS Ecological Site Upland Loam (Mountain Big Sagebrush)
 NRCS Ecological Site # R034XY306UT

SOIL ANALYSIS DATA--

Management unit 16R, Study no: 16

Texture	Sand (%)	Silt (%)	Clay (%)	pH	ds/m	OM (%)	PPM P	PPM K	Year Sampled
Clay Loam	42.4	28.4	29.2	7.2	0.5	1.9	5.5	83.2	2005

Soil specific normal values are described in the ecological site description (USDA-NRCS, 2011) and by Tiedeman and Lopez (2004).

States and Transitions

No state and transition model is available for the above ecological site.

When established in 2005, the site was in phase I juniper encroachment. There were not many other browse species on this site (Table – Browse Trends). The herbaceous understory consisted mainly of annual forbs with some perennial grasses (Table – Herbaceous Trends). After treatment, juniper cover decreased but was still the most prevalent browse species on the site (Table – Browse Trends). Following treatment, annual and perennial forbs decreased in cover while perennial grasses increased to become the dominant cover type. While cheatgrass (*Bromus tectorum*) is present on the site, its cover is low enough to not pose a serious threat to the resilience of the site (Table – Herbaceous Trends).

Trend Summary

HERBACEOUS TRENDS--

Management unit 16R, Study no: 16

Type	Species	Nested Frequency			Average Cover %		
		'05	'10	'14	'05	'10	'14
G	Agropyron cristatum	a-	b45	b45	-	.96	.90
G	Agropyron dasystachyum	a-	ab3	b10	-	.00	.26
G	Agropyron intermedium	a12	c136	b71	.18	4.88	1.85
G	Agropyron spicatum	a-	a12	b83	-	.36	4.26
G	Agropyron trachycaulum	a-	b78	b53	-	1.92	2.23
G	Bouteloua gracilis	b21	a9	ab17	.43	.42	.85
G	Bromus tectorum (a)	a3	b24	ab14	.00	.12	.05
G	Elymus salina	50	40	57	1.25	1.59	3.89
G	Oryzopsis hymenoides	a15	b42	b46	.07	1.99	2.86
G	Poa secunda	3	6	3	.01	.04	.00
G	Sitanion hystrix	b44	a21	ab34	1.07	.91	.83
G	Stipa comata	a3	b24	b17	.04	.84	.69

Type	Species	Nested Frequency			Average Cover %		
		'05	'10	'14	'05	'10	'14
	Total for Annual Grasses	3	24	14	0.00	0.12	0.05
	Total for Perennial Grasses	148	416	436	3.07	13.94	18.65
	Total for Grasses	151	440	450	3.07	14.06	18.71
F	Arabis sp.	b ¹¹	a ³	a ⁻	.09	.00	-
F	Astragalus convallarius	ab ¹⁵	b ¹⁸	a ⁴	.57	.14	.01
F	Astragalus sp.	-	1	-	-	.03	-
F	Chenopodium album (a)	-	10	-	-	.19	-
F	Chenopodium fremontii (a)	b ⁴³	b ⁴⁹	a ²	.18	.42	.00
F	Chenopodium leptophyllum(a)	a ⁵	b ⁶³	a ⁻	.01	.26	-
F	Chorispota tenella (a)	-	2	-	-	.00	-
F	Cordylanthus sp. (a)	c ⁶⁰	b ¹⁴	a ⁻	2.30	.64	-
F	Cryptantha sp.	-	-	5	-	-	.00
F	Descurainia pinnata (a)	b ⁴⁴	a ³	b ³⁰	.20	.03	.11
F	Erigeron pumilus	a ⁻	a ⁻	b ¹¹	-	-	.02
F	Eriogonum cernuum (a)	a ¹⁴	b ¹¹³	a ⁴	.05	1.13	.00
F	Gayophytum ramosissimum(a)	b ⁴⁶	a ⁻	a ⁻	.11	-	-
F	Gilia sp. (a)	b ¹²⁷	a ²⁰	a ³	1.46	.05	.00
F	Lactuca serriola (a)	b ⁴¹	b ⁴³	a ¹	.82	.37	.03
F	Lappula occidentalis (a)	a ⁵⁰	a ⁴⁸	b ⁹⁰	1.95	.19	.53
F	Lepidium sp. (a)	6	-	-	.04	-	-
F	Machaeranthera canescens	-	4	-	-	.03	-
F	Medicago sativa	a ⁻	b ¹⁹	a ²	-	.27	.03
F	Mentzelia sp.	4	3	-	.06	.01	-
F	Pedicularis centranthera	8	-	-	.33	-	-
F	Penstemon sp.	3	7	2	.04	.04	.00
F	Phlox longifolia	-	2	-	-	.00	-
F	Polygonum douglasii (a)	-	1	-	-	.00	-
F	Sisymbrium altissimum (a)	-	-	1	.00	-	.00
F	Sphaeralcea coccinea	-	-	3	-	-	.00
	Total for Annual Forbs	436	366	131	7.16	3.31	0.69
	Total for Perennial Forbs	41	57	27	1.09	0.54	0.07
	Total for Forbs	477	423	158	8.26	3.86	0.77

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

BROWSE TRENDS--

Management unit 16R, Study no: 16

Type	Species	Quadrat Cover %			Line Intercept Cover %		
		'05	'10	'14	'05	'10	'14
B	Artemisia nova	.03	.03	.33	.13	-	.18
B	Artemisia tridentata wyomingensis	-	.63	1.20	-	.81	.80
B	Atriplex canescens	-	.00	.00	-	-	.50
B	Ephedra viridis	.15	.03	.00	-	.20	-
B	Gutierrezia sarothrae	-	-	.00	-	-	-
B	Juniperus osteosperma	3.28	2.14	.62	15.25	2.30	1.30
B	Opuntia sp.	.01	.03	.00	.58	.38	.03
B	Pediocactus simpsonii	.04	.03	-	.03	-	-
B	Pinus edulis	.21	.15	-	1.06	-	-
B	Sclerocactus sp.	-	-	.00	-	.08	-
Total for Browse		3.72	3.06	2.17	17.05	3.77	2.81

POINT-QUARTER TREE DATA--

Management unit 16R, Study no: 16

Species	Trees per Acre			Average diameter (in)		
	'05	'10	'14	'05	'10	'14
Juniperus osteosperma	223	80	75	5.7	5.6	3.0
Pinus edulis	31	34	34	1.6	1.2	1.1

BASIC COVER--

Management unit 16R, Study no: 16

Cover Type	Average Cover %		
	'05	'10	'14
Vegetation	15.64	25.79	23.33
Rock	.83	.09	.56
Pavement	2.85	1.12	.97
Litter	41.31	50.63	46.85
Cryptogams	.75	.30	.00
Bare Ground	46.87	32.38	36.55

PELLET GROUP DATA--

Management unit 16R, Study no: 16

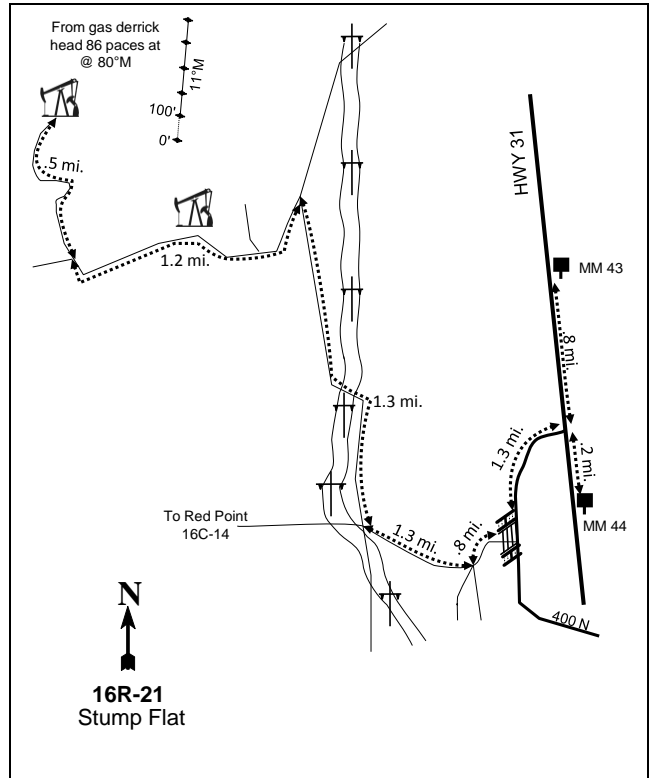
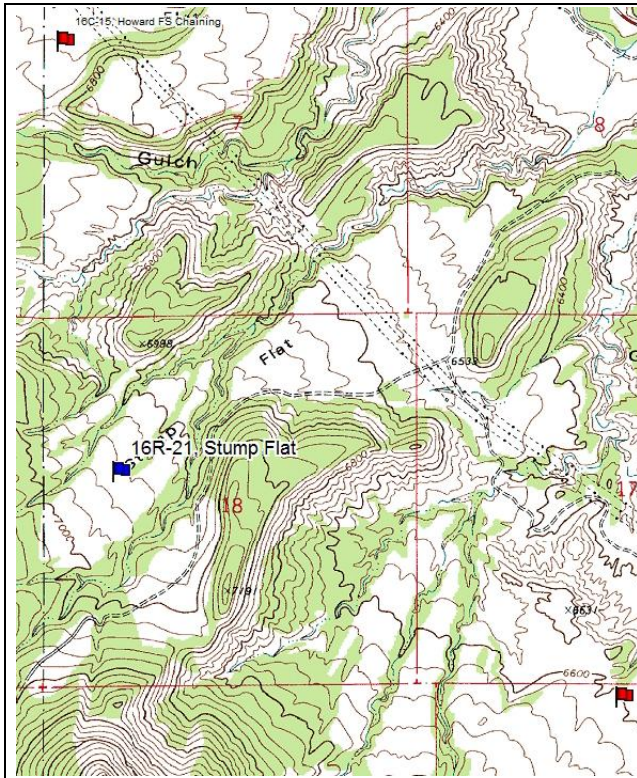
Type	Quadrat Frequency			Days use per acre (ha)		
	'05	'10	'14	'05	'10	'14
Rabbit	59	14	45	-	-	-
Elk	3	2	14	12 (30)	14 (35)	18 (45)
Deer	8	9	12	3 (7)	16 (40)	7 (17)
Cattle	1	1	3	-	2 (4)	2 (5)

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

Year	Plants per Acre (excluding seedlings)	Age class distribution			Seedling (plants/acre)	Utilization		% poor vigor	Average Height Crown (in)
		% Young	% Mature	% Decadent		% moderate	% heavy		
<i>Artemisia nova</i>									
05	240	83	8	8	40	0	0	8	8/14
10	60	0	100	0	-	0	0	0	8/17
14	320	0	100	0	-	69	25	0	7/13
<i>Artemisia tridentata wyomingensis</i>									
05	0	0	0	0	-	0	0	0	-/-
10	1560	67	32	1	20	0	0	1	12/10
14	1620	5	95	0	-	77	11	10	12/13
<i>Atriplex canescens</i>									
05	0	0	0	-	-	0	0	0	-/-
10	40	0	100	-	20	0	0	0	21/20
14	60	33	67	-	20	0	0	0	32/39
<i>Chrysothamnus nauseosus</i>									
05	0	0	0	-	-	0	0	0	-/-
10	0	0	0	-	-	0	0	0	15/17
14	0	0	0	-	-	0	0	0	-/-
<i>Chrysothamnus viscidiflorus</i>									
05	0	0	0	-	-	0	0	0	-/-
10	0	0	0	-	-	0	0	0	9/8
14	0	0	0	-	-	0	0	0	-/-
<i>Ephedra viridis</i>									
05	20	0	100	-	-	0	0	0	40/50
10	20	0	100	-	-	0	0	0	26/33
14	20	100	0	-	-	100	0	0	17/14
<i>Gutierrezia sarothrae</i>									
05	20	0	100	-	-	0	0	0	10/12
10	0	0	0	-	-	0	0	0	10/15
14	40	50	50	-	-	0	0	0	6/6
<i>Juniperus osteosperma</i>									
05	220	27	64	9	-	0	0	0	-/-
10	120	17	50	33	200	0	0	33	-/-
14	100	40	60	0	-	0	0	20	-/-
<i>Opuntia sp.</i>									
05	220	0	91	9	-	0	0	9	4/14
10	60	0	100	0	-	0	0	0	3/20
14	60	0	67	33	-	0	0	100	3/19

		Age class distribution					Utilization			
Year	Plants per Acre (excluding seedlings)	% Young	% Mature	% Decadent	Seedling (plants/acre)	% moderate	% heavy	% poor vigor	Average Height Crown (in)	
<i>Pediocactus simpsonii</i>										
05	0	0	0	-	20	0	0	0	1/2	
10	20	0	100	-	-	0	0	0	2/4	
14	0	0	0	-	-	0	0	0	-/-	
<i>Pinus edulis</i>										
05	60	33	67	-	40	0	0	0	-/-	
10	40	50	50	-	40	0	0	0	-/-	
14	40	100	0	-	-	0	0	0	-/-	
<i>Sclerocactus sp.</i>										
05	40	50	50	-	-	0	0	0	5/5	
10	20	0	100	-	-	0	0	0	3/6	
14	0	0	0	-	-	0	0	0	-/-	

STUMP FLAT - TREND STUDY NO. 16R-21



Location Information

USGS 7.5 min Map Info Red Point; Township 17S, Range 8E, Section 18
 GPS (0' Stake) NAD 83, UTM Zone 12, 493633 East 4354996 North

Transect Information

Browse Tag # (0' Stake) 153
 Transect Bearing 11° magnetic
 Length 500ft
 Belt Placement Line 1 (11ft), Line 2 (34ft), Line 3 (59ft), Line 4 (71ft), Line 5 (95ft)
 Belt Marker Placement Standard

Directions to Site

From Highway 31 heading south from mile marker 43 drive 0.8 miles to a road on the right, or heading north drive 0.2 miles from mile marker 44. Turn here and drive 1.3 miles to a road on the right (west) and a gate. Go through the gate and drive 0.8 miles to a fork and stay right. Drive 1.3 miles to a fork and some power lines. Go right while following the power lines for 1.3 miles to another fork. Turn left here and drive for 1.2 miles to a fork while passing a road and gas derrick on the right side of the road. Turn right at the fork and drive 0.5 miles to a gas derrick. From the gas derrick walk 86 paces at 80 degrees magnetic to the 0-foot stake, and is marked with browse tag #153.

Site Information

Land Ownership SITLA
 Allotment West Huntington
 Elevation 6,900ft (2,103m)
 Aspect Northeast
 Slope 8%
 Sample Dates 06/20/2006, 08/24/2010, 07/28/2014

DISTURBANCE HISTORY--

Management unit 16R, Study no: 21

Treatment/Disturbance	Name	WRI DB #	Date	Size (acres)
Chaining	-	-	Historic	-
Roller Chopper	Stump Flat Pinyon/Juniper Habitat Restoration	431	Fall 2006	67

The table is a recorded disturbance history of the study site.

Habitat and Vegetation Information

Wildlife Habitat Deer, Crucial Winter; Elk, Substantial Winter

VEGETATION HISTORY--

Management unit 16R, Study no: 21

Year	Vegetation Type ¹	Woodland Succession ²
2006	Pinyon	Phase I
2010-2014	Perennial Grass	Phase I

¹Vegetation Type (Appendix - Vegetation Type), ²Woodland Succession (Tausch, Miller, Roundy, & Chambers, 2009).

Site Notes

The objectives of the project were to enhance winter habitat for elk and mule deer by reducing the pinyon pine (*Pinus edulis*) and Utah juniper (*Juniperus osteosperma*) cover and increasing perennial grasses, forbs and preferred browse species (WRI Database 2015).

Site Potential

1981-2010 Average Annual Precipitation 13 inches
 NRCS Ecological Site Upland Stony Loam (Pinyon-Utah Juniper)
 NRCS Ecological Site # R047XA336UT

SOIL ANALYSIS DATA--

Management unit 16R, Study no: 21

Texture	Sand (%)	Silt (%)	Clay (%)	pH	ds/m	OM (%)	PPM P	PPM K	Year Sampled
Loam	40.2	33	26.8	7.3	0.7	3.6	14.3	96	2006

Soil specific normal values are described in the ecological site description (USDA-NRCS, 2011) and by Tiedeman and Lopez (2004).

States and Transitions

No state and transition model is available for the above ecological site.

When established in 2006, this site was in phase I encroachment by pinyon pine. There was few other browse species (Table – Browse Trends). The herbaceous understory was moderate in cover with the majority coming from the introduced perennial grass crested wheatgrass (*Agropyron cristatum*). Forb cover was low prior to treatment (Table – Herbaceous Trends). After treatment, pinyon cover decreased as did most other browse species with the exception of black sagebrush (*Artemisia nova*) which increased (Table – Browse Trends). Crested wheatgrass cover remained high and became the dominant species after the trees were removed. Forb cover increased post treatment but decreased again (Table – Herbaceous Trends).

Trend Summary

HERBACEOUS TRENDS--

Management unit 16R, Study no: 21

Type	Species	Nested Frequency			Average Cover %		
		'06	'10	'14	'06	'10	'14
G	Agropyron cristatum	_b 333	_a 280	_{ab} 316	17.18	16.16	17.22
G	Agropyron intermedium	7	6	6	.19	.16	.09
G	Elymus junceus	2	-	10	.15	-	.18
G	Elymus salina	_a 3	_{a-}	_b 30	.15	-	1.18
G	Oryzopsis hymenoides	2	3	5	.00	.00	.18
G	Sitanion hystrix	-	-	2	.00	-	.03
Total for Annual Grasses		0	0	0	0	0	0
Total for Perennial Grasses		347	289	369	17.68	16.33	18.91
Total for Grasses		347	289	369	17.68	16.33	18.91
F	Arabis sp.	_a 1	_b 46	_{a-}	.00	.87	-
F	Astragalus convallarius	_a 11	_b 25	_{a-}	.25	.26	-
F	Chenopodium fremontii (a)	_{a-}	_b 13	_{a-}	-	.05	-
F	Cryptantha sp.	18	19	19	.31	.55	.23
F	Descurainia pinnata (a)	-	-	3	-	-	.01
F	Eriogonum umbellatum	4	-	4	.03	-	.15
F	Hedysarum boreale	4	3	1	.09	.15	.00
F	Ipomopsis aggregata	1	1	-	.00	.06	-
F	Lactuca serriola (a)	-	3	-	-	.03	-
F	Lappula occidentalis (a)	_a 12	_b 58	_a 18	.02	.85	.04
F	Lesquerella sp.	7	-	-	.01	-	-
F	Machaeranthera canescens	-	-	1	-	-	.00
F	Machaeranthera grindelioides	5	3	8	.18	.00	.01
F	Medicago sativa	31	24	14	.55	1.55	.11
F	Penstemon sp.	_b 14	_b 14	_{a-}	.37	.32	-
F	Salsola iberica (a)	_{a-}	_b 53	_b 36	-	1.52	.13
F	Schoenocrambe linifolia	6	21	16	.07	.35	.04
F	Senecio multilobatus	8	-	1	.06	-	.00
F	Stanleya pinnata	_b 40	_{a-}	_b 39	.98	-	.22
F	Tragopogon dubius (a)	-	8	-	-	.04	-
F	Trifolium sp.	-	-	3	-	-	.01
Total for Annual Forbs		12	135	57	0.02	2.49	0.18
Total for Perennial Forbs		150	156	106	2.95	4.13	0.80
Total for Forbs		162	291	163	2.98	6.62	0.98

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

BROWSE TRENDS--

Management unit 16R, Study no: 21

Type	Species	Quadrat Cover %			Line Intercept Cover %		
		'06	'10	'14	'06	'10	'14
B	Artemisia nova	.48	.31	.64	.25	.31	1.11
B	Artemisia tridentata wyomingensis	-	-	.03	-	-	-
B	Cercocarpus montanus	.67	.03	.01	1.58	.45	.10
B	Ephedra viridis	.00	.38	.00	-	.28	-
B	Gutierrezia sarothrae	-	.03	-	-	-	-
B	Juniperus osteosperma	1.01	.15	.03	-	.40	.06
B	Opuntia sp.	-	-	.00	-	-	-
B	Pinus edulis	6.40	-	-	7.10	-	-
Total for Browse		8.57	0.90	0.72	8.93	1.44	1.27

POINT-QUARTER TREE DATA--

Management unit 16R, Study no: 21

Species	Trees per Acre			Average diameter (in)		
	'06	'10	'14	'06	'10	'14
Juniperus osteosperma	41	25	19	4.4	1.5	1.2
Pinus edulis	64	27	19	5.0	2.3	2.0

BASIC COVER--

Management unit 16R, Study no: 21

Cover Type	Average Cover %		
	'06	'10	'14
Vegetation	27.17	21.98	21.82
Rock	4.67	6.33	6.98
Pavement	2.02	5.92	4.21
Litter	47.03	49.32	50.47
Cryptogams	1.21	.03	.66
Bare Ground	30.35	25.33	27.16

PELLET GROUP DATA--

Management unit 16R, Study no: 21

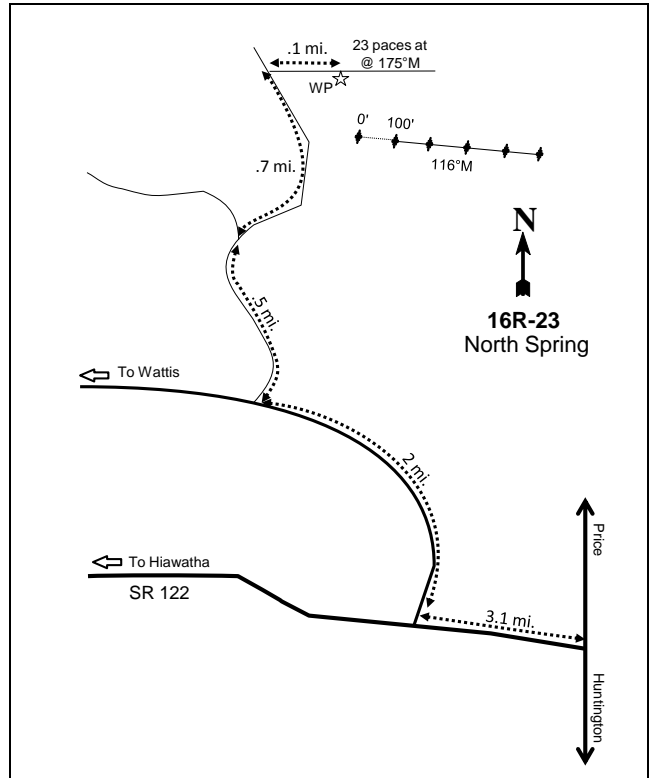
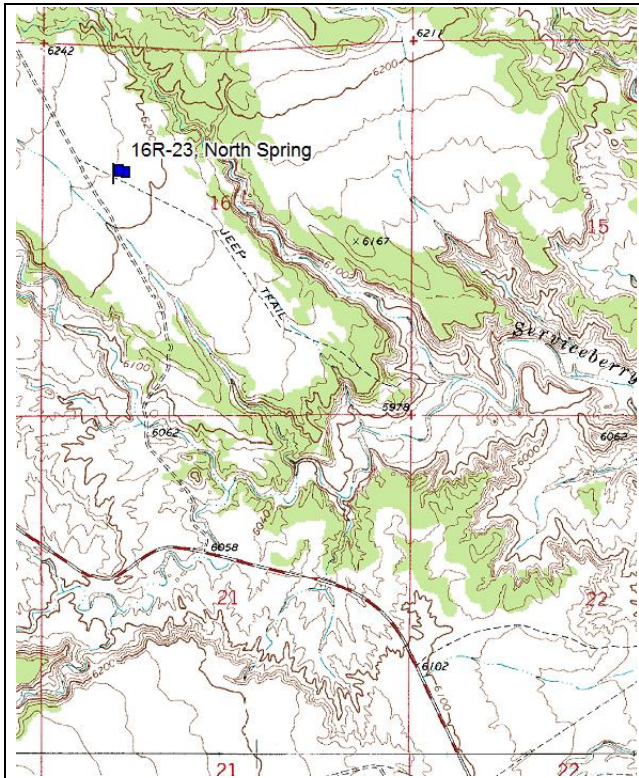
Type	Quadrat Frequency			Days use per acre (ha)		
	'06	'10	'14	'06	'10	'14
Rabbit	49	20	35	-	-	-
Elk	38	3	28	94 (231)	3 (8)	29 (73)
Deer	3	22	8	9 (23)	32 (78)	9 (22)
Cattle	3	5	15	10 (25)	15 (36)	26 (65)

BROWSE CHARACTERISTICS--
Management unit 16R, Study no: 21

Year	Plants per Acre (excluding seedlings)	Age class distribution			Seedling (plants/acre)	Utilization		% poor vigor	Average Height Crown (in)
		% Young	% Mature	% Decadent		% moderate	% heavy		
<i>Amelanchier utahensis</i>									
06	0	0	0	-	-	0	0	0	32/30
10	0	0	0	-	-	0	0	0	-/-
14	0	0	0	-	-	0	0	0	17/34
<i>Artemisia nova</i>									
06	120	67	33	0	2080	17	0	0	13/28
10	320	38	56	6	240	31	0	6	8/14
14	1300	15	85	0	40	35	60	0	10/19
<i>Artemisia tridentata wyomingensis</i>									
06	0	0	0	-	-	0	0	0	-/-
10	260	38	62	-	-	0	0	0	15/20
14	240	58	42	-	60	58	0	0	9/14
<i>Ceratoides lanata</i>									
06	0	0	0	-	-	0	0	0	21/16
10	0	0	0	-	-	0	0	0	14/15
14	0	0	0	-	-	0	0	0	-/-
<i>Cercocarpus montanus</i>									
06	60	0	100	-	20	0	33	0	64/64
10	80	0	100	-	-	0	100	0	42/52
14	80	25	75	-	-	75	0	0	41/43
<i>Chrysothamnus nauseosus</i>									
06	0	0	0	-	-	0	0	0	34/39
10	0	0	0	-	-	0	0	0	18/27
14	40	50	50	-	-	0	0	0	23/31
<i>Chrysothamnus viscidiflorus viscidiflorus</i>									
06	0	0	0	-	-	0	0	0	10/13
10	0	0	0	-	-	0	0	0	7/12
14	0	0	0	-	-	0	0	0	14/19
<i>Cowania mexicana stansburiana</i>									
06	0	0	0	-	-	0	0	0	39/41
10	0	0	0	-	-	0	0	0	39/38
14	20	0	100	-	-	0	100	0	35/38
<i>Ephedra nevadensis</i>									
06	0	0	0	-	-	0	0	0	-/-
10	0	0	0	-	-	0	0	0	-/-
14	0	0	0	-	-	0	0	0	38/54

Year	Plants per Acre (excluding seedlings)	Age class distribution			Seedling (plants/acre)	Utilization			Average Height Crown (in)
		% Young	% Mature	% Decadent		% moderate	% heavy	% poor vigor	
<i>Ephedra viridis</i>									
06	20	100	0	-	-	0	0	0	33/60
10	20	0	100	-	-	0	100	0	22/35
14	20	0	100	-	-	0	100	100	27/38
<i>Eriogonum microthecum</i>									
06	0	0	0	-	-	0	0	0	-/-
10	0	0	0	-	-	0	0	0	4/5
14	0	0	0	-	-	0	0	0	-/-
<i>Gutierrezia sarothrae</i>									
06	0	0	0	-	-	0	0	0	9/11
10	20	0	100	-	-	0	0	0	9/10
14	0	0	0	-	-	0	0	0	7/8
<i>Juniperus osteosperma</i>									
06	40	100	0	-	-	0	0	0	-/-
10	20	100	0	-	-	0	0	0	-/-
14	20	100	0	-	-	0	0	0	-/-
<i>Opuntia sp.</i>									
06	20	0	100	-	-	0	0	0	-/-
10	0	0	0	-	-	0	0	0	-/-
14	40	50	50	-	-	0	0	0	4/11
<i>Pinus edulis</i>									
06	120	17	83	-	-	0	0	0	-/-
10	0	0	0	-	-	0	0	0	-/-
14	0	0	0	-	-	0	0	0	-/-
<i>Purshia tridentata</i>									
06	0	0	0	-	-	0	0	0	25/48
10	0	0	0	-	-	0	0	0	16/36
14	0	0	0	-	-	0	0	0	-/-

NORTH SPRING - TREND STUDY NO. 16R-23



Location Information

USGS 7.5 min Map Info Pinnacle Peak; Township 15S, Range 9E, Section 16
 GPS (0' Stake) NAD 83, UTM Zone 12, 506474 East 4374741 North

Transect Information

Browse Tag # (0' Stake) 175
 Transect Bearing 116° magnetic
 Length 500ft
 Belt Placement Line 1 (11ft), Line 2 (34ft), Line 3 (59ft), Line 4 (71ft), Line 5 (95ft)
 Belt Marker Placement Belt 3: 7ft, Belt 5: 3ft; Belt 4: 83ft long to avoid a gully

Directions to Site

Turn from State Road 10 onto State Road 122 from Price or Huntington and drive 3.1 miles to a road on the right. Turn here and drive 2.0 miles to another right. Turn here and drive 0.5 miles to a fork and stay right for another 0.7 miles to a road on the right heading southeast. Turn right and travel 0.1 miles to a witness post on the right. From the witness post walk 23 paces at 175 degrees magnetic to the 0-foot stake that is marked with browse tag #175.

Site Information

Land Ownership SITLA
 Allotment Not Available
 Elevation 6,200ft (1,890m)
 Aspect South
 Slope 1%
 Sample Dates 08/15/2006, 08/24/2010, 07/29/2014

DISTURBANCE HISTORY--

Management unit 16R, Study no: 23

<i>Treatment/Disturbance</i>	<i>Name</i>	<i>WRI DB #</i>	<i>Date</i>	<i>Size (acres)</i>
One-Way Dixie Harrow	Price West Benches Phase 3 – North Springs	430	October 2006	680
Seeding: Broadcast Before	Price West Benches Phase 3 – North Springs	430	October 2006	340

The table is a recorded disturbance history of the study site.

SEED MIX--

Management unit 16R, Study no: 23

Project Name: Price West Benches Phase 3 – North Springs			
WRI Database #: 430			
Application: Broadcast Seeder		Acres: 340	
Seed type		lbs in mix	lbs/acre
G	Crested Wheatgrass 'Hycrest'	350	1.03
G	Indian Ricegrass 'Rimrock'	350	1.03
G	Russian Wildrye	1314	3.86
G	Sheep Fescue	175	0.51
G	Siberian Wheatgrass 'Vavilov'	675	1.99
G	Western Wheatgrass 'Arriba'	350	1.03
F	Alfalfa 'Ranger'	175	0.51
F	Alfalfa 'Spredor 4'	175	0.51
F	Sainfoin 'Eski'	350	1.03
F	Small Burnet 'Delar'	175	0.51
B	Fourwing Saltbush	500	1.47
B	Sagebrush, Wyoming	175	0.51
Total Pounds:		4764	14.01
PLS Pounds:			11.41

Habitat and Vegetation Information

Wildlife Habitat Deer, Crucial Winter; Elk, Crucial Winter

VEGETATION HISTORY--

Management unit 16R, Study no: 23

<i>Year</i>	<i>Vegetation Type¹</i>	<i>Woodland Succession²</i>
2006-2014	Wyoming Big Sagebrush	No Encroachment

¹Vegetation Type (Appendix - Vegetation Type), ²Woodland Succession (Tausch, Miller, Roundy, & Chambers, 2009).

Site Notes

The study was established in 2006 in a Wyoming big sagebrush (*Artemisia tridentata* ssp. *wyomingensis*) community approximately seven miles southwest of Price to monitor the effects of a one-way Dixie harrow and broadcast seeding. The project objectives were to improve 340 acres of crucial mule deer winter range following a systemic sagebrush die-off in the area west of Price. This area is heavily used by the oil and gas industry (WRI Database 2015).

Site Potential

1981-2010 Average Annual Precipitation 10 inches
 NRCS Ecological Site Semidesert Loam (Wyoming Big Sagebrush)
 NRCS Ecological Site # R034XY212UT

SOIL ANALYSIS DATA--

Management unit 16R, Study no: 23

Texture	Sand (%)	Silt (%)	Clay (%)	pH	ds/m	OM (%)	PPM P	PPM K	Year Sampled
Loam	41.2	33	25.8	7.5	0.5	3.3	12.1	118.4	2006

Soil specific normal values are described in the ecological site description (USDA-NRCS, 2011) and by Tiedeman and Lopez (2004).

States and Transitions

No state and transition model is available for the above ecological site, but it is likely similar to the [Semidesert Loam \(Wyoming Big Sagebrush\), R035XA209UT](#) ecological site, which does have a defined state and transition model (USDA-NRCS, 2011).

Since site establishment in 2006, this site has remained in a stable Wyoming big sagebrush community with a few other browse species contributing to cover. Although sagebrush cover decreased, the treatment increased density and diversified the age of sagebrush on the site (Table – Browse Trends). The herbaceous understory has decreased since treatment; especially the perennial grasses (Table – Herbaceous Trends).

Trend Summary

HERBACEOUS TRENDS--

Management unit 16R, Study no: 23

Type	Species	Nested Frequency			Average Cover %		
		'06	'10	'14	'06	'10	'14
G	Agropyron cristatum	-	47	52	-	1.41	.65
G	Agropyron intermedium	-	1	-	-	.03	-
G	Bouteloua gracilis	66	53	59	3.93	3.40	2.20
G	Bromus tectorum (a)	13	9	2	.10	.02	.01
G	Festuca ovina	-	-	6	-	-	.01
G	Oryzopsis hymenoides	80	38	38	1.13	1.56	.54
G	Poa secunda	2	2	-	.03	.00	-
G	Sitanion hystrix	179	170	43	4.62	3.63	.30
G	Stipa comata	5	1	-	.01	.00	-
G	Stipa thurberiana	1	-	-	.03	-	-
G	Vulpia octoflora (a)	13	-	6	.09	-	.04
Total for Annual Grasses		26	9	8	0.20	0.02	0.04
Total for Perennial Grasses		333	312	198	9.76	10.04	3.72
Total for Grasses		359	321	206	9.96	10.07	3.77
F	Alyssum alyssoides (a)	2	1	-	.01	.00	-
F	Calochortus nuttallii	-	3	-	-	.00	-
F	Chaenactis douglasii	1	-	-	.00	-	-
F	Chenopodium leptophyllum(a)	-	5	-	-	.00	-
F	Crepis acuminata	1	-	-	.03	-	-
F	Cryptantha sp.	10	-	3	.07	-	.00

T y p e	Species	Nested Frequency			Average Cover %		
		'06	'10	'14	'06	'10	'14
F	Descurainia pinnata (a)	24	2	31	.12	.03	.14
F	Eriogonum cernuum (a)	44	28	12	.20	.27	.02
F	Halogeton glomeratus (a)	10	-	22	.07	-	.04
F	Lappula occidentalis (a)	4	1	12	.03	.00	.07
F	Lepidium montanum	23	1	-	.41	.15	-
F	Leucelene ericoides	10	7	-	.18	.15	-
F	Lupinus sp.	1	-	-	.03	-	-
F	Machaeranthera grindelioides	21	7	-	.59	.66	-
F	Plantago patagonica (a)	6	7	2	.01	.01	.00
F	Ranunculus testiculatus (a)	3	-	-	.00	-	-
F	Salsola iberica (a)	18	-	3	.09	-	.03
F	Schoenocrambe linifolia	15	3	-	.03	.21	-
F	Sisymbrium altissimum (a)	7	-	25	.02	-	.22
F	Sphaeralcea coccinea	3	2	2	.01	.03	.01
Total for Annual Forbs		118	44	107	0.58	0.33	0.55
Total for Perennial Forbs		85	23	5	1.36	1.22	0.01
Total for Forbs		203	67	112	1.94	1.55	0.56

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

BROWSE TRENDS--

Management unit 16R, Study no: 23

T y p e	Species	Quadrat Cover %			Line Intercept Cover %		
		'06	'10	'14	'06	'10	'14
B	Artemisia tridentata wyomingensis	9.33	9.02	7.30	10.86	8.33	7.56
B	Atriplex confertifolia	.41	.30	.53	.75	.05	.36
B	Ceratoides lanata	.00	.15	.03	-	-	-
B	Chrysothamnus viscidiflorus stenophyllus	.98	1.36	.55	.60	1.20	.98
B	Gutierrezia sarothrae	.60	1.37	.23	.71	1.35	.21
B	Opuntia sp.	6.02	2.85	3.10	4.96	2.75	2.60
Total for Browse		17.36	15.06	11.76	17.88	13.68	11.71

BASIC COVER--

Management unit 16R, Study no: 23

Cover Type	Average Cover %		
	'06	'10	'14
Vegetation	24.47	25.67	16.26
Rock	.04	1.01	.38
Pavement	.07	.20	.22
Litter	29.24	29.51	24.68
Cryptogams	4.09	.21	.30
Bare Ground	57.20	57.73	52.56

PELLET GROUP DATA--

Management unit 16R, Study no: 23

Type	Quadrat Frequency		
	'06	'10	'14
Rabbit	33	12	34
Elk	22	-	5
Deer	32	65	27

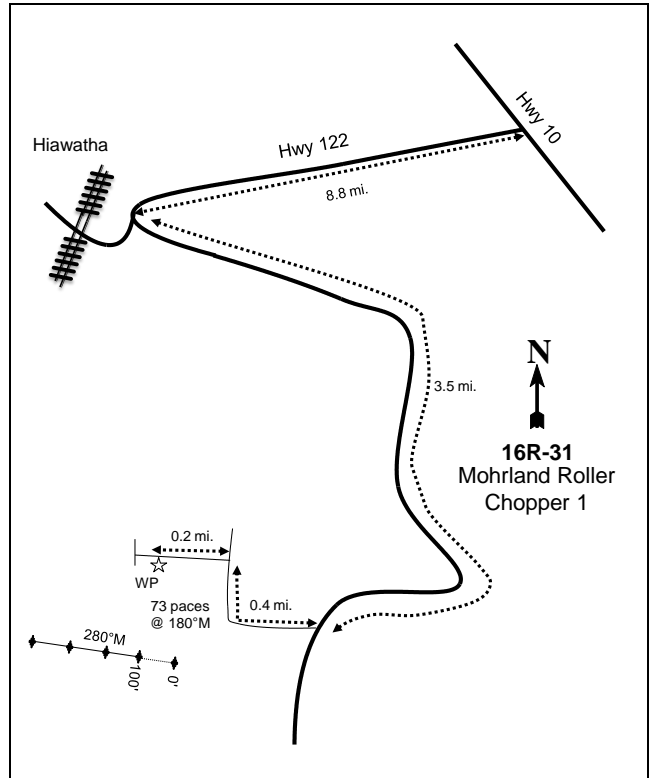
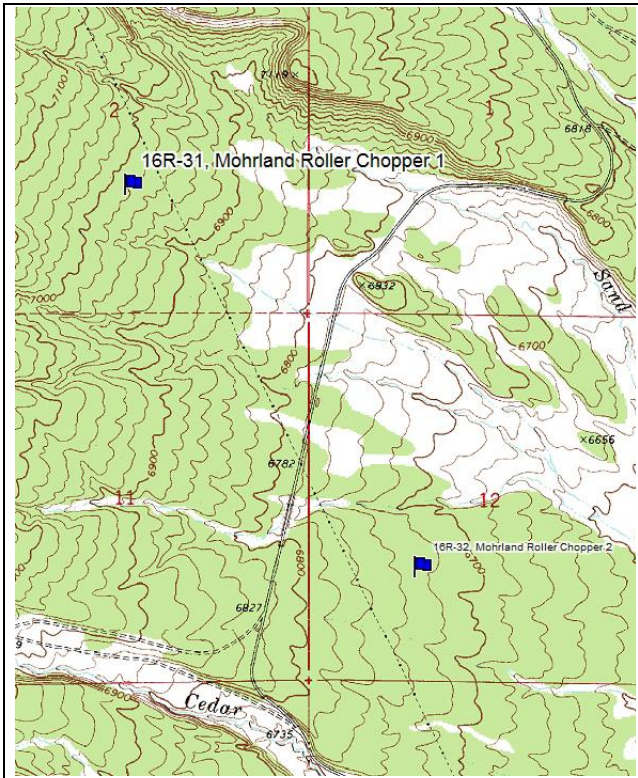
Days use per acre (ha)		
'06	'10	'14
-	-	-
5 (13)	1 (3)	-
121 (299)	114 (281)	40 (98)

BROWSE CHARACTERISTICS--

Management unit 16R, Study no: 23

Year	Plants per Acre (excluding seedlings)	Age class distribution			Seedling (plants/acre)	Utilization		% poor vigor	Average Height Crown (in)
		% Young	% Mature	% Decadent		% moderate	% heavy		
<i>Artemisia tridentata wyomingensis</i>									
06	3700	6	24	70	41260	29	46	59	18/26
10	7700	51	37	12	1600	25	11	13	15/26
14	7900	27	63	10	300	35	50	12	12/22
<i>Atriplex confertifolia</i>									
06	140	57	43	-	20	14	14	0	16/30
10	140	29	71	-	-	0	0	0	15/32
14	180	33	67	-	20	22	0	0	12/26
<i>Ceratoides lanata</i>									
06	20	0	100	-	-	0	100	0	15/12
10	40	0	100	-	-	50	0	0	14/11
14	40	50	50	-	60	0	100	0	9/7
<i>Chrysothamnus viscidiflorus stenophyllus</i>									
06	640	25	69	6	100	0	25	6	9/17
10	1540	6	94	0	-	3	0	0	8/12
14	1940	8	87	5	540	1	1	11	7/10
<i>Gutierrezia sarothrae</i>									
06	980	43	57	0	520	0	0	0	11/13
10	1780	2	91	7	-	0	0	9	8/9
14	580	10	83	7	40	3	0	10	5/6
<i>Opuntia sp.</i>									
06	4840	1	98	1	20	0	0	.82	3/12
10	2300	1	92	7	40	0	0	9	3/15
14	4020	0	97	3	-	.49	0	3	3/12
<i>Yucca sp.</i>									
06	0	0	0	-	-	0	0	0	17/27
10	0	0	0	-	-	0	0	0	13/28
14	0	0	0	-	-	0	0	0	-/-

MOHRLAND ROLLER CHOPPER 1 - TREND STUDY NO. 16R-31



Location Information

USGS 7.5 min Map Info Poison Spring Bench; Township 16S, Range 8E, Section 2
 GPS (0' Stake) NAD 83, UTM Zone 12, 500581 East 4367603 North

Transect Information

Browse Tag # (0' Stake) 262
 Transect Bearing 280° magnetic
 Length 400ft
 Belt Placement Line 1 (11ft & 95ft), Line 2 (34ft), Line 3 (59ft), Line 4 (71ft)
 Belt Marker Placement Standard

Directions to Site

From State Road 10, turn onto State Road 122 and drive 8.8 miles to a road on the left just before the railroad crossing near Hiawatha. Continue on this road for 3.5 miles to a fork and go right. Drive 0.4 miles to a road on the left and go 0.2 miles to the half-high witness post. The 0-foot stake is 73 paces from the witness post at 180 degrees magnetic. The 0-foot stake is marked with browse tag # 262.

Site Information

Land Ownership SITLA
 Allotment Not Available
 Elevation 6,979ft (2,127m)
 Aspect Southeast
 Slope 6%
 Sample Dates 07/23/2008, 07/05/2011, 07/31/2014

DISTURBANCE HISTORY--

Management unit 16R, Study no: 31

Treatment/Disturbance	Name	WRI DB #	Date	Size (acres)
Two-Way Chaining	-	-	1960's	-
Seeding	-	-	1960's	-
Roller Chopper	Mohrland PJ Removal	1083	November 2008	743
Seeding: Aerial Before	Mohrland PJ Removal	1083	October 2008	847
Seeding: Dribbler	Mohrland PJ Removal	1083	November 2008	847

The table is a recorded disturbance history of the study site.

SEED MIX--

Management unit 16R, Study no: 31

Project Name: Mohrland PJ Removal					
WRI Database #: 1083					
Application: Aerial		Acres: 847		Application: Dribbler	
				Acres: 847	
Seed type		lbs in mix	lbs/acre	Seed type	
G	Bottlebrush Squirreltail 'Toe Jam'	250	0.30	B	Fourwing Saltbush
G	Bottlebrush Squirreltail	150	0.18	B	True Mountain Mahogany
G	Canby Bluegrass 'Canbar'	400	0.47	Total Pounds:	
G	Crested Wheatgrass 'Hycrest'	650	0.77	PLS Pounds:	
G	Crested Wheatgrass 'Nordan'	600	0.71		
G	Indian Ricegrass	250	0.30		
G	Intermediate Wheatgrass 'Rush'	900	1.06		
G	Needle and Thread	200	0.24		
G	Pubescent Wheatgrass	1600	1.89		
G	Snake River Wheatgrass 'Secar'	850	1.00		
G	Western Wheatgrass 'Arriba'	1250	1.48		
F	Blue Flax 'Appar'	450	0.53		
F	Scarlet Globemallow	20	0.02		
F	Western Yarrow	50	0.06		
B	Fourwing Saltbush	500	0.59		
Total Pounds:		8120	9.59		
PLS Pounds:			8.03		

Habitat and Vegetation Information

Wildlife Habitat Deer, Crucial Winter; Elk, Crucial Winter

VEGETATION HISTORY--

Management unit 16R, Study no: 31

Year	Vegetation Type ¹	Woodland Succession ²
2008	Pinyon-Juniper/Black Sagebrush	Phase I transitioning to Phase II
2011-2014	Black Sagebrush	Phase I

¹Vegetation Type (Appendix - Vegetation Type), ²Woodland Succession (Tausch, Miller, Roundy, & Chambers, 2009).

Site Notes

In the 1960's the area was two-way chained, which removed the majority of the pinyon pine (*Pinus edulis*) and Utah juniper (*Juniperus osteosperma*) trees, but over time the pinyon and juniper trees began to reestablish within the chained area. The objectives of the project are to improve wildlife habitat by removing pinyon and juniper trees, and increasing the browse and herbaceous production and diversity. The treatment area was rested from livestock grazing for two years (WRI Database 2015).

Site Potential

1981-2010 Average Annual Precipitation 13 inches
 NRCS Ecological Site Upland Shallow Loam (Black Sagebrush)
 NRCS Ecological Site # [R034BY320UT](#)

SOIL ANALYSIS DATA--

Management unit 16R, Study no: 31

Texture	Sand (%)	Silt (%)	Clay (%)	pH	ds/m	OM (%)	PPM P	PPM K	Year Sampled
Sandy Clay Loam	53.6	25.8	20.6	6.9	0.9	3.2	13	172.8	2008

Soil specific normal values are described in the ecological site description (USDA-NRCS, 2011) and by Tiedeman and Lopez (2004).

States and Transitions

No state and transition model is available for the above ecological site.

When established in 2008, this site was a mixed stand of black sagebrush (*Artemisia nova*) and pinyon-juniper trees with few other browse species (Table - Browse Trends). The herbaceous understory was sparse likely due to competition (Table – Herbaceous Trends). After treatment, tree cover was greatly reduced and black sagebrush became the sole dominant species while all other browse species remained at low cover (Table – Browse Trends). Perennial grasses increased in cover while the perennial forbs experienced small fluctuations in cover. While cheatgrass (*Bromus tectorum*) was present on the site, it does not pose a threat at this time (Table – Herbaceous Trends).

