

UTAH WATERSHED RESTORATION INITIATIVE VEGETATION MONITORING 2016



PUBLICATION NUMBER 17-07
REPORT FOR FEDERAL AID PROJECT W-82-R-61

STATE OF UTAH
DEPARTMENT OF NATURAL RESOURCES
DIVISION OF WILDLIFE RESOURCES

Utah Watershed Restoration Initiative Vegetation Monitoring 2016

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Spotted stickseed (*Hackelia patens*) Jason Cox (2016)

Performance Report for Federal Aid Project W-82-R-61

Publication No. 17-07

UTAH DEPARTMENT OF NATURAL RESOURCES
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PROGRAM NARRATIVE

State: UTAH

Project Number: W-82-R-61

Grant Title: Wildlife Habitat Research and Monitoring

Project Title: Wildlife Habitat Monitoring/Range Trend Studies

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

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

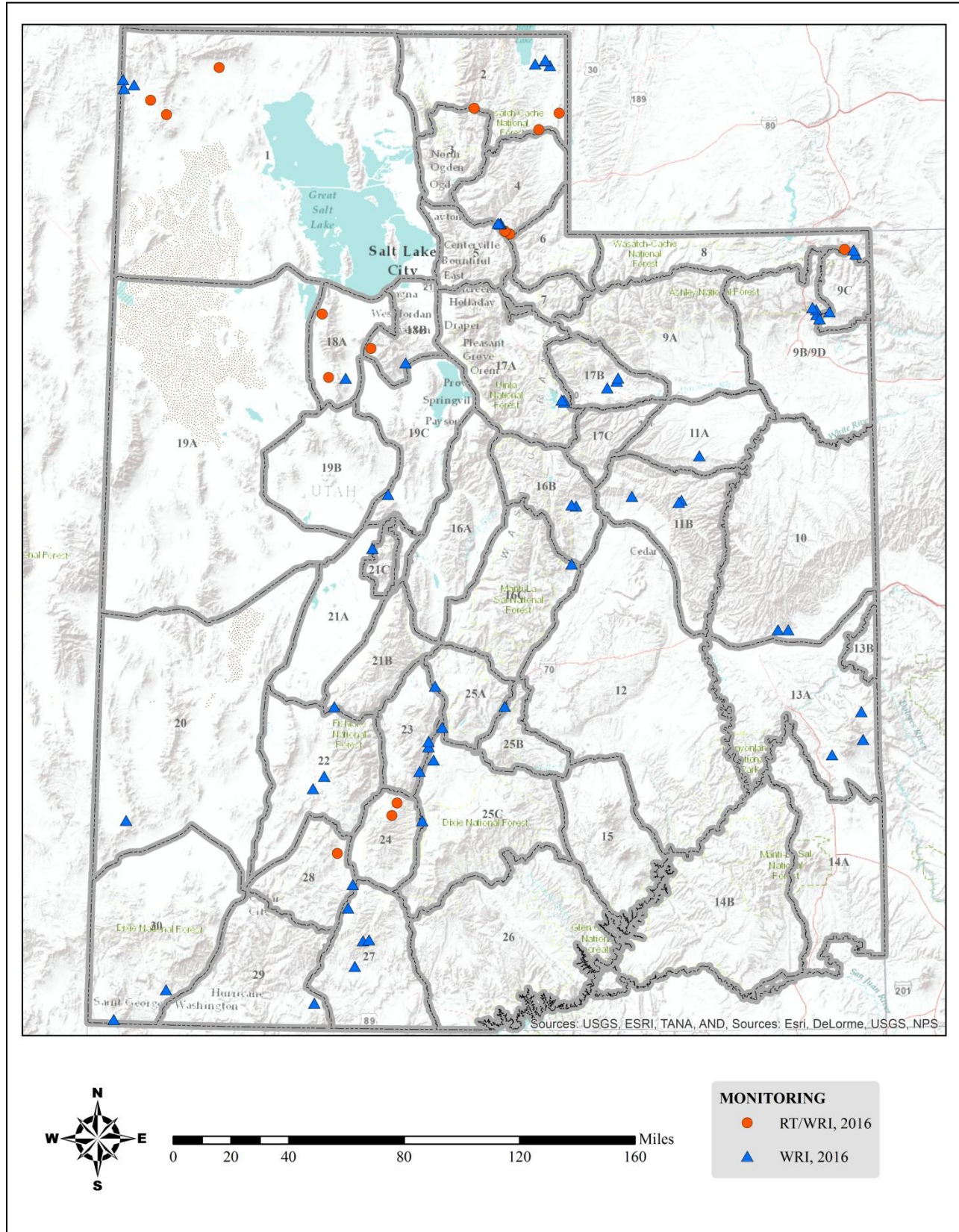
Expected Results or Benefits: Range trend studies in each region will be reread every five years, and vegetation condition and trend assessments will be made for key areas. DWR biologists, land management personnel from the USFS and BLM, and private landowners will use the range trend database to evaluate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

REMARKS

The work completed during the 2016 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 added 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 2016



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.

Study sites for the Watershed Restoration Initiative (WRI) are placed to monitor vegetation treatment projects. Studies are established to assess conditions prior to treatment. Each study is re-read approximately every 3-5 years following treatment.

Vegetation Composition

Vegetation composition 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.

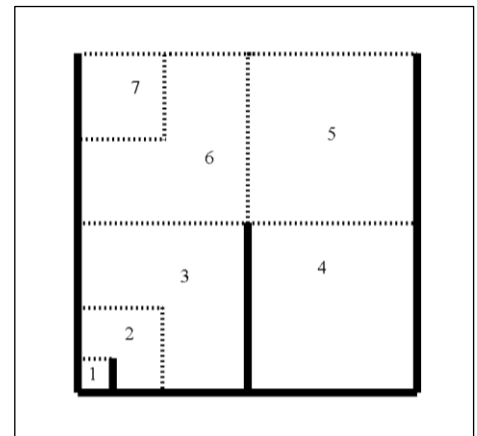


Figure 1 Cover classes of the 1/4 m² sampling quadrat

Total canopy cover of shrubs or trees is also estimated using the line-intercept method (U.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 is used in measuring intercept; gaps less than six inches between the same tree or shrub species are 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).

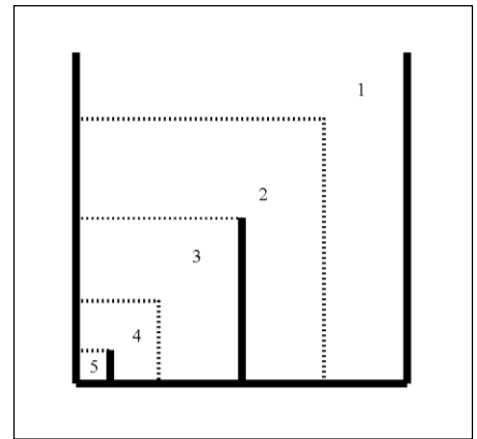


Figure 2 Nested frequency sub-quadrats of the 1/4 m² sampling quadrat.

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

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 (U.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
4. Dying

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.

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. 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 density of mature trees that are often widely distributed.

Animal Occupancy: 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). Quadrat frequency of wildlife and livestock droppings is also captured within the 1/4 m² quadrat. Rabbit pellet groups are not included in the pellet group transects but are sampled in quadrat frequency.

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. Starting in 2016, species identification and classification is reported following the USDA Plant Database taxonomic nomenclature (USDA, NRCS, 2016). Prior to 2015, species identification mostly followed "A Utah Flora" (Welsh et al. 2003). In some cases, most notably *Agropyron* sp. and *Purshia* sp., the species names used were 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 were retained to maintain continuity and alleviate confusion with earlier published reports.

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) 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, 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 four categories because each community has a different ecological potential. These categories include very low potential (Desert Ecological Site), low potential (Semidesert Ecological Site), mid-level potential (Upland Ecological Site) and high potential (Mountain and High Mountain Ecological Sites) categories. The four categories are scored based on the above criteria as follows:

Very Low potential scale (Desert Ecological Site)

> 50	Excellent
50-40	Good
40-25	Fair
25-10	Poor
< 10	Very Poor

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 et cetera).

Woodland Succession: Although pinyon-juniper woodlands are an important 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 leads 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. State-and-Transitions are not trends per se, 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 FORMAT

The first page of the report is the map page, which has a topographic map and a diagrammatic sketch to illustrate the study location. The map page also contains three sections, *Location information*, *Transect Information* and *Directions to Site*, which contain directions, location, and transect setup descriptions. Following the map page, discussions of the study site are addressed by several topics including *Site Information*, *Wildlife Habitat and Vegetation History*, *Site Notes*, *Soils*, *Site Potential*, and "Trend Summary" tables. Site information contains geographic information such as land ownership, allotment, elevation, aspect, slope, and sample dates. *Disturbance History* contains all known disturbances that have occurred on the site. Known seed mixes are listed within the table named "Seed Mix." *Habitat and Vegetation Information* contains wildlife habitat that the site falls within for specific big game and other species of interest. *Vegetation History* follows *Wildlife Seasonal Habitat* and evaluates any major compositional transitions within the vegetation community. Site notes discuss any miscellaneous information as it relates to the site and immediate area. Site potential presents a table containing average annual precipitation, NRCS taxonomic 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 titled "Soil Analysis Data" presents texture and chemical characteristics found on the site. The *States and Transitions* portion states if the site has a defined state and transition model available and is 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 which can be referred to in the accompanying CD or webpage <http://wildlife.utah.gov/range-trend.html>.

The "Trend Summary" tables contain 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.

Report Description

The following tables and partial tables are examples from study numbers 09-01 and 11B-06.

Map Page

The name and directions for locating a site are given on the map page. A topographical map and diagrammatic sketch are provided to show spacial 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.

Site Information

Table 1: The “Disturbance History” table summarizes what type of treatments and/or disturbances have affected the site over it’s 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. Finalization dates or the date in which a particular disturbance occurred are listed with reported affected acreage of the respective disturbance.

Table 09-01.1 Disturbance History. Recorded history of major disturbances.

Treatment/Disturbance	Name	WRI DB#	Date	Size (acres)
Herbicide - Herbicide	Taylor Mountain Fire Rehabilitation	3182	Fall 2014	2200
Chaining - Two-Way Ely Chain	Taylor Mountain Fire Rehabilitation	3182	Fall 2014	1100
Seeding - Rangeland Drill	Taylor Mountain Fire Rehabilitation	3182	October 2014	2000
Hand Crew - Lop and Scatter	Steinaker Draw PJ (CCI)	28	September 2015	266
Seeding - Aerial After	Taylor Mountain Fire--BLM ESR Supplement	3207	December 2014	2019
Fire - Wildfire	Taylor Mountain Road	-	July 2014	3146.98

Table 2: The “Seed Mix” tables are included when a seed mix is made available and are referenced to a particular WRI project. Additionally, multiple seed mixes are often associated with one particular treatment and are combined to simplify the appearance of the report.

Table 09-01.2 Seed Mix. List of known seeded plant species and rates (if available).

Mix Name		Application Type	Application Date	Acres	
Taylor Mountain fire; drill seed mix		Drill	Oct 2014	200	
Type	Species	Common Name	Cultivar/Source ID	Bulk lbs/acre	PLS lbs/acr
G	Achnatherum hymenoides	Indian Ricegrass		0.50	0.00
G	Agropyron cristatum	Crested Wheatgrass		1.00	0.00
G	Agropyron fragile	Siberian Wheatgrass		1.00	0.00
F	Medicago sativa	Alfalfa		1.00	0.00
F	Onobrychis viciifolia	Sainfoin		4.00	0.00
Mix Name		Application Type	Application Date	Acres	
Taylor Mountain Fire Sage/Kochia		Aerial	Dec 2014	2020	
Type	Species	Common Name	Cultivar/Source ID	Bulk lbs/acre	PLS lbs/acr
	Bassia prostrata	Forage Kochia	Millard UT	0.99	0.83
S	Artemisia tridentata ssp. wyomingensis	Wyoming Big Sagebrush	Uintah UT	1.22	0.15
S	Artemisia tridentata ssp. wyomingensis	Wyoming Big Sagebrush	Beaver UT	0.26	0.05

Habitat and Vegetation Information

Table 3: The “Wildlife Seasonal Habitat” table is a summarization of habitat for big game and other species of interest, and further categorizes the habitat into seasonal range and a value description of the habitat for the allied species.

Table 09-01.3 - Wildlife Seasonal Habitat. UDWR wildlife habitat and seasonality.

Species	Habitat	Season
Deer	crucial	winter
Elk	crucial	winter

Table 4: 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 the length of time that 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: this is usually a shrub species (Appendix A - Vegetation Type). 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 higher 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 and the corresponding years of persistence. Phases of woodland succession may also influence the vegetation type. For example, pinyon-juniper encroachments in phase I are not considered co-dominant and may not be listed within the vegetation type column as they are subordi vegetation type. Trees in phase II are considered co-dominant with the co-dominant understory counterpart, and under these circumstances tree species are 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 1982 to 2010, but the site transitioned to an annual grass-forb community in 2015. The table also indicates that woodland succession has remained in Phase I over the sample years until 2015 when the Taylor Mountain Fire removed all of the trees on the site. The transition from Wyoming big sagebrush to an annual grass-forb community that occurred between the 2010 and 2015 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 Taylor Mountain fire that occurred in 2014.

Table 09-01.4 - Vegetation History. The dominant vegetation type(s) and phase of woodland succession (Tausch, Miller, Roundy, & Chambers, 2009).

Year	Vegetation Type	Woodland Succession
1982	Wyoming Big Sagebrush	Phase I
1988	Wyoming Big Sagebrush	Phase I
1995	Wyoming Big Sagebrush	Phase I
2000	Wyoming Big Sagebrush	Phase I
2005	Wyoming Big Sagebrush/Annual Grass	Phase I
2010	Wyoming Big Sagebrush/Annual Grass	Phase I
2015	Annual Grass-Forb	No Encroachment

Site Notes

This section contains miscellaneous information pertinent to the study site.

Soils

Table 4: Chemical and textural characteristics are listed here 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

Table 09-01.5 - Soil Analysis Data. List of chemical and textural soil characteristics determined by laboratory analysis.

Texture	pH	%sand	%silt	%clay	%OM	PPM P	PPM K	ds/m	Sample Date
Sandy Loam	7.9	77.0	12.7	10.3	0.6	6.3	64.0	0.6	08/19/2000

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 soil 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.

State-and Transitions: The state-and-transitions section is prefaced by whether or not there is 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”. It is important to note that 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.

Trend Summary Tables

Table 6: The “Shrub/Tree Summary” table summarizes percent average quadrat cover and percent average line intercept cover for all shrub and tree species occurring on the site. Average quadrat cover is determined using cover classes in conjunction with the 1/4m² quadrat to estimate percent quadrat cover. To more accurately estimate canopy cover of trees and shrubs, the line-intercept method is used along each 100-foot belt.

Table 09-01.6 - Shrub/Tree Summary. Average modified Daubenmire quadrat and line intercept cover by year for shrubs/trees.

Year	Quadrat Cover (%)			Line-intercept Cover (%)		
	Preferred Shrub	Other Shrub	Tree	Preferred Shrub	Other Shrub	Tree
1995	21.2	4.1	-	-	-	-
2000	20.0	2.1	-	-	-	-
2005	14.8	0.2	-	20.1	0.8	-
2010	16.3	0.2	-	17.6	0.6	-
2015	-	-	-	-	-	-

Table 7: The “Herbaceous Summary” table summarizes the total average cover for all grass and forb species and summarizes the nested frequency by life form.

Table 09-01.7 - Herbaceous Summary. Nested frequency and average modified Daubenmire quadrat cover by year for herbaceous functional groups.

Year	Nested Frequency				Quadrat Cover (%)			
	Annual Grass	Perennial Grass	Annual/Biennial Forb	Perennial Forb	Annual Grass	Perennial Grass	Annual/Biennial Forb	Perennial Forb
1995	408	133	300	69	7.5	1.7	1.7	0.3
2000	356	99	121	8	7.0	1.2	0.4	0.0
2005	485	62	170	13	21.4	0.8	0.8	0.1
2010	405	78	136	9	17.6	1.6	1.6	0.2
2015	192	180	178	114	17.1	4.2	21.8	3.1

Table 8: The “Basic Ground 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 planar projection and when combined will usually exceed 100%. Therefore, comparisons can be made for all cover measurements except for general vegetation cover.

Table 09-01.8 - Basic Ground Cover. Average modified Daubenmire quadrat cover by year for basic ground cover types.

Year	Cover Type (%)					
	Bare Ground	Cryptogams	Litter	Pavement	Rock	Vegetation
1995	21.0	15.9	43.5	0.0	0.0	34.0
2000	25.8	18.3	43.0	0.1	-	30.1
2005	16.3	14.2	44.7	0.1	0.0	37.3
2010	20.7	9.7	56.5	-	0.0	36.5
2015	72.9	0.0	14.4	2.0	0.0	36.2

Table 9: 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 data presented in the “Days Use per Acre” section of the 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 in 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). Animals that do not have a defined defecation rate are recorded as pellets per acre (ha) and are indicated by (*). Rabbit pellet groups were recorded in a few of the years close to the year 2000, but have not been sample within the transect since that time; these are also recorded as pellets per acre (ha).

Table 09-01.9 - Pellet Group Data. Quadrat frequency and pellet group transect data for animal pellets. Rabbit pellet groups are not sampled in the pellet group transect.

Year	Cattle	Coyote	Mule Deer	Elk	Rabbit
	Quadrat Frequency				
1995	-	-	47	2	14
2000	1	-	30	1	65
2005	1	-	29	1	90
2010	-	-	40	2	28
2015	-	-	4	-	15
Year	Days Use Per Acre (ha)				
1995	-	-	-	-	-
2000	0.7 (1.8)	-	45.6 (112.6)	-	400.8 (989.9)*
2005	2.2 (5.4)	8.7 (21.5)*	59.0 (145.7)	-	-
2010	-	-	65.0 (160.6)	6.0 (14.9)	-
2015	-	-	8.7 (21.5)	-	-

*Pellets per acre (ha)

Table 10: The “Grass Species” table summarizes the average cover and nested frequency for grass species., Species may be designated as annual species, noxious weeds, and/or introduced species by the associated symbol below the graph. Only species that are on the Utah Noxious Weed List are designated as a noxious weed.

Table 09-01.10 - Grass Species. Nested frequency and modified Daubenmire average cover by year.

GRASS SPECIES	Achnatherum hymenoides (Indian ricegrass)	Agropyron cristatum ⁱ (crested wheatgrass)	Bromus briziformis ^{ai} (rattlesnake brome)	Bromus tectorum ^{ai} (cheatgrass)	Elymus elymoides (squirreltail)	Elymus lanceolatus (thickspike wheatgrass)	Hesperostipa comata (needle and thread)	Poa fendleriana (muttongrass)	Poa secunda (Sandberg bluegrass)	Sporobolus cryptandrus (sand dropseed)	Vulpia octiflora ^a (sixweeks fescue)
year	Nested Frequency										
1995	-	-	-	294	26	61	3	53	18	-	290
2000	-	-	-	345	4	16	2	47	52	-	35
2005	-	-	-	476	10	16	5	25	16	-	292
2010	4	-	-	405	2	4	11	7	56	-	-
2015	85	56	5	160	-	26	5	-	30	4	50
year	Average Cover (%)										
1995	-	-	-	5.6	0.2	0.3	0.1	0.7	0.4	-	1.8
2000	-	-	-	6.9	0.0	0.1	0.0	0.4	0.6	-	0.1
2005	-	-	-	19.1	0.1	0.1	0.0	0.5	0.1	-	2.3
2010	0.0	-	-	17.6	0.0	0.0	0.1	0.2	1.2	-	-
2015	1.8	0.9	0.0	16.6	-	0.5	0.4	-	0.5	0.0	0.5

a - Annual; n - Noxious Weed; i - Introduced Species

Table 11: The “Forb Species” table table summarizes the average cover and nested frequency for forb species., Species may be designated as annual species, noxious weeds, and/or introduced species by the associated symbol below the graph. Only species that are on the Utah Noxious Weed List are designated as a noxious weed.

Table 09-01.11 - Forb Species. Nested frequency and modified Daubenmire average cover by year.

FORB SPECIES	Achillea millefolium (Common yarrow)	Allium (onion)	Alyssum alyssoides ^{ai} (pale madwort)	Androsace septentrionalis ^a (pygmyflower rockjasmine)	Astragalus (milkvetch)	Calochortus nuttallii (sego lily)	Chaenactis (pincushion)	Chenopodium leptophyllum ^a (narrow/leaf goosefoot)	Cleome serrulata ^a (Rocky Mountain beeplant)	Collinsia parviflora ^a (maiden blue eyed Mary)	Cryptantha ^a (annual cryptantha)	Cryptantha (cryptantha)	Descurainia pinnata ^a (western tansymustard)	Draba ^a (draba)	Erigeron pumilus (shaggy fleabane)	Eriogonum cernuum ^a (nodding buckwheat)	Gilia ^a (gilia)
year	Nested Frequency																
1995	-	11	-	4	-	2	2	17	-	3	-	18	103	-	8	2	16
2000	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2	-	7
2005	-	-	-	-	2	2	-	-	-	8	-	7	11	-	2	-	-
2010	-	-	-	-	-	-	-	-	-	-	-	1	4	-	-	-	2
2015	1	-	25	-	-	2	-	-	22	-	11	-	60	1	-	-	8
year	Average Cover (%)																
1995	-	0.0	-	0.0	-	0.0	0.0	0.0	-	0.0	-	0.1	0.3	-	0.0	0.0	0.0
2000	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.0	-	0.0
2005	-	-	-	-	0.0	0.0	-	-	-	0.0	-	0.0	0.1	-	0.0	-	-
2010	-	-	-	-	-	-	-	-	-	-	-	0.1	0.0	-	-	-	0.0
2015	0.0	-	2.0	-	-	0.0	-	-	2.2	-	0.2	-	8.2	0.0	-	-	0.7

a - Annual/Biennial; n - Noxious Weed; i - Introduced Species

Table 12: The “Shrub and Tree Species” table summarizes the quadrat average and line intercept cover for shrub and tree species. Species may be designated as tree species, preferred browse, and/or introduced species by the associated symbol below the graph. Preferred browse species are determined by Range Trend staff.

Table 09-01.12 - Shrub and Tree Species. Average modified Daubenmire quadrat and line intercept cover by year.

SHRUB SPECIES	Artemisia tridentata ssp. wyomingensis ^p (Wyoming big sagebrush)	Chrysothamnus viscidiflorus ssp. viscidiflorus (yellow rabbitbrush)	Linanthus pungens (granite prickly phlox)	Opuntia (pricklypear)
year	Line Intercept Cover (%)			
1995	-	-	-	-
2000	-	-	-	-
2005	20.1	0.8	-	-
2010	17.6	0.4	-	0.2
2015	-	-	-	-
year	Quadrat Cover (%)			
1995	21.2	4.0	0.1	-
2000	20.0	2.1	-	-
2005	14.8	0.2	-	0.0
2010	16.3	0.0	-	0.2
2015	-	-	-	-

t - Tree Species; p - Preferred Browse; i - Introduced

Table 13: The “Shrub/Tree Characteristics” table summarizes shrub and tree species by density, age class distribution, utilization, poor vigor, and average height/crown.

Table 09-01.13 - Shrub/Tree Characteristics. Population characteristics of shrub/tree species populations including density reproduction (seedlings), age distribution, utilization, vigor and average size (height/crown) of plants.

Year	Density		Age Class Distribution			Utilization		Poor Vigor (%)	Average Height Crown (cm)
	Plants Per Acre		Excluding Seedlings			Moderate (%)	Heavy (%)		
	Excluding	Seedling	Young	Mature (%)	Decadent (%)				
Artemisia tridentata ssp. wyomingensis -- (Wyoming big sagebrush)									
1995	4360	120	8	77	15	39	8	6	83/107
2000	5440	40	1	34	65	28	3	25	74/78
2005	4360	3280	12	26	62	9	30	30	92/94
2010	3080	-	3	65	32	34	1	29	88/106
2015	-	-	-	-	-	-	-	-	-/-
Chrysothamnus viscidiflorus ssp. viscidiflorus -- (yellow rabbitbrush)									
1995	1000	-	6	86	8	0	0	2	60/81
2000	1020	20	8	65	28	0	0	12	46/56
2005	320	40	13	63	25	0	0	6	46/48
2010	120	-	0	50	50	0	0	50	49/65
2015	-	-	-	-	-	-	-	-	-/-

t - Tree Species; p - Preferred Browse; i - Introduced Species

Table 13a: The “Aspen Characteristics” table summarizes characteristics of the aspen community. Only aspen that was sampled using the size class distribution method is included in this table. Aspen sampled using the modified Cole Browse method is included 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; this method was started in 2011. Aspen data prior to 2011 is included in Table 13.

- 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.

Table 11B-06.13a - Aspen Characteristics. Characteristics of aspen populations including density, size class distribution, and vigor of plants.

Year	Density	Size Class Distribution				Utilization		Poor Vigor (%)
	Plants per Acre	Class I (%)	Class II (%)	Class III (%)	Class IV (%)	Moderate (%)	Heavy (%)	
Populus tremuloides (quaking aspen)								
2015	1620	10	62	20	9	27	11	1

Class I - Less than or equal to 1.5 feet

Class II - Greater than 1.5 feet to 5 feet

Class III - Greater than 5 feet and up to 1 inch diameter at breast height (dbh)

Class IV - Greater than 1 in diameter at breast height (dbh)

Table 14: The “Tree Characteristics” table 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 centimeters.

Table 11B-06.14 - Tree Characteristics. Point-quarter tree density, size class distribution, and average diameter.

Year	Density	Size Class Distribution					Average Diameter (cm)
	Trees per Acre	Seedling (%)	1-4' (%)	4-8' (%)	8-12' (%)	>12'	
Abies lasiocarpa (subalpine fir)							
2015	74	-	60	13	-	27	6.4
Pinus flexilis (limber pine)							
2015	6	-	-	50	50	-	6.0
Picea pungens (blue spruce)							
2015	1	-	100	-	-	-	3.0
Populus tremuloides (quaking aspen)							
2015	179	15	55	15	15	-	2.5
Pseudotsuga menziesii (Douglas-fir)							
2015	5	-	50	-	-	50	6.0

PRE-1992 DATA

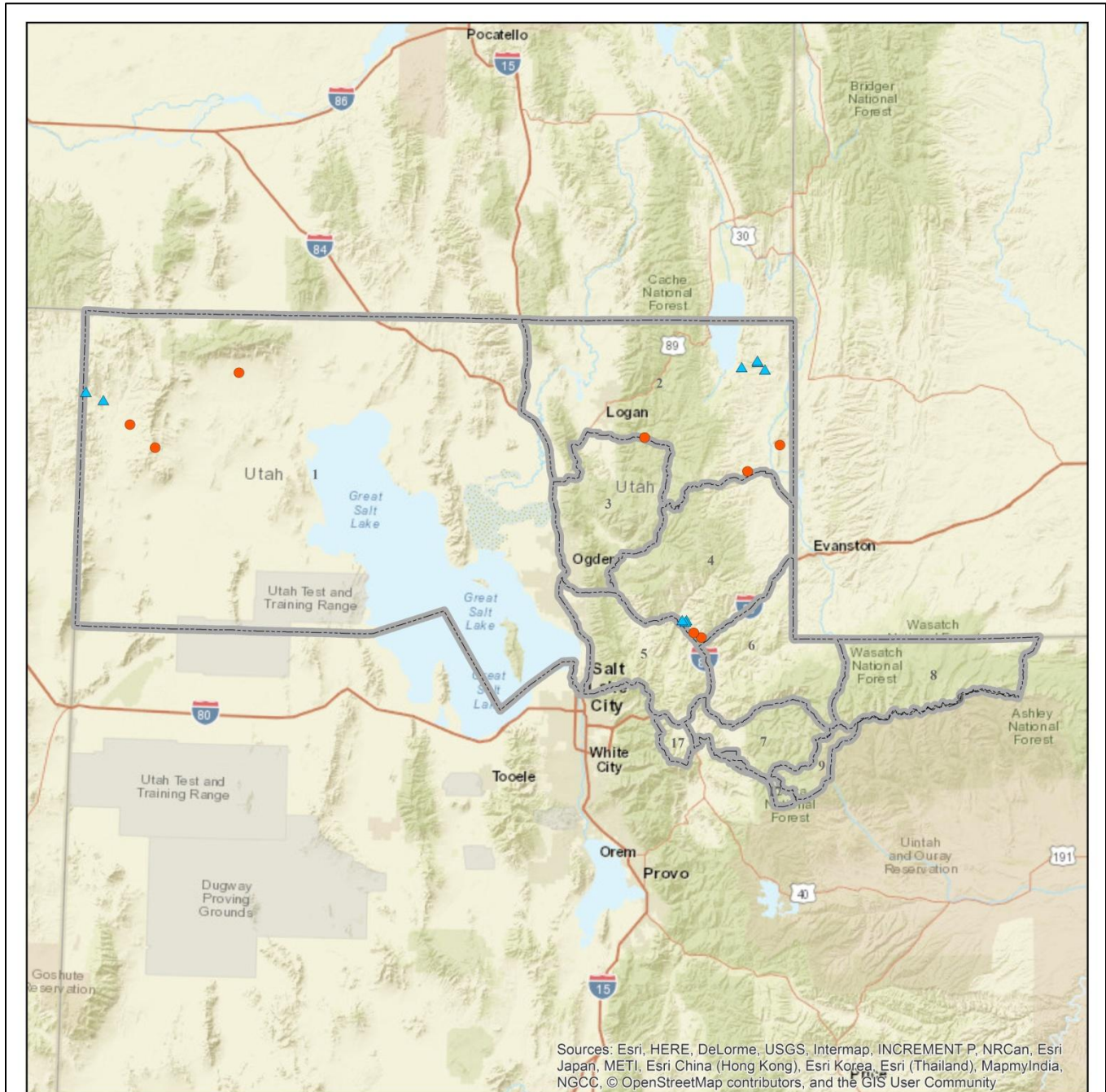
Pre-1992 Data: Data collected before July 19, 1992 has been excluded from the individual site summaries due to differences in sampling techniques and changes in sample size and area. This pre-1992 data can be found in the Utah Big Game Range Trend Studies 1982-1992 report. The following explanations 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 are characteristically 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. For more information on earlier range trend sampling methods, see the Pre-1992 Data report methodologies (Utah Big Game Range Trend Studies 1982-1992).

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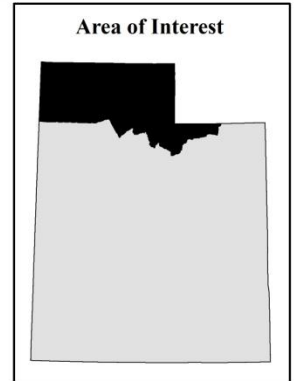
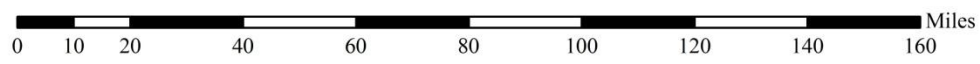
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NORTHERN REGION

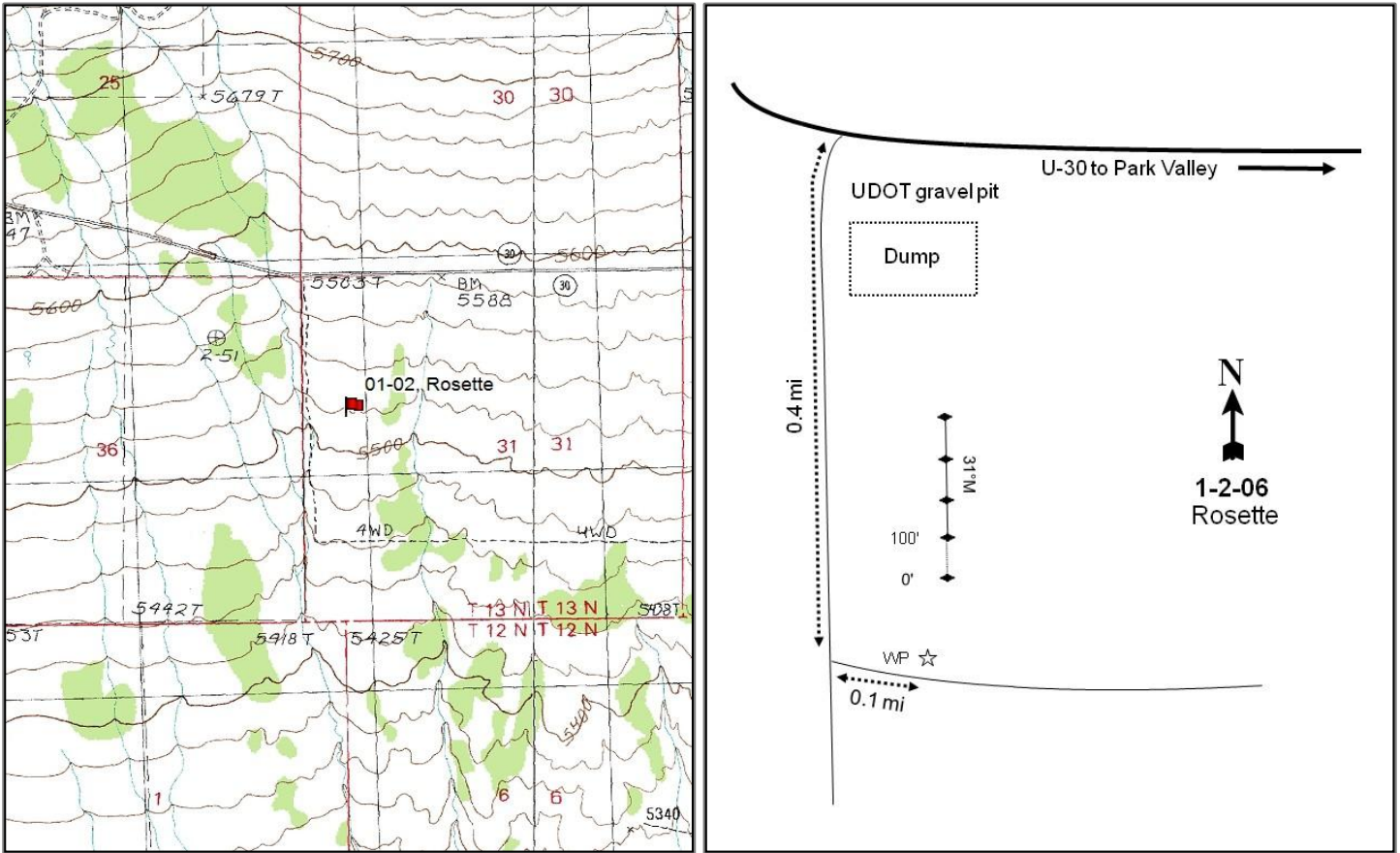


Project

- Range Trend
- ▲ WRI
- Northern Region WMUs



ROSETTE - STUDY No. 01-2



Location Information

USGS 7.5 min Map Info	Rosette SE; Township 13N, Range 13W, Section 31
GPS (0' Stake)	NAD 83 UTM ZONE 12, 301847 East 4631471 North

Transect Information

Browse Tag # (0' Stake)	7906
Transect Bearing	0° 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 Rosette, Utah and mile marker 51, proceed northeast on U-30 approximately 1.0 miles and turn right. Proceed through the Utah Department of Transportation gravel dump and find a dirt road on the west side of gravel pile area. Proceed south on this road for 0.4 miles (passing a left fork) to a left fork. Turn left (i.e., east) and proceed 0.1 miles to a witness post on the left side of the road and stop. From the witness post take a bearing of 9 degrees magnetic and walk 22 paces to the 0-foot stake of the frequency baseline. The 0-foot stake is wired with a red browse tag #7906.

Site Information

Land Ownership	Federal
Land Administrator	BLM
Allotment	HIRSCHI
Elevation	5,500ft (1,676m)
Aspect	South
Slope	1%
Sample Dates	06/17/1996, 05/23/2001, 06/02/2006, 05/23/2011, 05/26/2016

Table 01-02.1 Disturbance History. Recorded history of major disturbances.

Treatment/Disturbance	Name	WRI DB#	Date	Size (acres)
Hand Crew - Lop and Scatter	Park Valley PJ Treatment Project Phase 2	3400	December 2015-March 2016	680

Wildlife Habitat and Vegetation History

Table 01-02.3 - Wildlife Seasonal Habitat. UDWR wildlife habitat and seasonality.

Species	Habitat	Season	Brood/Young Rearing
Deer	crucial	winter	
Greater Sage Grouse		occupied & winter	brood-rearing
Pronghorn	substantial	summer	

Table 01-02.4 - Vegetation History. The dominant vegetation type(s) and phase of woodland succession (Tausch, Miller, Roundy, & Chambers, 2009).

Year	Vegetation Type	Woodland Succession
1984	Wyoming Big Sagebrush	Phase I
1990	Wyoming Big Sagebrush	Phase I
1996	Wyoming Big Sagebrush	Phase I
2001	Wyoming Big Sagebrush	Phase I
2006	Wyoming Big Sagebrush	Phase I
2011	Wyoming Big Sagebrush	Phase I
2016	Wyoming Big Sagebrush	Phase I

Site Notes

No Notes

Soils

Table 01-02.5 - Soil Analysis Data. List of chemical and textural soil characteristics determined by laboratory analysis.

Texture	pH	%sand	%silt	%clay	%OM	PPM P	PPM K	ds/m	Sample Date
Sandy Clay Loam	7.3	46.6	25.4	28.0	1.5	7.2	236.8	0.7	06/17/1996

Site Potential

1981-2010 Average Annual Precipitation	11 inches
NRCS Ecological Site	Semidesert Loam (Wyoming Big Sagebrush)
NRCS Ecological Site #	028AY220UT
States and Transitions	No state and transition model is available for this ecological site.

Since establishment in 1984, the site has remained a stable Wyoming big sagebrush community (Table 01-02.12, Table 01-02.13). The introduced annual grass species, cheatgrass (*Bromus tectorum*) has made up the majority of the herbaceous understory (Table 01-02.10). Additionally, there has not been a single dominant perennial forb species from sample year to sample year (Table 01-02.11). Utah juniper (*Juniperus osteosperma*) has been present in low abundance since site establishment, but most trees were removed following a lop and scatter treatment in 2015 (Table 01-02.12, Table 01-02.13).

Trend Summary Tables

Table 01-02.6 - Shrub/Tree Summary. Average modified Daubenmire quadrat and line intercept cover by year for shrubs/trees.

Year	Quadrat Cover (%)			Line-intercept Cover (%)		
	Preferred Shrub	Other Shrub	Tree	Preferred Shrub	Other Shrub	Tree
1996	14.0	7.8	2.5	-	-	-
2001	18.4	5.9	1.5	-	-	0.6
2006	15.8	2.9	3.1	18.0	5.2	6.3
2011	14.9	4.9	1.4	19.3	5.3	6.1
2016	13.3	3.8	-	17.2	3.9	-

Table 01-02.7 - Herbaceous Summary. Nested frequency and average modified Daubenmire quadrat cover by year for herbaceous functional groups.

Year	Nested Frequency				Quadrat Cover (%)			
	Annual Grass	Perennial Grass	Annual/Biennial Forb	Perennial Forb	Annual Grass	Perennial Grass	Annual/Biennial Forb	Perennial Forb
1996	303	302	79	168	3.2	6.4	0.3	1.7
2001	261	306	119	106	3.7	9.2	0.5	1.8
2006	349	241	118	81	5.4	5.7	0.4	0.9
2011	245	250	241	104	11.0	10.5	3.0	1.9
2016	339	227	174	88	9.2	3.3	1.4	1.7

Table 01-02.8 - Basic Ground Cover. Average modified Daubenmire quadrat cover by year for basic ground cover types.

Year	Cover Type (%)					
	Bare Ground	Cryptograms	Litter	Pavement	Rock	Vegetation
1996	21.9	4.6	38.9	4.6	1.2	34.7
2001	28.5	2.8	37.8	3.9	0.4	42.3
2006	19.6	5.0	47.0	5.8	0.3	35.7
2011	29.9	3.6	22.8	3.6	0.2	39.9
2016	41.2	8.0	30.3	3.5	0.2	30.8

Table 01-02.9 - Pellet Group Data. Quadrat frequency and pellet group transect data for animal pellets. Rabbit pellet groups are not sampled in the pellet group transect.

Year	Cattle	Mule Deer/Pronghorn	Elk	Rabbit
	Quadrat Frequency			
1996	-	21	-	19
2001	-	11	-	6
2006	-	22	-	55
2011	-	15	-	9
2016	-	23	-	75
Days Use Per Acre (ha)				
1996	-	-	-	-
2001	-	26.2 (64.6)	-	-
2006	0.7 (1.8)	24.8 (61.2)	-	-
2011	1.5 (3.6)	24.1 (59.6)	-	-
2016	2.2 (5.4)	14.1 (34.8)	0.7 (1.7)	-

Table 01-02.10 - Grass Species. Nested frequency and modified Daubenmire average cover by year.