Trend Summary

HERBACEOUS TRENDS--

Management unit 16R, Study no: 31

Type	Species	Nested Frequency			Average Cover %		
		'08	'11	'14	'08	'11	'14
G	Agropyron cristatum	_a 71	_b 146	_c 244	.26	4.62	7.35
G	Agropyron intermedium	_a -	_c 143	_b 37	-	3.64	.54
G	Agropyron smithii	_a -	_c 29	_b 11	-	1.06	.15
G	Bromus japonicus (a)	-	7	3	-	.16	.00
G	Bromus tectorum (a)	-	4	-	-	.03	-
G	Elymus wawawaiensis	-	4	-	-	.01	-
G	Oryzopsis hymenoides	_a -	_b 14	_a 5	-	.22	.03
G	Poa canbyi	-	1	4	-	.00	.01
G	Poa fendleriana	-	-	1	-	-	.15
G	Sitanion hystrix	_a -	_b 12	_a -	-	.19	-
Total for Annual Grasses		0	11	3	0	0.19	0.00
Total for Perennial Grasses		71	349	302	0.26	9.76	8.24

Type	Species	Nested Frequency			Average Cover %		
		'08	'11	'14	'08	'11	'14
	Total for Grasses	71	360	305	0.26	9.96	8.24
F	Arabis sp.	1	-	-	.03	-	-
F	Astragalus convallarius	5	7	-	.07	.21	-
F	Descurainia pinnata (a)	a ⁻	b ¹²	ab ⁸	-	.37	.02
F	Eriogonum cernuum (a)	b ¹⁷	b ¹⁷	a ⁻	.08	.23	-
F	Euphorbia albomarginata	b ³⁸	ab ²³	a ¹⁴	1.27	.70	.08
F	Ipomopsis aggregata	1	-	-	.03	-	-
F	Lactuca serriola (a)	-	5	-	-	.01	-
F	Linum perenne	-	2	-	-	.00	-
F	Machaeranthera canescens	-	2	1	-	.00	.00
F	Penstemon sp.	3	-	-	.03	-	-
F	Salsola iberica (a)	a ²	c ¹⁰⁹	b ⁴⁸	.00	2.03	.21
F	Senecio multilobatus	1	-	-	.03	-	-
F	Sisymbrium altissimum (a)	-	6	-	-	.03	-
	Total for Annual Forbs	19	149	56	0.08	2.70	0.23
	Total for Perennial Forbs	49	34	15	1.46	0.91	0.09
	Total for Forbs	68	183	71	1.55	3.61	0.32

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

BROWSE TRENDS--

Management unit 16R, Study no: 31

Type	Species	Quadrat Cover %			Line Intercept Cover %		
		'08	'11	'14	'08	'11	'14
B	Artemisia nova	12.77	10.20	8.07	13.76	8.81	8.33
B	Artemisia tridentata vaseyana	-	-	-	-	.03	-
B	Cercocarpus montanus	.15	-	-	.56	.15	-
B	Chrysothamnus nauseosus	1.63	1.06	1.08	1.90	2.09	1.31
B	Gutierrezia sarothrae	.03	.77	.82	-	.45	.23
B	Juniperus osteosperma	5.88	.68	.53	7.11	.65	.78
B	Leptodactylon pungens	.03	.15	.03	-	-	-
B	Opuntia sp.	.00	-	.00	.21	.28	.06
B	Pinus edulis	3.04	.00	-	6.15	-	-
	Total for Browse	23.55	12.87	10.55	29.69	12.46	10.71

POINT-QUARTER TREE DATA--

Management unit 16R, Study no: 31

Species	Trees per Acre			Average diameter (in)		
	'08	'11	'14	'08	'11	'14
Juniperus osteosperma	107	31	47	4.7	2	3.1
Pinus edulis	51	5	21	6.5	1.4	2.0

BASIC COVER--

Management unit 16R, Study no: 31

Cover Type	Average Cover %		
	'08	'11	'14
Vegetation	26.14	29.14	18.73
Rock	7.36	8.14	10.18
Pavement	7.96	6.98	9.87
Litter	37.48	32.23	38.43
Cryptogams	.09	.09	0
Bare Ground	40.54	26.29	39.52

PELLET GROUP DATA--

Management unit 16R, Study no: 31

Type	Quadrat Frequency			Days use per acre (ha)		
	'08	'11	'14	'08	'11	'14
Rabbit	54	8	37	-	-	-
Elk	1	4	6	3 (7)	21 (52)	24 (60)
Deer	41	15	16	34 (84)	34 (84)	30 (74)
Cattle	3	2	1	2 (5)	-	18 (45)

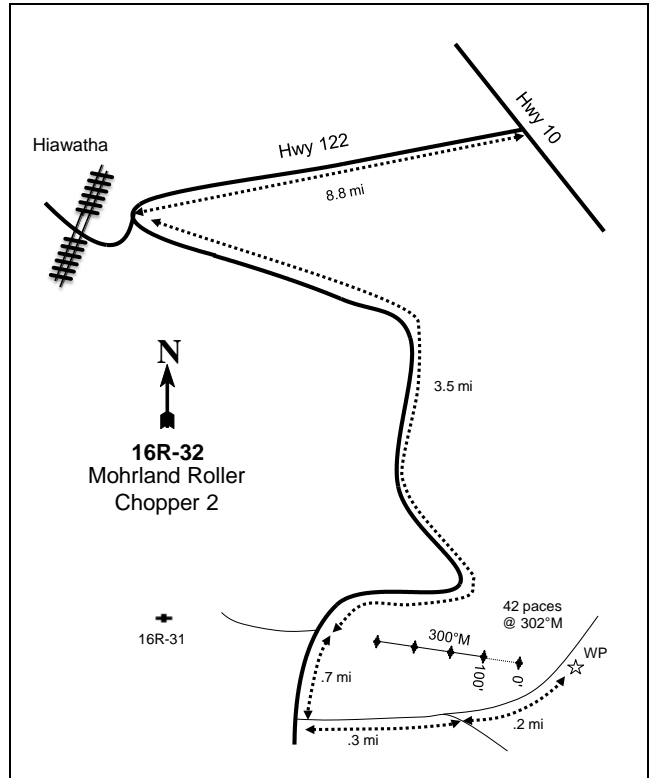
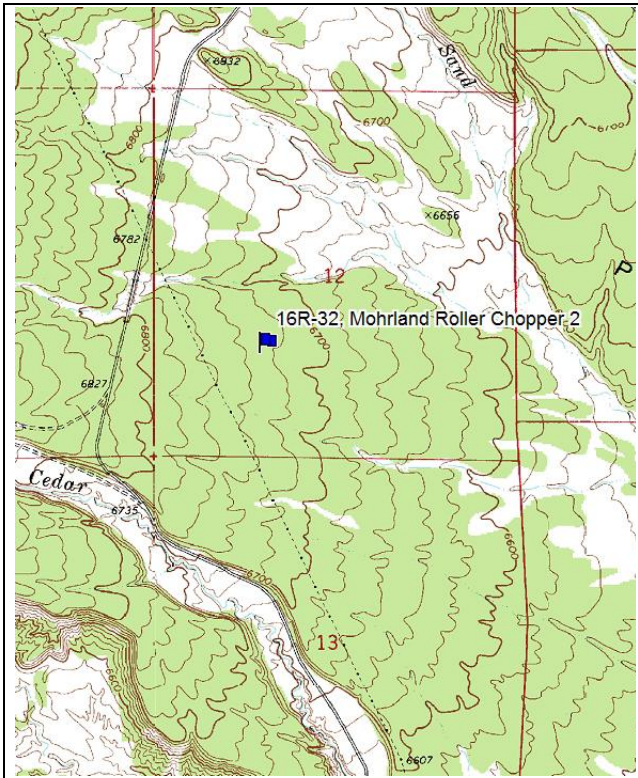
BROWSE CHARACTERISTICS--

Management unit 16R, Study no: 31

Year	Plants per Acre (excluding seedlings)	Age class distribution			Seedling (plants/acre)	Utilization			Average Height Crown (in)
		% Young	% Mature	% Decadent		% moderate	% heavy	% poor vigor	
<i>Amelanchier utahensis</i>									
08	0	0	0	-	-	0	0	0	-/-
11	0	0	0	-	-	0	0	0	-/-
14	0	0	0	-	-	0	0	0	26/37
<i>Artemisia nova</i>									
08	8620	23	42	35	2940	32	12	6	9/22
11	4440	25	72	3	1340	68	9	5	9/17
14	7000	22	74	4	380	37	46	2	9/17
<i>Artemisia tridentata vaseyana</i>									
08	0	0	0	-	-	0	0	0	-/-
11	20	0	100	-	-	0	0	0	9/9
14	0	0	0	-	-	0	0	0	5/13
<i>Cercocarpus montanus</i>									
08	40	0	100	-	-	100	0	0	48/56
11	20	100	0	-	-	100	0	0	33/47
14	40	0	100	-	-	0	100	0	11/14
<i>Chrysothamnus nauseosus</i>									
08	200	10	90	0	-	0	0	10	27/40
11	240	33	58	8	-	25	0	8	12/16
14	460	4	74	22	-	9	13	13	18/22

Year	Plants per Acre (excluding seedlings)	Age class distribution			Seedling (plants/acre)	Utilization		% poor vigor	Average Height Crown (in)
		% Young	% Mature	% Decadent		% moderate	% heavy		
<i>Gutierrezia sarothrae</i>									
08	800	10	83	8	20	0	5	8	6/6
11	280	43	50	7	-	0	0	7	9/12
14	1340	4	96	0	40	0	0	0	6/6
<i>Juniperus osteosperma</i>									
08	180	22	78	0	-	0	0	0	-/-
11	20	0	100	0	20	0	0	0	-/-
14	100	60	0	40	40	0	20	20	-/-
<i>Kochia prostrata</i>									
08	0	0	0	-	-	0	0	0	-/-
11	0	0	0	-	-	0	0	0	-/-
14	0	0	0	-	-	0	0	0	5/3
<i>Leptodactylon pungens</i>									
08	120	50	33	17	-	0	0	0	2/4
11	40	0	100	0	20	0	0	0	3/8
14	20	0	0	100	20	0	100	100	-/-
<i>Opuntia sp.</i>									
08	40	0	100	-	-	0	0	0	3/15
11	20	0	100	-	-	0	0	0	3/8
14	0	0	0	-	-	0	0	0	3/8
<i>Pinus edulis</i>									
08	20	0	100	-	-	0	0	0	-/-
11	0	0	0	-	20	0	0	0	-/-
14	0	0	0	-	-	0	0	0	-/-

MOHRLAND ROLLER CHOPPER 2 - TREND STUDY NO. 16R-32



Location Information

USGS 7.5 min Map Info Poison Spring Bench; Township 16S, Range 8E, Section 12
 GPS (0' Stake) NAD 83, UTM Zone 12, 501846 East 4365934 North

Transect Information

Browse Tag # (0' Stake) 254
 Transect Bearing 300° magnetic
 Length 400ft
 Belt Placement Line 1 (11ft & 95ft), Line 2 (34ft), Line 3 (59ft), Line 4 (71ft)
 Belt Marker Placement Standard

Directions to Site

From State Road 10, turn onto State Road 122 and drive 8.8 miles to a road on the left just before the railroad crossing near Hiawatha. Continue on this road for 3.5 miles to the fork that leads to 16R-31. Continue straight for 0.7 miles to a left turn and follow this road for 0.3 miles to a fork. Go left and drive 0.2 miles to the witness post. The 0-foot stake is 42 paces from the witness post at 302 degrees magnetic. The 0-foot stake is marked with browse tag # 254.

Site Information

Land Ownership SITLA
 Allotment Not Available
 Elevation 6,732ft (2,052m)
 Aspect East
 Slope 7-9%
 Sample Dates 07/23/2008, 07/05/2011, 07/31/2014

DISTURBANCE HISTORY--

Management unit 16R, Study no: 32

Treatment/Disturbance	Name	WRI DB #	Date	Size (acres)
Two-Way Chaining	-	-	1960's	-
Seeding	-	-	1960's	-
Roller Chopper	Mohrland PJ Removal	1083	November 2008	743
Seeding: Aerial Before	Mohrland PJ Removal	1083	October 2008	847
Seeding: Dribbler	Mohrland PJ Removal	1083	November 2008	847

The table is a recorded disturbance history of the study site.

SEED MIX--

Management unit 16R, Study no: 32

Project Name: Mohrland PJ Removal WRI Database #: 1083							
Application: Aerial		Acres: 847		Application: Dribbler		Acres: 847	
Seed type		lbs in mix	lbs/acre	Seed type		lbs in mix	lbs/acre
G	Bottlebrush Squirreltail 'Toe Jam'	250	0.30	B	Fourwing Saltbush	350	0.41
G	Bottlebrush Squirreltail	150	0.18	B	True Mountain Mahogany	25	0.03
G	Canby Bluegrass 'Canbar'	400	0.47	Total Pounds:		375	0.44
G	Crested Wheatgrass 'Hycrest'	650	0.77	PLS Pounds:			0.20
G	Crested Wheatgrass 'Nordan'	600	0.71				
G	Indian Ricegrass	250	0.30				
G	Intermediate Wheatgrass 'Rush'	900	1.06				
G	Needle and Thread	200	0.24				
G	Pubescent Wheatgrass	1600	1.89				
G	Snake River Wheatgrass 'Secar'	850	1.00				
G	Western Wheatgrass 'Arriba'	1250	1.48				
F	Blue Flax 'Appar'	450	0.53				
F	Scarlet Globemallow	20	0.02				
F	Western Yarrow	50	0.06				
B	Fourwing Saltbush	500	0.59				
Total Pounds:		8120	9.59				
PLS Pounds:			8.03				

Habitat and Vegetation Information

Wildlife Habitat Deer, Crucial Winter; Elk, Crucial Winter

VEGETATION HISTORY--

Management unit 16R, Study no: 32

Year	Vegetation Type ¹	Woodland Succession ²
2008-2014	Black Sagebrush	Phase I

¹Vegetation Type (Appendix - Vegetation Type), ²Woodland Succession (Tausch, Miller, Roundy, & Chambers, 2009).

Site Notes

In the 1960's the area was two-way chained, which removed the majority of the pinyon pine (*Pinus edulis*) and Utah juniper (*Juniperus osteosperma*) trees, but over time the pinyon and juniper trees began to reestablish within the chained area. The objectives of the project are to improve wildlife habitat by removing pinyon and juniper trees, and increasing the browse and herbaceous production and diversity. The treatment area was rested from livestock grazing for two years (WRI Database 2015).

Site Potential

1981-2010 Average Annual Precipitation 12 inches
 NRCS Ecological Site Upland Shallow Loam (Black Sagebrush)
 NRCS Ecological Site # [R034BY320UT](#)

SOIL ANALYSIS DATA--

Management unit 16R, Study no: 32

Texture	Sand (%)	Silt (%)	Clay (%)	pH	ds/m	OM (%)	PPM P	PPM K	Year Sampled
Sandy Clay Loam	52	27.4	20.6	7	0.7	2.5	9.7	121.6	2008

Soil specific normal values are described in the ecological site description (USDA-NRCS, 2011) and by Tiedeman and Lopez (2004).

States and Transitions

No state and transition model is available for the above ecological site.

Since site establishment in 2008, this site has been dominated by black sagebrush (*Artemisia nova*). Black sagebrush did experience a decrease in cover after treatment; however, density increased and the age class was diversified. Prior to treatment, pinyon-juniper trees were a robust component of the browse cover, but after treatment tree cover dropped significantly (Table - Browse Trends). Perennial grasses were sparse prior to the treatment and increased in cover after the treatment while the perennial forbs stay pretty consistent (Table – Herbaceous Trends).

Trend Summary

HERBACEOUS TRENDS--

Management unit 16R, Study no: 32

Type	Species	Nested Frequency			Average Cover %		
		'08	'11	'14	'08	'11	'14
G	Agropyron cristatum	^a 77	^b 167	^c 239	.73	7.30	6.08
G	Agropyron intermedium	^{a-}	^c 114	^b 32	-	3.45	.86
G	Agropyron smithii	-	11	3	-	.07	.03
G	Bromus japonicus (a)	-	-	-	-	.00	-
G	Bromus tectorum (a)	-	3	-	-	.00	-
G	Elymus junceus	-	2	-	-	.15	-
G	Elymus wawawaiensis	-	7	-	-	.09	-
G	Oryzopsis hymenoides	^{a-}	^c 33	^b 16	-	.75	.25
G	Sitanion hystrix	^{a-}	^b 18	^a 5	-	.29	.01
G	Stipa comata	-	1	-	-	.03	-
Total for Annual Grasses		0	3	0	0	0.01	0
Total for Perennial Grasses		77	353	295	0.73	12.15	7.23
Total for Grasses		77	356	295	0.73	12.16	7.23

Type	Species	Nested Frequency			Average Cover %		
		'08	'11	'14	'08	'11	'14
F	Chenopodium fremontii (a)	-	2	-	-	.00	-
F	Cryptantha sp.	2	-	-	.00	-	-
F	Descurainia pinnata (a)	a ⁻	b ²⁶	a ⁻	-	.85	-
F	Eriogonum cernuum (a)	14	6	3	.07	.04	.01
F	Erodium cicutarium (a)	-	2	-	-	.00	-
F	Euphorbia albomarginata	ab ¹⁶	b ²⁶	a ⁹	.12	.35	.07
F	Lactuca serriola (a)	-	1	-	-	.00	-
F	Linum perenne	-	7	-	-	.01	-
F	Lithospermum incisum	-	4	-	-	.01	-
F	Penstemon palmeri	-	1	3	-	.00	.00
F	Penstemon sp.	-	2	-	-	.15	-
F	Salsola iberica (a)	a ⁴	b ⁷⁸	b ⁴²	.01	.70	.32
F	Sisymbrium altissimum (a)	-	3	-	-	.15	-
F	Streptanthus cordatus	-	-	1	-	-	.00
Total for Annual Forbs		18	118	45	0.08	1.76	0.33
Total for Perennial Forbs		18	40	13	0.12	0.52	0.08
Total for Forbs		36	158	58	0.21	2.29	0.41

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

BROWSE TRENDS--

Management unit 16R, Study no: 32

Type	Species	Quadrat Cover %			Line Intercept Cover %		
		'08	'11	'14	'08	'11	'14
B	Artemisia nova	14.13	6.05	6.36	20.11	9.06	9.84
B	Juniperus osteosperma	.68	.00	.03	.66	.48	.70
B	Pinus edulis	2.77	-	.03	8.81	.03	.15
Total for Browse		17.58	6.05	6.42	29.58	9.57	10.69

POINT-QUARTER TREE DATA--

Management unit 16R, Study no: 32

Species	Trees per Acre			Average diameter (in)		
	'08	'11	'14	'08	'11	'14
Juniperus osteosperma	122	65	108	2.5	2.1	2.6
Pinus edulis	156	26	36	4.4	1.6	2.3

BASIC COVER--

Management unit 16R, Study no: 32

Cover Type	Average Cover %		
	'08	'11	'14
Vegetation	19.01	23.70	13.09
Rock	2.71	4.39	7.91
Pavement	21.88	15.51	14.18
Litter	22.15	29.40	33.27
Cryptogams	.17	0	.00
Bare Ground	34.17	30.12	41.76

PELLET GROUP DATA--

Management unit 16R, Study no: 32

Type	Quadrat Frequency			Days use per acre (ha)		
	'08	'11	'14	'08	'11	'14
Rabbit	44	3	44	-	-	-
Elk	1	3	8	1 (3)	8 (20)	11 (26)
Deer	41	6	9	30 (74)	17 (41)	9 (22)
Cattle	-	-	4	5 (13)	2 (5)	17 (41)

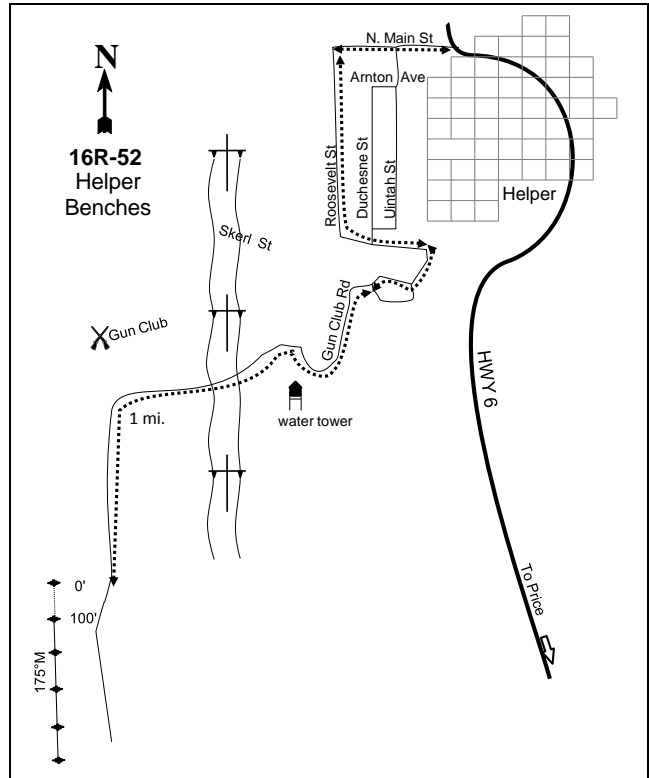
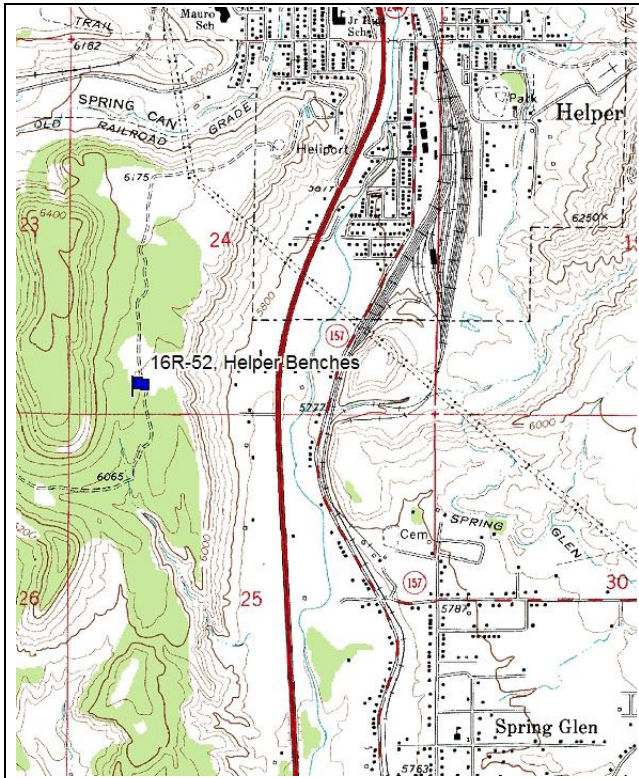
BROWSE CHARACTERISTICS--

Management unit 16R, Study no: 32

Year	Plants per Acre (excluding seedlings)	Age class distribution			Seedling (plants/acre)	Utilization			Average Height Crown (in)
		% Young	% Mature	% Decadent		% moderate	% heavy	% poor vigor	
<i>Artemisia nova</i>									
08	7180	7	57	36	3460	33	8	8	8/22
11	4580	21	68	10	220	51	7	9	9/17
14	6340	14	77	10	200	40	45	3	8/19
<i>Artemisia tridentata vaseyana</i>									
08	0	0	0	-	-	0	0	0	-/-
11	0	0	0	-	-	0	0	0	15/15
14	0	0	0	-	-	0	0	0	13/19
<i>Atriplex canescens</i>									
08	0	0	0	-	-	0	0	0	-/-
11	0	0	0	-	-	0	0	0	-/-
14	0	0	0	-	-	0	0	0	20/23
<i>Gutierrezia sarothrae</i>									
08	160	0	100	-	-	0	0	0	5/5
11	0	0	0	-	-	0	0	0	8/9
14	0	0	0	-	-	0	0	0	7/9
<i>Juniperus osteosperma</i>									
08	160	100	0	-	-	0	0	0	-/-
11	20	0	100	-	20	0	0	0	-/-
14	120	100	0	-	-	17	0	17	-/-

		Age class distribution					Utilization			
Year	Plants per Acre (excluding seedlings)	% Young	% Mature	% Decadent	Seedling (plants/acre)	% moderate	% heavy	% poor vigor	Average Height Crown (in)	
Opuntia sp.										
08	0	0	0	-	-	0	0	0	3/17	
11	0	0	0	-	-	0	0	0	-/-	
14	20	0	100	-	-	0	0	0	3/8	
Pinus edulis										
08	140	29	71	-	-	0	0	0	-/-	
11	20	100	0	-	-	0	0	0	-/-	
14	20	0	100	-	-	0	0	0	-/-	

HELPER BENCHES - TREND STUDY NO. 16R-52



Location Information

USGS 7.5 min Map Info Helper; Township 13S, Range 9E, Section 24
 GPS (0' Stake) NAD 83, UTM Zone 12, 511228 East 4391631 North

Transect Information

Browse Tag # (0' Stake) Not Available
 Transect Bearing 173° magnetic
 Length 500ft
 Belt Placement Line 1 (11ft), Line 2 (34ft), Line 3 (59ft), Line 4 (71ft), Line 5 (95ft)
 Belt Marker Placement No Rebar or Stakes

Directions to Site

Heading west out of Price on Hwy 6, take exit 232 in Helper. Follow Main St. and turn left (south) on Roosevelt St. Take Roosevelt Street to Gun Club Road. Follow Gun Club Road for approximately 1 mile. The site will be on the right (west) side of the road.

Site Information

Land Ownership SITLA
 Allotment Not Available
 Elevation 6,132 (1,869m)
 Aspect South
 Slope 5%
 Sample Dates 07/14/2014

DISTURBANCE HISTORY--

Management unit 16R, Study no: 52

<i>Treatment/Disturbance</i>	<i>Name</i>	<i>WRI DB #</i>	<i>Date</i>	<i>Size (acres)</i>
*Two-Way Ely Chaining	Helper Benches Pinyon/Juniper Removal	3006	2015	308
*Seeding	Helper Benches Pinyon/Juniper Removal	3006	2015	308

The table is a recorded disturbance history of the study site.

*Proposed Treatment

SEED MIX--

Management unit 16R, Study no: 52

Project name: Helper Benches Pinyon/Juniper Removal			
WRI Database #: 3006			
Application: Broadcast		Acres: 308	
Seed type		lbs in mix	lbs/acre
G	Canby Bluegrass 'Canbar'	200	.65
G	Indian Ricegrass 'Nezpar'	350	1.1
G	Siberian Wheatgrass	150	.49
G	Thickspike Wheatgrass 'Critanta'	200	.65
F	Alfalfa 'Ranger'	401	1.3
F	Annual Sunflower	100	.3
F	Blue Flax 'Appar'	300	.97
F	Palmer Penstemon	90	.29
F	Rocky Mountain Beeplant	150	.49
F	Small Burnet	450	1.5
F	Western Yarrow	30	.1
F	Yellow Sweetclover	150	.49
B	Fourwing Saltbush	350	1.1
Total Pounds:		2921	9.48
PLS Pounds:			7.72

Habitat and Vegetation Information

Wildlife Habitat Deer, Crucial Winter

VEGETATION HISTORY--

Management unit 16R, Study no: 52

<i>Year</i>	<i>Vegetation Type¹</i>	<i>Woodland Succession²</i>
2014	Pinyon-Juniper	Phase III

¹Vegetation Type (Appendix - Vegetation Type), ²Woodland Succession (Tausch, Miller, Roundy, & Chambers, 2009).

Site Notes

No remarks.

Site Potential

1981-2010 Average Annual Precipitation 11 inches
 NRCS Ecological Site Upland Stony Loam (Pinyon-Utah Juniper)
 NRCS Ecological Site # R034XY330UT

States and Transitions

No state and transition model is available for the above ecological site.

This site was established in 2014, and is in phase III encroachment by pinyon pine (*Pinus edulis*) and Utah Juniper (*Juniperus osteosperma*) with little other browse cover (Table – Browse Trends). The herbaceous understory is extremely sparse (Table – Herbaceous Trends). This site is in danger of losing soil, which could decrease its potential, unless a tree removing disturbance releases resources and seeded species are established on the site to augment the herbaceous understory.

Trend Summary

HERBACEOUS TRENDS--
 Management unit 16R, Study no: 52

T y p e	Species	Nested Frequency	Average Cover %
		'14	'14
G	Sitanion hystrix	1	.00
Total for Annual Grasses		0	0
Total for Perennial Grasses		1	0.00
Total for Grasses		1	0.00
F	Arabis sp.	1	.00
F	Cryptantha sp.	6	.06
F	Eriogonum sp.	3	.00
F	Euphorbia fendleri	21	.05
Total for Annual Forbs		0	0
Total for Perennial Forbs		31	0.13
Total for Forbs		31	0.13

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

BROWSE TRENDS--
 Management unit 16R, Study no: 52

T y p e	Species	Quadrat Cover %	Line Intercept Cover %
		'14	'14
B	Juniperus osteosperma	3.33	15.29
B	Opuntia polyacantha	.38	.05
B	Pinus edulis	5.20	13.98
Total for Browse		8.91	29.32

POINT-QUARTER TREE DATA--
Management unit 16R, Study no: 52

Species	Trees per Acre	Average diameter (in)
	'14	
Juniperus osteosperma	366	7.1
Pinus edulis	163	3.9

BASIC COVER--
Management unit 16R, Study no: 52

Cover Type	Average Cover %
	'14
Vegetation	9.45
Rock	11.38
Pavement	21.83
Litter	43.64
Cryptogams	.43
Bare Ground	23.22

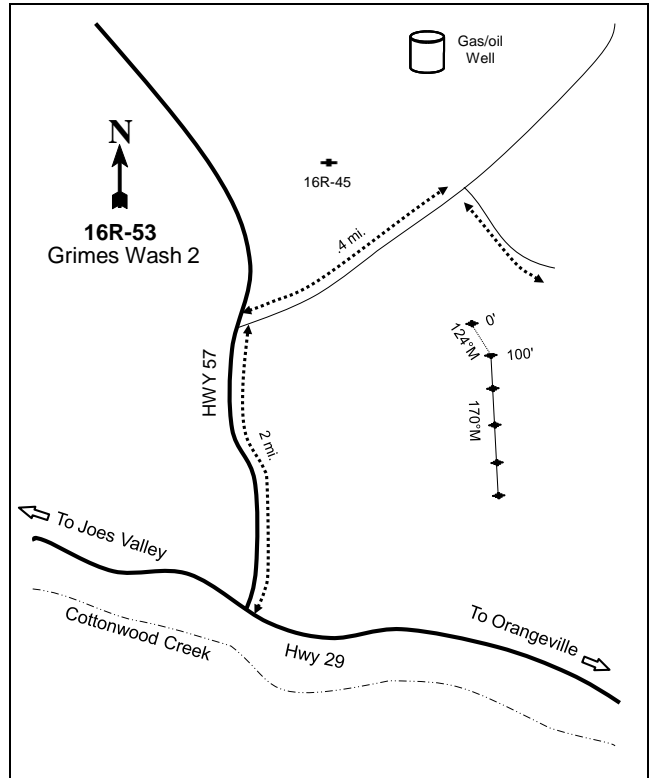
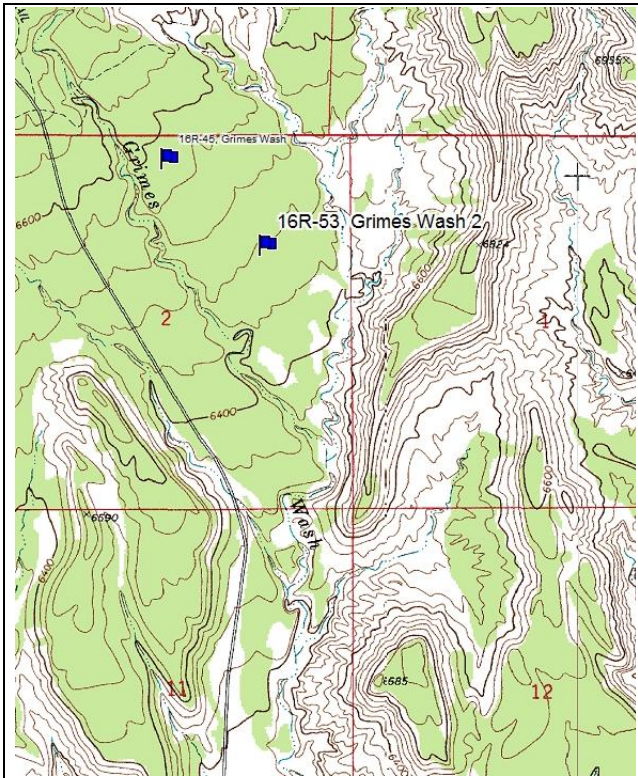
PELLET GROUP DATA--
Management unit 16R, Study no: 52

Type	Quadrat Frequency	Days use per acre (ha)
	'14	
Rabbit	7	-
Deer	58	72 (177)

BROWSE CHARACTERISTICS--
Management unit 16R, Study no: 52

Year	Plants per Acre (excluding seedlings)	Age class distribution			Seedling (plants/acre)	Utilization			Average Height Crown (in)
		% Young	% Mature	% Decadent		% moderate	% heavy	% poor vigor	
Ephedra viridis									
14	0	0	0	-	-	0	0	0	11/9
Juniperus osteosperma									
14	260	15	77	8	-	0	0	15	-/-
Opuntia polyacantha									
14	40	0	100	-	-	100	0	0	4/17
Pinus edulis									
14	380	63	32	5	-	0	0	5	-/-

GRIMES WASH 2 - TREND STUDY NO. 16R-53



Location Information

USGS 7.5 min Map Info Red Point; Township 18S, Range 7E, Section 2
 GPS (0' Stake) NAD 83, UTM Zone 12, 491361 East 4348787 North

Transect Information

Browse Tag # (0' Stake) 140
 Transect Bearing Line 1: 124° magnetic, Lines 2-5: 170° magnetic
 Length 500ft
 Belt Placement Line 1 (11ft), Line 2 (34ft), Line 3 (59ft), Line 4 (71ft), Line 5 (95ft)
 Belt Marker Placement Standard

Directions to Site

From the intersection of State Road 29 and State Road 57, drive 2 miles north on State Road 57. Turn right heading northeast and go 0.4 miles. Turn right heading southeast and go 0.1 miles. The site will be to the south.

Site Information

Land Ownership SITLA
 Allotment Not Available
 Elevation 6,506ft (1,983m)
 Aspect South
 Slope 5%
 Sample Dates 07/14/2014

DISTURBANCE HISTORY--

Management unit 16R, Study no: 53

<i>Treatment/Disturbance</i>	<i>Name</i>	<i>WRI DB #</i>	<i>Date</i>	<i>Size (acres)</i>
Two-Way Ely Chaining	Grimes Wash PJ Removal	1946	Fall 2011	147
Seeding: Aerial Before	Grimes Wash PJ Removal	1946	Fall 2011	272

The table is a recorded disturbance history of the study site.

SEED MIX--

Management unit 16R, Study no: 53

Project Name: Grimes Wash			
WRI Database #: 1946			
Application: Aerial Before		Acres: 272	
Seed Type		lbs in mix	lbs/acre
G	Canby Bluegrass 'Canbar'	150	0.55
G	Indian Ricegrass	550	2.02
G	Siberian Wheatgrass 'Vavilov' NC	400	1.47
G	Thickspike Wheatgrass 'Bannock'	400	1.47
F	Alfalfa 'Ladak+'	100	0.37
F	Blue Flax 'Appar'	150	0.55
F	Gooseberryleaf Globemallow	50	0.18
F	Western Yarrow 'Eagle Mountain'	25	0.09
F	Yellow Sweetclover	100	0.37
B	Fourwing Saltbush	150	0.55
B	Winterfat	120	0.44
Total Pounds:		2195	8.07
PLS Pounds:			5.91

Habitat and Vegetation Information

Wildlife Habitat Deer, Crucial Winter; Elk, Substantial Winter

VEGETATION HISTORY--

Management unit 16R, Study no: 53

<i>Year</i>	<i>Vegetation Type¹</i>	<i>Woodland Succession²</i>
2014	Annual Forb	Phase I

¹Vegetation Type (Appendix - Vegetation Type), ²Woodland Succession (Tausch, Miller, Roundy, & Chambers, 2009).

Site Notes

The original Grimes Wash study (16R-45) was not included in the treatment, so it became a reference site for the Grimes Wash 2 study that was established in 2014 after the treatment.

Site Potential

1981-2010 Average Annual Precipitation 11 inches
 NRCS Ecological Site Upland Shallow Loam (Pinyon-Utah Juniper)
 NRCS Ecological Site # R034XY332UT

States and Transitions

No state and transition model is available for the above ecological site.

When established in 2014, this site was dominated by the annual forb saltwort (*Salsola iberica*). All other forbs and grasses were sparse (Table – Herbaceous Trends). Browse cover was low and not very diverse (Table – Browse Trends). This site has recently been treated and continual monitoring should occur to track its progress to determine if further work, especially in regards to annuals, should be done.

Trend Summary

HERBACEOUS TRENDS--

Management unit 16R, Study no: 53

Type	Species	Nested Frequency	Average Cover %
		'14	'14
G	Agropyron fragile	6	.03
G	Oryzopsis hymenoides	3	.03
G	Poa secunda	2	.01
G	Sitanion hystrix	-	.00
Total for Annual Grasses		0	0
Total for Perennial Grasses		11	0.08
Total for Grasses		11	0.08
F	Arabis holboellii	4	.18
F	Descurainia pinnata (a)	8	.17
F	Eriogonum alatum	-	.00
F	Eriogonum sp.	4	.00
F	Euphorbia sp.	11	.25
F	Halogeton glomeratus (a)	50	.48
F	Hymenoxys acaulis	1	.00
F	Lepidium sp. (a)	24	.45
F	Lithospermum ruderae	2	.00
F	Lomatium sp.	15	.40
F	Melilotus officinalis	6	.03
F	Penstemon sp.	2	.04
F	Salsola iberica (a)	328	21.02
F	Sisymbrium altissimum (a)	6	.04
F	Stanleya viridiflora	-	.00
Total for Annual Forbs		416	22.18
Total for Perennial Forbs		45	0.93
Total for Forbs		461	23.12

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

BROWSE TRENDS--

Management unit 16R, Study no: 53

Type	Species	Quadrat	Line
		Cover %	Intercept
		'14	'14
B	Artemisia nova	.09	-
B	Artemisia tridentata wyomingensis	-	.15
B	Atriplex canescens	.00	-
B	Eriogonum microthecum	.04	.08
B	Gutierrezia sarothrae	.03	.03
B	Juniperus osteosperma	.03	.15
B	Opuntia sp.	.06	-
Total for Browse		0.26	0.41

BASIC COVER--

Management unit 16R, Study no: 53

Cover Type	Average
	Cover %
	'14
Vegetation	24.47
Rock	6.11
Pavement	10.06
Litter	34.13
Cryptogams	.03
Bare Ground	32.76

PELLET GROUP DATA--

Management unit 16R, Study no: 53

Type	Quadrat	Days use
	Frequency	
		per acre
		(ha)
		'14
Rabbit	12	-
Deer	5	-

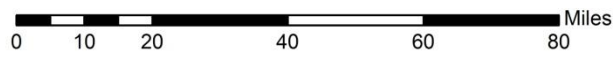
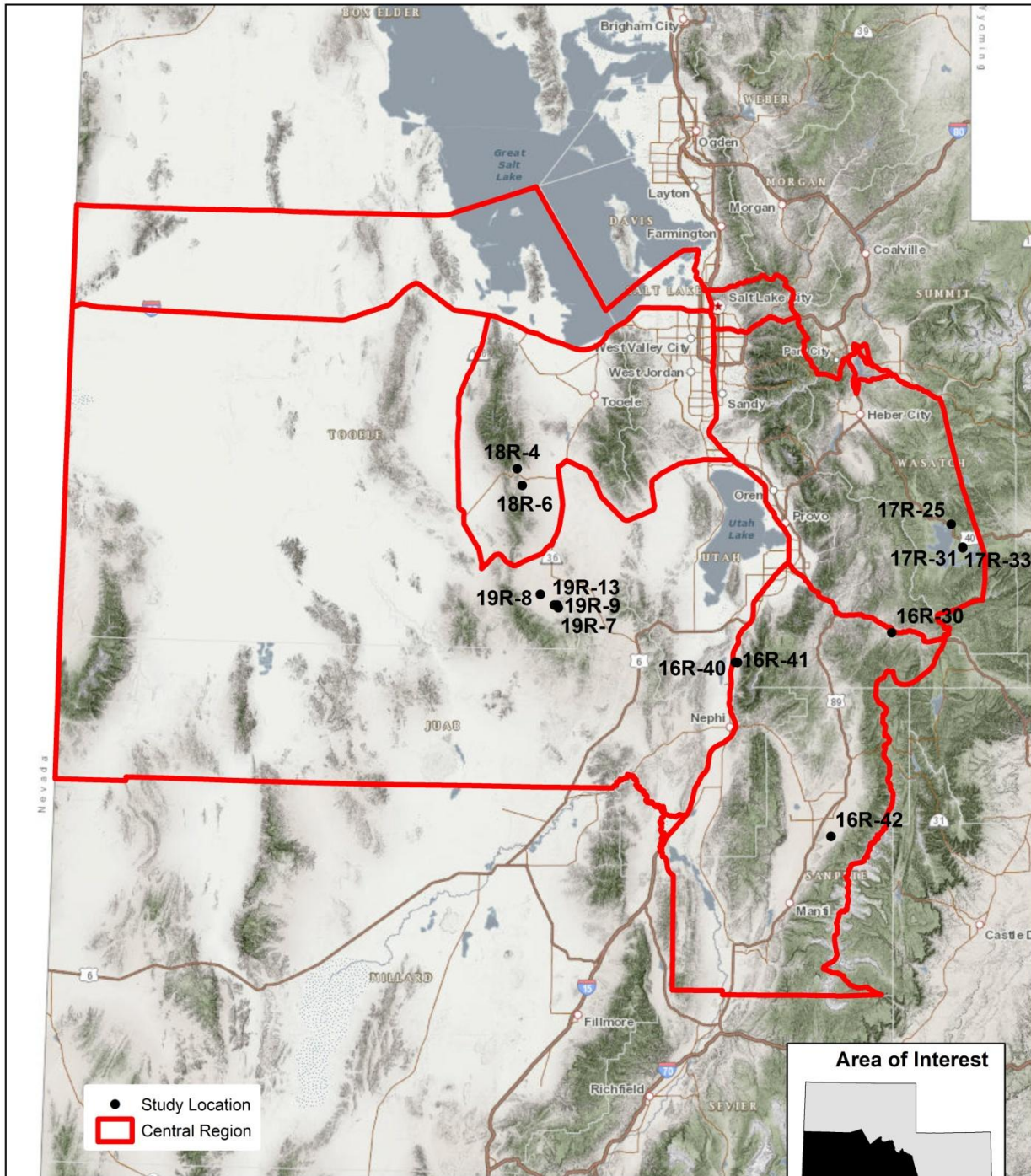
BROWSE CHARACTERISTICS--

Management unit 16R, Study no: 53

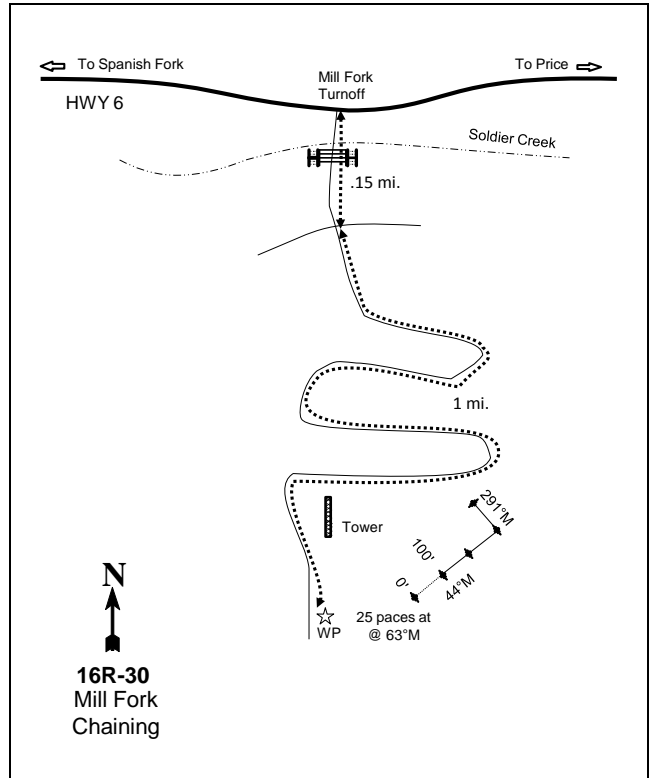
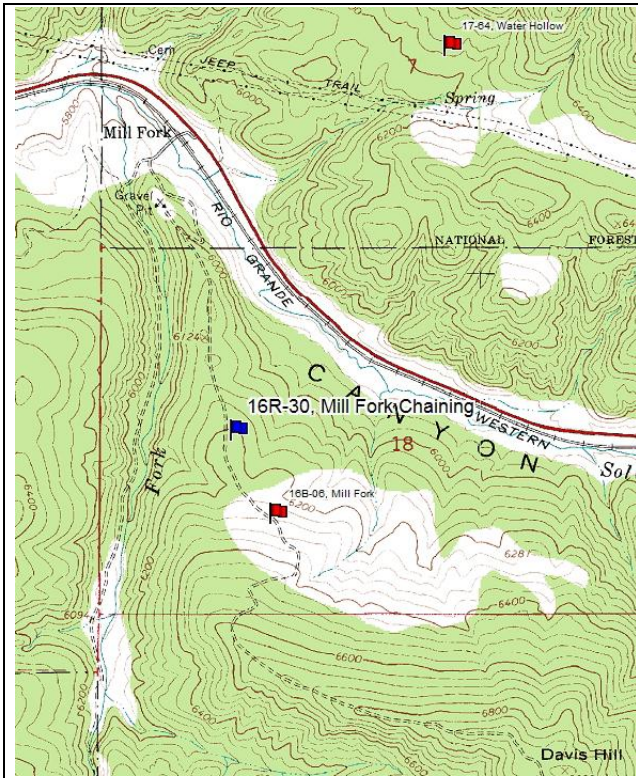
		Age class distribution					Utilization			
Year	Plants per Acre (excluding seedlings)	%	%	%	Seedling (plants/acre)	%	%	% poor vigor	Average Height Crown (in)	
		Young	Mature	Decadent		moderate	heavy			
Artemisia nova										
14	120	33	67	-	140	0	0	0	6/14	
Artemisia tridentata wyomingensis										
14	220	18	82	-	-	18	0	0	9/14	

Year	Plants per Acre (excluding seedlings)	Age class distribution			Seedling (plants/acre)	Utilization			Average Height Crown (in)
		% Young	% Mature	% Decadent		% moderate	% heavy	% poor vigor	
<i>Atriplex canescens</i>									
14	20	100	0	-	-	0	0	0	-/-
<i>Cercocarpus montanus</i>									
14	20	0	100	-	-	0	0	0	22/35
<i>Ephedra viridis</i>									
14	0	0	0	-	-	0	0	0	12/24
<i>Eriogonum microthecum</i>									
14	80	0	100	-	-	0	0	0	3/6
<i>Gutierrezia sarothrae</i>									
14	260	77	23	-	-	0	0	0	10/16
<i>Opuntia sp.</i>									
14	20	0	100	-	-	0	0	0	2/7

CENTRAL REGION



MILL FORK CHAINING - TREND STUDY NO. 16R-30



Location Information

USGS 7.5 min Map Info Mill Fork; Township 10S, Range 6E, Section 18
 GPS (0' Stake) NAD 83, UTM Zone 12, 473936 East 4422429 North

Transect Information

Browse Tag # (0' Stake) 111
 Transect Bearing 44° magnetic
 Length 400ft
 Belt Placement Line 1 (11ft & 95ft), Line 2 (34ft), Line 3 (59ft), Line 4 (71ft)
 Belt Marker Placement Standard

Directions to Site

Travel east on Highway 6 (toward Price) for 1.9 miles to the Mill Fork turnoff on the south side of the highway from the Sheep Creek Cafe and the Sheep Creek Turnoff. Take this road 0.15 miles through a gate and cross the river to a fork. Stay to the left (east) and go up the hill 1 mile to a witness post on the east side of the road. From the witness post the 0-foot baseline stake is located 25 paces away at 63 degrees magnetic. The stake is marked by browse tag #111.

Site Information

Land Ownership Private
 Allotment Not Available
 Elevation 6,200ft (1,890m)
 Aspect North
 Slope 3%
 Sample Dates 10/09/2007, 06/21/2010, 05/29/2014

DISTURBANCE HISTORY--

Management unit 16R, Study no: 30

<i>Treatment/Disturbance</i>	<i>Name</i>	<i>WRI DB #</i>	<i>Date</i>	<i>Size (acres)</i>
Two-Way Ely/Smooth Chaining	Mill Fork Wildlife Habitat Improvement	716	October 2007	350
Seeding: Aerial Before	Mill Fork Wildlife Habitat Improvement	716	October 2007	472
Seeding: Dribbler	Mill Fork Wildlife Habitat Improvement	716	October 2007	370

The table is a recorded disturbance history of the study site.

SEED MIX--

Management unit 16R, Study no: 30

Project Name: Mill Fork Wildlife Habitat Improvement					
WRI Database #: 716					
Application: Aerial Seed		Acres: 472		Application: Seed Dribbler	
Acres: 370					
Seed type	lbs in mix	lbs/acre	Seed type	lbs in mix	lbs/acre
G Bluebunch WG 'Anatone'	450	0.95	B Bitterbrush	100	0.27
G Canby Bluegrass 'Canbar'	200	0.42	B Fourwing Saltbush	100	0.27
G Crested Wheatgrass 'Douglas'	250	0.53	Total Pounds:		200
G Crested Wheatgrass 'Ephraim'	250	0.53	PLS Pounds:		0.35
G Crested Wheatgrass 'Hycrest'	200	0.42			
G Great Basin Wildrye 'Trailhead'	250	0.53			
G Indian Ricegrass 'Rimrock'	450	0.95			
G Intermediate Wheatgrass	450	0.95			
G Mountain Brome	400	0.85			
G Orchardgrass 'Paiute'	200	0.42			
G Siberian Wheatgrass 'Vavilov'	400	0.85			
F Alfalfa 'Ladak'	300	0.64			
F Alfalfa 'Ranger'	300	0.64			
F Alfalfa 'Spredor 4'	300	0.64			
F Cicer Milkvetch 'Lutana'	250	0.53			
F Sainfoin 'Eski'	900	1.91			
F Small Burnet 'Delar'	883	1.87			
F Western Yarrow	48	0.10			
Total Pounds:		6481	13.73		
PLS Pounds:			12.44		

Habitat and Vegetation Information

Wildlife Habitat Deer, Crucial Winter/Spring; Elk, Crucial Winter

VEGETATION HISTORY--

Management unit 16R, Study no: 30

Year	Vegetation Type ¹	Woodland Succession ²
2007	Juniper	Phase III
2010	Annual Grass	Phase I
2014	Perennial Grass	Phase I

¹Vegetation Type (Appendix - Vegetation Type), ²Woodland Succession (Tausch, Miller, Roundy, & Chambers, 2009).

Site Notes

The study was established in 2007 to monitor a big game winter range improvement project in Spanish Fork Canyon. A large portion of the sagebrush habitats in the canyon have become decadent or have been invaded by pinyon pine (*Pinus edulis*) and Utah juniper (*Juniperus osteosperma*). These rangelands have been heavily grazed by sheep and cattle for decades; leaving little herbaceous understory. This project was conducted on private property that has the potential to serve as quality big game winter range habitat. The objectives of the project were to improve private property, to provide winter habitat for mule deer and elk, and potentially reduce the amount of vehicle collisions of wintering deer and elk crossing US 6. A secondary goal is to reduce erosion and the sediment load in the Spanish Fork River (WRI Database 2015).

Site Potential

1981-2010 Average Annual Precipitation 21 inches
 NRCS Ecological Site Mountain Loam (Mountain Big Sagebrush)
 NRCS Ecological Site # R047XA430UT

SOIL ANALYSIS DATA--

Management unit 16R, Study no: 30

Texture	Sand (%)	Silt (%)	Clay (%)	pH	ds/m	OM (%)	PPM P	PPM K	Year Sampled
Clay Loam	34.4	37	28.6	6.9	0.7	3.7	8.9	179.2	2007

Soil specific normal values are described in the ecological site description (USDA-NRCS, 2011) and by Tiedeman and Lopez (2004).

States and Transitions

A defined [state and transition model](#) is available.

When established in 2007, this site was in phase III juniper encroachment and all other browse species contributed little cover (Table – Browse Trends). The herbaceous understory was also sparse. The sample year after the treatment, cheatgrass (*Bromus tectorum*) had become the dominant species on the site despite perennial grasses and forbs increasing. In 2014, cheatgrass cover had decreased significantly and perennial grasses had become the dominant cover type (Table – Herbaceous Trends). Browse species have remained sparse (Table – Browse Trends). These phases and states are not currently described in the Mountain Loam (Mountain Big Sagebrush) ecological site (USDA-NRCS, 2011).