GRASS SPECIES	Achnatherum hymenoides (Indian ricegrass)	Bromus tectorum ^{ai} (cheatgrass)	Elymus elymoides (squirreltail)	Pascopyrum smithii (western wheatgrass)	Poa pratensis ⁱ (Kentucky bluegrass)	Poa secunda (Sandberg bluegrass)	Pseudoroegneria spicata (bluebunch wheatgrass)	Vulpia octoflora ^a (sixweeks fescue)
year	Nested Frequency							
1996	-	303	74	78	-	215	16	3
2001	1	261	29	93	-	244	-	-
2006	6	348	22	110	-	196	-	7
2011	3	245	31	126	5	178	-	-
2016	0	339	19	157	1	78	-	-
year	Average Cover (%)							
1996	-	3.2	0.6	0.6	-	5.1	0.1	0.0
2001	0.0	3.7	0.7	1.1	-	7.4	-	-
2006	0.2	5.3	0.4	1.4	-	3.7	-	0.0
2011	0.0	11.0	0.4	2.2	0.1	7.8	-	-
2016	0.0	9.2	0.3	2.3	0.0	0.7	-	-

a - Annual; n - Noxious Weed; i - Introduced Species

Table 01-02.11 - Forb Species. Nested frequency and modified Daubenmire average cover by year.

FORB SPECIES	Agoseris glauca (pale agoseris)	Allium nevadense (Nevada onion)	Alyssum desertorum ^{ai} (desert madwort)	Antennaria (pussytoes)	Arabis (rockcress)	Astragalus (milkvetch)	Astragalus beckwithii (Beckwith's milkvetch)	Astragalus purshii (woollypod milkvetch)	Balsamorhiza hookeri (Hooker's balsamroot)	Calochortus nuttallii (sego lily)	Camelina microcarpa ^{ai} (littlupod false flax)	Ceratocephala testiculata ^{ai} (curvseed butterwort)	Chaenactis douglasii (Douglas' dustymaiden)	Collinsia parviflora ^a (maiden blue eyed Mary)	Cryptantha (cryptantha)	Cryptantha watsonii ^a (Watson's cryptantha)	Cymopterus longipes (longstalk springparsley)
year	Nested Frequency																
1996	3	-	4	3	6	3	2	7	2	-	-	9	37	-	49	-	23
2001	-	9	-	7	3	-	-	7	8	-	-	78	5	-	-	-	28
2006	-	3	20	3	2	-	1	4	-	-	-	97	3	2	10	-	10
2011	-	30	17	5	-	1	-	4	-	4	-	142	4	44	12	-	29
2016	-	1	35	5	-	-	2	4	8	1	2	39	-	2	6	5	24
year	Average Cover (%)																
1996	0.0	-	0.0	0.0	0.0	0.0	0.0	0.1	0.2	-	-	0.0	0.1	-	0.2	-	0.1
2001	-	0.0	-	0.1	0.0	-	-	0.0	0.3	-	-	0.2	0.0	-	-	-	0.2
2006	-	0.0	0.1	0.0	0.0	-	0.0	0.0	-	-	-	0.2	0.0	0.0	0.0	-	0.0
2011	-	0.2	0.1	0.0	-	0.0	-	0.0	-	0.0	-	1.4	0.0	0.1	0.0	-	0.3
2016	-	0.0	0.4	0.0	-	-	0.0	0.0	0.3	0.0	0.0	0.1	-	0.0	0.0	0.0	0.1

a - Annual/Biennial; n - Noxious Weed; i - Introduced Species

FORB SPECIES	Delphinium nuttallianum (twolobe larkspur)	Descurainia pinnata ^a (western tansymustard)	Erigeron eatonii (Eaton's fleabane)	Erigeron pumilus (shaggy fleabane)	Eriogonum caespitosum (matted buckwheat)	Eriogonum cernuum ^a (nodding buckwheat)	Gayophytum ramosissimum ^a (pinyon groundsmoke)	Gilia inconspicua ^a (shy gilia)	Lactuca serriola ^{ai} (prickly lettuce)	Lappula occidentalis ^a (flatspine stickseed)	Machaeranthera canescens (hoary tansyaster)	Microsteris gracilis ^a (slender phlox)	Navaretia intertexta ^a (needleleaf navaretia)	Pedicularis centranthera (dwarf lousewort)	Phlox hoodii (spiny phlox)	Phlox longifolia (longleaf phlox)	Polygonum douglasii ^a (Douglas' knotweed)
year	Nested Frequency																
1996	-	3	-	-	4	24	-	14	-	19	4	-	5	-	40	63	4
2001	-	43	-	1	-	6	-	6	-	12	-	-	-	-	31	35	-
2006	-	6	-	-	2	6	4	-	2	13	0	-	-	-	52	1	-
2011	5	166	-	-	2	2	10	10	-	21	-	-	19	3	35	2	-
2016	1	89	5	-	-	-	1	64	-	30	-	1	-	-	48	4	-
year	Average Cover (%)																
1996	-	0.0	-	-	0.0	0.1	-	0.1	-	0.1	0.1	-	0.0	-	0.8	0.2	0.0
2001	-	0.1	-	0.0	-	0.0	-	0.0	-	0.0	-	-	-	-	1.0	0.1	-
2006	-	0.0	-	-	0.0	0.0	0.0	-	0.0	0.0	0.0	-	-	-	0.7	0.0	-
2011	0.1	0.9	-	-	0.1	0.0	0.1	0.0	-	0.1	-	-	0.2	0.4	0.6	0.0	-
2016	0.0	0.6	0.2	-	-	-	0.0	0.2	-	0.1	-	0.0	-	-	1.0	0.0	-

a - Annual/Biennial; n - Noxious Weed; i - Introduced Species

FORB SPECIES	Salsola tragus ^{ai} (prickly Russian thistle)	Sisymbrium altissimum ^{ai} (tall tumblemustard)	Zigadenus paniculatus (foxtail deathcamas)
year	Nested Frequency		
1996	-	4	-
2001	-	-	2
2006	-	-	1
2011	3	-	3
2016	-	1	4
year	Average Cover (%)		
1996	-	0.0	-
2001	-	-	0.0
2006	-	-	0.0
2011	0.0	-	0.0
2016	-	0.0	0.1

a - Annual/Biennial; n - Noxious Weed; i - Introduced Species

Table 01-02.12 - Shrub and Tree Species. Average modified Daubenmire quadrat and line intercept cover by year.

SHRUB SPECIES	Artemisia nova ^p (black sagebrush)	Artemisia tridentata ssp. wyomingensis ^p (Wyoming big sagebrush)	Chrysothamnus viscidiflorus ssp. viscidiflorus var. stenophyllus (yellow rabbitbrush)	Ericameria nauseosa ssp. consimilis var. oreophila (rubber rabbitbrush)	Juniperus osteosperma ^t (Utah juniper)	Linanthus pungens (granite prickly phlox)	Opuntia polyacantha (plains pricklypear)
year	Line Intercept Cover (%)						
1996	-	-	-	-	-	-	-
2001	-	-	-	-	-	-	-
2006	-	18	3.3	-	6.3	1.9	-
2011	-	19.3	4.1	-	6.1	1.2	-
2016	-	17.2	3	-	-	0.9	-
year	Quadrat Cover (%)						
1996	-	14.0	5.6	-	2.5	2.0	0.2
2001	-	18.4	3.0	-	1.5	2.8	0.1
2006	0.0	15.8	1.6	-	3.1	1.2	0.1
2011	-	14.9	3.6	-	1.4	1.3	0.0
2016	0.0	13.3	2.0	0.1	-	1.1	0.7

t - Tree Species; p - Preferred Browse; i - Introduced

Table 01-02.13 - Shrub/Tree Characteristics. Population characteristics of shrub/tree species populations including density reproduction (seedlings), age distribution, utilization, vigor and average size (height/crown) of plants.

Year	Density		Age Class Distribution			Utilization		Poor Vigor (%)	Average Height Crown (cm)
	Plants Per Acre	Excluding Seedlings	Seedling	Young (%)	Mature (%)	Decadent (%)	Moderate (%)		
Artemisia nova^p -- (black sagebrush)									
1996	-	-	-	-	-	-	-	-	-/-
2001	-	-	-	-	-	-	-	-	-/-
2006	40	-	50	50	0	0	50	0	14/26
2011	20	-	0	100	0	0	0	0	15/44
2016	20	-	0	100	0	0	0	0	36/81
Artemisia tridentata ssp. wyomingensis^p -- (Wyoming big sagebrush)									
1996	6160	2620	49	21	29	22	0	9	63/94
2001	5380	20	23	60	18	1	0	7	56/69
2006	4180	2940	7	58	35	21	2	17	58/76
2011	3600	20	6	71	23	39	2	19	49/79
2016	3500	1980	6	68	26	6	2	13	50/77
Atriplex canescens^p -- (fourwing saltbush)									
1996	-	-	-	-	-	-	-	-	-/-
2001	-	-	-	-	-	-	-	-	32/27
2006	-	-	-	-	-	-	-	-	-/-
2011	-	-	-	-	-	-	-	-	-/-
2016	-	-	-	-	-	-	-	-	-/-
Chrysothamnus viscidiflorus ssp. viscidiflorus var. stenophyllus -- (yellow rabbitbrush)									
1996	5900	1660	20	78	2	2	0	0	29/46
2001	3160	80	11	63	26	0	0	1	28/32
2006	3560	800	9	76	15	11	12	2	25/32
2011	4160	-	19	80	1	0	0	1	26/37
2016	2700	160	13	78	9	1	3	5	23/30

Year	Density		Age Class Distribution			Utilization		Poor Vigor (%)	Average Height Crown (cm)
	Plants Per Acre		Excluding Seedlings			Moderate (%)	Heavy (%)		
	Excluding Seedlings	Seedling	Young (%)	Mature (%)	Decadent (%)				
Ericameria nauseosa ssp. consimilis var. oreophila -- (rubber rabbitbrush)									
1996	40	-	0	100	0	0	0	0	42/49
2001	20	-	0	0	100	0	0	0	- / -
2006	-	-	-	-	-	-	-	-	- / -
2011	-	-	-	-	-	-	-	-	- / -
2016	120	-	33	67	0	0	33	0	24/31
Juniperus osteosperma^t -- (Utah juniper)									
1996	160	-	38	63	0	0	0	0	- / -
2001	140	20	43	57	0	0	0	0	- / -
2006	140	20	29	71	0	0	0	0	- / -
2011	140	20	14	86	0	0	0	0	- / -
2016	40	20	100	0	0	0	0	50	22/15
Linanthus pungens -- (granite prickly phlox)									
1996	2520	40	10	89	1	0	0	1	25/37
2001	2660	60	9	86	5	0	0	1	17/20
2006	2700	360	19	77	4	0	0	0	15/23
2011	2360	-	7	92	2	0	0	1	15/25
2016	1720	60	9	90	1	0	0	1	14/19
Opuntia polyacantha -- (plains pricklypear)									
1996	160	-	13	75	13	0	0	0	11/30
2001	140	-	0	100	0	0	0	0	- / -
2006	80	-	0	75	25	0	0	25	13/23
2011	80	-	0	100	0	0	0	0	9/21
2016	120	20	17	83	0	0	0	0	13/39
Pinus edulis^t -- (twoneedle pinyon)									
1996	-	20	0	0	0	0	0	0	- / -
2001	-	-	-	-	-	-	-	-	- / -
2006	-	-	-	-	-	-	-	-	- / -
2011	-	-	-	-	-	-	-	-	- / -
2016	-	-	-	-	-	-	-	-	- / -

t - Tree Species; p - Preferred Browse; i - Introduced Species

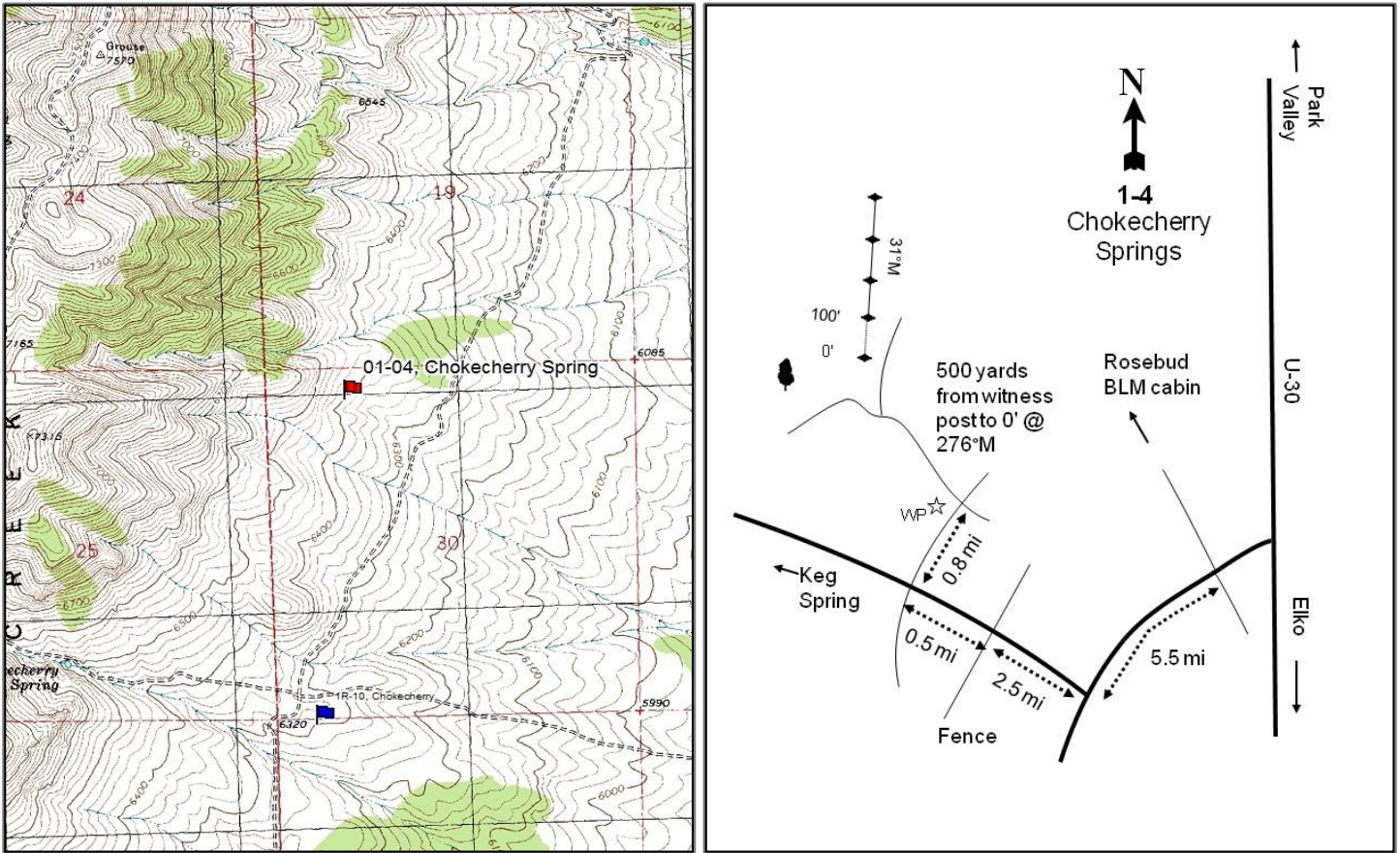
Table 01-02.14 - Tree Characteristics. Point-quarter tree density, size class distribution, and average diameter.

Year	Density	Size Class Distribution					Average Diameter (cm)
	Trees per Acre	Seedling (%)	1-4'	4-8'	8-12'	>12' (%)	
Juniperus osteosperma (Utah juniper)							
1996	55	-	-	-	-	-	9.8
2001	33	-	-	-	-	-	19.8
2006	56	-	25	35	25	15	14.1
2011	48	5	16	47	16	16	12.6
2016	12	90	10	-	-	-	14.6

Table -01-02.15 - Deer Desirable Components Index: Low Potential Scale.

Year	Preferred Browse Cover	Preferred Browse Decadence	Preferred Browse Young	Perennial Grass Cover	Annual Grass Cover	Perennial Forb Cover	Noxious Weeds	Total Score	Ranking
1996	17.6	6.3	15.0	12.8	-2.4	3.4	0.0	52.6	Good
2001	23.2	9.6	11.5	18.4	-2.7	3.7	0.0	63.6	Good-Excellent
2006	19.9	4.5	3.5	11.4	-4.0	1.9	0.0	37.2	Fair
2011	18.7	8.1	3.0	21.1	-8.3	3.8	0.0	46.3	Fair-Good
2016	16.6	7.2	3.0	6.6	-6.9	3.4	0.0	29.9	Fair

CHOKECHERRY SPRINGS - STUDY NO. 01-4



Location Information

USGS 7.5 min Map Info
GPS (0' Stake)

Emigrant Pass NW; Township 10N, Range 16W, Section 30
NAD 83 UTM ZONE 12, 272445 East 4605180 North

Transect Information

Browse Tag # (0' Stake)
Transect Bearing
Length
Belt Placement
Belt Marker Placement

197
345° magnetic
400ft
Line 1 (11ft & 95ft), Line 2 (34ft), Line 3 (59ft), Line 4 (71ft)
Standard, Belt 2: No Rebar

Directions to Site

Proceed from State Road 30 towards the Rosebud BLM field station. Bear left at the fork to the BLM station. Travel 2.1 miles to a canal and intersection with a sign designating Emigrant Pass Road. Proceed southwest on Emigrant Pass Road 5.5 miles to a fork. Turn right and travel 2.5 miles to a gate. Pass through the gate, proceed 0.5 miles and turn right at a four way junction. Travel 0.8 miles to a witness post on left side of road and stop. From the witness post, take a bearing of 276 degrees magnetic to a large juniper that is just off the left side of the drainage with several young trees around it. This juniper is located on the slope above the split in the drainage. Walk about 500 yards from the witness post to the large juniper. From this tree, take a bearing of 9 degrees magnetic and walk 9 paces to the 0-foot stake of the baseline, which is marked with browse tag #197. The baseline runs at 345 degrees magnetic.

Site Information

Land Ownership	Federal
Land Administrator	BLM
Allotment	MUDDY CREEK
Elevation	6,400ft (1,951m)
Aspect	East
Slope	15%
Sample Dates	06/10/1996, 05/31/2001, 06/01/2006, 06/02/2011, 06/08/2016

Table 01-04.1 Disturbance History. Recorded history of major disturbances.

Treatment/Disturbance	Name	WRI DB#	Date	Size (acres)
Mechanical - Bullhog	Chokecherry Springs	155	March-June 2005	571
Seeding - Aerial Before	Chokecherry Springs	155	November 2004	571

Table 01-04.2 Seed Mix.List of known seeded plant species and rates (if available).

Mix Name		Application Type	Application Date	Acres	
Choke Cherry		Aerial	Nov 2004	550	
Type	Species	Common Name	Cultivar/Source ID	Bulk lbs/acre	PLS lbs/acre
G	Achnatherum hymenoides	Indian Ricegrass		1.00	0.96
G	Achnatherum hymenoides	Indian Ricegrass	Rimrock	0.01	0.01
G	Dactylis glomerata	Orchardgrass	Paiute	1.00	0.92
G	Elymus wawawaiensis	Snake River Wheatgrass	Secar	1.73	1.61
G	Elymus wawawaiensis	Snake River Wheatgrass	Secar	0.34	0.30
G	Poa secunda	Sandberg Bluegrass	SID MT	0.09	0.07
G	Poa secunda	Canby Bluegrass		0.55	0.46
F	Achillea millefolium	Western Yarrow		0.09	0.09
F	Linum perenne	Blue Flax	Appar	0.55	0.50
F	Medicago sativa	Alfalfa	Ladak+	2.09	1.99
F	Onobrychis viciifolia	Sainfoin	Eski	3.09	2.90
F	Poa secunda	Sandberg Bluegrass	SID OR	0.45	0.36
F	Sanguisorba minor	Small Burnet	Delar	2.09	1.96

Wildlife Habitat and Vegetation History**Table 01-04.3 - Wildlife Seasonal Habitat.** UDWR wildlife habitat and seasonality.

Species	Habitat	Season	Brood/Young Rearing
Deer	crucial	winter	
Greater Sage Grouse		occupied	brood-rearing

Table 01-04.4 - Vegetation History. The dominant vegetation type(s) and phase of woodland succession (Tausch, Miller, Roundy, & Chambers, 2009).

Year	Vegetation Type	Woodland Succession
1984	Mixed Shrub	Phase I
1990	Mixed Shrub	Phase I
1996	Mixed Shrub	Phase I
2001	Mixed Shrub	Phase I
2006	Mixed Shrub	Phase I
2011	Mixed Shrub	Phase I
2016	Mixed Shrub	Phase I

Site Notes

No Notes

Soils**Table 01-04.5 - Soil Analysis Data.** List of chemical and textural soil characteristics determined by laboratory analysis.

Texture	pH	%sand	%silt	%clay	%OM	PPM P	PPM K	ds/m	Sample Date
Clay Loam	7.7	41.7	29.0	29.3	2.6	5.9	201.6	0.5	06/10/1996

Site Potential

1981-2010 Average Annual Precipitation 14 inches
 NRCS Ecological Site Upland Loam (Browse)
 NRCS Ecological Site # 025XY312UT
 States and Transitions No state and transition model is available for this ecological site.

When established in 1984, the site was a mixed stand of mountain big sagebrush (*Artemisia tridentata* ssp. *vaseyana*) and antelope bitterbrush (*Purshia tridentata*) (Table 01-04.12, Table 01-04.13). Native perennial grass species made up the majority of the herbaceous understory; However, the invasive annual grass species cheatgrass (*Bromus tectorum*) has had periodic increases in cover (Table 01-04.7). Young Utah juniper (*Juniperus osteosperma*) trees have been sparsely scattered across the site despite a bullhog project that removed juniper trees on the site in 2005. Mountain big sagebrush has remained the dominant browse species on the site since establishment.

Trend Summary Tables

Table 01-04.6 - Shrub/Tree Summary. Average modified Daubenmire quadrat and line intercept cover by year for shrubs/trees.

Year	Quadrat Cover (%)			Line-intercept Cover (%)		
	Preferred Shrub	Other Shrub	Tree	Preferred Shrub	Other Shrub	Tree
1996	17.0	11.2	0.0	-	-	-
2001	22.8	8.9	0.3	-	-	0.1
2006	15.4	8.6	1.1	24.0	11.0	2.7
2011	13.4	6.2	1.1	20.9	6.6	3.4
2016	11.6	8.9	2.4	19.2	8.8	2.7

Table 01-04.7 - Herbaceous Summary. Nested frequency and average modified Daubenmire quadrat cover by year for herbaceous functional groups.

Year	Nested Frequency				Quadrat Cover (%)			
	Annual Grass	Perennial Grass	Annual/Biennial Forb	Perennial Forb	Annual Grass	Perennial Grass	Annual/Biennial Forb	Perennial Forb
1996	387	164	276	217	6.2	6.2	1.5	6.7
2001	446	249	271	215	23.3	7.6	3.4	6.1
2006	326	278	227	271	3.0	12.3	1.6	10.6
2011	240	301	412	292	2.8	13.6	11.2	8.1
2016	431	257	273	172	19.6	10.0	1.6	6.3

Table 01-04.8 - Basic Ground Cover. Average modified Daubenmire quadrat cover by year for basic ground cover types.

Year	Cover Type (%)					
	Bare Ground	Cryptograms	Litter	Pavement	Rock	Vegetation
1996	7.0	0.1	55.2	6.1	6.4	46.1
2001	7.9	0.1	44.4	4.7	4.7	61.7
2006	12.1	0.2	45.6	6.4	2.8	50.4
2011	8.3	0.1	36.4	6.2	3.8	56.5
2016	22.1	0.0	33.9	7.6	3.9	52.2

Table 01-04.9 - Pellet Group Data. Quadrat frequency and pellet group transect data for animal pellets. Rabbit pellet groups are not sampled in the pellet group transect.

Year	Cattle	Mule Deer	Rabbit
	Quadrat Frequency		
1996	3	11	5
2001	1	14	1
2006	3	7	18
2011	1	2	1
2016	2	11	17
Year	Days Use Per Acre (ha)		
1996	-	-	-
2001	2.9 (7.2)	36.2 (89.4)	-
2006	8.7 (21.5)	22.1 (54.6)	-
2011	4.4 (10.8)	21.5 (53.0)	-
2016	-	24.8 (61.2)	-

Table 01-04.10 - Grass Species. Nested frequency and modified Daubenmire average cover by year.

GRASS SPECIES	Achnatherum hymenoides (Indian ricegrass)	Bromus tectorum ^{ai} (cheatgrass)	Elymus elymoides (squirreltail)	Elymus lanceolatus (thickspike wheatgrass)	Festuca ovina ⁱ (sheep fescue)	Melica bulbosa (oniongrass)	Poa secunda (Sandberg bluegrass)	Pseudoroegneria spicata (bluebunch wheatgrass)
year	Nested Frequency							
1996	12	387	34	16	5	-	62	54
2001	11	446	44	21	-	-	159	57
2006	19	326	55	36	-	-	192	62
2011	25	240	56	36	-	6	234	52
2016	14	431	44	29	-	4	187	57
year	Average Cover (%)							
1996	0.4	6.2	1.2	0.6	0.2	-	1.0	2.9
2001	0.1	23.3	0.8	0.5	-	-	3.9	2.3
2006	1.0	3.0	1.4	0.8	-	-	5.6	3.4
2011	0.4	2.8	1.4	0.5	-	0.2	9.6	1.6
2016	0.2	19.6	0.6	0.9	-	0.0	6.3	1.9

a - Annual; n - Noxious Weed; i - Introduced Species

Table 01-04.11 - Forb Species. Nested frequency and modified Daubenmire average cover by year.

FORB SPECIES	Agoseris glauca (pale agoseris)	Allium acuminatum (tapertip onion)	Androsace septentrionalis ^a (pygmyflower rockjasmine)	Astragalus beckwithii (Beckwith's milkvetch)	Astragalus cibirius (browse milkvetch)	Balsamorhiza hookeri (Hooker's balsamroot)	Balsamorhiza sagittata (arrowleaf balsamroot)	Calochortus nuttallii (sego lily)	Camelina microcarpa ^{ai} (littlupod false flax)	Castilleja linariifolia (Wyoming Indian paintbrush)	Ceratocephala testiculata ^{ai} (curvseed butterwort)	Chaenactis douglasii (Douglas' dustymaiden)	Cirsium arvense ⁿⁱ (Canada thistle)	Collinsia parviflora ^a (maiden blue eyed Mary)	Collomia linearis ^a (tiny trumpet)	Comandra umbellata (bastard toadflax)	Crepis acuminata (tapertip hawkbeard)
year	Nested Frequency																
1996	6	14	-	37	-	-	11	-	85	-	8	7	4	205	48	31	17
2001	2	95	-	28	-	-	7	5	80	-	16	-	-	174	8	37	11
2006	69	75	3	8	40	-	14	2	23	3	-	-	-	173	-	36	19
2011	129	118	-	45	3	9	12	-	23	-	39	0	2	372	44	31	26
2016	22	19	-	2	41	2	21	1	43	-	-	-	4	184	24	48	17
year	Average Cover (%)																
1996	0.0	0.0	-	0.5	-	-	1.3	-	0.2	-	0.0	0.0	0.0	0.9	0.1	0.6	0.3
2001	0.0	0.7	-	0.8	-	-	0.7	0.0	0.8	-	0.0	-	-	1.3	0.0	0.5	0.3
2006	0.4	0.3	0.1	0.3	1.8	-	2.5	0.0	0.1	0.0	-	-	-	0.7	-	0.2	0.6
2011	1.9	0.5	-	1.5	0.0	0.1	0.8	-	0.1	-	0.4	0.0	0.0	9.3	0.1	0.3	0.6
2016	0.1	0.1	-	0.1	0.6	0.0	1.8	0.0	0.2	-	-	-	0.0	0.4	0.1	1.0	0.2

a - Annual/Biennial; n - Noxious Weed; i - Introduced Species

FORB SPECIES	Cryptantha (cryptantha)	Descurainia pinnata ^a (western tansymustard)	Draba ^a (draba)	Epilobium brachycarpum ^a (tall annual willowherb)	Eriastrum sparsiflorum ^a (Great Basin woollystar)	Galium aparine ^a (stickywilly)	Gayophytum ramosissimum ^a (pinyon groundsmoke)	Gilia inconspicua ^a (shy gilia)	Hackelia patens (spotted stickseed)	Lactuca serriola ^{ai} (prickly lettuce)	Lappula occidentalis ^a (flatspine stickseed)	Lithospermum ruderale (western stoneseed)	Lomatium triternatum (nineleaf biscuitroot)	Lupinus argenteus (silvery lupine)	Machaeranthera (tansyaster)	Microsteris gracilis ^a (slender phlox)	Oenothera caespitosa (tufted evening primrose)	
year	Nested Frequency																	
1996	13	-	-	-	-	9	1	-	9	-	-	16	8	24	14	-	2	
2001	-	-	2	-	-	-	54	13	1	-	2	7	4	18	-	33	-	
2006	17	4	-	14	-	-	2	-	10	3	6	15	8	22	-	12	-	
2011	1	-	1	8	-	2	5	-	4	-	1	5	17	14	4	67	-	
2016	2	12	-	-	1	2	3	-	7	-	8	9	-	17	-	28	-	
year	Average Cover (%)																	
1996	0.0	-	-	-	-	0.0	0.0	-	0.0	-	-	1.2	0.0	1.3	0.0	-	0.0	
2001	-	-	0.0	-	-	-	0.7	0.0	0.0	-	0.0	0.3	0.0	1.4	-	0.5	-	
2006	0.1	0.0	-	0.0	-	-	0.0	-	0.1	0.0	0.0	1.0	0.0	1.8	-	0.0	-	
2011	0.0	-	0.0	0.0	-	0.0	0.0	-	0.0	-	0.0	0.3	0.3	0.8	0.0	0.3	-	
2016	0.0	0.1	-	-	0.0	0.0	0.0	-	0.1	-	0.0	0.1	-	1.4	-	0.1	-	

a - Annual/Biennial; n - Noxious Weed; i - Introduced Species

FORB SPECIES	Penstemon speciosus (royal penstemon)	Phlox hoodii (spiny phlox)	Phlox longifolia (longleaf phlox)	Pleiocanthus spinosus (thorn skeletonweed)	Stenotus acaulis (stemless mock goldenweed)	Tragopogon dubius ^{ai} (yellow safsify)	Veronica biloba ^{ai} (two-lobed speedwell)	Viola (violet)
year	Nested Frequency							
1996	-	-	108	37	-	5	25	-
2001	-	-	104	19	-	2	23	-
2006	-	-	102	28	-	7	55	3
2011	10	12	94	11	2	4	57	-
2016	-	-	23	14	2	2	94	1
year	Average Cover (%)							
1996	-	-	0.5	0.7	-	0.0	0.1	-
2001	-	-	0.8	0.6	-	0.0	0.1	-
2006	-	-	0.7	0.8	-	0.1	0.4	0.0
2011	0.1	0.0	0.5	0.2	0.2	0.0	1.0	-
2016	-	-	0.1	0.7	0.0	0.0	0.7	0.0

a - Annual/Biennial; n - Noxious Weed; i - Introduced Species

Table 01-04.12 - Shrub and Tree Species. Average modified Daubenmire quadrat and line intercept cover by year.

SHRUB SPECIES	Artemisia tridentata ssp. vaseyana ^p (mountain big sagebrush)	Chrysothamnus viscidiflorus ssp. viscidiflorus (yellow rabbitbrush)	Ericameria nauseosa ssp. consimilis var. oreophila (rubber rabbitbrush)	Juniperus osteosperma ¹ (Utah juniper)	Opuntia polyacantha (plains pricklypear)	Purshia tridentata ^p (antelope bitterbrush)	Symphoricarpos oreophilus (mountain snowberry)
year	Line Intercept Cover (%)						
1996	-	-	-	-	-	-	-
2001	-	-	-	-	-	-	-
2006	13.1	7.9	0	2.7	0.1	10.9	3
2011	8.5	4.2	0.3	3.4	0.1	12.4	2
2016	7.9	5.1	0.5	2.7	0.3	11.3	2.9
year	Quadrat Cover (%)						
1996	13.1	10.3	0.8	0.0	0.0	3.9	0.1
2001	16.5	6.0	1.0	0.3	0.6	6.4	1.4
2006	10.3	5.8	0.8	1.1	0.3	5.1	1.7
2011	7.9	4.3	0.5	1.1	0.1	5.5	1.3
2016	7.9	5.2	0.9	2.4	0.5	3.7	2.3

t - Tree Species; p - Preferred Browse; i - Introduced

Table 01-04.13 - Shrub/Tree Characteristics. Population characteristics of shrub/tree species populations including density reproduction (seedlings), age distribution, utilization, vigor and average size (height/crown) of plants.

Year	Density		Age Class Distribution			Utilization		Poor Vigor (%)	Average Height Crown (cm)
	Plants Per Acre		Excluding Seedlings			Moderate (%)	Heavy (%)		
	Excluding Seedlings	Seedling	Young (%)	Mature (%)	Decadent (%)				
Artemisia tridentata ssp. vaseyana^p -- (mountain big sagebrush)									
1996	2960	180	12	62	26	10	1	17	51/82
2001	2520	-	4	75	21	2	0	4	56/85
2006	1760	280	2	61	36	22	2	10	61/92
2011	2100	-	3	51	46	30	0	39	59/89
2016	1400	5560	7	59	34	3	0	41	72/106
Chrysothamnus viscidiflorus ssp. viscidiflorus -- (yellow rabbitbrush)									
1996	3660	-	6	91	3	7	1	2	35/60
2001	3000	-	3	84	13	3	0	3	28/45
2006	2460	100	7	81	12	0	0	2	33/56
2011	2640	20	21	78	1	1	0	1	30/48
2016	2300	20	2	96	3	3	0	4	35/50
Ericameria nauseosa ssp. consimilis var. oreophila -- (rubber rabbitbrush)									
1996	200	-	50	30	20	0	0	0	75/106
2001	160	80	25	63	13	25	0	0	71/72
2006	80	-	0	100	0	0	0	0	66/84
2011	40	-	0	50	50	0	0	50	67/73
2016	80	-	0	100	0	0	0	0	58/83
Juniperus osteosperma¹ -- (Utah juniper)									
1996	60	40	67	33	0	0	0	0	-/-
2001	120	20	100	0	0	0	0	0	-/-
2006	160	20	100	0	0	0	0	0	-/-
2011	180	20	89	11	0	0	0	0	-/-
2016	200	20	60	40	0	0	0	0	-/-

Year	Density		Age Class Distribution			Utilization		Poor Vigor (%)	Average Height Crown (cm)
	Plants Per Acre		Excluding Seedlings			Moderate (%)	Heavy (%)		
	Excluding Seedlings	Seedling	Young (%)	Mature (%)	Decadent (%)				
Opuntia polyacantha -- (plains pricklypear)									
1996	300	-	7	87	7	0	0	0	12/37
2001	180	-	0	100	0	0	0	0	12/25
2006	160	-	0	100	0	0	13	0	13/29
2011	120	-	0	100	0	0	0	0	10/29
2016	200	-	0	100	0	0	0	0	13/32
Purshia tridentata^P -- (antelope bitterbrush)									
1996	740	-	11	89	0	35	3	0	66/137
2001	800	-	3	93	5	45	8	0	81/139
2006	600	460	7	73	20	43	13	3	81/146
2011	580	-	0	100	0	52	10	3	85/149
2016	560	-	0	75	25	36	25	11	77/148
Symphoricarpos oreophilus -- (mountain snowberry)									
1996	120	-	33	67	0	33	17	0	56/131
2001	260	-	0	100	0	0	0	0	53/124
2006	360	-	11	83	6	0	0	0	51/113
2011	420	-	10	91	0	0	0	0	46/87
2016	500	-	12	88	0	8	0	0	49/95

t - Tree Species; p - Preferred Browse; i - Introduced Species

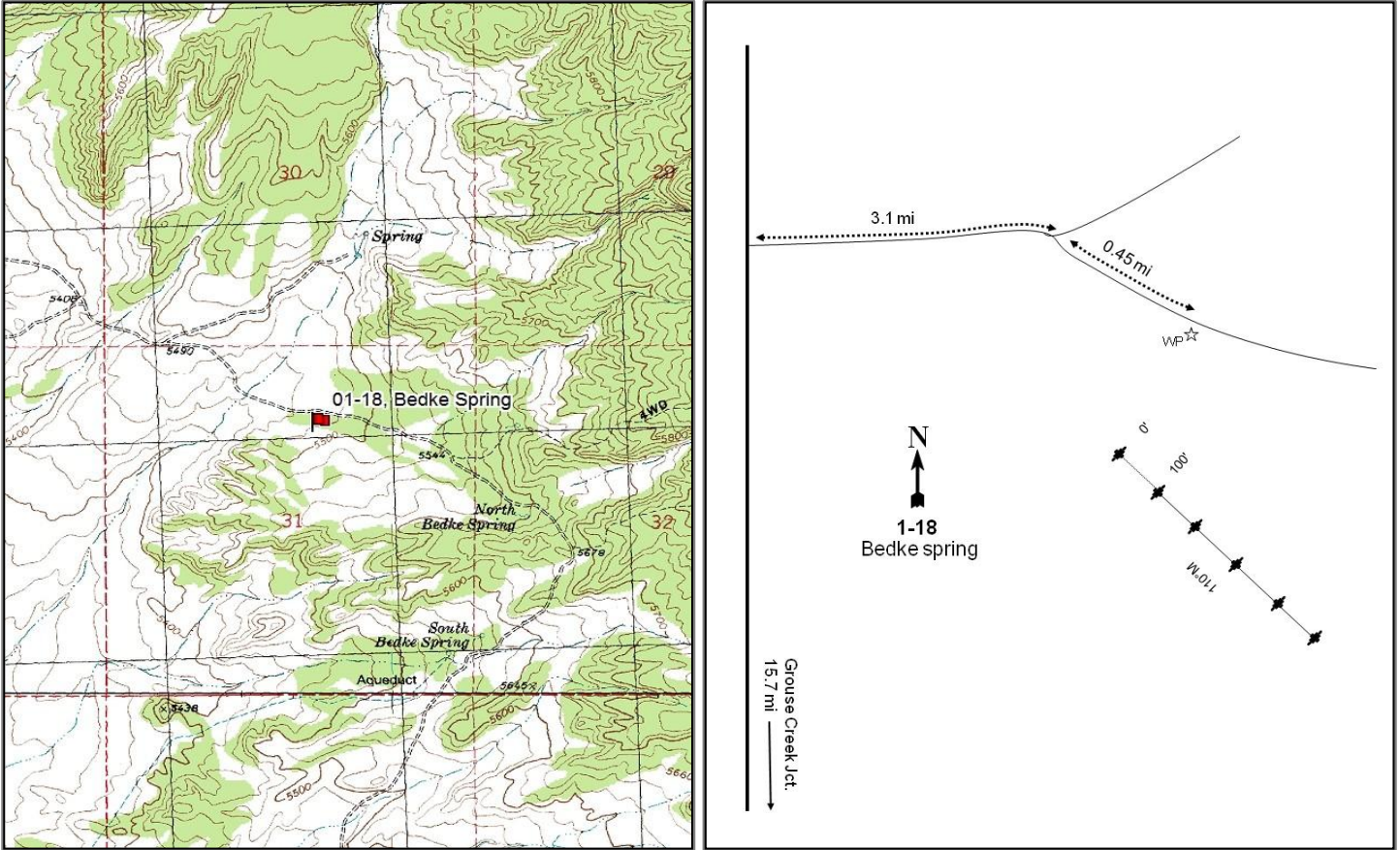
Table 01-04.14 - Tree Characteristics. Point-quarter tree density, size class distribution, and average diameter.

Year	Density	Size Class Distribution					Average Diameter (cm)
	Trees per Acre	Seedling (%)	1-4'	4-8'	8-12'	>12' (%)	
Juniperus osteosperma (Utah juniper)							
1996	30	-	-	-	-	-	11.3
2001	76	-	-	-	-	-	6.5
2006	87	11	47	32	5	5	10.9
2011	104	-	50	40	5	5	9.0
2016	230	-	50	50	-	-	5.9

Table -01-04.15 - Deer Desirable Components Index: Mid Potential Scale.

Year	Preferred Browse Cover	Preferred Browse Decadence	Preferred Browse Young	Perennial Grass Cover	Annual Grass Cover	Perennial Forb Cover	Noxious Weeds	Total Score	Ranking
1996	22.3	9.0	5.5	17.4	-4.7	10.0	0.0	59.5	Fair
2001	30.0	10.0	1.9	17.0	-17.6	10.0	0.0	51.3	Poor-Fair
2006	20.7	5.8	1.8	26.0	-2.3	10.0	0.0	62.1	Fair
2011	18.3	6.9	0.9	29.8	-2.1	10.0	0.0	63.8	Fair-Good
2016	14.5	11.7	1.1	20.0	-14.7	10.0	-2.0	40.7	Poor

BEDKE SPRING - STUDY NO. 01-18



Location Information

USGS 7.5 min Map Info Ingham Canyon SW; Township 11N, Range 17W, Section 31
 GPS (0' Stake) NAD 83 UTM ZONE 12, 263597 East 4613231 North

Transect Information

Browse Tag # (0' Stake) Not available
 Transect Bearing 110° 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 Grouse Creek Junction on State Route 30 travel north for 15.7 miles. Turn right and travel east for 3.1 miles. Stay right and continue 0.45 miles to a witness post on the right hand side of the road. The baseline is approximately 300 feet in a southerly direction on a small bench. The baseline runs 110 degrees magnetic.

Site Information

Land Ownership Federal
 Land Administrator BLM
 Allotment RED BUTTE
 Elevation 5,500ft (1,676m)
 Aspect West
 Slope 5%
 Sample Dates 06/11/1996, 05/24/2001, 05/24/2006, 05/25/2011, 06/07/2016

Table 01-18.1 Disturbance History. Recorded history of major disturbances.