Trend Summary

HERBACEOUS TRENDS--

Management unit 16R, Study no: 30

Type	Species	Nested Frequency			Average Cover %		
		'07	'10	'14	'07	'10	'14
G	Agropyron cristatum	a-	b15	c67	-	.93	3.81
G	Agropyron intermedium	a-	b19	c55	-	.84	2.66
G	Agropyron spicatum	a-	a-	b29	-	-	2.62

Type	Species	Nested Frequency			Average Cover %		
		'07	'10	'14	'07	'10	'14
G	Bromus carinatus	a ⁻	b ¹¹	a ⁻	-	.48	-
G	Bromus tectorum (a)	b ²²⁶	c ³¹³	a ¹⁰²	2.45	13.56	.93
G	Dactylis glomerata	-	7	6	-	.33	.18
G	Elymus cinereus	-	-	2	-	-	.41
G	Elymus salina	-	-	5	-	-	.66
G	Oryzopsis hymenoides	5	6	20	.05	.04	.40
G	Poa fendleriana	-	-	13	-	-	.33
G	Poa pratensis	a ⁵	ab ¹⁸	b ²¹	.03	.34	.55
G	Poa secunda	b ¹³⁰	a ¹⁴	a ³⁵	2.71	.27	.85
G	Sitanion hystrix	b ¹¹⁷	a ⁶⁵	b ²⁴⁰	1.37	2.54	15.41
Total for Annual Grasses		226	313	102	2.45	13.56	0.93
Total for Perennial Grasses		257	155	493	4.16	5.79	27.91
Total for Grasses		483	468	595	6.62	19.35	28.84
F	Achillea millefolium	-	-	1	-	-	.00
F	Agoseris glauca	a ⁻	a ²	b ⁹	-	.15	.18
F	Alyssum alyssoides (a)	a ²⁵	ab ³⁸	b ⁴⁵	.09	.32	.19
F	Antennaria sp.	12	2	-	.04	.03	-
F	Astragalus calycosus	a ⁻	a ⁻	b ¹²	-	-	.26
F	Astragalus cibarius	-	-	-	-	-	.03
F	Astragalus convallarius	1	-	-	.03	-	-
F	Astragalus utahensis	4	1	1	.04	.03	.03
F	Calochortus nuttallii	-	1	2	-	.00	.01
F	Camelina microcarpa (a)	-	-	2	-	-	.03
F	Carduus nutans (a)	a ⁻	a ⁻	b ⁸⁷	-	-	1.84
F	Chaenactis douglasii	a ²	a ⁸	b ¹⁹	.00	.03	.14
F	Cirsium sp.	-	3	-	-	.18	-
F	Collinsia parviflora (a)	13	-	-	.02	-	-
F	Cymopterus sp.	a ⁻	a ⁴	b ¹⁸	-	.03	.20
F	Cynoglossum officinale	-	-	2	-	-	.03
F	Descurainia pinnata (a)	b ⁸⁶	a ³⁰	ab ⁵¹	.23	.42	.43
F	Eriogonum sp.	a ⁻	b ³⁶	a ⁻	-	.40	-
F	Lactuca serriola (a)	a ⁻	c ¹⁹⁹	b ¹³	-	3.47	.02
F	Machaeranthera canescens	a ⁻	a ⁻	b ¹³	-	-	.22
F	Machaeranthera grindelioides	-	3	-	-	.00	-
F	Medicago sativa	-	7	2	-	.10	.09
F	Microsteris gracilis (a)	b ²⁸	a ⁻	a ⁻	.05	-	-
F	Onobrychis viciaefolia	-	4	9	-	.33	.27
F	Penstemon caespitosus	25	6	14	.23	.48	.54
F	Phlox hoodii	-	-	5	-	-	.15
F	Phlox longifolia	b ²⁸	a ²	ab ⁸	.13	.00	.19
F	Ranunculus testiculatus (a)	b ¹⁴⁸	a ¹²	a ²⁵	.51	.05	.09
F	Sanguisorba minor	a ⁻	ab ⁶	b ¹⁵	-	.21	.40
F	Senecio multilobatus	6	7	-	.01	.01	-
F	Streptanthus cordatus	1	-	-	.00	-	-

Type	Species	Nested Frequency			Average Cover %		
		'07	'10	'14	'07	'10	'14
F	Taraxacum officinale	a ⁻	a ⁴	b ²²	-	.03	.17
F	Tragopogon dubius (a)	a ⁻	a ⁻	b ¹¹	-	-	.08
F	Verbascum thapsus	a ⁻	a ⁻	b ¹²	-	-	.48
Total for Annual Forbs		300	279	234	0.90	4.26	2.70
Total for Perennial Forbs		79	96	164	0.50	2.04	3.41
Total for Forbs		379	375	398	1.40	6.31	6.11

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

BROWSE TRENDS--

Management unit 16R, Study no: 30

Type	Species	Average Cover %			Line Intercept Cover %		
		'07	'10	'14	'07	'10	'14
B	Atriplex canescens	-	.06	-	-	.56	-
B	Gutierrezia sarothrae	.03	.06	.05	.11	.05	.03
B	Juniperus osteosperma	7.01	1.65	2.05	39.18	1.11	3.05
B	Leptodactylon pungens	-	.15	-	-	-	-
B	Opuntia fragilis	1.15	.57	.79	.86	.05	.55
B	Symphoricarpos oreophilus	-	-	.00	-	-	-
Total for Browse		8.20	2.49	2.90	40.15	1.77	3.63

POINT-QUARTER TREE DATA--

Management unit 16R, Study no: 30

Species	Trees per Acre			Average diameter (in)		
	'07	'10	'14	'07	'10	'14
Juniperus osteosperma	272	72	102	5.5	5.3	2.6
Juniperus scopulorum	-	-	19	-	-	2.0
Pinus edulis	-	20	20	-	0.8	1.2

BASIC COVER--

Management unit 16R, Study no: 30

Cover Type	Average Cover %		
	'07	'10	'14
Vegetation	15.62	29.93	37.80
Rock	5.48	3.59	3.90
Pavement	17.96	4.61	2.27
Litter	50.14	60.81	59.51
Cryptogams	11.75	.41	.75
Bare Ground	16.06	18.23	12.86

PELLET GROUP DATA--

Management unit 16R, Study no: 30

Type	Quadrat Frequency		
	'07	'10	'14
Rabbit	23	8	15
Elk	2	1	10
Deer	6	4	3

Days use per acre (ha)		
'07	'10	'14
-	-	-
3 (7)	11 (26)	18 (45)
5 (12)	7 (18)	11 (28)

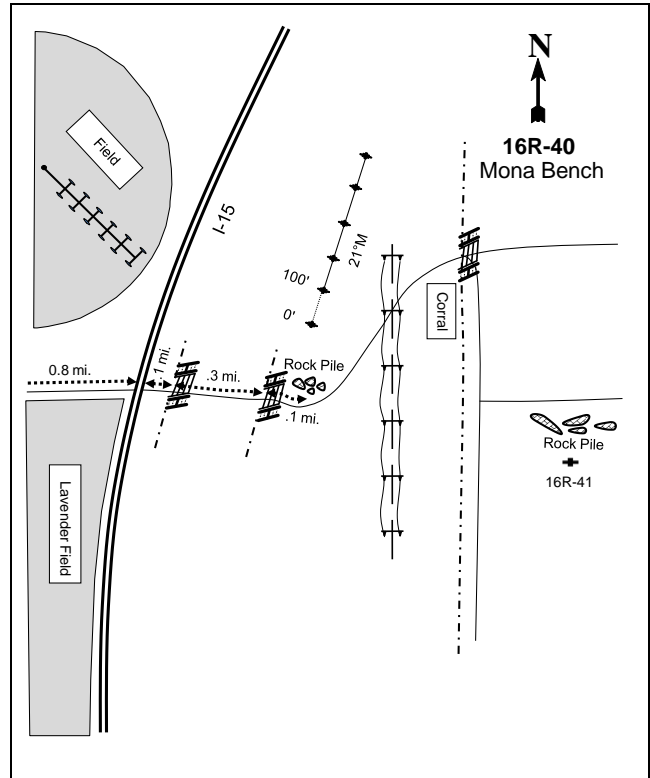
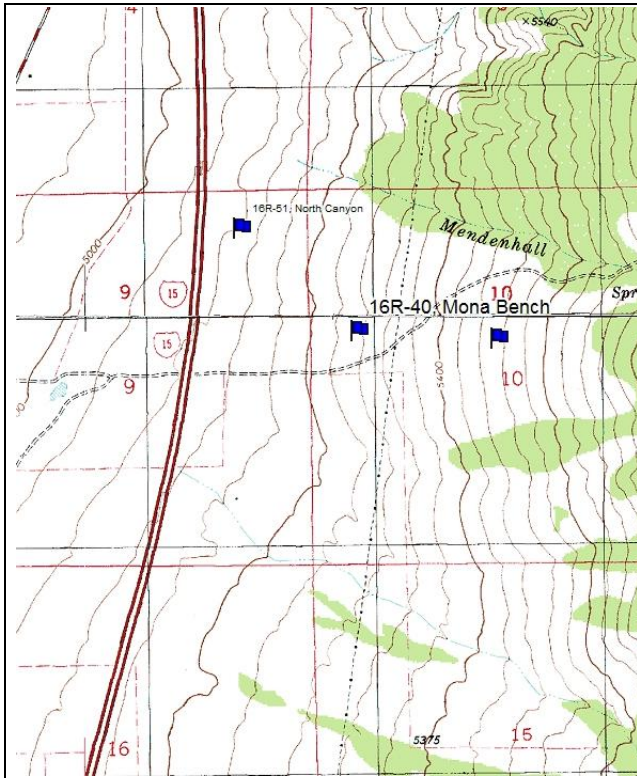
BROWSE CHARACTERISTICS--

Management unit 16R, Study no: 30

Year	Plants per Acre (excluding seedlings)	Age class distribution			Seedling (plants/acre)	Utilization		% poor vigor	Average Height Crown (in)
		% Young	% Mature	% Decadent		% moderate	% heavy		
<i>Artemisia tridentata vaseyana</i>									
07	0	0	0	-	-	0	0	0	10/10
10	20	0	100	-	-	0	0	0	13/16
14	0	0	0	-	-	0	0	0	25/27
<i>Atriplex canescens</i>									
07	0	0	0	-	-	0	0	0	-/-
10	40	100	0	-	-	0	0	0	18/23
14	0	0	0	-	-	0	0	0	18/35
<i>Ceratoides lanata</i>									
07	0	0	0	-	-	0	0	0	-/-
10	0	0	0	-	-	0	0	0	17/25
14	0	0	0	-	-	0	0	0	-/-
<i>Gutierrezia sarothrae</i>									
07	40	0	100	0	-	0	0	0	9/12
10	220	55	36	9	20	0	0	9	12/16
14	280	14	86	0	20	0	0	0	6/8
<i>Juniperus osteosperma</i>									
07	340	6	76	18	40	0	0	0	-/-
10	100	40	40	20	20	0	0	20	-/-
14	180	67	33	0	200	0	0	0	-/-
<i>Leptodactylon pungens</i>									
07	20	100	0	-	-	0	0	0	-/-
10	60	0	100	-	-	0	0	0	1/4
14	0	0	0	-	-	0	0	0	-/-
<i>Opuntia fragilis</i>									
07	1060	15	79	6	-	0	0	2	3/14
10	440	9	91	0	-	0	0	0	4/9
14	560	11	82	7	20	0	0	14	3/9
<i>Purshia tridentata</i>									
07	0	0	0	-	-	0	0	0	-/-
10	20	100	0	-	-	0	0	0	9/13
14	60	67	33	-	-	67	33	0	5/12

		Age class distribution					Utilization			
Year	Plants per Acre (excluding seedlings)	% Young	% Mature	% Decadent	Seedling (plants/acre)	% moderate	% heavy	% poor vigor	Average Height Crown (in)	
<i>Symphoricarpos oreophilus</i>										
07	0	0	0	-	-	0	0	0	-/-	
10	0	0	0	-	-	0	0	0	-/-	
14	40	50	50	-	-	0	50	0	22/24	
<i>Tetradymia canescens</i>										
07	0	0	0	-	-	0	0	0	-/-	
10	0	0	0	-	-	0	0	0	12/16	
14	0	0	0	-	-	0	0	0	16/24	

MONA BENCH - TREND STUDY NO. 16R-40



Location Information

USGS 7.5 min Map Info Mona; Township 11S, Range 1E, Section 10
 GPS (0' Stake) NAD 83, UTM Zone 12, 429839 East 4414083 North

Transect Information

Browse Tag # (0' Stake) 194
 Transect Bearing 21° magnetic
 Length 500ft
 Belt Placement Line 1 (11ft), Line 2 (34ft), Line 3 (59ft), Line 4 (71ft), Line 5 (95ft)
 Belt Marker Placement Standard

Directions to Site

From Mona, drive 3 miles heading north. Turn right on the road to the east by the lavender farms. Go 0.8 miles and drive under the freeway. Travel another 0.1 miles to panel gate. Proceed through gate and go another 0.3 miles to a wire gate. Go another 0.1 miles to a rock pile on the north side of the road and park. There is no witness post. The 0-foot stake is 18 paces to the north of the road. The browse tag is #194.

Site Information

Land Ownership Private
 Allotment Not Available
 Elevation 5,181ft (1,578m)
 Aspect West
 Slope 8%
 Sample Dates 07/06/2011, 08/11/2014

DISTURBANCE HISTORY--

Management unit 16R, Study no: 40

Treatment/Disturbance	Name	WRI DB #	Date	Size (acres)
Herbicide: Milestone	Mona Bench Project	1934	May 2011	62
Herbicide: Plateau	Mona Bench Project	1934	November 2011	190
Two-Way Chain Harrow	Mona Bench Project	1934	October 2011	190
Seeding: Broadcast Before	Mona Bench Project	1934	October 2011	190
Seeding: Aerial After	Mona Bench Project	1934	January 2012	190
Herbicide: Milestone	Mona Bench Project	1934	May 2012	62

The table is a recorded disturbance history of the study site.

SEED MIX--

Management unit 16R, Study no: 40

Project Name: Mona Bench - Grass Mix WRI Database #: 1934				Project Name: Mona Bench - Browse Mix WRI Database #: 1934			
Application: Broadcast Before		Acres: 62		Application: Aerial After		Acres: 129	
Seed Type		lbs in mix	lbs/acre	Seed Type		lbs in mix	lbs/acre
G	Bluebunch Wheatgrass 'Anatone'	100	1.61	F	Alfalfa 'Nomad'	65	0.50
G	Canby Bluegrass 'Canbar'	25	0.40	B	Forage Kochia	130	1.01
G	Crested Wheatgrass 'Hycrest'	100	1.61	B	Sagebrush, Wyoming	40	0.31
G	Great Basin Wildrye 'Trailhead'	100	1.61	Total Pounds:		235	1.82
G	Indian Ricegrass 'Rimrock'	100	1.61	PLS Pounds:			1.09
G	Russian Wildrye	100	1.61				
G	Sandberg Bluegrass	25	0.40				
G	Thickspike Wheatgrass 'Bannock'	100	1.61				
G	Western Wheatgrass 'Arriba'	100	1.61				
Total Pounds:		750	12.10				
PLS Pounds:			10.54				

Habitat and Vegetation Information

Wildlife Habitat Elk, Crucial Winter

VEGETATION HISTORY--

Management unit 16R, Study no: 40

Year	Vegetation Type ¹	Woodland Succession ²
2011	Annual Grass/Wyoming Big Sagebrush	No Encroachment
2014	Annual Grass	No Encroachment

¹Vegetation Type (Appendix - Vegetation Type), ²Woodland Succession (Tausch, Miller, Roundy, & Chambers, 2009).

Site Notes

Livestock grazing will be rested until grass and forb species reestablish within the treatment area. The objectives of the project are to control noxious weeds, establish grass and forb species, and improve wildlife habitat (WRI Database 2015).

Site Potential

1981-2010 Average Annual Precipitation 18 inches
 NRCS Ecological Site Upland Stony Loam (Mountain Big Sagebrush)
 NRCS Ecological Site # R028AY334UT

States and Transitions

No state and transition model is available for the above ecological site.

When established in 2011, this site was a stand of Wyoming big sagebrush (*Artemisia tridentata* ssp. *wyomingensis*) co-dominant with the annual grasses cheatgrass (*Bromus tectorum*) and Japanese chess (*Bromus japonicus*). After treatment, sagebrush cover had decreased as had the perennial herbaceous understory. Cheatgrass had become the dominant species and filled the interspace, creating continuous fuels and increasing the fire potential. Overall, plant diversity was low on this site (Table – Browse Trends) (Table – Herbaceous Trends). Continual treatment is likely needed on this site to reduce cheatgrass.

Trend Summary

HERBACEOUS TRENDS--

Management unit 16R, Study no: 40

T y P e	Species	Nested Frequency		Average Cover %	
		'11	'14	'11	'14
G	<i>Aegilops cylindrica</i> (a)	_b 8	_a -	.36	-
G	<i>Agropyron cristatum</i>	-	3	-	.00
G	<i>Agropyron intermedium</i>	_a 12	_b 23	.11	.47
G	<i>Aristida purpurea</i>	67	85	3.61	2.89
G	<i>Bromus japonicus</i> (a)	234	49	16.18	.39
G	<i>Bromus tectorum</i> (a)	311	457	21.78	33.68
G	<i>Festuca myuros</i> (a)	7	-	.02	-
G	<i>Oryzopsis hymenoides</i>	-	2	-	.06
G	<i>Poa bulbosa</i>	_b 45	_a 11	.49	.19
G	<i>Poa fendleriana</i>	1	-	.00	-
G	<i>Poa secunda</i>	_b 45	_a 12	.29	.45
G	<i>Sitanion hystrix</i>	-	2	-	.00
G	<i>Sporobolus cryptandrus</i>	8	5	.51	.19
Total for Annual Grasses		560	506	38.35	34.07
Total for Perennial Grasses		178	143	5.02	4.27
Total for Grasses		738	649	43.37	38.35
F	<i>Alyssum alyssoides</i> (a)	_b 197	_a 20	1.23	.04
F	<i>Artemisia ludoviciana</i>	1	-	.00	-
F	<i>Asclepias subverticillata</i>	-	-	.00	-
F	<i>Astragalus utahensis</i>	-	-	.00	-
F	<i>Calochortus nuttallii</i>	25	1	.07	.00
F	<i>Castilleja chromosa</i>	1	-	.00	-
F	<i>Centaurea virgata</i>	15	15	.47	.45
F	<i>Cirsium</i> sp.	4	1	.18	.03
F	<i>Crepis acuminata</i>	3	-	.00	-
F	<i>Draba</i> sp. (a)	_b 98	_a -	1.00	-
F	<i>Erigeron flagellaris</i>	3	-	.03	-

Type	Species	Nested Frequency		Average Cover %	
		'11	'14	'11	'14
F	<i>Erodium cicutarium</i> (a)	17	195	.35	3.16
F	<i>Helianthus annuus</i> (a)	_b 9	_a -	.03	-
F	<i>Holosteum umbellatum</i> (a)	_b 128	_a -	.69	-
F	<i>Lactuca serriola</i> (a)	_b 29	_a -	.08	-
F	<i>Phlox longifolia</i>	8	-	.04	-
F	<i>Ranunculus testiculatus</i> (a)	26	5	.15	.00
F	<i>Sphaeralcea coccinea</i>	19	12	.24	.03
F	<i>Tragopogon dubius</i> (a)	2	2	.03	.00
F	<i>Zigadenus paniculatus</i>	14	4	.13	.01
Total for Annual Forbs		506	222	3.58	3.21
Total for Perennial Forbs		93	33	1.20	0.52
Total for Forbs		599	255	4.78	3.74

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

BROWSE TRENDS--

Management unit 16R, Study no: 40

Type	Species	Quadrat Cover %		Line Intercept Cover %	
		'11	'14	'11	'14
B	<i>Artemisia nova</i>	1.78	.38	2.53	.33
B	<i>Artemisia tridentata wyomingensis</i>	6.86	1.68	9.26	1.70
B	<i>Gutierrezia sarothrae</i>	9.81	.18	10.14	-
Total for Browse		18.45	2.24	21.93	2.03

BASIC COVER--

Management unit 16R, Study no: 40

Cover Type	Average Cover %	
	'11	'14
Vegetation	57.56	46.83
Rock	4.44	5.47
Pavement	15.45	14.77
Litter	29.72	53.13
Cryptogams	.13	.00
Bare Ground	14.75	10.68

PELLET GROUP DATA--

Management unit 16R, Study no: 40

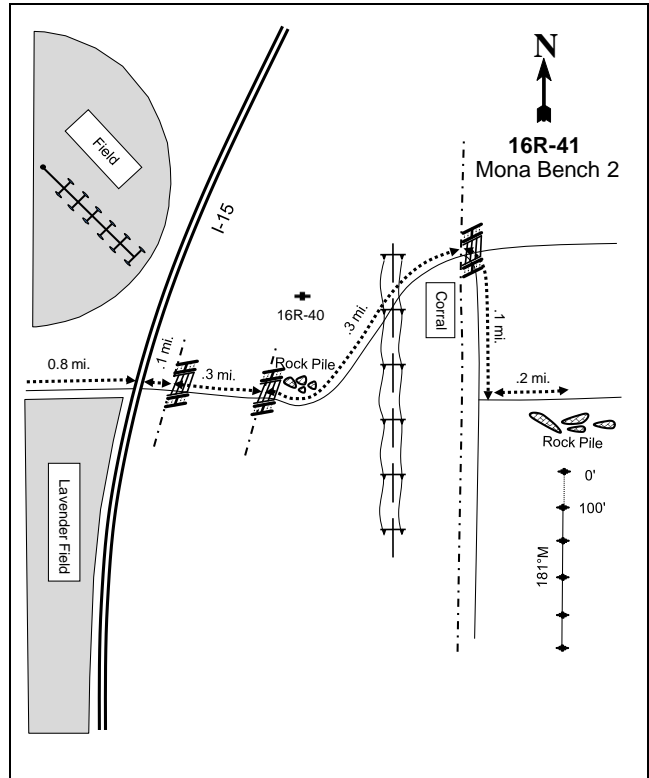
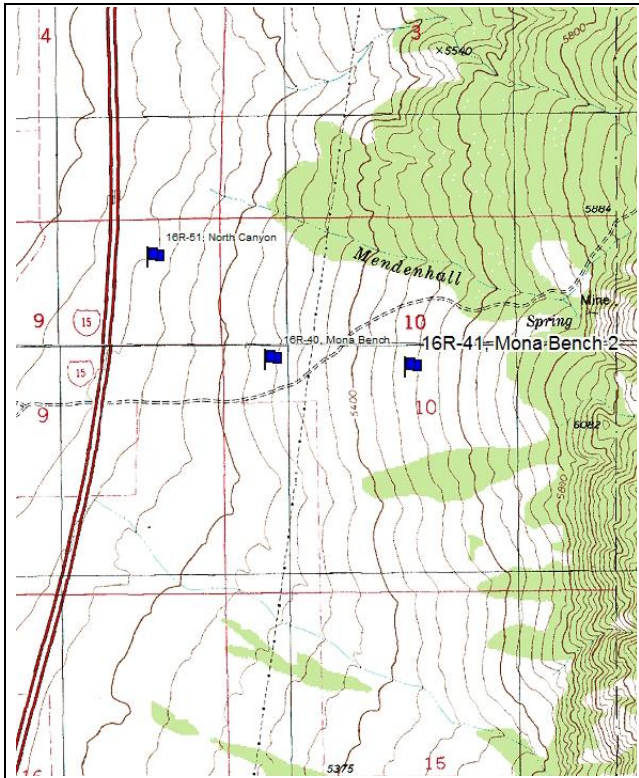
Type	Quadrat Frequency		Days use per acre (ha)	
	'11	'14	'11	'14
Rabbit	3	3	-	-
Horse	1	-	-	-
Deer	16	2	7 (18)	1 (3)
Cattle	1	-	-	4 (9)

BROWSE CHARACTERISTICS--

Management unit 16R, Study no: 40

Year	Plants per Acre (excluding seedlings)	Age class distribution			Seedling (plants/acre)	Utilization		% poor vigor	Average Height Crown (in)
		% Young	% Mature	% Decadent		% moderate	% heavy		
Artemisia nova									
11	140	0	100	-	-	0	0	0	17/27
14	100	0	100	-	-	80	20	0	11/20
Artemisia tridentata wyomingensis									
11	1480	22	73	5	60	45	8	1	21/31
14	940	11	87	2	-	51	6	4	15/21
Gutierrezia sarothrae									
11	8160	15	80	4	980	3	0	4	9/12
14	80	0	100	0	-	50	0	75	9/17
Opuntia sp.									
11	0	0	0	-	-	0	0	0	2/5
14	0	0	0	-	-	0	0	0	-/-

MONA BENCH 2 - TREND STUDY NO. 16R-41



Location Information

USGS 7.5 min Map Info Mona; Township 11S, Range 1E, Section 10
 GPS (0' Stake) NAD 83, UTM Zone 12, 430451 East 4414045 North

Transect Information

Browse Tag # (0' Stake) 195
 Transect Bearing 181° magnetic
 Length 500ft
 Belt Placement Line 1 (11ft), Line 2 (34ft), Line 3 (59ft), Line 4 (71ft), Line 5 (95ft)
 Belt Marker Placement Standard

Directions to Site

Drive 3 miles heading north from Mona. Turn right on road to the east by the lavender farms. Go 0.8 miles and drive under the freeway. Travel another 0.1 miles to a panel gate. Proceed through gate and go another 0.3 miles to a wire gate. Go another 0.3 miles to a gate and corrals on the right. Turn right and head south after passing through the gate. Continue for 0.1 miles and turn left and head east. Go 0.2 miles. There is no witness post, but there is a pile of larger rocks on the south side of the road, park here. The 0-foot stake is 18 paces to the south of the road, and is marked with browse tag #195.

Site Information

Land Ownership Private
 Allotment Not Available
 Elevation 5,432ft (1,656m)
 Aspect West
 Slope 11%
 Sample Dates 07/06/2011, 08/11/2014

DISTURBANCE HISTORY--

Management unit 16R, Study no: 41

Treatment/Disturbance	Name	WRI DB #	Date	Size (acres)
Herbicide: Plateau	Mona Bench Project	1934	November 2011	190
Two-Way Chain Harrow	Mona Bench Project	1934	October 2011	190
Seeding: Broadcast Before	Mona Bench Project	1934	October 2011	62
Seeding: Aerial After	Mona Bench Project	1934	January 2012	129

The table is a recorded disturbance history of the study site.

SEED MIX--

Management unit 16R, Study no: 41

Project Name: Mona Bench - Grass Mix WRI Database #: 1934				Project Name: Mona Bench - Browse Mix WRI Database #: 1934			
Application: Broadcast		Acres: 62		Application: Aerial		Acres: 129	
Seed Type		lbs in mix	lbs/acre	Seed Type		lbs in mix	lbs/acre
G	Bluebunch Wheatgrass 'Anatone'	100	1.61	F	Alfalfa 'Nomad'	65	0.50
G	Canby Bluegrass 'Canbar'	25	0.40	B	Forage Kochia	130	1.01
G	Crested Wheatgrass 'Hycrest'	100	1.61	B	Sagebrush, Wyoming	40	0.31
G	Great Basin Wildrye 'Trailhead'	100	1.61	Total Pounds:		235	1.82
G	Indian Ricegrass 'Rimrock'	100	1.61	PLS Pounds:			1.09
G	Russian Wildrye	100	1.61				
G	Sandberg Bluegrass	25	0.40				
G	Thickspike Wheatgrass 'Bannock'	100	1.61				
G	Western Wheatgrass 'Arriba'	100	1.61				
Total Pounds:		750	12.10				
PLS Pounds:			10.54				

Habitat and Vegetation Information

Wildlife Habitat Deer, Crucial Winter; Elk, Crucial Winter

VEGETATION HISTORY--

Management unit 16R, Study no: 41

Year	Vegetation Type ¹	Woodland Succession ²
2011-2014	Annual-Perennial Grass	No Encroachment

¹Vegetation Type (Appendix - Vegetation Type), ²Woodland Succession (Tausch, Miller, Roundy, & Chambers, 2009).

Site Notes

Livestock grazing will be rested until grass and forb species reestablish within the treatment area. The objectives of the project are to control the noxious weeds, establish grass and forb species, and improve wildlife habitat (WRI Database 2015).

Site Potential

1981-2010 Average Annual Precipitation 19 inches
 NRCS Ecological Site Upland Stony Loam (Mountain Big Sagebrush)
 NRCS Ecological Site # [R028AY334UT](#)

States and Transitions

No state and transition model is available for the above ecological site.

Since establishment in 2011, this site has remained in an annual-perennial grass state with cheatgrass (*Bromus tectorum*) and purple three-awn (*Aristida purpurea*) as the dominant species. Forb cover and diversity was low on this site as was browse cover and diversity. Due to the amount of cheatgrass, the fire potential is high on this site. Overall plant diversity was low on this site (Table – Browse Trends) (Table – Herbaceous Trends). Continual treatment is likely needed to reduce cheatgrass.

Trend Summary

HERBACEOUS TRENDS--

Management unit 16R, Study no: 41

Type	Species	Nested Frequency		Average Cover %	
		'11	'14	'11	'14
G	<i>Aegilops cylindrica</i> (a)	_b 76	_a 3	7.08	.00
G	<i>Agropyron cristatum</i>	-	3	-	.01
G	<i>Aristida purpurea</i>	273	294	20.03	19.25
G	<i>Bromus japonicus</i> (a)	1	-	.00	-
G	<i>Bromus tectorum</i> (a)	456	470	22.52	35.69
G	<i>Festuca myuros</i> (a)	_b 75	_a 1	.65	.00
G	<i>Poa bulbosa</i>	10	4	.07	.00
G	<i>Poa secunda</i>	_b 29	_a 11	.06	.02
G	<i>Sporobolus cryptandrus</i>	39	65	1.13	1.18
Total for Annual Grasses		608	474	30.26	35.70
Total for Perennial Grasses		351	377	21.31	20.46
Total for Grasses		959	851	51.57	56.16
F	<i>Alyssum alyssoides</i> (a)	_b 118	_a -	.46	-
F	<i>Artemisia ludoviciana</i>	_a 13	_b 34	.40	1.87
F	<i>Astragalus utahensis</i>	1	-	.00	-
F	<i>Calochortus nuttallii</i>	7	21	.05	.05
F	<i>Descurainia pinnata</i> (a)	3	-	.00	-
F	<i>Draba</i> sp. (a)	_b 26	_a -	.06	-
F	<i>Epilobium brachycarpum</i> (a)	1	12	.00	.09
F	<i>Eriogonum racemosum</i>	38	30	.26	.14
F	<i>Erodium cicutarium</i> (a)	230	147	3.55	3.08
F	<i>Euphorbia albomarginata</i>	1	13	.00	.02
F	<i>Helianthus annuus</i> (a)	_b 23	_a -	.08	-
F	<i>Holosteum umbellatum</i> (a)	_b 133	_a 1	.93	.00
F	<i>Lactuca serriola</i> (a)	_b 26	_a 2	.10	.00
F	<i>Leucelene ericoides</i>	21	10	.06	.12
F	<i>Lomatium</i> sp.	1	1	.00	.00
F	<i>Medicago sativa</i>	-	2	-	.03
F	<i>Onobrychis viciaefolia</i>	-	4	-	.01
F	<i>Sanguisorba minor</i>	-	4	-	.04
F	<i>Sphaeralcea coccinea</i>	28	25	.47	.06
F	<i>Tragopogon dubius</i> (a)	4	-	.03	-

Type	Species	Nested Frequency		Average Cover %	
		'11	'14	'11	'14
F	Zigadenus paniculatus	_b 16	_a 4	.11	.00
Total for Annual Forbs		564	162	5.23	3.18
Total for Perennial Forbs		126	148	1.38	2.37
Total for Forbs		690	310	6.62	5.56

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

BROWSE TRENDS--

Management unit 16R, Study no: 41

Type	Species	Quadrat Cover %		Line Intercept Cover %	
		'11	'14	'11	'14
B	Gutierrezia sarothrae	3.67	.35	3.41	.28
B	Kochia prostrata	-	.24	-	.08
B	Pediocactus simpsonii	.00	.00	-	.05
Total for Browse		3.67	0.59	3.41	0.41

BASIC COVER--

Management unit 16R, Study no: 41

Cover Type	Average Cover %	
	'11	'14
Vegetation	53.78	64.50
Rock	11.30	10.70
Pavement	27.25	23.90
Litter	24.28	45.07
Cryptogams	.48	0
Bare Ground	1.12	.87

PELLET GROUP DATA--

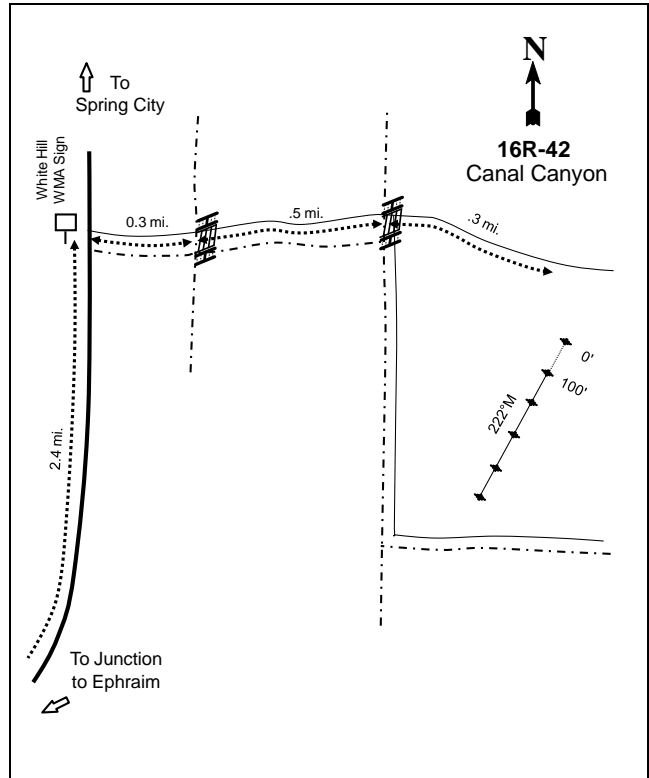
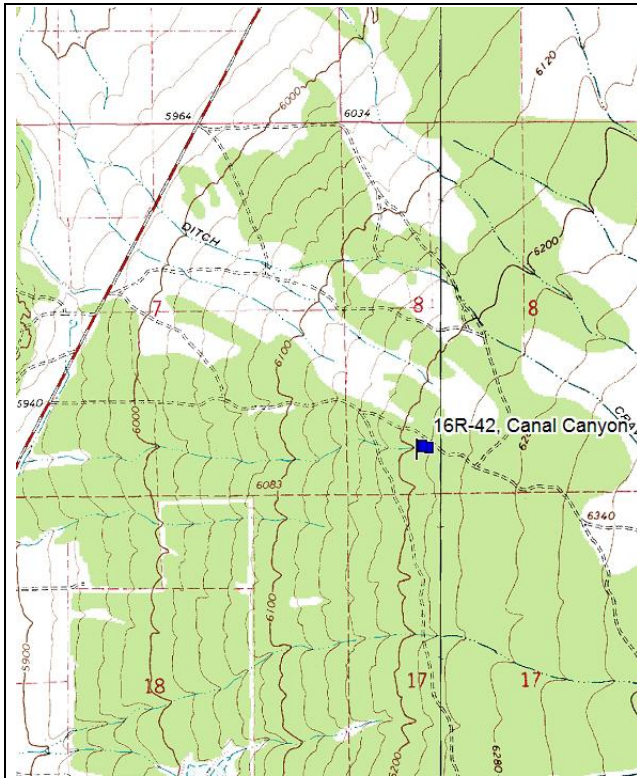
Management unit 16R, Study no: 41

Type	Quadrat Frequency		Days use per acre (ha)	
	'11	'14	'11	'14
Rabbit	-	3	-	-
Deer	1	-	-	-
Cattle	10	-	-	1 (2)

BROWSE CHARACTERISTICS--
 Management unit 16R, Study no: 41

		Age class distribution					Utilization			
Year	Plants per Acre (excluding seedlings)	% Young	% Mature	% Decadent	Seedling (plants/acre)	% moderate	% heavy	% poor vigor	Average Height Crown (in)	
<i>Artemisia tridentata vaseyana</i>										
11	0	0	0	-	-	0	0	0	17/23	
14	0	0	0	-	-	0	0	0	15/23	
<i>Chrysothamnus nauseosus</i>										
11	0	0	0	-	-	0	0	0	19/21	
14	0	0	0	-	-	0	0	0	23/59	
<i>Gutierrezia sarothrae</i>										
11	3760	22	76	2	740	.53	0	5	9/12	
14	320	6	88	6	140	0	0	6	8/10	
<i>Kochia prostrata</i>										
11	0	0	0	-	-	0	0	0	-/-	
14	700	26	74	-	20	26	0	0	5/6	
<i>Pediocactus simpsonii</i>										
11	20	0	100	-	-	0	0	0	3/3	
14	40	0	100	-	-	0	0	0	1/3	

CANAL CANYON - TREND STUDY NO. 16R-42



Location Information

USGS 7.5 min Map Info Chester; Township 16S, Range 4E, Section 8
 GPS (0' Stake) NAD 83, UTM Zone 12, 456805 East 4365063 North

Transect Information

Browse Tag # (0' Stake) 185
 Transect Bearing 222° magnetic
 Length 500ft
 Belt Placement Line 1 (11ft), Line 2 (34ft), Line 3 (59ft), Line 4 (71ft), Line 5 (95ft)
 Belt Marker Placement Belt 3: 3ft

Directions to Site

Travel east on US 89 towards Spring City from Pigeon Hollow Junction. Travel 2.4 miles until the White Hill WMA sign on the left side of the road (west). Turn right and head east. Go 0.3 miles to a gate. Proceed another 0.5 miles to another gate. Travel 0.3 miles. There is no witness post. The study transect is approximately 75 paces to the south. The 0-foot stake is marked with browse tag#185.

Site Information

Land Ownership Private
 Allotment Not Available
 Elevation 6,137ft (1,871m)
 Aspect West
 Slope 5%
 Sample Dates 07/27/2011, 05/28/2014

DISTURBANCE HISTORY--

Management unit 16R, Study no: 42

Treatment/Disturbance	Name	WRI DB #	Date	Size (acres)
Two-Way Ely/Smooth Chaining	Canal Canyon Project	1921	October 2011	370
Seeding: Dribbler	Canal Canyon Project	1921	October 2011	370
Seeding: Aerial Before	Canal Canyon Project	1921	October 2011	402
Seeding: Aerial After	Canal Canyon Project	1921	January 2012	402
Herbicide: Plateau	Canal Canyon Project	1921	Fall 2012	314

The table is a recorded disturbance history of the study site.

SEED MIX--

Management unit 16R, Study no: 42

Project Name: Canal Canyon Project WRI Database #: 1921				Project Name: Canal Canyon Project WRI Database #: 1921			
Application: Aerial Before		Acres: 400		Application: Aerial After		Acres: 400	
Seed Type		lbs in mix	lbs/acre	Seed Type		lbs in mix	lbs/acre
G	Snakeriver Wheatgrass 'Secar'	569	1.42	F	Alfalfa 'Ladak'	202	0.50
G	Crested Wheatgrass 'Hycrest'	919	2.30	B	Forage Kochia 'Immigrant'	366	.92
G	Great Basin Wildrye 'Trailhead'	257	0.64	B	Sagebrush, Wyoming	14	0.04
G	Indian Ricegrass 'Rimrock'	374	0.94	Total Pounds:		582	1.46
G	Orchardgrass 'Paiute'	376	0.94	PLS Pounds:			1.17
G	Pubescent wheatgrass 'Luna'	383	0.96	Project Name: Canal Canyon Project WRI Database #: 1921			
F	Alfalfa 'Ladak'	403	1.01	Application: Dribbler		Acres: 370	
F	Blue Flax 'Appar'	250	0.63	Seed Type		lbs in mix	lbs/acre
F	Sainfoin 'Eski'	775	1.94	B	Bitterbrush	23	0.06
F	Small Burnet 'Delar'	882	2.21	B	Fourwing Saltbush	49	0.13
F	Western Yarrow	9	0.02	Total Pounds:		72	0.22
Total Pounds:		5197	13.01	PLS Pounds:			0.12
PLS Pounds:			11.17	PLS Pounds:			0.12

Habitat and Vegetation Information

Wildlife Habitat Deer, Crucial Winter; Elk, Crucial Winter

VEGETATION HISTORY--

Management unit 16R, Study no: 42

Year	Vegetation Type ¹	Woodland Succession ²
2011	Juniper	Phase III
2014	Annual-Perennial Grass	Phase I

¹Vegetation Type (Appendix - Vegetation Type), ²Woodland Succession (Tausch, Miller, Roundy, & Chambers, 2009).

Site Notes

The objectives of the project are to remove encroaching pinyon and juniper trees, improve the herbaceous understory, and improve wildlife habitat (WRI Database 2015).

Site Potential

1981-2010 Average Annual Precipitation 16 inches
 NRCS Ecological Site Upland Shallow Loam (Pinyon-Utah Juniper)
 NRCS Ecological Site # R028AY324UT

States and Transitions

No state and transition model is available for the above ecological site, but it is likely similar to the [Upland Shallow Loam \(Pinyon-Utah Juniper\), R036XY315UT](#) ecological site, which does have a defined state and transition model (USDA-NRCS, 2011).

When established in 2011, this site was in phase III encroachment with Utah juniper (*Juniperus osteosperma*) providing most of the cover. Forbs and grasses contributed little cover and were not very diverse. After treatment perennial forbs, perennial grasses, and annual grasses increased in cover making perennial and annual grasses the dominant species on the site (Table – Herbaceous Trends). Tree cover was greatly reduced with remaining trees consisting of young or partially treated trees (Table – Browse Trends).

Trend Summary

HERBACEOUS TRENDS--
 Management unit 16R, Study no: 42

Type	Species	Nested Frequency		Average Cover %	
		'11	'14	'11	'14
G	Agropyron cristatum	a12	b169	.31	7.35
G	Agropyron intermedium	a2	b60	.00	2.07
G	Agropyron spicatum	a-	b47	-	1.45
G	Bromus tectorum (a)	a174	b339	3.49	14.15
G	Dactylis glomerata	a-	b29	-	1.27
G	Elymus cinereus	-	6	-	.22
G	Oryzopsis hymenoides	a-	b19	-	.16
G	Poa secunda	10	9	.10	.07
G	Sitanion hystrix	16	6	.09	.13
Total for Annual Grasses		174	339	3.49	14.15
Total for Perennial Grasses		40	345	0.50	12.74
Total for Grasses		214	684	4.00	26.90
F	Achillea millefolium	-	4	-	.42
F	Agoseris glauca	-	4	-	.00
F	Alyssum alyssoides (a)	b295	a104	4.60	.66
F	Arabis holboellii	2	1	.15	.00
F	Calochortus nuttallii	-	3	-	.00
F	Chorispora tenella (a)	-	1	-	.00
F	Crepis acuminata	-	4	-	.03
F	Cryptantha sp.	-	1	-	.03
F	Descurainia pinnata (a)	4	6	.01	.03
F	Erodium cicutarium (a)	-	2	-	.00
F	Helianthus annuus (a)	a-	b11	-	.02
F	Lactuca serriola (a)	5	8	.01	.01
F	Linum perenne	a-	b45	-	3.05
F	Machaeranthera canescens	-	3	-	.03

Type	Species	Nested Frequency		Average Cover %	
		'11	'14	'11	'14
F	Medicago sativa	a ⁻	b ⁵⁴	-	.76
F	Onobrychis viciaefolia	1 _a ⁻	b ²¹	-	.43
F	Ranunculus testiculatus (a)	b ¹²¹	a ²⁶	.25	.05
F	Salsola iberica (a)	a ⁻	b ²²	-	.09
F	Sanguisorba minor	a ⁻	b ¹⁷	-	.23
F	Tragopogon dubius (a)	-	2	-	.03
Total for Annual Forbs		425	182	4.88	0.92
Total for Perennial Forbs		2	157	0.15	5.01
Total for Forbs		427	339	5.03	5.94

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

BROWSE TRENDS--

Management unit 16R, Study no: 42

Type	Species	Quadrat Cover %		Line Intercept Cover %	
		'11	'14	'11	'14
B	Juniperus osteosperma	20.17	1.25	35.31	1.85
B	Kochia prostrata	-	.74	-	.21
Total for Browse		20.17	1.99	35.31	2.06

POINT-QUARTER TREE DATA--

Management unit 16R, Study no: 42

Species	Trees per Acre		Average diameter (in)	
	'11	'14	'11	'14
Juniperus osteosperma	236	44	7.6	4.1

BASIC COVER--

Management unit 16R, Study no: 42

Cover Type	Average Cover %	
	'11	'14
Vegetation	26.87	34.43
Rock	3.03	2.19
Pavement	11.98	4.56
Litter	36.44	46.37
Cryptogams	9.01	.01
Bare Ground	41.80	32.54

PELLET GROUP DATA--

Management unit 16R, Study no: 42

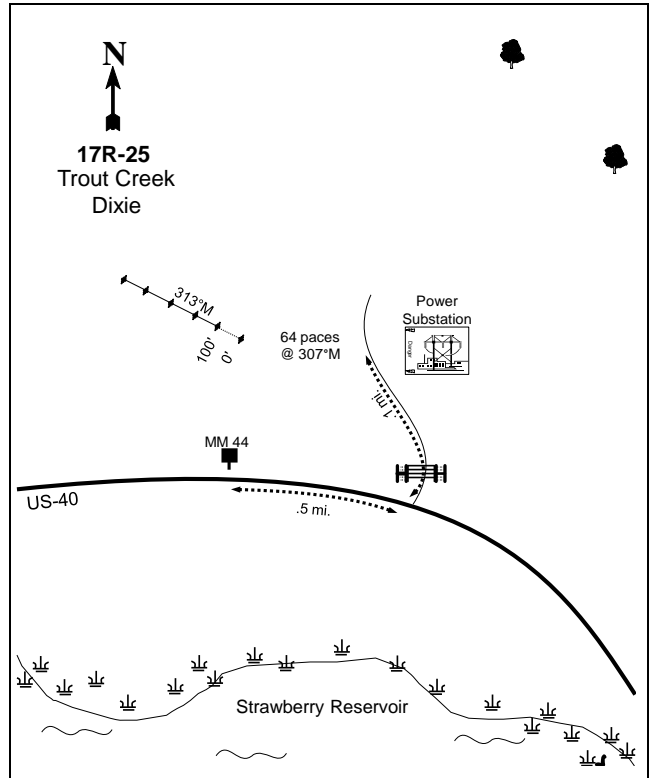
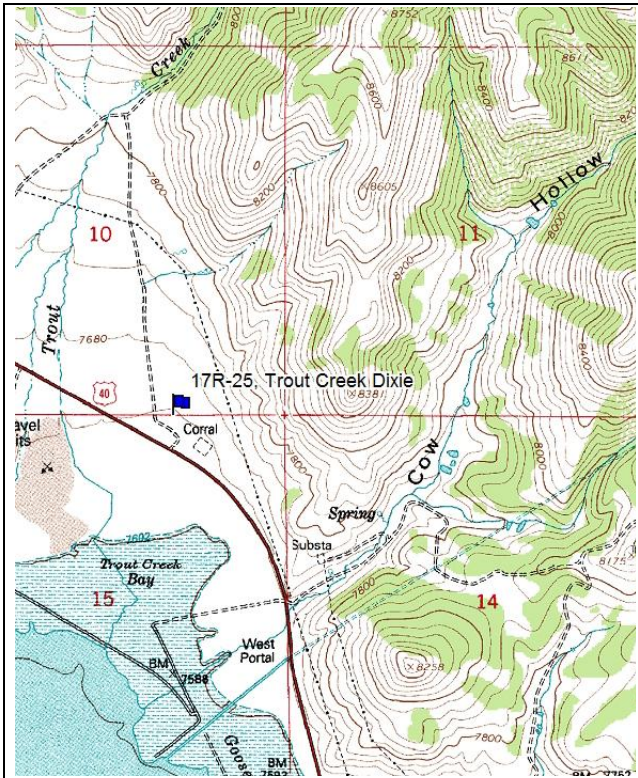
Type	Quadrat Frequency		Days use per acre (ha)	
	'11	'14	'11	'14
Rabbit	19	31	-	-
Elk	12	9	15 (38)	22 (55)
Deer	5	9	8 (20)	8 (20)

BROWSE CHARACTERISTICS--

Management unit 16R, Study no: 42

Year	Plants per Acre (excluding seedlings)	Age class distribution			Seedling (plants/acre)	Utilization		% poor vigor	Average Height Crown (in)
		% Young	% Mature	% Decadent		% moderate	% heavy		
<i>Chrysothamnus nauseosus albicaulis</i>									
11	0	0	0	-	-	0	0	0	-/-
14	0	0	0	-	-	0	0	0	8/13
<i>Juniperus osteosperma</i>									
11	180	0	100	-	-	0	0	0	-/-
14	40	0	100	-	-	0	0	50	-/-
<i>Kochia prostrata</i>									
11	0	0	0	-	-	0	0	0	-/-
14	940	13	87	-	-	40	9	0	4/6
<i>Opuntia sp.</i>									
11	0	0	0	-	-	0	0	0	-/-
14	0	0	0	-	-	0	0	0	11/14
<i>Purshia tridentata</i>									
11	0	0	0	-	-	0	0	0	-/-
14	20	100	0	-	-	0	0	0	-/-

TROUT CREEK DIXIE - TREND STUDY NO. 17R-25



Location Information

USGS 7.5 min Map Info Strawberry Reservoir NE; Township 3S, Range 11W, Section 15
 GPS (0' Stake) NAD 83, UTM Zone 12, 490655 East 4452940 North

Transect Information

Browse Tag # (0' Stake) 161
 Transect Bearing 313° magnetic
 Length 500ft
 Belt Placement Line 1 (11ft), Line 2 (34ft), Line 3 (59ft), Line 4 (71ft), Line 5 (95ft)
 Belt Marker Placement Standard

Directions to Site

Drive east on US 40 around Strawberry Reservoir to mile marker 44. From there, drive 0.5 miles to a road with a gate on the left (north). Turn here and proceed 0.1 miles through the gate to a power substation. From the “danger” sign on the substation gate, walk 64 paces at 307 degrees magnetic to the 0-foot stake marked with browse tag #161.

Site Information

Land Ownership USFS
 Allotment Not Available
 Elevation 7,650ft (2,332m)
 Aspect West
 Slope 3%
 Sample Dates 08/13/2006, 07/01/2010, 08/06/2014

DISTURBANCE HISTORY--

Management unit 17R, Study no: 25

<i>Treatment/Disturbance</i>	<i>Name</i>	<i>WRI DB #</i>	<i>Date</i>	<i>Size (acres)</i>
Two-Way Dixie Harrow	Trout Creek Sagebrush Enhancement	323	Fall 2007	80
Seeding: Broadcast	Trout Creek Sagebrush Enhancement	323	Fall 2007	85

The table is a recorded disturbance history of the study site.

SEED MIX--

Management unit 17R, Study no: 25

Project name: Trout Creek Sagebrush Enhancement			
WRI Database #: 323			
Application: Broadcast		Acres: 85	
Seed type		lbs in mix	lbs/acre
F	Blue Flax 'Appar	85	1.00
F	Penstemon, Rocky Mountain 'Bandera'	22	0.26
F	Utah Sweetvech	25	0.29
F	Western Yarrow	22	0.26
Total Pounds:		154	1.81
PLS Pounds:			1.64

Habitat and Vegetation Information

Wildlife Habitat Deer, Substantial Summer/Fall; Elk, Crucial Summer; Sage-Grouse, Crucial Occupied, Brood-Rearing; Moose, Crucial Spring/Fall

VEGETATION HISTORY--

Management unit 17R, Study no: 25

<i>Year</i>	<i>Vegetation Type¹</i>	<i>Woodland Succession²</i>
2006-2014	Mountain Big Sagebrush	No Encroachment

¹Vegetation Type (Appendix - Vegetation Type), ²Woodland Succession (Tausch, Miller, Roundy, & Chambers, 2009).

Site Notes

The study was harrowed to open the sagebrush canopy and seeded with native forbs to improve sage-grouse habitat. In early October of 2007, a radio collared sage-grouse hen was located in the Trout Creek project area, just a month after treatments were completed. No sage-grouse previously used the area (WRI Database 2015). Most of the sagebrush is so dense that only one or two game trails exist and that is where all pellet groups were sampled.

Site Potential

1981-2010 Average Annual Precipitation 23 inches
 NRCS Ecological Site High Mountain Loam (Mountain Big Sagebrush)
 NRCS Ecological Site # [R047XA516UT](#)

SOIL ANALYSIS DATA--

Management unit 17R, Study no: 25

Texture	Sand (%)	Silt (%)	Clay (%)	pH	ds/m	OM (%)	PPM P	PPM K	Year Sampled
Sandy Clay Loam	50.7	21.5	27.8	6.1	0.4	3.9	60.5	224	2006

Soil specific normal values are described in the ecological site description (USDA-NRCS, 2011) and by Tiedeman and Lopez (2004).

States and Transitions

A defined [state and transition model](#) is available.

When established in 2006, this site was in the Mountain Big Sagebrush-Steppe/Introduced Non-Natives State and in the Dense Shrubs/Reduced Understory community phase. In this community phase, mountain big sagebrush (*Artemisia tridentata ssp. vaseyana*) is very dense while the understory cover is reduced. After treatment, the community followed the shrub reduction pathway that allowed for more perennial grasses and forbs to establish. As more time passes since the treatment, the community is beginning to increase in shrub cover once again with shrub and herbaceous cover near equal (Table - Browse Trends) (Table – Herbaceous Trends) (USDA-NRCS, 2011).