Treatment/Disturbance	Name	WRI DB#	Date	Size (acres)
Mechanical - Bullhog	Grouse Creek Bullhog Phase 2	1938	Winter 2012	1031

Wildlife Habitat and Vegetation History

Table 01-18.3 - Wildlife Seasonal Habitat. UDWR wildlife habitat and seasonality.

Species	Habitat	Season	Brood/Young Rearing
Deer	substantial	winter	
Elk	crucial	year-long	
Greater Sage Grouse		occupied	brood-rearing
Pronghorn	substantial	summer	

Table 01-18.4 - Vegetation History. The dominant vegetation type(s) and phase of woodland succession (Tausch, Miller, Roundy, & Chambers, 2009).

Year	Vegetation Type	Woodland Succession
1996	Wyoming Big Sagebrush/Perennial Grass	Phase I
2001	Wyoming Big Sagebrush/Perennial Grass	Phase I
2006	Wyoming Big Sagebrush/Perennial Grass	Phase I
2011	Wyoming Big Sagebrush/Perennial Grass	Phase I
2016	Wyoming Big Sagebrush/Perennial Grass	No Encroachment

Site Notes

No Notes

Soils

Table 01-18.5 - Soil Analysis Data. List of chemical and textural soil characteristics determined by laboratory analysis.

Texture	pH	%sand	%silt	%clay	%OM	PPM P	PPM K	ds/m	Sample Date
Clay Loam	7.7	36.7	30.0	33.3	2.2	5.4	387.2	0.6	06/11/1996

Site Potential

1981-2010 Average Annual Precipitation 11 inches
 NRCS Ecological Site Upland Loam (Wyoming Big Sagebrush)
 NRCS Ecological Site # 028AY309UT
 States and Transitions No state and transition model is available for this ecological site.

Since study establishment in 1996, the site has remained in a stable state as a Wyoming big sagebrush plant (*Artemisia tridentata ssp. wyomingensis*) community type (Table 01-18.12) that likely behaves similar to the Upland Loam (Wyoming Big Sagebrush), R025XY314UT ecological site when subjected to disturbances (USDA-NRCS, 2011). The herbaceous understory has remained diverse and abundant over the study years (Table 01-18.10, Table 01-18.11). It is predicted the site will remain in this state unless a major disturbance occurs. There was some conifer encroachment occurring on the site, but a bullhog treatment removed the encroaching trees.

Trend Summary Tables

Table 01-18.6 - Shrub/Tree Summary. Average modified Daubenmire quadrat and line intercept cover by year for shrubs/trees.

Year	Quadrat Cover (%)			Line-intercept Cover (%)		
	Preferred Shrub	Other Shrub	Tree	Preferred Shrub	Other Shrub	Tree
1996	8.8	8.1	-	-	-	-
2001	8.1	4.2	-	-	-	-
2006	7.3	3.8	-	9.0	5.2	-
2011	6.9	6.1	-	9.3	5.0	-
2016	5.1	6.8	-	9.0	7.2	-

Table 01-18.7 - Herbaceous Summary. Nested frequency and average modified Daubenmire quadrat cover by year for herbaceous functional groups.

Year	Nested Frequency				Quadrat Cover (%)			
	Annual Grass	Perennial Grass	Annual/Biennial Forb	Perennial Forb	Annual Grass	Perennial Grass	Annual/Biennial Forb	Perennial Forb
1996	115	300	75	314	0.3	5.5	0.3	8.2
2001	310	285	299	289	3.5	6.5	2.3	9.6
2006	351	296	288	272	7.1	8.6	2.7	9.6
2011	190	336	367	260	4.2	11.5	7.3	8.4
2016	342	342	141	206	16.8	11.1	0.7	6.1

Table 01-18.8 - Basic Ground Cover. Average modified Daubenmire quadrat cover by year for basic ground cover types.

Year	Cover Type (%)					
	Bare Ground	Cryptograms	Litter	Pavement	Rock	Vegetation
1996	27.7	7.7	28.7	6.2	2.5	29.7
2001	31.1	12.0	22.5	10.1	0.7	34.2
2006	38.2	7.5	24.6	7.1	0.6	38.2
2011	26.7	8.7	17.7	7.7	0.2	44.3
2016	42.9	6.2	20.8	10.0	0.9	39.9

Table 01-18.9 - Pellet Group Data. Quadrat frequency and pellet group transect data for animal pellets. Rabbit pellet groups are not sampled in the pellet group transect.

Year	Cattle	Mule Deer	Elk	Rabbit
	Quadrat Frequency			
1996	1	6	3	7
2001	3	1	-	2
2006	3	10	-	49
2011	5	1	-	5
2016	1	-	-	45
Year	Days Use Per Acre (ha)			
1996	-	-	-	-
2001	10.9 (26.9)	2.0 (5.0)	-	-
2006	14.5 (35.9)	6.0 (14.9)	4.7 (11.6)	-
2011	6.5 (16.1)	1.3 (3.3)	-	-
2016	0.7 (1.8)	0.7 (1.7)	0.7 (1.7)	-

Table 01-18.10 - Grass Species. Nested frequency and modified Daubenmire average cover by year.

GRASS SPECIES	Achnatherum hymenoides (Indian ricegrass)	Agropyron cristatum ⁱ (crested wheatgrass)	Bromus tectorum ^{ai} (cheatgrass)	Elymus (wildrye)	Elymus elymoides (squirriltail)	Elymus lanceolatus (thickspike wheatgrass)	Festuca (fescue)	Poa fendleriana (muttongrass)	Poa secunda (Sandberg bluegrass)	Pseudoroegneria spicata (bluebunch wheatgrass)
year	Nested Frequency									
1996	-	7	115	10	135	30	2	2	216	51
2001	-	11	310	-	71	21	-	-	218	89
2006	-	14	351	-	55	85	-	-	247	22
2011	3	53	190	-	35	63	3	-	248	80
2016	6	39	342	-	141	136	-	9	190	37
year	Average Cover (%)									
1996	-	0.3	0.3	0.1	1.2	0.2	0.0	0.0	2.9	0.7
2001	-	0.1	3.5	-	0.9	0.1	-	-	4.3	1.1
2006	-	0.7	7.1	-	1.1	0.8	-	-	5.2	0.7
2011	0.0	1.3	4.2	-	0.3	0.8	0.0	-	6.8	2.4
2016	0.2	1.5	16.8	-	2.6	2.8	-	0.1	3.1	0.8

a - Annual; n - Noxious Weed; i - Introduced Species

Table 01-18.11 - Forb Species. Nested frequency and modified Daubenmire average cover by year.

FORB SPECIES	Agoseris glauca (pale agoseris)	Allium acuminatum (tapertip onion)	Alyssum desertorum ^{ai} (desert madwort)	Antennaria (pussytoes)	Arabis (rockcress)	Astragalus beckwithii (Beckwith's milkvetch)	Astragalus calycosus (Torrey's milkvetch)	Astragalus cibirarius (browse milkvetch)	Astragalus purshii (woollypod milkvetch)	Camelina microcarpa ^{ai} (littlupod false flax)	Castilleja angustifolia (northwestern Indian paintbrush)	Ceratocephala testiculata ^{ai} (curvseed butterwort)	Chaenactis douglasii (Douglas' dustymaiden)	Chorispora tenella ^{ai} (crossflower)	Collinsia parviflora ^a (maiden blue eyed Mary)	Collomia linearis ^a (tiny trumpet)	Cordylanthus ramosus ^a (bushy bird's beak)
year	Nested Frequency																
1996	-	1	-	-	5	21	-	35	13	-	2	11	23	-	32	4	2
2001	-	13	-	-	1	43	-	7	5	3	-	196	3	-	10	-	-
2006	3	11	6	12	-	33	-	41	19	66	3	183	7	-	19	-	3
2011	3	15	-	34	2	3	-	41	3	88	-	338	6	4	108	-	-
2016	-	-	28	12	-	8	4	36	10	72	-	1	7	-	10	-	-
year	Average Cover (%)																
1996	-	0.0	-	-	0.0	0.1	-	0.2	0.1	-	0.0	0.0	0.1	-	0.1	0.0	0.0
2001	-	0.0	-	-	0.0	0.6	-	0.1	0.0	0.0	-	1.6	0.0	-	0.0	-	-
2006	0.0	0.0	0.0	0.3	-	0.7	-	1.4	0.2	0.3	0.0	1.3	0.0	-	0.1	-	0.0
2011	0.0	0.0	-	1.0	0.0	0.0	-	1.0	0.0	0.6	-	5.9	0.0	0.0	0.5	-	-
2016	-	-	0.1	0.1	-	0.2	0.0	0.6	0.0	0.3	-	0.0	0.0	-	0.0	-	-

a - Annual/Biennial; n - Noxious Weed; i - Introduced Species

FORB SPECIES	Crepis acuminata (tapertip hawkbeard)	Cryptantha (cryptantha)	Delphinium nuttallianum (twolobe larkspur)	Descurainia pinnata ^a (western tansymustard)	Erigeron (fleafbane)	Erigeron pumilus (shaggy fleabane)	Eriogonum ovalifolium (cushion buckwheat)	Eriogonum umbellatum (sulphur-flower buckwheat)	Gilia inconspicua ^a (shy gilia)	Hackelia patens (spotted stickseed)	Ionactis alpina (Lava aster)	Lactuca serriola ^{ai} (prickly lettuce)	Lappula occidentalis ^a (flatspine stickseed)	Lathyrus brachycalyx (Bonneville pea)	Lomatium (desertparsley)	Microsteris gracilis ^a (slender phlox)	Penstemon cyananthus (Wasatch beardtongue)
year	Nested Frequency																
1996	-	12	-	11	-	50	1	-	2	-	-	-	22	-	-	-	24
2001	1	-	4	122	6	10	3	1	29	-	-	-	77	1	-	33	-
2006	-	1	3	5	14	5	-	2	3	-	1	-	48	-	0	114	4
2011	4	3	12	46	1	-	2	-	-	5	8	-	12	-	-	5	1
2016	-	1	2	8	-	16	-	-	1	-	9	3	33	-	-	3	-
year	Average Cover (%)																
1996	-	0.1	-	0.0	-	0.3	0.0	-	0.0	-	-	-	0.1	-	-	-	0.3
2001	0.0	-	0.0	0.4	0.2	0.0	0.0	0.0	0.1	-	-	-	0.1	0.0	-	0.1	-
2006	-	0.0	0.0	0.0	0.1	0.0	-	0.0	0.0	-	0.0	-	0.2	-	0.0	0.8	0.0
2011	0.0	0.0	0.1	0.1	0.0	-	0.0	-	-	0.0	0.2	-	0.0	-	-	0.0	0.1
2016	-	0.0	0.0	0.0	-	0.4	-	-	0.0	-	0.1	0.0	0.1	-	-	0.0	-

a - Annual/Biennial; n - Noxious Weed; i - Introduced Species

FORB SPECIES	Phlox hoodii (spiny phlox)	Phlox longifolia (longleaf phlox)	Tragopogon dubius ^{ai} (yellow safsify)	unknown annual forb ^a (unknown forb)	unknown perennial forb (unknown forb)	Veronica biloba ^{ai} (twolobe speedwell)
year	Nested Frequency					
1996	240	67	-	4	-	-
2001	240	52	-	-	4	-
2006	217	32	1	-	-	3
2011	204	29	-	-	-	15
2016	164	8	6	-	-	-
year	Average Cover (%)					
1996	6.6	0.3	-	0.0	-	-
2001	8.2	0.5	-	-	0.0	-
2006	6.4	0.3	0.0	-	-	0.0
2011	5.4	0.4	-	-	-	0.0
2016	4.6	0.0	0.0	-	-	-

a - Annual/Biennial; n - Noxious Weed; i - Introduced Species

Table 01-18.12 - Shrub and Tree Species. Average modified Daubenmire quadrat and line intercept cover by year.

SHRUB SPECIES	Line Intercept Cover (%)								
	year								
Artemisia nova ^p (black sagebrush)	1996	-	-	-	-	-	-	-	-
Artemisia tridentata ssp. wyomingensis ^p (Wyoming big sagebrush)	2001	-	-	-	-	-	-	-	-
Atriplex confertifolia ^p (shadscale saltbush)	2006	-	6.1	2.9	3.7	0.8	-	0.2	0.5
Chrysothamnus viscidiflorus ssp. viscidiflorus var. stenophyllus (yellow rabbitbrush)	2011	-	6.3	3	3.3	1.2	-	-	0.5
Ericameria nauseosa ssp. consimilis var. oreophila (rubber rabbitbrush)	2016	-	6.1	2.9	5.9	0.6	-	0.2	0.5
Grayia spinosa (spiny hopsage)	year	Quadrat Cover (%)							
Opuntia polyacantha (plains pricklypear)	1996	0.8	7.8	0.3	7.3	-	0.3	0.1	0.4
Sarcobatus vermiculatus (greasewood)	2001	0.0	6.9	1.2	3.3	0.0	-	0.1	0.8
	2006	-	4.9	2.5	2.3	0.4	-	0.1	1.0
	2011	0.1	4.6	2.1	4.0	0.1	0.9	-	1.2
	2016	0.1	3.4	1.6	3.6	1.5	-	0.2	1.4

t - Tree Species; p - Preferred Browse; i - Introduced

Table 01-18.13 - Shrub/Tree Characteristics. Population characteristics of shrub/tree species populations including density reproduction (seedlings), age distribution, utilization, vigor and average size (height/crown) of plants.

Year	Density		Age Class Distribution			Utilization		Poor Vigor (%)	Average Height Crown (cm)
	Plants Per Acre		Excluding Seedlings			Moderate (%)	Heavy (%)		
	Excluding Seedlings	Seedling	Young (%)	Mature (%)	Decadent (%)				
Artemisia nova^p -- (black sagebrush)									
1996	40	-	0	50	50	100	0	0	26/67
2001	60	-	0	67	33	0	0	0	34/60
2006	-	-	-	-	-	-	-	-	-/-
2011	40	-	0	100	0	0	0	0	21/37
2016	40	-	0	100	0	50	0	0	27/48
Artemisia tridentata ssp. wyomingensis^p -- (Wyoming big sagebrush)									
1996	3360	20	6	69	26	13	0	5	56/78
2001	2540	40	17	49	35	5	0	16	57/72
2006	2060	-	8	52	41	8	0	25	53/64
2011	1200	-	5	73	22	13	0	25	63/85
2016	1220	20	12	62	26	3	0	28	61/85
Atriplex confertifolia^p -- (shadscale saltbush)									
1996	1160	200	76	24	0	2	0	0	20/23
2001	2020	20	39	59	2	0	0	0	20/40
2006	1620	-	9	79	12	0	0	10	32/57
2011	780	-	10	64	26	0	0	28	35/52
2016	940	-	11	77	13	0	0	15	34/45
Chrysothamnus viscidiflorus ssp. viscidiflorus var. stenophyllus -- (yellow rabbitbrush)									
1996	6600	20	3	94	2	1	0	0	28/38
2001	3820	340	6	51	44	0	0	15	23/32
2006	3840	360	5	89	6	9	2	1	22/33
2011	3600	440	21	75	4	3	0	2	24/36
2016	4740	60	13	83	4	0	0	5	30/36

Year	Density		Age Class Distribution			Utilization		Poor Vigor (%)	Average Height Crown (cm)
	Plants Per Acre		Excluding Seedlings			Moderate (%)	Heavy (%)		
	Excluding Seedlings	Seedling	Young (%)	Mature (%)	Decadent (%)				
Eriogonum microthecum^P -- (slender buckwheat)									
1996	-	-	-	-	-	-	-	-	-/-
2001	-	-	-	-	-	-	-	-	-/-
2006	-	-	-	-	-	-	-	-	-/-
2011	-	-	-	-	-	-	-	-	-/-
2016	-	-	-	-	-	-	-	-	20/26
Ericameria nauseosa ssp. consimilis var. oreophila -- (rubber rabbitbrush)									
1996	40	-	50	50	0	0	0	0	54/80
2001	20	-	0	100	0	0	0	0	60/124
2006	20	-	0	100	0	0	0	0	72/128
2011	400	-	10	90	0	15	0	10	28/42
2016	820	-	7	90	2	0	0	2	29/37
Grayia spinosa -- (spiny hopsage)									
1996	-	-	-	-	-	-	-	-	45/101
2001	20	-	100	0	0	0	0	0	39/65
2006	-	-	-	-	-	-	-	-	42/101
2011	40	-	0	100	0	0	0	0	24/37
2016	-	-	-	-	-	-	-	-	65/68
Opuntia polyacantha -- (plains pricklypear)									
1996	140	-	29	71	0	0	0	0	11/22
2001	300	40	13	87	0	0	0	0	10/21
2006	320	20	6	88	6	0	0	6	12/32
2011	40	-	0	50	50	0	0	100	10/25
2016	240	-	0	100	0	0	0	0	11/28
Sarcobatus vermiculatus -- (greasewood)									
1996	80	-	100	0	0	0	0	0	66/84
2001	60	-	67	33	0	0	0	0	67/101
2006	80	-	50	50	0	0	0	0	67/98
2011	20	20	0	100	0	0	0	0	86/131
2016	60	-	0	100	0	0	0	0	93/146

t - Tree Species; p - Preferred Browse; i - Introduced Species

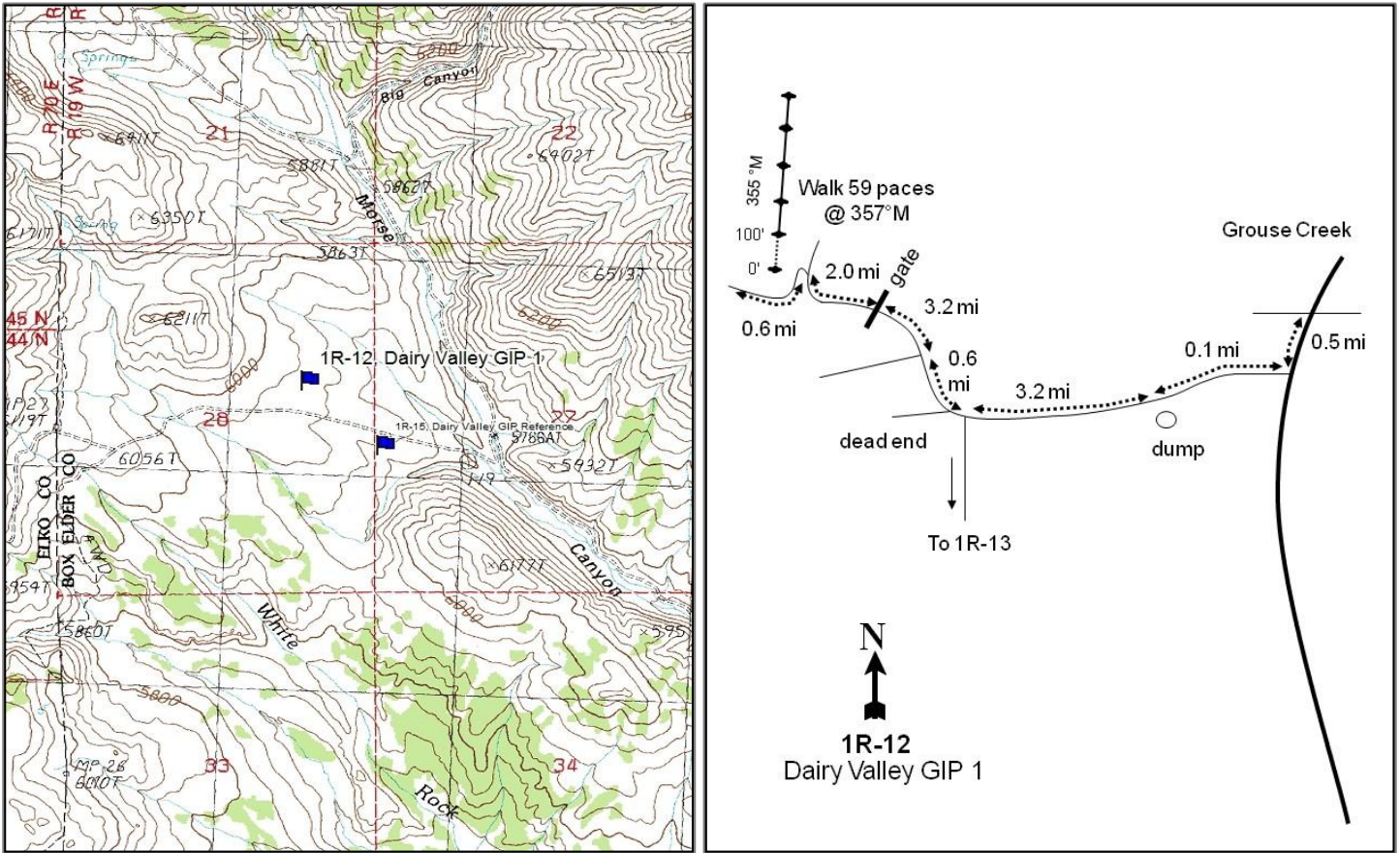
Table 01-18.14 - Tree Characteristics. Point-quarter tree density, size class distribution, and average diameter.

Year	Density	Size Class Distribution				Average Diameter (cm)	
	Trees per Acre	Seedling (%)	1-4'	4-8'	8-12'		>12' (%)
Juniperus osteosperma (Utah juniper)							
2016	3	-	100	-	-	-	4.5

Table -01-18.15 - Deer Desirable Components Index: Mid Potential Scale.

Year	Preferred Browse Cover	Preferred Browse Decadence	Preferred Browse Young	Perennial Grass Cover	Annual Grass Cover	Perennial Forb Cover	Noxious Weeds	Total Score	Ranking
1996	11.0	6.9	4.0	11.0	-0.2	10.0	0.0	42.7	Poor
2001	9.9	6.0	10.1	13.1	-2.6	10.0	0.0	46.5	Poor
2006	8.6	5.6	4.2	17.1	-5.4	10.0	0.0	40.1	Poor
2011	8.1	8.2	3.2	23.2	-3.2	10.0	0.0	49.4	Poor-Fair
2016	6.0	8.6	5.7	22.2	-12.6	10.0	0.0	39.9	Poor

DAIRY VALLEY GIP 1 - STUDY NO. 01R-12



Location Information

USGS 7.5 min Map Info	Death Creek Reservoir; Township 12N, Range 19W, Section 28
GPS (0' Stake)	NAD 83 UTM ZONE 12, 248235 East 4624739 North

Transect Information

Browse Tag # (0' Stake)	247
Transect Bearing	335° magnetic
Length	500ft
Belt Placement	Line 1 (11ft), Line 2 (34ft), Line 3 (59ft), Line 4 (71ft), Line 5 (95ft)
Belt Marker Placement	Standard, Belt 2, 3 4, 5: No Rebar

Directions to Site

Drive west on State Route 42 from Snowville to Curlew Junction, turn south (left) onto State Route 30, and drive toward Park Valley. Turn left onto Grouse Creek Road and follow it until the pavement ends. From the pavement, drive 0.5 miles to a right turn and then go 0.1 miles to a dump on the left side of the road. Continue 3.2 miles to the road leading to 1R-13 and stay to the right. Drive 0.6 miles to another fork and stay on the main road (right). Go 1.7 miles, take the right fork, and continue 1.5 miles to a gate. From the gate, go 2.0 miles, staying left at the fork. Drive 0.6 miles to a witness post on the right side of the road. From the witness post, walk 59 paces at 357 degrees magnetic to the 0-foot stake. The 0-foot stake is marked with browse tag #247.

Site Information

Land Ownership	State
Land Administrator	SITLA
Allotment	GROUSE CREEK
Elevation	5,933ft (1,808m)
Aspect	Southeast
Slope	3%
Sample Dates	08/12/2008, 08/04/2009, 05/25/2011, 07/27/2016

Table 01R-12.1 Disturbance History. Recorded history of major disturbances.

Treatment/Disturbance	Name	WRI DB#	Date	Size (acres)
Fire - Wildfire	Winecup complex	-	2007	234413
Chaining - One-Way Ely	Dairy Valley Fire Rehabilitation	992	Jun. 2008	2700
Seeding - Aerial Before	Dairy Valley Fire Rehabilitation	992	Dec. 2007	6900

Table 01R-12.2 Seed Mix. List of known seeded plant species and rates (if available).

Mix Name		Application Type	Application Date	Acres	
Dairy Valley		Aerial	Dec 2007	6300	
Type	Species	Common Name	Cultivar/Source ID	Bulk lbs/acre	PLS lbs/acre
G	Agropyron cristatum	Crested Wheatgrass	Hcrest	0.87	0.67
G	Agropyron cristatum	Crested Wheatgrass	Nordan	0.87	0.83
G	Dactylis glomerata	Orchardgrass	Paiute	0.51	0.44
G	Elymus wawawaiensis	Snake River Wheatgrass	Secar	1.00	0.94
G	Leymus cinereus	Great Basin Wildrye	Trailhead	0.54	0.49
G	Poa secunda	Canby Bluegrass	Canbar	0.04	0.03
G	Poa secunda	Canby Bluegrass	Canbar	0.32	0.24
G	Pseudoroegneria spicata	Bluebunch Wheatgrass	P-7	1.00	0.92
G	Thinopyrum intermedium	Pubescent Wheatgrass		1.00	0.91
G	Thinopyrum intermedium	Intermediate Wheatgrass	Oahe	1.00	0.89
F	Medicago sativa	Alfalfa	Ladak	1.13	1.12
F	Medicago sativa	Alfalfa	Ranger	0.37	0.34
F	Melilotus officinalis	Yellow Sweetclover		0.51	0.41
F	Onobrychis viciifolia	Sainfoin	Eski	0.75	0.69
F	Onobrychis viciifolia	Sainfoin	Eski	0.25	0.22
F	Sanguisorba minor	Small Burnet	Delar	0.92	0.85
F	Sanguisorba minor	Small Burnet	Delar	0.08	0.07
S	Bassia prostrata	Forage Kochia	Immigrant	0.37	0.21

Wildlife Habitat and Vegetation History

Table 01R-12.3 - Wildlife Seasonal Habitat. UDWR wildlife habitat and seasonality.

Species	Habitat	Season	Brood/Young Rearing
Deer	substantial	winter	
Elk	crucial	year-long	
Greater Sage Grouse		occupied	brood-rearing

Table 01R-12.4 - Vegetation History. The dominant vegetation type(s) and phase of woodland succession (Tausch, Miller, Roundy, & Chambers, 2009).

Year	Vegetation Type	Woodland Succession
2008	Low Rabbitbrush	Phase I
2011	Low Rabbitbrush	Phase I
2016	Low Rabbitbrush	Phase I

Site Notes

No Notes

Site Potential

1981-2010 Average Annual Precipitation 12 inches
 NRCS Ecological Site Upland Loam (Wyoming Big Sagebrush)
 NRCS Ecological Site # 028AY309UT
 States and Transitions No state and transition model is available for this ecological site.

This community likely behaves similar to the Upland Loam (Wyoming Big Sagebrush), R035XY209UT ecological site when subjected to disturbances. When established in 2008, the site was a Wyoming big sagebrush (*Artemisia tridentata* ssp. *wyomingensis*) flat that had been burned. Following the fire, much of the site has been dominated by yellow rabbitbrush (*Chrysothamnus viscidiflorus* ssp. *viscidiflorus*); However, Wyoming big sagebrush has increased in cover, but is confined to the end of the study (Table 01R-12.12, Table 01R-12.13). The herbaceous understory has remained moderately diverse and abundant on the site over the sample years (Table 01R-12.10, Table 01R-12.11). It is expected that with time and proper management, the native herbaceous and browse communities will have the opportunity to re-establish.

Trend Summary Tables

Table 01R-12.6 - Shrub/Tree Summary. Average modified Daubenmire quadrat and line intercept cover by year for shrubs/trees.

Year	Quadrat Cover (%)			Line-intercept Cover (%)		
	Preferred Shrub	Other Shrub	Tree	Preferred Shrub	Other Shrub	Tree
2008	2.9	13.6	-	4.3	17.8	-
2009	5.2	17.5	-	7.9	15.4	-
2011	5.4	12.6	-	5.7	13.2	-
2016	13.9	22.3	-	18.6	24.8	-

Table 01R-12.7 - Herbaceous Summary. Nested frequency and average modified Daubenmire quadrat cover by year for herbaceous functional groups.

Year	Nested Frequency				Quadrat Cover (%)			
	Annual Grass	Perennial Grass	Annual/Biennial Forb	Perennial Forb	Annual Grass	Perennial Grass	Annual/Biennial Forb	Perennial Forb
2008	60	289	79	385	0.3	7.6	0.6	7.4
2009	137	291	133	326	2.2	17.1	2.5	12.6
2011	18	286	363	403	0.1	10.1	11.0	18.4
2016	306	315	187	175	12.0	14.6	2.5	2.2

Table 01R-12.8 - Basic Ground Cover. Average modified Daubenmire quadrat cover by year for basic ground cover types.

Year	Cover Type (%)					
	Bare Ground	Cryptograms	Litter	Pavement	Rock	Vegetation
2008	41.8	0.0	24.3	11.2	2.3	32.2
2009	35.0	-	24.0	10.3	0.4	47.9
2011	33.1	0.0	13.1	1.2	0.4	54.8
2016	25.2	-	22.6	4.4	0.2	60.8

Table 01R-12.9 - Pellet Group Data. Quadrat frequency and pellet group transect data for animal pellets. Rabbit pellet groups are not sampled in the pellet group transect.

Year	Cattle	Mule Deer	Elk	Horse	Rabbit
	Quadrat Frequency				
2008	20	1	-	1	2
2009	7	3	-	-	4
2011	6	1	-	-	1
2016	7	2	1	-	3
Year	Days Use Per Acre (ha)				
2008	3.6 (9.0)	1.3 (3.3)	-	-	-
2009	27.6 (68.1)	-	1.3 (3.3)	-	-
2011	34.1 (84.3)	-	-	-	-
2016	5.1 (12.6)	1.3 (3.3)	-	-	-

Table 01R-12.10 - Grass Species. Nested frequency and modified Daubenmire average cover by year.

GRASS SPECIES	Achnatherum hymenoides (Indian ricegrass)	Agropyron cristatum ⁱ (crested wheatgrass)	Bromus tectorum ^{ai} (cheatgrass)	Elymus elymoides (squirreltail)	Koeleria macrantha (prairie Junegrass)	Pascopyrum smithii (western wheatgrass)	Poa fendleriana (muttongrass)	Poa secunda (Sandberg bluegrass)	Pseudoroegneria spicata (bluebunch wheatgrass)	Thinopyrum intermedium ⁱ (intermediate wheatgrass)
year	Nested Frequency									
2008	4	-	60	39	5	77	3	232	5	-
2009	1	3	137	25	19	23	-	239	18	53
2011	-	4	18	15	-	71	2	260	1	8
2016	17	37	306	39	8	62	-	267	20	-
year	Average Cover (%)									
2008	0.0	-	0.3	0.5	0.0	1.3	0.1	5.6	0.0	-
2009	0.0	0.3	2.2	1.1	0.5	0.7	-	12.5	0.2	1.9
2011	-	0.0	0.1	0.1	-	1.1	0.1	8.5	0.0	0.2
2016	0.2	0.9	12.0	1.1	0.0	0.7	-	10.9	0.8	-

a - Annual; n - Noxious Weed; i - Introduced Species

Table 01R-12.11 - Forb Species. Nested frequency and modified Daubenmire average cover by year.

FORB SPECIES	Achillea millefolium (Common yarrow)	Agoseris glauca (pale agoseris)	Allium (onion)	Alyssum desertorum ^{ai} (desert madwort)	Antennaria (pussytoes)	Astragalus (milkvetch)	Astragalus convallarius (lesser rushy milkvetch)	Camelina microcarpa ^{ai} (littlerpod false flax)	Ceratocephala testiculata ^{ai} (curvseed butterwort)	Chaenactis douglasii (Douglas' dustymaiden)	Chenopodium leptophyllum ^a (narrowleaf goosefoot)	Cirsium (thistle)	Collinsia parviflora ^a (maiden blue eyed Mary)	Collomia linearis ^a (tiny trumpet)	Comandra umbellata (bastard toadflax)	Cordylanthus ramosus ^a (bushy bird's beak)	Crepis acuminata (tapertip hawkbeard)
year	Nested Frequency																
2008	3	96	40	-	-	14	4	4	1	3	5	1	-	-	18	-	5
2009	-	22	133	-	-	3	10	15	-	23	-	2	-	-	21	9	7
2011	-	278	171	3	1	33	-	-	42	13	-	7	287	22	15	-	13
2016	-	12	88	43	-	4	4	3	2	-	-	5	19	6	32	9	5
year	Average Cover (%)																
2008	0.0	1.0	0.1	-	-	0.1	0.1	0.0	0.0	0.0	0.0	0.0	-	-	0.1	-	0.0
2009	-	0.0	2.0	-	-	0.1	0.1	0.1	-	0.1	-	0.0	-	-	0.3	0.3	0.1
2011	-	5.3	1.6	0.1	0.0	0.7	-	-	0.9	0.2	-	0.0	3.6	0.2	0.1	-	0.1
2016	-	0.1	0.8	0.3	-	0.0	0.0	0.0	0.0	-	-	0.2	0.1	0.1	0.4	0.4	0.2

a - Annual/Biennial; n - Noxious Weed; i - Introduced Species

FORB SPECIES	Cryptantha (cryptantha)	Descurainia pinnata ^a (western tansymustard)	Epilobium brachycarpum ^a (tall annual willowherb)	Gayophytum ramosissimum ^a (pinyon groundsmoke)	Hackelia patens (spotted stickseed)	Lactuca serriola ^{ai} (prickly lettuce)	Lappula occidentalis ^a (flatspine stickseed)	Lomatium triternatum (nineleaf biscuitroot)	Microsteris gracilis ^a (slender phlox)	Onobrychis viciifolia ⁱ (sainfoin)	Orogenia linearifolia (Great Basin Indian potato)	Orthocarpus ^a (owl's-clover)	Penstemon (beardtongue)	Phlox hoodii (spiny phlox)	Phlox longifolia (longleaf phlox)	Polygonum douglasii ^a (Douglas' knotweed)	Senecio integerrimus ^a (lambstongue ragwort)	
year	Nested Frequency																	
2008	-	-	-	3	-	8	5	-	-	-	-	-	16	-	356	18	-	
2009	-	13	-	11	-	80	12	-	-	-	-	-	14	-	288	20	-	
2011	6	14	25	-	4	10	5	12	121	6	13	-	16	23	282	7	81	
2016	-	-	8	-	1	2	-	-	16	1	3	7	3	-	58	27	-	
year	Average Cover (%)																	
2008	-	-	-	0.0	-	0.1	0.0	-	-	-	-	-	0.1	-	5.8	0.0	-	
2009	-	0.5	-	0.1	-	1.1	0.2	-	-	-	-	-	0.1	-	9.8	0.1	-	
2011	0.0	0.0	0.1	-	0.0	0.0	0.0	0.0	0.6	0.0	0.1	-	0.1	0.8	7.9	0.0	3.6	
2016	-	-	0.1	-	0.0	0.0	-	-	0.0	0.0	0.0	0.3	0.0	-	0.5	0.1	-	

a - Annual/Biennial; n - Noxious Weed; i - Introduced Species

FORB SPECIES	Sisymbrium altissimum ^{ai} (tall tumblemustard)	Symphoricarichum (aster)	Taraxacum officinale (common dandelion)	Tragopogon dubius ^{ai} (yellow salsify)	Trifolium (clover)	Veronica biloba ^{ai} (two-lobed speedwell)	Viola (violet)
year	Nested Frequency						
2008	-	9	7	25	-	25	-
2009	-	-	1	5	-	-	-
2011	-	3	28	37	-	67	66
2016	1	-	-	13	1	115	10
year	Average Cover (%)						
2008	-	0.0	0.0	0.3	-	0.1	-
2009	-	-	0.0	0.1	-	-	-
2011	-	0.0	0.4	0.7	-	0.9	0.9
2016	0.0	-	-	0.0	0.0	1.1	0.0

a - Annual/Biennial; n - Noxious Weed; i - Introduced Species

Table 01R-12.12 - Shrub and Tree Species. Average modified Daubenmire quadrat and line intercept cover by year.

SHRUB SPECIES	Line Intercept Cover (%)							
	year	Line Intercept Cover (%)						
Artemisia nova ^p (black sagebrush)	-	3.9	17.8	-	-	-	-	0.4
Artemisia tridentata ssp. wyomingensis ^p (Wyoming big sagebrush)	-	7.3	15.4	-	-	-	-	0.6
Chrysothamnus viscidiflorus ssp. viscidiflorus (yellow rabbitbrush)	2.9	2.4	13.2	-	-	-	-	0.4
Ericameria nauseosa (rubber rabbitbrush)	8.7	8.8	24.4	0.4	-	-	-	1.1
Eriogonum corymbosum (crisp-leaf buckwheat)	-	-	-	-	0.0	-	0.0	0.0
Eriogonum microthecum ^p (slender buckwheat)	-	-	-	-	-	-	0.0	0.1
Opuntia (pricklypear)	-	-	-	-	-	-	0.1	0.0
Purshia tridentata ^p (antelope bitterbrush)	-	-	-	-	-	-	-	0.2
year	Quadrat Cover (%)							
2008	-	2.9	13.6	-	0.0	-	0.0	0.0
2009	-	5.0	17.5	-	-	-	0.0	0.1
2011	2.5	2.7	12.5	0.0	-	0.1	0.1	0.0
2016	3.2	10.4	22.2	0.0	-	0.1	0.0	0.2

t - Tree Species; p - Preferred Browse; i - Introduced

Table 01R-12.13 - Shrub/Tree Characteristics. Population characteristics of shrub/tree species populations including density reproduction (seedlings), age distribution, utilization, vigor and average size (height/crown) of plants.

Year	Density		Age Class Distribution			Utilization		Poor Vigor (%)	Average Height Crown (cm)
	Plants Per Acre		Excluding Seedlings			Moderate (%)	Heavy (%)		
	Excluding Seedlings	Seedling	Young (%)	Mature (%)	Decadent (%)				
Amelanchier utahensis^p -- (Utah serviceberry)									
2008	-	-	-	-	-	-	-	-	56/61
2009	-	-	-	-	-	-	-	-	71/78
2011	-	-	-	-	-	-	-	-	76/105
2016	-	-	-	-	-	-	-	-	73/96
Artemisia nova^p -- (black sagebrush)									
2008	-	-	-	-	-	-	-	-	-/-
2009	-	-	-	-	-	-	-	-	-/-
2011	3540	-	23	77	0	0	0	9	17/33
2016	2720	-	1	98	2	2	0	2	31/47
Artemisia tridentata ssp. wyomingensis^p -- (Wyoming big sagebrush)									
2008	3320	2580	19	49	31	37	8	13	34/49
2009	-	-	-	-	-	-	-	-	32/45
2011	3380	140	37	63	1	0	0	4	31/39
2016	3060	140	33	66	1	11	12	1	59/74
Bassia prostrataⁱ -- (forage kochia)									
2008	-	-	-	-	-	-	-	-	-/-
2009	-	-	-	-	-	-	-	-	-/-
2011	-	-	-	-	-	-	-	-	17/35
2016	-	-	-	-	-	-	-	-	-/-
Chrysothamnus viscidiflorus ssp. viscidiflorus -- (yellow rabbitbrush)									
2008	14340	3740	24	69	6	1	0	2	29/44
2009	-	-	-	-	-	-	-	-	27/45
2011	8220	1000	27	53	20	13	0	13	29/47
2016	10440	60	12	85	3	0	0	27	35/53

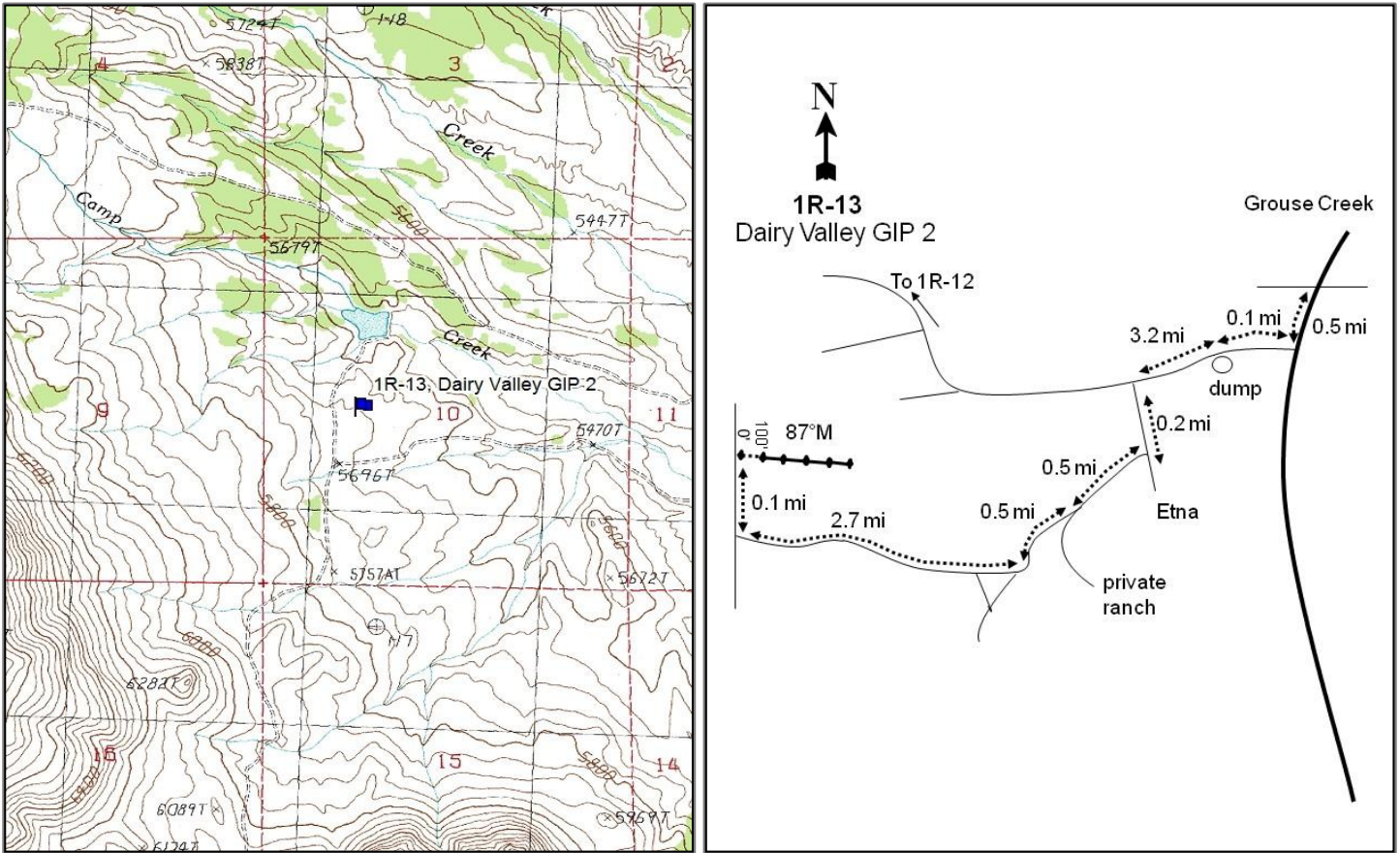
Year	Density		Age Class Distribution			Utilization		Poor Vigor (%)	Average Height Crown (cm)
	Plants Per Acre		Excluding Seedlings			Moderate (%)	Heavy (%)		
	Excluding Seedlings	Seedling	Young (%)	Mature (%)	Decadent (%)				
Eriogonum corymbosum -- (crispleaf buckwheat)									
2008	80	20	0	100	0	0	0	0	20/32
2009	-	-	-	-	-	-	-	-	-/-
2011	-	-	-	-	-	-	-	-	-/-
2016	-	-	-	-	-	-	-	-	-/-
Eriogonum microthecum^P -- (slender buckwheat)									
2008	-	-	-	-	-	-	-	-	-/-
2009	-	-	-	-	-	-	-	-	-/-
2011	40	-	0	50	50	0	0	0	10/13
2016	140	-	0	100	0	0	0	0	30/29
Ericameria nauseosa -- (rubber rabbitbrush)									
2008	-	-	-	-	-	-	-	-	70/90
2009	-	-	-	-	-	-	-	-	43/68
2011	-	-	-	-	-	-	-	-	74/91
2016	60	-	67	33	0	0	0	67	63/62
Juniperus osteosperma^t -- (Utah juniper)									
2008	-	-	-	-	-	-	-	-	-/-
2009	-	-	-	-	-	-	-	-	-/-
2011	-	-	-	-	-	-	-	-	-/-
2016	-	-	-	-	-	-	-	-	-/-
Opuntia -- (pricklypear)									
2008	140	-	0	43	57	0	0	57	11/32
2009	-	-	-	-	-	-	-	-	13/32
2011	60	-	0	100	0	0	0	0	11/36
2016	220	-	9	91	0	0	0	0	13/18
Purshia tridentata^P -- (antelope bitterbrush)									
2008	60	20	33	67	0	33	33	0	44/123
2009	-	-	-	-	-	-	-	-	53/102
2011	120	-	0	100	0	83	0	0	42/115
2016	60	-	33	67	0	33	0	0	48/105
Symphoricarpos oreophilus -- (mountain snowberry)									
2008	-	-	-	-	-	-	-	-	14/39
2009	-	-	-	-	-	-	-	-	-/-
2011	-	-	-	-	-	-	-	-	29/76

t - Tree Species; p - Preferred Browse; i - Introduced Species

Table 01R-12.14 - Tree Characteristics. Point-quarter tree density, size class distribution, and average diameter.

Year	Density	Size Class Distribution				Average Diameter (cm)	
	Trees per Acre	Seedling (%)	1-4'	4-8'	8-12'		>12' (%)
Juniperus osteosperma (Utah juniper)							
2008	1	-	-	-	100	-	48.0
2011	20	50	-	50	-	-	5.3
2016	16	-	100	-	-	-	2.5

DAIRY VALLEY GIP 2 - STUDY NO. 01R-13



Location Information

USGS 7.5 min Map Info Death Creek Reservoir; Township 11N, Range 19W, Section 10
 GPS (0' Stake) NAD 83 UTM ZONE 12, 248771 East 4619741 North

Transect Information

Browse Tag # (0' Stake) 250
 Transect Bearing 87° magnetic
 Length 500ft
 Belt Placement Belt 1 (11ft), Belt 2 (34ft), Belt 3 (59ft), Belt 4 (71ft), Belt 5 (95ft)
 Belt Marker Placement Standard

Directions to Site

From Grouse Creek, follow the Grouse Creek Road south out of town until the pavement ends. From the pavement, drive 0.5 miles to a right turn, and then go 0.1 miles to a dump on the left side of the road. Continue 3.2 miles and take the road on the left (78800 W). Drive for 0.2 miles to Etna, turn right in front of the mailboxes and continue for 0.2 miles to a gate with a private ranch on the left. From the gate, go 0.3 miles to a fork and stay right. Drive 0.1 miles to another gate and continue 0.4 miles passed it, staying right at the fork. From the fork, go 1.3 miles to the next gate and drive 0.3 miles to another gate. Continue 0.9 miles to the next gate. Go 0.2 miles, turn right and drive 0.1 miles to the witness post on the right side of the road. From the witness post, go 96 paces to the 0-foot stake at 71 degrees magnetic. The 0-foot stake is marked with browse tag # 250.

Site Information

Land Ownership	Private
Land Administrator	Private
Allotment	DEATH CREEK
Elevation	5,676ft (1,730m)
Aspect	Northeast
Slope	8%
Sample Dates	08/12/2008, 05/25/2011, 07/27/2016

Table 01R-13.1 Disturbance History. Recorded history of major disturbances.

Treatment/Disturbance	Name	WRI DB#	Date	Size (acres)
Fire - Wildfire	Winecup complex	-	2007	234413
Chaining - One-Way Ely	Dairy Valley Fire Rehabilitation	992	Jun. 2008	2700
Seeding - Aerial Before	Dairy Valley Fire Rehabilitation	992	Dec. 2007	6900

Table 01R-13.2 Seed Mix.List of known seeded plant species and rates (if available).

Mix Name		Application Type	Application Date	Acres	
Dairy Valley		Aerial	Dec 2007	6300	
Type	Species	Common Name	Cultivar/Source ID	Bulk lbs/acre	PLS lbs/acre
G	Agropyron cristatum	Crested Wheatgrass	Hcrest	0.87	0.67
G	Agropyron cristatum	Crested Wheatgrass	Nordan	0.87	0.83
G	Dactylis glomerata	Orchardgrass	Paiute	0.51	0.44
G	Elymus wawawaiensis	Snake River Wheatgrass	Secar	1.00	0.94
G	Leymus cinereus	Great Basin Wildrye	Trailhead	0.54	0.49
G	Poa secunda	Canby Bluegrass	Canbar	0.04	0.03
G	Poa secunda	Canby Bluegrass	Canbar	0.32	0.24
G	Pseudoroegneria spicata	Bluebunch Wheatgrass	P-7	1.00	0.92
G	Thinopyrum intermedium	Pubescent Wheatgrass		1.00	0.91
G	Thinopyrum intermedium	Intermediate Wheatgrass	Oahe	1.00	0.89
F	Medicago sativa	Alfalfa	Ranger	0.37	0.34
F	Medicago sativa	Alfalfa	Ladak	1.13	1.12
F	Melilotus officinalis	Yellow Sweetclover		0.51	0.41
F	Onobrychis viciifolia	Sainfoin	Eski	0.75	0.69
F	Onobrychis viciifolia	Sainfoin	Eski	0.25	0.22
F	Sanguisorba minor	Small Burnet	Delar	0.92	0.85
F	Sanguisorba minor	Small Burnet	Delar	0.08	0.07
S	Bassia prostrata	Forage Kochia	Immigrant	0.37	0.21

Wildlife Habitat and Vegetation History

Table 01R-13.3 - Wildlife Seasonal Habitat. UDWR wildlife habitat and seasonality.

Species	Habitat	Season	Brood/Young Rearing
Deer	substantial	winter	
Elk	crucial	year-long	
Greater Sage Grouse		occupied	brood-rearing

Table 01R-13.4 - Vegetation History. The dominant vegetation type(s) and phase of woodland succession (Tausch, Miller, Roundy, & Chambers, 2009).

Year	Vegetation Type	Woodland Succession
2008		No Encroachment
2011	Annual Grass/Perennial Grass	No Encroachment
2016	Perennial Grass/Annual Grass	No Encroachment

Site Notes

No Notes

Site Potential

1981-2010 Average Annual Precipitation 11 inches
 NRCS Ecological Site Upland Loam (Wyoming Big Sagebrush)
 NRCS Ecological Site # 028AY309UT
 States and Transitions No state and transition model is available for this ecological site.

This introduced perennial grass community likely behaves similar to the Upland Loam (Wyoming Big Sagebrush), R035XY209UT ecological site when subjected to disturbances. When established in 2008, the site was a burned Utah juniper (*Juniperus osteosperma*) woodland. Browse species have been slow to establish; however, perennial grasses have steadily increased in abundance with crested wheatgrass (*Agropyron cristatum*) becoming the main component within the community (Table 01R-13.7, Table 01R-13.10). The herbaceous understory has remained moderately diverse in abundance since 2011 (Table 01R-13.7, Table 01R-13.11). It is expected that with time and proper management native herbaceous and browse communities will have the opportunity to re-establish.

Trend Summary Tables

Table 01R-13.6 - Shrub/Tree Summary. Average modified Daubenmire quadrat and line intercept cover by year for shrubs/trees.

Year	Quadrat Cover (%)			Line-intercept Cover (%)		
	Preferred Shrub	Other Shrub	Tree	Preferred Shrub	Other Shrub	Tree
2008	-	0.3	-	-	-	-
2011	0.0	0.2	-	-	0.3	-
2016	0.0	3.8	-	0.1	4.4	-

Table 01R-13.7 - Herbaceous Summary. Nested frequency and average modified Daubenmire quadrat cover by year for herbaceous functional groups.

Year	Nested Frequency				Quadrat Cover (%)			
	Annual Grass	Perennial Grass	Annual/Biennial Forb	Perennial Forb	Annual Grass	Perennial Grass	Annual/Biennial Forb	Perennial Forb
2008	14	171	18	139	0.0	2.0	0.1	1.1
2011	372	243	409	192	9.5	8.8	8.6	3.8
2016	361	320	339	100	18.3	20.6	4.2	2.4

Table 01R-13.8 - Basic Ground Cover. Average modified Daubenmire quadrat cover by year for basic ground cover types.

Year	Cover Type (%)					
	Bare Ground	Cryptograms	Litter	Pavement	Rock	Vegetation
2008	28.8	-	18.7	56.8	3.9	3.7
2011	29.5	0.0	19.8	9.6	2.3	31.0
2016	25.0	0.4	18.1	20.3	0.5	49.3

Table 01R-13.9 - Pellet Group Data. Quadrat frequency and pellet group transect data for animal pellets. Rabbit pellet groups are not sampled in the pellet group transect.

Year	Cattle	Mule Deer	Rabbit
	Quadrat Frequency		
2008	-	-	6
2011	7	-	-
2016	6	1	6
Year	Days Use Per Acre (ha)		
2008	2.9 (7.2)	-	-
2011	13.8 (34.1)	-	-
2016	19.6 (48.4)	0.7 (1.7)	-

Table 01R-13.10 - Grass Species. Nested frequency and modified Daubenmire average cover by year.

GRASS SPECIES	Achnatherum hymenoides (Indian ricegrass)	Agropyron cristatum ⁱ (crested wheatgrass)	Bromus arvensis ^{ai} (field brome)	Bromus tectorum ^{ai} (cheatgrass)	Elymus elymoides (squirreltail)	Pascopyrum smithii (western wheatgrass)	Poa secunda (Sandberg bluegrass)	Pseudoroegneria spicata (bluebunch wheatgrass)	Thinopyrum intermedium ⁱ (intermediate wheatgrass)
year	Nested Frequency								
2008	23	-	-	14	19	7	134	20	-
2011	25	70	-	372	18	8	156	20	33
2016	50	164	9	361	45	15	148	61	47
year	Average Cover (%)								
2008	0.4	-	-	0.0	0.2	0.0	1.2	0.2	-
2011	0.9	2.0	-	9.5	0.4	0.2	3.8	0.7	0.9
2016	3.5	8.1	0.2	18.1	0.9	0.6	2.9	2.4	2.2

a - Annual; n - Noxious Weed; i - Introduced Species

Table 01R-13.11 - Forb Species. Nested frequency and modified Daubenmire average cover by year.

FORB SPECIES	Agoseris glauca (pale agoseris)	Allium (onion)	Alyssum desertorum ^{ai} (desert madwort)	Antennaria (pussytoes)	Astragalus (milkvetch)	Astragalus convallarius (lesser rushy milkvetch)	Astragalus utahensis (Utah milkvetch)	Balsamorhiza hookeri (Hooker's balsamroot)	Camelina microcarpa ^{ai} (littledod false flax)	Ceratocephala testiculata ^{ai} (curvseed butterwort)	Chaenactis douglasii (Douglas' dustymaiden)	Collinsia parviflora ^a (maiden blue eyed Mary)	Collomia linearis ^a (tiny trumpet)	Comandra umbellata (bastard toadflax)	Cordylanthus ramosus ^a (bushy bird's beak)	Crepis acuminata (tapertip hawksbeard)	Cryptantha (cryptantha)
year	Nested Frequency																
2008	-	-	9	2	-	3	-	5	-	-	-	-	1	12	-	11	-
2011	27	7	314	12	14	6	3	19	-	51	3	191	-	10	-	31	8
2016	5	-	331	-	7	5	2	-	2	6	4	5	-	23	1	12	-
year	Average Cover (%)																
2008	-	-	0.0	0.0	-	0.1	-	0.0	-	-	-	-	0.0	0.2	-	0.2	-
2011	0.4	0.0	2.6	0.2	0.1	0.0	0.0	0.2	-	0.7	0.0	0.8	-	0.1	-	0.5	0.1
2016	0.1	-	3.6	-	0.2	0.1	0.0	-	0.0	0.0	0.0	0.0	-	0.7	0.0	0.1	-

a - Annual/Biennial; n - Noxious Weed; i - Introduced Species

FORB SPECIES	Descurainia pinnata ^a (western tansymustard)	Gayophytum ramosissimum ^a (pinyon groundsmoke)	Gilia ^a (gilia)	Heterotheca villosa (hairy false goldenaster)	Lactuca serriola ^{ai} (prickly lettuce)	Lappula occidentalis ^{ai} (flatspine stickseed)	Lomatium (desertparsley)	Lomatium triternatum (nineleaf biscuitroot)	Medicago sativa ⁱ (alfalfa)	Microsteris gracilis ^a (slender phlox)	Onobrychis viciifolia ⁱ (sainfoin)	Penstemon (beardtongue)	Phlox hoodii (spiny phlox)	Phlox longifolia (longleaf phlox)	Sanguisorba minor ⁱ (small burnet)	Sisymbrium altissimum ^{ai} (tall tumbledustard)	Symphotrichum (aster)
year	Nested Frequency																
2008	7	-	4	-	-	0	-	-	1	-	-	1	6	95	-	-	16
2011	179	4	82	4	14	17	7	5	-	28	13	8	5	94	1	127	22
2016	7	-	12	-	27	2	-	-	-	-	3	-	12	25	-	5	4
year	Average Cover (%)																
2008	0.0	-	0.0	-	-	0.0	-	-	0.0	-	-	0.0	0.0	0.4	-	-	0.1
2011	1.2	0.0	0.3	0.0	0.1	0.2	0.2	0.0	-	0.1	0.1	0.0	0.2	0.9	0.0	2.8	0.8
2016	0.0	-	0.1	-	0.2	0.0	-	-	-	-	0.0	-	0.6	0.1	-	0.2	0.2

a - Annual/Biennial; n - Noxious Weed; i - Introduced Species

FORB SPECIES	Taraxacum officinale (common dandelion)	Townsendia (Townsend daisy)	Tragopogon dubius ^{ai} (yellow salsify)
year	Nested Frequency		
2008	2	-	-
2011	1	2	-
2016	-	14	7
year	Average Cover (%)		
2008	0.0	-	-
2011	0.0	0.0	-
2016	-	0.2	0.1

a - Annual/Biennial; n - Noxious Weed; i - Introduced Species

Table 01R-13.12 - Shrub and Tree Species. Average modified Daubenmire quadrat and line intercept cover by year.

SHRUB SPECIES	Line Intercept Cover (%)			
	Artemisia tridentata ssp. wyomingensis ^P (Wyoming big sagebrush)	Bassia prostrata ⁱ (forage kochia)	Chrysothamnus viscidiflorus ssp. viscidiflorus (yellow rabbitbrush)	Opuntia (pricklypear)
year	Line Intercept Cover (%)			
2008	-	-	0	-
2011	-	-	0.3	-
2016	0.1	0.2	4.2	-
year	Quadrat Cover (%)			
2008	-	0.0	0.1	0.2
2011	0.0	-	0.2	-
2016	0.0	0.2	3.6	0.0

t - Tree Species; p - Preferred Browse; i - Introduced

Table 01R-13.13 - Shrub/Tree Characteristics. Population characteristics of shrub/tree species populations including density reproduction (seedlings), age distribution, utilization, vigor and average size (height/crown) of plants.

Year	Density		Age Class Distribution			Utilization		Poor Vigor (%)	Average Height Crown (cm)
	Plants Per Acre		Excluding Seedlings			Moderate (%)	Heavy (%)		
	Excluding Seedlings	Seedling	Young (%)	Mature (%)	Decadent (%)				
Amelanchier utahensis^P -- (Utah serviceberry)									
2008	-	-	-	-	-	-	-	-	23/50
2011	-	-	-	-	-	-	-	-	37/53
2016	-	-	-	-	-	-	-	-	56/112
Artemisia tridentata ssp. wyomingensis^P -- (Wyoming big sagebrush)									
2008	-	-	-	-	-	-	-	-	-/-
2011	20	-	100	0	0	0	0	0	24/33
2016	20	-	0	100	0	0	0	0	48/64
Bassia prostrataⁱ -- (forage kochia)									
2008	20	40	0	100	0	0	0	0	8/16
2011	60	-	33	67	0	0	67	0	6/17
2016	240	-	8	92	0	0	0	0	43/70
Chrysothamnus viscidiflorus ssp. viscidiflorus -- (yellow rabbitbrush)									
2008	400	-	10	90	0	0	0	0	15/21
2011	360	-	11	83	6	6	0	0	26/43
2016	1620	-	9	91	0	0	0	0	36/59
Ericameria nauseosa -- (rubber rabbitbrush)									
2008	-	-	-	-	-	-	-	-	-/-
2011	-	-	-	-	-	-	-	-	-/-
2016	-	-	-	-	-	-	-	-	61/88
Juniperus osteosperma^t -- (Utah juniper)									
2008	-	-	-	-	-	-	-	-	-/-
2011	-	-	-	-	-	-	-	-	-/-
2016	-	-	-	-	-	-	-	-	-/-
Opuntia -- (pricklypear)									
2008	280	-	29	21	50	0	0	57	9/26
2011	80	-	25	75	0	0	0	0	6/18
2016	80	-	0	100	0	0	0	0	15/41

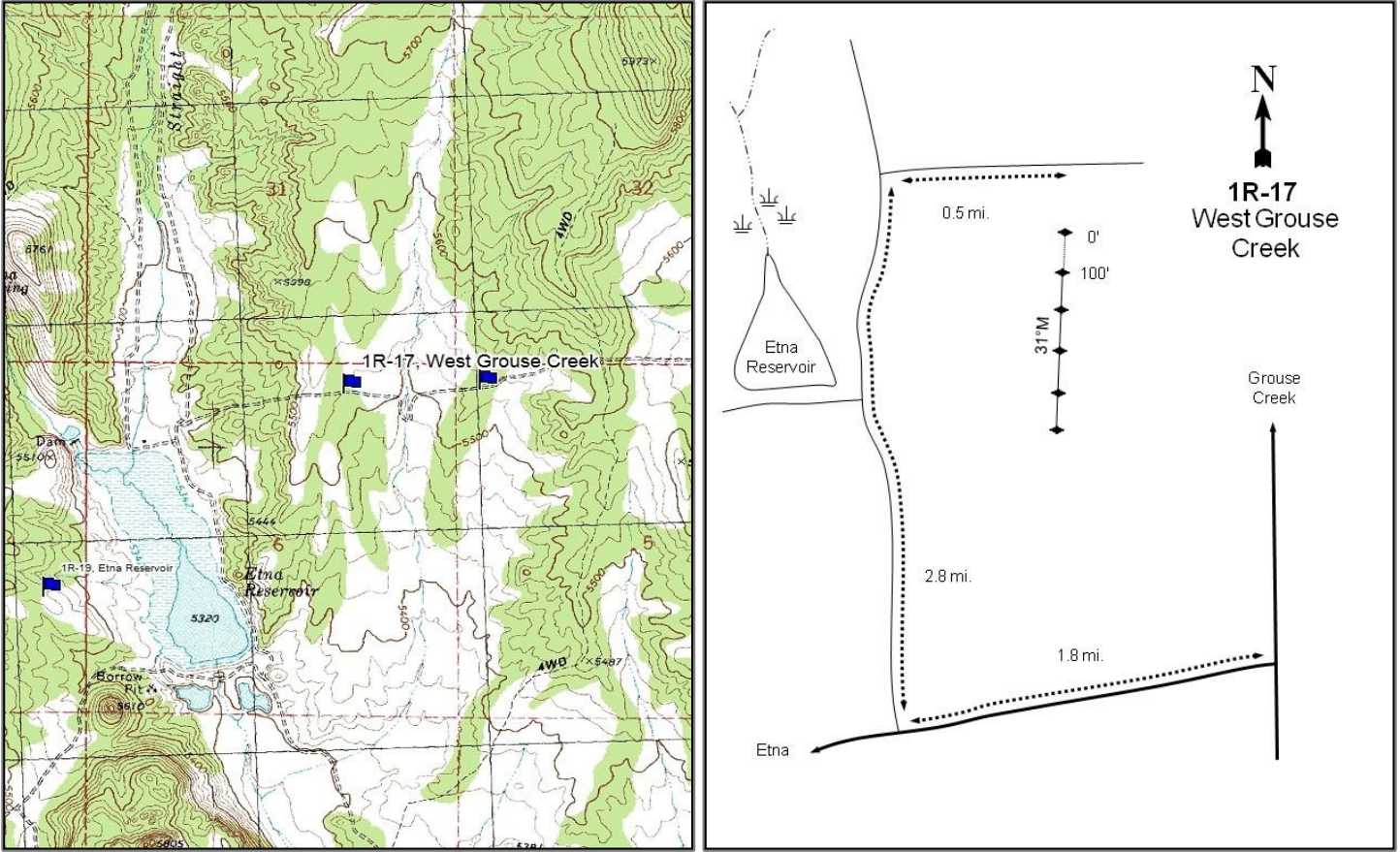
Year	Density		Age Class Distribution			Utilization		Poor Vigor (%)	Average Height Crown (cm)
	Plants Per Acre		Excluding Seedlings			Moderate (%)	Heavy (%)		
	Excluding Seedlings	Seedling	Young (%)	Mature (%)	Decadent (%)				
Purshia tridentata ^P -- (antelope bitterbrush)									
2008	-	-	-	-	-	-	-	-	-/-
2011	-	-	-	-	-	-	-	-	12/44
2016	-	-	-	-	-	-	-	-	42/111

t - Tree Species; p - Preferred Browse; i - Introduced Species

Table 01R-13.14 - Tree Characteristics. Point-quarter tree density, size class distribution, and average diameter.

Year	Density	Size Class Distribution					Average Diameter (cm)
	Trees per Acre	Seedling (%)	1-4'	4-8'	8-12'	>12' (%)	
Juniperus osteosperma (Utah juniper)							
2008	1	-	100	-	-	-	12.0
2011	1	-	50	50	-	-	11.5
2016	1	-	100	-	-	-	12.0

WEST GROUSE CREEK - STUDY No. 01R-17



Location Information

USGS 7.5 min Map Info Grouse Creek NW; Township 11N, Range 18W, Section 06
 GPS (0' Stake) NAD 83 UTM ZONE 12, 254366 East 4621842 North

Transect Information

Browse Tag # (0' Stake) 789
 Transect Bearing 180° magnetic
 Length 500ft
 Belt Placement Line 1 (11ft), Line 2 (34ft), Line 3 (59ft), Line 4 (71ft), Line 5 (95ft)
 Belt Marker Placement Standard, Belt 5: 1ft

Directions to Site

Head north towards Grouse Creek and turn left (west) toward Etna. Drive 1.8 miles then turn right. Drive for 2.8 miles and then turn right (east). Drive another 0.5 miles. The transect will be to the south of the road.

Site Information

Land Ownership	Federal
Land Administrator	BLM
Allotment	GROUSE CREEK
Elevation	5,520ft (1,682m)
Aspect	Southeast
Slope	7-8%
Sample Dates	07/09/2013, 07/28/2016

Table 01R-17.1 Disturbance History. Recorded history of major disturbances.

Treatment/Disturbance	Name	WRI DB#	Date	Size (acres)
Mechanical - Bullhog	West Grouse Creek Bullhog Phase 2	2574	October-December 2013	1079
Seeding - Aerial Before	West Grouse Creek Bullhog Phase 2	2574	October 2013	1079

Table 01R-17.2 Seed Mix.List of known seeded plant species and rates (if available).

Mix Name			Application Type	Application Date	Acres
West Grouse Creek Bullhog 11			Aerial	Oct 2013	1079
Type	Species	Common Name	Cultivar/Source ID	Bulk lbs/acre	PLS lbs/acre
G	Elymus lanceolatus	Thickspike Wheatgrass		0.79	0.72
G	Elymus lanceolatus	Thickspike Wheatgrass	Bannock	1.16	1.01
G	Elymus wawawaiensis	Snake River Wheatgrass	Secar	1.44	1.28
G	Poa secunda	Canby Bluegrass	Canbar	0.51	0.42
G	Psathyrostachys juncea	Russian Wildrye		1.02	0.88
G	Pseudoroegneria spicata	Bluebunch Wheatgrass	Anatone	0.97	0.75
F	Linum perenne	Blue Flax	Appar	0.20	0.17
F	Medicago sativa	Alfalfa	Ladak	1.02	0.93
F	Onobrychis viciifolia	Sainfoin	Eski	0.37	0.31
F	Onobrychis viciifolia	Sainfoin	Delaney	1.58	1.54
F	Sanguisorba minor	Small Burnet		1.95	1.79

Wildlife Habitat and Vegetation History

Table 01R-17.3 - Wildlife Seasonal Habitat. UDWR wildlife habitat and seasonality.

Species	Habitat	Season	Brood/Young Rearing
Deer	substantial	winter	
Elk	crucial	year-long	
Greater Sage Grouse		occupied	brood-rearing
Pronghorn	substantial	summer	

Table 01R-17.4 - Vegetation History. The dominant vegetation type(s) and phase of woodland succession (Tausch, Miller, Roundy, & Chambers, 2009).

Year	Vegetation Type	Woodland Succession
2013	Black Sagebrush/Juniper	Phase I transitioning to Phase II
2016	Black Sagebrush	Phase I

Site Notes

Utah juniper (*Juniperus osteosperma*) near the site is highlined.

Site Potential

1981-2010 Average Annual Precipitation	11 inches
NRCS Ecological Site	Upland Shallow Loam (Black Sagebrush)
NRCS Ecological Site #	R028AY325UT
States and Transitions	No state and transition model is available for the above ecological site.

When established in 2013 the site was dominated by a mix of black sagebrush (*Artemisia nova*) and Utah juniper. Utah juniper was transitioning to phase II encroachment and posed a risk to the resilience of the community. After the bullhog treatment much of the juniper cover was reduced substantially in 2016 (Table 01R- 17.12, Table 01R-17.13). There was not much change in the black sagebrush population following treatment; However, there was a shift in the age class of black sagebrush from a decadent population to one that is more mature (Table 01R-17.13). There was very limited herbaceous understory prior to treatment, but following the bullhog and seeding treatments herbaceous diversity and abundance increased significantly (Table 01R-17.7, Table 01R-17.11).

Trend Summary Tables

Table 01R-17.6 - Shrub/Tree Summary. Average modified Daubenmire quadrat and line intercept cover by year for shrubs/trees.

Year	Quadrat Cover (%)			Line-intercept Cover (%)		
	Preferred Shrub	Other Shrub	Tree	Preferred Shrub	Other Shrub	Tree
2013	12.6	1.5	13.3	9.6	2.2	15.4
2016	12.8	2.5	0.3	12.8	1.9	0.5

Table 01R-17.7 - Herbaceous Summary. Nested frequency and average modified Daubenmire quadrat cover by year for herbaceous functional groups.

Year	Nested Frequency				Quadrat Cover (%)			
	Annual Grass	Perennial Grass	Annual/Biennial Forb	Perennial Forb	Annual Grass	Perennial Grass	Annual/Biennial Forb	Perennial Forb
2013	37	182	34	151	0.1	2.9	0.2	1.0
2016	283	269	95	124	7.6	13.3	0.7	4.5

Table 01R-17.8 - Basic Ground Cover. Average modified Daubenmire quadrat cover by year for basic ground cover types.

Year	Cover Type (%)					
	Bare Ground	Cryptograms	Litter	Pavement	Rock	Vegetation
2013	11.6	2.9	39.0	20.6	8.2	33.6
2016	12.5	1.6	44.4	17.7	0.7	34.0

Table 01R-17.9 - Pellet Group Data. Quadrat frequency and pellet group transect data for animal pellets. Rabbit pellet groups are not sampled in the pellet group transect.

Year	Cattle	Mule Deer	Elk	Rabbit
	Quadrat Frequency			
2013	-	-	-	9
2016	-	7	1	24
Days Use Per Acre (ha)				
2013	0.7 (1.8)	5.3 (13.2)	-	-
2016	1.5 (3.6)	8.7 (21.5)	-	-

Table 01R-17.10 - Grass Species. Nested frequency and modified Daubenmire average cover by year.

GRASS SPECIES	Achnatherum hymenoides (Indian ricegrass)	Bromus inermis ⁱ (smooth brome)	Bromus tectorum ⁿⁱ (cheatgrass)	Elymus elymoides (squirreltail)	Elymus trachycaulus (slender wheatgrass)	Pascopyrum smithii (western wheatgrass)	Poa secunda (Sandberg bluegrass)	Psathyrostachys juncea ⁱ (Russian wildrye)	Pseudoroegneria spicata (bluebunch wheatgrass)
year	Nested Frequency								
2013	1	-	37	34	-	18	157	-	1
2016	3	0	283	80	41	47	136	1	81
year	Average Cover (%)								
2013	0.0	-	0.1	0.3	-	0.1	2.4	-	0.0
2016	0.2	0.0	7.6	2.9	2.3	1.0	4.2	0.1	2.6

a - Annual; n - Noxious Weed; i - Introduced Species

Table 01R-17.11 - Forb Species. Nested frequency and modified Daubenmire average cover by year.

FORB SPECIES	Agoseris glauca (pale agoseris)	Allium (onion)	Alyssum desertorum ^{ai} (desert madwort)	Androsace septentrionalis ^a (pygmyflower rockjasmine)	Antennaria (pussytoes)	Astragalus (milkvetch)	Astragalus convallarius (lesser rusly milkvetch)	Astragalus utahensis (Utah milkvetch)	Camelina microcarpa ^{ai} (littlepod false flax)	Ceratocephala testiculata ^{ai} (curvseed butterwort)	Chaetopappa ericoides (rose heath)	Collinsia parviflora ^a (maiden blue eyed Mary)	Collomia linearis ^a (tiny trumpet)	Cordylanthus ^a (bird's-beak)	Crepis acuminata (tapertip hawkbeard)	Cynoglossum officinale ^{ami} (gypsyflower)	Descurainia pinnata ^a (western tansymustard)
year	Nested Frequency																
2013	3	3	-	12	8	26	6	3	-	-	-	-	-	11	-	1	-
2016	-	1	10	3	5	2	8	3	1	4	1	3	6	22	2	-	5
year	Average Cover (%)																
2013	0.0	0.0	-	0.0	0.0	0.2	0.0	0.0	-	-	-	-	-	0.1	-	0.0	-
2016	-	0.0	0.1	0.0	0.2	0.0	0.4	0.0	0.0	0.0	0.0	0.0	0.0	0.3	0.0	-	0.0

a - Annual/Biennial; n - Noxious Weed; i - Introduced Species

FORB SPECIES	Draba ^a (draba)	Gilia ^a (gilia)	Halogeton glomeratus ^{ai} (saltlover)	Lappula occidentalis ^a (flatspine stickseed)	Lepidium ^a (pepperweed)	Linum perenne ⁱ (blue flax)	Medicago sativa ⁱ (alfalfa)	Microsteris gracilis ^a (slender phlox)	Onobrychis vicifolia ⁱ (sainfoin)	Orthocarpus ^a (owl's-clover)	Petradoria pumila (rock goldenrod)	Phlox hoodii (spiny phlox)	Phlox longifolia (longleaf phlox)	Polygonum douglasii ^a (Douglas' knotweed)	Sanguisorba minor ⁱ (small burnet)	Symphotrichum (aster)	Townsendia (Townsend daisy)
year	Nested Frequency																
2013	-	-	0	-	-	-	-	12	-	-	3	15	113	3	-	-	-
2016	5	30	-	1	18	61	2	8	10	3	-	20	24	4	12	3	3
year	Average Cover (%)																
2013	-	-	0.0	-	-	-	-	0.0	-	-	0.0	0.1	0.5	0.0	-	-	-
2016	0.0	0.1	-	0.0	0.1	2.4	0.0	0.0	0.6	0.1	-	0.3	0.1	0.0	0.1	0.2	0.1

a - Annual/Biennial; n - Noxious Weed; i - Introduced Species

Table 01R-17.12 - Shrub and Tree Species. Average modified Daubenmire quadrat and line intercept cover by year.

SHRUB SPECIES	Artemisia nova ^p (black sagebrush)	Artemisia tridentata ssp. wyomingensis ^p (Wyoming big sagebrush)	Chrysothamnus depressus ^p (longflower rabbitbrush)	Chrysothamnus viscidiflorus (yellow rabbitbrush)	Juniperus osteosperma ^t (Utah juniper)	Linanthus pungens (granite prickly phlox)	Opuntia (pricklypear)
year	Line Intercept Cover (%)						
2013	8	1.6	-	1.9	15.4	-	0.3
2016	10.8	2	-	1.9	0.5	-	-
year	Quadrat Cover (%)						
2013	10.6	1.9	0.0	0.8	13.3	0.5	0.1
2016	12.4	0.4	-	2.4	0.3	-	0.0

t - Tree Species; p - Preferred Browse; i - Introduced

Table 01R-17.13 - Shrub/Tree Characteristics. Population characteristics of shrub/tree species populations including density reproduction (seedlings), age distribution, utilization, vigor and average size (height/crown) of plants.

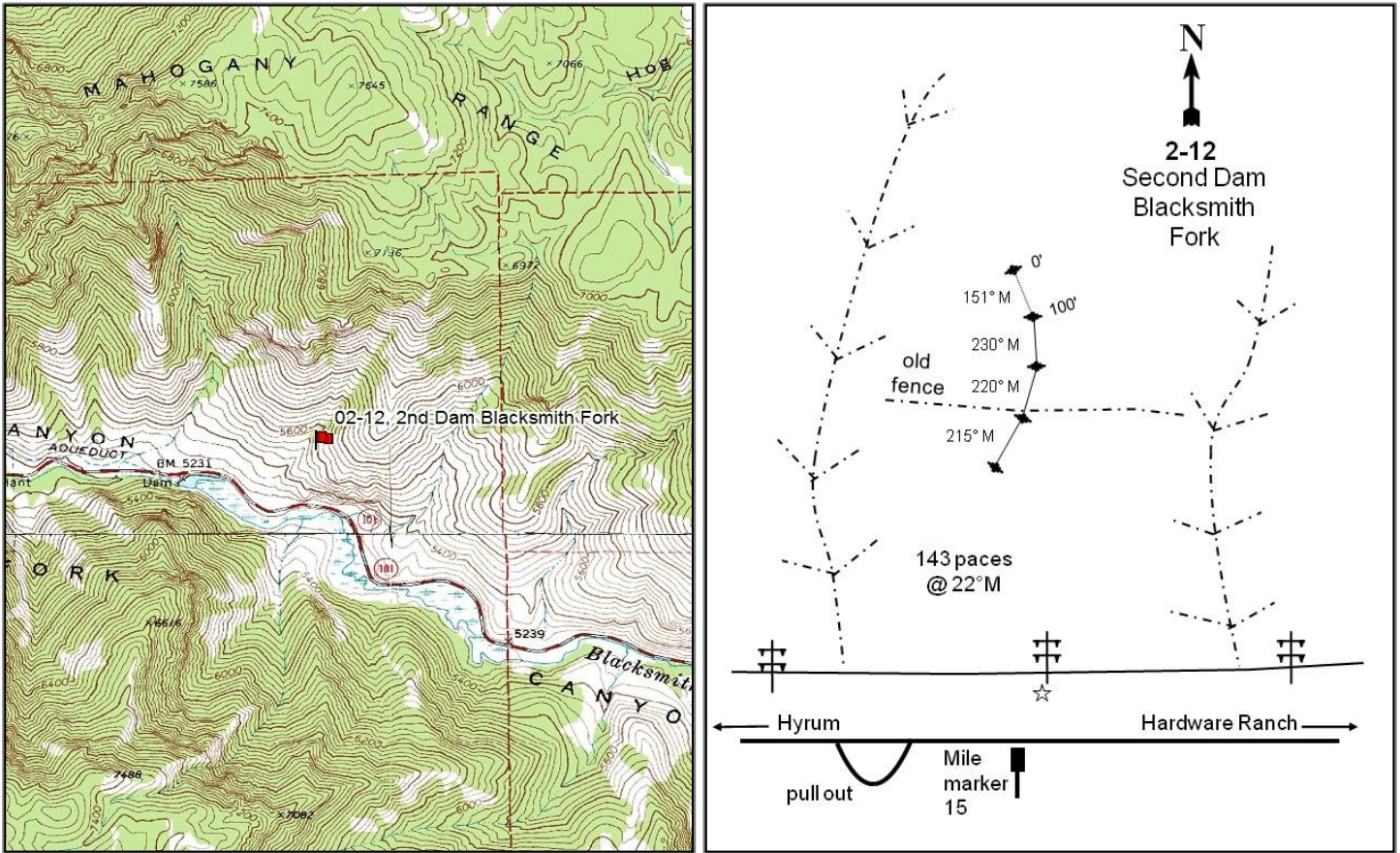
Year	Density Plants Per Acre		Age Class Distribution Excluding Seedlings			Utilization		Poor Vigor (%)	Average Height Crown (cm)
	Excluding Seedlings	Seedling	Young (%)	Mature (%)	Decadent (%)	Moderate (%)	Heavy (%)		
Artemisia nova ^p -- (black sagebrush)									
2013	5920	320	37	43	20	12	3	14	26/52
2016	4920	140	22	69	9	0	20	13	25/50
Artemisia tridentata ssp. wyomingensis ^p -- (Wyoming big sagebrush)									
2013	380	20	5	42	53	0	21	5	67/96
2016	320	880	31	56	13	6	0	31	54/95
Chrysothamnus viscidiflorus -- (yellow rabbitbrush)									
2013	1020	-	6	77	18	8	2	24	23/36
2016	1100	-	2	95	4	0	0	6	30/45
Ericameria nauseosa -- (rubber rabbitbrush)									
2013	-	-	-	-	-	-	-	-	-/-
2016	-	-	-	-	-	-	-	-	64/81
Juniperus osteosperma ^t -- (Utah juniper)									
2013	380	40	32	68	0	37	16	58	-/-
2016	60	-	67	0	33	0	0	0	-/-
Linanthus pungens -- (granite prickly phlox)									
2013	60	20	0	100	0	0	67	0	28/33
2016	40	-	0	100	0	0	0	0	22/20
Opuntia -- (pricklypear)									
2013	160	-	0	88	13	0	0	0	12/25
2016	120	-	0	100	0	0	0	0	12/23

t - Tree Species; p - Preferred Browse; i - Introduced Species

Table 01R-17.14 - Tree Characteristics. Point-quarter tree density, size class distribution, and average diameter.