Trend Summary

HERBACEOUS TRENDS--

Management unit 17R, Study no: 25

Type	Species	Nested Frequency			Average Cover %		
		'06	'10	'14	'06	'10	'14
G	Agropyron dasystachyum	a235	b309	b298	1.98	12.23	9.97
G	Agropyron trachycaulum	a-	a-	b25	-	-	.88
G	Carex sp.	ab16	b38	a3	.18	.50	.06
G	Dactylis glomerata	-	4	-	-	.03	-
G	Festuca ovina	a-	a-	b12	-	-	.64
G	Koeleria cristata	b175	a137	a106	5.33	6.17	2.04
G	Melica bulbosa	-	-	-	.00	-	-
G	Poa fendleriana	a4	b21	ab6	.18	.75	.39
G	Poa pratensis	a52	b164	a80	1.30	7.61	4.75
G	Poa secunda	b33	b24	a-	.83	.19	-
G	Sitanion hystrix	-	-	11	-	-	.23
G	Stipa columbiana	-	-	2	-	-	.15
G	Stipa comata	b119	a39	b140	4.28	1.52	8.42
G	Stipa lettermani	b209	a96	a71	5.99	4.57	2.06
Total for Annual Grasses		0	0	0	0	0	0
Total for Perennial Grasses		843	832	754	20.10	33.58	29.63
Total for Grasses		843	832	754	20.10	33.58	29.63
F	Agoseris glauca	2	-	-	.00	-	-
F	Castilleja flava	-	9	-	-	.07	-
F	Chaenactis douglasii	1	-	-	.00	-	-
F	Collinsia parviflora (a)	-	3	-	-	.01	-
F	Draba sp. (a)	-	-	4	-	-	.00
F	Eriogonum sp.	a-	a-	b36	-	-	1.63

Type	Species	Nested Frequency			Average Cover %		
		'06	'10	'14	'06	'10	'14
F	Eriogonum umbellatum	a ⁻	a ⁻	b ¹⁶	-	-	1.58
F	Hackelia patens	a ⁶	b ¹²⁷	a ²	.04	1.53	.03
F	Lappula occidentalis (a)	-	9	-	-	.01	-
F	Linum lewisii	a ⁻	a ⁻	b ¹⁵	-	-	.28
F	Lotus utahensis	-	4	-	-	.15	-
F	Lupinus argenteus	a ¹⁶⁶	b ²³⁵	a ¹⁴¹	4.78	9.87	8.09
F	Lupinus sp.	a ⁻	a ⁻	b ⁴⁸	-	-	1.93
F	Orthocarpus sp. (a)	-	-	2	-	-	.00
F	Penstemon sp.	a ²	b ³⁷	a ⁻	.00	.45	-
F	Penstemon strictus	a ⁻	a ⁻	b ²⁰	-	-	1.11
F	Polygonum douglasii (a)	14	50	2	.03	.17	.03
F	Taraxacum officinale	-	-	3	-	-	.03
F	Tragopogon dubius (a)	-	-	-	-	.00	-
Total for Annual Forbs		14	62	8	0.03	0.20	0.04
Total for Perennial Forbs		177	412	281	4.83	12.07	14.71
Total for Forbs		191	474	289	4.86	12.28	14.75

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

BROWSE TRENDS--

Management unit 17R, Study no: 25

Type	Species	Quadrat Cover %			Line Intercept Cover %		
		'06	'10	'14	'06	'10	'14
B	Artemisia tridentata vaseyana	34.90	18.67	22.70	46.10	21.51	28.66
B	Chrysothamnus viscidiflorus viscidiflorus	.03	.15	.91	-	.31	.38
B	Eriogonum heracleoides	1.50	2.03	-	1.68	1.98	-
Total for Browse		36.44	20.85	23.61	47.78	23.8	29.04

BASIC COVER--

Management unit 17R, Study no: 25

Cover Type	Average Cover %		
	'06	'10	'14
Vegetation	55.04	64.93	63.48
Rock	.21	.20	.01
Pavement	.33	.44	.20
Litter	47.61	50.58	68.88
Cryptogams	.13	0	0
Bare Ground	16.87	10.85	6.19

PELLET GROUP DATA--

Management unit 17R, Study no: 25

Type	Quadrat Frequency		
	'06	'10	'14
Rabbit	3	1	-
Grouse	3	-	-
Deer	2	1	-

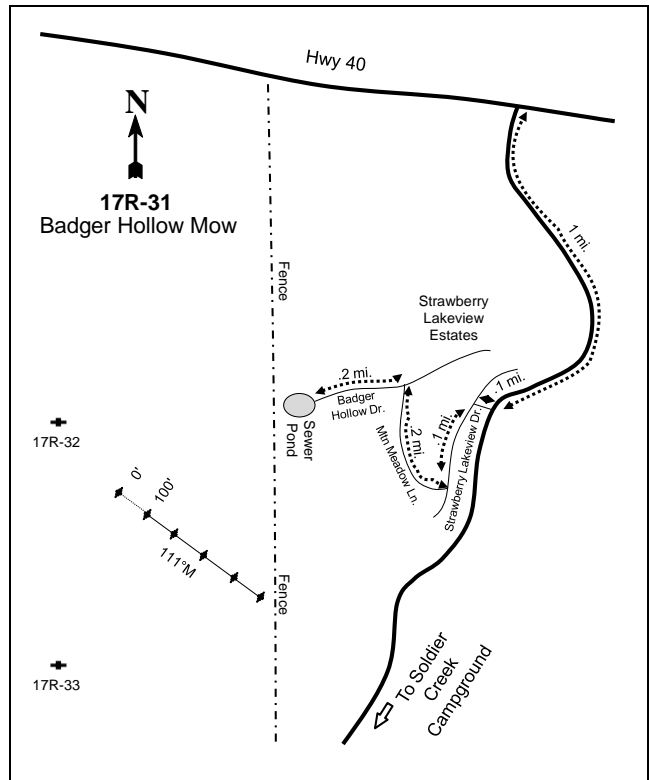
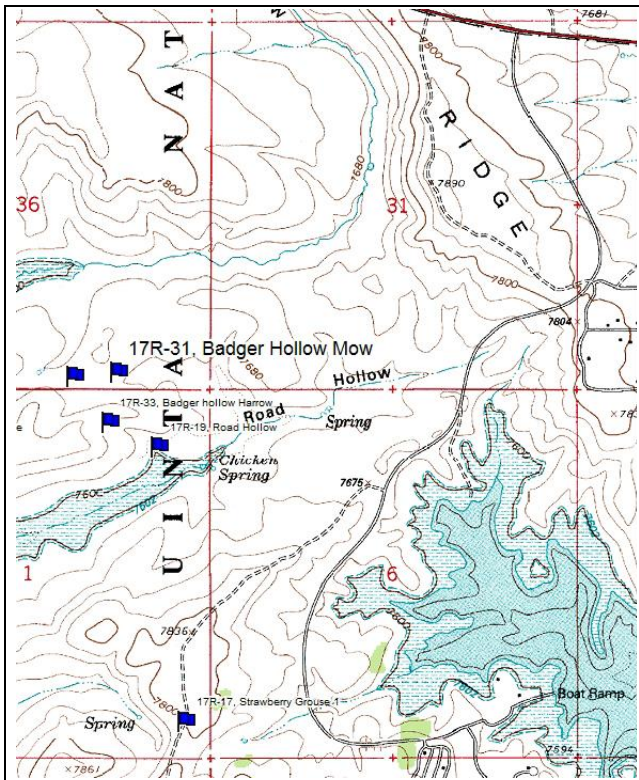
Days use per acre (ha)		
'06	'10	'14
-	-	-
-	-	-
1 (3)	1 (2)	-

BROWSE CHARACTERISTICS--

Management unit 17R, Study no: 25

Year	Plants per Acre (excluding seedlings)	Age class distribution			Seedling (plants/acre)	Utilization		% poor vigor	Average Height Crown (in)
		% Young	% Mature	% Decadent		% moderate	% heavy		
<i>Artemisia tridentata vaseyana</i>									
06	7500	1	70	29	3260	0	0	11	23/30
10	6620	47	45	7	34680	13	.30	.90	19/30
14	12060	47	48	5	380	21	.16	4	15/26
<i>Chrysothamnus viscidiflorus viscidiflorus</i>									
06	40	0	100	-	-	0	0	0	10/7
10	120	0	100	-	-	0	0	0	11/17
14	160	0	100	-	-	0	0	0	14/21
<i>Eriogonum heracleoides</i>									
06	1100	4	96	0	-	0	2	0	3/14
10	2360	16	83	1	1220	.84	0	3	4/14
14	0	0	0	0	-	0	0	0	-/-

BADGER HOLLOW MOW - TREND STUDY NO. 17R-31



Location Information

USGS 7.5 min Map Info Strawberry Reservoir NE; Township 3S, Range 11W, Section 36
 GPS (0' Stake) NAD 83, UTM Zone 12, 493930 East 4446518 North

Transect Information

Browse Tag # (0' Stake) Not Available
 Transect Bearing 111° magnetic
 Length 500ft
 Belt Placement Line 1 (11ft), Line 2 (34ft), Line 3 (59ft), Line 4 (71ft), Line 5 (95ft)
 Belt Marker Placement Standard

Directions to Site

Drive south towards the Soldier Creek campground from the US 40 and Soldier Creek campground intersection. Travel 1 mile to the Strawberry Lakeview Estates and turn right heading west. Drive 0.1 miles to the Strawberry Lakeview Drive and turn left (south). Travel 0.1 miles to Mountain Meadow Lane on the right side of the road (west). Continue on Mountain Meadow Lane for 0.2 miles to Badger Hollow Drive and turn left and (west). Drive 0.2 miles to the Sewer ponds. To get to the study, park at the sewer ponds and walk about a half mile to the southwest.

Site Information

Land Ownership USFS
 Allotment Not Available
 Elevation 7,680ft (2,341m)
 Aspect Northwest
 Slope 5-10%
 Sample Dates 07/26/2011, 08/05/2014

DISTURBANCE HISTORY--

Management unit 17R, Study no: 31

<i>Treatment/Disturbance</i>	<i>Name</i>	<i>WRI DB #</i>	<i>Date</i>	<i>Size (acres)</i>
Mow	Badger Hollow/Chicken Spring Ridge Habitat Improvement	1816	August 2011	60

The table is a recorded disturbance history of the study site.

Habitat and Vegetation Information

Wildlife Habitat Deer, Substantial Summer/Fall; Elk, Crucial Summer; Sage-Grouse, Crucial Occupied & Winter, Brood-Rearing

VEGETATION HISTORY--

Management unit 17R, Study no: 31

<i>Year</i>	<i>Vegetation Type¹</i>	<i>Woodland Succession²</i>
2011	Mountain Big Sagebrush/Perennial Grass-Forb	No Encroachment
2014	Perennial Grass-Forb	No Encroachment

¹Vegetation Type (Appendix - Vegetation Type), ²Woodland Succession (Tausch, Miller, Roundy, & Chambers, 2009).

Site Notes

The study was established to monitor the effects of a brush mower treatment project designed to decrease the density of mountain big sagebrush (*Artemisia tridentata* ssp. *vaseyana*). The objectives of the project are to reduce sagebrush canopy cover to 10%-15%, improve brood rearing habitat by increasing cover and abundance of grasses and forbs, and increase aerial cover of perennial grasses to 30% and forb cover to 20% (WRI Database 2015).

Site Potential

1981-2010 Average Annual Precipitation 21 inches
 NRCS Ecological Site Mountain Loam (Mountain Big Sagebrush)
 NRCS Ecological Site # [R047XA430UT](#)

States and Transitions

A defined [state and transition model](#) is available.

When this site was established in 2011, it was dominated by mountain big sagebrush with a robust herbaceous understory consisting of various perennial native grasses and forbs. After treatment, shrub cover was greatly reduced that resulted in perennial grasses and forbs becoming dominant (Table – Browse Trends) (Table – Herbaceous Trends). These states are not represented within the current ecological site description (USDA, NRCS 2011). Given an appropriate amount of time, it is predicted that the browse species will likely come back as a healthier community.

Trend Summary

HERBACEOUS TRENDS--

Management unit 17R, Study no: 31

T y p e	Species	Nested Frequency		Average Cover %	
		'11	'14	'11	'14
G	Agropyron dasystachyum	10	-	.09	-
G	Agropyron trachycaulum	-	10	-	.71
G	Bromus anomalus	42	67	.94	.77
G	Carex sp.	58	67	.90	1.95
G	Dactylis glomerata	1	1	.00	.03
G	Deschampsia caespitosa	1	-	.00	-
G	Festuca ovina	9	9	.07	.21
G	Juncus balticus	4	9	.03	.21
G	Koeleria cristata	_b 198	_a 47	8.92	.80
G	Poa fendleriana	20	17	.72	1.20
G	Poa pratensis	118	134	5.40	6.79
G	Poa secunda	_a 39	_b 112	1.94	6.01
G	Sitanion hystrix	_a 81	_b 133	1.79	4.08
G	Stipa comata	_a 248	_b 314	13.85	25.26
G	Stipa lettermani	_b 58	_a 5	4.89	.07
Total for Annual Grasses		0	0	0	0
Total for Perennial Grasses		887	925	39.60	48.11
Total for Grasses		887	925	39.60	48.11
F	Achillea millefolium	3	4	.00	.00
F	Androsace septentrionalis (a)	8	18	.08	.06
F	Antennaria sp.	_a 1	_b 29	.00	.90
F	Arabis drummondi	1	9	.00	.02
F	Arenaria fendleri	251	219	10.94	6.46
F	Draba rectifruca (a)	_a 14	_b 36	.02	.07
F	Eriogonum umbellatum	144	111	9.07	4.94
F	Ipomopsis aggregata	-	2	-	.00
F	Lupinus argenteus	_b 295	_a 219	25.45	11.20
F	Machaeranthera canescens	3	7	.00	.04
F	Mertensia sp.	_b 25	_a -	.16	-
F	Orthocarpus luteus (a)	_b 138	_a 41	4.58	.36
F	Penstemon procerus	3	2	.03	.00
F	Polygonum douglasii (a)	4	-	.01	-
F	Senecio multilobatus	12	8	.26	.04
Total for Annual Forbs		164	95	4.70	0.49
Total for Perennial Forbs		738	610	45.94	23.64
Total for Forbs		902	705	50.64	24.13

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

BROWSE TRENDS--

Management unit 17R, Study no: 31

Type	Species	Quadrat Cover %		Line Intercept Cover %	
		'11	'14	'11	'14
B	<i>Artemisia tridentata vaseyana</i>	33.98	2.40	40.90	4.08
B	<i>Chrysothamnus viscidiflorus viscidiflorus</i>	1.22	.21	1.28	.60
Total for Browse		35.21	2.61	42.18	4.68

BASIC COVER--

Management unit 17R, Study no: 31

Cover Type	Average Cover %	
	'11	'14
Vegetation	81.65	75.25
Rock	.03	1.00
Pavement	.19	.05
Litter	44.89	85.60
Cryptogams	.09	.07
Bare Ground	5.00	4.08

PELLET GROUP DATA--

Management unit 17R, Study no: 31

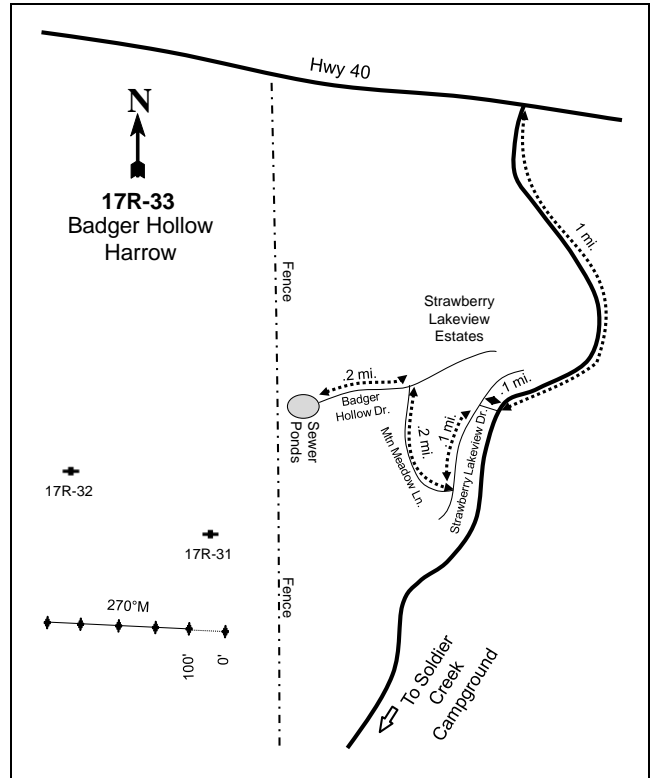
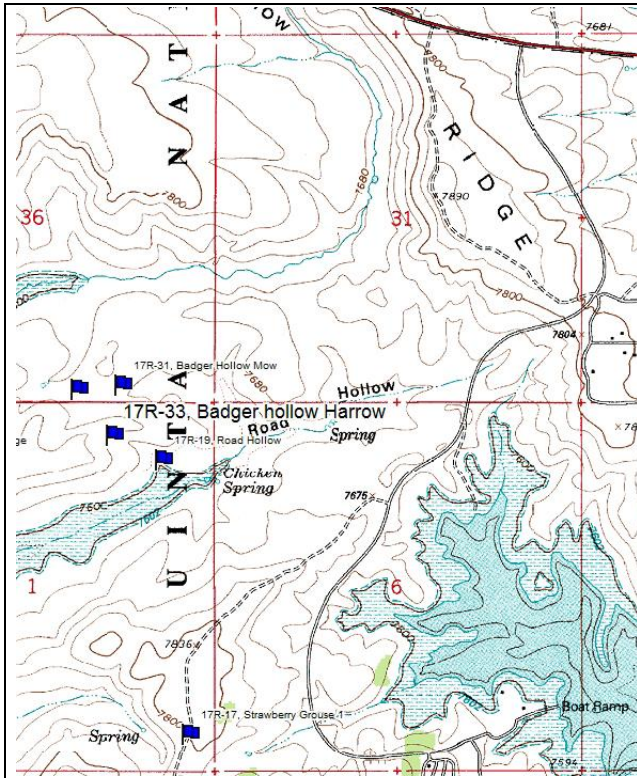
Type	Quadrat Frequency		Days use per acre (ha)	
	'11	'14	'11	'14
Rabbit	8	4	-	-
Grouse	-	2	17 groups/acre	-
Elk	1	-	7 (17)	-
Deer	1	1	11 (26)	2 (5)

BROWSE CHARACTERISTICS--

Management unit 17R, Study no: 31

Year	Plants per Acre (excluding seedlings)	Age class distribution			Seedling (plants/acre)	Utilization			Average Height Crown (in)
		% Young	% Mature	% Decadent		% moderate	% heavy	% poor vigor	
<i>Artemisia tridentata vaseyana</i>									
11	4820	2	89	10	40	41	1	8	24/38
14	1820	14	80	5	80	38	10	3	12/19
<i>Chrysothamnus viscidiflorus viscidiflorus</i>									
11	780	100	0	-	340	0	0	0	8/10
14	260	0	100	-	20	0	0	0	10/15

BADGER HOLLOW HARROW - TREND STUDY NO. 17R-33



Location Information

USGS 7.5 min Map Info Strawberry Reservoir NE; Township 4S, Range 11W, Section 1
 GPS (0' Stake) NAD 83, UTM Zone 12, 493894 East 4446300 North

Transect Information

Browse Tag # (0' Stake) Not Available
 Transect Bearing 270° magnetic
 Length 500ft
 Belt Placement Line 1 (11ft), Line 2 (34ft), Line 3 (59ft), Line 4 (71ft), Line 5 (95ft)
 Belt Marker Placement Standard

Directions to Site

Drive south towards the Soldier Creek campground from the US 40 and Soldier Creek campground intersection. Travel 1 mile to the Strawberry Lakeview Estates and turn right heading west. Drive 0.1 miles to the Strawberry Lakeview Drive and turn left (south). Travel 0.1 miles to Mountain Meadow Lane on the right side of the road (west). Continue on Mountain Meadow Lane for 0.2 miles to Badger Hollow Drive and turn left and (west). Drive 0.2 miles to the Sewer ponds. To get to the study, park at the sewer ponds and walk about a half mile to the southwest.

Site Information

Land Ownership USFS
Allotment Not Available
Elevation 7,641ft (2,329m)
Aspect East
Slope 4%
Sample Dates 07/27/2011, 08/05/2014

DISTURBANCE HISTORY--

Management unit 17R, Study no: 33

<i>Treatment/Disturbance</i>	<i>Name</i>	<i>WRI DB #</i>	<i>Date</i>	<i>Size (acres)</i>
Harrow	Badger Hollow/Chicken Spring Ridge Habitat Improvement	1816	August 2011	384

The table is a recorded disturbance history of the study site.

Habitat and Vegetation Information

Wildlife Habitat Deer, Crucial Summer/Fall; Elk, Crucial Summer; Sage-Grouse, Crucial Occupied & Winter, Brood-Rearing

VEGETATION HISTORY--

Management unit 17R, Study no: 33

<i>Year</i>	<i>Vegetation Type¹</i>	<i>Woodland Succession²</i>
2011	Mountain Big Sagebrush	No Encroachment
2014	Perennial Grass	No Encroachment

¹Vegetation Type (Appendix - Vegetation Type), ²Woodland Succession (Tausch, Miller, Roundy, & Chambers, 2009).

Site Notes

The study was established to monitor the effects of a two-way chain harrow treatment project designed to decrease the density of mountain big sagebrush (*Artemisia tridentata* ssp. *vaseyana*). The project area was not seeded due to the good herbaceous understory. The objectives of the project are to reduce sagebrush canopy cover to 10%-15%, improve brood rearing habitat by increasing cover and abundance of grasses and forbs, and increase aerial cover of perennial grasses to 30% and forb cover to 20% (WRI Database 2015).

Site Potential

1981-2010 Average Annual Precipitation 21 inches
NRCS Ecological Site Mountain Loam (Mountain Big Sagebrush)
NRCS Ecological Site # [R047XA430UT](#)

States and Transitions

A defined [state and transition model](#) is available.

When this site was established in 2011, it was dominated by mountain big sagebrush with a robust herbaceous understory consisting of various perennial native grasses and forbs. After treatment, shrub cover was greatly reduced making the perennial grasses dominant, though there was a fair amount of forbs as well (Table – Browse Trends, Table – Herbaceous Trends). These states are not represented within the current ecological site description (USDA, NRCS 2011). Given an appropriate amount of time, it is predicted the browse species will likely come back as a healthier community.

Trend Summary

HERBACEOUS TRENDS--

Management unit 17R, Study no: 33

Type	Species	Nested Frequency		Average Cover %	
		'11	'14	'11	'14
G	<i>Agropyron dasystachyum</i>	1	5	.00	.03
G	<i>Agropyron trachycaulum</i>	-	1	-	.15
G	<i>Agrostis exarata</i>	-	14	-	.93
G	<i>Bromus anomalus</i>	48	57	2.40	1.72
G	<i>Carex</i> sp.	_b 50	_a 13	.74	.59
G	<i>Deschampsia caespitosa</i>	1	-	.03	-
G	<i>Festuca ovina</i>	15	-	.09	-
G	<i>Koeleria cristata</i>	_b 124	_a 48	8.98	1.21
G	<i>Poa fendleriana</i>	5	17	.41	.39
G	<i>Poa pratensis</i>	_b 234	_a 175	13.71	12.22
G	<i>Poa secunda</i>	_a 13	_b 44	.84	1.60
G	<i>Sitanion hystrix</i>	_a 45	_b 139	.91	8.37
G	<i>Stipa comata</i>	_a 151	_b 217	7.68	17.68
G	<i>Stipa lettermani</i>	84	69	6.35	3.03
Total for Annual Grasses		0	0	0	0
Total for Perennial Grasses		771	799	42.18	47.95
Total for Grasses		771	799	42.18	47.95
F	<i>Achillea millefolium</i>	_a 10	_b 19	.56	.40
F	<i>Androsace septentrionalis</i> (a)	_a 12	_b 36	.07	.10
F	<i>Antennaria</i> sp.	10	3	1.62	.15
F	<i>Arabis drummondi</i>	1	4	.00	.00
F	<i>Arenaria fendleri</i>	_a 15	_b 29	.63	1.08
F	<i>Aster ascendens</i>	6	5	.04	.00
F	<i>Collinsia parviflora</i> (a)	3	-	.03	-
F	<i>Draba rectifruca</i> (a)	_a 19	_b 51	.32	.22
F	<i>Erigeron</i> sp.	-	8	-	.66
F	<i>Eriogonum umbellatum</i>	48	70	3.82	3.65
F	<i>Gayophytum ramosissimum</i> (a)	5	-	.03	-
F	<i>Hackelia patens</i>	1	-	.03	-
F	<i>Hydrophyllum capitatum</i>	10	2	.24	.03
F	<i>Lappula occidentalis</i> (a)	5	-	.00	-
F	<i>Linum lewisii</i>	-	5	-	.18
F	<i>Lupinus argenteus</i>	_b 276	_a 216	22.75	12.32
F	<i>Melilotus officinalis</i>	1	-	.15	-
F	<i>Mertensia</i> sp.	1	-	.00	-
F	<i>Orthocarpus luteus</i> (a)	_b 77	_a 10	2.13	.33
F	<i>Phacelia hastata</i>	6	9	.18	.21
F	<i>Phacelia sericea</i>	-	3	-	.00
F	<i>Polygonum douglasii</i> (a)	26	12	.11	.06
F	<i>Potentilla gracilis</i>	-	2	-	.03
F	<i>Taraxacum officinale</i>	2	2	.00	.06

Type	Species	Nestled Frequency		Average Cover %	
		'11	'14	'11	'14
Total for Annual Forbs		147	109	2.70	0.72
Total for Perennial Forbs		387	377	30.06	18.80
Total for Forbs		534	486	32.76	19.53

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

BROWSE TRENDS--

Management unit 17R, Study no: 33

Type	Species	Quadrat Cover %		Line Intercept Cover %	
		'11	'14	'11	'14
B	<i>Artemisia tridentata vaseyana</i>	41.98	3.10	56.28	4.06
B	<i>Chrysothamnus viscidiflorus viscidiflorus</i>	.45	1.34	.43	1.53
B	<i>Mahonia repens</i>	-	.03	-	.03
Total for Browse		42.43	4.48	56.71	5.62

BASIC COVER--

Management unit 17R, Study no: 33

Cover Type	Average Cover %	
	'11	'14
Vegetation	83.75	72.47
Rock	.04	0
Litter	49.76	79.50
Cryptogams	.06	.01
Bare Ground	4.15	1.68

PELLET GROUP DATA--

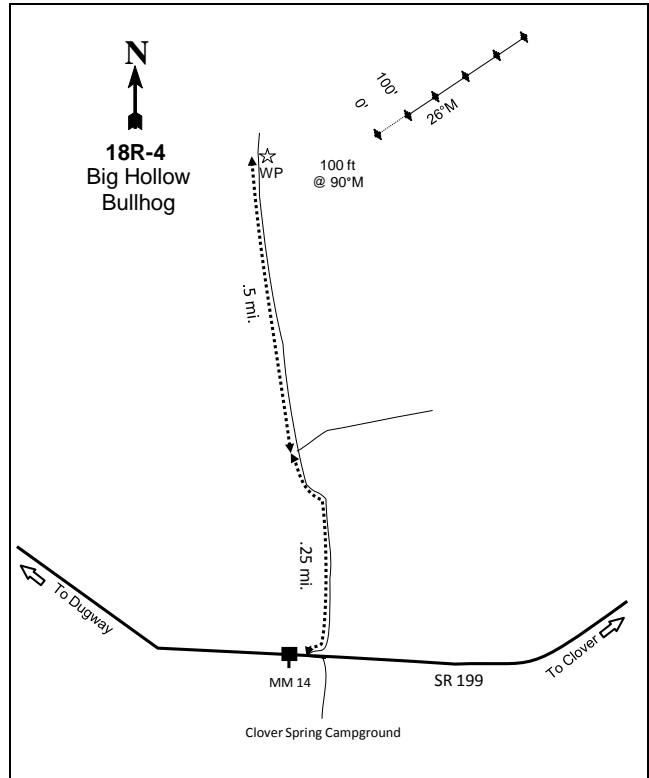
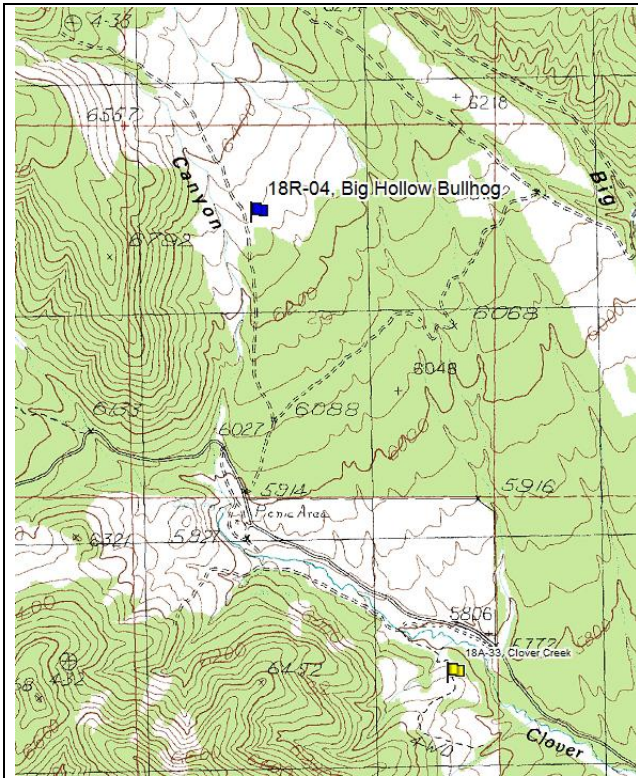
Management unit 17R, Study no: 33

Type	Quadrat Frequency		Days use per acre (ha)	
	'11	'14	'11	'14
Rabbit	5	11	-	-
Elk	1	-	2 (5)	-
Deer	3	4	4 (10)	5 (12)
Grouse	-	16	148 groups/acre	496 groups/acre

BROWSE CHARACTERISTICS--
 Management unit 17R, Study no: 33

		Age class distribution				Utilization			
Year	Plants per Acre (excluding seedlings)	% Young	% Mature	% Decadent	Seedling (plants/acre)	% moderate	% heavy	% poor vigor	Average Height Crown (in)
<i>Artemisia tridentata vaseyana</i>									
11	6160	0	91	9	100	1	0	4	25/40
14	1700	4	79	18	20	28	6	13	15/24
<i>Chrysothamnus nauseosus</i>									
11	0	0	0	-	-	0	0	0	20/25
14	0	0	0	-	-	0	0	0	-/-
<i>Chrysothamnus viscidiflorus viscidiflorus</i>									
11	160	63	38	-	-	0	0	0	11/14
14	820	2	98	-	-	0	0	0	10/14
<i>Eriogonum microthecum</i>									
11	0	0	0	-	-	0	0	0	-/-
14	20	0	100	-	-	0	0	0	-/-
<i>Mahonia repens</i>									
11	0	0	0	-	-	0	0	0	-/-
14	100	40	60	-	-	0	0	0	2/2

BIG HOLLOW BULLHOG - TREND STUDY NO. 18R-4



Location Information

USGS 7.5 min Map Info Johnson Pass; Township 5S, Range 6W, Section 29
 GPS (0' Stake) NAD 83, UTM Zone 12, 368429 East 4468585 North

Transect Information

Browse Tag # (0' Stake) 155
 Transect Bearing 26° magnetic
 Length 500ft
 Belt Placement Line 1 (11ft), Line 2 (34ft), Line 3 (59ft), Line 4 (71ft), Line 5 (95ft)
 Belt Marker Placement Standard

Directions to Site

Drive west from Clover on State Road 199 and turn north at mile marker #14 on the road across the street from the road that goes to Clover Spring Campground. From the turnoff, drive 0.25 miles to a fork and stay left and drive 0.5 miles to a witness post on the right. From the witness post, walk 100 feet at 90 degrees magnetic to the 0-foot stake marked with browse tag #155.

Site Information

Land Ownership BLM
 Allotment Onaqui Mountain East
 Elevation 6,300ft (1,920m)
 Aspect East
 Slope 2-6%
 Sample Dates 06/22/2006, 08/11/2010, 08/13/2014

DISTURBANCE HISTORY--

Management unit 18R, Study no: 4

Treatment/Disturbance	Name	WRI DB #	Date	Size (acres)
Bullhog	Big Hollow Bullhog – Phase 2	1380	Summer 2010	220

The table is a recorded disturbance history of the study site.

Habitat and Vegetation Information

Wildlife Habitat Deer, Crucial Spring/Fall

VEGETATION HISTORY--

Management unit 18R, Study no: 4

Year	Vegetation Type ¹	Woodland Succession ²
2006	Mountain Big Sagebrush/Juniper	Phase I transitioning to Phase II
2010	Mountain Big Sagebrush	Phase I
2014	Mountain Big Sagebrush/Perennial Grass	Phase I

¹Vegetation Type (Appendix - Vegetation Type), ²Woodland Succession (Tausch, Miller, Roundy, & Chambers, 2009).

Site Notes

The site was treated by a bullhog to reduce the density of pinyon pine (*Pinus edulis*) and Utah juniper (*Juniperus osteosperma*) by 90%. No seed mix was applied to the site. The objectives of the treatment were to enhance preferred browse species, grasses, and forbs by reducing the density and cover of pinyon pine and Utah juniper and to improve wildlife habitat (WRI Database 2015).

Site Potential

1981-2010 Average Annual Precipitation 19 inches
 NRCS Ecological Site Mountain Gravelly Loam (Mountain Big Sagebrush)
 NRCS Ecological Site # [R047XA406UT](#)

SOIL ANALYSIS DATA--

Management unit 18R, Study no: 4

Texture	Sand (%)	Silt (%)	Clay (%)	pH	ds/m	OM (%)	PPM P	PPM K	Year Sampled
Sandy Loam	60.7	33.9	5.4	7.1	0.7	3.3	12.5	268.8	2006

Soil specific normal values are described in the ecological site description (USDA-NRCS, 2011) and by Tiedeman and Lopez (2004).

States and Transitions

A defined [state and transition model](#) is available.

When established in 2006, this site was a mountain big sagebrush (*Artemisia tridentata* ssp. *vaseyana*) site co-dominant with Utah juniper. There were a few other browse species that were also present, but they offered little cover (Tables – Browse Trends). The herbaceous understory was made up primarily of perennial grasses that were a mix of native and introduced species (Tables – Herbaceous Trends). Directly after the treatment not only did the tree cover decrease, but so did perennial grasses and many of the browse species (Tables – Browse Trends, Tables – Herbaceous Trends). This may be due to the site being read in the same summer that

it was treated. In the 2014 sample year, the browse and herbaceous components increased in cover and diversity. This resulted in mountain big sagebrush being co-dominant with perennial grasses, which is a defined phase, mountain big sagebrush-steppe/rich and productive herbaceous component (Community Phase 2.1) (USDA – NRCS, 2011).

Trend Summary

HERBACEOUS TRENDS--

Management unit 18R, Study no: 4

T y P e	Species	Nested Frequency			Average Cover %		
		'06	'10	'14	'06	'10	'14
G	<i>Agropyron cristatum</i>	a32	b55	b59	1.59	3.85	2.47
G	<i>Agropyron dasystachyum</i>	b69	b57	a26	2.71	2.22	1.18
G	<i>Agropyron spicatum</i>	b61	a26	c110	2.69	1.19	5.85
G	<i>Bromus tectorum</i> (a)	a45	a22	b127	.30	.16	4.22
G	<i>Oryzopsis hymenoides</i>	b17	a2	ab15	.23	.30	.52
G	<i>Poa bulbosa</i>	a55	a32	b101	1.16	.43	1.83
G	<i>Poa fendleriana</i>	b25	a-	a3	.66	-	.00
G	<i>Poa pratensis</i>	a61	a24	b117	.97	1.53	6.34
G	<i>Poa secunda</i>	b99	a45	a53	1.68	.72	.93
G	<i>Sitanion hystrix</i>	ab19	a1	b30	.38	.00	1.16
Total for Annual Grasses		45	22	127	0.30	0.16	4.22
Total for Perennial Grasses		438	242	514	12.09	10.25	20.32
Total for Grasses		483	264	641	12.39	10.42	24.54
F	<i>Agoseris glauca</i>	5	2	5	.03	.03	.01
F	<i>Allium</i> sp.	-	5	-	-	.01	-
F	<i>Alyssum alyssoides</i> (a)	b168	a100	c201	.42	.73	2.16
F	<i>Arabis</i> sp.	-	-	2	-	-	.00
F	<i>Astragalus cibarius</i>	1	-	-	.00	-	-
F	<i>Calochortus nuttallii</i>	-	3	-	-	.01	-
F	<i>Chaenactis douglasii</i>	1	-	2	.00	-	.00
F	<i>Collinsia parviflora</i> (a)	b25	ab21	a2	.05	.22	.01
F	<i>Comandra pallida</i>	19	22	26	.17	.87	.21
F	<i>Crepis acuminata</i>	1	-	2	.03	-	.15
F	<i>Epilobium brachycarpum</i> (a)	2	-	-	.00	-	-
F	<i>Eriogonum racemosum</i>	3	-	2	.00	-	.00
F	<i>Lactuca serriola</i> (a)	a-	a-	b14	-	-	.03
F	<i>Linum lewisii</i>	24	11	29	.13	.25	.30
F	<i>Microsteris gracilis</i> (a)	8	-	-	.01	-	-
F	<i>Phlox longifolia</i>	b41	a11	a3	.22	.07	.00
F	<i>Polygonum douglasii</i> (a)	b18	a4	a-	.04	.01	-
F	<i>Ranunculus testiculatus</i> (a)	b159	a-	a-	.45	-	-
F	<i>Senecio multilobatus</i>	-	-	2	-	-	.00
F	<i>Tragopogon dubius</i> (a)	a-	a-	b18	-	-	.14
F	<i>Veronica biloba</i> (a)	b74	a-	a2	.13	-	.00
F	<i>Vicia americana</i>	b108	a17	a26	.90	.88	.19
F	<i>Zigadenus paniculatus</i>	3	-	2	.01	-	.03

Type	Species	Nested Frequency			Average Cover %		
		'06	'10	'14	'06	'10	'14
	Total for Annual Forbs	454	125	237	1.13	0.96	2.35
	Total for Perennial Forbs	206	71	101	1.53	2.14	0.92
	Total for Forbs	660	196	338	2.66	3.11	3.28

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

BROWSE TRENDS--

Management unit 18R, Study no: 4

Type	Species	Quadrat Cover %			Line Intercept Cover %		
		'06	'10	'14	'06	'10	'14
B	Artemisia tridentata vaseyana	7.82	5.64	6.46	10.68	5.26	9.38
B	Chrysothamnus nauseosus albicaulis	.33	.03	1.48	-	.20	1.13
B	Chrysothamnus viscidiflorus viscidiflorus	.15	-	-	.18	.05	.10
B	Cowania mexicana stansburiana	.38	-	-	-	-	-
B	Gutierrezia sarothrae	.03	.19	2.58	-	.18	2.86
B	Juniperus osteosperma	7.72	.41	.38	13.68	1.91	2.91
B	Pinus edulis	-	-	.00	-	-	-
B	Purshia tridentata	1.16	.53	1.60	5.46	1.01	2.76
B	Tetradymia canescens	.00	-	.38	-	-	.38
	Total for Browse	17.59	6.80	12.90	30	8.61	19.52

POINT-QUARTER TREE DATA--

Management unit 18R, Study no: 4

Species	Trees per Acre			Average diameter (in)		
	'06	'10	'14	'06	'10	'14
Juniperus osteosperma	140	26	68	7.5	3.8	2.0

BASIC COVER--

Management unit 18R, Study no: 4

Cover Type	Average Cover %		
	'06	'10	'14
Vegetation	29.17	18.78	43.52
Rock	6.32	9.40	3.30
Pavement	14.86	4.09	11.88
Litter	39.44	61.31	62.33
Cryptogams	.92	.03	.20
Bare Ground	28.34	14.57	8.27

PELLET GROUP DATA--

Management unit 18R, Study no: 4

Type	Quadrat Frequency		
	'06	'10	'14
Rabbit	60	3	1
Elk	-	-	-
Deer	12	5	6
Cattle	-	-	1

Days use per acre (ha)		
'06	'10	'14
-	-	-
-	1 (2)	-
7 (17)	2 (5)	21 (53)
-	-	-

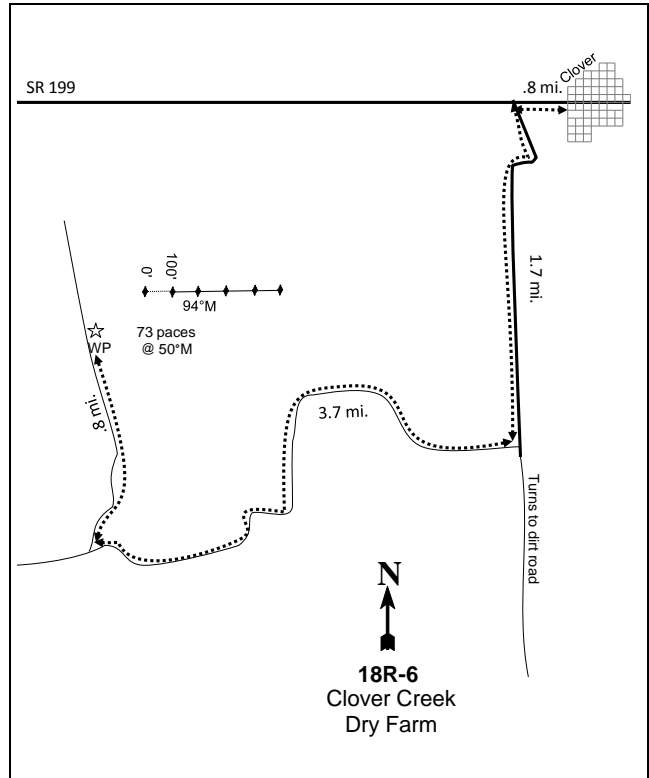
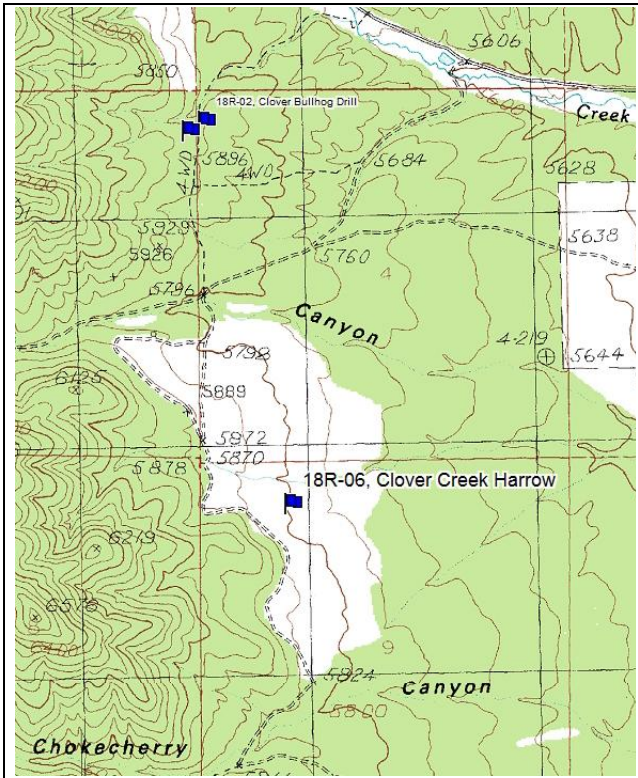
BROWSE CHARACTERISTICS--

Management unit 18R, Study no: 4

Year	Plants per Acre (excluding seedlings)	Age class distribution			Seedling (plants/acre)	Utilization		% poor vigor	Average Height Crown (in)
		% Young	% Mature	% Decadent		% moderate	% heavy		
Amelanchier utahensis									
06	0	0	0	-	-	0	0	0	23/35
10	0	0	0	-	-	0	0	0	20/32
14	0	0	0	-	-	0	0	0	16/26
Artemisia tridentata vaseyana									
06	1580	0	76	24	60	9	1	15	22/30
10	1220	2	80	18	-	26	7	13	22/31
14	1220	10	87	3	60	18	39	7	17/30
Chrysothamnus nauseosus albicaulis									
06	40	50	0	50	-	0	0	0	20/27
10	40	0	50	50	-	0	0	50	26/26
14	120	17	83	0	-	0	0	0	18/20
Chrysothamnus viscidiflorus viscidiflorus									
06	40	0	100	0	-	0	0	0	16/22
10	80	0	75	25	-	0	25	25	12/19
14	80	25	75	0	-	25	0	0	14/27
Cowania mexicana stansburiana									
06	0	0	0	-	-	0	0	0	20/27
10	0	0	0	-	-	0	0	0	31/45
14	40	50	50	-	-	0	0	0	16/20
Gutierrezia sarothrae									
06	440	32	64	5	240	0	0	0	7/8
10	260	46	54	0	-	0	0	0	10/11
14	1780	3	97	0	740	0	0	0	10/15
Juniperus osteosperma									
06	100	60	40	-	80	0	0	0	-/-
10	20	100	0	-	20	0	0	0	-/-
14	380	95	5	-	220	0	0	0	-/-

Year	Plants per Acre (excluding seedlings)	Age class distribution			Seedling (plants/acre)	Utilization			Average Height Crown (in)
		% Young	% Mature	% Decadent		% moderate	% heavy	% poor vigor	
<i>Opuntia</i> sp.									
06	60	0	100	-	-	0	0	0	5/14
10	20	0	100	-	-	0	0	0	5/15
14	40	0	100	-	-	0	0	0	4/6
<i>Purshia tridentata</i>									
06	320	6	69	25	-	6	94	0	15/37
10	220	45	55	0	-	64	27	0	19/45
14	460	4	96	0	-	78	13	0	16/37
<i>Symphoricarpos oreophilus</i>									
06	0	0	0	-	-	0	0	0	13/18
10	0	0	0	-	-	0	0	0	16/34
14	0	0	0	-	-	0	0	0	15/22
<i>Tetradymia canescens</i>									
06	120	33	50	17	60	0	50	0	9/11
10	20	0	0	100	-	0	0	0	9/17
14	40	0	100	0	-	50	0	0	11/17

CLOVER CREEK DRY FARM - TREND STUDY NO. 18R-6



Location Information

USGS 7.5 min Map Info Johnson Pass; Township 6S, Range 6W, Section 9
 GPS (0' Stake) NAD 83, UTM Zone 12, 369836 East 4463898 North

Transect Information

Browse Tag # (0' Stake) 115
 Transect Bearing 94° magnetic
 Length 500ft
 Belt Placement Line 1 (11ft), Line 2 (34ft), Line 3 (59ft), Line 4 (71ft), Line 5 (95ft)
 Belt Marker Placement No Rebar

Directions to Site

From the town of Clover, head west out of town 0.8 miles and turn left on Johnson road. Follow Johnson road for 1.7 miles and turn right just before it turns into a dirt road. Continue on this road for 3.7 miles, turn right and drive for another 0.8 miles. The 0-foot stake is 73 paces at 50 degrees magnetic from the witness post, and identified by browse tag #115.

Site Information

Land Ownership Private
 Allotment Onaqui Mountain East
 Elevation 5,800ft (1,768m)
 Aspect Northeast
 Slope 6%
 Sample Dates 08/16/2007, 08/11/2010, 08/13/2014

DISTURBANCE HISTORY--

Management unit 18R, Study no: 6

<i>Treatment/Disturbance</i>	<i>Name</i>	<i>WRI DB #</i>	<i>Date</i>	<i>Size (acres)</i>
Agricultural	-	-	Historic	-
Two-Way Ely/Smooth Chaining	Clover Creek Habitat Enhancement	712	September-November 2008	193
Seeding: Aerial Before	Clover Creek Habitat Enhancement	712	October 2008	250
Herbicide: Plateau	Clover Creek Plateau	1613	September 2010	220

The table is a recorded disturbance history of the study site.

SEED MIX--

Management unit 18R, Study no: 6

Project Name: Clover Creek Habitat Enhancement			
WRI Database #: 712			
Application: Aerial Before		Acres: 250	
Seed type	lbs in mix	lbs/acre	
G	Bluebunch WG 'Anatone'	250	1.00
G	Canby Bluegrass 'Canbar'	150	0.60
G	Crested Wheatgrass 'Douglas'	150	0.60
G	Crested Wheatgrass 'Ephraim'	150	0.60
G	Crested Wheatgrass 'Hycrest'	200	0.80
G	Indian Ricegrass 'Rimrock'	150	0.60
G	Intermediate Wheatgrass	500	2.00
G	Orchardgrass 'Paiute'	200	0.80
G	Siberian Wheatgrass 'Vavilov'	450	1.80
F	Alfalfa 'Ladak'	100	0.40
F	Alfalfa 'Ranger'	100	0.40
F	Alfalfa 'Spredor 4'	100	0.40
F	Blue Flax 'Appar'	100	0.40
F	Sainfoin 'Eski'	500	2.00
F	Small Burnet 'Delar'	500	2.00
F	Western Yarrow	25	0.10
F	Yellow Sweetclover	200	0.80
Total Pounds:		3825	15.30
PLS Pounds:			13.78

Habitat and Vegetation Information

Wildlife Habitat Deer, Crucial Winter/Spring; Sage-Grouse, Crucial Occupied & Winter, Brood-Rearing

VEGETATION HISTORY--

Management unit 18R, Study no: 6

<i>Year</i>	<i>Vegetation Type¹</i>	<i>Woodland Succession²</i>
2007	Wyoming Big Sagebrush	Phase I
2010	Wyoming Big Sagebrush/Annual Grass	Phase I
2014	Wyoming Big Sagebrush/Perennial Grass	Phase I

¹Vegetation Type (Appendix - Vegetation Type), ²Woodland Succession (Tausch, Miller, Roundy, & Chambers, 2009).

Site Notes

This study was established to monitor the effects of a pinyon pine (*Pinus edulis*) and Utah juniper (*Juniperus osteosperma*) thinning project approximately 5 miles southwest of Rush Valley in the Clover Creek watershed. The objectives for this project include improving wildlife habitat, livestock grazing and increased water yields (WRI Database 2015).

Site Potential

1981-2010 Average Annual Precipitation 15 inches
 NRCS Ecological Site Upland Loam (Mountain Big Sagebrush)
 NRCS Ecological Site # [R028AY310UT](#)

SOIL ANALYSIS DATA--

Management unit 18R, Study no: 6

Texture	Sand (%)	Silt (%)	Clay (%)	pH	ds/m	OM (%)	PPM P	PPM K	Year Sampled
Loam	31.4	44	24.6	7	0.5	2.2	19.6	444.8	2007

Soil specific normal values are described in the ecological site description (USDA-NRCS, 2011) and by Tiedeman and Lopez (2004).

States and Transitions

No state and transition model is available for the above ecological site.

When established in 2007, this site was dominated by Wyoming big sagebrush (*Artemisia tridentata* ssp. *wyomingensis*) with a few other browse species that provided limited cover (Table – Browse Trends). The herbaceous understory was limited, and while cheatgrass (*Bromus tectorum*) was present, cover of cheatgrass was low (Table – Herbaceous Trends). After treatment in 2010, Wyoming big sagebrush became co-dominant with cheatgrass, but following the 2010 sample reading, the area was sprayed with plateau. In 2014, cheatgrass cover had decreased substantially, and the perennial grasses were co-dominant with Wyoming big sagebrush which also increased in cover (Table – Browse Trends) (Table – Herbaceous Trends). The presence of cheatgrass poses a risk to the resilience of the site.

Trend Summary

HERBACEOUS TRENDS--

Management unit 18R, Study no: 6

T y p e	Species	Nested Frequency			Average Cover %		
		'07	'10	'14	'07	'10	'14
G	Agropyron cristatum	a ⁻	b ¹⁴	c ⁴⁷	-	.30	2.41
G	Agropyron intermedium	a ⁻	b ³⁸	c ¹⁶⁵	-	.87	6.61
G	Agropyron spicatum	1	-	6	.00	-	.12
G	Bromus carinatus	a ⁻	b ⁸⁰	a ⁻	-	2.86	-
G	Bromus japonicus (a)	b ¹⁴¹	c ²⁷⁰	a ⁶⁶	1.18	14.83	.34
G	Bromus tectorum (a)	a ²²²	b ³⁷⁸	a ¹⁸⁵	1.66	13.44	4.81
G	Dactylis glomerata	-	-	3	-	-	.03
G	Oryzopsis hymenoides	-	5	-	-	.00	-
G	Poa bulbosa	a ¹	ab ⁷	b ²²	.00	.06	.13
G	Poa pratensis	a ⁶¹	ab ⁹⁰	b ¹¹⁴	1.45	3.38	5.72
G	Poa secunda	4	16	10	.15	.95	.07
G	Sitanion hystrix	-	-	6	-	-	.30
Total for Annual Grasses		363	648	251	2.84	28.28	5.16

Type	Species	Nested Frequency			Average Cover %		
		'07	'10	'14	'07	'10	'14
	Total for Perennial Grasses	67	250	373	1.62	8.43	15.40
	Total for Grasses	430	898	624	4.46	36.71	20.56
F	Agoseris glauca	1	-	-	.00	-	-
F	Alyssum alyssoides (a)	_b 360	_a 306	_a 266	2.50	4.83	1.42
F	Arabis sp.	3	-	-	.02	-	-
F	Astragalus convallarius	2	3	-	.15	.00	-
F	Cirsium sp.	_a -	_a 4	_b 20	.03	.19	.29
F	Crepis acuminata	-	2	3	-	.03	.06
F	Epilobium brachycarpum (a)	_b 25	_a -	_a -	.42	-	-
F	Helianthus annuus (a)	_a 7	_b 49	_a -	.23	.34	-
F	Lactuca serriola (a)	_a 4	_b 36	_b 31	.02	.61	.30
F	Lappula occidentalis (a)	1	-	-	.00	-	-
F	Linum lewisii	_a -	_a -	_b 11	-	-	.11
F	Onobrychis viciaefolia	_a -	_a -	_b 16	-	-	.26
F	Polygonum douglasii (a)	-	2	-	-	.01	-
F	Ranunculus testiculatus (a)	_b 62	_a 10	_a -	.39	.12	-
F	Sanguisorba minor	_a -	_b 18	_c 38	-	.54	.98
F	Sisymbrium altissimum (a)	-	-	-	-	.03	-
F	Sphaeralcea munroana	_b 37	_a 5	_a 22	.12	.04	.23
F	Tragopogon dubius (a)	_a -	_a -	_b 47	-	-	.31
	Total for Annual Forbs	459	403	344	3.58	5.95	2.04
	Total for Perennial Forbs	43	32	110	0.32	0.81	1.95
	Total for Forbs	502	435	454	3.90	6.76	3.99

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

BROWSE TRENDS--

Management unit 18R, Study no: 6

Type	Species	Quadrat Cover %			Line Intercept Cover %		
		'07	'10	'14	'07	'10	'14
B	Artemisia tridentata wyomingensis	10.30	6.46	9.05	11.36	7.76	11.48
B	Chrysothamnus nauseosus	-	-	.06	-	-	.46
B	Gutierrezia sarothrae	1.71	5.60	4.00	2.25	6.30	4.19
B	Juniperus osteosperma	1.23	.03	.38	.23	.53	.30
B	Purshia tridentata	.21	-	.38	1.33	-	.33
	Total for Browse	13.46	12.10	13.88	15.17	14.59	16.76

POINT-QUARTER TREE DATA--

Management unit 18R, Study no: 6

Species	Trees per Acre			Average diameter (in)		
	'07	'10	'14	'07	'10	'14
Juniperus osteosperma	58	53	68	3.1	1.5	2.0

BASIC COVER--

Management unit 18R, Study no: 6

Cover Type	Average Cover %		
	'07	'10	'14
Vegetation	21.67	51.07	39.57
Rock	.30	.38	.10
Pavement	3.81	2.47	2.19
Litter	53.14	51.50	57.68
Cryptogams	1.37	.15	0
Bare Ground	34.26	19.56	24.14

PELLET GROUP DATA--

Management unit 18R, Study no: 6

Type	Quadrat Frequency			Days use per acre (ha)		
	'07	'10	'14	'07	'10	'14
Rabbit	29	-	1	-	-	-
Sheep	-	-	-	2 (5)	-	-
Elk	-	-	-	-	-	3 (7)
Deer	9	-	2	5 (13)	1 (3)	3 (8)
Cattle	-	-	2	-	1 (2)	9 (24)

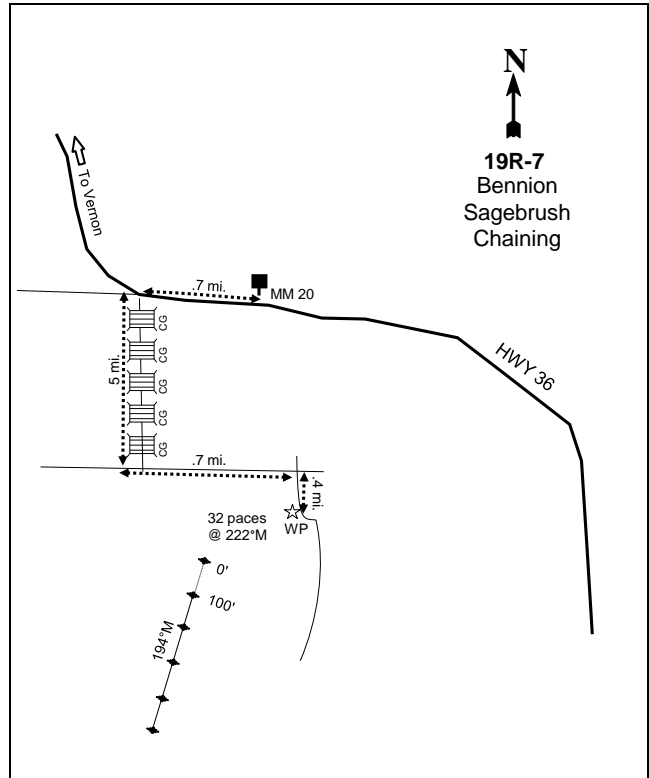
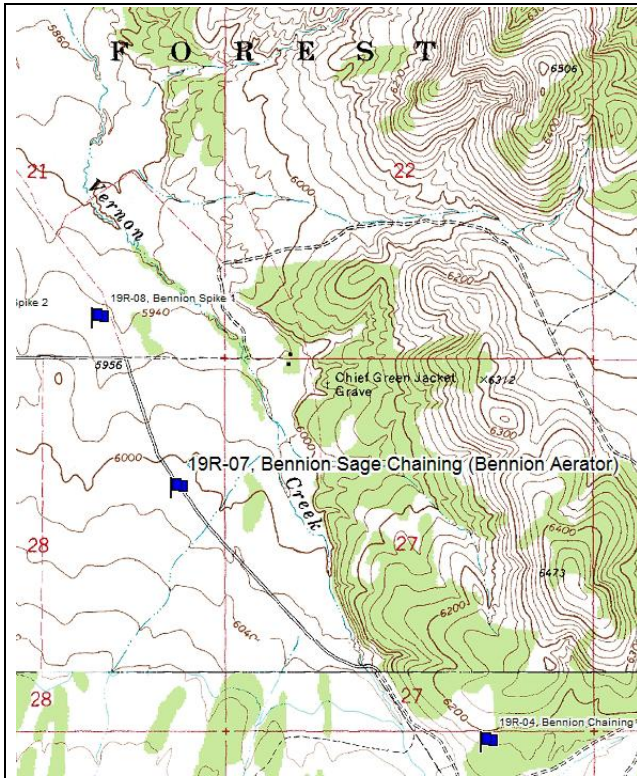
BROWSE CHARACTERISTICS--

Management unit 18R, Study no: 6

Year	Plants per Acre (excluding seedlings)	Age class distribution			Seedling (plants/acre)	Utilization			Average Height Crown (in)
		% Young	% Mature	% Decadent		% moderate	% heavy	% poor vigor	
Artemisia tridentata wyomingensis									
07	4320	1	31	68	1580	14	13	88	20/25
10	2740	13	80	7	40	10	0	6	19/24
14	2660	2	92	5	60	59	11	8	19/27
Chrysothamnus nauseosus									
07	20	100	0	-	-	0	0	0	19/20
10	0	0	0	-	-	0	0	0	27/27
14	20	0	100	-	-	0	0	100	28/31
Gutierrezia sarothrae									
07	5880	37	61	2	6080	0	0	2	7/7
10	4680	7	92	1	-	0	0	.85	12/14
14	3820	4	81	15	140	1	1	21	10/13
Juniperus osteosperma									
07	80	75	25	0	20	0	0	50	-/-
10	40	100	0	0	20	0	0	0	-/-
14	60	33	33	33	-	0	0	33	-/-
Pediocactus simpsonii									
07	0	0	0	-	-	0	0	0	-/-
10	20	100	0	-	-	0	0	0	-/-
14	0	0	0	-	-	0	0	0	-/-

		Age class distribution					Utilization			
Year	Plants per Acre (excluding seedlings)	% Young	% Mature	% Decadent	Seedling (plants/acre)	% moderate	% heavy	% poor vigor	Average Height Crown (in)	
Purshia tridentata										
07	60	33	0	67	-	0	100	67	14/26	
10	40	100	0	0	-	0	0	0	23/13	
14	40	0	100	0	-	50	0	50	26/36	

BENNION SAGEBRUSH CHAINING - TREND STUDY NO. 19R-7



Location Information

USGS 7.5 min Map Info Vernon; Township 9S, Range 5W, Section 26
 GPS (0' Stake) NAD 83, UTM Zone 12, 380054 East 4429455 North

Transect Information

Browse Tag # (0' Stake) Not Available
 Transect Bearing 194° magnetic
 Length 500ft
 Belt Placement Line 1 (11ft), Line 2 (34ft), Line 3 (59ft), Line 4 (71ft), Line 5 (95ft)
 Belt Marker Placement No Rebar

Directions to Site

From highway 36 south of Vernon, drive to mile marker #20. From there, drive 0.7 miles to a turn off on the left (west). Turn there and drive south for 5.0 miles passing several (4 or 5) cattle guards to a fork. Turn left and drive 0.7 miles to an intersection. Turn right (south) crossing a cattle guard and drive 0.4 miles to a witness post on the right. Walk 32 paces at 222 degrees magnetic from the witness post to the 0-foot stake (no browse tag).

Site Information

Land Ownership Private
 Allotment Bennion Ranch
 Elevation 6,000ft (1,829m)
 Aspect East
 Slope 1%
 Sample Dates 06/21/2006, 08/10/2010, 08/14/2014

DISTURBANCE HISTORY--

Management unit 19R, Study no: 7

Treatment/Disturbance	Name	WRI DB #	Date	Size (acres)
Two-Way Ely Chaining	Bennion Ranch Sage Grouse Demonstration Year 2	396	Fall 2006	192
Seeding: Aerial Before	Bennion Ranch Sage Grouse Demonstration Year 2	396	Fall 2006	192
Seeding: Dribbler	Bennion Ranch Sage Grouse Demonstration Year 2	396	Fall 2006	192
Seeding: Broadcast After	Bennion Ranch Sage Grouse Demonstration Year 2	396	Fall 2006	192

The table is a recorded disturbance history of the study site.

SEED MIX--

Management unit 19R, Study no: 7

Project Name: Bennion Ranch Sage Grouse Demonstration Year 2					
WRI Database #: 396					
Application: Aerial Before		Acres: 180		Application: Dribbler	
				Acres: 320	
Seed type		lbs in mix	lbs/acre	Seed type	
G	Bluebunch WG 'Anatone'	150	0.83	B	Bitterbrush
G	Crested Wheatgrass 'Hycrest'	200	1.11	B	Fourwing Saltbush
G	Crested Wheatgrass VNS	200	1.11	Total Pounds: 150 0.47	
G	Indian Ricegrass 'Rimrock'	90	0.50	PLS Pounds: 0.24	
G	Pubescent Wheatgrass	150	0.83	Application: Broadcast After	
G	Russian Wildrye 'Bozoisky'	200	1.11	Acres: 320	
G	Siberian Wheatgrass 'Vavilov'	200	1.11	Seed type	
F	Alfalfa 'Ladak'	75	0.42	B	Forage Kochia
F	Alfalfa 'Ranger'	75	0.42	B	Sagebrush, Wyoming
F	Alfalfa 'Spredor 4'	75	0.42	Total Pounds: 790 2.47	
F	Sainfoin 'Eski'	350	1.94	PLS Pounds: 0.80	
F	Small Burnet 'Delar'	350	1.94		
F	Yellow Sweetclover	30	0.17		
Total Pounds:		2145	11.92		
PLS Pounds:			10.54		

Habitat and Vegetation Information

Wildlife Habitat Deer, Substantial Spring/Fall; Sage-Grouse, Crucial Occupied & Winter, Brood-Rearing

VEGETATION HISTORY--

Management unit 19R, Study no: 7

Year	Vegetation Type ¹	Woodland Succession ²
2006	Wyoming Big Sagebrush	Phase I
2014	Low Rabbitbrush/Perennial Grass	Phase I

¹Vegetation Type (Appendix - Vegetation Type), ²Woodland Succession (Tausch, Miller, Roundy, & Chambers, 2009).

Site Notes

This study was established to monitor a Wyoming big sagebrush (*Artemisia tridentata* ssp. *wyomingensis*) community improvement on the privately owned Bennion Ranch. The objectives of the project were to provide improved brood-rearing habitat for sage-grouse and improve transitional and winter ranges for mule deer (WRI Database 2015).

Site Potential

1981-2010 Average Annual Precipitation 15 inches
 NRCS Ecological Site Upland Loam (Mountain Big Sagebrush)
 NRCS Ecological Site # R028AY310UT

SOIL ANALYSIS DATA--

Management unit 19R, Study no: 7

Texture	Sand (%)	Silt (%)	Clay (%)	pH	ds/m	OM (%)	PPM P	PPM K	Year Sampled
Silt Loam	28.2	56	15.8	7.5	0.6	1.7	10.3	316.8	2006

Soil specific normal values are described in the ecological site description (USDA-NRCS, 2011) and by Tiedeman and Lopez (2004).

States and Transitions

No state and transition model is available for the above ecological site.

When established in 2006, this site was a Wyoming big sagebrush community with a robust and diverse herbaceous understory. After treatment, sagebrush cover decreased substantially while sticky leaf low rabbitbrush (*Chrysothamnus viscidiflorus* ssp. *viscidiflorus*) increased and became co-dominant with perennial grasses. Cheatgrass (*Bromus tectorum*) and Utah juniper (*Juniperus osteosperma*) are both present on the site, and while in 2014 cover for both is low, presence on the site indicates potential threats to the resilience in the future (Table – Browse Trends, Table – Herbaceous Trends).

Trend Summary

HERBACEOUS TRENDS--

Management unit 19R, Study no: 7

Type	Species	Nested Frequency			Average Cover %		
		'06	'10	'14	'06	'10	'14
G	Agropyron cristatum	a-	b42	c114	-	1.99	3.94
G	Agropyron intermedium	a6	b57	b32	.03	2.00	1.62
G	Agropyron smithii	b229	a177	a129	4.60	10.92	3.03
G	Agropyron spicatum	a44	a34	b85	1.73	1.83	4.65
G	Bromus tectorum (a)	65	89	82	1.14	3.37	.30
G	Elymus cinereus	-	3	2	-	.15	.15
G	Elymus junceus	-	3	2	-	.15	.15
G	Oryzopsis hymenoides	24	28	31	1.48	1.58	1.48
G	Poa bulbosa	a45	ab59	b99	.80	.70	1.83
G	Poa secunda	c212	a68	b160	6.71	1.31	2.43
G	Sitanion hystrix	18	6	10	.56	.29	.33
Total for Annual Grasses		65	89	82	1.14	3.37	0.30
Total for Perennial Grasses		578	477	664	15.93	20.96	19.64
Total for Grasses		643	566	746	17.08	24.33	19.94

T y p e	Species	Nested Frequency			Average Cover %		
		'06	'10	'14	'06	'10	'14
F	Agoseris glauca	-	5	1	-	.03	.00
F	Allium sp.	7	9	-	.02	.05	-
F	Alyssum alyssoides (a)	_a 112	_b 222	_{ab} 159	.26	4.22	.42
F	Alyssum desertorum (a)	-	3	-	-	.03	-
F	Astragalus convallarius	19	21	5	.16	.59	.13
F	Calochortus nuttallii	-	1	-	-	.00	-
F	Cirsium sp.	-	-	4	-	-	.01
F	Comandra pallida	19	23	28	.19	.39	.19
F	Crepis acuminata	_b 8	_{ab} 5	_a -	.02	.10	.00
F	Cymopterus sp.	3	11	3	.00	.24	.00
F	Ipomopsis congesta	4	4	5	.01	.06	.00
F	Lactuca serriola (a)	_a -	_b 11	_a -	-	.08	-
F	Lepidium sp. (a)	-	1	-	-	.03	-
F	Machaeranthera canescens	1	-	2	.00	-	.03
F	Melilotus officinalis	-	-	1	-	-	.03
F	Microsteris gracilis (a)	-	5	-	-	.03	-
F	Onobrychis viciaefolia	-	5	3	-	.15	.00
F	Phlox austromontana	80	85	93	2.50	2.84	1.78
F	Phlox longifolia	7	3	-	.02	.04	-
F	Ranunculus testiculatus (a)	_c 262	_b 85	_a -	3.89	1.32	-
F	Senecio integerrimus	-	5	-	-	.03	-
F	Tragopogon dubius (a)	-	-	-	-	.00	-
F	Vicia americana	_b 23	_a 6	_a 1	.16	.09	.00
F	Zigadenus paniculatus	2	-	-	.06	.00	-
Total for Annual Forbs		374	327	159	4.15	5.72	0.42
Total for Perennial Forbs		173	183	146	3.17	4.64	2.20
Total for Forbs		547	510	305	7.32	10.36	2.62

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

BROWSE TRENDS--

Management unit 19R, Study no: 7

T y p e	Species	Average Cover %			Line Intercept Cover %		
		'06	'10	'14	'06	'10	'14
B	Artemisia tridentata wyomingensis	10.82	.64	2.59	15.36	1.28	1.46
B	Chrysothamnus nauseosus albicaulis	-	-	.15	.18	.56	.36
B	Chrysothamnus viscidiflorus stenophyllus	.15	-	.44	.06	.20	-
B	Chrysothamnus viscidiflorus viscidiflorus	2.20	6.08	5.98	1.75	6.86	5.63
B	Juniperus osteosperma	.15	-	.03	-	-	.08
Total for Browse		13.33	6.72	9.20	17.35	8.9	7.53

POINT-QUARTER TREE DATA--
Management unit 19R, Study no: 7

Species	Trees per Acre			Average diameter (in)		
	'06	'10	'14	'06	'10	'14
Juniperus osteosperma	63	19	34	2.5	1.5	2.6

BASIC COVER--
Management unit 19R, Study no: 7

Cover Type	Average Cover %		
	'06	'10	'14
Vegetation	33.43	40.15	36.34
Rock	.10	.63	.01
Pavement	.42	1.02	.80
Litter	30.59	39.76	45.17
Cryptogams	2.03	.18	.55
Bare Ground	46.05	35.25	36.28

PELLET GROUP DATA--
Management unit 19R, Study no: 7

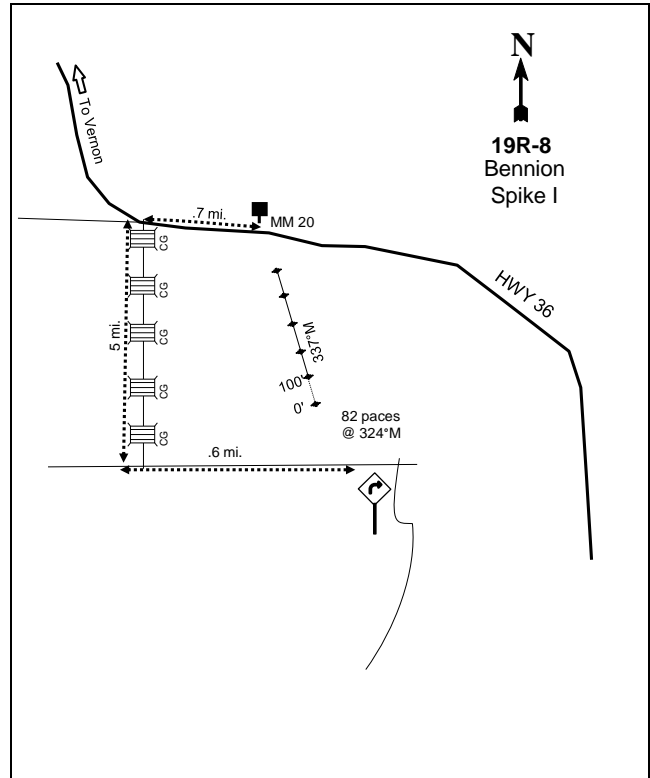
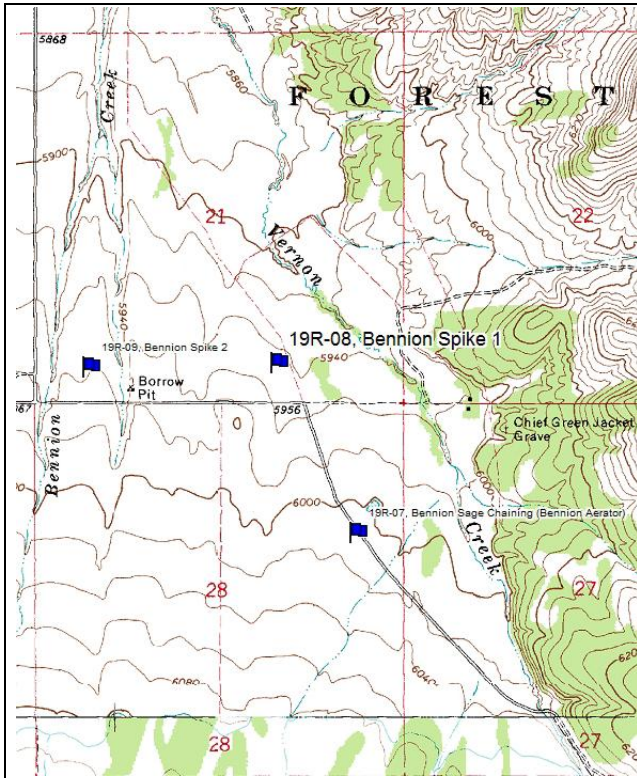
Type	Quadrat Frequency			Days use per acre (ha)		
	'06	'10	'14	'06	'10	'14
Rabbit	59	12	3	-	-	-
Elk	1	-	-	2 (5)	-	-
Deer	5	-	2	3 (7)	-	-
Cattle	1	3	2	5 (13)	9 (23)	4 (11)

BROWSE CHARACTERISTICS--
Management unit 19R, Study no: 7

		Age class distribution				Utilization			
Year	Plants per Acre (excluding seedlings)	% Young	% Mature	% Decadent	Seedling (plants/acre)	% moderate	% heavy	% poor vigor	Average Height Crown (in)
Artemisia tridentata wyomingensis									
06	2140	1	47	52	320	7	0	51	25/32
10	780	31	41	28	-	3	0	26	20/23
14	740	5	86	8	-	32	16	11	17/24
Chrysothamnus nauseosus albicaulis									
06	20	0	100	-	-	0	0	0	19/19
10	20	0	100	-	-	0	0	0	24/33
14	20	0	100	-	-	0	0	0	23/34
Chrysothamnus viscidiflorus stenophyllus									
06	40	0	100	-	-	0	0	0	13/32
10	120	0	100	-	-	0	0	0	14/24
14	80	0	100	-	-	0	0	0	9/14

		Age class distribution					Utilization			
Year	Plants per Acre (excluding seedlings)	% Young	% Mature	% Decadent	Seedling (plants/acre)	% moderate	% heavy	% poor vigor	Average Height Crown (in)	
Chrysothamnus viscidiflorus viscidiflorus										
06	3100	15	85	0	20	0	3	0	9/12	
10	2260	3	97	0	-	0	0	10	13/22	
14	3100	1	94	5	40	5	1	21	11/20	
Juniperus osteosperma										
06	20	100	0	-	-	0	0	0	-/-	
10	0	0	0	-	-	0	0	0	-/-	
14	0	0	0	-	20	0	0	0	-/-	
Kochia prostrata										
06	0	0	0	-	-	0	0	0	-/-	
10	0	0	0	-	-	0	0	0	-/-	
14	20	0	100	-	-	100	0	0	9/6	

BENNION SPIKE 1 - TREND STUDY NO. 19R-8



Location Information

USGS 7.5 min Map Info Vernon; Township 9S, Range 5W, Section 21
 GPS (0' Stake) NAD 83, UTM Zone 12, 379721 East 4430198 North

Transect Information

Browse Tag # (0' Stake) 176
 Transect Bearing 337° magnetic
 Length 500ft
 Belt Placement Line 1 (11ft), Line 2 (34ft), Line 3 (59ft), Line 4 (71ft), Line 5 (95ft)
 Belt Marker Placement No Rebar

Directions to Site

From highway 36 south of Vernon, drive to mile marker #20. From there, drive 0.7 miles to a turn off on the left (west). Turn there and drive south for 5.0 miles passing several (4 or 5) cattle guards to a fork. Turn left and drive 0.6 miles to a road sign showing a bend in the road. Walk 82 paces at 324 degrees magnetic from the witness post to the 0- foot stake marked with browse tag #176.

Site Information

Land Ownership Private
 Allotment Bennion Ranch
 Elevation 5,950ft (1,814m)
 Aspect Northeast
 Slope 2%
 Sample Dates 08/14/2006, 08/10/2010, 08/12/2014

DISTURBANCE HISTORY--

Management unit 19R, Study no: 8

Treatment/Disturbance	Name	WRI DB #	Date	Size (acres)
Herbicide: Spike	Bennion Ranch Sage Grouse Demonstration Year 2	396	Fall 2006	158

The table is a recorded disturbance history of the study site.

Habitat and Vegetation Information

Wildlife Habitat Pronghorn, Crucial Year-long; Sage-Grouse, Crucial Occupied & Winter, Brood-Rearing

VEGETATION HISTORY--

Management unit 19R, Study no: 8

Year	Vegetation Type ¹	Woodland Succession ²
2006	Wyoming Big Sagebrush	Phase I
2010-2014	Perennial Grass	Phase I

¹Vegetation Type (Appendix - Vegetation Type), ²Woodland Succession (Tausch, Miller, Roundy, & Chambers, 2009).

Site Notes

The study was established to monitor a Spike (Tebuthiuron) treatment of a Wyoming big sagebrush (*Artemisia tridentata* ssp. *wyomingensis*) community on the privately owned Bennion Ranch. The objectives of the project were to provide improved brood-rearing habitat for sage-grouse and improve transitional and winter ranges for mule deer (WRI Database 2015).

Site Potential

1981-2010 Average Annual Precipitation 14 inches
 NRCS Ecological Site Upland Loam (Wyoming Big Sagebrush)
 NRCS Ecological Site # R028AY309UT

SOIL ANALYSIS DATA--

Management unit 19R, Study no: 8

Texture	Sand (%)	Silt (%)	Clay (%)	pH	ds/m	OM (%)	PPM P	PPM K	Year Sampled
Clay Loam	25.2	45	29.8	7.5	0.6	1.9	8.7	467.2	2006

Soil specific normal values are described in the ecological site description (USDA-NRCS, 2011) and by Tiedeman and Lopez (2004).

States and Transitions

No state and transition model is available for the above ecological site, but it is likely similar to the Upland Loam (Wyoming Big Sagebrush), R025XY314UT ecological site, which does have a defined state and transition model (USDA-NRCS, 2011).

When established in 2006, this site was a Wyoming big sagebrush community with a vigorous and diverse perennial grass component, though forbs and other browse species contributed little cover. After treatment, sagebrush cover decreased dramatically and perennial grass became the dominant cover type. Forb cover

remained low, as did other browse species (Table - Browse Trends). Cheatgrass (*Bromus tectorum*) was present on the site but cover remains relatively low (Table - Herbaceous Trends).

Trend Summary

HERBACEOUS TRENDS--
Management unit 19R, Study no: 8

T y P e	Species	Nested Frequency			Average Cover %		
		'06	'10	'14	'06	'10	'14
G	<i>Agropyron cristatum</i>	_a 14	_a 11	_b 47	.27	.60	1.62
G	<i>Agropyron intermedium</i>	_a -	_b 71	_b 66	-	3.08	3.75
G	<i>Agropyron smithii</i>	176	139	155	2.67	5.64	4.15
G	<i>Agropyron spicatum</i>	19	11	24	.68	.37	1.85
G	<i>Bromus brizaeformis</i> (a)	-	-	2	-	-	.00
G	<i>Bromus tectorum</i> (a)	_a 7	_b 64	_c 131	.07	1.18	2.94
G	<i>Oryzopsis hymenoides</i>	15	19	16	.51	1.05	.42
G	<i>Poa bulbosa</i>	_a -	_b 19	_c 74	-	.41	1.59
G	<i>Poa secunda</i>	_c 276	_a 111	_b 235	10.66	4.32	5.97
G	<i>Sitanion hystrix</i>	30	24	2	.66	1.30	.00
Total for Annual Grasses		7	64	133	0.07	1.18	2.94
Total for Perennial Grasses		530	405	619	15.46	16.79	19.39
Total for Grasses		537	469	752	15.53	17.98	22.33
F	<i>Alyssum alyssoides</i> (a)	_a 24	_a 40	_b 73	.05	.97	.23
F	<i>Astragalus convallarius</i>	5	9	9	.06	.33	.24
F	<i>Calochortus nuttallii</i>	-	3	-	-	.00	-
F	<i>Crepis acuminata</i>	3	4	3	.03	.18	.03
F	<i>Cymopterus</i> sp.	_a 7	_b 27	_a -	.04	.38	-
F	<i>Ipomopsis congesta</i>	-	-	1	-	-	.03
F	<i>Lactuca serriola</i> (a)	-	4	-	-	.09	-
F	<i>Machaeranthera canescens</i>	-	-	1	-	-	.00
F	<i>Machaeranthera grindelioides</i>	-	-	1	-	-	.03
F	<i>Phlox austromontana</i>	_b 79	_a 27	_a 19	1.55	.58	.13
F	<i>Phlox longifolia</i>	2	1	1	.01	.00	.00
F	<i>Ranunculus testiculatus</i> (a)	_b 276	_b 260	_a 19	2.94	5.14	.09
F	<i>Salsola iberica</i> (a)	_a -	_a 1	_b 104	-	.03	4.12
F	<i>Tragopogon dubius</i> (a)	_a -	_a -	_b 12	-	-	.10
F	<i>Zigadenus paniculatus</i>	-	1	-	-	.03	-
Total for Annual Forbs		300	305	208	2.99	6.23	4.56
Total for Perennial Forbs		96	72	35	1.70	1.52	0.47
Total for Forbs		396	377	243	4.69	7.75	5.04

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

BROWSE TRENDS--

Management unit 19R, Study no: 8

Type	Species	Quadrat Cover %			Line Intercept Cover %		
		'06	'10	'14	'06	'10	'14
B	Artemisia tridentata wyomingensis	8.63	.90	.15	15.20	1.93	.93
B	Chrysothamnus nauseosus	-	.21	3.09	-	.06	1.91
B	Chrysothamnus viscidiflorus stenophyllus	.15	.03	.19	.80	.26	.65
B	Chrysothamnus viscidiflorus viscidiflorus	.00	1.04	1.61	-	1.04	2.21
B	Juniperus osteosperma	-	.15	-	.05	.26	-
B	Opuntia sp.	-	-	.00	-	-	-
Total for Browse		8.79	2.34	5.06	16.05	3.55	5.7

BASIC COVER--

Management unit 19R, Study no: 8

Cover Type	Average Cover %		
	'06	'10	'14
Vegetation	28.53	27.17	34.63
Rock	.19	.03	.04
Pavement	.46	1.77	1.11
Litter	35.15	36.96	42.11
Cryptogams	2.77	4.50	3.58
Bare Ground	50.37	43.11	44.53

PELLET GROUP DATA--

Management unit 19R, Study no: 8

Type	Quadrat Frequency			Days use per acre (ha)		
	'06	'10	'14	'06	'10	'14
Rabbit	52	6	-	-	-	-
Horse	1	-	-	-	-	-
Deer/Antelope	2	-	-	4 (10)	1 (2)	-
Cattle	9	5	6	19 (47)	9 (23)	20 (48)

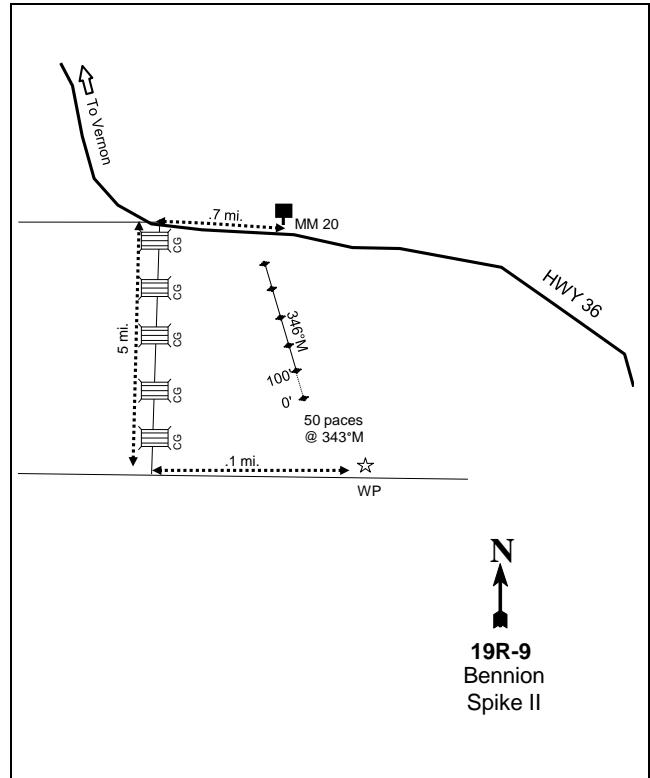
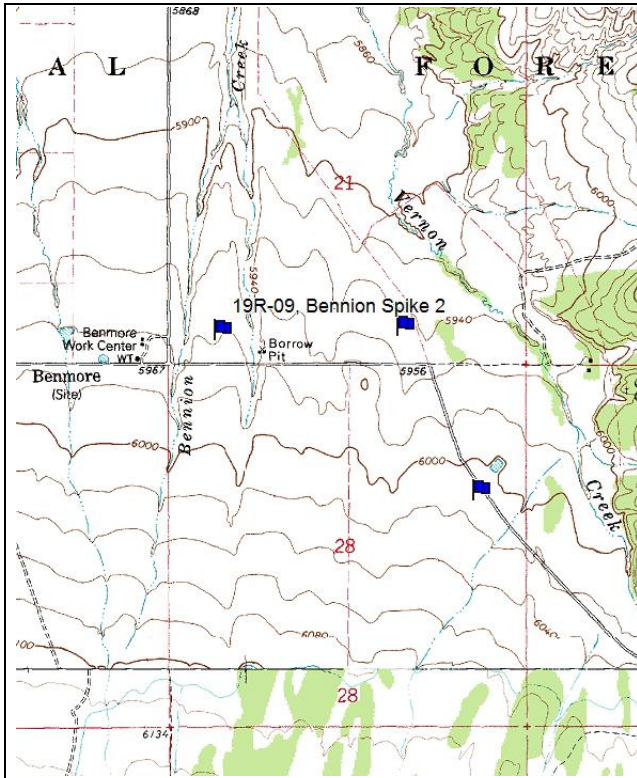
BROWSE CHARACTERISTICS--

Management unit 19R, Study no: 8

Year	Plants per Acre (excluding seedlings)	Age class distribution			Seedling (plants/acre)	Utilization			Average Height Crown (in)
		% Young	% Mature	% Decadent		% moderate	% heavy	% poor vigor	
Artemisia tridentata wyomingensis									
06	3280	0	51	49	180	6	3	40	28/31
10	700	6	9	86	20	11	6	89	21/20
14	480	4	50	46	-	25	4	58	14/17

Year	Plants per Acre (excluding seedlings)	Age class distribution			Seedling (plants/acre)	Utilization		% poor vigor	Average Height Crown (in)
		% Young	% Mature	% Decadent		% moderate	% heavy		
Chrysothamnus nauseosus									
06	0	0	0	0	-	0	0	0	-/-
10	220	82	18	0	80	0	0	0	25/26
14	640	3	91	6	-	0	0	3	19/23
Chrysothamnus viscidiflorus stenophyllus									
06	240	0	100	-	60	17	0	0	12/14
10	0	0	0	-	-	0	0	0	14/19
14	580	52	48	-	-	7	0	3	10/17
Chrysothamnus viscidiflorus viscidiflorus									
06	0	0	0	0	-	0	0	0	14/19
10	1160	47	52	2	40	0	0	2	12/20
14	1880	13	86	1	-	0	1	5	8/14
Gutierrezia sarothrae									
06	0	0	0	-	-	0	0	0	-/-
10	0	0	0	-	-	0	0	0	-/-
14	0	0	0	-	-	0	0	0	13/14
Juniperus osteosperma									
06	40	50	50	-	20	0	0	50	-/-
10	40	100	0	-	-	0	0	0	-/-
14	0	0	0	-	-	0	0	0	-/-
Leptodactylon pungens									
06	0	0	0	-	-	0	0	0	-/-
10	20	100	0	-	-	0	0	0	-/-
14	0	0	0	-	-	0	0	0	-/-
Opuntia sp.									
06	0	0	0	-	-	0	0	0	-/-
10	0	0	0	-	-	0	0	0	6/17
14	20	100	0	-	-	0	0	0	6/19

BENNION SPIKE 2 - TREND STUDY NO. 19R-9



Location Information

USGS 7.5 min Map Info Vernon; Township 9S, Range 5W, Section 21
 GPS (0' Stake) NAD 83, UTM Zone 12, 378898 East 4430193 North

Transect Information

Browse Tag # (0' Stake) 174
 Transect Bearing 346° magnetic
 Length 500ft
 Belt Placement Line 1 (11ft), Line 2 (34ft), Line 3 (59ft), Line 4 (71ft), Line 5 (95ft)
 Belt Marker Placement No Rebar

Directions to Site

From highway 36 south of Vernon, drive to mile marker #20. From there, drive 0.7 miles to a turn off on the left (west). Turn there and drive south for 5.0 miles passing several (4 or 5) cattle guards to a fork. Turn left and drive 0.1 miles to a witness post on the left. Walk 55 paces at 343 degrees magnetic from the witness post to the 0-foot stake marked with browse tag #174.

Site Information

Land Ownership Private
 Allotment Bennion Ranch
 Elevation 5,950ft (1,814m)
 Aspect North
 Slope 2%
 Sample Dates 08/17/2006, 08/10/2010, 08/12/2014

DISTURBANCE HISTORY--

Management unit 19R, Study no: 9

Treatment/Disturbance	Name	WRI DB #	Date	Size (acres)
Herbicide: Spike	Bennion Ranch Sage Grouse Demonstration Year 2	396	Fall 2006	158

The table is a recorded disturbance history of the study site.

Habitat and Vegetation Information

Wildlife Habitat Pronghorn, Crucial Year-long; Sage-Grouse, Crucial Occupied & Winter, Brood-Rearing

VEGETATION HISTORY--

Management unit 19R, Study no: 9

Year	Vegetation Type ¹	Woodland Succession ²
2006	Wyoming Big Sagebrush	No Encroachment
2010-2014	Perennial Grass	No Encroachment

¹Vegetation Type (Appendix - Vegetation Type), ²Woodland Succession (Tausch, Miller, Roundy, & Chambers, 2009).

Site Notes

The study was established to monitor a Spike (Tebuthiuron) treatment of a Wyoming big sagebrush (*Artemisia tridentata* ssp. *wyomingensis*) community on the privately owned Bennion Ranch. The objectives of the project were to provide improved brood-rearing habitat for sage-grouse and improve transitional and winter ranges for mule deer (WRI Database 2015).

Site Potential

1981-2010 Average Annual Precipitation 14 inches
 NRCS Ecological Site Upland Loam (Wyoming Big Sagebrush)
 NRCS Ecological Site # R028AY309UT

SOIL ANALYSIS DATA--

Management unit 19R, Study no: 9

Texture	Sand (%)	Silt (%)	Clay (%)	pH	ds/m	OM (%)	PPM P	PPM K	Year Sampled
Clay Loam	33.2	36	30.8	7.6	0.6	1.6	21.2	336	2006

Soil specific normal values are described in the ecological site description (USDA-NRCS, 2011) and by Tiedeman and Lopez (2004).

States and Transitions

No state and transition model is available for the above ecological site, but it is likely similar to the Upland Loam (Wyoming Big Sagebrush), R025XY314UT ecological site, which does have a defined state and transition model (USDA-NRCS, 2011).

When established in 2006, this site was a Wyoming big sagebrush community with very little herbaceous understory or other browse species. After treatment, sagebrush cover decreased considerably and perennial grass cover increased, becoming the dominant cover type. It is predicted that over time, the sagebrush will

increase in cover and become a major component of the site. Additionally, cheatgrass (*Bromus tectorum*) and bulbous bluegrass (*Poa bulbosa*) are present on the site and have been slowly increasing in cover. While not currently an issue, under certain circumstances, such as overgrazing, it could increase and threaten the resilience of the site.

Trend Summary

HERBACEOUS TRENDS--

Management unit 19R, Study no: 9

Type	Species	Nested Frequency			Average Cover %		
		'06	'10	'14	'06	'10	'14
G	<i>Agropyron cristatum</i>	a132	b213	b233	3.42	12.06	11.24
G	<i>Agropyron smithii</i>	b82	a57	ab69	.29	3.16	3.13
G	<i>Bromus brizaeformis</i> (a)	-	3	-	-	.03	-
G	<i>Bromus tectorum</i> (a)	a19	b56	c73	.09	.87	1.25
G	<i>Oryzopsis hymenoides</i>	6	4	1	.05	.41	.03
G	<i>Poa bulbosa</i>	a-	b116	c205	-	3.46	6.27
G	<i>Poa secunda</i>	b102	a27	b123	.91	1.01	3.95
G	<i>Sitanion hystrix</i>	13	3	-	.25	.03	-
Total for Annual Grasses		19	59	73	0.09	0.90	1.25
Total for Perennial Grasses		335	420	631	4.93	20.14	24.63
Total for Grasses		354	479	704	5.02	21.04	25.88
F	<i>Alyssum alyssoides</i> (a)	a128	b214	a149	.26	6.00	1.20
F	<i>Arenaria</i> sp.	4	-	-	.00	-	-
F	<i>Argemone corymbosa</i>	-	1	-	-	.00	-
F	<i>Crepis acuminata</i>	3	1	-	.00	.00	-
F	<i>Descurainia pinnata</i> (a)	-	3	1	-	.03	.00
F	<i>Lactuca serriola</i> (a)	-	6	-	-	.16	-
F	<i>Lygodesmia</i> sp.	-	1	-	-	.03	-
F	<i>Phlox austromontana</i>	b21	a2	a-	.69	.06	-
F	<i>Ranunculus testiculatus</i> (a)	b212	b225	a6	.72	4.62	.01
F	<i>Salsola iberica</i> (a)	-	-	7	-	-	.42
F	<i>Senecio integerrimus</i>	-	1	-	-	.03	-
F	<i>Sphaeralcea grossulariifolia</i>	-	2	2	-	.00	.00
F	<i>Tragopogon dubius</i> (a)	-	-	4	-	-	.01
F	<i>Zigadenus paniculatus</i>	1	-	-	.00	-	-
Total for Annual Forbs		340	448	167	0.98	10.81	1.64
Total for Perennial Forbs		29	8	2	0.71	0.13	0.00
Total for Forbs		369	456	169	1.69	10.95	1.65

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

BROWSE TRENDS--

Management unit 19R, Study no: 9

Type	Species	Quadrat Cover %			Line Intercept Cover %		
		'06	'10	'14	'06	'10	'14
B	Artemisia tridentata wyomingensis	11.20	.06	-	18.65	.35	.08
B	Chrysothamnus nauseosus	-	.15	1.57	-	-	2.21
B	Tetradymia canescens	.03	.00	-	-	-	-
Total for Browse		11.23	0.22	1.57	18.65	.35	2.29

BASIC COVER--

Management unit 19R, Study no: 9

Cover Type	Average Cover %		
	'06	'10	'14
Vegetation	15.20	29.72	32.37
Rock	.63	1.08	.64
Pavement	2.42	2.08	1.55
Litter	36.14	39.80	44.05
Cryptogams	2.89	.57	.70
Bare Ground	54.09	42.43	40.83

PELLET GROUP DATA--

Management unit 19R, Study no: 9

Type	Quadrat Frequency			Days use per acre (ha)		
	'06	'10	'14	'06	'10	'14
Rabbit	86	16	-	-	-	-
Deer/Antelope	-	-	-	1 (2)	1 (2)	-
Cattle	1	2	2	12 (30)	7 (16)	-

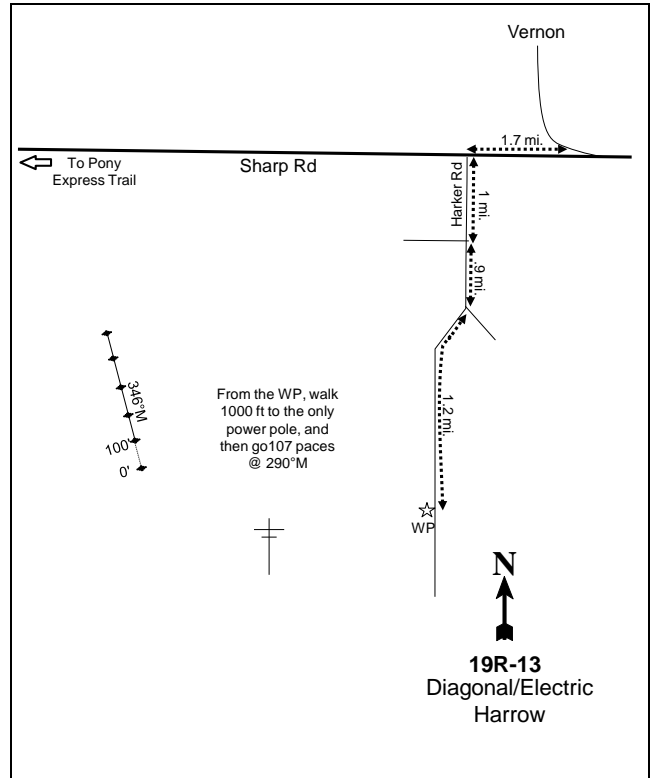
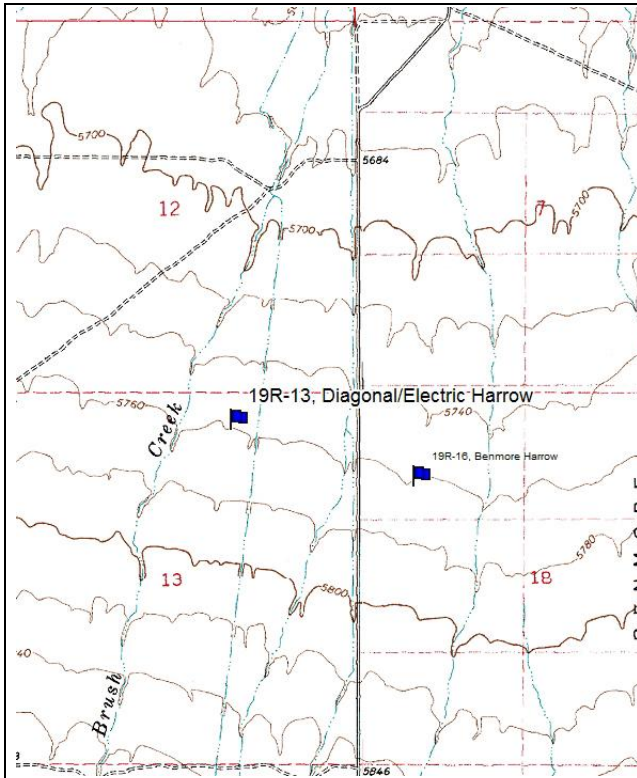
BROWSE CHARACTERISTICS--

Management unit 19R, Study no: 9

Year	Plants per Acre (excluding seedlings)	Age class distribution			Seedling (plants/acre)	Utilization			Average Height Crown (in)
		% Young	% Mature	% Decadent		% moderate	% heavy	% poor vigor	
Amelanchier utahensis									
06	40	0	0	100	-	0	0	100	-/-
10	0	0	0	0	-	0	0	0	-/-
14	0	0	0	0	-	0	0	0	-/-
Artemisia tridentata wyomingensis									
06	2800	8	51	41	180	5	0	26	29/39
10	160	25	25	50	20	0	13	63	16/15
14	40	100	0	0	-	0	0	0	19/23

		Age class distribution					Utilization			
Year	Plants per Acre (excluding seedlings)	% Young	% Mature	% Decadent	Seedling (plants/acre)	% moderate	% heavy	% poor vigor	Average Height Crown (in)	
Chrysothamnus nauseosus										
06	0	0	0	0	-	0	0	0	-/-	
10	40	100	0	0	-	0	0	0	21/25	
14	420	5	90	5	-	0	0	5	21/28	
Chrysothamnus viscidiflorus viscidiflorus										
06	0	0	0	-	-	0	0	0	-/-	
10	0	0	0	-	-	0	0	0	14/19	
14	0	0	0	-	-	0	0	0	17/21	
Tetradymia canescens										
06	40	0	0	100	-	0	100	100	15/26	
10	20	0	0	100	-	0	0	100	15/24	
14	0	0	0	0	-	0	0	0	12/22	

DIAGONAL/ELECTRIC HARROW - TREND STUDY NO. 19R-13



Location Information

USGS 7.5 min Map Info Vernon; Township 9S, Range 6W, Section 13
 GPS (0' Stake) NAD 83, UTM Zone 12, 374946 East 4433229 North

Transect Information

Browse Tag # (0' Stake) Not Available
 Transect Bearing 176° magnetic
 Length 400ft
 Belt Placement Line 1 (11ft & 95ft), Line 2 (34ft), Line 3 (59ft), Line 4 (71ft)
 Belt Marker Placement No Rebar

Directions to Site

From Vernon, drive 1.7 miles on Sharp Road (leads to the Pony Express Trail). Turn left onto Harker Road and drive 1.0 miles to a fork. Stay left and drive 0.9 miles to another fork. Keep to the right and drive 1.2 miles to the witness post. From the witness post, walk 1,000 feet to the only power pole and then go 107 paces at 290 degrees magnetic to the 0-foot stake. The 0-foot stake does not have a browse tag.

Site Information

Land Ownership USFS
 Allotment Vernon
 Elevation 5,697ft (1,736m)
 Aspect North
 Slope 1%
 Sample Dates 08/05/2008, 07/20/2009, 08/09/2010, 08/12/2014

DISTURBANCE HISTORY--

Management unit 19R, Study no: 13

<i>Treatment/Disturbance</i>	<i>Name</i>	<i>WRI DB #</i>	<i>Date</i>	<i>Size (acres)</i>
Two-Way Dixie Harrow	Diagonal-Electric Sagebrush Improvement	659	Fall 2008	993
Seeding: Broadcast Before	Diagonal-Electric Sagebrush Improvement	659	Fall 2008	1000

The table is a recorded disturbance history of the study site.

SEED MIX--

Management unit 19R, Study no: 13

Project Name: Diagonal-Electric Sagebrush Improvement			
WRI Database #: 659			
Application:		Acres: 1000	
Seed type		lbs in mix	lbs/acre
G	Bluebunch WG 'Anatone'	2002	2.00
G	Great Basin Wildrye 'Trailhead'	976	0.98
G	Indian Ricegrass 'Rimrock'	1500	1.50
G	Snake River Wheatgrass 'Secar'	992	0.99
G	Western Wheatgrass 'Arriba'	2000	2.00
F	Alfalfa 'Ladak'	1500	1.50
F	Blue Flax 'Appar'	500	0.50
F	Rocky Mountain Beeplant	250	0.25
F	Sainfoin 'Eski'	3000	3.00
F	Small Burnet 'Delar'	2000	2.00
F	Western Yarrow	100	0.10
Total Pounds:		14820	14.82
PLS Pounds:			12.87

Habitat and Vegetation Information

Wildlife Habitat Pronghorn, Crucial Year-long; Sage-Grouse, Occupied & Winter, Brood-Rearing

VEGETATION HISTORY--

Management unit 19R, Study no: 13

<i>Year</i>	<i>Vegetation Type¹</i>	<i>Woodland Succession²</i>
2008	Wyoming Big Sagebrush	No Encroachment
2009	Perennial Grass	No Encroachment
2010-2014	Wyoming Big Sagebrush/Perennial Grass	No Encroachment

¹Vegetation Type (Appendix - Vegetation Type), ²Woodland Succession (Tausch, Miller, Roundy, & Chambers, 2009).

Site Notes

The study was established to monitor the effects of a harrow treatment in Wyoming big sagebrush (*Artemisia tridentata* ssp. *wyomingensis*). The project objectives were to improve sage-grouse brood rearing habitat by reducing canopy cover of Wyoming big sagebrush to 5% to 10% and increase openings and improve the herbaceous understory by establishing perennial grasses and forbs (WRI Database 2015).

Site Potential

1981-2010 Average Annual Precipitation 12 inches
 NRCS Ecological Site Upland Loam (Wyoming Big Sagebrush)
 NRCS Ecological Site # R028AY309UT

SOIL ANALYSIS DATA--

Management unit 19R, Study no: 13

<i>Texture</i>	<i>Sand (%)</i>	<i>Silt (%)</i>	<i>Clay (%)</i>	<i>pH</i>	<i>ds/m</i>	<i>OM (%)</i>	<i>PPM P</i>	<i>PPM K</i>	<i>Year Sampled</i>
Clay Loam	34	34.4	31.6	7.2	1.1	1.1	2.7	326.4	2008

Soil specific normal values are described in the ecological site description (USDA-NRCS, 2011) and by Tiedeman and Lopez (2004).

States and Transitions

No state and transition model is available for the above ecological site, but it is likely similar to the Upland Loam (Wyoming Big Sagebrush), R025XY314UT ecological site, which does have a defined state and transition model (USDA-NRCS, 2011).

When established in 2008, this site was a Wyoming big sagebrush community with a fair amount of perennial grass cover but low herbaceous diversity overall. The year after treatment showed reduced cover for all vegetative categories, with perennial grasses as the dominant cover. Subsequent sample years have shown that vegetatively this is a mixed community comprised of Wyoming big sagebrush and perennial grasses with very little forbs and no other browse species (Table – Browse Trends, Table – Herbaceous Trends).