Year	Density	Size Class Distribution				Average Diameter (cm)	
	Trees per Acre	Seedling (%)	1-4'	4-8'	8-12'		>12' (%)
Juniperus osteosperma (Utah juniper)							
2013	146	13	38	33	8	8	13.1
2016	37	18	82	-	-	-	2.6

SECOND DAM BLACKSMITH FORK - STUDY NO. 02-12



Location Information

USGS 7.5 min Map Info	Logan Peak SE; Township 10N, Range 2E, Section 01
GPS (0' Stake)	NAD 83 UTM ZONE 12, 444089 East 4608733 North

Transect Information

Browse Tag # (0' Stake)	7985
Transect Bearing	151° magnetic (Line 2: 230° magnetic, Line 3: 220° magnetic, Line 4: 215° magnetic)
Length	400ft
Belt Placement	Line 1 (11ft & 71ft), Line 2 (59ft), Line 3 (34ft), Line 4 (95ft)
Belt Marker Placement	Standard

Directions to Site

In Hyrum, proceed east up Blacksmith Fork Canyon (State Route 101) to mile marker 15. Continue 200 feet to the pullout before mile marker 15. Look for a power pole north of the east of the pull-out. From the pole, take an azimuth of 22 degrees magnetic and walk 143 paces to the 400-foot baseline stake marked by browse tag #7985. The baseline bearing is 151 degrees magnetic. Note: due to the rocky terrain the 100-foot stake is actually at the 95 foot mark; adjust the tape and belts accordingly. Line 2 runs 230 degrees magnetic. Line 3 runs 220 degrees magnetic. Line 4 runs 215 degrees magnetic.

Site Information

Land Ownership	Federal
Land Administrator	USFS
Allotment	No data
Elevation	5,600ft (1,707m)
Aspect	Southwest
Slope	36%
Sample Dates	08/30/1996, 06/29/2001, 07/10/2006, 07/21/2011, 06/27/2016

Table 02-12.1 Disturbance History. Recorded history of major disturbances.

Treatment/Disturbance	Name	WRI DB#	Date	Size (acres)
Hand Crew - Lop and Scatter	Blacksmith Fork Juniper Thinning and Shrub Restoration	2697	October-November 2013	1200

Wildlife Habitat and Vegetation History

Table 02-12.3 - Wildlife Seasonal Habitat. UDWR wildlife habitat and seasonality.

Species	Habitat	Season
Deer	crucial	winter
Elk	crucial	winter
Moose	crucial	winter

Table 02-12.4 - Vegetation History. The dominant vegetation type(s) and phase of woodland succession (Tausch, Miller, Roundy, & Chambers, 2009).

Year	Vegetation Type	Woodland Succession
1984	Perennial Grass/Mountain Big Sagebrush	Phase I
1990	Perennial Grass/Mountain Big Sagebrush	Phase I
1996	Perennial Grass/Mountain Big Sagebrush	Phase I
2001	Annual Grass/Mountain Big Sagebrush	Phase I
2006	Perennial Grass/Mountain Big Sagebrush	Phase I
2011	Annual Grass/Mountain Big Sagebrush	Phase I
2016	Annual Grass/Mountain Big Sagebrush	Phase I

Site Notes

No Notes

Soils

Table 02-12.5 - Soil Analysis Data. List of chemical and textural soil characteristics determined by laboratory analysis.

Texture	pH	%sand	%silt	%clay	%OM	PPM P	PPM K	ds/m	Sample Date
Clay Loam	7.4	36.6	35.1	28.4	3.4	10.0	176.0	0.7	08/30/1996

Site Potential

1981-2010 Average Annual Precipitation	24 inches
NRCS Ecological Site	Mountain Stony Loam (Antelope Bitterbrush)
NRCS Ecological Site #	047XA456UT
States and Transitions	No state and transition model is available.

This plant community does not have a well defined ecological site. However, due to the presence of Utah juniper (*Juniperus osteosperma*) since 1984 the community most resembles Community Phase 4.1 found of the Mountain Big Sagebrush/ Utah Juniper Invasion State (State 4). Antelope bitterbrush (*Purshia tridentata*) and mountain big sagebrush (*Artemisia tridentata* ssp. *vaseyana*) both have a reduced presence in the community with a depleted herbaceous understory indicated by elevated presence of annual brome species (*Bromus* sp.) (Table 02-12.12, Table 02-12.10). Bluebunch wheatgrass (*Pseudoroegneria spicata*) has remained on the site in significant quantities since establishment (Table 02-12.10). There has been no indication that there has been a transition in the community type. It is predicted that the site will remain in the current community type unless there is a major disturbance (USDA-NRCS, 2011).

Trend Summary Tables

Table 02-12.6 - Shrub/Tree Summary. Average modified Daubenmire quadrat and line intercept cover by year for shrubs/trees.

Year	Quadrat Cover (%)			Line-intercept Cover (%)		
	Preferred Shrub	Other Shrub	Tree	Preferred Shrub	Other Shrub	Tree
1996	5.2	1.5	-	-	-	-
2001	3.3	2.9	-	-	-	-
2006	3.6	1.5	-	6.8	3.9	-
2011	4.5	0.3	-	7.6	1.5	-
2016	2.5	0.6	-	6.7	1.8	-

Table 02-12.7 - Herbaceous Summary. Nested frequency and average modified Daubenmire quadrat cover by year for herbaceous functional groups.

Year	Nested Frequency				Quadrat Cover (%)			
	Annual Grass	Perennial Grass	Annual/Biennial Forb	Perennial Forb	Annual Grass	Perennial Grass	Annual/Biennial Forb	Perennial Forb
1996	429	272	324	82	9.6	10.3	4.4	1.8
2001	443	262	392	75	20.5	9.7	8.2	3.2
2006	356	263	351	131	8.6	14.0	8.0	5.9
2011	405	225	393	138	26.0	11.8	13.2	4.0
2016	457	208	330	94	37.6	6.2	7.8	2.9

Table 02-12.8 - Basic Ground Cover. Average modified Daubenmire quadrat cover by year for basic ground cover types.

Year	Cover Type (%)					
	Bare Ground	Cryptograms	Litter	Pavement	Rock	Vegetation
1996	4.6	4.3	31.6	3.8	31.4	32.8
2001	4.5	3.3	36.5	3.0	29.6	52.0
2006	9.0	1.8	30.1	6.9	36.6	34.3
2011	5.3	2.5	25.1	7.8	35.2	50.5
2016	2.9	0.3	21.1	4.4	31.6	53.1

Table 02-12.9 - Pellet Group Data. Quadrat frequency and pellet group transect data for animal pellets. Rabbit pellet groups are not sampled in the pellet group transect.

Year	Cattle	Mule Deer	Elk	Rabbit
	Quadrat Frequency			
1996	-	8	6	-
2001	-	4	1	-
2006	1	11	5	4
2011	-	5	2	-
2016	-	1	1	-
Days Use Per Acre (ha)				
1996	-	-	-	-
2001	-	12.1 (29.8)	6.0 (14.9)	-
2006	-	16.1 (39.7)	16.1 (39.7)	-
2011	-	10.0 (24.8)	3.4 (8.3)	-
2016	-	0.7 (1.7)	-	-

Table 02-12.10 - Grass Species. Nested frequency and modified Daubenmire average cover by year.

GRASS SPECIES	Bromus arvensis ^{ai} (field brome)	Bromus briziformis ^{ai} (rattlesnake brome)	Bromus tectorum ^{ai} (cheatgrass)	Koeleria macrantha (prairie Junegrass)	Pascopyrum smithii (western wheatgrass)	Poa bulbosa ⁱ (bulbous bluegrass)	Poa fendleriana (muttongrass)	Poa pratensis ⁱ (Kentucky bluegrass)	Poa secunda (Sandberg bluegrass)	Pseudoroegneria spicata (bluebunch wheatgrass)
year	Nested Frequency									
1996	339	11	255	13	-	4	-	-	179	170
2001	103	52	431	10	-	9	-	-	178	189
2006	51	82	313	5	3	11	2	11	132	196
2011	98	212	311	4	-	26	2	-	63	161
2016	87	149	437	12	27	42	7	2	34	123
year	Average Cover (%)									
1996	5.6	0.0	4.0	0.2	-	0.0	-	-	3.7	6.4
2001	1.2	0.4	19.0	0.1	-	0.2	-	-	2.9	6.5
2006	0.3	0.6	7.7	0.0	0.2	0.1	0.0	0.1	2.3	11.3
2011	1.4	7.5	17.0	0.2	-	0.1	0.0	-	6.1	5.4
2016	1.9	1.6	34.1	0.5	0.7	0.3	0.1	0.0	0.2	4.5

a - Annual; n - Noxious Weed; i - Introduced Species

Table 02-12.11 - Forb Species. Nested frequency and modified Daubenmire average cover by year.

FORB SPECIES	Achillea millefolium (Common yarrow)	Agoseris glauca (pale agoseris)	Allium acuminatum (tapertip onion)	Alyssum desertorum ^{ai} (desert madwort)	Artemisia ludoviciana (white sagebrush)	Astragalus (milkvetch)	Astragalus utahensis (Utah milkvetch)	Balsamorhiza sagittata (arrowleaf balsamroot)	Buglossoides arvensis ^{ai} (corn gromwell)	Calochortus nuttallii (sego lily)	Camelina microcapa ^{ai} (littlupod false flax)	Castilleja linariifolia (Wyoming Indian paintbrush)	Ceratocephala testiculata ^{ai} (curvseed butterwort)	Cirsium (thistle)	Cirsium undulatum ^a (wavyleaf thistle)	Collinsia parviflora ^a (maiden blue eyed Mary)	Collomia linearis ^a (tiny trumpet)
year	Nested Frequency																
1996	-	3	20	261	-	-	1	12	-	3	-	-	14	-	5	8	1
2001	-	9	25	338	-	-	-	11	-	-	1	1	38	-	0	5	6
2006	0	33	13	246	-	1	-	7	1	6	6	-	90	-	4	28	12
2011	-	4	102	340	-	-	-	9	9	3	5	-	6	-	6	9	11
2016	1	-	42	194	2	-	0	9	3	1	-	-	-	6	2	-	-
year	Average Cover (%)																
1996	-	0.0	0.0	0.9	-	-	0.0	0.4	-	0.0	-	-	0.0	-	0.2	0.0	0.0
2001	-	0.2	0.1	4.4	-	-	-	1.6	-	-	0.0	0.0	0.1	-	0.1	0.0	0.0
2006	0.0	0.2	0.1	1.3	-	0.0	-	1.2	0.0	0.0	0.0	-	0.4	-	0.2	0.1	0.0
2011	-	0.0	0.6	7.3	-	-	-	1.7	0.1	0.0	0.2	-	0.0	-	0.2	0.0	0.1
2016	0.0	-	0.2	1.2	0.0	-	0.0	1.1	0.0	0.0	-	-	-	0.2	0.0	-	-

a - Annual/Biennial; n - Noxious Weed; i - Introduced Species

FORB SPECIES	Comandra umbellata (bastard toadflax)	Crepis acuminata (tapertip hawkbeard)	Delphinium nuttallianum (twolobe larkspur)	Descurainia pinnata ^a (western tansymustard)	Draba ^a (draba)	Epilobium brachycarpum ^a (tall annual willowherb)	Eriogonum umbellatum (sulphur-flower buckwheat)	Erodium cicutarium ^{ai} (redstem stork's bill)	Galium aparine ^a (stickywilly)	Hackelia patens (spotted stickseed)	Holosteum umbellatum ^{ai} (jagged chickweed)	Isatis tinctoria ^{ami} (Dyer's woad)	Lactuca serriola ^{ai} (prickly lettuce)	Lappula occidentalis ^a (flatspine stickseed)	Linum lewisii (Lewis flax)	Lithospermum ruderale (western stoneseed)	Lomatium grayi (Gray's biscuitroot)
year	Nested Frequency																
1996	17	18	-	-	-	11	2	-	3	-	10	19	5	-	3	0	4
2001	11	8	-	3	3	-	5	5	3	2	183	-	59	-	-	5	5
2006	3	12	2	-	2	51	-	49	27	3	60	0	25	10	-	6	64
2011	8	14	-	-	-	37	-	42	16	4	30	3	16	-	5	0	15
2016	7	12	-	-	1	-	-	242	5	0	-	-	21	-	-	0	10
year	Average Cover (%)																
1996	0.1	0.3	-	-	-	0.0	0.2	-	0.0	-	0.1	0.1	0.1	-	0.0	0.0	0.0
2001	0.1	0.2	-	0.0	0.0	-	0.0	0.1	0.0	0.0	0.8	-	0.6	-	-	0.1	0.0
2006	0.0	0.3	0.0	-	0.0	0.5	-	1.4	0.0	0.0	0.2	0.0	0.2	0.0	-	0.2	2.6
2011	0.1	0.3	-	-	-	0.4	-	0.3	0.1	0.0	0.1	0.1	0.2	-	0.2	0.1	0.2
2016	0.0	0.2	-	-	0.0	-	-	4.7	0.0	0.0	-	-	0.3	-	-	0.0	0.2

a - Annual/Biennial; n - Noxious Weed; i - Introduced Species

FORB SPECIES	Medicago sativa ⁱ (alfalfa)	Melilotus officinalis ⁱ (sweetclover)	Microsteris gracilis ^a (slender phlox)	Oenothera (evening primrose)	Penstemon (beardtongue)	Petrorhiza pumila (rock goldenrod)	Tragopogon dubius ^{ai} (yellow salsify)	Veronica biloba ^{ai} (twolobe speedwell)
year	Nested Frequency							
1996	-	1	-	-	3	10	186	50
2001	-	-	-	-	-	11	102	65
2006	-	3	8	1	-	10	116	108
2011	0	-	2	-	-	7	158	45
2016	7	15	-	7	-	8	122	15
year	Average Cover (%)							
1996	-	0.0	-	-	0.0	0.7	2.9	0.2
2001	-	-	-	-	-	0.9	1.3	0.7
2006	-	0.0	0.0	0.0	-	1.3	3.1	0.4
2011	0.0	-	0.0	-	-	0.7	3.9	0.2
2016	0.3	0.1	-	0.1	-	0.4	1.4	0.0

a - Annual/Biennial; n - Noxious Weed; i - Introduced Species

Table 02-12.12 - Shrub and Tree Species. Average modified Daubenmire quadrat and line intercept cover by year.

SHRUB SPECIES	Line Intercept Cover (%)						
	year	1996	2001	2006	2011	2016	
Amelanchier alnifolia ^p (Saskatoon serviceberry)	-	-	-	-	-	-	-
Artemisia tridentata ssp. vaseyana ^p (mountain big sagebrush)	-	0.8	0.8	2.2	0.9	5.6	0.4
Chrysothamnus viscidiflorus ssp. viscidiflorus (yellow rabbitbrush)	-	0.9	0	1.4	0.1	6.3	0.4
Ericameria nauseosa ssp. nauseosa var. hololeuca (rubber rabbitbrush)	0	1.5	0.1	1.6	0.1	5	0.2
Gutierrezia sarothrae (broom snakeweed)							
Purshia tridentata ^p (antelope bitterbrush)							
Rosa woodsii ^p (Woods' rose)							

year	Quadrat Cover (%)						
	1996	2001	2006	2011	2016		
1996	-	3.2	0.1	0.8	0.7	2.0	-
2001	-	1.7	0.2	1.9	0.7	1.4	0.1
2006	-	0.7	0.3	0.8	0.4	2.7	0.1
2011	-	0.5	0.0	0.3	0.0	3.9	0.1
2016	0.0	0.5	0.0	0.5	0.0	1.8	0.2

t - Tree Species; p - Preferred Browse; i - Introduced

Table 02-12.13 - Shrub/Tree Characteristics. Population characteristics of shrub/tree species populations including density reproduction (seedlings), age distribution, utilization, vigor and average size (height/crown) of plants.

Year	Density		Age Class Distribution			Utilization		Poor Vigor (%)	Average Height Crown (cm)
	Plants Per Acre		Excluding Seedlings			Moderate (%)	Heavy (%)		
	Excluding Seedlings	Seedling	Young (%)	Mature (%)	Decadent (%)				
Amelanchier alnifolia^p -- (Saskatoon serviceberry)									
1996	-	-	-	-	-	-	-	-	123/108
2001	-	-	-	-	-	-	-	-	116/122
2006	-	-	-	-	-	-	-	-	93/113
2011	-	-	-	-	-	-	-	-	122/120
2016	-	-	-	-	-	-	-	-	112/118
Artemisia tridentata ssp. vaseyana^p -- (mountain big sagebrush)									
1996	380	-	5	42	53	21	5	16	77/121
2001	300	20	0	47	53	80	0	27	82/123
2006	160	20	0	38	63	25	25	63	78/112
2011	140	-	14	29	57	29	29	57	74/110
2016	160	-	0	88	13	25	13	0	81/117
Chrysothamnus viscidiflorus ssp. viscidiflorus -- (yellow rabbitbrush)									
1996	140	-	14	86	0	0	0	0	48/76
2001	100	-	0	100	0	0	0	0	40/72
2006	80	-	0	75	25	0	0	0	43/79
2011	80	-	0	100	0	0	0	0	49/76
2016	20	-	0	100	0	0	0	0	42/61
Eriogonum heracleoides -- (parsnipflower buckwheat)									
1996	20	-	0	100	0	0	0	0	8/11
2001	-	-	-	-	-	-	-	-	-/-
2006	-	-	-	-	-	-	-	-	-/-
2011	-	-	-	-	-	-	-	-	-/-
2016	-	-	-	-	-	-	-	-	-/-

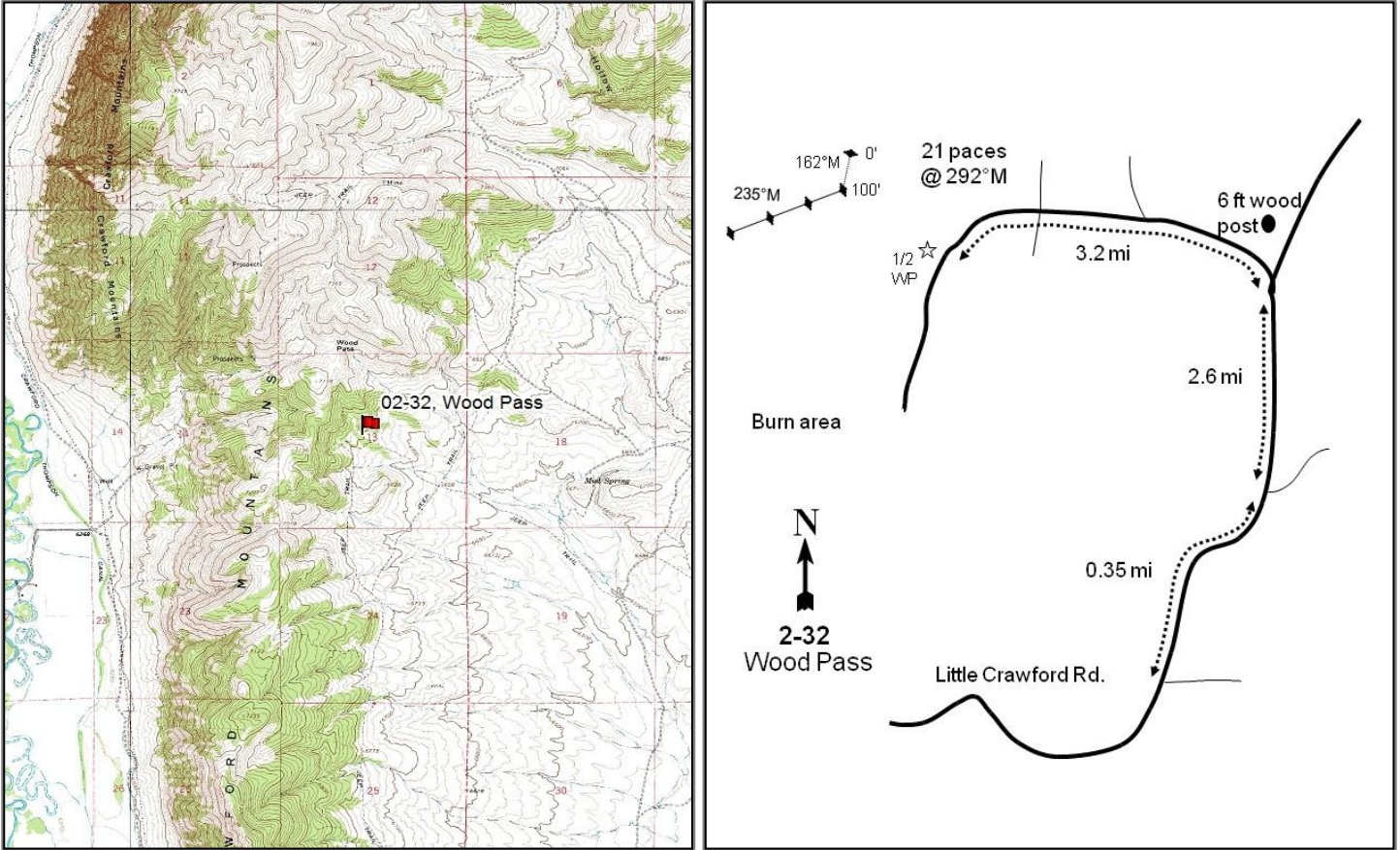
Year	Density		Age Class Distribution			Utilization		Poor Vigor (%)	Average Height Crown (cm)
	Plants Per Acre		Excluding Seedlings			Moderate (%)	Heavy (%)		
	Excluding Seedlings	Seedling	Young (%)	Mature (%)	Decadent (%)				
Ericameria nauseosa ssp. nauseosa var. hololeuca -- (rubber rabbitbrush)									
1996	40	-	0	100	0	0	0	0	107/165
2001	40	-	0	100	0	0	0	0	80/103
2006	60	-	0	67	33	0	0	0	66/86
2011	60	-	0	100	0	0	0	0	73/181
2016	80	-	0	0	100	0	0	100	80/123
Gutierrezia sarothrae -- (broom snakeweed)									
1996	1260	60	35	65	0	0	0	0	25/41
2001	1080	-	0	100	0	0	0	0	22/34
2006	500	-	0	92	8	0	0	4	28/41
2011	100	-	0	100	0	0	0	0	27/29
2016	180	-	0	100	0	0	0	0	39/58
Purshia tridentata^P -- (antelope bitterbrush)									
1996	180	-	11	89	0	44	0	0	84/185
2001	100	-	0	60	40	60	20	0	100/188
2006	100	-	0	100	0	20	80	0	95/181
2011	240	40	50	42	8	42	8	25	107/175
2016	140	-	0	100	0	71	29	0	118/187
Rosa woodsii^P -- (Woods' rose)									
1996	20	-	0	100	0	0	0	0	25/16
2001	40	-	100	0	0	0	0	0	-/-
2006	180	-	11	89	0	0	0	0	40/29
2011	180	-	33	67	0	0	0	0	46/38
2016	420	-	0	100	0	0	0	0	36/24
Sambucus racemosa^P -- (red elderberry)									
1996	-	-	-	-	-	-	-	-	-/-
2001	-	-	-	-	-	-	-	-	-/-
2006	-	-	-	-	-	-	-	-	157/241
2011	-	-	-	-	-	-	-	-	153/228
2016	-	-	-	-	-	-	-	-	172/238
Symphoricarpos oreophilus -- (mountain snowberry)									
1996	-	-	-	-	-	-	-	-	-/-
2001	-	-	-	-	-	-	-	-	-/-
2006	-	-	-	-	-	-	-	-	-/-
2011	-	-	-	-	-	-	-	-	55/67
2016	-	-	-	-	-	-	-	-	75/116
Tetradymia canescens -- (spineless horsebrush)									
1996	-	-	-	-	-	-	-	-	-/-
2001	-	-	-	-	-	-	-	-	-/-
2006	-	-	-	-	-	-	-	-	-/-
2011	-	-	-	-	-	-	-	-	85/120

t - Tree Species; p - Preferred Browse; i - Introduced Species

Table -02-12.15 - Deer Desirable Components Index: High Potential Scale.

Year	Preferred Browse Cover	Preferred Browse Decadence	Preferred Browse Young	Perennial Grass Cover	Annual Grass Cover	Perennial Forb Cover	Noxious Weeds	Total Score	Ranking
1996	7.0	0.0	0.0	20.6	-7.2	8.4	-2.0	26.7	Very Poor
2001	4.5	0.0	0.0	19.1	-15.5	6.6	0.0	14.7	Very Poor
2006	5.1	0.0	0.0	28.0	-6.5	10.0	-2.0	34.7	Very Poor
2011	6.6	0.0	0.0	23.4	-19.6	8.8	-2.0	17.2	Very Poor
2016	3.6	0.0	0.0	11.8	-20.0	5.8	0.0	1.2	Very Poor

WOOD PASS - STUDY NO. 02-32



Location Information

USGS 7.5 min Map Info	Woodruff Narrows NW; Township 10N, Range 7E, Section 13
GPS (0' Stake)	NAD 83 UTM ZONE 12, 491501 East 4606053 North

Transect Information

Browse Tag # (0' Stake)	7942
Transect Bearing	162° magnetic (Line 2-4: 235° magnetic)
Length	400ft
Belt Placement	Line 1 (11ft & 95ft), Line 2 (71ft), Line 3 (59ft), Line 4 (34ft)
Belt Marker Placement	Standard, Belt 5: No Rebar

Directions to Site

From the intersection of Wilson Lane and Little Crawford Road east of Woodruff proceed northeast for 1.35 miles to a fork. Turn left and travel 0.35 mile to another fork. Turn left and proceed 2.6 miles to a third fork marked by a six-foot tall wooden post. Turn left and proceed 3.2 miles staying on the main road, to a witness post just off the right side of road. From the witness post walk 21 paces at 292 degrees magnetic to the 100-foot baseline stake. Walk 100 feet at 342 degrees magnetic from the 100-foot stake to the 0-foot baseline stake. The 0-foot stake is marked by browse tag #7942. The baseline doglegs at 100 feet and runs 235 degrees magnetic.

Site Information

Land Ownership	Federal
Land Administrator	BLM
Allotment	No data
Elevation	6,800ft (2,073m)
Aspect	Southeast
Slope	1%
Sample Dates	08/22/1996, 08/02/2001, 07/27/2006, 08/10/2011, 07/12/2016

Table 02-32.1 Disturbance History. Recorded history of major disturbances.

Treatment/Disturbance	Name	WRI DB#	Date	Size (acres)
Mechanical - Bullhog	Crawford Mountain Bullhog	1936	October 2011-August 2012	1103

Wildlife Habitat and Vegetation History

Table 02-32.3 - Wildlife Seasonal Habitat. UDWR wildlife habitat and seasonality.

Species	Habitat	Season	Brood/Young Rearing
Deer	crucial	winter	
Greater Sage Grouse	Crucial	occupied	brood-rearing
Pronghorn	substantial	summer	

Table 02-32.4 - Vegetation History. The dominant vegetation type(s) and phase of woodland succession (Tausch, Miller, Roundy, & Chambers, 2009).

Year	Vegetation Type	Woodland Succession
1984	Wyoming Big Sagebrush	Phase I
1990	Wyoming Big Sagebrush	Phase I
1996	Wyoming Big Sagebrush	Phase I
2001	Wyoming Big Sagebrush	Phase I transitioning to Phase II
2006	Wyoming Big Sagebrush	Phase I transitioning to Phase II
2011	Utah Juniper/Wyoming Big Sagebrush	Phase I transitioning to Phase II
2016	Wyoming Big Sagebrush	Phase I

Site Notes

No Notes

Soils

Table 02-32.5 - Soil Analysis Data. List of chemical and textural soil characteristics determined by laboratory analysis.

Texture	pH	%sand	%silt	%clay	%OM	PPM P	PPM K	ds/m	Sample Date
Clay Loam	7.4	32.9	36.7	30.4	3.3	4.5	70.4	0.7	08/22/1996

Site Potential

1981-2010 Average Annual Precipitation	12 inches
NRCS Ecological Site	Semi-desert Loam (Wyoming Big Sagebrush)
NRCS Ecological Site #	034XY212UT
States and Transitions	No state and transition model is available for this ecological site.

The state and transition model is likely similar to the Semi-desert Loam (Wyoming Big Sagebrush), R035XY209UT ecological site. Since study establishment in 1984, the site is a Wyoming big sagebrush (*Artemisia tridentata* ssp. *wyominensis*) dominated plant community type (Table 02-32.12). The herbaceous understory has remained moderately diverse yet sparse over the sample years (Table 02-32.10, Table 02-32.11). Conifer encroachment by Utah juniper (*Juniperus osteosperma*) has been active in this community, though a lop and scatter treatment removed most of the conifer trees on the site and surrounding area. The site will likely remain in the current plant community phase without a major disturbance.

Trend Summary Tables

Table 02-32.6 - Shrub/Tree Summary. Average modified Daubenmire quadrat and line intercept cover by year for shrubs/trees.

Year	Quadrat Cover (%)			Line-intercept Cover (%)		
	Preferred Shrub	Other Shrub	Tree	Preferred Shrub	Other Shrub	Tree
1996	13.4	0.1	7.6	-	-	-
2001	13.8	0.6	11.0	-	-	1.1
2006	11.5	0.4	12.7	14.0	0.4	18.1
2011	12.8	0.2	14.1	15.4	0.1	20.1
2016	11.9	0.3	3.5	15.0	1.4	8.2

Table 02-32.7 - Herbaceous Summary. Nested frequency and average modified Daubenmire quadrat cover by year for herbaceous functional groups.

Year	Nested Frequency				Quadrat Cover (%)			
	Annual Grass	Perennial Grass	Annual/Biennial Forb	Perennial Forb	Annual Grass	Perennial Grass	Annual/Biennial Forb	Perennial Forb
1996	26	326	22	160	0.1	5.9	0.1	3.0
2001	34	304	63	211	0.5	8.4	0.3	4.2
2006	4	316	73	209	0.0	7.6	0.9	4.4
2011	25	292	193	195	0.1	7.0	5.0	3.1
2016	81	282	198	139	1.4	6.9	5.0	3.0

Table 02-32.8 - Basic Ground Cover. Average modified Daubenmire quadrat cover by year for basic ground cover types.

Year	Cover Type (%)					
	Bare Ground	Cryptograms	Litter	Pavement	Rock	Vegetation
1996	21.6	4.8	39.6	4.1	1.2	29.3
2001	36.9	3.9	40.5	3.9	1.0	36.4
2006	28.6	3.7	40.1	11.2	2.4	33.1
2011	36.7	5.5	37.9	7.2	0.8	36.2
2016	34.5	1.9	43.4	2.8	1.1	30.1

Table 02-32.9 - Pellet Group Data. Quadrat frequency and pellet group transect data for animal pellets. Rabbit pellet groups are not sampled in the pellet group transect.

Year	Cattle	Mule Deer/Pronghorn	Elk	Rabbit
	Quadrat Frequency			
1996	1	38	2	15
2001	4	17	-	20
2006	6	29	4	21
2011	3	16	1	13
2016	7	23	-	11
Days Use Per Acre (ha)				
1996	-	-	-	-
2001	9.4 (23.3)	18.7 (46.3)	-	-
2006	17.4 (43.0)	20.8 (51.3)	32.8 (81.1)	-
2011	3.6 (9.0)	27.5 (67.9)	13.4 (33.1)	-
2016	15.3 (37.7)	26.2 (64.6)	-	-

Table 02-32.10 - Grass Species. Nested frequency and modified Daubenmire average cover by year.

GRASS SPECIES	Achnatherum hymenoides (Indian ricegrass)	Achnatherum lettermanii (Letterman's needlegrass)	Bromus tectorum ^{ai} (cheatgrass)	Carex (sedge)	Elymus elymoides (squirriltail)	Hesperostipa comata (needle and thread)	Pascopyrum smithii (western wheatgrass)	Poa fendleriana (muttongrass)	Poa secunda (Sandberg bluegrass)	Pseudoroegneria spicata (bluebunch wheatgrass)
year	Nested Frequency									
1996	34	-	26	-	29	18	96	14	217	39
2001	19	-	34	-	18	28	66	11	223	72
2006	52	11	4	6	10	32	107	22	257	8
2011	68	14	25	10	37	18	71	8	204	53
2016	60	26	81	19	44	15	97	20	154	19
year	Average Cover (%)									
1996	0.5	-	0.1	-	0.1	0.2	1.0	0.1	3.3	0.7
2001	0.6	-	0.5	-	0.6	0.8	0.5	0.1	3.8	2.1
2006	0.9	0.2	0.0	0.1	0.1	0.5	0.9	0.2	4.7	0.1
2011	0.7	0.1	0.1	0.1	0.4	0.1	0.4	0.0	4.8	0.4
2016	0.5	0.5	1.4	0.1	0.5	0.6	1.7	0.3	2.5	0.1

a - Annual; n - Noxious Weed; i - Introduced Species

Table 02-32.11 - Forb Species. Nested frequency and modified Daubenmire average cover by year.

FORB SPECIES	Agoseris glauca (pale agoseris)	Alyssum desertorum ^{ai} (desert madwort)	Antennaria (pussytoes)	Arabis (rockcress)	Arenaria (sandwort)	Astragalus convallarius (lesser rushy milkvetch)	Astragalus purshii (woollypod milkvetch)	Astragalus utahensis (Utah milkvetch)	Calochortus nuttallii (sego lily)	Camelina microcarpa ^{ai} (littlupod false flax)	Carduus nutans ^{ai} (nodding plumeless thistle)	Ceratocephala testiculata ^{ai} (curvseed butterwort)	Chaenactis douglasii (Douglas' dustymaiden)	Chenopodium fremontii ^a (Fremont's goosefoot)	Cirsium undulatum ^a (wavyleaf thistle)	Collinsia parviflora ^a (maiden blue eyed Mary)	Collomia linearis ^a (tiny trumpet)
year	Nested Frequency																
1996	4	-	8	10	-	11	-	21	-	-	-	-	-	-	-	-	-
2001	4	6	16	1	-	8	-	14	-	-	-	-	-	-	3	-	4
2006	11	6	14	-	-	22	-	20	-	2	-	-	-	-	-	12	-
2011	4	50	7	14	3	12	-	21	1	-	-	7	4	6	4	11	-
2016	3	112	4	-	-	14	2	20	-	-	31	2	3	9	-	4	-
year	Average Cover (%)																
1996	0.0	-	0.3	0.0	-	0.0	-	0.1	-	-	-	-	-	-	-	-	-
2001	0.0	0.0	0.3	0.0	-	0.1	-	0.1	-	-	-	-	-	-	0.0	-	0.0
2006	0.1	0.0	0.4	-	-	0.2	-	0.1	-	0.0	-	-	-	-	-	0.0	-
2011	0.0	0.1	0.2	0.0	0.0	0.1	-	0.2	0.0	-	-	0.0	0.0	0.0	0.0	0.2	-
2016	0.0	0.8	0.6	-	-	0.1	0.0	0.6	-	-	0.8	0.0	0.0	0.0	-	0.0	-

a - Annual/Biennial; n - Noxious Weed; i - Introduced Species

FORB SPECIES	Comandra umbellata (bastard toadflax)	Cordylanthus ramosus ^a (bushy bird's beak)	Crepis acuminata (lapertip hawkbeard)	Cryptantha (cryptantha)	Cryptantha ^a (annual cryptantha)	Cymopterus (springparsley)	Cynoglossum officinale ^{ani} (gypsyflower)	Descurainia pinnata ^a (western tansymustard)	Draba ^a (draba)	Erigeron eatonii (Eaton's fleabane)	Erigeron pumilus (shaggy fleabane)	Erigeron brevicaulis (shortstem buckwheat)	Erigeron umbellatum (sulphur-flower buckwheat)	Gayophytum ramosissimum ^a (pinyon groundsmoke)	Gilia ^a (gilia)	Holosteum umbellatum ^{ai} (jagged chickweed)	Ipomopsis aggregata (scarlet gilia)
year	Nested Frequency																
1996	-	15	3	8	-	-	-	7	-	-	-	-	-	-	-	-	-
2001	-	36	1	52	-	2	3	8	1	-	-	-	-	-	-	-	-
2006	3	52	5	11	-	1	-	0	-	-	8	-	1	-	-	-	-
2011	5	128	11	9	-	-	-	6	-	-	23	-	3	1	-	10	-
2016	2	77	8	11	3	-	4	1	1	2	9	3	1	-	2	-	1
year	Average Cover (%)																
1996	-	0.1	0.1	0.1	-	-	-	0.0	-	-	-	-	-	-	-	-	-
2001	-	0.2	0.0	0.6	-	0.0	0.0	0.0	0.0	-	-	-	-	-	-	-	-
2006	0.0	0.9	0.0	0.1	-	0.0	-	0.0	-	-	0.0	-	0.0	-	-	-	-
2011	0.0	4.7	0.1	0.1	-	-	-	0.0	-	-	0.1	-	0.0	0.0	-	0.0	-
2016	0.0	2.9	0.1	0.3	0.0	-	0.0	0.0	0.0	0.0	0.1	0.0	0.0	-	0.0	-	0.0

a - Annual/Biennial; n - Noxious Weed; i - Introduced Species

FORB SPECIES	Isatis tinctoria ^{ani} (Dyer's woad)	Lactuca serriola ^{ai} (prickly lettuce)	Lappula occidentalis ^a (flatspine stickseed)	Machaeranthera grindelioides (rayless tansyaster)	Microsteris gracilis ^a (slender phlox)	Packera multilobata (lobeleaf groundsel)	Penstemon humilis (low beardtongue)	Phlox hoodii (spiny phlox)	Phlox longifolia (longleaf phlox)	Trifolium (clover)
year	Nested Frequency									
1996	-	-	3	-	-	3	3	111	13	3
2001	-	-	9	-	2	5	24	118	5	45
2006	-	-	3	-	-	5	26	109	23	70
2011	-	-	17	-	-	10	24	82	29	52
2016	19	5	8	0	-	10	23	48	2	32
year	Average Cover (%)									
1996	-	-	0.0	-	-	0.0	0.0	2.3	0.0	0.0
2001	-	-	0.0	-	0.0	0.0	0.2	2.5	0.0	0.3
2006	-	-	0.0	-	-	0.0	0.5	2.5	0.1	0.4
2011	-	-	0.1	-	-	0.1	0.2	1.0	0.1	0.6
2016	0.4	0.0	0.0	0.0	-	0.1	0.2	0.6	0.0	0.1

a - Annual/Biennial; n - Noxious Weed; i - Introduced Species

Table 02-32.12 - Shrub and Tree Species. Average modified Daubenmire quadrat and line intercept cover by year.

SHRUB SPECIES	Artemisia nova ^p (black sagebrush)	Artemisia tridentata ssp. wyomingensis ^p (Wyoming big sagebrush)	Atriplex canescens ^p (fourwing saltbush)	Chrysothamnus viscidiflorus ssp. viscidiflorus (yellow rabbitbrush)	Ericameria nauseosa ssp. consimilis var. oreophila (rubber rabbitbrush)	Eriogonum microthecum ^p (slender buckwheat)	Juniperus osteosperma ¹ (Utah juniper)	Linanthus pungens (granite prickly phlox)	Tetradymia canescens (spineless horsebrush)
year	Line Intercept Cover (%)								
1996	-	-	-	-	-	-	-	-	-
2001	-	-	-	-	-	-	-	-	-
2006	8.9	5.1	-	0.4	-	-	18.1	-	-
2011	9.2	6.1	-	0.1	-	0.1	20.1	-	-
2016	6	9	-	1.2	0.2	-	8.2	-	-
year	Quadrat Cover (%)								
1996	6.9	6.5	-	0.1	-	0.0	7.6	-	-
2001	7.4	6.2	0.0	0.5	-	0.1	11.0	0.0	-
2006	7.4	4.0	-	0.3	-	0.0	12.7	0.0	0.0
2011	6.8	5.9	-	0.2	-	0.2	14.1	0.0	0.0
2016	4.6	7.3	-	0.3	0.0	-	3.5	-	0.0

t - Tree Species; p - Preferred Browse; i - Introduced

Table 02-32.13 - Shrub/Tree Characteristics. Population characteristics of shrub/tree species populations including density reproduction (seedlings), age distribution, utilization, vigor and average size (height/crown) of plants.