Trend Summary

HERBACEOUS TRENDS--

Management unit 19R, Study no: 13

Type	Species	Nested Frequency				Average Cover %			
		'08	'09	'10	'14	'08	'09	'10	'14
G	Agropyron cristatum	a230	a216	a229	b290	8.62	4.97	10.76	16.50
G	Agropyron intermedium	3	9	1	10	.15	.01	.03	.05
G	Agropyron smithii	a-	a-	b19	a1	-	-	.17	.03
G	Agropyron spicatum	a-	a-	a-	b10	-	-	-	.28
G	Bromus tectorum (a)	-	3	-	-	-	.00	-	-
G	Elymus cinereus	-	-	-	3	-	-	-	.03
G	Oryzopsis hymenoides	-	-	3	-	-	-	.01	-
G	Poa secunda	c268	a94	ab128	b155	7.73	1.19	2.11	2.70
Total for Annual Grasses		0	3	0	0	0	0.00	0	0
Total for Perennial Grasses		501	319	380	469	16.51	6.17	13.09	19.60
Total for Grasses		501	322	380	469	16.51	6.18	13.09	19.60
F	Alyssum alyssoides (a)	bc14	a-	b10	c35	.03	-	.03	.07
F	Astragalus sp.	1	4	3	-	.03	.01	.00	-
F	Cleome serrulata (a)	-	-	7	-	-	-	.02	-
F	Linum lewisii	-	2	9	2	-	.00	.04	.00
F	Medicago sativa	-	3	-	-	-	.01	-	-
F	Onobrychis viciaefolia	a-	b10	a4	a-	-	.03	.03	-
F	Phlox austromontana	44	30	37	37	.34	.33	1.43	.79
F	Phlox longifolia	2	1	-	-	.00	.00	-	-

Type	Species	Nested Frequency				Average Cover %			
		'08	'09	'10	'14	'08	'09	'10	'14
F	Ranunculus testiculatus (a)	_b 264	_{bc} 314	_c 358	_a 2	1.38	4.17	8.17	.03
F	Salsola iberica (a)	-	4	-	-	-	.00	-	-
F	Sanguisorba minor	-	4	1	-	-	.01	.03	-
F	Senecio multilobatus	1	2	-	-	.00	.03	-	-
F	Unknown forb-annual (a)	-	5	-	-	-	.02	-	-
Total for Annual Forbs		278	323	375	37	1.41	4.20	8.22	0.10
Total for Perennial Forbs		48	56	54	39	0.38	0.43	1.54	0.79
Total for Forbs		326	379	429	76	1.80	4.63	9.76	0.90

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

BROWSE TRENDS--

Management unit 19R, Study no: 13

Type	Species	Quadrat Cover %				Line Intercept Cover %			
		'08	'09	'10	'14	'08	'09	'10	'14
B	Artemisia tridentata wyomingensis	8.29	3.35	4.57	5.42	12.78	3.41	6.05	6.86
B	Chrysothamnus viscidiflorus	.18	.09	.06	.45	-	-	-	-
Total for Browse		8.48	3.45	4.64	5.87	12.78	3.41	6.05	6.86

BASIC COVER--

Management unit 19R, Study no: 13

Cover Type	Average Cover %			
	'08	'09	'10	'14
Vegetation	28.02	14.21	26.04	28.57
Rock	.02	.30	.23	.22
Pavement	3.16	4.34	4.74	1.89
Litter	31.36	23.13	23.03	39.57
Cryptogams	11.80	.53	.21	.41
Bare Ground	40.70	67.86	53.83	50.39

PELLET GROUP DATA--

Management unit 19R, Study no: 13

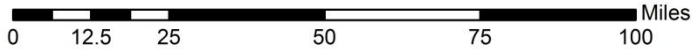
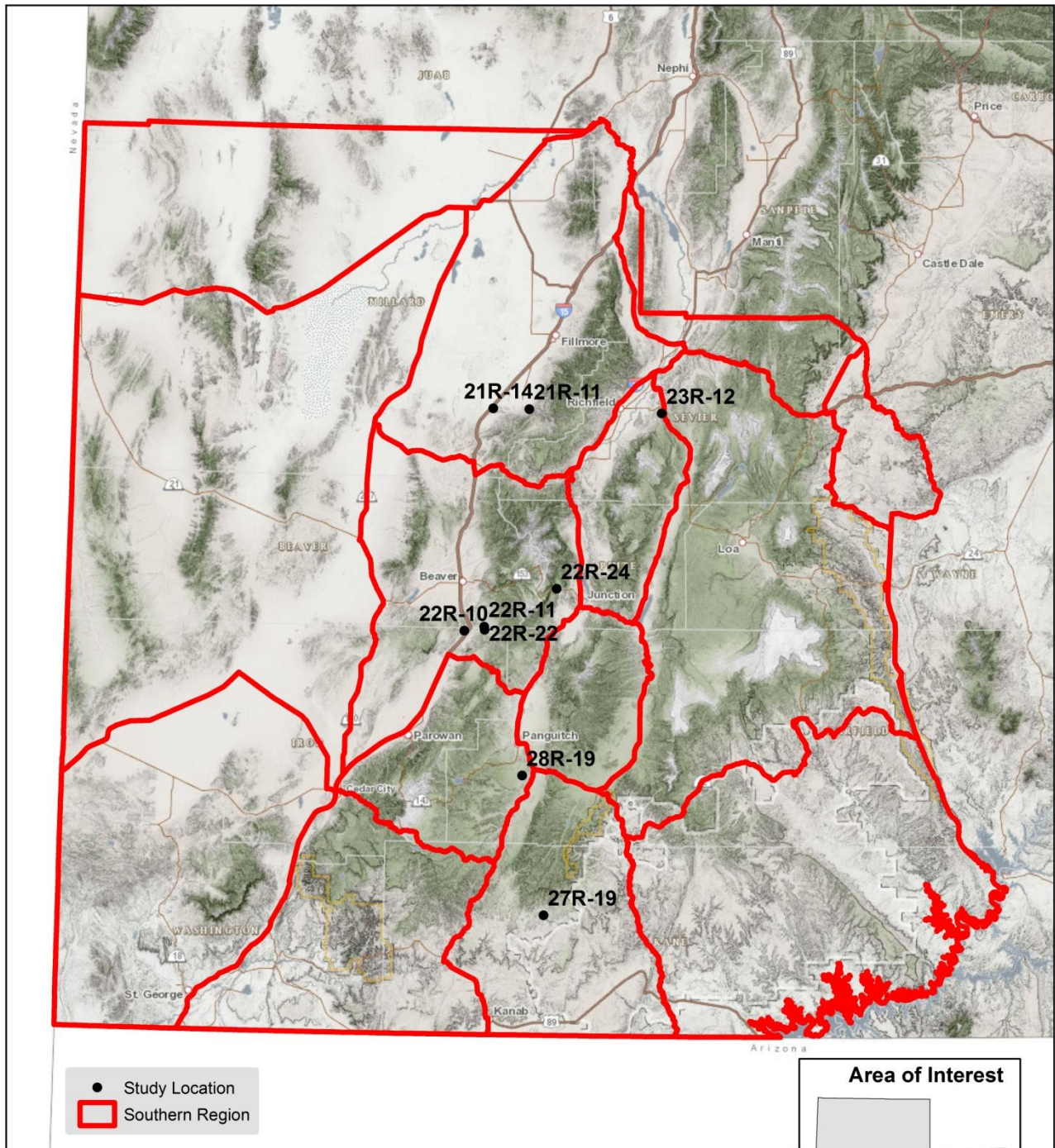
Type	Quadrat Frequency			
	'08	'09	'10	'14
Rabbit	97	49	29	1
Deer	1	6	-	-
Cattle	7	2	-	-
Grouse	-	-	-	-

Days use per acre (ha)			
'08	'09	'10	'14
-	-	-	-
-	-	2 (5)	-
9 (23)	1 (2)	-	-
-	-	26/acre	-

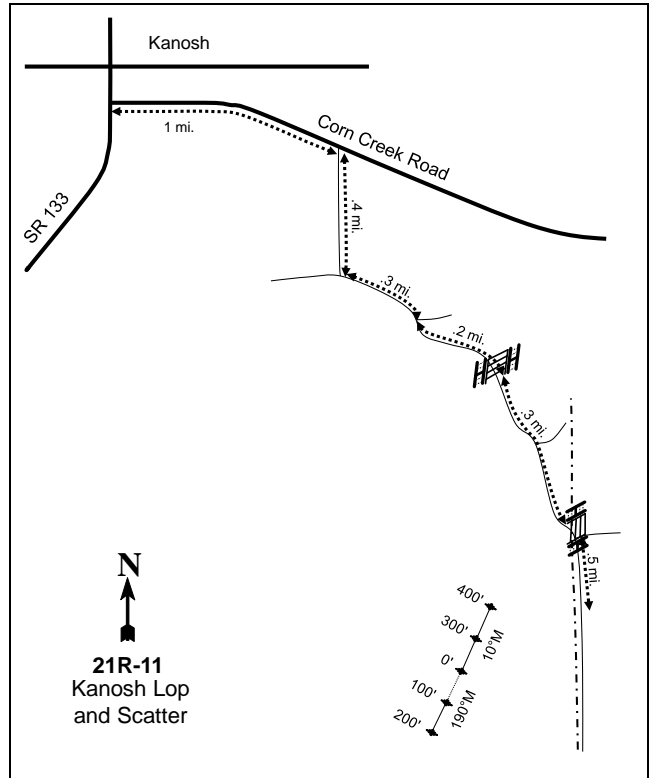
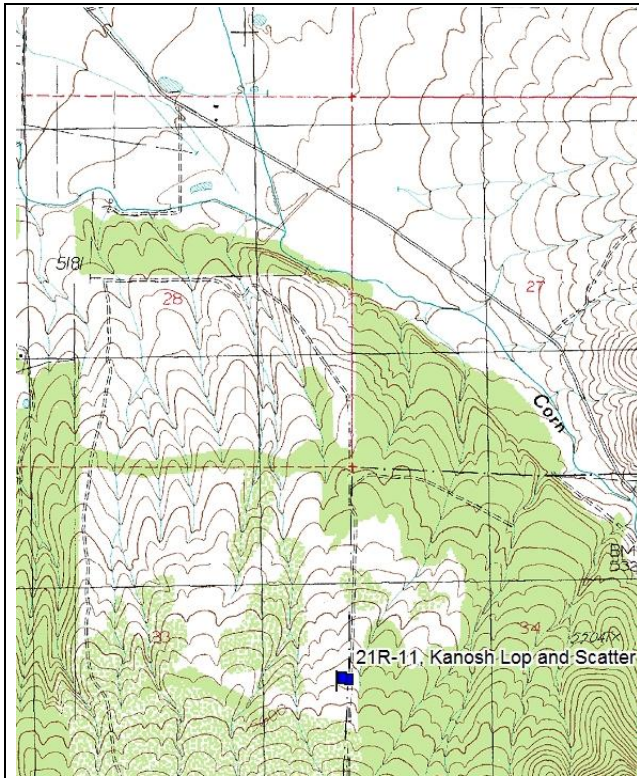
BROWSE CHARACTERISTICS--
Management unit 19R, Study no: 13

Year	Plants per Acre (excluding seedlings)	Age class distribution			Seedling (plants/acre)	Utilization		% poor vigor	Average Height Crown (in)
		% Young	% Mature	% Decadent		% moderate	% heavy		
<i>Artemisia tridentata wyomingensis</i>									
08	3020	9	37	54	80	30	3	32	24/32
09	No Density Collected								13/18
10	3240	58	35	7	2200	5	0	6	19/25
14	4340	36	58	6	160	38	8	7	14/22
<i>Chrysothamnus nauseosus</i>									
08	0	0	0	-	-	0	0	0	17/17
09	No Density Collected								-/-
10	0	0	0	-	-	0	0	0	-/-
14	80	25	75	-	-	0	0	0	14/13
<i>Chrysothamnus viscidiflorus</i>									
08	80	0	100	-	-	0	0	0	7/9
09	No Density Collected								9/10
10	120	33	67	-	-	0	0	0	9/9
14	80	0	100	-	-	0	0	0	11/17
<i>Gutierrezia sarothrae</i>									
08	40	0	100	0	-	0	0	0	8/8
09	No Density Collected								12/13
10	0	0	0	0	-	0	0	0	-/-
14	80	0	50	50	-	25	0	75	9/10

SOUTHERN REGION



KANOSH LOP AND SCATTER - TREND STUDY NO. 21R-11



Location Information

USGS 7.5 min Map Info Kanosh; Township 25S, Range 5W, Section 33
 GPS (0' Stake) NAD 83, UTM Zone 12, 377260 East 4291728 North

Transect Information

Browse Tag # (0' Stake) Not Available
 Transect Bearing Lines 1-2: 190° magnetic; Lines 3-4: 10° magnetic
 Length 400ft
 Belt Placement Line 1 (11ft & 95ft), Line 2 (34ft), Line 3 (59ft), Line 4 (71ft)
 Belt Marker Placement Standard

Directions to Site

From Main Street in Kanosh, turn onto 300 south and drive 1.0 mile to a road on the right. Follow this road 0.4 miles to where the road turns sharply to the left. From this point, drive 0.3 miles to a fork and stay right; drive on the main road 0.2 miles to a gate. Continue driving straight along a fence line 0.3 miles to another gate. Turn right and drive 0.5 miles to the site on the right side of the road. There is no witness post or browse tag; use GPS to locate the 0-foot stake.

Site Information

Land Ownership UDWR
 Allotment Not Available
 Elevation 5,600ft (1,707m)
 Aspect Northwest
 Slope 13%
 Sample Dates 08/27/2008, 06/22/2011, 08/11/2014

DISTURBANCE HISTORY--

Management unit 21R, Study no: 11

Treatment/Disturbance	Name	WRI DB #	Date	Size (acres)
Chaining	-	-	1960's	-
Seeding	-	-	1960's	-
Lop and Scatter	Fillmore WMA Juniper Thinning	408	May 2008	575

The table is a recorded disturbance history of the study site.

Habitat and Vegetation Information

Wildlife Habitat Deer, Crucial Winter; Elk, Substantial Winter

VEGETATION HISTORY--

Management unit 21R, Study no: 11

Year	Vegetation Type ¹	Woodland Succession ²
2008	Juniper/Mountain Big Sagebrush	Phase I transitioning to Phase II
2010-2014	Mountain Big Sagebrush/Bitterbrush	Phase I

¹Vegetation Type (Appendix - Vegetation Type), ²Woodland Succession (Tausch, Miller, Roundy, & Chambers, 2009).

Site Notes

The study was established to monitor a lop and scatter treatment on the Kanosh (Corn Creek) Unit within the Fillmore Wildlife Management Area (WMA) complex. The area is valuable winter range for mule deer and elk. Seed was not applied to the lop and scatter treatment due to the productive herbaceous understory. The objectives of the project are to increase the productivity of desirable forage species by removing pinyon pine (*Pinus edulis*) and Utah juniper (*Juniperus osteosperma*) trees, and to improve winter range for deer and elk (WRI Database 2015). Part of the study transect was not treated, and untreated sample transects were moved within the treated portion of the project area in 2011.

Site Potential

1981-2010 Average Annual Precipitation 18 inches
 NRCS Ecological Site Upland Stony Loam (Mountain Big Sagebrush)
 NRCS Ecological Site # R028AY334UT

SOIL ANALYSIS DATA--

Management unit 21R, Study no: 11

Texture	Sand (%)	Silt (%)	Clay (%)	pH	ds/m	OM (%)	PPM P	PPM K	Year Sampled
Loam	41.1	35.1	23.8	6.6	0.7	1.6	15.2	150.4	2008

Soil specific normal values are described in the ecological site description (USDA-NRCS, 2011) and by Tiedeman and Lopez (2004).

States and Transitions

No state and transition model is available for the above ecological site.

When established in 2008, this site was a mixed stand of Utah juniper and mountain big sagebrush (*Artemisia tridentata* ssp. *vaseyana*) with a few other browse species that provided some cover (Table – Browse Trends).

The herbaceous understory was composed mainly of grasses that were a mix of native and introduced species (Table – Herbaceous Trends). After treatment, the site was a mixed stand of mountain big sagebrush and bitterbrush (*Purshia tridentata*), with a few other browse species that provided limited cover (Table – Browse Trends). Perennial grass cover increased as well, remaining a mix of native and introduced species. Annual grass cover fluctuated year to year and still has a presence on the site, which could be a threat in the future. Forbs were diverse but contributed little cover (Table – Herbaceous Trends).

Trend Summary

HERBACEOUS TRENDS--

Management unit 21R, Study no: 11

Type	Species	Nested Frequency			Average Cover %		
		'08	'11	'14	'08	'11	'14
G	<i>Agropyron cristatum</i>	a24	b57	b71	1.00	3.75	3.58
G	<i>Agropyron intermedium</i>	22	20	15	1.40	1.06	.21
G	<i>Agropyron smithii</i>	-	5	6	-	.15	.03
G	<i>Agropyron spicatum</i>	a14	b81	b93	.91	3.43	4.68
G	<i>Bromus inermis</i>	-	3	-	-	.03	-
G	<i>Bromus japonicus</i> (a)	a-	b57	b86	-	2.02	1.57
G	<i>Bromus tectorum</i> (a)	b310	c365	a237	4.23	13.64	5.07
G	<i>Festuca ovina</i>	b22	a-	a-	.06	-	-
G	<i>Poa bulbosa</i>	a-	b22	a6	-	.33	.06
G	<i>Poa secunda</i>	ab157	b201	a134	2.47	4.27	3.50
G	<i>Sitanion hystrix</i>	ab77	b92	a67	1.33	3.78	1.62
Total for Annual Grasses		310	422	323	4.23	15.67	6.64
Total for Perennial Grasses		316	481	392	7.18	16.84	13.71
Total for Grasses		626	903	715	11.41	32.51	20.36
F	<i>Agoseris glauca</i>	-	2	-	-	.00	-
F	<i>Allium</i> sp.	-	1	-	-	.00	-
F	<i>Alyssum alyssoides</i> (a)	a104	c264	b197	.32	4.39	2.12
F	<i>Antennaria</i> sp.	-	1	-	-	.00	-
F	<i>Arenaria</i> sp.	b20	a-	a-	1.62	-	-
F	<i>Astragalus</i> sp.	10	5	-	.16	.04	-
F	<i>Calochortus nuttallii</i>	a-	b27	a8	-	.12	.01
F	<i>Collinsia parviflora</i> (a)	a12	b79	a5	.02	.93	.01
F	<i>Draba</i> sp. (a)	-	9	-	-	.01	-
F	<i>Epilobium brachycarpum</i> (a)	-	8	-	-	.01	-
F	<i>Eriogonum racemosum</i>	1	3	-	.00	.03	-
F	<i>Eriogonum umbellatum</i>	5	1	1	.04	.03	.00
F	<i>Erodium cicutarium</i> (a)	a-	b15	c29	-	.10	.27
F	<i>Galium aparine</i> (a)	a-	b33	a6	-	.89	.09
F	<i>Holosteum umbellatum</i> (a)	a-	b82	a-	-	.35	-
F	<i>Lactuca serriola</i> (a)	a-	b50	a3	-	.32	.03
F	<i>Linum lewisii</i>	a-	c22	b11	-	.21	.12
F	<i>Lithospermum ruderales</i>	2	1	1	.03	.38	.15
F	<i>Microsteris gracilis</i> (a)	5	1	1	.03	.00	.00
F	<i>Montia perfoliata</i> (a)	-	10	-	-	.09	-

Type	Species	Nested Frequency			Average Cover %		
		'08	'11	'14	'08	'11	'14
F	Orogenia linearifolia	-	6	-	-	.01	-
F	Phlox longifolia	15	14	3	.08	.17	.03
F	Polygonum douglasii (a)	8	-	-	.02	-	-
F	Ranunculus testiculatus (a)	_b 10	_a 5	_a -	.04	.01	-
F	Unknown forb-annual (a)	-	3	-	-	.03	-
F	Zigadenus paniculatus	_b 16	_{ab} 8	_a 1	.21	.27	.03
Total for Annual Forbs		139	559	241	0.44	7.15	2.54
Total for Perennial Forbs		69	91	25	2.15	1.29	0.35
Total for Forbs		208	650	266	2.60	8.44	2.89

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

BROWSE TRENDS--

Management unit 21R, Study no: 11

Type	Species	Average Cover %			Line Intercept Cover %		
		'08	'11	'14	'08	'11	'14
B	Artemisia tridentata vaseyana	8.42	15.10	12.28	10.50	19.96	15.25
B	Gutierrezia sarothrae	.33	.41	.38	.11	.10	.68
B	Juniperus osteosperma	7.98	-	-	19.30	-	-
B	Purshia tridentata	6.57	9.57	7.47	10.40	22.20	18.66
B	Quercus gambelii	.49	-	-	2.20	-	-
B	Rhus trilobata	1.01	1.36	1.48	1.08	3.03	1.43
B	Ribes sp.	.38	-	-	.48	-	-
Total for Browse		25.19	26.46	21.62	44.07	45.29	36.02

POINT-QUARTER TREE DATA--

Management unit 21R, Study no: 11

Species	Trees per Acre			Average diameter (in)		
	'08	'11	'14	'08	'11	'14
Juniperus osteosperma	220	27	39	5.3	3.7	6.6

BASIC COVER--

Management unit 21R, Study no: 11

Cover Type	Average Cover %		
	'08	'11	'14
Vegetation	42.48	60.98	50.72
Rock	3.92	2.97	2.21
Pavement	6.14	2.32	2.45
Litter	58.27	52.18	61.40
Cryptogams	1.16	1.12	.25
Bare Ground	11.80	4.91	5.21

PELLET GROUP DATA--

Management unit 21R, Study no: 11

Type	Quadrat Frequency			Days use per acre (ha)		
	'08	'11	'14	'08	'11	'14
Rabbit	30	4	10	-	-	-
Grouse	-	-	1	-	-	-
Elk	1	7	2	1 (2)	23 (58)	1 (2)
Deer	44	31	45	203 (501)	141 (349)	147 (362)
Cattle	-	-	-	-	2 (5)	-

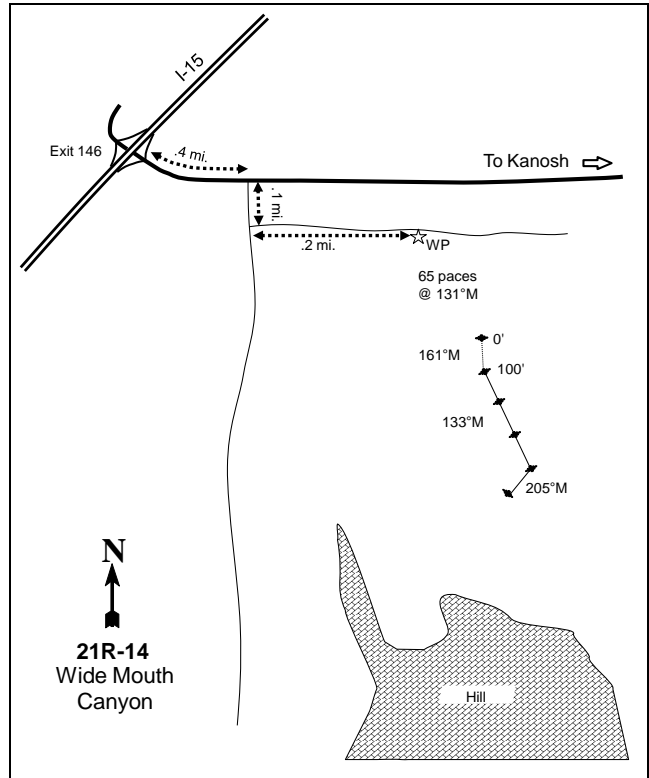
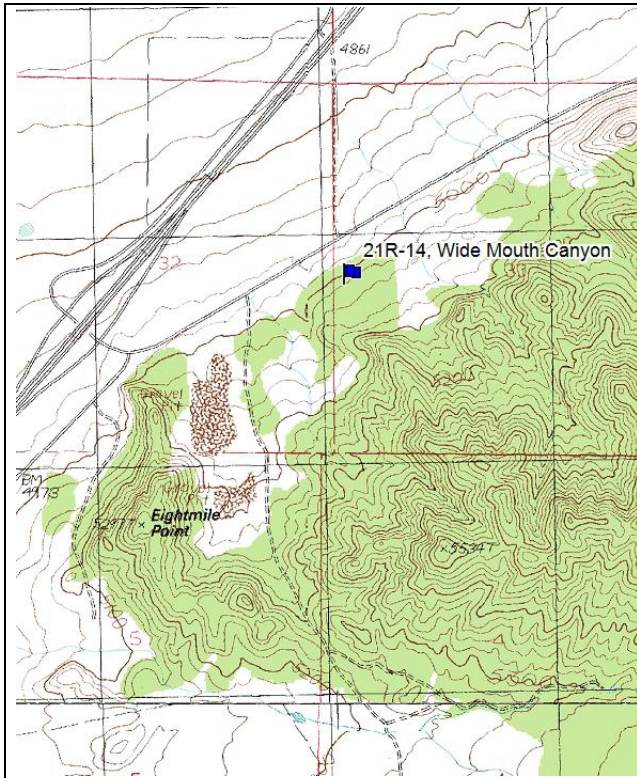
BROWSE CHARACTERISTICS--

Management unit 21R, Study no: 11

Year	Plants per Acre (excluding seedlings)	Age class distribution			Seedling (plants/acre)	Utilization			Average Height Crown (in)
		% Young	% Mature	% Decadent		% moderate	% heavy	% poor vigor	
<i>Artemisia tridentata vaseyana</i>									
08	1580	0	34	66	-	13	4	49	23/34
11	2240	3	75	22	80	49	4	2	36/42
14	2580	6	78	16	-	64	18	19	26/42
<i>Chrysothamnus viscidiflorus</i>									
08	0	0	0	-	-	0	0	0	11/23
11	0	0	0	-	-	0	0	0	11/23
14	0	0	0	-	-	0	0	0	-/-
<i>Cowania mexicana stansburiana</i>									
08	0	0	0	-	-	0	0	0	-/-
11	0	0	0	-	-	0	0	0	81/87
14	0	0	0	-	-	0	0	0	-/-
<i>Gutierrezia sarothrae</i>									
08	160	0	75	25	-	0	0	13	9/12
11	220	36	64	0	120	0	0	0	10/13
14	640	0	100	0	-	41	0	0	10/15
<i>Juniperus osteosperma</i>									
08	180	0	100	-	20	0	0	0	-/-
11	0	0	0	-	-	0	0	0	-/-
14	0	0	0	-	-	0	0	0	-/-
<i>Purshia tridentata</i>									
08	560	0	43	57	-	79	7	54	37/66
11	740	3	78	19	-	76	3	5	41/68
14	1140	5	89	5	-	46	42	23	38/60
<i>Quercus gambelii</i>									
08	280	7	93	-	-	0	0	0	35/25
11	0	0	0	-	-	0	0	0	-/-
14	0	0	0	-	-	0	0	0	-/-

		Age class distribution			Utilization				
Year	Plants per Acre (excluding seedlings)	% Young	% Mature	% Decadent	Seedling (plants/acre)	% moderate	% heavy	% poor vigor	Average Height Crown (in)
<i>Rhus trilobata</i>									
08	40	0	50	50	-	0	0	50	35/51
11	20	0	100	0	-	0	0	0	46/90
14	20	0	100	0	-	0	0	0	52/125
<i>Ribes</i> sp.									
08	20	0	0	100	-	0	0	0	37/118
11	0	0	0	0	-	0	0	0	-/-
14	0	0	0	0	-	0	0	0	-/-
<i>Tetradymia canescens</i>									
08	0	0	0	-	-	0	0	0	-/-
11	0	0	0	-	-	0	0	0	19/52
14	0	0	0	-	-	0	0	0	-/-

WIDEMOUTH CANYON - TREND STUDY NO. 21R-14



Location Information

USGS 7.5 min Map Info Sixmile Point; Township 23S, Range 6W, Section 33
 GPS (0' Stake) NAD 83, UTM Zone 12, 366026 East 4291976 North

Transect Information

Browse Tag # (0' Stake) 146
 Transect Bearing Line 1: 161° magnetic, Lines 2-4: 133° magnetic, Line 5: 205° magnetic
 Length 500ft
 Belt Placement Line 1 (11ft), Line 2 (34ft), Line 3 (59ft), Line 4 (71ft), Line 5 (95ft)
 Belt Marker Placement No Rebar

Directions to Site

Take exit 146 on from I-15 and travel east towards Kanosh. Drive 0.4 miles to a gravel road on the right side of the road (south). Turn right and travel south on gravel road for 0.1 miles to a two track road on the left side of the road (east). Turn left and travel 0.2 miles to the witness post. The 0-foot stake is 65 paces at a bearing of 161 degrees magnetic and is marked with browse tag #146.

Site Information

Land Ownership Private
 Allotment Not Available
 Elevation 4,953ft (1,510m)
 Aspect Northwest
 Slope 6%
 Sample Dates 06/23/2011, 08/11/2014

DISTURBANCE HISTORY--

Management unit 21R, Study no: 14

Treatment/Disturbance	Name	WRI DB #	Date	Size (acres)
Two-Way Ely/Smooth Chaining	Widemouth Canyon Chaining Phase III Project	1972	Fall 2011	237
Herbicide: Plateau	Widemouth Canyon Chaining Phase III Project	1972	Fall 2011	237
Seeding: Aerial Before	Widemouth Canyon Chaining Phase III Project	1972	Fall 2011	240
Seeding: Dribbler	Widemouth Canyon Chaining Phase III Project	1972	Fall 2011	240
Seeding: Aerial After	Widemouth Canyon Chaining Phase III Project	1972	February 2012	270

The table is a recorded disturbance history of the study site.

SEED MIX--

Management unit 21R, Study no: 14

Project Name: Widemouth Canyon Chaining Phase III Project							
WRI Database #: 1972							
Application: Aerial Before		Acres: 240		Application: Dribbler		Acres: 240	
Seed Type		lbs in mix	lbs/acre	Seed Type		lbs in mix	lbs/acre
G	Bluebunch Wheatgrass 'Anatone'	500	2.08	B	Bitterbrush	30	0.13
G	Bottlebrush Squirreltail	250	1.04	B	Fourwing Saltbush	60	0.25
G	Canby Bluegrass 'Canbar'	100	0.42	B	Stansbury Cliffrose	30	0.13
G	Crested Wheatgrass 'Hycrest II'	500	2.08	Total Pounds:		120	0.50
G	Indian Ricegrass 'Nezpar'	350	1.46	PLS Pounds:			0.27
G	Sandberg Bluegrass	150	0.63	Application: Aerial After		Acres: 270	
G	Thickspike Wheatgrass 'Critana'	450	1.88	Seed Type		lbs in mix	lbs/acre
F	Alfalfa 'Nomad'	250	1.04	F	Alfalfa 'Nomad'	135	0.5
F	Blue Flax 'Appar'	50	0.21	B	Forage Kochia	280	1.03
F	Small Burnet 'Delar'	500	2.08	Total Pounds:		415	1.54
F	Western Yarrow 'Eagle Mountain'	25	0.10	PLS Pounds:			1.05
Total Pounds:		3125	13.02				
PLS Pounds:			11.51				

Habitat and Vegetation Information

Wildlife Habitat Deer, Crucial Winter

VEGETATION HISTORY--

Management unit 21R, Study no: 14

Year	Vegetation Type ¹	Woodland Succession ²
2011	Juniper/Wyoming Big Sagebrush/Annual Grass	Phase I transitioning to Phase II
2014	Annual Grass	Phase I

¹Vegetation Type (Appendix - Vegetation Type), ²Woodland Succession (Tausch, Miller, Roundy, & Chambers, 2009).

Site Notes

The study was established to monitor the effects of a two-way chaining project. The objectives of the project are to increase habitat quality and quantity for wintering big game and livestock, increase forage value and improved range utilization for wildlife and livestock, and decrease invasive plant species such as cheatgrass (*Bromus tectorum*) through chemical treatment (WRI Database 2015).

Site Potential

1981-2010 Average Annual Precipitation 15 inches
 NRCS Ecological Site Upland Loam (Wyoming Big Sagebrush)
 NRCS Ecological Site # R028AY309UT

States and Transitions

No state and transition model is available for the above ecological site, but it is likely similar to the Upland Loam (Wyoming Big Sagebrush), R025XY314UT ecological site, which does have a defined state and transition model (USDA-NRCS, 2011).

When established in 2001, this site was a mixed stand of Utah juniper (*Juniperus osteosperma*), Wyoming big sagebrush (*Artemisia tridentata* ssp. *wyomingensis*), and cheatgrass with little else contributing to cover. After treatment, juniper and sagebrush cover were greatly reduced leaving cheatgrass to dominate the site (Table – Browse Trends, Table – Herbaceous Trends). Additional treatments will likely be needed to reduce the amount of cheatgrass and restore the function and diversity of the site.

Trend Summary

HERBACEOUS TRENDS--
 Management unit 21R, Study no: 14

Type	Species	Nested Frequency		Average Cover %	
		'11	'14	'11	'14
G	Agropyron smithii	-	1	-	.03
G	Aristida purpurea	_b 111	_a 81	4.17	2.11
G	Bromus tectorum (a)	_b 460	_a 389	28.56	30.49
G	Hilaria jamesii	_b 56	_a 30	1.30	.46
G	Koeleria cristata	-	3	-	.03
G	Muhlenbergia sp.	-	3	-	.03
G	Poa bulbosa	_a 1	_b 10	.00	.68
G	Poa fendleriana	1	-	.00	-
G	Poa secunda	_b 215	_a 57	3.76	.55
G	Secale cereale (a)	-	2	-	.00
G	Sitanion hystrix	-	1	-	.00
G	Stipa comata	12	5	.26	.07
G	Vulpia octoflora (a)	_b 158	_a 52	.52	.80
Total for Annual Grasses		618	443	29.08	31.29
Total for Perennial Grasses		396	191	9.52	3.97
Total for Grasses		1014	634	38.60	35.27
F	Achillea millefolium	-	3	-	.16
F	Allium acuminatum	_b 13	_a -	.03	-
F	Alyssum desertorum (a)	_b 26	_a -	.14	-
F	Calochortus nuttallii	3	-	.00	-

Type	Species	Nested Frequency		Average Cover %	
		'11	'14	'11	'14
F	<i>Collinsia parviflora</i> (a)	_b 21	_a -	.18	-
F	<i>Cryptantha</i> sp.	-	3	-	.00
F	<i>Eriastrum sparsiflorum</i> (a)	3	-	.03	-
F	<i>Eriogonum cernuum</i> (a)	1	-	.00	-
F	<i>Erodium cicutarium</i> (a)	60	72	.61	.43
F	<i>Holosteum umbellatum</i> (a)	_b 77	_a -	.25	-
F	<i>Lactuca serriola</i> (a)	_a 9	_b 33	.02	.54
F	<i>Lygodesmia grandiflora</i>	2	1	.00	.00
F	<i>Phlox longifolia</i>	8	-	.16	-
F	<i>Physaria</i> sp.	-	3	-	.00
F	<i>Plantago patagonica</i> (a)	_a 122	_b 176	.52	3.48
F	<i>Ranunculus testiculatus</i> (a)	12	9	.39	.01
F	<i>Salsola iberica</i> (a)	-	7	-	.16
Total for Annual Forbs		331	297	2.16	4.63
Total for Perennial Forbs		26	10	0.20	0.17
Total for Forbs		357	307	2.37	4.81

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

BROWSE TRENDS--

Management unit 21R, Study no: 14

Type	Species	Quadrat Cover %		Line Intercept Cover %	
		'11	'14	'11	'14
B	<i>Artemisia tridentata wyomingensis</i>	3.67	.51	7.51	1.38
B	<i>Gutierrezia sarothrae</i>	-	-	.10	.16
B	<i>Juniperus osteosperma</i>	5.44	.00	13.66	-
B	<i>Leptodactylon pungens</i>	.30	.18	.13	.56
B	<i>Opuntia</i> sp.	.03	-	-	-
Total for Browse		9.46	0.70	21.4	2.1

POINT-QUARTER TREE DATA--

Management unit 21R, Study no: 14

Species	Trees per Acre		Average diameter (in)	
	'11	'14	'11	'14
<i>Juniperus osteosperma</i>	35	21	14.3	1.8

BASIC COVER--

Management unit 21R, Study no: 14

Cover Type	Average Cover %	
	'11	'14
Vegetation	50.70	43.90
Rock	.19	.14
Pavement	20.65	21.56
Litter	30.74	38.45
Cryptogams	5.56	.00
Bare Ground	2.41	18.65

PELLET GROUP DATA--

Management unit 21R, Study no: 14

Type	Quadrat Frequency		Days use per acre (ha)	
	'11	'14	'11	'14
Rabbit	9	10	-	-
Elk	1	1	1 (3)	2 (5)
Deer	20	3	13 (33)	7 (18)
Cattle	4	-	1 (2)	2 (5)

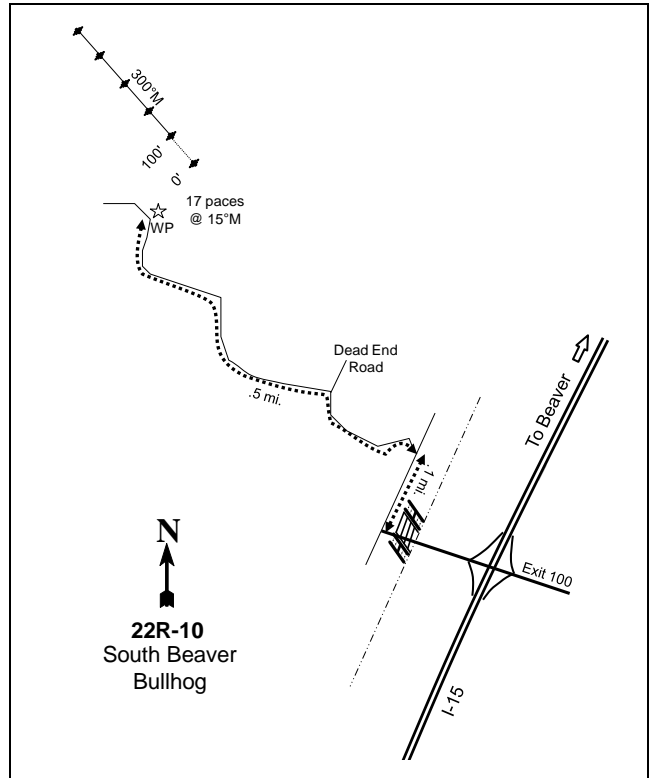
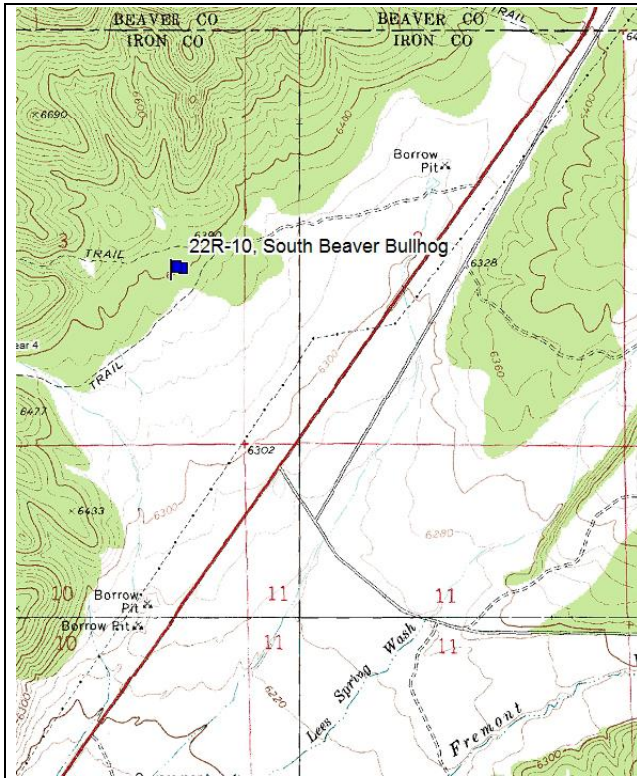
BROWSE CHARACTERISTICS--

Management unit 21R, Study no: 14

Year	Plants per Acre (excluding seedlings)	Age class distribution			Seedling (plants/acre)	Utilization			Average Height Crown (in)
		% Young	% Mature	% Decadent		% moderate	% heavy	% poor vigor	
<i>Artemisia tridentata wyomingensis</i>									
11	840	2	64	33	-	50	5	10	24/38
14	460	9	78	13	40	57	30	4	18/32
<i>Chrysothamnus viscidiflorus</i>									
11	0	0	0	-	-	0	0	0	14/20
14	0	0	0	-	-	0	0	0	-/-
<i>Ephedra nevadensis</i>									
11	20	0	0	100	-	0	0	0	21/47
14	0	0	0	0	-	0	0	0	16/46
<i>Gutierrezia sarothrae</i>									
11	20	0	100	-	-	0	0	0	9/11
14	280	7	93	-	-	79	0	0	10/15
<i>Juniperus osteosperma</i>									
11	40	0	100	-	20	0	0	0	-/-
14	0	0	0	-	20	0	0	0	-/-
<i>Leptodactylon pungens</i>									
11	240	0	50	50	20	0	0	0	8/14
14	180	0	100	0	-	56	44	0	9/15

		Age class distribution					Utilization			
Year	Plants per Acre (excluding seedlings)	% Young	% Mature	% Decadent	Seedling (plants/acre)	% moderate	% heavy	% poor vigor	Average Height Crown (in)	
Opuntia sp.										
11	80	0	75	25	-	0	0	0	7/13	
14	0	0	0	0	-	0	0	0	3/5	
Tetradymia glabrata										
11	0	0	0	-	-	0	0	0	18/31	
14	0	0	0	-	-	0	0	0	-/-	

SOUTH BEAVER BULLHOG - TREND STUDY NO. 22R-10



Location Information

USGS 7.5 min Map Info Greenville Bench; Township 31S, Range 7W, Section 3
 GPS (0' Stake) NAD 83, UTM Zone 12, 356966 East 4222402 North

Transect Information

Browse Tag # (0' Stake) 167
 Transect Bearing 300° magnetic
 Length 500ft
 Belt Placement Line 1 (11ft), Line 2 (34ft), Line 3 (59ft), Line 4 (71ft), Line 5 (95ft)
 Belt Marker Placement Standard

Directions to Site

Take exit 100 from I-15. From the off-ramp turn right and proceed to a gate. Go through the gate and turn right. Drive 0.1 miles to a fork. Turn left and drive 0.5 miles on a two-track road through a harrow project to a witness post on the right. Walk 17 paces at 15 degrees magnetic from the witness post to the 0-foot stake marked with browse tag #167.

Site Information

Land Ownership BLM
 Allotment Fremont
 Elevation 6,400ft (1,951m)
 Aspect Southeast
 Slope 6%
 Sample Dates 07/27/2006, 07/14/2010, 08/12/2014

DISTURBANCE HISTORY--

Management unit 22R, Study no: 10

<i>Treatment/Disturbance</i>	<i>Name</i>	<i>WRI DB #</i>	<i>Date</i>	<i>Size (acres)</i>
Bullhog	South Beaver Vegetation Enhancement Year 4	1224	Fall 2008-Summer 2009	1520
Seeding: Aerial Before	South Beaver Vegetation Enhancement Year 4	1224	December 2008	1358

The table is a recorded disturbance history of the study site.

SEED MIX--

Management unit 22R, Study no: 10

Project Name: South Beaver Vegetation Enhancement			
WRI Database #: 1224			
Application: Aerial Seed		Acres: 1480	
Seed type		lbs in mix	lbs/acre
G	Bluebunch WG 'Anatone'	1430	0.97
G	Bluebunch WG 'Goldar'	50	0.03
G	Crested Wheatgrass 'Douglas'	1150	0.78
G	Crested Wheatgrass 'Nordan'	1150	0.78
G	Indian Ricegrass 'Rimrock'	1500	1.01
G	Intermediate Wheatgrass 'Oahe'	750	0.51
G	Pubescent Wheatgrass 'Luna'	3000	2.03
G	Sandberg Bluegrass	400	0.27
G	Siberian Wheatgrass 'Vavilov'	2250	1.52
G	Snake River Wheatgrass 'Secar'	2250	1.52
F	Alfalfa 'Ladak 65'	750	0.51
F	Alfalfa 'Ranger'	750	0.51
F	Blue Flax 'Appar'	750	0.51
F	Palmer Penstemon	150	0.10
F	Sainfoin 'Eski'	750	0.51
F	Small Burnet 'Delar'	1500	1.01
F	Yellow Sweetclover	750	0.51
Total Pounds:		19330	13.06
PLS Pounds:			11.65

Habitat and Vegetation Information

Wildlife Habitat Deer, Crucial Winter

VEGETATION HISTORY--

Management unit 22R, Study no: 10

<i>Year</i>	<i>Vegetation Type¹</i>	<i>Woodland Succession²</i>
2006	Pinyon-Juniper	Phase III
2010	Wyoming Big Sagebrush	Phase I
2014	Wyoming Big Sagebrush/Perennial Grass	Phase I

¹Vegetation Type (Appendix - Vegetation Type), ²Woodland Succession (Tausch, Miller, Roundy, & Chambers, 2009).

Site Notes

The study was established to monitor a bullhog treatment to remove pinyon pine (*Pinus edulis*) and Utah juniper (*Juniperus osteosperma*) trees, and restore Wyoming big sagebrush (*Artemisia tridentata* ssp. *wyomingensis*) habitat (WRI Database 2015).

Site Potential

1981-2010 Average Annual Precipitation 13 inches
 NRCS Ecological Site Upland Loam (Wyoming Big Sagebrush)
 NRCS Ecological Site # R028AY309UT

SOIL ANALYSIS DATA--

Management unit 22R, Study no: 10

Texture	Sand (%)	Silt (%)	Clay (%)	pH	ds/m	OM (%)	PPM P	PPM K	Year Sampled
Loam	38	39.1	22.9	6.9	0.6	1.5	22.7	182.4	2006

Soil specific normal values are described in the ecological site description (USDA-NRCS, 2011) and by Tiedeman and Lopez (2004).

States and Transitions

No state and transition model is available for the above ecological site, but it is likely similar to the Upland Loam (Wyoming Big Sagebrush), R025XY314UT ecological site, which does have a defined state and transition model (USDA-NRCS, 2011).

When established in 2006, this site was a mixed stand of pinyon and juniper trees in phase III encroachment. There were also other browse species present such as Wyoming big sagebrush but they were not as abundant (Table – Browse Trends). The herbaceous understory was lacking as well, with the exception of cheatgrass (*Bromus tectorum*) which posed additional threats to the site. After treatment, tree cover decreased substantially. Initially, shrub and herbaceous cover decreased, but has since increased (Table – Browse Trends). The herbaceous understory was mainly of a mixture of native and introduced perennial grass species (Table – Herbaceous Trends).

Trend Summary

HERBACEOUS TRENDS--

Management unit 22R, Study no: 10

T y P e	Species	Nested Frequency			Average Cover %		
		'06	'10	'14	'06	'10	'14
G	Agropyron cristatum	a-	b15	c67	-	.08	3.64
G	Agropyron intermedium	a-	a3	b55	-	.01	2.44
G	Agropyron smithii	a-	a-	b13	-	-	.68
G	Agropyron spicatum	-	-	8	-	-	.24
G	Aristida purpurea	a-	b34	b39	-	.43	1.97
G	Bouteloua gracilis	12	8	15	.13	.51	.87
G	Bromus tectorum (a)	b340	a110	a121	12.65	1.50	1.77
G	Elymus cinereus	-	-	-	-	-	.03
G	Oryzopsis hymenoides	12	5	15	.20	.01	.81
G	Poa secunda	5	1	3	.03	.00	.01
G	Sitanion hystrix	a37	b67	c161	.77	1.67	7.97
G	Stipa comata	a-	ab5	b14	-	.18	.57
G	Stipa lettermani	9	-	4	.09	-	.03

Type	Species	Nested Frequency			Average Cover %		
		'06	'10	'14	'06	'10	'14
G	<i>Vulpia octoflora</i> (a)	c64	b13	a-	.26	.07	-
Total for Annual Grasses		404	123	121	12.91	1.57	1.77
Total for Perennial Grasses		75	138	394	1.24	2.90	19.30
Total for Grasses		479	261	515	14.16	4.47	21.07
F	<i>Alyssum alyssoides</i> (a)	5	-	-	.01	-	-
F	<i>Astragalus</i> sp.	-	-	2	-	-	.00
F	<i>Caulanthus crassicaulis</i>	4	-	-	.01	-	-
F	<i>Chaenactis douglasii</i>	5	-	3	.01	-	.03
F	<i>Euphorbia</i> sp.	5	-	-	.01	-	-
F	<i>Gayophytum ramosissimum</i> (a)	a-	b55	a-	-	.60	-
F	<i>Gilia</i> sp. (a)	a-	b65	a-	-	1.45	-
F	<i>Hedysarum boreale</i>	-	2	2	-	.00	.01
F	<i>Ipomopsis aggregata</i>	1	-	-	.03	-	-
F	<i>Lactuca serriola</i> (a)	a-	b21	a-	-	.31	-
F	<i>Linum perenne</i>	a-	b13	a1	-	.04	.00
F	<i>Lygodesmia</i> sp.	-	1	-	-	.00	-
F	<i>Melilotus officinalis</i>	-	1	-	-	.00	-
F	<i>Microsteris gracilis</i> (a)	a-	b34	a5	-	.13	.04
F	<i>Polygonum douglasii</i> (a)	-	2	-	-	.00	-
F	<i>Ranunculus testiculatus</i> (a)	-	3	-	-	.00	-
F	<i>Sanguisorba minor</i>	-	2	2	-	.03	.00
F	<i>Sphaeralcea coccinea</i>	1	1	4	.00	.00	.03
Total for Annual Forbs		5	180	5	0.01	2.51	0.04
Total for Perennial Forbs		16	20	14	0.06	0.09	0.08
Total for Forbs		21	200	19	0.07	2.60	0.12

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

BROWSE TRENDS--

Management unit 22R, Study no: 10

Type	Species	Quadrat Cover %			Line Intercept Cover %		
		'06	'10	'14	'06	'10	'14
B	<i>Artemisia tridentata wyomingensis</i>	7.00	4.21	6.95	8.00	3.48	6.48
B	<i>Gutierrezia sarothrae</i>	.80	.22	.76	1.43	-	1.10
B	<i>Juniperus osteosperma</i>	1.63	-	.00	9.80	-	-
B	<i>Leptodactylon pungens</i>	.30	.15	.19	.13	-	.25
B	<i>Pinus edulis</i>	10.01	-	-	21.30	-	-
Total for Browse		19.75	4.58	7.91	40.66	3.48	7.83

POINT-QUARTER TREE DATA--
Management unit 22R, Study no: 10

Species	Trees per Acre			Average diameter (in)		
	'06	'10	'14	'06	'10	'14
Juniperus osteosperma	53	-	19	7.2	-	1.7
Pinus edulis	177	-	23	3.8	-	0.6

BASIC COVER--
Management unit 22R, Study no: 10

Cover Type	Average Cover %		
	'06	'10	'14
Vegetation	33.05	10.94	33.05
Rock	8.02	2.17	4.01
Pavement	14.65	14.47	11.82
Litter	45.78	60.80	54.69
Cryptogams	.01	.15	.00
Bare Ground	18.84	16.46	8.11

PELLET GROUP DATA--
Management unit 22R, Study no: 10

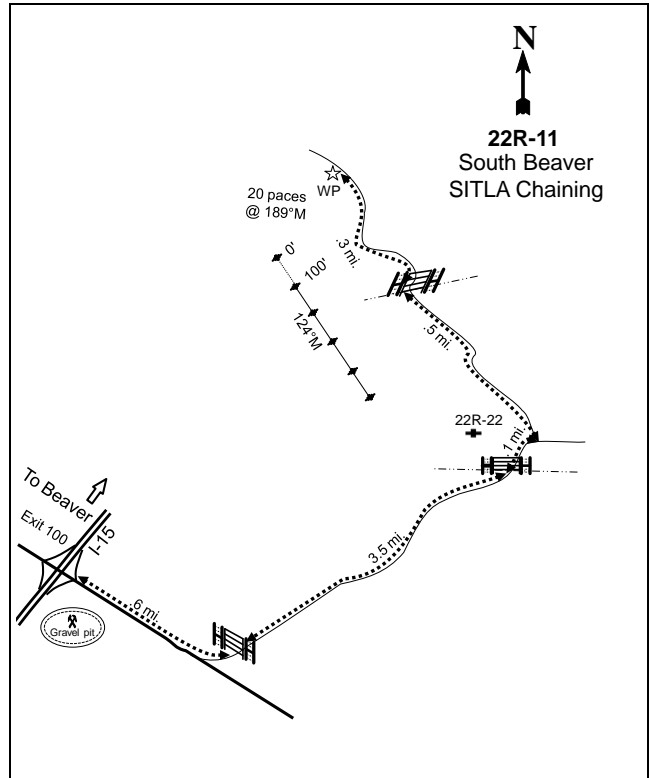
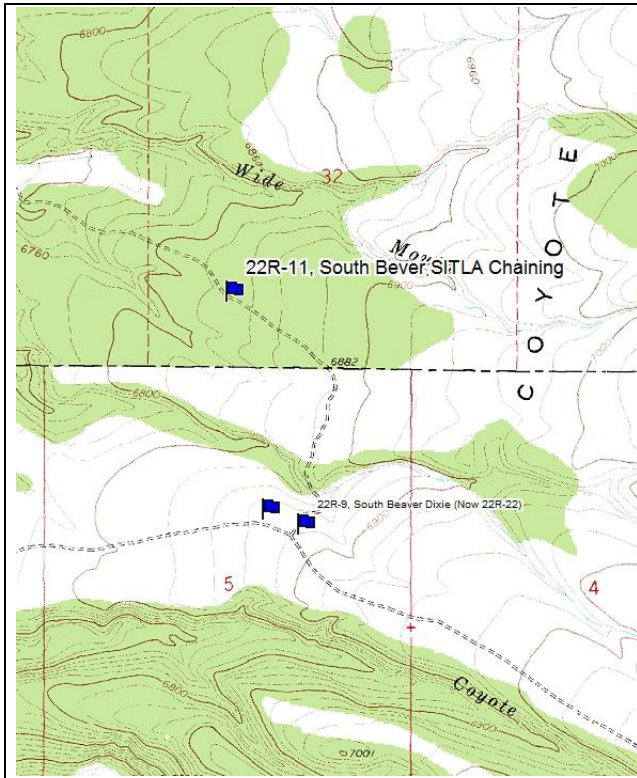
Type	Quadrat Frequency			Days use per acre (ha)		
	'06	'10	'14	'06	'10	'14
Rabbit	51	3	32	-	-	-
Elk	-	-	1	-	-	-
Deer	-	1	2	-	1 (2)	1 (3)
Cattle	-	-	3	-	-	9 (23)

BROWSE CHARACTERISTICS--
Management unit 22R, Study no: 10

Year	Plants per Acre (excluding seedlings)	Age class distribution			Seedling (plants/acre)	Utilization			Average Height Crown (in)
		% Young	% Mature	% Decadent		% moderate	% heavy	% poor vigor	
Artemisia tridentata wyomingensis									
06	2460	5	54	41	840	2	2	25	23/30
10	1700	48	49	2	20	9	5	2	16/26
14	1740	8	91	1	140	46	39	1	19/30
Gutierrezia sarothrae									
06	1800	7	90	3	20	0	1	0	10/10
10	180	0	100	0	40	0	0	0	9/11
14	960	4	90	6	40	6	2	6	7/12
Juniperus osteosperma									
06	20	0	100	-	40	0	0	0	-/-
10	0	0	0	-	20	0	0	0	-/-
14	0	0	0	-	20	0	0	0	-/-

		Age class distribution					Utilization			
Year	Plants per Acre (excluding seedlings)	% Young	% Mature	% Decadent	Seedling (plants/acre)	% moderate	% heavy	% poor vigor	Average Height Crown (in)	
<i>Leptodactylon pungens</i>										
06	100	0	100	-	20	20	0	0	6/10	
10	80	0	100	-	-	0	0	0	6/10	
14	180	0	100	-	60	0	0	0	7/11	
<i>Opuntia sp.</i>										
06	0	0	0	-	-	0	0	0	4/10	
10	0	0	0	-	-	0	0	0	3/5	
14	0	0	0	-	-	0	0	0	4/7	
<i>Pediocactus simpsonii</i>										
06	0	0	0	-	-	0	0	0	2/3	
10	0	0	0	-	-	0	0	0	-/-	
14	0	0	0	-	-	0	0	0	-/-	
<i>Pinus edulis</i>										
06	220	55	45	-	220	0	0	0	-/-	
10	0	0	0	-	20	0	0	0	-/-	
14	0	0	0	-	-	0	0	0	-/-	

SOUTH BEAVER SITLA CHAINING - TREND STUDY NO. 22R-11



Location Information

USGS 7.5 min Map Info Kane Canyon; Township 30S, Range 6W, Section 32
 GPS (0' Stake) NAD 83, UTM Zone 12, 363187 East 4223621 North

Transect Information

Browse Tag # (0' Stake) Not Available
 Transect Bearing 124° magnetic
 Length 400ft
 Belt Placement Line 1 (11ft & 95ft), Line 2 (34ft), Line 3 (59ft), Line 4 (71ft)
 Belt Marker Placement Standard

Directions to Site

Take exit 100 from I-15. From the northbound on-ramp drive east 0.6 miles to a fork. Turn left and drive through a gate; continue 3.5 miles to a fence. From the fence drive 0.1 miles to another fork and a witness post between the forks. From the post take the left fork and go 0.5 miles to a gate. From the gate go another 0.3 miles to a witness post on the left side of the road. From the witness post the 0-foot stake is 20 paces at 189 degrees magnetic.

Site Information

Land Ownership SITLA
 Allotment South Creek
 Elevation 6,800ft (2,073m)
 Aspect Northwest
 Slope 4%
 Sample Dates 06/20/2007, 07/13/2010, 08/12/2014

DISTURBANCE HISTORY--

Management unit 22R, Study no: 11

<i>Treatment/Disturbance</i>	<i>Name</i>	<i>WRI DB #</i>	<i>Date</i>	<i>Size (acres)</i>
Two-Way Ely/Smooth Chaining	South Beaver SITLA Vegetation Enhancement	918	November-December 2008	400
Seeding: Aerial Before	South Beaver SITLA Vegetation Enhancement	918	November-December 2008	450
Seeding: Dribbler	South Beaver SITLA Vegetation Enhancement	918	November-December 2008	450

The table is a recorded disturbance history of the study site.

SEED MIX--

Management unit 22R, Study no: 11

Project Name: South Beaver SITLA Vegetation Enhancement							
WRI Database #: 918							
Application: Aerial Seed		Acres: 450		Application: Seed Dribbler		Acres: 450	
Seed type		lbs in mix	lbs/acre	Seed type		lbs in mix	lbs/acre
G	Bluebunch WG 'Anatone'	450	1.00	F	Small Burnet 'Delar'	100	0.22
G	Crested Wheatgrass 'Nordan'	450	1.00	B	Bitterbrush	100	0.22
G	Orchardgrass 'Paiute'	200	0.44	Total Pounds:		200	0.44
G	Pubescent Wheatgrass 'Luna'	900	2.00	PLS Pounds:			0.39
G	Sandberg Bluegrass	150	0.33				
G	Siberian Wheatgrass 'Vavilov'	450	1.00				
G	Snake River Wheatgrass 'Secar'	450	1.00				
F	Alfalfa 'Ladak'	150	0.33				
F	Alfalfa 'Ranger'	150	0.33				
F	Blue Flax 'Appar'	100	0.22				
F	Sainfoin 'Eski'	900	2.00				
F	Small Burnet 'Delar'	900	2.00				
F	Yellow Sweetclover	150	0.33				
B	Forage Kochia	200	0.44				
Total Pounds:		5600	12.44				
PLS Pounds:			11.16				

Habitat and Vegetation Information

Wildlife Habitat Deer, Crucial Winter; Elk, Substantial Winter; Sage-Grouse, Occupied

VEGETATION HISTORY--

Management unit 22R, Study no: 11

<i>Year</i>	<i>Vegetation Type¹</i>	<i>Woodland Succession²</i>
2007	Pinyon-Juniper	Phase II transitioning to Phase III
2010	Perennial Forb	Phase I
2014	Perennial Grass	Phase I

¹Vegetation Type (Appendix - Vegetation Type), ²Woodland Succession (Tausch, Miller, Roundy, & Chambers, 2009).

Site Notes

The study was established to monitor a pinyon pine (*Pinus edulis*) and Utah juniper (*Juniperus osteosperma*) removal project on Utah State Institutional Trust Land (SITLA). The area is used heavily by deer and elk, and also once served as sage-grouse habitat. The objective of this project is to restore the sagebrush semi-desert ecosystem by removing pinyon and juniper trees and seeding desirable grass, forb, and browse species. These improvements will enhance habitat for big game and sage-grouse, as well as forage for livestock (WRI Database 2015).

Site Potential

1981-2010 Average Annual Precipitation 15 inches
 NRCS Ecological Site Upland Loam (Mountain Big Sagebrush)
 NRCS Ecological Site # [R028AY310UT](#)

SOIL ANALYSIS DATA--

Management unit 22R, Study no: 11

Texture	Sand (%)	Silt (%)	Clay (%)	pH	ds/m	OM (%)	PPM P	PPM K	Year Sampled
Loam	43.4	35	21.6	7.3	0.5	2.1	8.7	156.8	2007

Soil specific normal values are described in the ecological site description (USDA-NRCS, 2011) and by Tiedeman and Lopez (2004).

States and Transitions

No state and transition model is available for the above ecological site.

When established in 2007, this site was in phase II encroachment by pinyon and juniper trees, with a few other browse species that offered limited cover (Table – Browse Trends). The herbaceous understory was sparse and not very diverse (Table – Herbaceous Trends). Initially after treatment in 2010, tree cover decreased and perennial forb cover increased as well as diversified, becoming the dominant cover type on the site. In the following sample year (2014), perennial grasses increased and became the dominant cover type with a mixture of native and introduced grasses that were seeded on the site (Table – Herbaceous Trends). Over time, it is likely that the shrub cover will re-establish and become dominant.

Trend Summary

HERBACEOUS TRENDS--

Management unit 22R, Study no: 11

Type	Species	Nested Frequency			Average Cover %		
		'07	'10	'14	'07	'10	'14
G	Agropyron cristatum	a-	b20	c58	-	.36	2.51
G	Agropyron dasystachyum	-	5	3	-	.06	.03
G	Agropyron intermedium	a-	b19	c60	-	.08	3.01
G	Agropyron spicatum	b127	a50	a84	3.13	1.27	5.71
G	Aristida purpurea	-	-	5	-	-	.06
G	Bromus tectorum (a)	b27	a1	a7	.06	.00	.07
G	Dactylis glomerata	-	5	-	-	.18	.00
G	Oryzopsis hymenoides	b36	a6	b38	.39	.27	2.50
G	Poa secunda	-	2	1	-	.00	.15
G	Sitanion hystrix	a1	b40	c102	.00	.43	3.92
G	Stipa comata	6	7	2	.03	.09	.15
Total for Annual Grasses		27	1	7	0.06	0.00	0.07

Type	Species	Nested Frequency			Average Cover %		
		'07	'10	'14	'07	'10	'14
	Total for Perennial Grasses	170	154	353	3.56	2.75	18.06
	Total for Grasses	197	155	360	3.63	2.76	18.13
F	Agoseris glauca	-	1	-	-	.00	-
F	Antennaria sp.	3	-	-	.00	-	-
F	Arabis sp.	_b 11	_{ab} 3	_a -	.02	.00	-
F	Astragalus lentiginosus	_a 9	_b 39	_{ab} 22	.03	2.64	.73
F	Calochortus nuttallii	-	3	-	-	.00	-
F	Castilleja linariaefolia	-	-	-	-	.03	-
F	Chaenactis douglasii	_a 6	_b 15	_a 4	.01	.23	.01
F	Collinsia parviflora (a)	1	-	-	.00	-	-
F	Cryptantha sp.	-	2	2	-	.15	.00
F	Erigeron pumilus	-	4	2	-	.04	.03
F	Erigeron sp.	-	1	-	-	.00	-
F	Eriogonum umbellatum	5	2	4	.33	.01	.06
F	Gayophytum ramosissimum(a)	_a -	_b 53	_a -	-	2.11	-
F	Geranium sp.	-	3	-	-	.04	-
F	Gilia sp. (a)	_b 65	_c 101	_a 4	.13	3.82	.01
F	Hedysarum boreale	-	5	4	-	.03	.18
F	Hymenoxys acaulis	_b 17	_a -	_a -	.09	-	-
F	Lactuca serriola (a)	_a -	_b 52	_a 2	-	1.06	.00
F	Lesquerella sp.	6	4	4	.02	.07	.01
F	Linum lewisii	_a -	_b 20	_b 11	-	.44	.08
F	Lygodesmia spinosa	_a 3	_b 16	_{ab} 4	.03	.13	.15
F	Melilotus officinalis	_a -	_b 7	_b -	-	.33	.06
F	Microsteris gracilis (a)	_c 54	_b 14	_a -	.14	.10	-
F	Onobrychis viciaefolia	_a -	_b 48	_a -	-	.42	-
F	Penstemon sp.	-	-	1	-	-	.00
F	Penstemon sp.	-	2	7	-	.06	.04
F	Phlox austromontana	_b 96	_a 33	_a 29	3.06	.28	.59
F	Physaria sp.	_a -	_a -	_b 31	-	-	.16
F	Polygonum douglasii (a)	-	2	-	-	.00	-
F	Ranunculus testiculatus (a)	_c 82	_b 51	_a -	.18	.69	-
F	Sanguisorba minor	-	1	1	-	.09	.03
F	Senecio multilobatus	_a -	_{ab} 8	_b 9	-	.03	.05
F	Sisymbrium altissimum (a)	-	-	4	-	-	.79
F	Sphaeralcea coccinea	-	-	2	-	-	.03
	Total for Annual Forbs	202	273	10	0.45	7.80	0.80
	Total for Perennial Forbs	156	217	137	3.61	5.08	2.23
	Total for Forbs	358	490	147	4.06	12.88	3.04

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

BROWSE TRENDS--

Management unit 22R, Study no: 11

Type	Species	Quadrat Cover %			Line Intercept Cover %		
		'07	'10	'14	'07	'10	'14
B	Artemisia tridentata wyomingensis	1.14	1.82	2.66	2.26	1.55	2.80
B	Chrysothamnus viscidiflorus stenophyllus	.04	-	-	-	-	-
B	Chrysothamnus viscidiflorus viscidiflorus	-	.03	-	-	.08	-
B	Gutierrezia sarothrae	.21	.03	1.48	.18	.11	1.75
B	Juniperus osteosperma	4.17	.53	.03	10.45	1.00	.18
B	Leptodactylon pungens	.36	.00	.03	.36	-	-
B	Opuntia sp.				-	.03	-
B	Pinus edulis	8.91	.00	.00	16.78	.20	.18
B	Purshia tridentata	-	-	.00	-	-	-
Total for Browse		14.85	2.42	4.21	30.03	2.97	4.91

POINT-QUARTER TREE DATA--

Management unit 22R, Study no: 11

Species	Trees per Acre			Average diameter (in)		
	'07	'10	'14	'06	'10	'14
Juniperus osteosperma	259	74	115	5.3	1.7	1.0
Pinus edulis	168	42	26	5.3	1.2	0.6

BASIC COVER--

Management unit 22R, Study no: 11

Cover Type	Nested Frequency			Average Cover %		
	'07	'10	'14	'07	'10	'14
Vegetation	275	268	286	22.86	18.72	27.39
Rock	259	160	225	15.14	6.04	9.86
Pavement	306	182	278	20.00	5.85	11.04
Litter	412	463	456	34.03	54.13	50.46
Cryptogams	79	3	4	1.59	.15	.01
Bare Ground	337	252	262	24.18	23.17	18.70

PELLET GROUP DATA--

Management unit 22R, Study no: 11

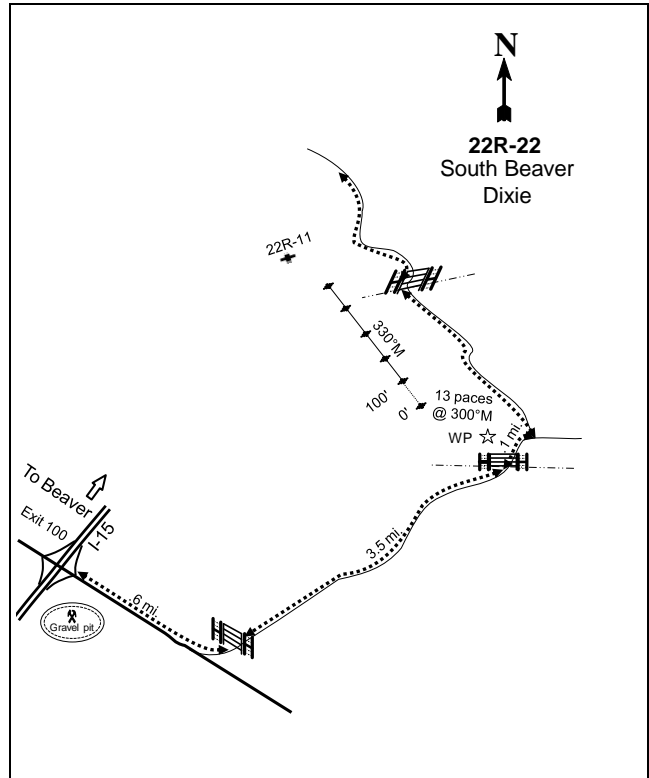
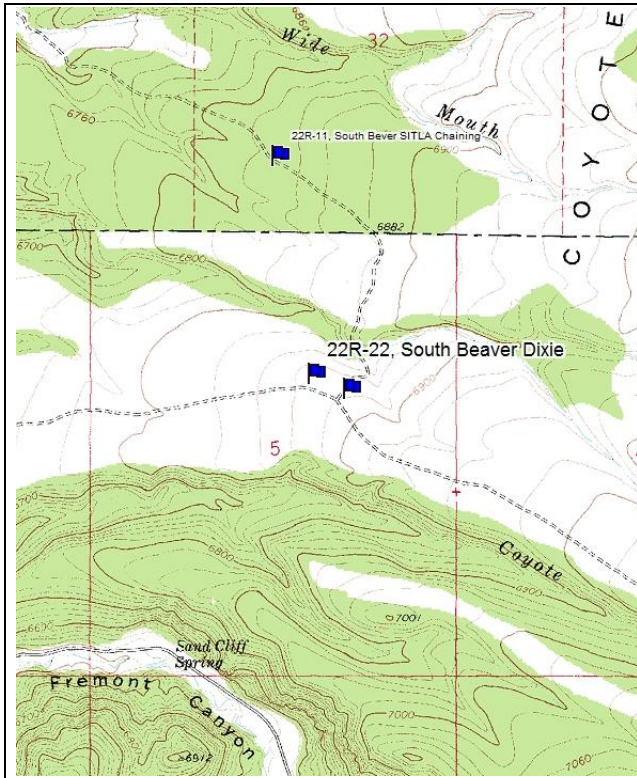
Type	Quadrat Frequency			Days use per acre (ha)		
	'07	'10	'14	'07	'10	'14
Rabbit	52	21	16	-	-	-
Elk	-	-	5	-	-	11 (28)
Deer	-	2	2	-	2 (5)	2 (5)
Cattle	-	-	1	-	3 (7)	4 (11)

BROWSE CHARACTERISTICS--
Management unit 22R, Study no: 11

		Age class distribution					Utilization			
Year	Plants per Acre (excluding seedlings)	% Young	% Mature	% Decadent	Seedling (plants/acre)	% moderate	% heavy	% poor vigor	Average Height Crown (in)	
<i>Artemisia tridentata wyomingensis</i>										
07	1540	1	45	53	20	12	39	25	16/22	
10	500	0	88	12	20	0	0	0	17/23	
14	1180	34	64	2	220	51	29	2	19/29	
<i>Chrysothamnus nauseosus</i>										
07	0	0	0	-	-	0	0	0	-/-	
10	0	0	0	-	-	0	0	0	-/-	
14	0	0	0	-	-	0	0	0	28/28	
<i>Chrysothamnus viscidiflorus stenophyllus</i>										
07	240	0	83	17	-	25	58	8	6/7	
10	0	0	0	0	-	0	0	0	-/-	
14	0	0	0	0	-	0	0	0	10/13	
<i>Chrysothamnus viscidiflorus viscidiflorus</i>										
07	0	0	0	-	-	0	0	0	-/-	
10	40	0	100	-	-	0	0	0	11/12	
14	0	0	0	-	-	0	0	0	-/-	
<i>Gutierrezia sarothrae</i>										
07	240	8	92	0	-	0	0	0	7/5	
10	100	0	100	0	-	0	0	0	10/11	
14	2060	22	77	1	240	18	0	.97	10/14	
<i>Juniperus osteosperma</i>										
07	120	17	83	-	100	0	0	0	-/-	
10	80	75	25	-	80	0	0	0	-/-	
14	100	100	0	-	40	0	0	0	-/-	
<i>Kochia prostrata</i>										
07	0	0	0	-	-	0	0	0	-/-	
10	20	0	100	-	-	0	0	0	10/15	
14	0	0	0	-	-	0	0	0	-/-	
<i>Leptodactylon pungens</i>										
07	820	0	98	2	20	0	0	2	5/8	
10	60	0	100	0	-	0	0	0	6/12	
14	120	17	83	0	-	0	0	0	8/14	
<i>Opuntia sp.</i>										
07	20	0	100	-	-	0	0	0	4/8	
10	20	0	100	-	-	0	0	0	4/7	
14	0	0	0	-	-	0	0	0	4/15	

		Age class distribution					Utilization			
Year	Plants per Acre (excluding seedlings)	% Young	% Mature	% Decadent	Seedling (plants/acre)	% moderate	% heavy	% poor vigor	Average Height Crown (in)	
<i>Pinus edulis</i>										
07	300	47	53	-	100	0	0	0	-/-	
10	80	75	25	-	-	0	0	0	-/-	
14	40	100	0	-	60	0	0	0	-/-	
<i>Purshia tridentata</i>										
07	0	0	0	-	-	0	0	0	28/48	
10	0	0	0	-	-	0	0	0	18/35	
14	0	0	0	-	-	0	0	0	24/48	

SOUTH BEAVER DIXIE - TREND STUDY NO. 22R-22



Location Information

USGS 7.5 min Map Info Kane Canyon; Township 31S, Range 6W, Section 5
 GPS (0' Stake) NAD 83, UTM Zone 12, 363328 East 4222667 North

Transect Information

Browse Tag # (0' Stake) Not Available
 Transect Bearing 330° magnetic
 Length 400ft
 Belt Placement Line 1 (11ft & 95ft), Line 2 (34ft), Line 3 (59ft), Line 4 (71ft)
 Belt Marker Placement No Rebar

Directions to Site

Take exit 100 from I-15. From the northbound on-ramp drive east 0.6 miles to a fork. Turn left and drive through a gate, continue 3.5 miles to a just before a fence. You will see a witness post on the north side of the road; park here. From the witness post walk 14 paces at 300 degrees magnetic to the 0-foot stake.

Site Information

Land Ownership BLM
 Allotment Fremont
 Elevation 6,799ft (2,072m)
 Aspect North
 Slope 3%
 Sample Dates 07/14/2010, 08/14/2014

DISTURBANCE HISTORY--

Management unit 22R, Study no: 22

<i>Treatment/Disturbance</i>	<i>Name</i>	<i>WRI DB #</i>	<i>Date</i>	<i>Size (acres)</i>
Chaining	-	-	Historic	-
Seeding	-	-	Historic	-
One-Way Dixie Harrow	South Beaver Vegetation Enhancement Project Year 1	104	Winter 2005-2006	1646
Seeding: Broadcast Before	South Beaver Vegetation Enhancement Project Year 1	104	Winter 2005-2006	1900

The table is a recorded disturbance history of the study site.

SEED MIX--

Management unit 22R, Study no: 22

Project Name: South Beaver Vegetation Enhancement Year 1			
WRI Database #: 104			
Application: Broadcast Before		Acres: 1900	
Seed type	lbs in mix	lbs/acre	
G	Crested Wheatgrass 'Douglas'	1108	0.58
G	Siberian Wheatgrass 'Vavilov'	400	0.21
G	Siberian Wheatgrass 'Vavilov'	1500	0.79
G	Bluebunch WG 'Goldar'	1900	1.00
G	Pubescent Wheatgrass	3800	2.00
G	Snake River Wheatgrass 'Secar'	1900	1.00
G	Indian Ricegrass 'Rimrock'	950	0.50
G	Sandberg Bluegrass 'Toole MT'	500	0.26
G	Orchardgrass 'Paiute'	950	0.50
F	Blue Flax	300	0.16
F	Yellow Sweetclover	950	0.50
F	Alfalfa 'Spredor 4'	1900	1.00
F	Small Burnet 'Delar'	2000	1.05
F	Palmer Penstemon	200	0.11
B	Bitterbrush	200	0.11
Total Pounds:		18558	9.77
PLS Pounds:			8.67

Habitat and Vegetation Information

Wildlife Habitat Deer, Crucial Winter; Elk, Substantial Winter; Sage-Grouse, Occupied

VEGETATION HISTORY--

Management unit 22R, Study no: 22

<i>Year</i>	<i>Vegetation Type¹</i>	<i>Woodland Succession²</i>
2010-2014	Wyoming Big Sagebrush/Perennial Grass	Phase I

¹Vegetation Type (Appendix - Vegetation Type), ²Woodland Succession (Tausch, Miller, Roundy, & Chambers, 2009).

Site Notes

The study was established to monitor a one-way Dixie harrow project of Wyoming big sagebrush (*Artemisia tridentata* ssp. *wyomingensis*) with scattered young pinyon pine (*Pinus edulis*) and Utah juniper (*Juniperus osteosperma*) mixed throughout the site. Study 22R-9 was established prior to treatment, but was not within the treatment polygon and is a reference to this site. The objectives of the project were to enhance the sagebrush steppe ecosystem, greater sage grouse habitat; riparian systems and water quality, and big game habitat on public lands (WRI Database 2015).

Site Potential

1981-2010 Average Annual Precipitation 15 inches
 NRCS Ecological Site Upland Shallow Loam (Wyoming Big Sagebrush)
 NRCS Ecological Site # R047XA320UT

States and Transitions

A defined [state and transition model](#) is available.

Since site establishment in 2010, this site has remained in the Wyoming Big Sagebrush/Introduced Non-Native Herb State and the Native Perennial Grasses/Mixed Shrubs community phase (Community Phase 2.1). This state is considered to be the current potential for this site. If a wildfire passes through, it would reduce Wyoming big sagebrush and allow the perennial grasses to dominate. However, lack of wildfire will favor the return of Wyoming big sagebrush and cause the understory to become sparse (USDA – NRCS, 2011).

Trend Summary

HERBACEOUS TRENDS--

Management unit 22R, Study no: 22

T y P e	Species	Nested Frequency		Average Cover %	
		'10	'14	'10	'14
G	<i>Agropyron cristatum</i>	_a 225	_b 271	11.54	12.72
G	<i>Agropyron dasystachyum</i>	5	11	.18	.12
G	<i>Agropyron intermedium</i>	9	8	.10	.18
G	<i>Agropyron spicatum</i>	26	20	.92	.82
G	<i>Bromus tectorum</i> (a)	_b 182	_a 31	1.65	.17
G	<i>Oryzopsis hymenoides</i>	2	9	.30	.21
G	<i>Poa secunda</i>	15	2	.07	.03
G	<i>Sitanion hystrix</i>	53	67	.86	2.16
G	<i>Stipa comata</i>	1	12	.03	.24
Total for Annual Grasses		182	31	1.65	0.17
Total for Perennial Grasses		336	400	14.01	16.50
Total for Grasses		518	431	15.66	16.67
F	<i>Alyssum alyssoides</i> (a)	106	131	2.16	.72
F	<i>Androsace septentrionalis</i> (a)	1	3	.15	.00
F	<i>Astragalus</i> sp.	2	5	.01	.04
F	<i>Calochortus nuttallii</i>	9	2	.04	.03
F	<i>Castilleja flava</i>	1	2	.03	.03
F	<i>Chaenactis douglasii</i>	_b 123	_a 3	.80	.04
F	<i>Cirsium</i> sp.	1	2	.03	.15
F	<i>Collinsia parviflora</i> (a)	3	-	.15	-

T y p e	Species	Nested Frequency		Average Cover %	
		'10	'14	'10	'14
F	Comandra pallida	3	7	.03	.06
F	Cryptantha sp.	2	-	.00	-
F	Erigeron pumilus	26	23	.40	.15
F	Eriogonum cernuum (a)	4	6	.00	.01
F	Euphorbia sp.	a-	b ³⁰	-	.11
F	Gayophytum ramosissimum(a)	13	-	.07	-
F	Geranium sp.	5	-	.03	-
F	Gilia sp. (a)	7	-	.04	-
F	Hedysarum boreale	5	5	.01	.07
F	Linum perenne	11	1	.25	.00
F	Lygodesmia sp.	1	-	.00	-
F	Machaeranthera grindelioides	-	3	-	.03
F	Medicago sativa	1	2	.03	.00
F	Melilotus officinalis	-	3	-	.03
F	Microsteris gracilis (a)	b ⁵²	a-	.16	-
F	Phlox austromontana	58	72	1.51	1.81
F	Ranunculus testiculatus (a)	b ¹⁶²	a-	1.89	-
F	Senecio multilobatus	-	3	-	.00
F	Sphaeralcea coccinea	-	1	-	.00
Total for Annual Forbs		348	140	4.65	0.73
Total for Perennial Forbs		248	164	3.19	2.59
Total for Forbs		596	304	7.85	3.33

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

BROWSE TRENDS--

Management unit 22R, Study no: 22

T y p e	Species	Quadrat Cover %		Line Intercept Cover %	
		'10	'14	'10	'14
B	Artemisia tridentata wyomingensis	8.44	7.37	8.06	8.53
B	Gutierrezia sarothrae	.30	3.75	.48	6.20
B	Juniperus osteosperma	-	.03	-	.21
B	Opuntia sp.	.00	-	-	-
B	Pinus edulis	.18	-	.48	-
B	Purshia tridentata	.18	.38	-	.50
Total for Browse		9.11	11.53	9.02	15.44

POINT-QUARTER TREE DATA--
Management unit 22R, Study no: 22

Species	Trees per Acre		Average diameter (in)	
	'10	'14	'10	'14
Juniperus osteosperma	21	21	2.9	1.8
Pinus edulis	96	44	0.9	0.8

BASIC COVER--
Management unit 22R, Study no: 22

Cover Type	Average Cover %	
	'10	'14
Vegetation	32.77	32.47
Rock	11.36	15.01
Pavement	5.83	6.48
Litter	40.65	36.09
Cryptogams	.38	0
Bare Ground	24.51	24.56

PELLET GROUP DATA--
Management unit 22R, Study no: 22

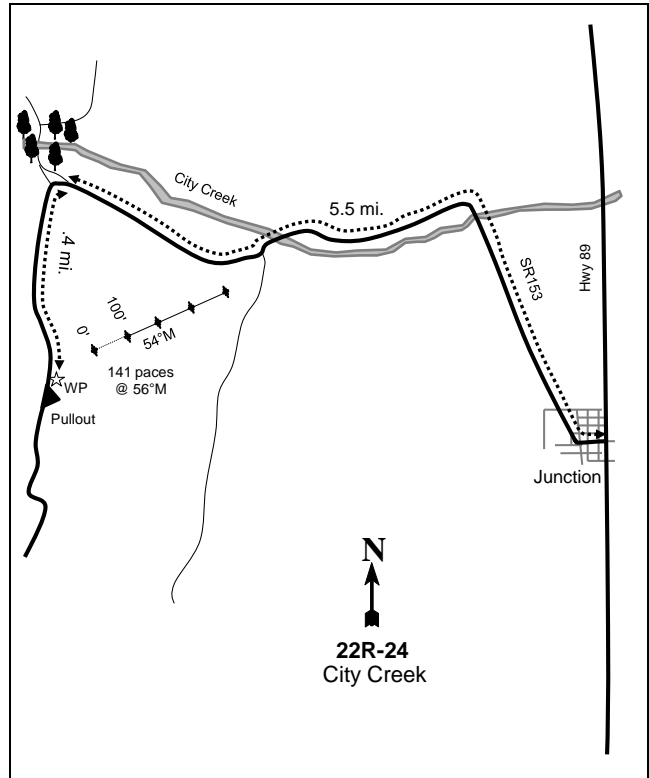
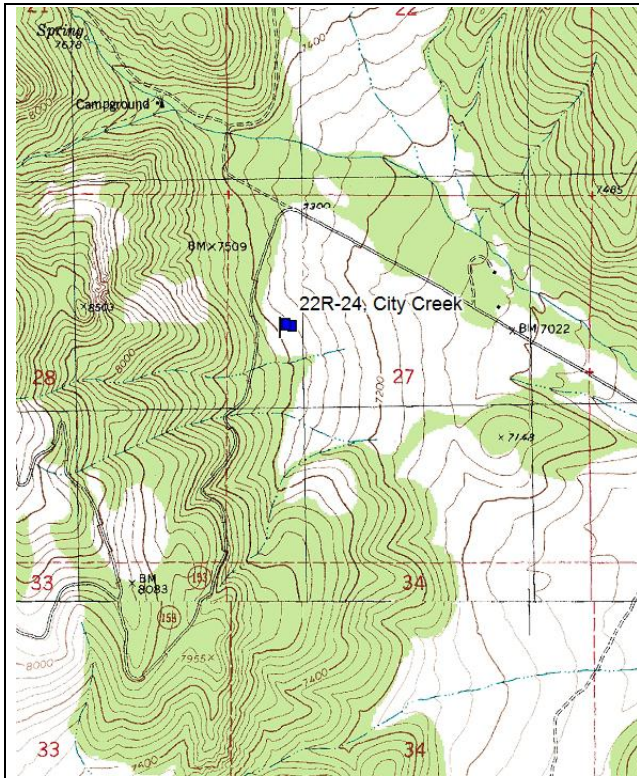
Type	Quadrat Frequency		Days use per acre (ha)	
	'10	'14	'10	'14
Rabbit	32	7	-	-
Elk	5	11	10 (25)	7 (17)
Deer	8	3	6 (15)	3 (8)
Cattle	1	2	7 (16)	2 (4)

BROWSE CHARACTERISTICS--
Management unit 22R, Study no: 22

Year	Plants per Acre (excluding seedlings)	Age class distribution			Seedling (plants/acre)	Utilization			Average Height Crown (in)
		% Young	% Mature	% Decadent		% moderate	% heavy	% poor vigor	
Artemisia tridentata wyomingensis									
10	2340	9	82	9	40	17	2	9	18/22
14	2860	13	78	10	100	55	29	3	16/27
Gutierrezia sarothrae									
10	800	15	85	0	-	0	0	0	8/9
14	6480	20	80	1	2760	22	.30	.61	9/13
Juniperus osteosperma									
10	0	0	0	-	-	0	0	0	-/-
14	20	0	100	-	-	0	0	100	-/-
Opuntia sp.									
10	20	0	100	-	-	0	0	0	4/9
14	60	33	67	-	-	0	0	0	2/1

		Age class distribution					Utilization			
Year	Plants per Acre (excluding seedlings)	% Young	% Mature	% Decadent	Seedling (plants/acre)	% moderate	% heavy	% poor vigor	Average Height Crown (in)	
<i>Pinus edulis</i>										
10	60	67	0	33	-	0	33	33	-/-	
14	40	100	0	0	-	0	0	0	-/-	
<i>Purshia tridentata</i>										
10	20	100	0	-	-	0	0	0	23/51	
14	20	0	100	-	-	100	0	0	42/56	

CITY CREEK - TREND STUDY NO. 22R-24



Location Information

USGS 7.5 min Map Info Delano Peak; Township 29S, Range 4W, Section 27
 GPS (0' Stake) NAD 83, UTM Zone 12, 385836 East 4235496 North

Transect Information

Browse Tag # (0' Stake) 192
 Transect Bearing 54° magnetic
 Length 400ft
 Belt Placement Line 1 (11ft & 95ft), Line 2 (34ft), Line 3 (59ft), Line 4 (71ft)
 Belt Marker Placement No Rebar

Directions to Site

From the town of Junction turn on to State Road 153 (Center St) head west 5.5 miles stay left heading towards Puffer lake and go another 0.4 miles to a pullout on the east side of the road. From the pullout, the transect is located on the east side of the road. The 0-foot stake is 141 paces at 56 degrees magnetic from the witness post and is marked with browse tag #192.

Site Information

Land Ownership USFS
 Allotment Circleville Allotment
 Elevation 7,341ft (2,237m)
 Aspect Northeast
 Slope 10%
 Sample Dates 07/13/2011, 08/14/2014

DISTURBANCE HISTORY--

Management unit 22R, Study no: 24

<i>Treatment/Disturbance</i>	<i>Name</i>	<i>WRI DB #</i>	<i>Date</i>	<i>Size (acres)</i>
Chaining	-	-	Historic	-
Seeding	-	-	Historic	-
Bullhog	City Creek Sagebrush-steppe Enhancement Year 1	1995	Fall 2011-Spring 2012	1080

The table is a recorded disturbance history of the study site.

Habitat and Vegetation Information

Wildlife Habitat Deer, Crucial Winter; Elk, Substantial Winter

VEGETATION HISTORY--

Management unit 22R, Study no: 24

<i>Year</i>	<i>Vegetation Type¹</i>	<i>Woodland Succession²</i>
2011	Pinyon-Juniper/Mountain Big Sagebrush/Gambel Oak	Phase II transitioning to Phase III
2014	Mountain Big Sagebrush/Perennial Grass/Gambel Oak	Phase I

¹Vegetation Type (Appendix - Vegetation Type), ²Woodland Succession (Tausch, Miller, Roundy, & Chambers, 2009).

Site Notes

The study was established to monitor the effects of a bullhog project to remove encroaching pinyon pine (*Pinus edulis*) and Utah juniper (*Juniperus osteosperma*) trees from an old chaining treatment. Future management in this area includes a 60% reduction in livestock numbers from 200 - 80, and reduced utilization from 60% to 30%. Follow up steps for this treatment include prescribed fire in specific areas, which will be followed by re-seeding, and total rest from livestock grazing for a minimum of two growing seasons. The objectives of the project are to remove pinyon and juniper trees, and increase desirable and palatable forbs, shrubs, and grasses (WRI Database 2015).

Site Potential

1981-2010 Average Annual Precipitation 18 inches
 NRCS Ecological Site Upland Stony Loam (Mountain Big Sagebrush)
 NRCS Ecological Site # R047XB336UT

States and Transitions

No state and transition model is available for the above ecological site.

When established in 2011, this site was in phase II pinyon-juniper encroachment with mountain big sagebrush (*Artemisia tridentata* ssp. *vaseyana*) and Gambel oak (*Quercus gambelii*) as major components (Table – Browse Trends). The herbaceous understory was sparse (Table – Herbaceous Trends). After treatment mountain big sagebrush and Gambel oak were the dominant browse species and perennial grass also became a dominant cover type, while all other herbaceous species remained low (Table – Browse Trends, Table – Herbaceous Trends). Over time, shrub cover will likely increase and become the dominant cover type.

Trend Summary

HERBACEOUS TRENDS--

Management unit 22R, Study no: 24

Type	Species	Nested Frequency		Average Cover %	
		'11	'14	'11	'14
G	Agropyron cristatum	a ³	b ¹²	.15	.11
G	Agropyron intermedium	19	26	.43	.32
G	Agropyron spicatum	3	16	.03	.83
G	Bouteloua gracilis	-	2	-	.00
G	Bromus tectorum (a)	a ²¹	b ⁴²	.06	1.36
G	Carex rossii	48	26	1.55	1.61
G	Poa fendleriana	a ¹⁰⁹	b ¹⁸⁶	2.96	6.45
G	Sitanion hystrix	a ³⁰	b ⁸²	.23	2.80
G	Stipa lettermani	13	26	.11	.72
Total for Annual Grasses		21	42	0.06	1.36
Total for Perennial Grasses		225	376	5.48	12.85
Total for Grasses		246	418	5.55	14.22
F	Agoseris glauca	3	-	.06	-
F	Alyssum alyssoides (a)	-	3	-	.00
F	Arabis holboellii	b ¹⁵	a ⁻	.08	-
F	Astragalus convallarius	-	-	.01	-
F	Astragalus sp.	3	-	.03	-
F	Calochortus nuttallii	6	11	.01	.05
F	Castilleja chromosa	3	-	.00	-
F	Castilleja linariaefolia	-	5	-	.02
F	Chaenactis douglasii	4	-	.01	-
F	Chenopodium fremontii (a)	3	3	.00	.00
F	Collinsia parviflora (a)	b ¹⁴	a ⁻	.02	-
F	Comandra pallida	-	3	-	.00
F	Conyza canadensis (a)	a ⁻	b ¹²	-	.15
F	Erigeron pumilus	1	15	.00	.17
F	Eriogonum racemosum	6	9	.06	.07
F	Gayophytum ramosissimum(a)	b ⁹⁰	a ⁻	.24	-
F	Hymenopappus filifolius	2	-	.03	-
F	Lactuca serriola (a)	1	4	.00	.01
F	Linum lewisii	-	3	-	.00
F	Lomatium sp.	b ²⁰	a ⁴	.04	.00
F	Lotus utahensis	30	15	.18	.13
F	Machaeranthera canescens	-	7	-	.04
F	Penstemon comarrhenus	1	-	.00	-
F	Penstemon sp.	a ⁻	b ⁹	-	.07
F	Phlox longifolia	6	-	.04	-
F	Polygonum douglasii (a)	6	3	.03	.00
F	Senecio multilobatus	4	-	.01	-
F	Trifolium gymnocarpon	4	1	.03	.00
F	Zigadenus paniculatus	b ¹⁸	a ⁷	.15	.05

Type	Species	Nested Frequency		Average Cover %	
		'11	'14	'11	'14
	Total for Annual Forbs	114	25	0.30	0.18
	Total for Perennial Forbs	126	89	0.79	0.63
	Total for Forbs	240	114	1.09	0.81

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

BROWSE TRENDS--

Management unit 22R, Study no: 24

Type	Species	Average Cover %		Line Intercept Cover %	
		'11	'14	'11	'14
B	Artemisia tridentata vaseyana	11.67	3.81	11.15	6.35
B	Cercocarpus montanus	.76	.56	.10	-
B	Chrysothamnus viscidiflorus viscidiflorus	.03	.15	.53	-
B	Gutierrezia sarothrae	-	.15	-	-
B	Juniperus osteosperma	7.92	1.04	11.50	1.96
B	Opuntia sp.	.00	.06	.11	-
B	Pediocactus simpsonii	-	.15	-	-
B	Pinus edulis	5.82	.16	17.90	-
B	Purshia tridentata	3.48	2.57	4.51	2.18
B	Quercus gambelii	6.25	4.85	9.46	6.88
	Total for Browse	35.94	13.52	55.46	17.37

POINT-QUARTER TREE DATA--

Management unit 22R, Study no: 24

Species	Trees per Acre		Average diameter (in)	
	'11	'14	'11	'14
Juniperus osteosperma	131	52	6.7	1.6
Pinus edulis	229	73	3.9	1.1

BASIC COVER--

Management unit 22R, Study no: 24

Cover Type	Average Cover %	
	'11	'14
Vegetation	38.15	30.85
Rock	26.75	22.67
Pavement	3.69	3.19
Litter	45.28	50.13
Cryptogams	.66	.03
Bare Ground	13.03	7.88

PELLET GROUP DATA--

Management unit 22R, Study no: 24

Type	Quadrat Frequency		Days use per acre (ha)	
	'11	'14	'11	'14
Rabbit	2	5	-	-
Elk	-	2	2 (5)	3 (7)
Deer	20	11	46 (112)	29(71)
Cattle	1	-	1 (2)	3 (7)

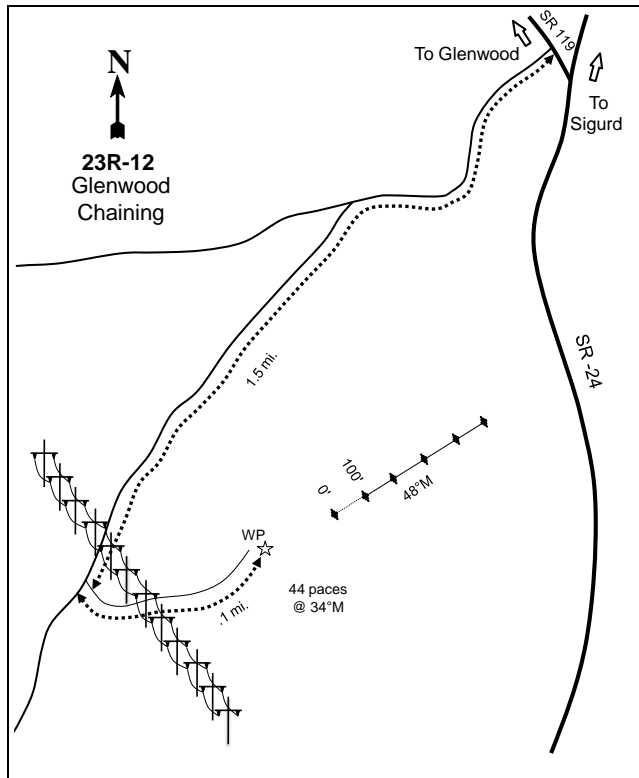
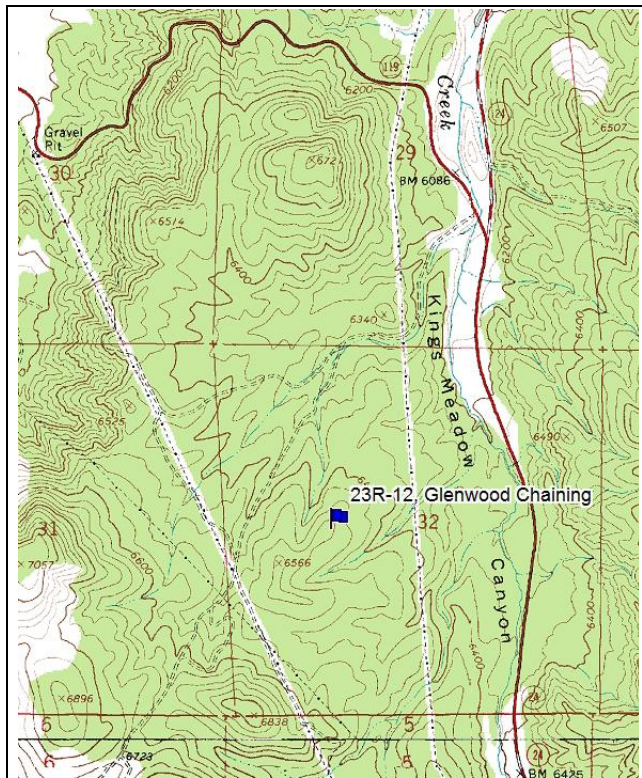
BROWSE CHARACTERISTICS--

Management unit 22R, Study no: 24

Year	Plants per Acre (excluding seedlings)	Age class distribution			Seedling (plants/acre)	Utilization		% poor vigor	Average Height Crown (in)
		% Young	% Mature	% Decadent		% moderate	% heavy		
<i>Artemisia tridentata vaseyana</i>									
11	3880	6	39	55	40	37	5	30	22/30
14	2980	13	69	17	60	63	10	15	18/23
<i>Cercocarpus ledifolius</i>									
11	40	0	100	-	-	0	50	0	20/22
14	0	0	0	-	-	0	0	0	16/25
<i>Cercocarpus montanus</i>									
11	80	0	100	-	-	25	50	0	36/39
14	60	0	100	-	-	33	0	0	24/30
<i>Chrysothamnus viscidiflorus viscidiflorus</i>									
11	120	0	100	-	-	0	0	0	7/11
14	60	67	33	-	-	33	0	0	8/15
<i>Gutierrezia sarothrae</i>									
11	0	0	0	-	-	0	0	0	-/-
14	100	0	100	-	-	0	0	0	7/17
<i>Juniperus osteosperma</i>									
11	180	0	100	-	-	0	0	0	-/-
14	80	75	25	-	-	25	0	25	-/-
<i>Opuntia sp.</i>									
11	200	0	80	20	-	0	0	20	5/13
14	80	0	100	0	-	0	0	0	6/12
<i>Pediocactus simpsonii</i>									
11	20	0	100	0	-	0	0	0	3/3
14	20	0	0	100	-	0	0	100	20/22
<i>Pinus edulis</i>									
11	240	50	33	17	60	0	0	0	-/-
14	80	100	0	0	40	0	0	25	-/-
<i>Purshia tridentata</i>									
11	420	0	76	24	-	43	48	14	24/42
14	560	4	93	4	-	25	54	18	20/38

		Age class distribution					Utilization			
Year	Plants per Acre (excluding seedlings)	% Young	% Mature	% Decadent	Seedling (plants/acre)	% moderate	% heavy	% poor vigor	Average Height Crown (in)	
Quercus gambelii										
11	1340	24	70	6	-	24	1	6	34/34	
14	1180	25	75	0	120	39	3	0	26/27	

GLENWOOD CHAINING - TREND STUDY NO. 23R-12



Location Information

USGS 7.5 min Map Info Sigurd; Township 23S, Range 1W, Section 32
 GPS (0' Stake) NAD 83, UTM Zone 12, 418699 East 4290353 North

Transect Information

Browse Tag # (0' Stake) 190
 Transect Bearing 48° magnetic
 Length 500ft
 Belt Placement Line 1 (11ft), Line 2 (34ft), Line 3 (59ft), Line 4 (71ft), Line 5 (95ft)
 Belt Marker Placement Standard

Directions to Site

From the junction of State Road 24 and State Road 119 turn onto the dirt road heading southwest and go 1.5 miles. Just past the power poles turn left heading east up to the top of a hill. Continue 0.1 miles and park on the top of the hill. The 0-foot stake is 44 paces at 35 degrees magnetic from the witness post and is marked by browse tag #190.

Site Information

Land Ownership SITLA
 Allotment North Cove Mountain
 Elevation 6,449ft (1,966m)
 Aspect Northeast
 Slope 10-15%
 Sample Dates 07/29/2013, 08/21/2014

DISTURBANCE HISTORY--

Management unit 23R, Study no: 12

Treatment/Disturbance	Name	WRI DB #	Date	Size (acres)
Two-Way Ely/Smooth Chaining	Glenwood Habitat Enhancement	1941	Fall 2011	303
Seeding: Aerial Before	Glenwood Habitat Enhancement	1941	Fall 2011	303
Seeding: Dribbler	Glenwood Habitat Enhancement	1941	Fall 2011	303
Seeding: Aerial After	Glenwood Habitat Enhancement	1941	February 2012	303

The table is a recorded disturbance history of the study site.

SEED MIX--

Management unit 23R, Study no: 12

Project Name: Glenwood Habitat Enhancement							
WRI Database #: 1941							
Application: Aerial Before		Acres: 317		Application: Dribbler		Acres: 210	
Seed Type		lbs in mix	lbs/acre	Seed Type		lbs in mix	lbs/acre
G	Bluebunch WG 'P-7'	400	1.26	F	Small Burnet 'Delar'	100	0.48
G	Crested Wheatgrass 'Ephraim'	550	1.74	B	Bitterbrush	75	0.36
G	Indian Ricegrass 'Rimrock'	400	1.26	Total Pounds:		175	0.83
G	Needle and Threadgrass	150	0.47	PLS Pounds:			0.74
G	Pubescent Wheatgrass 'Luna'	300	0.95	Application: Aerial After		Acres: 500	
G	Russian Wildrye	300	0.95	Seed Type		lbs in mix	lbs/acre
G	Sandberg Bluegrass	150	0.47	B	Forage Kochia	250	0.50
F	Alfalfa 'Nomad'	300	0.95	B	Sagebrush, Wyoming	250	0.50
F	Annual Sunflower	310	0.98	B	Small Burnet 'Delar'	500	1.00
F	Blue Flax 'Appar'	300	0.95	Total Pounds:		1000	2.00
F	Palmer Penstemon	75	0.24	PLS Pounds:			1.29
F	Small Burnet 'Delar'	700	2.21				
F	Yellow Sweetclover	300	0.95				
Total Pounds:		3125	13.02				
PLS Pounds:			11.51				

Habitat and Vegetation Information

Wildlife Habitat Deer, Crucial Winter; Elk, Substantial Winter

VEGETATION HISTORY--

Management unit 23R, Study no: 12

Year	Vegetation Type ¹	Woodland Succession ²
2011	Pinyon-Juniper	Phase II transitioning to Phase III
2014	Annual Grass	Phase I

¹Vegetation Type (Appendix - Vegetation Type), ²Woodland Succession (Tausch, Miller, Roundy, & Chambers, 2009).

Site Notes

The study was established to monitor the effects of a two-way Ely chaining project. The objectives of the project are to decrease encroaching pinyon pine (*Pinus edulis*) and Utah juniper (*Juniperus osteosperma*) trees within defined polygons by at least 80% thereby releasing the existing shrub steppe understory, and increase diversity through seeding (WRI Database 2015).

Site Potential

1981-2010 Average Annual Precipitation 11 inches
 NRCS Ecological Site Upland Gravelly Loam (Pinyon-Juniper)
 NRCS Ecological Site # R047XB304UT

States and Transitions

No state and transition model is available for the above ecological site.

When established in 2011, this site was in phase II pinyon-juniper encroachment, with almost no other browse species present (Table – Browse Trends). The herbaceous understory was very sparse (Table – Herbaceous Trends). After treatment, tree cover was greatly reduced (Table – Browse Trends). While grasses and forbs increased in cover after the treatment, the annual grass cheatgrass (*Bromus tectorum*) increased substantially and becoming the dominant species (Table – Herbaceous Trends). Additional treatments will likely be needed to reduce the annual grass cover and increase perennial cover and diversity.