Year	Density		Age Class Distribution			Utilization		Poor Vigor (%)	Average Height Crown (cm)
	Plants Per Acre		Excluding Seedlings			Moderate (%)	Heavy (%)		
	Excluding Seedlings	Seedling	Young (%)	Mature (%)	Decadent (%)				
Amelanchier alnifolia^p -- (Saskatoon serviceberry)									
1996	-	-	-	-	-	-	-	-	-/-
2001	-	-	-	-	-	-	-	-	-/-
2006	-	-	-	-	-	-	-	-	-/-
2011	-	-	-	-	-	-	-	-	24/35
2016	-	-	-	-	-	-	-	-	-/-
Artemisia nova^p -- (black sagebrush)									
1996	3800	-	3	73	25	20	2	2	31/54
2001	3760	-	1	68	31	4	0	6	29/48
2006	3560	2060	2	62	37	1	1	30	31/48
2011	2760	520	33	49	19	20	4	10	29/50
2016	2920	80	23	69	8	2	1	2	25/53
Artemisia tridentata ssp. wyomingensis^p -- (Wyoming big sagebrush)									
1996	2440	100	26	44	30	28	2	0	44/78
2001	2000	-	16	63	21	12	0	8	44/75
2006	1940	1360	8	50	42	27	8	70	39/62
2011	2120	320	21	59	20	12	1	18	36/56
2016	2060	-	2	87	11	32	0	5	40/77
Atriplex canescens^p -- (fourwing saltbush)									
1996	-	-	-	-	-	-	-	-	-/-
2001	-	-	-	-	-	-	-	-	16/26
2006	-	-	-	-	-	-	-	-	-/-
2011	-	-	-	-	-	-	-	-	-/-
2016	-	-	-	-	-	-	-	-	-/-

Year	Density		Age Class Distribution			Utilization		Poor Vigor (%)	Average Height Crown (cm)
	Plants Per Acre		Excluding Seedlings			Moderate (%)	Heavy (%)		
	Excluding Seedlings	Seedling	Young (%)	Mature (%)	Decadent (%)				
Chrysothamnus depressus^P -- (longflower rabbitbrush)									
1996	-	-	-	-	-	-	-	-	-/-
2001	-	-	-	-	-	-	-	-	-/-
2006	-	-	-	-	-	-	-	-	-/-
2011	-	-	-	-	-	-	-	-	-/-
2016	20	-	0	100	0	0	0	0	-/-
Chrysothamnus viscidiflorus ssp. viscidiflorus -- (yellow rabbitbrush)									
1996	500	-	16	32	52	12	0	36	20/26
2001	380	-	21	79	0	0	0	0	24/42
2006	360	60	0	44	56	0	0	17	24/38
2011	420	20	33	57	10	5	0	19	22/31
2016	600	-	7	90	3	3	3	3	27/43
Eriogonum microthecum^P -- (slender buckwheat)									
1996	20	-	0	100	0	0	0	0	14/24
2001	60	-	0	100	0	0	0	0	13/27
2006	40	-	0	100	0	0	0	0	13/28
2011	20	-	0	100	0	0	0	0	15/20
2016	20	-	0	100	0	0	0	0	15/17
Ericameria nauseosa ssp. consimilis var. oreophila -- (rubber rabbitbrush)									
1996	-	-	-	-	-	-	-	-	61/72
2001	40	-	0	100	0	0	0	0	79/115
2006	-	-	-	-	-	-	-	-	73/101
2011	40	-	0	0	100	0	0	0	76/98
2016	80	-	0	75	25	0	0	25	54/72
Gutierrezia sarothrae -- (broom snakeweed)									
1996	-	-	-	-	-	-	-	-	-/-
2001	-	-	-	-	-	-	-	-	-/-
2006	-	-	-	-	-	-	-	-	-/-
2011	-	-	-	-	-	-	-	-	-/-
2016	-	-	-	-	-	-	-	-	22/21
Juniperus osteosperma^t -- (Utah juniper)									
1996	500	-	28	72	0	0	0	0	-/-
2001	460	20	26	70	4	4	0	0	-/-
2006	460	60	22	70	9	0	0	9	-/-
2011	500	40	16	60	24	0	0	4	-/-
2016	280	20	36	57	7	0	0	0	-/-
Linanthus pungens -- (granite prickly phlox)									
1996	-	-	-	-	-	-	-	-	-/-
2001	20	-	0	100	0	0	0	0	-/-
2006	20	-	0	100	0	0	0	0	15/28
2011	20	-	0	100	0	0	0	0	8/16
2016	-	-	-	-	-	-	-	-	-/-
Opuntia -- (pricklypear)									
1996	60	-	0	100	0	0	0	0	10/20
2001	-	-	-	-	-	-	-	-	10/21
2006	-	-	-	-	-	-	-	-	13/47
2011	-	-	-	-	-	-	-	-	14/46
2016	-	-	-	-	-	-	-	-	13/44
Symphoricarpos oreophilus -- (mountain snowberry)									
1996	-	-	-	-	-	-	-	-	36/69
2001	-	-	-	-	-	-	-	-	38/73
2006	-	-	-	-	-	-	-	-	25/60
2011	-	-	-	-	-	-	-	-	13/49
2016	-	-	-	-	-	-	-	-	20/87
Tetradymia canescens -- (spineless horsebrush)									
1996	-	-	-	-	-	-	-	-	16/20
2001	20	-	0	100	0	0	0	0	27/47
2006	40	-	0	100	0	0	0	0	27/54
2011	60	-	67	33	0	0	0	0	23/40
2016	20	-	0	100	0	0	0	0	10/12

t - Tree Species; p - Preferred Browse; i - Introduced Species

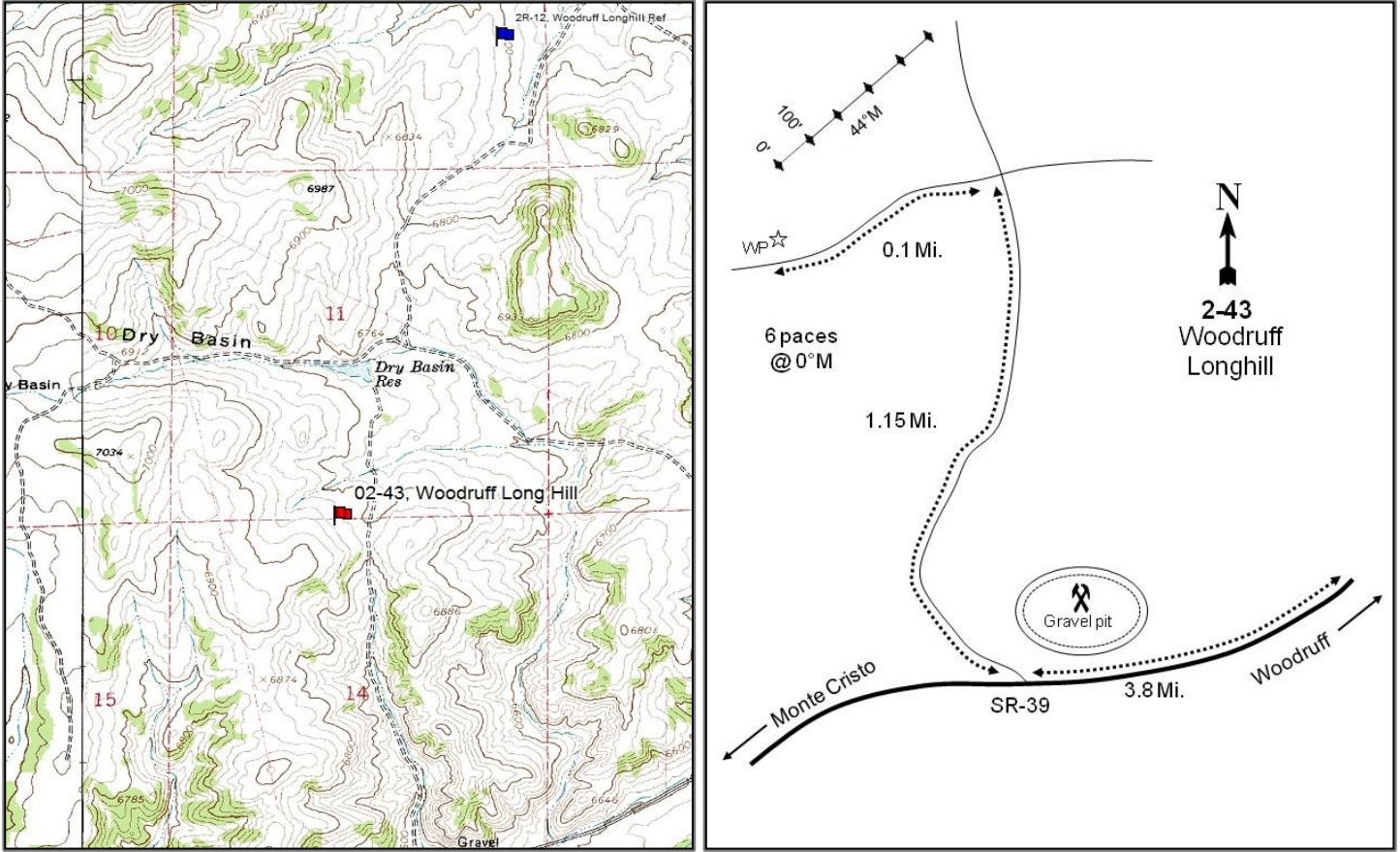
Table 02-32.14 - Tree Characteristics. Point-quarter tree density, size class distribution, and average diameter.

Year	Density	Size Class Distribution					Average Diameter (cm)
	Trees per Acre	Seedling (%)	1-4'	4-8'	8-12'	>12' (%)	
Juniperus osteosperma (Utah juniper)							
1996	292	-	-	-	-	-	13.2
2001	138	-	-	-	-	-	14.1
2006	309	5	25	35	25	10	12.8
2011	284	-	20	35	30	15	13.6
2016	65	18	47	12	24	-	14.0
Pinus edulis (twoneedle pinyon)							
2016	116	100	-	-	-	-	1.0

Table -02-32.15 - Deer Desirable Components Index: Low Potential Scale.

Year	Preferred Browse Cover	Preferred Browse Decadence	Preferred Browse Young	Perennial Grass Cover	Annual Grass Cover	Perennial Forb Cover	Noxious Weeds	Total Score	Ranking
1996	16.8	6.8	7.1	11.7	-0.1	6.0	0.0	48.3	Good
2001	17.3	7.1	3.9	16.9	-0.3	8.3	-2.0	51.2	Good
2006	14.4	3.4	2.0	15.2	0.0	8.9	0.0	43.9	Fair-Good
2011	16.1	9.2	13.5	14.0	0.0	6.2	0.0	59.0	Good
2016	14.9	12.0	5.1	13.8	-1.1	6.0	-4.0	46.7	Fair-Good

WOODRUFF LONGHILL - STUDY No. 02-43



Location Information

USGS 7.5 min Map Info Woodruff SW; Township 9N, Range 6E, Section 14
 GPS (0' Stake) NAD 83 UTM ZONE 12, 480155 East 4596848 North

Transect Information

Browse Tag # (0' Stake) Not Available
 Transect Bearing 44° 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 SR-16 (Woodruff Main street) turn left onto SR-39 (towards Monte Cristo) and continue for 3.8 miles. Turn right (north) onto a dirt road and continue for 1.15 miles to an intersecting dirt road just north of a saddle. Turn left (west) and proceed for 0.1 miles. The witness post is on the right and the 0-foot stake is 6 paces at 0 degrees magnetic.

Site Information

Land Ownership Federal
 Land Administrator BLM
 Allotment WOODRUFF PASTURES
 Elevation 6,794ft (2,071m)
 Aspect Northeast
 Slope 11-12%
 Sample Dates 08/11/2009, 08/25/2011, 07/13/2016

Table 02-43.1 Disturbance History. Recorded history of major disturbances.

Treatment/Disturbance	Name	WRI DB#	Date	Size (acres)
Hand Crew - Lop and Scatter	Woodruff Longhill Sagebrush Improvement	1477	Fall 2009	3069

Wildlife Habitat and Vegetation History

Table 02-43.3 - Wildlife Seasonal Habitat. UDWR wildlife habitat and seasonality.

Species	Habitat	Season	Brood/Young Rearing
Deer	crucial	winter	
Elk	substantial	winter	
Greater Sage Grouse	Crucial	occupied & Winter	brood-rearing
Moose	crucial	summer	
Pronghorn	substantial	summer	

Table 02-43.4 - Vegetation History. The dominant vegetation type(s) and phase of woodland succession (Tausch, Miller, Roundy, & Chambers, 2009).

Year	Vegetation Type	Woodland Succession
2009	Mountain Big Sagebrush/Perennial Grass	Phase I
2011	Mountain Big Sagebrush/Perennial Grass	No Encroachment
2016	Mountain Big Sagebrush/Perennial Grass	No Encroachment

Site Notes

This study is located approximately four miles west of Woodruff on the north side of SR 32. The study monitors a mountain big sagebrush (*Artemisia tridentata* ssp. *vaseyana*) community within crucial winter range for deer. In 2009, data was collected along the baseline rather than along belts and no shrub density data was collected.

Site Potential

1981-2010 Average Annual Precipitation 15 inches
 NRCS Ecological Site Upland Loam (Bonneville Big Sagebrush)
 NRCS Ecological Site # R047XA314UT
 States and Transitions No state and transition model is available for this ecological site.

The browse component of this study site has been mainly comprised of mountain big sagebrush (*Artemisia tridentata* ssp. *vaseyana*) since establishment in 2009 (Table 02-43.12). Perennial grasses, mainly crested wheatgrass (*Agropyron cristatum*) and Sandberg bluegrass (*Poa secunda*), have been a co-dominant site component in all sample years (Table 02-43.10). With the exception of annual forbs in 2011, forbs have generally remained rare and have lacked diversity (Table 02-43.7, Table 02-43.11). Although Utah juniper (*Juniperus osteosperma*) was recorded in small amounts in 2009, the trees were removed by a lop and scatter treatment in the fall of the same year (Table 02-43.13, Table 02- 43.1).

Trend Summary Tables

Table 02-43.6 - Shrub/Tree Summary. Average modified Daubenmire quadrat and line intercept cover by year for shrubs/trees.

Year	Quadrat Cover (%)			Line-intercept Cover (%)		
	Preferred Shrub	Other Shrub	Tree	Preferred Shrub	Other Shrub	Tree
2009	21.2	3.1	-	23.8	2.4	-
2011	15.3	5.3	-	25.2	7.1	-
2016	18.1	5.0	-	23.7	6.2	-

Table 02-43.7 - Herbaceous Summary. Nested frequency and average modified Daubenmire quadrat cover by year for herbaceous functional groups.

Year	Nested Frequency				Quadrat Cover (%)			
	Annual Grass	Perennial Grass	Annual/Biennial Forb	Perennial Forb	Annual Grass	Perennial Grass	Annual/Biennial Forb	Perennial Forb
2009	-	311	55	56	-	15.4	0.5	0.5
2011	-	335	272	133	-	13.5	8.2	1.5
2016	3	368	223	102	0.0	19.4	2.3	1.1

Table 02-43.8 - Basic Ground Cover. Average modified Daubenmire quadrat cover by year for basic ground cover types.

Year	Cover Type (%)					
	Bare Ground	Cryptograms	Litter	Pavement	Rock	Vegetation
2009	27.2	2.5	39.6	1.6	0.1	40.9
2011	36.9	3.8	35.7	0.9	0.4	35.5
2016	42.2	2.5	18.0	1.8	0.8	43.9

Table 02-43.9 - Pellet Group Data. Quadrat frequency and pellet group transect data for animal pellets. Rabbit pellet groups are not sampled in the pellet group transect.

Year	Cattle	Mule Deer	Elk	Greater Sage-Grouse	Rabbit
	Quadrat Frequency				
2009	4	33	-	-	21
2011	3	33	-	2	26
2016	-	18	-	1	3
Days Use Per Acre (ha)					
2009	20.3 (50.2)	81.7 (201.9)	0.7 (1.7)	-	-
2011	5.1 (12.6)	40.2 (99.3)	5.3 (13.2)	17.4 (43.0)*	-
2016	20.3 (50.2)	27.5 (67.9)	-	78.4 (193.7)*	-

*Pellets per acre (ha)

Table 02-43.10 - Grass Species. Nested frequency and modified Daubenmire average cover by year.

GRASS SPECIES	Agropyron cristatum ⁱ (crested wheatgrass)	Bromus arvensis ^{ai} (field brome)	Carex (sedge)	Elymus elymoides (squirreltail)	Poa fendleriana (nuttongrass)	Poa secunda (Sandberg bluegrass)	Psathyrostachys juncea ⁱ (Russian wildrye)	Pseudoroegneria spicata (bluebunch wheatgrass)
year	Nested Frequency							
2009	284	-	-	-	4	131	1	-
2011	259	-	8	-	-	213	3	9
2016	319	3	9	2	-	188	-	3
year	Average Cover (%)							
2009	12.8	-	-	-	0.1	2.5	0.0	-
2011	10.0	-	0.1	-	-	3.4	0.0	0.0
2016	13.3	0.0	0.0	0.0	-	5.9	-	0.1

a - Annual; n - Noxious Weed; i - Introduced Species

Table 02-43.11 - Forb Species. Nested frequency and modified Daubenmire average cover by year.

FORB SPECIES	Agoseris glauca (pale agoseris)	Allium (onion)	Alyssum desertorum ^{ai} (desert madwort)	Antennaria (pussytoes)	Arabis (rockcress)	Astragalus (milkvetch)	Astragalus convallarius (lesser rushy milkvetch)	Calochortus nuttallii (sego lily)	Ceratocephala testiculata ^{ai} (curvseed butterwort)	Chaenactis douglasii (Douglas' dustymaiden)	Collinsia parviflora ^a (maiden blue eyed Mary)	Comandra umbellata (bastard toadflax)	Cordylanthus ramosus ^a (bushy bird's beak)	Crepis acuminata (tapertip hawkbeard)	Cryptantha (cryptantha)	Erigeron pumilus (shaggy fleabane)	Eriogonum racemosum (redroot buckwheat)
year	Nested Frequency																
2009	-	-	20	3	-	-	1	-	35	-	-	3	9	-	-	3	0
2011	-	20	21	6	2	8	-	-	72	3	73	11	209	0	1	2	-
2016	3	-	151	-	0	28	2	7	51	-	13	1	102	-	-	2	-
year	Average Cover (%)																
2009	-	-	0.1	0.0	-	-	0.0	-	0.3	-	-	0.0	0.1	-	-	0.0	0.0
2011	-	0.0	0.0	0.2	0.0	0.0	-	-	1.2	0.0	0.2	0.1	6.8	0.0	0.0	0.0	-
2016	0.0	-	0.7	-	0.0	0.2	0.0	0.0	0.1	-	0.0	0.0	1.4	-	-	0.0	-

a - Annual/Biennial; n - Noxious Weed; i - Introduced Species

FORB SPECIES										
Eriogonum umbellatum (sulphur-flower buckwheat)										
Gayophytum ramosissimum ^a (pinyon groundsmoke)										
Microsteris gracilis ^a (slender phlox)										
Penstemon (beardtongue)										
Penstemon humilis (low beardtongue)										
Petroradia pumila (rock goldenrod)										
Phlox austromontana (mountain phlox)										
Phlox hoodii (spiny phlox)										
Phlox longifolia (longleaf phlox)										
Polygonum douglasii ^a (Douglas' knotweed)										
year	Nested Frequency									
2009	6	-	-	8	6	-	4	18	8	-
2011	-	1	-	3	24	-	-	28	55	7
2016	-	1	1	-	30	4	-	34	6	5
year	Average Cover (%)									
2009	0.2	-	-	0.0	0.0	-	0.0	0.1	0.0	-
2011	-	0.0	-	0.0	0.3	-	-	0.5	0.2	0.0
2016	-	0.0	0.0	-	0.4	0.0	-	0.5	0.0	0.0

a - Annual/Biennial; n - Noxious Weed; i - Introduced Species

Table 02-43.12 - Shrub and Tree Species. Average modified Daubenmire quadrat and line intercept cover by year.

SHRUB SPECIES			
Artemisia tridentata ssp. vaseyana ^p (mountain big sagebrush)			
Chrysothamnus viscidiflorus ssp. viscidiflorus (yellow rabbitbrush)			
Symphoricarpos oreophilus (mountain snowberry)			
year	Line Intercept Cover (%)		
2009	23.8	2.4	-
2011	25.2	7.1	-
2016	23.7	6.2	0
year	Quadrat Cover (%)		
2009	21.2	3.1	-
2011	15.3	5.3	-
2016	18.1	5.0	0.0

t - Tree Species; p - Preferred Browse; i - Introduced

Table 02-43.13 - Shrub/Tree Characteristics. Population characteristics of shrub/tree species populations including density reproduction (seedlings), age distribution, utilization, vigor and average size (height/crown) of plants.

Year	Density		Age Class Distribution			Utilization		Poor Vigor (%)	Average Height Crown (cm)
	Plants Per Acre		Excluding Seedlings			Moderate (%)	Heavy (%)		
	Excluding Seedlings	Seedling	Young (%)	Mature (%)	Decadent (%)				
Artemisia tridentata ssp. vaseyana^P -- (mountain big sagebrush)									
2009	-	-	-	-	-	-	-	-	38/60
2011	7200	-	2	63	36	28	38	30	46/70
2016	5040	60	4	78	18	37	27	30	45/70
Chrysothamnus viscidiflorus ssp. viscidiflorus -- (yellow rabbitbrush)									
2009	-	-	-	-	-	-	-	-	23/37
2011	5400	20	0	97	3	1	0	3	26/40
2016	4620	-	1	99	0	0	0	0	24/37
Linanthus pungens -- (granite prickly phlox)									
2009	-	-	-	-	-	-	-	-	-/-
2011	-	-	-	-	-	-	-	-	19/32
2016	-	-	-	-	-	-	-	-	-/-
Opuntia -- (pricklypear)									
2009	-	-	-	-	-	-	-	-	-/-
2011	-	-	-	-	-	-	-	-	-/-
2016	-	-	-	-	-	-	-	-	6/11
Symphoricarpos oreophilus -- (mountain snowberry)									
2009	-	-	-	-	-	-	-	-	-/-
2011	60	-	0	100	0	33	0	0	34/47
2016	20	-	0	100	0	0	0	0	37/62
Tetradymia canescens -- (spineless horsebrush)									
2009	-	-	-	-	-	-	-	-	11/33
2011	20	-	0	100	0	0	0	0	19/27
2016	20	-	0	100	0	0	0	0	30/40

t - Tree Species; p - Preferred Browse; i - Introduced Species

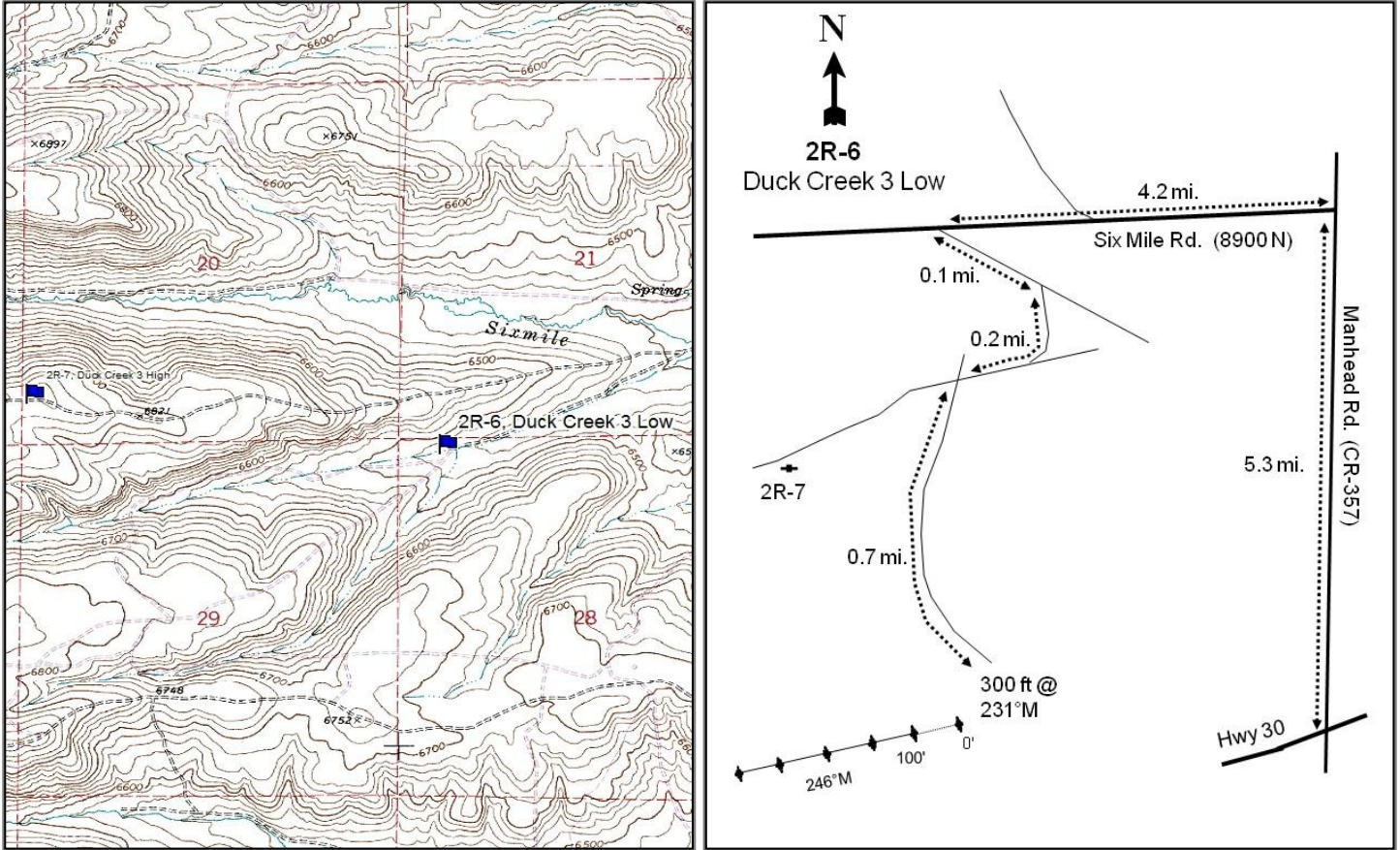
Table 02-43.14 - Tree Characteristics. Point-quarter tree density, size class distribution, and average diameter.

Year	Density	Size Class Distribution					Average Diameter (cm)
	Trees per Acre	Seedling (%)	1-4'	4-8'	8-12'	>12' (%)	
Juniperus osteosperma (Utah juniper)							
2009	7	-	67	33	-	-	4.0

Table -02-43.15 - Deer Desirable Components Index: Low Potential Scale.

Year	Preferred Browse Cover	Preferred Browse Decadence	Preferred Browse Young	Perennial Grass Cover	Annual Grass Cover	Perennial Forb Cover	Noxious Weeds	Total Score	Ranking
2011	30.0	4.2	0.5	27.0	0.0	3.0	0.0	64.8	Fair-Good
2016	22.6	9.6	2.0	30.0	0.0	2.2	0.0	66.4	Fair-Good

DUCK CREEK 3 LOW - STUDY NO. 02R-6



Location Information

USGS 7.5 min Map Info	Sage Creek NE; Township 13N, Range 7E, Section 28
GPS (0' Stake)	NAD 83 UTM ZONE 12, 486275 East 4632615 North

Transect Information

Browse Tag # (0' Stake)	Not Available
Transect Bearing	246° 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 Hwy 30 and Manhead Rd. (CR-357) drive north for 5.3 miles to Six Mile Road (8900 N). Turn left and drive 4.2 miles to a road going left (south east). Drive on this road for 0.1 miles to a right turn. Take the right turn and drive 0.2 miles to another intersection. Turn left (south) and drive 0.7 miles (there may be an old sheep trailer there). Park here and walk ~300 feet at 231 degrees magnetic to the 0-foot stake.

Site Information

Land Ownership	Private
Land Administrator	Private
Allotment	DUCK CREEK
Elevation	6,470ft (1,972m)
Aspect	Northeast
Slope	3%
Sample Dates	09/30/2003, 08/02/2006, 08/03/2011, 07/27/2016

Table 02R-06.1 Disturbance History. Recorded history of major disturbances.

Treatment/Disturbance	Name	WRI DB#	Date	Size (acres)
Aerator - Double Drum/Seed	Duck Creek	1321	2004	2850

Table 02R-06.2 Seed Mix. List of known seeded plant species and rates (if available).

Mix Name			Application Type	Application Date	Acres
Duck Creek B			Aerator	Mar 2004	650
Type	Species	Common Name	Cultivar/Source ID	Bulk lbs/acre	PLS lbs/acre
G	Achnatherum hymenoides	Indian Ricegrass	Rimrock	0.42	0.41
G	Achnatherum hymenoides	Indian Ricegrass	Rimrock	0.08	0.07
G	Dactylis glomerata	Orchardgrass	Paiute	1.00	0.88
G	Leymus cinereus	Great Basin Wildrye	Trailhead	1.00	0.86
G	Psathyrostachys juncea	Russian Wildrye	Bozoisky	1.00	0.75
G	Pseudoroegneria spicata	Bluebunch Wheatgrass	Goldar	0.46	0.43
G	Pseudoroegneria spicata	Bluebunch Wheatgrass	Goldar	0.57	0.53
F	Medicago sativa	Alfalfa	Ranger	1.00	0.96
F	Melilotus officinalis	Yellow Sweetclover		0.26	0.23
F	Onobrychis viciifolia	Sainfoin		2.00	1.91
F	Sanguisorba minor	Small Burnet	Delar	2.00	1.85
S	Atriplex canescens	Fourwing Saltbush	Juab UT	0.52	0.25
S	Purshia tridentata	Bitterbrush		0.13	0.11
Mix Name			Application Type	Application Date	Acres
Duck Creek C			Aerator	Mar 2004	2000
Type	Species	Common Name	Cultivar/Source ID	Bulk lbs/acre	PLS lbs/acre
G	Achnatherum hymenoides	Indian Ricegrass	Nezpar	0.50	0.47
G	Dactylis glomerata	Orchardgrass	Paiute	1.00	0.86
G	Leymus cinereus	Great Basin Wildrye	Trailhead	1.03	0.89
G	Psathyrostachys juncea	Russian Wildrye	Bozoisky	0.07	0.06
G	Psathyrostachys juncea	Russian Wildrye	Bozoisky	0.68	0.58
G	Pseudoroegneria spicata	Bluebunch Wheatgrass	Goldar	1.00	0.92
F	Astragalus cicer	Cicer Milkvetch	Windsor	0.75	0.70
F	Medicago sativa	Alfalfa	Ladak+	1.25	1.18
F	Melilotus officinalis	Yellow Sweetclover		0.25	0.22
F	Onobrychis viciifolia	Sainfoin		2.00	1.91
F	Sanguisorba minor	Small Burnet	Delar	1.25	1.19
S	Bassia prostrata	Forage Kochia	Immigrant	0.10	0.03

Wildlife Habitat and Vegetation History

Table 02R-06.3 - Wildlife Seasonal Habitat. UDWR wildlife habitat and seasonality.

Species	Habitat	Season	Brood/Young Rearing
Deer	crucial	summer	
Elk	substantial	winter	
Greater Sage Grouse	Crucial	occupied & Winter	brood-rearing
Pronghorn	substantial	summer	

Table 02R-06.4 - Vegetation History. The dominant vegetation type(s) and phase of woodland succession (Tausch, Miller, Roundy, & Chambers, 2009).

Year	Vegetation Type	Woodland Succession
2003	Mountain Big Sagebrush/Perennial Grass	NA
2006	Mountain Big Sagebrush/Perennial Grass	NA
2011	Mountain Big Sagebrush/Perennial Grass	NA
2016	Mountain Big Sagebrush/Perennial Grass	NA

Site Notes

This study is located on private land, east of Bear Lake, in the bottom of a side canyon of Sixmile Creek. The study was established in the fall of 2003 within a mountain big sagebrush (*Artemisia tridentata* ssp. *vaseyana*) dominated flat. In the spring of 2004, approximately 2,850 acres were treated with a single pass of a Lawson Pasture Aerator and a seed mix of grass, forb, and browse species were broadcast seeded during the aeration treatment.

Soils

Table 02R-06.5 - Soil Analysis Data. List of chemical and textural soil characteristics determined by laboratory analysis.

Texture	pH	%sand	%silt	%clay	%OM	PPM P	PPM K	ds/m	Sample Date
Clay Loam	7.6	26.6	40.7	32.7	4.1	5.4	643.2	0.8	09/30/2003

Site Potential

1981-2010 Average Annual Precipitation 14 inches
 NRCS Ecological Site Upland Loam (Bonneville Big Sagebrush)
 NRCS Ecological Site # R047XA314UT
 States and Transitions No state and transition model is available for this ecological site.

This study site has been dominated by mountain big sagebrush (*Artemisia tridentata* ssp. *vaseyana*) since it was established in 2003. Cover of sagebrush decreased by over 5% following a 2004 aerator treatment, but has surpassed pretreatment cover as of the 2016 sample year. Yellow rabbitbrush (*Chrysothamnus viscidiflorus* ssp. *viscidiflorus*) and rubber rabbitbrush (*Ericameria nauseosa*) are also scattered throughout the overstory, but contribute much less cover (Table 02R-06.12). The herbaceous understory is abundant with perennial graminoids such as sedges (*Carex* sp.), Kentucky bluegrass (*Poa pratensis*), and western wheatgrass (*Pascopyrum smithii*) filling the interspaces. The invasive annual species cheatgrass (*Bromus tectorum*) was observed in 2016, but in very low amounts (Table 02R- 06.7, Table 02R-06.10). Forbs are abundant, but not particularly diverse (Table 02R-06.11).

Trend Summary Tables

Table 02R-06.6 - Shrub/Tree Summary. Average modified Daubenmire quadrat and line intercept cover by year for shrubs/trees.

Year	Quadrat Cover (%)			Line-intercept Cover (%)		
	Preferred Shrub	Other Shrub	Tree	Preferred Shrub	Other Shrub	Tree
2003	10.8	4.3	-	10.4	6.3	-
2006	4.7	4.0	-	4.9	5.3	-
2011	13.3	6.4	-	23.1	8.8	-
2016	17.0	4.1	-	26.2	5.9	-

Table 02R-06.7 - Herbaceous Summary. Nested frequency and average modified Daubenmire quadrat cover by year for herbaceous functional groups.

Year	Nested Frequency				Quadrat Cover (%)			
	Annual Grass	Perennial Grass	Annual/Biennial Forb	Perennial Forb	Annual Grass	Perennial Grass	Annual/Biennial Forb	Perennial Forb
2003	-	463	-	368	-	17.5	-	11.8
2006	-	452	2	315	-	20.9	0.0	11.0
2011	-	449	18	270	-	16.4	0.6	8.4
2016	1	478	37	258	0.0	41.2	0.2	8.4

Table 02R-06.8 - Basic Ground Cover. Average modified Daubenmire quadrat cover by year for basic ground cover types.

Year	Cover Type (%)					
	Bare Ground	Cryptograms	Litter	Pavement	Rock	Vegetation
2003	28.9	0.3	39.0	0.1	0.0	44.5
2006	31.1	0.0	31.7	0.2	0.0	47.8
2011	39.2	-	37.2	0.1	-	38.8
2016	20.2	0.2	33.5	0.0	-	63.9

Table 02R-06.9 - Pellet Group Data. Quadrat frequency and pellet group transect data for animal pellets. Rabbit pellet groups are not sampled in the pellet group transect.

Year	Cattle	Mule Deer/Pronghorn	Elk	Greater Sage-Grouse	Horse	Rabbit	Domestic Sheep
	Quadrat Frequency						
2003	23	4	-	7	-	28	-
2006	27	5	-	2	-	44	1
2011	10	8	5	-	-	45	-
2016	18	-	-	-	-	9	-
Year	Days Use Per Acre (ha)						
2003	-	-	-	-	-	-	-
2006	63.9 (157.8)	2.0 (5.0)	-	26.2 (64.6)*	-	-	-
2011	38.5 (95.0)	2.0 (5.0)	5.3 (13.2)	-	0.6 (1.4)	-	-
2016	21.8 (53.8)	-	-	-	-	-	-

*Pellets per acre (ha)

Table 02R-06.10 - Grass Species. Nested frequency and modified Daubenmire average cover by year.

GRASS SPECIES										
	Achnatherum hymenoides (Indian ricegrass)	Achnatherum lettermanii (Letterman's needlegrass)	Bromus tectorum ⁿⁱ (cheatgrass)	Carex (sedge)	Elymus elymoides (squirreltail)	Koeleria macrantha (prairie Junegrass)	Pascopyrum smithii (western wheatgrass)	Poa pratensis ⁱ (Kentucky bluegrass)	Poa secunda (Sandberg bluegrass)	Pseudoroegneria spicata (bluebunch wheatgrass)
year	Nested Frequency									
2003	-	3	-	391	3	-	175	214	1	-
2006	3	-	-	325	2	-	261	222	52	3
2011	2	16	-	376	1	-	351	26	84	-
2016	-	-	1	278	-	4	339	275	134	1
year	Average Cover (%)									
2003	-	0.1	-	11.4	0.0	-	2.6	3.4	0.0	-
2006	0.1	-	-	7.9	0.0	-	5.9	6.5	0.5	0.0
2011	0.0	0.5	-	9.8	0.0	-	4.7	0.5	0.9	-
2016	-	-	0.0	15.9	-	0.1	9.4	12.5	3.3	0.0

a - Annual; n - Noxious Weed; i - Introduced Species

Table 02R-06.11 - Forb Species. Nested frequency and modified Daubenmire average cover by year.

FORB SPECIES	Achillea millefolium (Common yarrow)	Antennaria (pussytoes)	Arabis (rockcress)	Astragalus (milkvetch)	Ceratocephala testiculata ^a (curveseed butterwort)	Cirsium (thistle)	Collinsia parviflora ^a (maiden blue eyed Mary)	Cordylanthus ramosus ^a (bushy bird's beak)	Descurainia pinnata ^a (western tansymustard)	Eriogonum umbellatum (sulphur-flower buckwheat)	Linum lewisii (Lewis flax)	Medicago sativa ⁱ (alfalfa)	Packera multilobata (lobeleaf groundsel)	Phlox hoodii (spiny phlox)	Phlox longifolia (longleaf phlox)	Potentilla gracilis (slender cinquefoil)	Symphytotrichum (aster)
year	Nested Frequency																
2003	293	38	-	2	-	1	-	-	-	-	-	-	-	62	9	3	158
2006	181	34	-	20	-	1	2	0	-	1	-	2	-	84	38	-	179
2011	222	48	1	1	2	-	-	16	-	15	-	-	2	68	2	-	-
2016	189	41	1	3	23	-	1	12	1	6	0	9	-	67	3	-	5
year	Average Cover (%)																
2003	6.0	1.4	-	0.0	-	0.0	-	-	-	-	-	-	-	0.9	0.0	0.0	1.5
2006	2.8	1.6	-	0.1	-	0.0	0.0	0.0	-	0.0	-	0.0	-	1.3	0.4	-	4.4
2011	4.3	2.1	0.0	0.0	0.0	-	-	0.6	-	0.2	-	-	0.0	1.8	0.0	-	-
2016	4.2	1.8	0.0	0.0	0.1	-	0.0	0.1	0.0	0.2	0.0	0.0	-	2.1	0.0	-	0.0

a - Annual/Biennial; n - Noxious Weed; i - Introduced Species

FORB SPECIES	Taraxacum officinale (common dandelion)	Tragopogon dubius ^a (yellow salsify)	Trifolium (clover)
year	Nested Frequency		
2003	116	-	-
2006	35	-	14
2011	-	-	4
2016	-	1	40
year	Average Cover (%)		
2003	1.9	-	-
2006	0.2	-	0.0
2011	-	-	0.0
2016	-	0.0	0.1

a - Annual/Biennial; n - Noxious Weed; i - Introduced Species

Table 02R-06.12 - Shrub and Tree Species. Average modified Daubenmire quadrat and line intercept cover by year.

SHRUB SPECIES	Line Intercept Cover (%)				
	year	2003	2006	2011	2016
Artemisia tridentata ssp. vaseyana ^p (mountain big sagebrush)	10.4	2.1	4.2	-	-
Chrysothamnus viscidiflorus ssp. viscidiflorus (yellow rabbitbrush)	23.1	3.5	5.3	-	-
Ericameria nauseosa (rubber rabbitbrush)	26.2	0.7	5.2	-	-
Tetradymia canescens (spineless horsebrush)	-	-	-	-	-

SHRUB SPECIES	Quadrat Cover (%)				
	year	2003	2006	2011	2016
Artemisia tridentata ssp. vaseyana ^p (mountain big sagebrush)	10.8	1.4	2.9	-	-
Chrysothamnus viscidiflorus ssp. viscidiflorus (yellow rabbitbrush)	4.7	1.7	2.3	-	-
Ericameria nauseosa (rubber rabbitbrush)	13.3	2.6	3.7	0.0	-
Tetradymia canescens (spineless horsebrush)	17.0	1.5	2.7	-	-

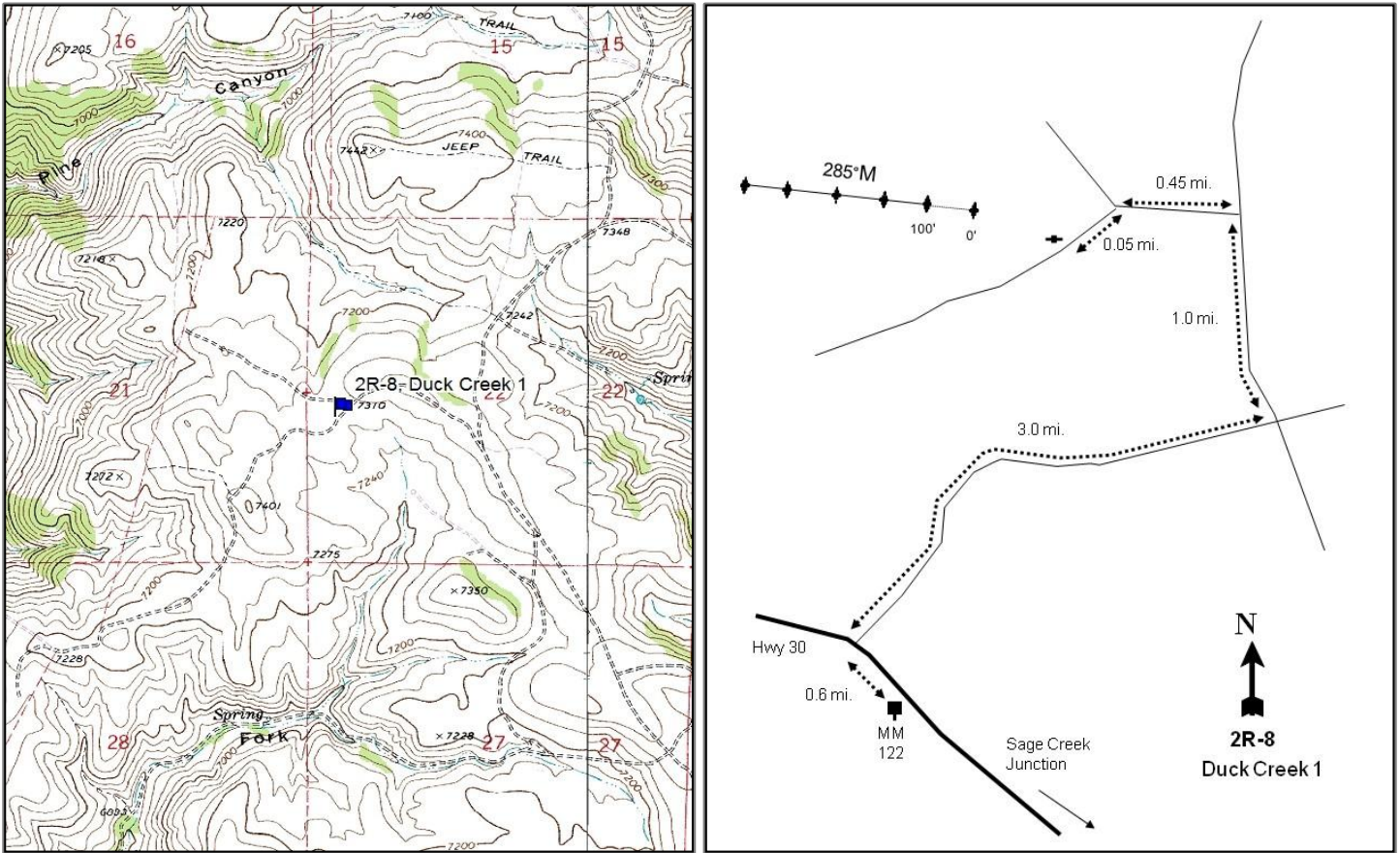
t - Tree Species; p - Preferred Browse; i - Introduced

Table 02R-06.13 - Shrub/Tree Characteristics. Population characteristics of shrub/tree species populations including density reproduction (seedlings), age distribution, utilization, vigor and average size (height/crown) of plants.