Trend Summary

HERBACEOUS TRENDS--

Management unit 23R, Study no: 12

T y p e	Species	Nested Frequency		Average Cover %	
		'11	'14	'11	'14
G	Agropyron cristatum	a-	b58	-	1.70
G	Agropyron intermedium	a-	b31	-	.57
G	Agropyron spicatum	a-	b49	-	1.03
G	Bromus tectorum (a)	a150	b319	1.22	11.19
G	Oryzopsis hymenoides	a1	b19	.00	.17
G	Poa fendleriana	5	-	.03	-
G	Poa secunda	1	-	.00	-
G	Sitanion hystrix	a34	b71	.18	1.97
Total for Annual Grasses		150	319	1.22	11.19
Total for Perennial Grasses		41	228	0.22	5.46
Total for Grasses		191	547	1.44	16.65
F	Arabis holboellii	5	-	.03	-
F	Astragalus calycosus	3	6	.03	.01
F	Astragalus lentiginosus	-	3	-	.03
F	Astragalus purshii	-	2	-	.00
F	Calochortus nuttallii	2	-	.00	-
F	Chaenactis douglasii	1	3	.00	.01
F	Cryptantha sp.	4	-	.03	-
F	Eriogonum cernuum (a)	5	6	.03	.03
F	Gayophytum ramosissimum(a)	1	-	.00	.00
F	Gilia sp. (a)	b117	a-	.71	-

Type	Species	Nested Frequency		Average Cover %	
		'11	'14	'11	'14
F	Helianthus annuus (a)	-	9	-	.05
F	Lactuca serriola (a)	5	9	.01	.02
F	Linum perenne	a-	b19	-	.20
F	Medicago sativa	-	11	-	.02
F	Penstemon palmeri	-	10	-	.54
F	Ranunculus testiculatus (a)	14	-	.05	-
F	Sanguisorba minor	a-	b30	-	1.09
F	Senecio multilobatus	-	1	-	.00
F	Streptanthus cordatus	3	-	.04	-
Total for Annual Forbs		142	24	0.81	0.11
Total for Perennial Forbs		18	85	0.14	1.91
Total for Forbs		160	109	0.96	2.02

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

BROWSE TRENDS--

Management unit 23R, Study no: 12

Type	Species	Quadrat Cover %		Line Intercept Cover %	
		'11	'14	'11	'14
B	Artemisia tridentata vaseyana	-	.03	.03	.08
B	Juniperus osteosperma	7.18	-	14.15	-
B	Kochia prostrata	-	.04	-	-
B	Opuntia sp.	.15	.38	-	-
B	Pinus edulis	3.36	-	12.60	-
B	Purshia tridentata	.38	.15	-	-
Total for Browse		11.07	0.60	26.78	0.08

POINT-QUARTER TREE DATA--

Management unit 23R, Study no: 12

Species	Trees per Acre		Average diameter (in)	
	'11	'14	'11	'14
Juniperus osteosperma	212	103	6.7	2.2
Pinus edulis	56	26	5.6	1.2

BASIC COVER--

Management unit 23R, Study no: 12

Cover Type	Average Cover %	
	'11	'14
Vegetation	12.71	18.95
Rock	19.27	15.74
Pavement	41.89	14.99
Litter	24.54	48.64
Cryptogams	.44	.09
Bare Ground	12.87	10.80

PELLET GROUP DATA--

Management unit 23R, Study no: 12

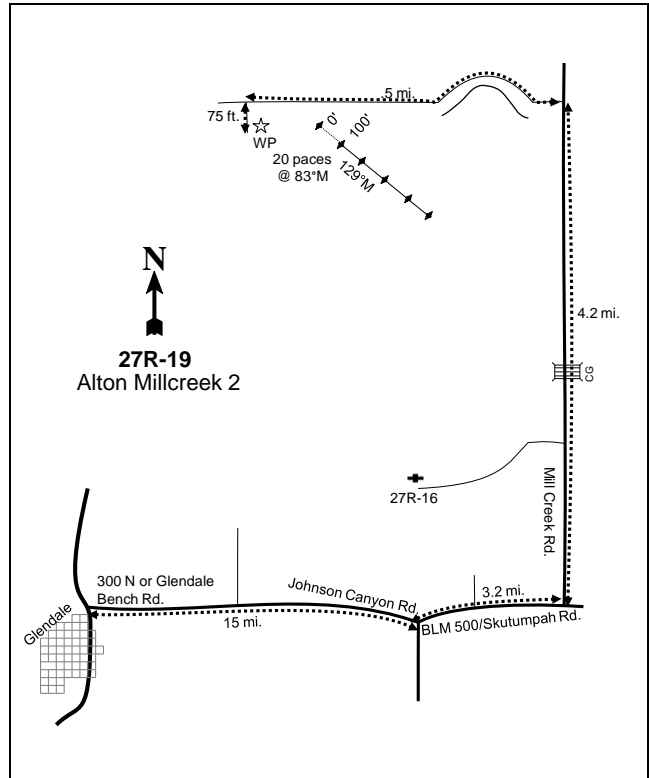
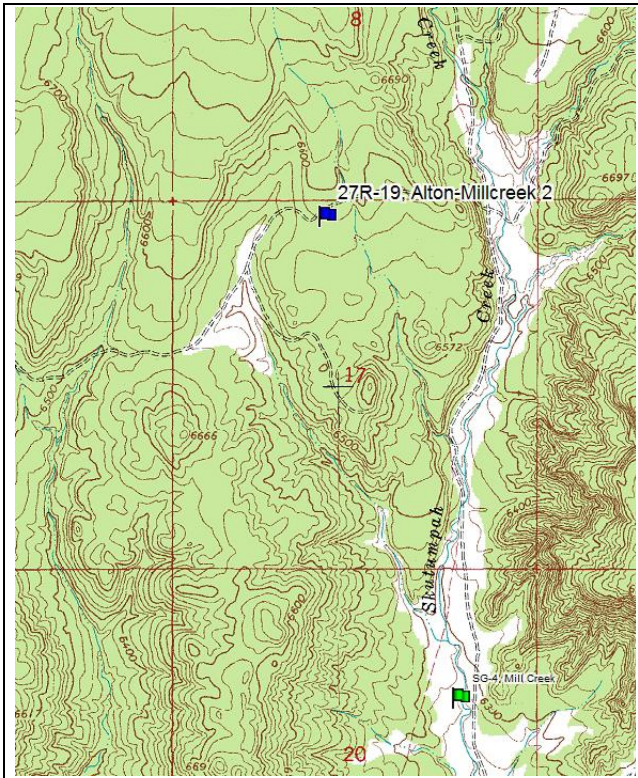
Type	Quadrat Frequency		Days use per acre (ha)	
	'11	'14	'11	'14
Rabbit	11	38	-	-
Elk	1	1	2 (5)	3 (8)
Deer	3	18	3 (7)	17 (43)
Cattle	1	-	-	-

BROWSE CHARACTERISTICS--

Management unit 23R, Study no: 12

Year	Plants per Acre (excluding seedlings)	Age class distribution			Seedling (plants/acre)	Utilization		% poor vigor	Average Height Crown (in)
		% Young	% Mature	% Decadent		% moderate	% heavy		
<i>Artemisia tridentata vaseyana</i>									
11	40	0	0	100	-	0	0	100	25/16
14	20	100	0	0	-	100	0	0	12/13
<i>Juniperus osteosperma</i>									
11	140	29	43	29	80	0	0	0	-/-
14	0	0	0	0	20	0	0	0	-/-
<i>Kochia prostrata</i>									
11	0	0	0	-	-	0	0	0	-/-
14	60	67	33	-	-	33	0	0	3/4
<i>Opuntia sp.</i>									
11	40	0	100	-	-	0	0	0	5/17
14	80	25	75	-	-	0	0	0	5/11
<i>Pinus edulis</i>									
11	40	0	100	-	40	0	0	0	-/-
14	0	0	0	-	-	0	0	0	-/-
<i>Purshia tridentata</i>									
11	20	0	0	100	-	0	100	0	40/65
14	40	0	100	0	-	50	50	0	8/13

ALTON MILLCREEK 2 - TREND STUDY NO. 27R-19



Location Information

USGS 7.5 min Map Info Skutumpah Creek; Township 40S, Range 4W, Section 17
 GPS (0' Stake) NAD 83, UTM Zone 12, 381746 East 4133372 North

Transect Information

Browse Tag # (0' Stake) 183
 Transect Bearing 129° magnetic
 Length 500ft
 Belt Placement Line 1 (11ft), Line 2 (34ft), Line 3 (59ft), Line 4 (71ft), Line 5 (95ft)
 Belt Marker Placement No Rebar

Directions to Site

From the junction of US 89 and 300 north (Glendale Bench Rd) in Glendale, drive east on 300 north for 15 miles to a fork or a road going northeast (there is a sign that says Deer Spring Ranch and Cannonville). Turn left and drive 3.2 miles to a road on the left with a stop sign. Turn left (north) on to Mill Creek Rd and drive 4.2 miles. Take a left here going through a gate 0.5 miles to a two-track to the left. 75 feet down the two-track is the witness post on the left side of the road. The 0-foot stake is 20 paces at 83 degrees magnetic from the witness post. The 0-foot stake is identified by browse tag #183.

Site Information

Land Ownership BLM
 Allotment Bald Knoll
 Elevation 6,600ft (2,012m)
 Aspect Southeast
 Slope 2%
 Sample Dates 06/19/2007, 07/15/2010, 08/13/2014

DISTURBANCE HISTORY--

Management unit 27R, Study no: 19

Treatment/Disturbance	Name	WRI DB #	Date	Size (acres)
Lop and Scatter	Alton/Mill Creek Sagebrush Restoration – Year 1	188	December 2005-February 2006	1630
Bullhog	Alton/Mill Creek Sagebrush Restoration – Year 3	900	October 2008-February 2009	912
Seeding: Aerial Before	Mill Creek Aerial Seeding	1313	October 2008	900

The table is a recorded disturbance history of the study site.

SEED MIX--

Management unit 27R, Study no: 19

Project Name: Mill Creek Seeding			
WRI Database #: 1313			
Application: Aerial Before		Acres: 900	
Seed type		lbs in mix	lbs/acre
G	Crested Wheatgrass 'Douglas'	1100	1.22
G	Crested Wheatgrass 'Nordan'	1100	1.22
G	Indian Ricegrass 'Rimrock'	1250	1.39
G	Intermediate Wheatgrass 'Oahe'	1775	1.97
G	Snake River Wheatgrass 'Secar'	2250	2.50
F	Alfalfa 'Ladak'	900	1.00
F	Blue Flax 'Appar'	450	0.50
F	Small Burnet 'Delar'	900	1.00
B	Forage Kochia 'Immigrant'	450	0.50
Total Pounds:		10175	11.31
PLS Pounds:			9.67

Habitat and Vegetation Information

Wildlife Habitat Deer, Substantial Summer; Elk, Substantial Year-Long

VEGETATION HISTORY--

Management unit 27R, Study no: 19

Year	Vegetation Type ¹	Woodland Succession ²
2007	Juniper	Phase I transitioning to Phase II
2010	Annual-Perennial Forb	Phase I
2014	Perennial Grass	Phase I

¹Vegetation Type (Appendix - Vegetation Type), ²Woodland Succession (Tausch, Miller, Roundy, & Chambers, 2009).

Site Notes

The study was established to monitor a pinyon pine (*Pinus edulis*) and Utah juniper (*Juniperus osteosperma*) removal project. The project area encompasses 3,400 acres in historically occupied sage-grouse habitat, and is three miles from the Ford Pasture historic lek. The objectives of the project were to reduce pinyon pine and Utah juniper in the area and increased cover of sagebrush (*Artemisia sp.*) (WRI Database 2015). A dead elk was found on the study site in 2007.

Site Potential

1981-2010 Average Annual Precipitation 15 inches
 NRCS Ecological Site Upland Loam (Black Sagebrush)
 NRCS Ecological Site # R047XB309UT

SOIL ANALYSIS DATA--

Management unit 27R, Study no: 19

<i>Texture</i>	<i>Sand (%)</i>	<i>Silt (%)</i>	<i>Clay (%)</i>	<i>pH</i>	<i>ds/m</i>	<i>OM (%)</i>	<i>PPM P</i>	<i>PPM K</i>	<i>Year Sampled</i>
Loam	37.4	38	24.6	6.7	0.7	2	9	182.4	2007

Soil specific normal values are described in the ecological site description (USDA-NRCS, 2011) and by Tiedeman and Lopez (2004).

States and Transitions

No state and transition model is available for the above ecological site.

When established in 2007, this site was in phase I juniper encroachment with few other browse species providing cover (Table – Browse Trends). The herbaceous understory was sparse as well (Table – Herbaceous Trends). After treatment, tree cover was reduced and other browse cover remained low, making annual and perennial forbs the dominant cover type, though overall cover was fairly low. By 2014, perennial grass cover increased and became the major cover type (Table – Herbaceous Trends). It is likely that browse cover will increase over time and become the dominant cover type.

Trend Summary

HERBACEOUS TRENDS--

Management unit 27R, Study no: 19

Type	Species	Nested Frequency			Average Cover %		
		'07	'10	'14	'07	'10	'14
G	Agropyron cristatum	a-	b52	c153	-	1.08	4.54
G	Agropyron dasystachyum	a-	b26	c86	-	1.52	1.09
G	Agropyron intermedium	a-	b34	c132	-	1.12	3.19
G	Agropyron spicatum	a-	a3	b22	-	.04	.84
G	Bromus tectorum (a)	b33	a9	a17	.10	.04	.10
G	Oryzopsis hymenoides	-	1	-	-	.03	-
G	Poa fendleriana	-	2	-	-	.00	-
G	Poa pratensis	-	-	2	-	-	.06
G	Sitanion hystrix	8	13	1	.01	.10	.03
G	Stipa lettermani	-	-	3	-	-	.06
G	Vulpia octoflora (a)	9	5	-	.01	.00	-
Total for Annual Grasses		42	14	17	0.11	0.04	0.10
Total for Perennial Grasses		8	131	399	0.01	3.91	9.82
Total for Grasses		50	145	416	0.13	3.96	9.93
F	Arabis sp.	-	1	-	-	.03	-
F	Astragalus convallarius	-	2	-	-	.03	-
F	Astragalus sp.	-	1	-	-	.03	-
F	Caulanthus crassicaulis	2	-	-	.00	-	-
F	Chaenactis douglasii	3	2	3	.03	.03	.00
F	Collinsia parviflora (a)	-	2	-	-	.03	-

Type	Species	Nested Frequency			Average Cover %		
		'07	'10	'14	'07	'10	'14
F	Cordylanthus sp. (a)	a ⁻	c ⁴⁶	b ¹⁴	-	1.39	.08
F	Cymopterus sp.	-	1	-	-	.15	-
F	Descurainia pinnata (a)	b ¹⁰	a ⁴	a ⁻	.05	.03	-
F	Erigeron flagellaris	-	-	2	-	-	.00
F	Eriogonum cernuum (a)	-	9	2	-	.02	.03
F	Eriogonum umbellatum	1	12	12	.00	.07	.07
F	Erodium cicutarium (a)	-	3	4	-	.03	.01
F	Gayophytum ramosissimum(a)	a ⁻	b ³⁸	a ⁻	-	1.05	-
F	Gilia sp. (a)	a ⁴	b ⁸³	a ³	.01	1.18	.00
F	Lactuca serriola (a)	a ⁻	b ⁵⁷	a ²	-	1.43	.00
F	Lappula occidentalis (a)	a ⁻	b ¹⁰	ab ⁵	-	.48	.02
F	Linum lewisii	a ⁻	b ³⁶	b ²²	-	1.43	.70
F	Lupinus sp.	a ⁻	b ¹⁸	a ⁻	-	.49	-
F	Medicago sativa	a ⁻	b ¹⁴	a ¹	-	.11	.00
F	Microsteris gracilis (a)	a ²	a ¹¹	b ⁻	.00	.02	-
F	Penstemon caespitosus	a ⁻	a ⁻	b ¹¹²	-	-	2.46
F	Penstemon humilis	b ⁹⁹	b ⁹⁰	a ⁻	.91	2.86	-
F	Penstemon sp.	-	1	1	-	.00	.00
F	Phlox longifolia	2	1	3	.00	.00	.06
F	Polygonum douglasii (a)	-	4	6	-	.04	.01
F	Sanguisorba minor	-	9	6	-	.06	.06
F	Sphaeralcea grossulariifolia	-	-	3	-	-	.03
F	Taraxacum officinale	-	1	-	-	.03	-
F	Tragopogon dubius (a)	-	-	2	-	-	.03
F	Trifolium sp.	3	15	10	.01	.25	.04
Total for Annual Forbs		16	267	38	0.07	5.73	0.19
Total for Perennial Forbs		110	204	175	0.97	5.60	3.47
Total for Forbs		126	471	213	1.04	11.33	3.66

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

BROWSE TRENDS--

Management unit 27R, Study no: 19

Type	Species	Quadrat Cover %			Line Intercept Cover %		
		'07	'10	'14	'07	'10	'14
B	Artemisia nova	1.25	.30	.83	1.56	.86	1.23
B	Artemisia tridentata wyomingensis	.01	.48	1.56	-	.75	1.60
B	Juniperus osteosperma	3.86	-	.00	17.98	-	.15
B	Pinus edulis	.33	.00	-	.56	-	-
B	Quercus gambelii	-	-	-	.10	-	-
Total for Browse		5.46	0.79	2.39	20.2	1.61	2.98

POINT-QUARTER TREE DATA--
Management unit 27R, Study no: 19

Species	Trees per Acre			Average diameter (in)		
	'07	'10	'14	'07	'10	'14
Juniperus osteosperma	237	7	47	6.5	0.7	0.9
Pinus edulis	29	5	20	2.7	0.6	0.6

BASIC COVER--
Management unit 27R, Study no: 19

Cover Type	Average Cover %		
	'07	'10	'14
Vegetation	6.97	15.69	18.53
Rock	.28	.31	.05
Pavement	.41	.22	.62
Litter	45.48	54.79	47.51
Cryptogams	3.01	0	.03
Bare Ground	48.80	40.46	40.67

PELLET GROUP DATA--
Management unit 27R, Study no: 19

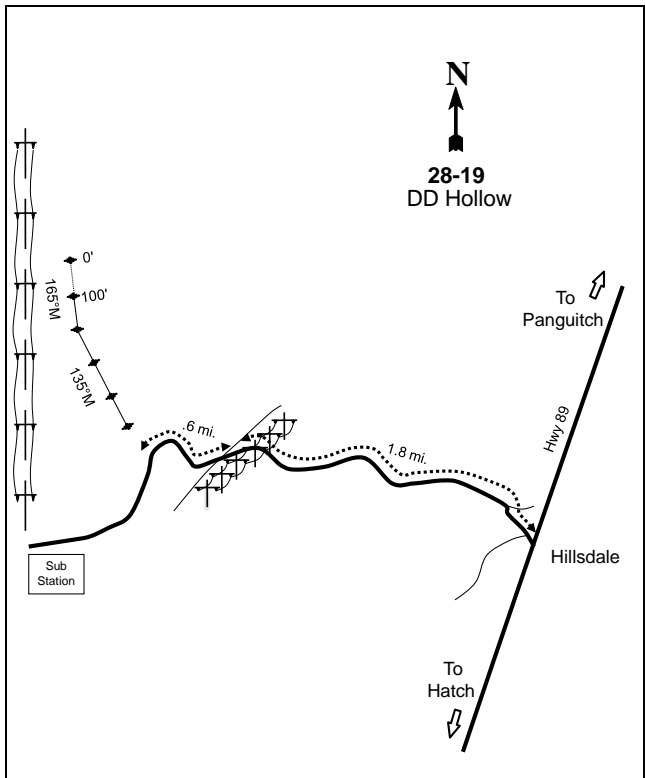
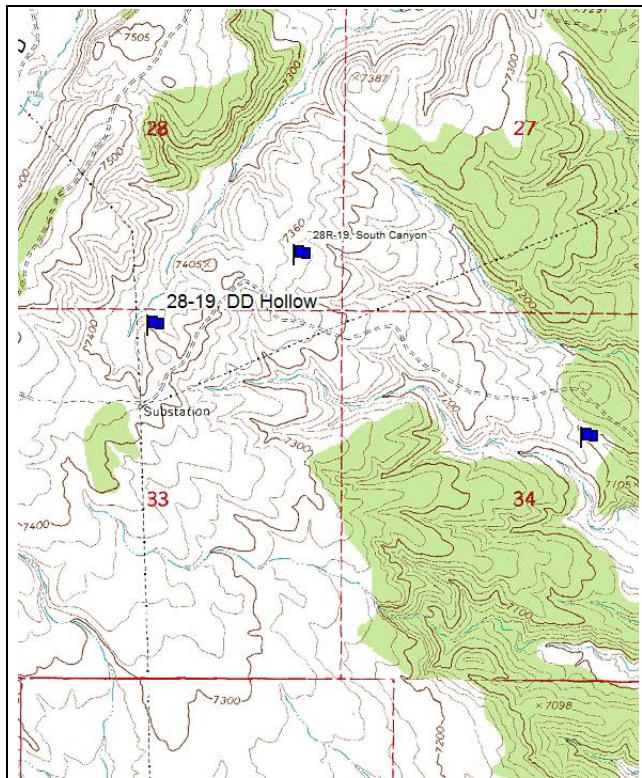
Type	Quadrat Frequency			Days use per acre (ha)		
	'07	'10	'14	'07	'10	'14
Rabbit	53	12	28	-	-	-
Elk	1	1	6	1 (3)	6 (15)	15 (36)
Deer	2	4	14	7 (18)	14 (35)	13 (33)
Cattle	-	-	10	-	-	20 (50)

BROWSE CHARACTERISTICS--
Management unit 27R, Study no: 19

Year	Plants per Acre (excluding seedlings)	Age class distribution			Seedling (plants/acre)	Utilization			Average Height Crown (in)
		% Young	% Mature	% Decadent		% moderate	% heavy	% poor vigor	
Artemisia nova									
07	860	0	35	65	-	35	65	40	11/19
10	340	24	76	0	40	35	0	0	16/23
14	2100	74	26	0	260	34	0	0	14/24
Artemisia tridentata wyomingensis									
07	140	14	29	57	-	14	86	43	17/18
10	540	63	37	0	-	0	0	0	15/17
14	1280	48	52	0	540	80	17	0	13/18
Chrysothamnus nauseosus									
07	0	0	0	-	-	0	0	0	-/-
10	0	0	0	-	-	0	0	0	-/-
14	40	0	100	-	-	50	50	0	20/18

Year	Plants per Acre (excluding seedlings)	Age class distribution			Seedling (plants/acre)	Utilization			Average Height Crown (in)
		% Young	% Mature	% Decadent		% moderate	% heavy	% poor vigor	
Juniperus osteosperma									
07	460	22	52	26	80	0	26	30	-/-
10	20	100	0	0	-	0	0	0	-/-
14	80	75	25	0	100	0	0	0	-/-
Pinus edulis									
07	60	33	67	-	40	0	0	33	-/-
10	0	0	0	-	20	0	0	0	-/-
14	0	0	0	-	-	0	0	0	-/-
Purshia tridentata									
07	0	0	0	-	-	0	0	0	15/35
10	0	0	0	-	-	0	0	0	14/20
14	0	0	0	-	-	0	0	0	16/56
Quercus gambelii									
07	0	0	0	-	-	0	0	0	36/31
10	0	0	0	-	-	0	0	0	24/49
14	0	0	0	-	-	0	0	0	30/28

DD HOLLOW - TREND STUDY NO. 28-19



Location Information

USGS 7.5 min Map Info Hatch; Township 35S, Range 5W, Section 33
 GPS (0' Stake) NAD 83, UTM Zone 12, 374402 East 4176769 North

Transect Information

Browse Tag # (0' Stake) 163
 Transect Bearing Lines 1-2: 165° magnetic; Lines 3-5: 135° magnetic
 Length 500ft
 Belt Placement Line 1 (11ft), Line 2 (34ft), Line 3 (59ft), Line 4 (71ft), Line 5 (95ft)
 Belt Marker Placement Standard

Directions to Site

From the turnoff to Red Canyon, drive 2 miles south towards Hatch. Turn right going west on road #730. Drive 1.8 miles to road and power lines. Continue on the same road another 0.6 miles. The 0-foot stake is on the northwest side of the road and is marked with browse tag #163.

Site Information

Land Ownership BLM
 Allotment South Canyon
 Elevation 7,400ft (2,256m)
 Aspect Southwest
 Slope 10%
 Sample Dates 07/23/2003, 07/12/2011, 08/13/2014

DISTURBANCE HISTORY--

Management unit 28, Study no: 19

<i>Treatment/Disturbance</i>	<i>Name</i>	<i>WRI DB #</i>	<i>Date</i>	<i>Size (acres)</i>
Bullhog	BLM Project	-	Fall 2003	765
Seeding	BLM Project	-	Fall 2003	765
Bullhog	BLM Project	-	2012	164
Seeding: Aerial Before	BLM Project	-	2012	164

The table is a recorded disturbance history of the study site.

SEED MIX--

Management unit 28, Study no: 19

Project Name: BLM Project		
Application: Aerial Before	Acres: 164	
Seed Type	lbs in mix	lbs/acre
G Crested Wheatgrass	-	2
G Great Basin Wildrye	-	1
G Indian Ricegrass	-	2.5
G Pubescent Wheatgrass	-	1
G Snake River Wheatgrass ¹	-	1.5
F Alfalfa	-	1
F Blue Flax	-	1
F Sainfoin	-	1
F Small Burnet	-	1
Total Pounds:	-	12

Habitat and Vegetation Information

Wildlife Habitat Deer, Substantial Winter; Pronghorn, Crucial Winter; Sage-Grouse, Occupied & Winter, Brood-Rearing

VEGETATION HISTORY--

Management unit 28, Study no: 19

<i>Year</i>	<i>Vegetation Type¹</i>	<i>Woodland Succession²</i>
2003	Pinyon	Phase II
2011-2014	Black Sagebrush	Phase I

¹Vegetation Type (Appendix - Vegetation Type), ²Woodland Succession (Tausch, Miller, Roundy, & Chambers, 2009).

Site Notes

The study was established to monitor the effects of a prescribed fire project. In the fall of 2003, a total of 765 acres were bullhogged to protect the substation and other buildings around the project location, and to help facilitate the South Canyon burn. The bullhog project consisted of two separate treatment polygon units. The northern unit (601 acres) was seeded while the southern unit (164 acres) was not. The study transect was located within the southern unit, though the study site appears to have been seeded, based on the plant species sampled on the study site. The seed used on this project was surplus seed that the BLM contributed. It is unknown what seed mixture was used on the project site. The objectives of the project are to remove the pinyon and juniper trees, and improve the vegetation understory. The area is important winter range for deer, and to a lesser extent elk, and pronghorn antelope use the surrounding open areas year-round.

Site Potential

1981-2010 Average Annual Precipitation 15 inches
 NRCS Ecological Site Upland Stony Loam (Pinyon-Utah Juniper)
 NRCS Ecological Site # [R047XB333UT](#)

SOIL ANALYSIS DATA--

Management unit 28, Study no: 19

Texture	Sand (%)	Silt (%)	Clay (%)	pH	ds/m	OM (%)	PPM P	PPM K	Year Sampled
Sandy Clay Loam	53.6	23.2	24.2	6.7	0.5	0.7	5.9	515.2	2003

Soil specific normal values are described in the ecological site description (USDA-NRCS, 2011) and by Tiedeman and Lopez (2004).

States and Transitions

No state and transition model is available for the above ecological site.

When established in 2003, this site was in phase II encroachment from pinyon pine (*Pinus edulis*), though black sagebrush (*Artemisia nova*) was also present on the site (Table – Browse Trends). The herbaceous understory was very sparse (Table – Herbaceous Trends). Tree cover decreased substantially following the bullhog treatment in 2003, but a few large trees were left scattered across the site; however, these remaining trees were removed in 2012. Since treatments, black sagebrush has become the dominant browse species (Table – Browse Trends). Perennial grasses increased in cover and diversity, though perennial forbs did not (Table – Herbaceous Trends). Black sagebrush and other browse species will likely increase in cover as time since treatment increases.

Trend Summary

HERBACEOUS TRENDS--

Management unit 28, Study no: 19

T y p e	Species	Nested Frequency			Average Cover %		
		'03	'11	'14	'03	'11	'14
G	Agropyron cristatum	a-	b11	c38	-	.36	.64
G	Agropyron dasystachyum	-	-	-	-	-	.03
G	Agropyron smithii	-	1	3	-	.03	.01
G	Bouteloua gracilis	a29	ab62	b87	.46	1.98	2.32
G	Bromus tectorum (a)	-	4	-	-	.00	-
G	Carex obtusata	a-	c29	b19	-	.29	1.08
G	Dactylis glomerata	-	1	2	-	.03	.18
G	Elymus cinereus	-	-	6	-	-	.44
G	Festuca idahoensis	a-	b12	b12	-	.42	.81
G	Oryzopsis hymenoides	a-	b11	c21	-	.58	1.43
G	Poa fendleriana	-	-	5	-	-	.18
G	Poa secunda	3	3	13	.03	.04	.24
G	Sitanion hystrix	a10	b103	b130	.05	2.23	5.75
G	Stipa lettermani	7	-	-	.01	-	-
Total for Annual Grasses		0	4	0	0	0.00	0
Total for Perennial Grasses		49	233	336	0.55	5.98	13.13
Total for Grasses		49	237	336	0.55	5.98	13.13

Type	Species	Nested Frequency			Average Cover %		
		'03	'11	'14	'03	'11	'14
F	<i>Achillea millefolium</i>	-	3	-	-	.03	-
F	<i>Arabis holboellii</i>	4	4	-	.00	.03	-
F	<i>Astragalus argophyllus</i>	-	5	2	-	.03	.07
F	<i>Carduus nutans</i> (a)	-	1	-	-	.00	-
F	<i>Chenopodium fremontii</i> (a)	a ⁻	b ⁶ 2	a ⁻	-	.29	-
F	<i>Chenopodium leptophyllum</i> (a)	-	8	3	-	.02	.01
F	<i>Cirsium vulgare</i>	-	4	-	-	.01	-
F	<i>Cryptantha</i> sp.	a ⁻	b ¹ 2	a ²	-	.03	.03
F	<i>Descurainia pinnata</i> (a)	a ¹ 5	b ³ 7	a ⁴	.09	.16	.02
F	<i>Eriogonum cernuum</i> (a)	a ⁻	b ¹ 17	a ⁴	-	.33	.01
F	<i>Eriogonum racemosum</i>	-	3	-	-	.00	-
F	<i>Gayophytum ramosissimum</i> (a)	a ³	b ¹ 60	a ⁻	.01	.70	-
F	<i>Gilia</i> sp. (a)	-	-	-	-	-	.00
F	<i>Hymenopappus filifolius</i>	-	3	-	-	.00	.00
F	<i>Lactuca serriola</i> (a)	-	3	-	-	.03	-
F	<i>Lappula occidentalis</i> (a)	a ¹	b ² 7	a ⁵	.00	.22	.15
F	<i>Linum lewisii</i>	a ⁻	a ⁴	b ³ 5	-	.01	.23
F	<i>Lotus utahensis</i>	-	5	-	-	.15	-
F	<i>Lygodesmia spinosa</i>	-	5	2	-	.15	.15
F	<i>Machaeranthera canescens</i>	-	1	-	-	.00	-
F	<i>Medicago sativa</i>	-	10	3	-	.42	.01
F	<i>Phlox longifolia</i>	a ⁻	b ¹ 5	ab ⁷	-	.05	.07
F	<i>Polygonum douglasii</i> (a)	-	4	-	-	.01	-
F	<i>Salsola iberica</i> (a)	-	3	-	-	.00	-
F	<i>Sanguisorba minor</i>	a ⁻	ab ²	b ¹ 6	-	.03	.16
F	<i>Senecio multilobatus</i>	-	-	1	-	-	.00
F	<i>Sphaeralcea coccinea</i>	a ⁻	a ⁵	b ¹ 6	-	.06	.05
F	<i>Verbascum thapsus</i>	a ⁻	a ¹	b ⁸	-	.15	.25
Total for Annual Forbs		19	422	16	0.10	1.79	0.20
Total for Perennial Forbs		4	82	92	0.00	1.20	1.04
Total for Forbs		23	504	108	0.11	2.99	1.24

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

BROWSE TRENDS--

Management unit 28, Study no: 19

Type	Species	Quadrat Cover %			Line Intercept Cover %		
		'03	'11	'14	'03	'11	'14
B	Artemisia nova	5.65	10.34	9.08	4.46	12.85	11.95
B	Artemisia tridentata vaseyana	-	1.26	1.06	-	2.15	2.08
B	Chrysothamnus nauseosus	-	1.76	.99	-	.46	1.58
B	Gutierrezia sarothrae	-	.02	.19	-	-	.31
B	Juniperus osteosperma	.03	-	-	-	-	-
B	Opuntia sp.	-	.03	.03	-	.10	-
B	Pinus edulis	23.40	1.37	-	38.48	5.63	-
B	Purshia tridentata	2.81	3.75	5.14	2.80	5.16	6.60
Total for Browse		31.91	18.55	16.50	45.74	26.35	22.52

POINT-QUARTER TREE DATA--

Management unit 28, Study no: 19

Species	Trees per Acre			Average diameter (in)		
	'03	'11	'14	'03	'11	'14
Juniperus osteosperma			20	-	-	1.6
Juniperus scopulorum	-	7	19	-	2.5	1.2
Pinus edulis	337	27	22	5.4	5.6	1.8

BASIC COVER--

Management unit 28, Study no: 19

Cover Type	Average Cover %		
	'03	'11	'14
Vegetation	31.91	24.97	32.93
Rock	8.42	7.19	9.49
Pavement	15.65	9.58	16.29
Litter	55.51	55.42	48.14
Cryptogams	.83	.00	0
Bare Ground	15.05	11.07	7.10

PELLET GROUP DATA--

Management unit 28, Study no: 19

Type	Quadrat Frequency			Days use per acre (ha)		
	'03	'11	'14	'03	'11	'14
Rabbit	20	10	15	-	-	-
Elk	1	-	1	-	-	1 (2)
Deer	9	7	1	22 (53)	9 (22)	7 (17)
Cattle	2	3	1	-	4 (11)	4 (9)

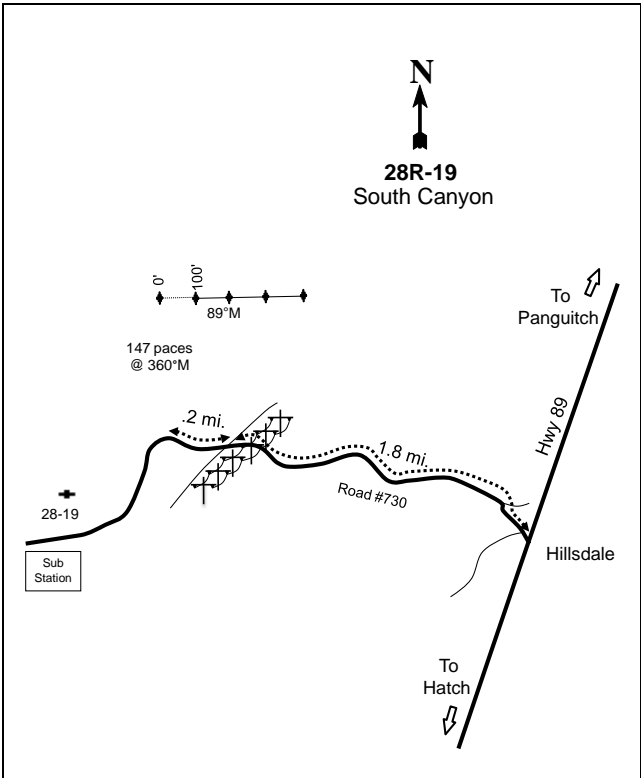
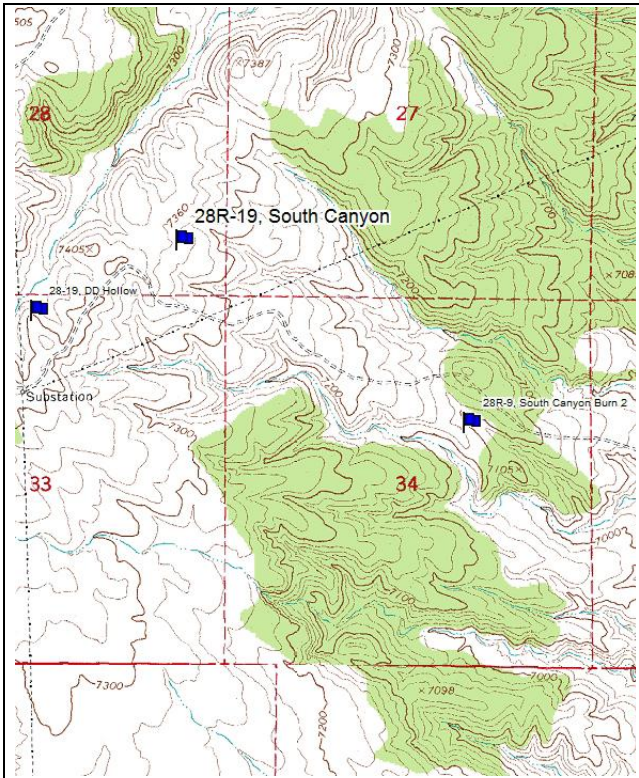
BROWSE CHARACTERISTICS--

Management unit 28, Study no: 19

Year	Plants per Acre (excluding seedlings)	Age class distribution			Seedling (plants/acre)	Utilization		% poor vigor	Average Height Crown (in)
		% Young	% Mature	% Decadent		% moderate	% heavy		
<i>Artemisia nova</i>									
03	3380	9	46	45	-	22	1	17	14/22
11	12460	77	22	1	16240	2	0	2	14/24
14	10780	46	53	1	2120	60	23	.55	13/26
<i>Artemisia tridentata vaseyana</i>									
03	0	0	0	0	-	0	0	0	-/-
11	100	0	80	20	60	0	0	20	23/36
14	1100	38	60	2	-	78	20	2	23/43
<i>Chrysothamnus nauseosus</i>									
03	0	0	0	0	-	0	0	0	-/-
11	1320	68	32	0	1000	0	0	2	22/28
14	1140	30	63	7	-	11	4	4	25/31
<i>Chrysothamnus viscidiflorus viscidiflorus</i>									
03	0	0	0	-	-	0	0	0	-/-
11	0	0	0	-	-	0	0	0	19/38
14	0	0	0	-	-	0	0	0	23/46
<i>Gutierrezia sarothrae</i>									
03	0	0	0	-	-	0	0	0	-/-
11	80	0	100	-	400	0	0	0	10/12
14	400	0	100	-	60	0	0	0	16/12
<i>Juniperus osteosperma</i>									
03	0	0	0	-	-	0	0	0	-/-
11	0	0	0	-	-	0	0	0	-/-
14	20	100	0	-	-	0	0	0	-/-
<i>Juniperus scopulorum</i>									
03	0	0	0	-	-	0	0	0	-/-
11	0	0	0	-	20	0	0	0	-/-
14	0	0	0	-	-	0	0	0	-/-
<i>Opuntia sp.</i>									
03	60	0	100	-	-	0	0	0	5/11
11	40	0	100	-	-	0	0	0	4/9
14	60	0	100	-	-	0	0	0	3/12
<i>Pinus edulis</i>									
03	680	24	76	0	-	3	0	0	-/-
11	60	67	0	33	80	0	0	0	-/-
14	0	0	0	0	20	0	0	0	-/-

		Age class distribution					Utilization			
Year	Plants per Acre (excluding seedlings)	% Young	% Mature	% Decadent	Seedling (plants/acre)	% moderate	% heavy	% poor vigor	Average Height Crown (in)	
<i>Purshia tridentata</i>										
03	360	6	61	33	-	61	22	6	30/51	
11	420	14	81	5	-	33	24	0	20/45	
14	500	28	72	0	20	48	24	0	25/46	
<i>Ribes sp.</i>										
03	0	0	0	-	-	0	0	0	35/57	
11	0	0	0	-	-	0	0	0	33/76	
14	0	0	0	-	-	0	0	0	-/-	

SOUTH CANYON - TREND STUDY NO. 28R-19



Location Information

USGS 7.5 min Map Info Hatch; Township 35S, Range 5W, Section 28
 GPS (0' Stake) NAD 83, UTM Zone 12, 375044 East 4177068 North

Transect Information

Browse Tag # (0' Stake) 163
 Transect Bearing 89° magnetic
 Length 400ft
 Belt Placement Line 1 (11ft & 95ft), Line 2 (34ft), Line 3 (59ft), Line 4 (71ft)
 Belt Marker Placement No Rebar

Directions to Site

From the turnoff to Red Canyon drive 2 miles south towards Hatch. Turn right going west on road #730. Drive 1.8 miles to road and power lines. Continue on the same road another 0.2 miles. The 0-foot stake is on the north side of the road about 147 paces and is marked with browse tag #163.

Site Information

Land Ownership BLM
 Allotment South Canyon
 Elevation 7,278ft (2,218m)
 Aspect East
 Slope 4-5%
 Sample Dates 07/12/2011, 08/14/2014

DISTURBANCE HISTORY--

Management unit 28R, Study no: 19

Treatment/Disturbance	Name	WRI DB #	Date	Size (acres)
Bullhog	South Canyon Year 2	2027	October 2011-January 2012	1901
Seeding: Aerial Before	South Canyon Year 2	2027	October 2011	1901

The table is a recorded disturbance history of the study site.

SEED MIX--

Management unit 28R, Study no: 19

Project Name: South Canyon Year 2			
WRI Database #: 2027			
Application: Aerial Seed		Acres: 1900	
Seed Type		lbs in mix	lbs/acre
G	Crested Wheatgrass 'Hycrest II'	4650	2.45
G	Great Basin Wildrye 'Trailhead'	2757	1.45
G	Indian Ricegrass 'Rimrock'	3700	1.95
G	Pubescent Wheatgrass	3000	1.58
G	Pubescent Wheatgrass 'Luna'	807	0.42
G	Snake River Wheatgrass 'Secar'	2849	1.50
F	Alfalfa 'Ladak+'	950	0.50
F	Alfalfa 'Nomad'	945	0.50
F	Blue Flax 'Appar'	1900	1.00
F	Sainfoin 'Eski'	1900	1.00
F	Small Burnet 'Delar'	2850	1.50
Total Pounds:		26308	13.85
PLS Pounds:			12.44

Habitat and Vegetation Information

Wildlife Habitat Deer, Substantial Winter; Sage-Grouse, Occuped & Winter, Brood-Rearing

VEGETATION HISTORY--

Management unit 28R, Study no: 19

Year	Vegetation Type ¹	Woodland Succession ²
2011	Pinyon	Phase III
2014	Black Sagebrush/Perennial Grass	Phase I

¹Vegetation Type (Appendix - Vegetation Type), ²Woodland Succession (Tausch, Miller, Roundy, & Chambers, 2009).

Site Notes

The study was established to monitor the effects of a bullhog project to remove pinyon pine (*Pinus edulis*) and juniper (*Juniperus sp.*) trees. The objectives of the project are to enhance sage-steppe habitat by increasing the herbaceous understory, decreasing density of pinyon and juniper trees, and decreasing sedimentation through erosion into the Sevier River (WRI Database 2015).

Site Potential

1981-2010 Average Annual Precipitation 14 inches
 NRCS Ecological Site Upland Shallow Hardpan (Pinyon-Utah Juniper)
 NRCS Ecological Site # R047XB316UT

States and Transitions

No state and transition model is available for the above ecological site.

When established in 2011, this site was in phase III encroachment by pinyon pine with some black sagebrush (*Artemisia nova*) and few other browse species. The herbaceous understory was very sparse. After treatment tree cover was significantly reduced, making black sagebrush and perennial grasses the major cover types (Table – Browse Trend, Table – Herbaceous Trend).

Trend Summary

HERBACEOUS TRENDS--
 Management unit 28R, Study no: 19

Type	Species	Nested Frequency		Average Cover %	
		'11	'14	'11	'14
G	Agropyron cristatum	a-	b38	-	1.44
G	Agropyron trachycaulum	a-	b76	-	2.32
G	Bouteloua gracilis	a30	b87	.62	2.92
G	Bromus tectorum (a)	1	-	.00	-
G	Elymus cinereus	-	4	-	.06
G	Elymus wawawaiensis	-	-	-	.15
G	Oryzopsis hymenoides	a-	b14	-	.39
G	Poa fendleriana	3	9	.03	.09
G	Sitanion hystrix	a75	b203	.75	11.92
G	Stipa comata	-	-	-	.03
Total for Annual Grasses		1	0	0.00	0
Total for Perennial Grasses		108	431	1.40	19.35
Total for Grasses		109	431	1.41	19.35
F	Astragalus lentiginosus	3	2	.03	.00
F	Chenopodium fremontii (a)	2	-	.00	-
F	Cirsium sp.	6	-	.33	-
F	Cryptantha sp.	2	-	.06	-
F	Descurainia pinnata (a)	b49	a6	.16	.03
F	Eriogonum cernuum (a)	7	-	.02	-
F	Gayophytum ramosissimum(a)	b120	a2	.30	.03
F	Lappula occidentalis (a)	3	-	.00	-
F	Linum perenne	a-	b46	-	1.87
F	Lithospermum incisum	-	2	-	.15
F	Lotus utahensis	-	6	-	.03
F	Medicago sativa	-	1	-	.00
F	Phlox longifolia	3	-	.01	-
F	Polygonum douglasii (a)	10	-	.02	-
F	Sanguisorba minor	a-	b25	-	.39

Type	Species	Nested Frequency		Average Cover %	
		'11	'14	'11	'14
F	<i>Sphaeralcea coccinea</i>	-	2	-	.03
F	<i>Zigadenus paniculatus</i>	1	-	.00	-
Total for Annual Forbs		191	8	0.51	0.06
Total for Perennial Forbs		15	84	0.43	2.49
Total for Forbs		206	92	0.95	2.55

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

BROWSE TRENDS--

Management unit 28R, Study no: 19

Type	Species	Quadrat Cover %		Line Intercept Cover %	
		'11	'14	'11	'14
B	<i>Artemisia nova</i>	5.51	5.91	6.93	8.08
B	<i>Gutierrezia sarothrae</i>	-	.00	-	-
B	<i>Juniperus scopulorum</i>	1.01	.00	2.38	.21
B	<i>Opuntia sp.</i>	.03	.15	-	-
B	<i>Pinus edulis</i>	10.72	.03	29.60	-
B	<i>Purshia tridentata</i>	1.62	.37	2.95	.75
Total for Browse		18.89	6.47	41.86	9.04

POINT-QUARTER TREE DATA--

Management unit 28R, Study no: 19

Species	Trees per Acre		Average diameter (in)	
	'11	'14	'11	'14
<i>Juniperus scopulorum</i>	19	-	6.7	-
<i>Pinus edulis</i>	283	28	5.7	1.2

BASIC COVER--

Management unit 28R, Study no: 19

Cover Type	Average Cover %	
	'11	'14
Vegetation	21.43	31.04
Rock	4.87	1.53
Pavement	16.49	9.11
Litter	53.07	62.38
Cryptogams	.62	.38
Bare Ground	20.12	6.54

PELLET GROUP DATA--

Management unit 28R, Study no: 19

Type	Quadrat Frequency		Days use per acre (ha)	
	'11	'14	'11	'14
Rabbit	17	7	-	-
Elk	-	-	1 (2)	-
Deer	1	6	6 (15)	12 (30)
Cattle	1	1	-	-

BROWSE CHARACTERISTICS--

Management unit 28R, Study no: 19

Year	Plants per Acre (excluding seedlings)	Age class distribution			Seedling (plants/acre)	Utilization		% poor vigor	Average Height Crown (in)
		% Young	% Mature	% Decadent		% moderate	% heavy		
<i>Artemisia frigida</i>									
11	0	0	0	-	-	0	0	0	6/9
14	0	0	0	-	-	0	0	0	-/-
<i>Artemisia nova</i>									
11	3400	22	49	29	1840	5	0	15	12/23
14	3880	27	71	2	40	45	20	2	11/21
<i>Artemisia tridentata vaseyana</i>									
11	20	0	100	-	-	0	0	0	24/31
14	40	0	100	-	-	50	0	0	17/32
<i>Chrysothamnus nauseosus</i>									
11	0	0	0	-	-	0	0	0	29/39
14	20	0	100	-	-	0	0	0	14/13
<i>Gutierrezia sarothrae</i>									
11	0	0	0	-	-	0	0	0	8/10
14	20	0	100	-	-	0	0	0	10/14
<i>Juniperus scopulorum</i>									
11	20	0	100	-	-	0	0	0	-/-
14	40	100	0	-	60	0	0	0	-/-
<i>Opuntia sp.</i>									
11	60	0	100	-	-	0	0	0	5/10
14	40	0	100	-	-	0	0	0	4/7
<i>Pinus edulis</i>									
11	400	35	45	20	140	0	0	10	-/-
14	60	100	0	0	-	0	0	0	-/-
<i>Purshia tridentata</i>									
11	420	57	33	10	-	43	0	0	37/65
14	260	69	31	0	-	31	23	0	21/34

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APPENDIX A - VEGETATION TYPE

VEGETATION COMMUNITY TYPE CLASSIFICATION--

Vegetation Type Code	Vegetation Community Type Name*	Description
ANN GRASS	Annual Grass	Annual grasses provide the dominant vegetation cover.
PER GRASS	Perennial Grass	Perennial grasses provide the dominant vegetation cover.
ANN-PER GRASS	Annual-Perennial Grass	Mixture of Annual and Perennial grass species provide the dominant vegetation cover.
ANN GRASS-FORB	Annual Grass-Forb	Mixture of Annual grass and forb species provide the dominant vegetation cover.
PER GRASS-FORB	Perennial Grass-Forb	Mixture of Perennial grass and forb species provide the dominant vegetation cover.
ANN FORB	Annual Forb	Annual forbs provide the dominant vegetation cover
PER FORB	Perennial Forb	Perennial forbs provide the dominant vegetation cover
ANN-PER FORB	Annual-Perennial Forb	Mixture of Annual and Perennial forb species provide the dominant vegetation cover.
WEED	Annual-Perennial Weed	Annual and/or Perennial weedy species provide the dominant vegetation cover.
WET MEADOW	Wet Meadow	Riparian vegetation species provide the dominant vegetation cover
DRY MEADOW	Dry Meadow	High elevation subalpine meadow
RIPAR	Riparian	Riparian vegetation species provide the dominant vegetation cover.
ALP GRASS	Alpine Grass	Grass or grass-like species provide the dominant vegetation cover
ALP FORB	Alpine Forb	Forb species provide the dominant vegetation cover
ALP SHRUB	Alpine Shrub	Alpine shrub species provide the dominant vegetation cover
ALP MIX	Alpine-Mixed	Mixture of grass, forb, or shrub species provide the dominant vegetation cover
ARTRT	Basin Big Sagebrush	Major component of the site (typically >5% cover).
ARTRV	Mountain Big Sagebrush	Major component of the site (typically > 5% cover).
ARTRW	Wyoming Big Sagebrush	Major component of the site (typically >5% cover).
ARAR	Low Sagebrush	Major component of the site (typically >5% cover).
ARCA	Silver Sagebrush	Major component of the site (typically >5% cover).
ARNO	Black Sagebrush	Major component of the site (typically >5% cover).
ARSP	Bud Sagebrush	Major component of the site (typically >5% cover).
ARFR	Fringed Sagebrush	Major component of the site (typically >5% cover).
CHNA	Rubber Rabbitbrush	Major component of the site (typically >5% cover).
CHPA	Parry Rabbitbrush	Major component of the site (typically >5% cover).
CHVI	Low Rabbitbrush	Major component of the site (typically >5% cover).
GUSA	Broom Snakeweed	Major component of the site (typically >5% cover).
SAVE	Black Greasewood	Major component of the site (typically >5% cover).
CELA	Winterfat	Major component of the site (typically >5% cover).
ATCO	Shadscale	Major component of the site (typically >5% cover).
ATCA	Fourwing Saltbush	Major component of the site (typically >5% cover).
GRSP	Spiny Hopsage	Major component of the site (typically >5% cover).
MSDS	Mixed Salt Desert Shrub	Mixture of one or more Salt Desert species (ATCO, ATCA, GRSP, etc.) with no one species expressing dominance.

Vegetation Type Code	Vegetation Community Type Name*	Description
LARRE	Creosote Bush	Major component of the site (typically >5% cover).
CORA	Blackbrush	Major component of the site (typically >5% cover).
PRFA	Desert Almond	Major component of the site (typically >5% cover).
EPHED	Ephedra	Major component of the site (typically >5% cover).
QUGA	Gambel Oak	Major component of the site (typically >5% cover).
QUTU	Live Oak	Major component of the site (typically >5% cover).
SYOR	Snowberry	Major component of the site (typically >5% cover).
AMAL	Serviceberry	Major component of the site (typically >5% cover).
PUTR	Bitterbrush	Major component of the site (typically >5% cover).
PUGL	Desert Bitterbrush	Major component of the site (typically >5% cover).
ARCT2	Manzanita	Major component of the site (typically >5% cover).
CEMOM	True Mountain Mahogany	Major component of the site (typically >5% cover).
CELEL	Curleaf Mountain Mahogany	Major component of the site (typically >5% cover).
COMES	Stansbury Cliffrose	Major component of the site (typically >5% cover).
KOPR	Forage Kochia	Major component of the site (typically >5% cover).
TAMARIX	Tamarix	Major component of the site (typically >5% cover).
MMB	Mixed Mountain Brush	Mixture of one or more Mountain brush species (ARTRV, AMAL, CEMOM, etc.) with no one species expressing dominance.
MB	Mixed Shrub	Mixture of various shrub species with none expressing dominance.
CHAPARRAL	Chaparral	Mixture of fire tolerant shrub species.
JUNIPER	Juniper	Major component of the site (Phase III ¹). No pinyon present.
PINYON	Pinyon	Major component of the site (Phase III ¹). No juniper present.
PJ	Pinyon-Juniper	Major components of the site (Phase III ¹). Pinyon and Juniper present.
POTR	Quaking Aspen	POTR provides the dominant overstory (typically >5% cover).
POTR-CE	Quaking Aspen-Conifer Encroached	Mixture of QUGA and Conifers (conifers typically provide >5% cover).
PIPO	Ponderosa Pine	PIPO provides the dominant overstory (typically >5% cover).
PSMEM	Douglas Fir	Major component of the site (typically >5% cover).
ABCO	White Fir	Major component of the site (typically >5% cover).
PIFL	Limber Pine	Major component of the site (typically >5% cover).
PICO	Lodgepole Pine	Major component of the site (typically >5% cover).
PILO	Bristlecone Pine	Major component of the site (typically >5% cover).
PIEN	Engelmann Spruce	Major component of the site (typically >5% cover).
ABLA	Subalpine Fir	Major component of the site (typically >5% cover).
SUBALP	Subalpine Forest	Mixture of PIEN and ABLA provide the dominant vegetation cover
MIX CON	Mixed Conifer Forest	Mixture of conifer tree species provide the dominant vegetation cover
AG-PAST	Agricultural-Pasture	Active or abandoned agricultural pasture
AG-CL	Agricultural-Cropland	Active or abandoned agricultural cropland
*Vegetation types can be co-dominant on the study site and when more than one vegetation community types are co-dominant and are major components of the site a (/) is used to separate vegetation community types.		
¹ Phase of woodland succession		