Year	Density		Age Class Distribution			Utilization		Poor Vigor (%)	Average Height Crown (cm)
	Plants Per Acre		Excluding Seedlings			Moderate (%)	Heavy (%)		
	Excluding Seedlings	Seedling	Young (%)	Mature (%)	Decadent (%)				
Artemisia tridentata ssp. vaseyana^p -- (mountain big sagebrush)									
2003	5880	100	10	80	11	1	0	4	65/62
2006	3280	3140	19	65	17	9	0	11	58/56
2011	8660	44220	43	56	1	7	0	3	62/69
2016	14480	500	69	29	2	9	0	6	84/88
Chrysothamnus viscidiflorus ssp. viscidiflorus -- (yellow rabbitbrush)									
2003	1320	-	3	85	12	2	0	2	21/33
2006	1800	20	16	80	4	7	0	2	23/37
2011	2220	20	15	78	7	1	0	15	22/39
2016	840	20	10	91	0	0	0	0	25/38
Ericameria nauseosa -- (rubber rabbitbrush)									
2003	1760	160	30	60	10	1	0	1	49/63
2006	2100	80	33	64	3	16	7	3	47/60
2011	2800	20	30	66	4	1	0	4	56/54
2016	1840	60	22	71	8	1	0	10	47/64
Tetradymia canescens -- (spineless horsebrush)									
2003	-	-	-	-	-	-	-	-	-/-
2006	20	-	100	0	0	100	0	0	-/-
2011	20	-	0	0	100	0	100	100	10/19

t - Tree Species; p - Preferred Browse; i - Introduced Species

DUCK CREEK 1 - STUDY No. 02R-8



Location Information

USGS 7.5 min Map Info Laketown NE; Township 13N, Range 6E, Section 22
 GPS (0' Stake) NAD 83 UTM ZONE 12, 478101 East 4633415 North

Transect Information

Browse Tag # (0' Stake) 9151
 Transect Bearing 285° magnetic
 Length 500ft
 Belt Placement Line 1 (11ft), Line 2 (34ft), Line 3 (59ft), Line 4 (71ft), Line 5 (95ft)
 Belt Marker Placement Standard, Belt 1, 3, 4, 5: No rebar

Directions to Site

On Highway 30, drive to mile marker 122 and continue north for 0.6 miles to a road to the right (east). Take this road for 3.0 miles to an intersection. At the intersection, turn left (north) and drive 1.0 miles to a fork. Take the left fork for 0.45 miles to another fork. Take the left fork for 0.05 miles to the witness post on the right side of the road. The zero post is 13 paces at 311 degrees magnetic. The browse tag is #9151.

Site Information

Land Ownership	Private
Land Administrator	Private
Allotment	DUCK CREEK
Elevation	7,300ft (2,225m)
Aspect	Northwest
Slope	3%
Sample Dates	10/01/2003, 08/02/2006, 08/03/2011, 07/28/2016

Table 02R-08.1 Disturbance History. Recorded history of major disturbances.

Treatment/Disturbance	Name	WRI DB#	Date	Size (acres)
Aerator - Double Drum/Seed	Duck Creek	1321	2004	2850

Table 02R-08.2 Seed Mix. List of known seeded plant species and rates (if available).

Mix Name			Application Type	Application Date	Acres
Duck Creek A			Aerator	Mar 2004	325
Type	Species	Common Name	Cultivar/Source ID	Bulk lbs/acre	PLS lbs/acre
G	Achnatherum hymenoides	Indian Ricegrass	Nezpar	0.51	0.45
G	Dactylis glomerata	Orchardgrass	Paiute	1.00	0.88
G	Leymus cinereus	Great Basin Wildrye	Trailhead	0.90	0.76
G	Leymus cinereus	Great Basin Wildrye	Trailhead	0.15	0.13
G	Psathyrostachys juncea	Russian Wildrye	Bozoisky	1.00	0.75
G	Pseudoroegneria spicata	Bluebunch Wheatgrass	Goldar	1.00	0.93
F	Medicago sativa	Alfalfa	Ranger	1.00	0.96
F	Melilotus officinalis	Yellow Sweetclover		0.26	0.23
F	Onobrychis viciifolia	Sainfoin		2.00	1.91
F	Sanguisorba minor	Small Burnet	Delar	2.00	1.85
S	Atriplex canescens	Fourwing Saltbush	Juab UT	0.51	0.25
S	Purshia tridentata	Bitterbrush		0.15	0.13
Mix Name			Application Type	Application Date	Acres
Duck Creek B			Aerator	Mar 2004	650
Type	Species	Common Name	Cultivar/Source ID	Bulk lbs/acre	PLS lbs/acre
G	Achnatherum hymenoides	Indian Ricegrass	Rimrock	0.42	0.41
G	Achnatherum hymenoides	Indian Ricegrass	Rimrock	0.08	0.07
G	Dactylis glomerata	Orchardgrass	Paiute	1.00	0.88
G	Leymus cinereus	Great Basin Wildrye	Trailhead	1.00	0.86
G	Psathyrostachys juncea	Russian Wildrye	Bozoisky	1.00	0.75
G	Pseudoroegneria spicata	Bluebunch Wheatgrass	Goldar	0.46	0.43
G	Pseudoroegneria spicata	Bluebunch Wheatgrass	Goldar	0.57	0.53
F	Medicago sativa	Alfalfa	Ranger	1.00	0.96
F	Melilotus officinalis	Yellow Sweetclover		0.26	0.23
F	Onobrychis viciifolia	Sainfoin		2.00	1.91
F	Sanguisorba minor	Small Burnet	Delar	2.00	1.85
S	Atriplex canescens	Fourwing Saltbush	Juab UT	0.52	0.25
S	Purshia tridentata	Bitterbrush		0.13	0.11

Wildlife Habitat and Vegetation History

Table 02R-08.3 - Wildlife Seasonal Habitat. UDWR wildlife habitat and seasonality.

Species	Habitat	Season	Brood/Young Rearing
Deer	crucial	winter	
Greater Sage Grouse	Crucial	occupied	brood-rearing

Table 02R-08.4 - Vegetation History. The dominant vegetation type(s) and phase of woodland succession (Tausch, Miller, Roundy, & Chambers, 2009).

Year	Vegetation Type	Woodland Succession
2003	Mountain Big Sagebrush	NA
2006	Mountain Big Sagebrush/Perennial Grass	NA
2011	Mountain Big Sagebrush/Perennial Grass	NA
2016	Mountain Big Sagebrush/Perennial Grass	NA

Site Notes

This study is located on private land, on top of the ridge east of Bear Lake. The study was established in the fall of 2003 within a mountain big sagebrush (*Artemisia tridentata* ssp. *vaseyana*) dominated flat. In the spring of 2004, approximately 2,850 acres were treated with a single pass of a Lawson Pasture Aerator and a seed mix of grass, forb, and browse species were broadcast seeded during the aeration treatment. In 2016, the fresh leg of a deer fawn was seen on the site and an older sheep skull found.

Soils

Table 02R-08.5 - Soil Analysis Data. List of chemical and textural soil characteristics determined by laboratory analysis.

Texture	pH	%sand	%silt	%clay	%OM	PPM P	PPM K	ds/m	Sample Date
Loam	7.1	40.6	35.2	24.2	2.5	32.0	512.0	0.7	10/01/2003

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 study was established in 2003, mountain big sagebrush (*Artemisia tridentata* ssp. *vaseyana*) dominated the overstory and the herbaceous understory was not particularly abundant, characteristics which place this site in Community Phase 3.1 of the Mountain Big Sagebrush Superdominance/Low Shrub state (State 3). Following an aerator treatment in 2004, the site reverted via an undefined pathway to Community Phase 2.1 of the Mountain Big Sagebrush-Steppe/Non-Natives state (State 2) with co-dominance between sagebrush and largely native perennial grasses. From this state, the model indicates that this site could transition back to State 3 through continued heavy grazing and fire suppression (Transition T2a) (USDA-NRCS, 2013).

Trend Summary Tables

Table 02R-08.6 - Shrub/Tree Summary. Average modified Daubenmire quadrat and line intercept cover by year for shrubs/trees.

Year	Quadrat Cover (%)			Line-intercept Cover (%)		
	Preferred Shrub	Other Shrub	Tree	Preferred Shrub	Other Shrub	Tree
2003	36.3	6.5	-	32.2	5.9	-
2006	8.3	8.0	-	9.2	9.3	-
2011	14.5	8.4	-	18.8	19.9	-
2016	21.3	7.5	-	23.7	9.8	-

Table 02R-08.7 - Herbaceous Summary. Nested frequency and average modified Daubenmire quadrat cover by year for herbaceous functional groups.

Year	Nested Frequency				Quadrat Cover (%)			
	Annual Grass	Perennial Grass	Annual/Biennial Forb	Perennial Forb	Annual Grass	Perennial Grass	Annual/Biennial Forb	Perennial Forb
2003	-	378	14	269	-	9.6	0.1	9.6
2006	-	396	41	323	-	15.7	0.7	11.1
2011	2	416	191	372	0.0	18.8	8.1	22.1
2016	-	437	144	297	-	21.6	4.2	9.7

Table 02R-08.8 - Basic Ground Cover. Average modified Daubenmire quadrat cover by year for basic ground cover types.

Year	Cover Type (%)					
	Bare Ground	Cryptograms	Litter	Pavement	Rock	Vegetation
2003	9.8	0.3	57.5	0.4	0.5	55.6
2006	19.2	0.2	47.9	0.3	0.4	43.4
2011	12.6	0.0	35.0	0.1	0.4	62.2
2016	17.6	-	33.1	0.2	0.3	60.7

Table 02R-08.9 - Pellet Group Data. Quadrat frequency and pellet group transect data for animal pellets. Rabbit pellet groups are not sampled in the pellet group transect.

Year	Cattle	Mule Deer	Elk	Greater Sage- Grouse	Rabbit	Domestic Sheep
	Quadrat Frequency					
2003	10	2	-	-	19	-
2006	8	3	-	1	9	18
2011	5	8	10	-	10	-
2016	7	1	-	-	-	-
Year	Days Use Per Acre (ha)					
2003	-	-	-	-	-	-
2006	29.0 (71.7)	3.4 (8.3)	-	17.4 (43.0)*	-	21.5 (53.0)
2011	28.3 (69.9)	0.7 (1.7)	3.4 (8.3)	-	-	-
2016	16.0 (39.5)	10.7 (26.5)	-	-	-	-

*Pellets per acre (ha)

Table 02R-08.10 - Grass Species. Nested frequency and modified Daubenmire average cover by year.

GRASS SPECIES	Achnatherum lettermanii (L-etterman's needlegrass)	Bromus tectorum ^{ai} (cheatgrass)	Carex (sedge)	Dactylis glomerata ⁱ (orchardgrass)	Elymus elymoides (squirreltail)	Hesperostipa comata (needle and thread)	Koeleria macrantha (prairie Junegrass)	Pascopyrum smithii (western wheatgrass)	Poa fendleriana (muttongrass)	Poa pratensis ⁱ (Kentucky bluegrass)	Poa secunda (Sandberg bluegrass)	Psathyrostachys juncea ⁱ (Russian wildrye)	Pseudoroegneria spicata (bluebunch wheatgrass)
year	Nested Frequency												
2003	135	-	35	-	2	4	24	206	63	-	187	-	1
2006	119	-	73	22	5	1	51	267	84	23	127	-	5
2011	170	2	71	-	3	1	28	315	63	8	178	6	15
2016	171	-	24	-	-	-	98	314	2	6	200	0	14
year	Average Cover (%)												
2003	2.3	-	0.7	-	0.0	0.0	0.3	2.0	0.6	-	3.7	-	0.0
2006	3.7	-	1.8	0.1	0.0	0.0	0.9	4.5	1.2	0.6	2.7	-	0.1
2011	6.7	0.0	2.7	-	0.0	0.0	0.4	4.6	0.5	0.1	3.7	0.0	0.1
2016	7.1	-	0.8	-	-	-	1.4	6.1	0.0	0.0	5.9	0.0	0.3

a - Annual; n - Noxious Weed; i - Introduced Species

Table 02R-08.11 - Forb Species. Nested frequency and modified Daubenmire average cover by year.

FORB SPECIES	Achillea millefolium (Common yarrow)	Antennaria microphylla (littleleaf pussytoes)	Arabis (rockcress)	Astragalus (milkvetch)	Astragalus convallarius (lesser rusly milkvetch)	Calochortus nuttallii (sego lily)	Ceratocephala testiculata ^{ai} (curvseed butterwort)	Cirsium (thistle)	Collinsia parviflora ^a (maiden blue eyed Mary)	Comandra umbellata (bastard toadflax)	Cordylanthus ramosus ^a (bushy bird's beak)	Descurainia pinnata ^a (western tansymustard)	Erigeron eatonii (Eaton's fleabane)	Eriogonum heracleoides (parsnipflower buckwheat)	Eriogonum umbellatum (sulphur-flower buckwheat)	Ipomopsis aggregata (scarlet gilia)	Lupinus argenteus (silvery lupine)	
year	Nested Frequency																	
2003	12	120	5	40	2	-	-	-	9	-	-	3	168	44	-	-	-	
2006	24	135	1	41	7	6	-	1	8	-	32	-	214	56	-	-	5	
2011	23	147	10	6	-	-	7	-	56	-	159	-	291	85	3	3	40	
2016	29	112	5	11	7	-	4	1	5	2	142	-	70	59	-	-	18	
year	Average Cover (%)																	
2003	0.1	4.5	0.0	0.9	0.0	-	-	-	0.0	-	-	0.0	1.7	1.4	-	-	-	
2006	0.1	4.2	0.0	0.9	0.0	0.0	-	0.0	0.0	-	0.6	-	2.8	2.0	-	-	0.2	
2011	1.4	5.5	0.0	0.0	-	-	0.0	-	0.1	-	8.0	-	8.4	4.2	0.1	0.0	1.1	
2016	0.4	4.2	0.0	0.1	0.0	-	0.0	0.0	0.0	0.0	4.2	-	0.7	1.6	-	-	0.7	

a - Annual/Biennial; n - Noxious Weed; i - Introduced Species

FORB SPECIES	Packera multilobata (lobeleaf groundsel)	Phlox hoodii (spiny phlox)	Phlox longifolia (longleaf phlox)	Polygonum douglasii ^{ai} (Douglas' knotweed)	Sanguisorba minor ⁱ (small burnet)	Senecio integerrimus ^a (lambstongue ragwort)	Symphoricarichum (aster)	Veronica biloba ^{ai} (two-lobed speedwell)	Zigadenus paniculatus (foothill deathcamas)
year	Nested Frequency								
2003	28	21	51	2	-	-	-	-	-
2006	0	22	39	-	7	5	2	-	3
2011	-	16	14	32	-	-	46	2	-
2016	-	15	1	3	-	-	149	-	-
year	Average Cover (%)								
2003	0.1	0.6	0.3	0.0	-	-	-	-	-
2006	0.0	0.6	0.2	-	0.0	0.1	0.0	-	0.1
2011	-	0.4	0.0	0.1	-	-	0.9	0.0	-
2016	-	0.4	0.0	0.0	-	-	1.5	-	-

a - Annual/Biennial; n - Noxious Weed; i - Introduced Species

Table 02R-08.12 - Shrub and Tree Species. Average modified Daubenmire quadrat and line intercept cover by year.

SHRUB SPECIES	Amelanchier utahensis ^p (Utah serviceberry)	Artemisia tridentata ssp. vaseyana ^p (mountain big sagebrush)	Atriplex canescens ^p (fourwing saltbush)	Chrysothamnus viscidiflorus ssp. viscidiflorus (yellow rabbitbrush)	Eriogonum heracleoides (parsnipflower buckwheat)	Symphoricarpos oreophilus (mountain snowberry)	Tetradymia canescens (spineless horsebrush)
year	Line Intercept Cover (%)						
2003	-	32.2	-	4.8	-	0.8	0.3
2006	-	9.2	-	6.7	0.5	1	1.1
2011	0.1	18.7	-	11	3	4.6	1.3
2016	0.2	23.5	-	4.8	2.2	1.8	1
year	Quadrat Cover (%)						
2003	0.0	36.2	-	4.9	-	1.1	0.5
2006	0.1	8.2	-	5.6	0.0	1.4	1.0
2011	0.0	14.3	0.1	5.8	0.0	1.6	1.0
2016	0.0	21.3	-	6.2	0.0	0.8	0.4

t - Tree Species; p - Preferred Browse; i - Introduced

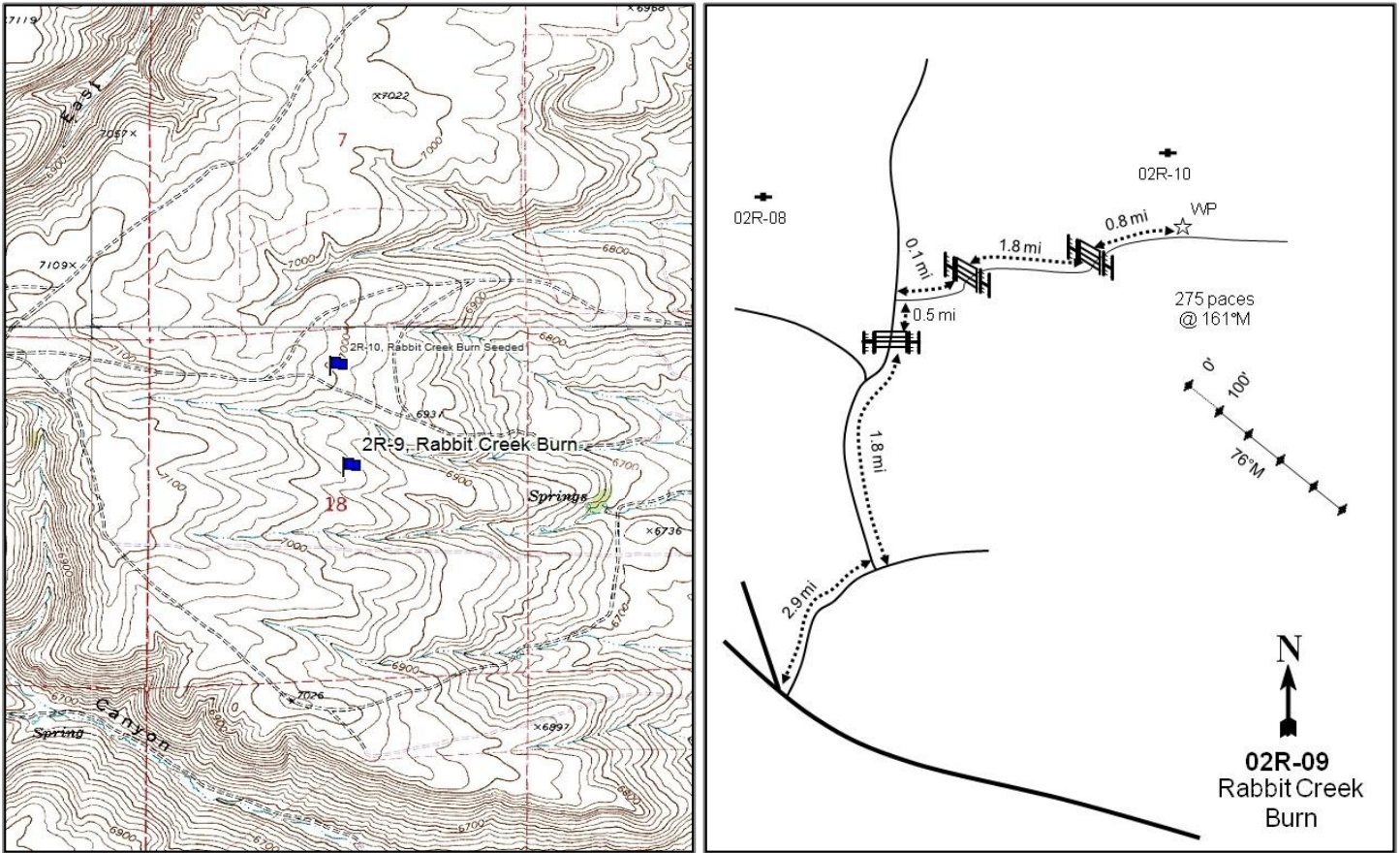
Table 02R-08.13 - Shrub/Tree Characteristics. Population characteristics of shrub/tree species populations including density reproduction (seedlings), age distribution, utilization, vigor and average size (height/crown) of plants.

Year	Density		Age Class Distribution			Utilization		Poor Vigor (%)	Average Height Crown (cm)
	Plants Per Acre		Excluding Seedlings			Moderate (%)	Heavy (%)		
	Excluding Seedlings	Seedling	Young (%)	Mature (%)	Decadent (%)				
Amelanchier utahensis^p -- (Utah serviceberry)									
2003	60	-	100	0	0	0	0	0	157/196
2006	60	-	100	0	0	0	0	0	119/106
2011	20	-	0	100	0	0	0	0	83/92
2016	40	-	0	100	0	50	0	0	76/84
Artemisia tridentata ssp. vaseyana^p -- (mountain big sagebrush)									
2003	12100	200	6	63	31	0	0	8	61/68
2006	4380	780	11	65	23	21	2	9	42/54
2011	5860	2220	16	71	13	32	1	4	45/64
2016	6660	1000	28	70	2	11	5	1	57/81
Atriplex canescens^p -- (fourwing saltbush)									
2003	-	-	-	-	-	-	-	-	-/-
2006	-	-	-	-	-	-	-	-	-/-
2011	20	-	0	100	0	100	0	0	39/63
2016	-	-	-	-	-	-	-	-	-/-
Chrysothamnus viscidiflorus ssp. viscidiflorus -- (yellow rabbitbrush)									
2003	5100	-	0	98	1	0	0	0	24/32
2006	5840	100	10	89	2	0	0	0	25/36
2011	6340	-	11	86	2	3	0	4	23/34
2016	3840	-	5	95	0	0	0	2	25/38
Eriogonum heracleoides -- (parsnipflower buckwheat)									
2003	1960	20	4	95	1	0	0	1	7/17
2006	2560	100	8	88	5	2	2	2	9/31
2011	3520	-	0	100	0	0	0	0	11/31
2016	2080	-	3	97	0	0	0	0	14/23

Year	Density		Age Class Distribution			Utilization		Poor Vigor (%)	Average Height Crown (cm)
	Plants Per Acre		Excluding Seedlings			Moderate (%)	Heavy (%)		
	Excluding Seedlings	Seedling	Young (%)	Mature (%)	Decadent (%)				
Eriogonum microthecum^P -- (slender buckwheat)									
2003	-	-	-	-	-	-	-	-	-/-
2006	-	-	-	-	-	-	-	-	18/23
2011	40	-	0	100	0	50	0	50	15/31
2016	-	-	-	-	-	-	-	-	-/-
Purshia tridentata^P -- (antelope bitterbrush)									
2003	-	-	-	-	-	-	-	-	-/-
2006	-	40	0	0	0	0	0	0	- / -
2011	-	-	-	-	-	-	-	-	58/152
2016	-	-	-	-	-	-	-	-	-/-
Symphoricarpos oreophilus -- (mountain snowberry)									
2003	380	-	16	84	0	0	0	0	43/55
2006	280	-	7	93	0	14	0	0	47/95
2011	460	-	9	91	0	39	0	4	43/69
2016	320	-	31	69	0	13	0	6	48/85
Tetradymia canescens -- (spineless horsebrush)									
2003	400	-	5	75	20	0	0	5	32/33
2006	880	40	27	68	5	7	0	5	24/37
2011	800	20	18	75	8	0	0	8	25/36
2016	720	-	8	92	0	0	0	8	28/35

t - Tree Species; p - Preferred Browse; i - Introduced Species

RABBIT CREEK BURN - STUDY No. 02R-9



Location Information

USGS 7.5 min Map Info	Sage Creek NW; Township 13N, Range 7E, Section 18
GPS (0' Stake)	NAD 83 UTM ZONE 12, 483723 East 4635212 North

Transect Information

Browse Tag # (0' Stake)	33
Transect Bearing	76° 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

Traveling on Highway 30, toward Bear Lake from Sage Creek Junction, turn right on a road that turns off the highway along with a runaway truck ramp. The road turns to the west of the ramp. Follow this road for 2.9 miles to a road that comes in on the left. Turn left on this road and drive 1.8 miles to a gate. Pass through the gate and continue 0.5 miles to a two-track road on the right. Turn onto this and follow it for 0.1 miles to a gate, continue 1.8 miles to another gate. Pass through the gate and travel 0.8 miles to the witness post on the left (north) side of the road. The 0-foot post is 275 paces at 161 degrees magnetic from the witness post and is marked with browse tag #33.

Site Information

Land Ownership Federal
 Land Administrator BLM
 Allotment RABBIT CREEK
 Elevation 7,000ft (2,134m)
 Aspect East
 Slope 8%
 Sample Dates 06/24/2004, 07/11/2007, 07/26/2012, 07/27/2016

Table 02R-09.1 Disturbance History. Recorded history of major disturbances.

Treatment/Disturbance	Name	WRI DB#	Date	Size (acres)
Fire - Wildfire	East Bear	PDB	Fall 2003	887

Wildlife Habitat and Vegetation History

Table 02R-09.3 - Wildlife Seasonal Habitat. UDWR wildlife habitat and seasonality.

Species	Habitat	Season	Brood/Young Rearing
Deer	crucial	summer	
Elk	substantial	winter	
Greater Sage Grouse	Crucial	occupied	brood-rearing
Pronghorn	substantial	summer	

Table 02R-09.4 - Vegetation History. The dominant vegetation type(s) and phase of woodland succession (Tausch, Miller, Roundy, & Chambers, 2009).

Year	Vegetation Type	Woodland Succession
2004	Yellow Rabbitbrush/Perennial Grass-Forb	NA
2007	Yellow Rabbitbrush/Perennial Grass	NA
2012	Yellow Rabbitbrush/Perennial Grass	NA
2016	Yellow Rabbitbrush/Perennial Grass	NA

Site Notes

No Notes

Soils

Table 02R-09.5 - Soil Analysis Data. List of chemical and textural soil characteristics determined by laboratory analysis.

Texture	pH	% sand	% silt	% clay	% OM	PPM P	PPM K	ds/m	Sample Date
Loam	6.8	34.6	47.9	17.5	3.2	7.2	336.0	0.8	06/24/2004

Site Potential

1981-2010 Average Annual Precipitation 18 inches
 NRCS Ecological Site Mountain Loam (Mountain Big Sagebrush)
 NRCS Ecological Site # R047XA430UT
 States and Transitions A defined state and transition model is available.

Since site establishment in 2004, this site has remained in Community Phase 4.1 in the Yellow Rabbitbrush State (State 4). This community is characterized by an abundance of yellow rabbitbrush (*Chrysothamnus viscidiflorus* ssp. *viscidiflorus*) and has a reduced amount of mountain big sagebrush (*Artemisia tridentata* ssp. *vaseyana*) (Table 02R- 09.12, Table 02-09.13). The herbaceous understory has been primarily comprised of perennial grasses throughout the years of the study (Table 02-09.10). Forbs have remained diverse, yet sparse, and are mainly composed of perennial species (Table 02-09.7, Table 02-09.11). If heavy, season long grazing is implemented to reduce the herbaceous understory, the community may be affected to allow sagebrush to return through a transitional pathway (Transition T4a) to the Mountain Big Sagebrush Super-Dominance State (State 3) (USDA-NRCS, 2011).

Trend Summary Tables

Table 02R-09.6 - Shrub/Tree Summary. Average modified Daubenmire quadrat and line intercept cover by year for shrubs/trees.

Year	Quadrat Cover (%)			Line-intercept Cover (%)		
	Preferred Shrub	Other Shrub	Tree	Preferred Shrub	Other Shrub	Tree
2004	-	5.4	-	-	5.6	-
2007	0.1	9.6	-	-	12.2	-
2012	0.2	9.1	-	-	11.1	-
2016	0.0	14.1	-	0.5	18.9	-

Table 02R-09.7 - Herbaceous Summary. Nested frequency and average modified Daubenmire quadrat cover by year for herbaceous functional groups.

Year	Nested Frequency				Quadrat Cover (%)			
	Annual Grass	Perennial Grass	Annual/Biennial Forb	Perennial Forb	Annual Grass	Perennial Grass	Annual/Biennial Forb	Perennial Forb
2004	1	315	82	329	0.0	5.9	0.9	7.5
2007	16	390	245	353	0.0	17.3	2.1	11.4
2012	32	437	-	150	0.3	17.4	-	3.0
2016	124	435	18	139	3.3	18.1	0.0	3.3

Table 02R-09.8 - Basic Ground Cover. Average modified Daubenmire quadrat cover by year for basic ground cover types.

Year	Cover Type (%)					
	Bare Ground	Cryptograms	Litter	Pavement	Rock	Vegetation
2004	53.0	-	1.6	28.3	0.6	22.6
2007	33.9	0.0	28.5	5.4	0.8	42.7
2012	36.1	-	43.7	3.0	0.4	30.9
2016	43.1	-	10.1	12.4	0.6	42.2

Table 02R-09.9 - Pellet Group Data. Quadrat frequency and pellet group transect data for animal pellets. Rabbit pellet groups are not sampled in the pellet group transect.

Year	Cattle	Mule Deer/Pronghorn	Greater Sage-Grouse	Rabbit
	Quadrat Frequency			
2004	-	-	1	1
2007	4	1	-	13
2012	4	15	9	17
2016	11	5	-	15
Year	Days Use Per Acre (ha)			
2004	0.7 (1.8)	-	-	-
2007	19.6 (48.4)	-	8.7 (21.5)*	-
2012	23.2 (57.4)	17.4 (43.0)	17.4 (43.0)*	-
2016	55.2 (136.3)	1.3 (3.3)	8.7 (21.5)*	-

*Pellets per acre (ha)

Table 02R-09.10 - Grass Species. Nested frequency and modified Daubenmire average cover by year.

GRASS SPECIES	Achnatherum lettermanii (Letterman's needlegrass)	Bromus tectorum ^{ai} (cheatgrass)	Dactylis glomerata ⁱ (orchardgrass)	Elymus elymoides (squirritail)	Elymus lanceolatus (thickspike wheatgrass)	Hesperostipa comata (needle and thread)	Koeleria macrantha (prairie Junegrass)	Poa bulbosa ⁱ (bulbous bluegrass)	Poa secunda (Sandberg bluegrass)	Psathyrostachys juncea ⁱ (Russian wildrye)	Pseudoroegneria spicata (bluebunch wheatgrass)
year	Nested Frequency										
2004	7	1	-	6	271	-	-	-	124	-	1
2007	13	16	2	2	318	-	33	3	175	-	36
2012	6	32	1	-	406	-	8	-	280	-	2
2016	1	124	-	-	284	1	10	-	355	1	69
year	Average Cover (%)										
2004	0.0	0.0	-	0.0	4.3	-	-	-	1.5	-	0.0
2007	0.1	0.0	0.0	0.0	10.3	-	0.7	0.0	5.0	-	1.2
2012	0.2	0.3	0.0	-	10.1	-	0.2	-	6.9	-	0.0
2016	0.0	3.3	-	-	6.4	0.1	0.2	-	9.2	0.1	2.0

a - Annual; n - Noxious Weed; i - Introduced Species

Table 02R-09.11 - Forb Species. Nested frequency and modified Daubenmire average cover by year.

FORB SPECIES	Agoseris glauca (pale agoseris)	Allium (onion)	Alyssum desertorum ^{ai} (desert madwort)	Antennaria microphylla (littleleaf pussytoes)	Astragalus cibaricus (browse milkvetch)	Astragalus convallarius (lesser rusty milkvetch)	Astragalus miser var. tenuifolius (timber milkvetch)	Calochortus nuttallii (sego lily)	Ceratocephala testiculata ^{ai} (curveseed butterwort)	Chenopodium album ^a (lambsquarters)	Cirsium (thistle)	Collinsia parryiflora ^a (maiden blue eyed Mary)	Collomia linearis ^a (tiny trumpet)	Comandra umbellata (bastard toadflax)	Cordylanthus ^a (bird's-beak)	Crepis acuminata (tapertip hawksbeard)	Cryptantha (cryptantha)
year	Nested Frequency																
2004	174	8	3	3	2	24	123	5	-	6	52	8	13	-	6	10	-
2007	194	-	-	-	12	26	132	-	-	-	28	64	68	-	-	3	4
2012	9	-	-	5	1	3	18	-	-	-	12	-	-	-	-	-	7
2016	-	-	-	3	9	5	4	-	5	-	17	8	1	2	-	-	5
year	Average Cover (%)																
2004	1.1	0.0	0.0	0.0	0.0	0.1	1.9	0.0	-	0.0	1.6	0.0	0.0	-	0.0	0.2	-
2007	1.8	-	-	-	0.1	0.3	1.8	-	-	-	0.9	0.2	0.3	-	-	0.3	0.1
2012	0.0	-	-	0.0	0.0	0.0	0.1	-	-	-	0.1	-	-	-	-	-	0.1
2016	-	-	-	0.1	0.3	0.0	0.1	-	0.0	-	0.2	0.0	0.0	0.0	-	-	0.2

a - Annual/Biennial; n - Noxious Weed; i - Introduced Species

FORB SPECIES	Cymopterus (springparsley)	Delphinium nuttallianum (twolobe larkspur)	Descurainia pinnata ^a (western tansymustard)	Gayophytum ramosissimum ^a (pinion groundsmoke)	Lactuca scariola ^{ai} (prickly lettuce)	Linum perenne ⁱ (blue flax)	Lithospermum ruderale (western stoneseed)	Lomatium (desertparsley)	Lupinus argenteus (silvery lupine)	Machaeranthera canescens (hoary tansyaster)	Medicago sativa ⁱ (alfalfa)	Microsteris gracilis ^a (slender phlox)	Penstemon radicosus (matroot penstemon)	Phlox hoodii (spiny phlox)	Phlox longifolia (longleaf phlox)	Polygonum douglasii ^a (Douglas' knotweed)	Sanguisorba minor ⁱ (small burnet)
year	Nested Frequency																
2004	-	-	26	3	-	-	-	13	4	-	-	2	24	48	72	2	-
2007	-	6	209	12	3	-	-	19	5	1	-	25	15	84	171	4	-
2012	-	-	-	-	-	-	-	-	1	-	-	-	2	91	30	-	-
2016	9	-	-	-	-	3	0	-	5	-	14	-	15	57	9	6	2
year	Average Cover (%)																
2004	-	-	0.5	0.0	-	-	-	0.3	0.0	-	-	0.0	0.1	0.3	0.3	0.0	-
2007	-	0.0	1.3	0.1	0.0	-	-	0.4	0.0	0.0	-	0.1	0.5	1.4	2.3	0.0	-
2012	-	-	-	-	-	-	-	-	0.0	-	-	-	0.0	2.4	0.1	-	-
2016	0.0	-	-	-	-	0.0	0.0	-	0.5	-	0.0	-	0.3	1.3	0.0	0.0	0.0

a - Annual/Biennial; n - Noxious Weed; i - Introduced Species

FORB SPECIES	Schoenocrambe linifolia (flaxleaf plainsmustard)	Senecio integerrimus ^a (lambstongue ragwort)	Symphotrichum (aster)	Tragopogon dubius ^{ai} (yellow salsify)	Trifolium (clover)	Veronica biloba ^{ai} (twolobe speedwell)	Viola (violet)	Zigadenus paniculatus (foohill deathcamas)
year	Nested Frequency							
2004	36	15	-	9	146	2	5	3
2007	50	1	-	3	97	13	-	-
2012	7	-	-	-	-	-	-	-
2016	2	-	8	-	14	3	-	-
year	Average Cover (%)							
2004	0.3	0.1	-	0.1	1.1	0.0	0.0	0.0
2007	0.2	0.0	-	0.0	1.3	0.0	-	-
2012	0.1	-	-	-	-	-	-	-
2016	0.0	-	0.1	-	0.2	0.0	-	-

a - Annual/Biennial; n - Noxious Weed; i - Introduced Species

Table 02R-09.12 - Shrub and Tree Species. Average modified Daubenmire quadrat and line intercept cover by year.

SHRUB SPECIES	Line Intercept Cover (%)						
	year						
Artemisia tridentata ssp. vaseyana ^p (mountain big sagebrush)	2004	-	4.5	-	-	0.5	0.6
Chrysothamnus viscidiflorus ssp. viscidiflorus (yellow rabbitbrush)	2007	-	9.3	-	-	0.9	2
Eriogonum corymbosum (crisp-leaf buckwheat)	2012	-	7.8	-	0	1	2.3
Eriogonum microthecum ^p (slender buckwheat)	2016	0.5	14.4	-	-	1.2	3.3
Symphoricarpos oreophilus (mountain snowberry)	year	Quadrat Cover (%)					
Tetradymia canescens (spineless horsebrush)	2004	-	3.9	0.7	-	0.2	0.7
	2007	0.0	6.1	1.6	0.1	0.5	1.4
	2012	-	7.0	0.0	0.2	0.2	1.9
	2016	0.0	10.1	0.3	0.0	1.2	2.5

t - Tree Species; p - Preferred Browse; i - Introduced

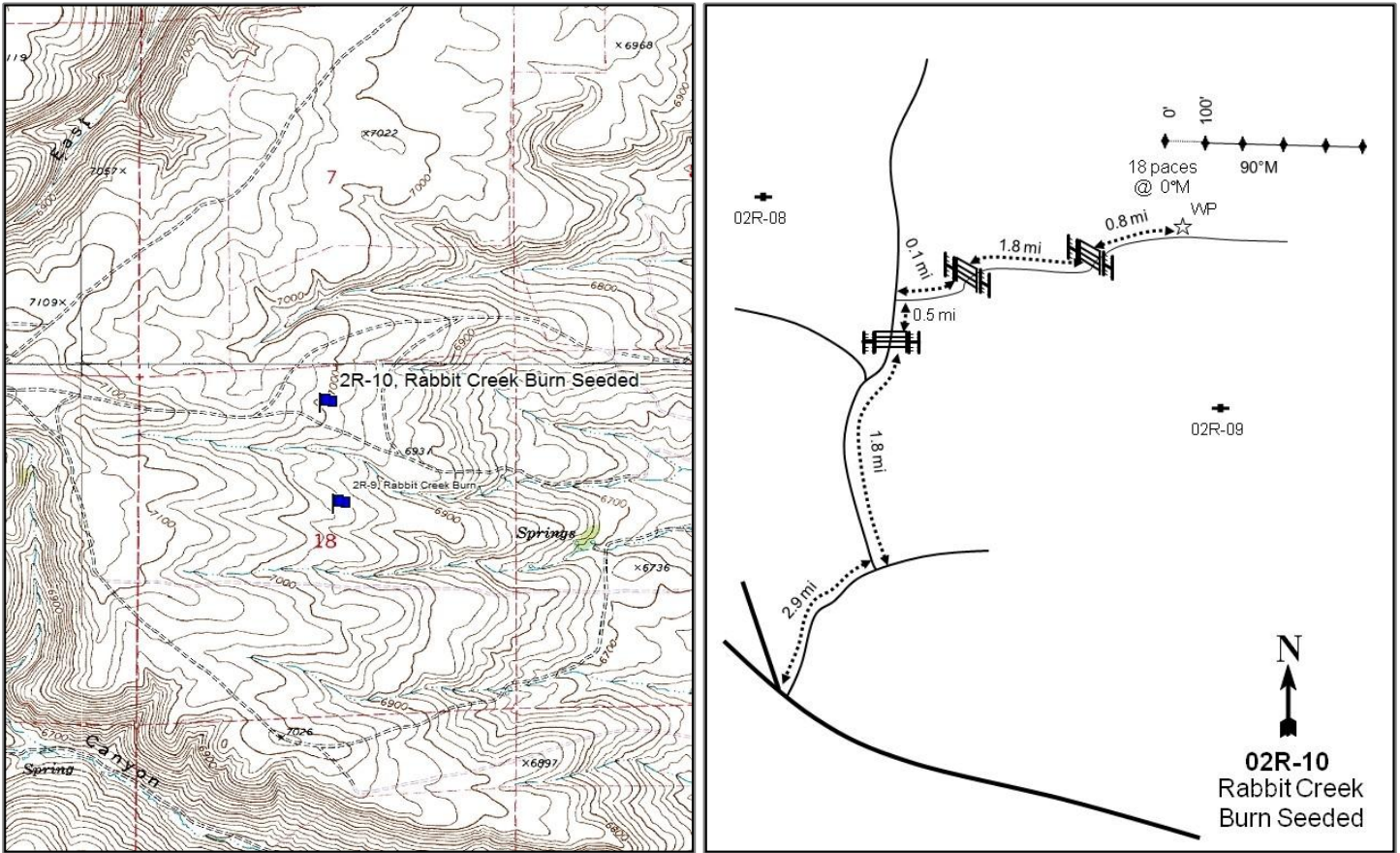
Table 02R-09.13 - Shrub/Tree Characteristics. Population characteristics of shrub/tree species populations including density reproduction (seedlings), age distribution, utilization, vigor and average size (height/crown) of plants.

Year	Density		Age Class Distribution			Utilization		Poor Vigor (%)	Average Height Crown (cm)
	Plants Per Acre		Excluding Seedlings			Moderate (%)	Heavy (%)		
	Excluding Seedlings	Seedling	Young (%)	Mature (%)	Decadent (%)				
Amelanchier utahensis^p -- (Utah serviceberry)									
2004	-	-	-	-	-	-	-	-	-/-
2007	-	-	-	-	-	-	-	-	56/64
2012	-	-	-	-	-	-	-	-	67/80
2016	-	-	-	-	-	-	-	-	71/81
Artemisia tridentata ssp. vaseyana^p -- (mountain big sagebrush)									
2004	-	-	-	-	-	-	-	-	-/-
2007	-	60	0	0	0	0	0	0	-/-
2012	100	-	0	80	20	0	0	40	36/46
2016	60	-	0	100	0	33	0	0	42/64
Chrysothamnus viscidiflorus ssp. viscidiflorus -- (yellow rabbitbrush)									
2004	8340	200	62	38	0	0	0	0	21/27
2007	8620	20	3	88	9	0	0	6	25/39
2012	7580	120	1	91	8	29	6	53	22/37
2016	7600	-	4	96	1	3	0	12	27/46
Eriogonum microthecum^p -- (slender buckwheat)									
2004	20	-	100	0	0	0	0	0	12/19
2007	120	20	0	100	0	33	0	0	16/16
2012	140	20	0	100	0	0	0	29	17/22
2016	40	-	0	100	0	50	0	0	22/31
Purshia tridentata^p -- (antelope bitterbrush)									
2004	-	-	-	-	-	-	-	-	-/-
2007	-	-	-	-	-	-	-	-	-/-
2012	-	-	-	-	-	-	-	-	38/139
2016	-	-	-	-	-	-	-	-	35/135

Year	Density		Age Class Distribution			Utilization		Poor Vigor (%)	Average Height Crown (cm)
	Plants Per Acre		Excluding Seedlings			Moderate (%)	Heavy (%)		
	Excluding Seedlings	Seedling	Young (%)	Mature (%)	Decadent (%)				
Symphoricarpos oreophilus -- (mountain snowberry)									
2004	180	-	89	11	0	0	0	0	37/52
2007	180	-	11	89	0	0	0	0	40/73
2012	280	-	7	93	0	14	0	36	43/92
2016	340	-	0	100	0	53	0	65	52/99
Tetradymia canescens -- (spineless horsebrush)									
2004	1160	380	79	21	0	0	0	0	19/24
2007	1220	-	12	82	7	10	0	8	25/45
2012	1240	-	10	61	29	13	5	26	28/55
2016	1680	-	26	70	4	11	0	14	30/55

t - Tree Species; p - Preferred Browse; i - Introduced Species

RABBIT CREEK BURN SEEDED - STUDY NO. 02R-10



Location Information

USGS 7.5 min Map Info Sage Creek NW; Township 13N, Range 7E, Section 18
 GPS (0' Stake) NAD 83 UTM ZONE 12, 483669 East 4635675 North

Transect Information

Browse Tag # (0' Stake) 34
 Transect Bearing 90° 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

Traveling on Highway 30 toward Bear Lake from Sage Creek Junction, turn right on a road that turns off of the highway along with a runaway truck ramp; the road turns to the west of the ramp. Follow this road for 2.9 miles to a road that comes in on the left. Turn here and drive 1.8 miles to a gate. Pass through the gate and continue 0.5 miles to a two-track road on the right. Turn onto this road and follow it for 0.1 miles to a gate, continuing 1.8 miles to another gate. Pass through the gate and travel 0.8 miles to the witness post on the left (north) side of the road. The 0-foot post is 18 paces at 0 degrees magnetic from the witness post and is marked with browse tag #34.

Site Information

Land Ownership	Private
Land Administrator	Private
Allotment	RABBIT CREEK
Elevation	7,000ft (2,134m)
Aspect	East
Slope	5%
Sample Dates	06/24/2004, 07/11/2007, 07/26/2012, 07/27/2016

Table 02R-10.1 Disturbance History. Recorded history of major disturbances.

Treatment/Disturbance	Name	WRI DB#	Date	Size (acres)
Fire - Wildfire	East Bear	PDB	Fall 2003	887
Seeding - Rangeland Drill	Rabbit Creek	PDB	Fall 2003	500

Wildlife Habitat and Vegetation History

Table 02R-10.3 - Wildlife Seasonal Habitat. UDWR wildlife habitat and seasonality.

Species	Habitat	Season	Brood/Young Rearing
Deer	crucial	summer	
Elk	substantial	winter	
Greater Sage Grouse	Crucial	occupied	brood-rearing
Pronghorn	substantial	summer	

Table 02R-10.4 - Vegetation History. The dominant vegetation type(s) and phase of woodland succession (Tausch, Miller, Roundy, & Chambers, 2009).

Year	Vegetation Type	Woodland Succession
2004	Perennial Grass-Forb	NA
2007	Yellow Rabbitbrush/Perennial Grass	NA
2012	Yellow Rabbitbrush/Perennial Grass	NA
2016	Yellow Rabbitbrush/Perennial Grass	NA

Site Notes

The study is located approximately five miles east of Bear Lake within a burned mountain big sagebrush (*Artemisia tridentata* ssp. *vaseyana*) flat. This study was established on private land in 2004 to monitor the vegetation response to a naturally caused fire (East Bear fire) which burned about 887 acres east of Bear Lake in the fall of 2003.

Soils

Table 02R-10.5 - Soil Analysis Data. List of chemical and textural soil characteristics determined by laboratory analysis.

Texture	pH	%sand	%silt	%clay	%OM	PPM P	PPM K	ds/m	Sample Date
Clay Loam	6.6	32.6	40.1	27.3	3.9	19.1	195.2	0.8	06/24/2004

Site Potential

1981-2010 Average Annual Precipitation	18 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 study was established in 2004 it was dominated by perennial grasses such as thickspike wheatgrass (*Elymus lanceolatus*) and various seeded species, placing it in Community Phase 4.1 of the Introduced Grassland state (State 4). Although the understory has remained persistent, increased cover of shrubs primarily yellow rabbitbrush (*Chrysothamnus viscidiflorus* ssp. *viscidiflorus*) and spineless horsebrush (*Tetradymia canescens*) in 2007 caused this site to transition via an unknown pathway to Community Phase 5.1 in the Yellow Rabbitbrush/Spineless Horsebrush state (State 5); the study site has remained in this community phase since that time period. According to the model, heavy season-long grazing and natural succession could allow mountain big sagebrush (*Artemisia tridentata* ssp. *vaseyana*) and mountain snowberry (*Symphoricarpos oreophilus*) to increase in abundance, shifting the site to Community Phase 6.1 in the Mountain Big Sagebrush/Snowberry state (State 6).

Trend Summary Tables

Table 02R-10.6 - Shrub/Tree Summary. Average modified Daubenmire quadrat and line intercept cover by year for shrubs/trees.

Year	Quadrat Cover (%)			Line-intercept Cover (%)		
	Preferred Shrub	Other Shrub	Tree	Preferred Shrub	Other Shrub	Tree
2004	0.1	4.8	-	0.1	3.1	-
2007	0.7	8.7	-	0.3	7.4	-
2012	1.2	8.4	-	1.6	9.9	-
2016	3.9	10.5	-	3.2	15.6	-

Table 02R-10.7 - Herbaceous Summary. Nested frequency and average modified Daubenmire quadrat cover by year for herbaceous functional groups.

Year	Nested Frequency				Quadrat Cover (%)			
	Annual Grass	Perennial Grass	Annual/Biennial Forb	Perennial Forb	Annual Grass	Perennial Grass	Annual/Biennial Forb	Perennial Forb
2004	14	326	184	345	0.2	9.6	5.3	8.6
2007	46	405	320	340	0.2	17.2	3.0	9.6
2012	68	440	22	120	0.2	16.0	0.1	1.4
2016	178	444	116	200	7.0	22.2	1.2	3.0

Table 02R-10.8 - Basic Ground Cover. Average modified Daubenmire quadrat cover by year for basic ground cover types.

Year	Cover Type (%)					
	Bare Ground	Cryptograms	Litter	Pavement	Rock	Vegetation
2004	65.0	-	1.8	9.0	0.5	31.8
2007	34.9	-	31.0	3.3	0.3	43.3
2012	37.1	-	45.0	3.1	0.9	27.1
2016	42.0	0.0	14.3	4.6	0.1	48.2

Table 02R-10.9 - Pellet Group Data. Quadrat frequency and pellet group transect data for animal pellets. Rabbit pellet groups are not sampled in the pellet group transect.

Year	Cattle	Mule Deer	Greater Sage-Grouse	Rabbit
	Quadrat Frequency			
2004	-	-	1	-
2007	5	-	2	15
2012	12	4	16	10
2016	10	-	1	6
Year	Days Use Per Acre (ha)			
2004	1.5 (3.6)	-	8.7 (21.5)*	-
2007	48.6 (120.1)	0.7 (1.7)	8.7 (21.5)*	-
2012	68.3 (168.6)	3.4 (8.3)	78.4 (193.7)*	-
2016	77.7 (191.9)	2.0 (5.0)	17.4 (43.0)*	-

*Pellets per acre (ha)

Table 02R-10.10 - Grass Species. Nested frequency and modified Daubenmire average cover by year.

GRASS SPECIES	Achnatherum hymenoides (Indian ricegrass)	Achnatherum lettermanii (Letterman's needlegrass)	Agropyron cristatum ⁱ (crested wheatgrass)	Bromus arvensis ^{ai} (field brome)	Bromus tectorum ^{ai} (cheatgrass)	Dactylis glomerata ⁱ (orchardgrass)	Elymus elymoides (squirreltail)	Elymus lanceolatus (thickspike wheatgrass)	Hesperostipa comata (needle and thread)	Koeleria macrantha (prairie Junegrass)	Melica bulbosa (ontongrass)	Poa bulbosa ⁱ (bulbous bluegrass)	Poa secunda (Sandberg bluegrass)	Psathyrostachys juncea ⁱ (Russian wildrye)	Pseudoroegneria spicata (bluebunch wheatgrass)	Thinopyrum intermedium ⁱ (intermediate wheatgrass)
year	Nested Frequency															
2004	3	16	5	-	14	116	1	228	19	-	0	-	64	-	-	30
2007	1	16	2	9	39	29	1	337	-	4	-	0	131	84	8	8
2012	0	13	2	-	68	8	-	381	6	14	-	-	248	46	33	-
2016	1	1	31	-	178	-	-	256	-	27	-	-	267	40	62	53
year	Average Cover (%)															
2004	0.0	0.1	0.2	-	0.2	2.2	0.0	4.4	0.4	-	0.0	-	1.6	-	-	0.6
2007	0.0	0.3	0.1	0.0	0.1	1.3	0.0	10.2	-	0.2	-	0.0	2.5	2.3	0.3	0.0
2012	0.0	0.2	0.1	-	0.2	0.1	-	7.8	0.0	0.1	-	-	5.4	1.4	0.8	-
2016	0.0	0.0	0.9	-	7.0	-	-	7.0	-	1.2	-	-	7.4	1.7	1.7	2.3

a - Annual; n - Noxious Weed; i - Introduced Species

Table 02R-10.11 - Forb Species. Nested frequency and modified Daubenmire average cover by year.

FORB SPECIES	Achillea millefolium (Common yarrow)	Agoseris glauca (pale agoseris)	Allium (onion)	Alyssum desertorum ^{ai} (desert madwort)	Astragalus cibaricus (browse milkvetch)	Astragalus convallarius (lesser rusty milkvetch)	Astragalus miser var. tenuifolius (timber milkvetch)	Astragalus utahensis (Utah milkvetch)	Calochortus nuttallii (sego lily)	Ceratocephala testiculata ^{ai} (curveseed butterwort)	Chenopodium album ^a (lambsquarters)	Chenopodium fremontii ^a (Fremont's goosefoot)	Chenopodium leptophyllum ^a (narrow/leaf goosefoot)	Cirsium (thistle)	Collinsia parviflora ^a (maiden blue eyed Mary)	Collomia linearis ^a (tiny trumpet)	Cortylanthus ^a (bird's-beak)
year	Nested Frequency																
2004	2	124	0	-	15	6	104	-	3	7	18	2	1	12	52	-	3
2007	-	127	-	2	-	6	69	3	-	36	-	-	-	8	64	23	-
2012	10	1	-	-	-	3	2	-	-	8	-	-	-	2	1	-	-
2016	6	-	-	3	-	12	56	-	-	81	-	-	-	13	5	-	5
year	Average Cover (%)																
2004	0.1	1.0	0.0	-	1.0	0.0	1.1	-	0.0	0.0	0.1	0.0	0.0	0.1	0.4	-	0.0
2007	-	1.3	-	0.0	-	0.0	0.8	0.0	-	0.2	-	-	-	0.2	0.2	0.0	-
2012	0.1	0.0	-	-	-	0.0	0.0	-	-	0.0	-	-	-	0.0	0.0	-	-
2016	0.2	-	-	0.0	-	0.1	0.8	-	-	0.9	-	-	-	0.3	0.0	-	0.0

a - Annual/Biennial; n - Noxious Weed; i - Introduced Species

FORB SPECIES	Crepis acuminata (tapertip hawkbeard)	Cryptantha (cryptantha)	Cymopterus (springparsley)	Descurainia pinnata ^a (western tansymustard)	Draba ^a (draba)	Erigeron filifolius (threadleaf fleabane)	Eriogonum umbellatum (sulphur-flower buckwheat)	Gayophytum ramosissimum ^a (pinyon groundsmoke)	Holosteum umbellatum ^{ai} (jagged chickweed)	Lactuca serriola ^{ai} (prickly lettuce)	Linum lewisii (Lewis flax)	Lithospermum ruderale (western stoneseed)	Lupinus argenteus (silvery lupine)	Medicago sativa ⁱ (alfalfa)	Microsteris gracilis ^a (slender phlox)	Penstemon radicosus (matroot penstemon)	Phlox hoodii (spiny phlox)
year	Nested Frequency																
2004	14	5	-	129	1	8	1	4	-	0	1	-	-	50	2	1	24
2007	-	-	4	277	-	-	-	-	-	-	9	-	0	18	14	2	20
2012	-	-	-	-	-	6	5	-	-	-	-	-	-	-	-	-	47
2016	-	-	-	-	1	64	-	1	5	-	-	0	1	23	-	-	41
year	Average Cover (%)																
2004	0.0	0.0	-	3.7	0.0	0.2	0.0	0.0	-	0.0	0.0	-	-	0.4	0.0	0.0	0.1
2007	-	-	0.0	2.5	-	-	-	-	-	-	0.1	-	0.0	0.1	0.1	0.0	0.4
2012	-	-	-	-	-	0.0	0.0	-	-	-	-	-	-	-	-	-	0.8
2016	-	-	-	-	0.0	0.3	-	0.0	0.0	-	-	0.0	0.1	0.1	-	-	0.8

a - Annual/Biennial; n - Noxious Weed; i - Introduced Species

FORB SPECIES	Phlox longifolia (longleaf phlox)	Polygonum douglasii ^a (Douglas' knotweed)	Sanguisorba minor ⁱ (small burnet)	Schoenocrambe limifolia (flaxleaf plainsmustard)	Senecio integerrimus ^a (lambstongue ragwort)	Sisymbrium altissimum ^{ai} (tall tumblemustard)	Sphaeralcea grossularifolia (gooseberry/leaf globemallow)	Taraxacum officinale (common dandelion)	Tragopogon dubius ^{ai} (yellow salsify)	Trifolium (clover)	Veronica biloba ^{ai} (two-lobed speedwell)	Viola (violet)	Zigadenus paniculatus (foothill deathcamas)
year	Nested Frequency												
2004	73	25	110	14	20	-	3	3	0	198	-	26	-
2007	207	5	12	21	2	-	1	-	-	198	23	-	1
2012	56	14	-	-	-	-	-	-	-	-	-	-	-
2016	51	59	-	-	-	1	2	-	-	43	-	-	-
year	Average Cover (%)												
2004	0.3	0.2	1.6	0.6	0.8	-	0.0	0.1	0.0	1.8	-	0.2	-
2007	2.8	0.0	0.1	0.2	0.0	-	0.0	-	-	3.4	0.1	-	0.0
2012	0.5	0.0	-	-	-	-	-	-	-	-	-	-	-
2016	0.3	0.3	-	-	-	0.0	0.0	-	-	0.2	-	-	-

a - Annual/Biennial; n - Noxious Weed; i - Introduced Species

Table 02R-10.12 - Shrub and Tree Species. Average modified Daubenmire quadrat and line intercept cover by year.

SHRUB SPECIES	Line Intercept Cover (%)					
	year	2004	2007	2012	2016	
Artemisia tridentata ssp. vaseyana ^p (mountain big sagebrush)	-	2.5	-	0.1	0.3	0.3
Chrysothamnus viscidiflorus ssp. viscidiflorus (yellow rabbitbrush)	0.1	5.2	-	0.2	0.6	1.6
Eriogonum corymbosum (crisp-leaf buckwheat)	1	7.1	-	0.6	0.6	2.2
Eriogonum microthecum ^p (slender buckwheat)	2.9	12	-	0.3	0.1	3.5
Symphoricarpos oreophilus (mountain snowberry)						
Tetradymia canescens (spineless horsebrush)						

SHRUB SPECIES	Quadrat Cover (%)					
	year	2004	2007	2012	2016	
Artemisia tridentata ssp. vaseyana ^p (mountain big sagebrush)	0.0	2.2	2.3	0.0	0.0	0.3
Chrysothamnus viscidiflorus ssp. viscidiflorus (yellow rabbitbrush)	0.1	5.2	2.3	0.6	0.0	1.2
Eriogonum corymbosum (crisp-leaf buckwheat)	0.9	5.3	0.1	0.2	0.0	3.0
Eriogonum microthecum ^p (slender buckwheat)	3.3	7.7	0.2	0.6	0.0	2.7

t - Tree Species; p - Preferred Browse; i - Introduced

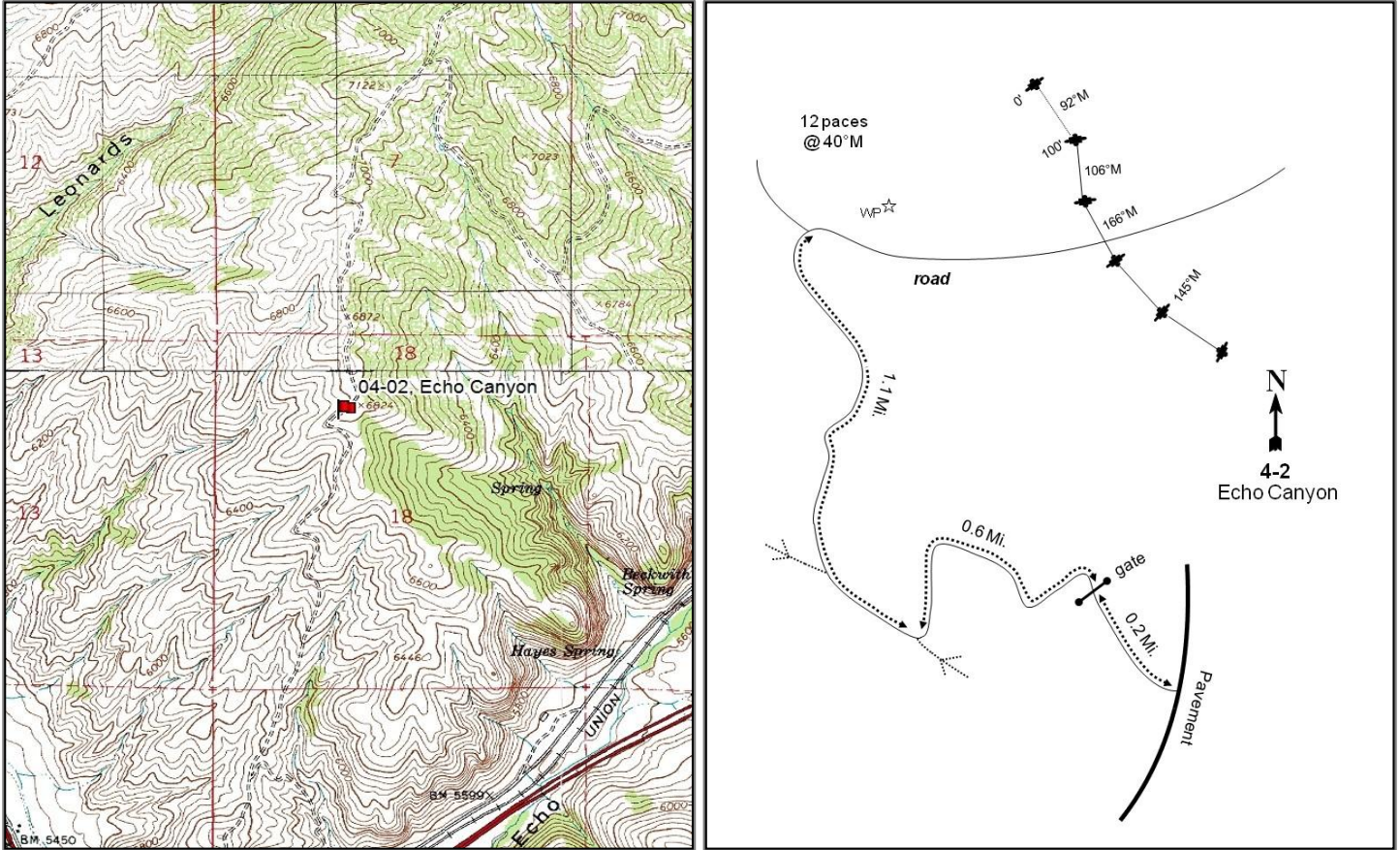
Table 02R-10.13 - Shrub/Tree Characteristics. Population characteristics of shrub/tree species populations including density reproduction (seedlings), age distribution, utilization, vigor and average size (height/crown) of plants.

Year	Density		Age Class Distribution			Utilization		Poor Vigor (%)	Average Height Crown (cm)
	Plants Per Acre		Excluding Seedlings			Moderate (%)	Heavy (%)		
	Excluding Seedlings	Seedling	Young (%)	Mature (%)	Decadent (%)				
Amelanchier utahensis^p -- (Utah serviceberry)									
2004	-	-	-	-	-	-	-	-	-/-
2007	-	-	-	-	-	-	-	-	-/-
2012	-	-	-	-	-	-	-	-	43/64
2016	-	-	-	-	-	-	-	-	-/-
Artemisia tridentata ssp. vaseyana^p -- (mountain big sagebrush)									
2004	20	120	100	0	0	0	0	0	- / -
2007	360	180	61	39	0	17	6	0	25/27
2012	560	140	21	79	0	11	14	18	40/50
2016	800	160	43	57	0	5	0	5	52/69
Chrysothamnus viscidiflorus ssp. viscidiflorus -- (yellow rabbitbrush)									
2004	5780	720	49	51	0	0	0	0	20/22
2007	6000	-	2	83	15	0	3	9	24/38
2012	6360	-	3	93	4	18	2	36	24/46
2016	5520	-	7	92	1	0	0	8	29/45
Eriogonum microthecum^p -- (slender buckwheat)									
2004	60	-	100	0	0	0	0	0	15/15
2007	200	-	0	100	0	0	0	0	22/32
2012	340	-	0	100	0	53	0	0	19/36
2016	480	-	0	100	0	0	0	0	16/26
Purshia tridentata^p -- (antelope bitterbrush)									
2004	-	-	-	-	-	-	-	-	-/-
2007	-	-	-	-	-	-	-	-	-/-
2012	-	-	-	-	-	-	-	-	-/-
2016	-	-	-	-	-	-	-	-	28/47

Year	Density		Age Class Distribution			Utilization		Poor Vigor (%)	Average Height Crown (cm)
	Plants Per Acre		Excluding Seedlings			Moderate (%)	Heavy (%)		
	Excluding Seedlings	Seedling	Young (%)	Mature (%)	Decadent (%)				
Symphoricarpos oreophilus -- (mountain snowberry)									
2004	40	-	100	0	0	0	0	0	61/105
2007	40	-	0	100	0	0	0	0	58/107
2012	20	-	0	100	0	0	0	0	50/101
2016	40	-	0	100	0	100	0	0	52/102
Tetradymia canescens -- (spineless horsebrush)									
2004	900	60	76	24	0	0	0	0	20/25
2007	1000	-	12	88	0	6	0	2	28/54
2012	1020	80	6	90	4	18	12	26	32/70
2016	1060	-	6	87	8	4	2	15	37/69

t - Tree Species; p - Preferred Browse; i - Introduced Species

ECHO CANYON - STUDY No. 04-2



Location Information

USGS 7.5 min Map Info Coalville NE; Township 3N, Range 5E, Section 18
 GPS (0' Stake) NAD 83 UTM ZONE 12, 463944 East 4538614 North

Transect Information

Browse Tag # (0' Stake) 7943
 Transect Bearing 92° magnetic (Line 2: 106° magnetic, Line 3: 166° magnetic, Line 4-5: 145° magnetic)
 Length 500ft
 Belt Placement Line (11ft), Line 2 (34ft), Line 3 (95ft), Line 4 (59ft), Line 5 (71ft)
 Belt Marker Placement Standard

Directions to Site

From I-80 exit 169, just east of the I-80/I-84 junction, travel northeast towards Emery 0.1 miles, and turn left onto a dirt road. Proceed up the mountain 0.2 miles to a gate. Proceed 0.6 miles to a fork, and turn right. Proceed north 1.1 miles to a fork in the road and stop. From this point, walk 12 paces at 40 degrees magnetic to the witness post. The 0-foot baseline stake is 18 paces at 40 degrees magnetic from the witness post. The 0-foot baseline stake is marked by browse tag #7943. The baseline doglegs along the hillside. Line 1 runs 92 degrees magnetic. Line 2 runs 106 degrees magnetic. Line 3 runs 166 degrees magnetic. Lines 4 and 5 run 145 degrees magnetic.

Site Information

Land Ownership	Private
Land Administrator	Private
Allotment	No data
Elevation	6,800ft (2,073m)
Aspect	Southwest
Slope	30%
Sample Dates	06/21/1996, 06/14/2001, 06/13/2006, 06/14/2011, 06/16/2016

Table 04-02.1 Disturbance History. Recorded history of major disturbances.

Treatment/Disturbance	Name	WRI DB#	Date	Size (acres)
Seeding - Aerial After	Henefer Echo - Roadshed Fire, Rehab	3895	November 2016	315
Fire - Wildfire	Echo Road Shed	-	August 2016	317

Table 04-02.2 Seed Mix. List of known seeded plant species and rates (if available).

Mix Name		Application Type	Application Date	Acres	
Road Shed Fire		Aerial	Nov 2016	315	
Type	Species	Common Name	Cultivar/Source ID	Bulk lbs/acre	PLS lbs/acre
G	Bromus marginatus	Mountain Brome	Garnet	3.02	2.88
G	Elymus wawawaiensis	Snake River Wheatgrass	Discovery	1.43	1.12
G	Poa secunda	Canby Bluegrass	Canbar	0.48	0.39
G	Poa secunda	Canby Bluegrass	Canbar	0.10	0.08
G	Pseudoroegneria spicata	Bluebunch Wheatgrass	Anatone	1.43	1.33
F	Achillea millefolium	Western Yarrow	Eagle	0.10	0.09
F	Linum perenne	Blue Flax	Appar	0.48	0.43
F	Medicago sativa	Alfalfa	Ladak	0.95	0.89
F	Medicago sativa ssp. falcata	Yellow Alfalfa	Don	0.63	0.63
F	Sanguisorba minor	Small Burnet		3.97	3.55
S	Artemisia tridentata ssp. vaseyana	Mountain Big Sagebrush	Wasatch UT	0.95	0.21
S	Bassia prostrata	Forage Kochia	Box Elder UT	0.95	0.71
S	Ericameria nauseosa	Whitestem Rubber Rabbitbrush	Carbon/Emery UT	0.23	0.09

Wildlife Habitat and Vegetation History

Table 04-02.3 - Wildlife Seasonal Habitat. UDWR wildlife habitat and seasonality.

Species	Habitat	Season	Brood/Young Rearing
Deer	crucial	winter	
Elk	crucial	winter	
Greater Sage Grouse	Crucial	occupied & Winter	brood-rearing
Moose	crucial	summer	

Table 04-02.4 - Vegetation History. The dominant vegetation type(s) and phase of woodland succession (Tausch, Miller, Roundy, & Chambers, 2009).

Year	Vegetation Type	Woodland Succession
1984	Wyoming Big Sagebrush	No Encroachment
1990	Wyoming Big Sagebrush	No Encroachment
1996	Wyoming Big Sagebrush/Annual Grass	No Encroachment
2001	Wyoming Big Sagebrush/Perennial Grass	No Encroachment
2006	Wyoming Big Sagebrush/Perennial Grass	No Encroachment
2011	Perennial Grass	No Encroachment
2016	Perennial Grass	No Encroachment

Site Notes

This study is located on the ridge approximately one mile to the northeast of Echo Junction.

Soils

Table 04-02.5 - Soil Analysis Data. List of chemical and textural soil characteristics determined by laboratory analysis.

Texture	pH	%sand	%silt	%clay	%OM	PPM P	PPM K	ds/m	Sample Date
Sandy Clay Loam	7.0	46.7	27.0	26.3	3.1	25.9	192.0	0.7	06/21/1996

Site Potential

1981-2010 Average Annual Precipitation 17 inches
 NRCS Ecological Site Upland Stony Loam (Wyoming Big Sagebrush)
 NRCS Ecological Site # R047XA338UT
 States and Transitions A defined state and transition model is available.

This site was dominated by Wyoming big sagebrush (*Artemisia tridentata* ssp. *wyomingensis*) from establishment in 1984 through the 2006 sample year (Table 04-02.12). Annual grasses, mainly cheatgrass (*Bromus tectorum*), were co- dominant in 1996, although it is important to note that cover and frequency of these grasses were not recorded prior to that year: these characteristics place the site in a community phase which has not yet been defined. In 2001 and 2006, perennial grasses -- namely bluebunch wheatgrass (*Pseudoroegneria spicata*) -- replaced cheatgrass as the co- dominant herbaceous component, indicating that the site was in Community Phase 8.1 of the Wyoming Big Sagebrush/Increased Perennial Herbs state (State 8). Decreased sagebrush cover (Table 04-02.12) and increased amounts of bulbous bluegrass (*Poa bulbosa*) caused this site to transition via an unknown pathway to one dominated by perennial grasses in both the 2011 and 2016 sample years (Table 04-02.10). Although not defined by the current model, the increased herbaceous understory and reduced shrub cover indicate that this phase is likely similar to Community Phase 2.1 of the Wyoming Big Sagebrush/Introduced Non-Natives state (State 2) (USDA-NRCS, 2013). Forbs have remained abundant and diverse throughout the study years (Table 04-02.11). It is predicted that this site will remain dominated by perennial grasses in the future.

Trend Summary Tables

Table 04-02.6 - Shrub/Tree Summary. Average modified Daubenmire quadrat and line intercept cover by year for shrubs/trees.

Year	Quadrat Cover (%)			Line-intercept Cover (%)		
	Preferred Shrub	Other Shrub	Tree	Preferred Shrub	Other Shrub	Tree
1996	14.2	0.9	-	-	-	-
2001	14.9	1.5	-	-	-	-
2006	9.5	0.9	-	11.8	1.6	-
2011	4.2	0.7	-	5.9	1.7	-
2016	5.1	2.2	-	7.1	3.2	-

Table 04-02.7 - Herbaceous Summary. Nested frequency and average modified Daubenmire quadrat cover by year for herbaceous functional groups.

Year	Nested Frequency				Quadrat Cover (%)			
	Annual Grass	Perennial Grass	Annual/Biennial Forb	Perennial Forb	Annual Grass	Perennial Grass	Annual/Biennial Forb	Perennial Forb
1996	408	265	379	218	13.7	10.8	10.6	5.3
2001	208	334	342	204	4.4	18.6	6.3	6.5
2006	201	374	218	221	4.5	25.2	2.0	6.5
2011	155	430	344	267	4.6	36.7	8.7	9.8
2016	255	423	280	184	7.7	33.1	5.1	7.1

Table 04-02.8 - Basic Ground Cover. Average modified Daubenmire quadrat cover by year for basic ground cover types.

Year	Cover Type (%)					
	Bare Ground	Cryptograms	Litter	Pavement	Rock	Vegetation
1996	2.9	0.0	59.1	6.8	9.8	49.0
2001	9.3	0.1	42.8	11.6	11.9	50.6
2006	6.4	0.1	41.9	11.4	8.9	47.1
2011	3.0	0.1	44.8	3.0	9.1	60.5
2016	2.0	-	37.8	4.0	7.2	57.7

Table 04-02.9 - Pellet Group Data. Quadrat frequency and pellet group transect data for animal pellets. Rabbit pellet groups are not sampled in the pellet group transect.

Year	Cattle	Mule Deer	Elk	Rabbit
	Quadrat Frequency			
1996	2	17	17	-
2001	1	29	1	-
2006	1	36	22	5
2011	1	38	14	2
2016	12	38	4	11
Year	Days Use Per Acre (ha)			
1996	-	-	-	-
2001	5.1 (12.6)	50.2 (124.1)	6.0 (14.9)	-
2006	-	83.8 (206.9)	26.8 (66.2)	-
2011	-	7.4 (18.2)	5.3 (13.2)	-
2016	31.9 (78.9)	43.6 (107.6)	-	-

Table 04-02.10 - Grass Species. Nested frequency and modified Daubenmire average cover by year.

GRASS SPECIES	Achnatherum lettermanii (Letterman's needlegrass)	Bromus arvensis ^{ai} (field brome)	Bromus tectorum ^{ai} (cheatgrass)	Elymus elymoides (squirreltail)	Poa bulbosa ⁱ (bulbous bluegrass)	Poa fendleriana (muttongrass)	Poa pratensis ⁱ (Kentucky bluegrass)	Poa secunda (Sandberg bluegrass)	Pseudoroegneria spicata (bluebunch wheatgrass)	Sporobolus cryptandrus (sand dropseed)
year	Nested Frequency									
1996	-	18	407	1	67	6	11	91	209	4
2001	9	37	197	-	93	3	20	198	209	8
2006	-	6	199	-	182	18	5	138	264	4
2011	-	5	150	-	370	1	6	93	265	-
2016	15	1	255	-	360	-	-	39	276	9
year	Average Cover (%)									
1996	-	0.1	13.6	0.0	1.3	0.0	0.1	1.8	7.5	0.0
2001	0.1	0.4	4.0	-	2.6	0.0	0.7	7.9	7.4	0.1
2006	-	0.0	4.5	-	5.0	0.1	0.4	4.5	15.1	0.1
2011	-	0.0	4.6	-	23.5	0.0	0.0	3.0	10.1	-
2016	0.9	0.0	7.7	-	18.0	-	-	0.5	13.6	0.1

a - Annual; n - Noxious Weed; i - Introduced Species

Table 04-02.11 - Forb Species. Nested frequency and modified Daubenmire average cover by year.

FORB SPECIES	Achillea millefolium (Common yarrow)	Agoseris glauca (pale agoseris)	Allium acuminatum (tapertip onion)	Alyssum desertorum ^{ai} (desert madwort)	Ambrosia psilostachya (Cuman ragweed)	Antennaria (pussytoes)	Artemisia ludoviciana (white sagebrush)	Astragalus beckwithii (Beckwith's milkvetch)	Astragalus cibirius (browse milkvetch)	Astragalus utahensis (Utah milkvetch)	Calochortus nuttallii (sego lily)	Camelina microcarpa ^{ai} (littlepod false flax)	Castilleja linearifolia (Wyoming Indian paintbrush)	Ceratocephala testiculata ^{ai} (curvseeded butterwort)	Cirsium undulatum ^a (wavyleaf thistle)	Collinsia parviflora ^a (maiden blue eyed Mary)	Collomia linearis ^a (tiny trumpet)
year	Nested Frequency																
1996	4	6	-	232	-	-	22	10	16	79	1	-	2	26	14	23	15
2001	5	15	22	184	0	3	33	9	23	40	6	8	5	62	5	107	39
2006	4	14	2	85	-	1	30	12	17	18	1	5	-	53	2	56	-
2011	3	18	24	135	-	-	39	20	2	13	24	-	1	28	3	40	13
2016	4	8	16	152	-	-	50	-	23	13	7	6	0	5	-	44	22
year	Average Cover (%)																
1996	0.0	0.0	-	5.1	-	-	1.3	0.1	0.1	1.8	0.0	-	0.0	0.1	0.3	0.1	0.0
2001	0.0	0.1	0.1	1.1	0.0	0.0	1.8	0.2	0.3	1.4	0.0	0.1	0.0	0.5	0.2	0.7	0.2
2006	0.0	0.1	0.0	0.3	-	0.0	0.7	1.2	0.5	0.4	0.0	0.0	-	0.4	0.0	0.1	-
2011	0.0	0.3	0.1	0.6	-	-	0.8	0.9	0.0	0.5	0.1	-	0.0	0.2	0.2	0.2	0.2
2016	0.1	0.1	0.2	0.6	-	-	2.2	-	0.5	0.1	0.0	0.0	0.0	0.0	-	0.6	0.1

a - Annual/Biennial; n - Noxious Weed; i - Introduced Species

FORB SPECIES	Crepis acuminata (tapertip hawksbeard)	Cymopterus (springparsley)	Descurainia ^a (tansymustard)	Descurainia pinnata ^a (western tansymustard)	Draba ^a (draba)	Echium vulgare ^{ai} (common viper's bugloss)	Epilobium brachycarpum ^a (tall annual willowherb)	Erigeron pumilus (shaggy fleabane)	Eriogonum umbellatum (sulphur-flower buckwheat)	Erodium cicutarium ^{ai} (redstem stork's bill)	Galium ^a (bedstraw)	Grindelia squarrosa (curlycup gumweed)	Helianthus annuus ^a (common sunflower)	Heterotheca villosa (hairy false goldenaster)	Holosteum umbellatum ^{ai} (jagged chickweed)	Lactuca serriola ^{ai} (prickly lettuce)	Lithophragma (woodland-star)
year	Nested Frequency																
1996	1	-	-	-	127	-	-	-	-	113	14	22	-	3	281	3	-
2001	2	13	-	3	107	-	11	3	2	67	2	10	-	2	116	-	-
2006	-	72	-	-	81	-	4	-	-	39	-	1	6	-	87	-	-
2011	4	88	8	1	123	-	-	-	-	154	-	-	-	-	122	1	3
2016	5	29	-	-	8	1	-	-	-	158	-	3	-	-	5	-	-
year	Average Cover (%)																
1996	0.0	-	-	-	0.3	-	-	-	-	2.6	0.1	0.1	-	0.0	1.7	0.0	-
2001	0.0	0.1	-	0.0	0.2	-	0.0	0.0	0.0	2.0	0.0	0.3	-	0.1	0.7	-	-
2006	-	0.9	-	-	0.3	-	0.0	-	-	0.3	-	0.0	0.0	-	0.3	-	-
2011	0.0	1.6	0.0	0.0	0.5	-	-	-	-	5.4	-	-	-	-	1.0	0.0	0.0
2016	0.1	0.1	-	-	0.0	0.4	-	-	-	3.2	-	0.0	-	-	0.0	-	-

a - Annual/Biennial; n - Noxious Weed; i - Introduced Species

FORB SPECIES	Lomatium (desertparsley)	Lupinus argenteus (silvery lupine)	Machaeranthera (tansyaster)	Microsteris gracilis ^a (slender phlox)	Oenothera (evening primrose)	Schoenocrambe limifolia (flaxleaf plainsmustard)	Senecio integerrimus ^a (lambstongue ragwort)	Sisymbrium altissimum ^{ai} (tall tumbledustard)	Sphaeralcea grossularifolia (gooseberryleaf globemallow)	Taraxacum officinale (common dandelion)	Tragopogon dubius ^{ai} (yellow salsify)	Verbascum thapsus ^{ai} (common mullein)	Veronica biloba ^{ai} (two-lobed speedwell)	Vicia americana (American vetch)	Zigadenus paniculatus (foothill deathcamas)
year	Nested Frequency														
1996	31	28	43	-	-	-	-	-	5	-	64	-	-	69	-
2001	21	31	-	23	-	-	2	-	-	2	33	4	1	38	-
2006	3	32	-	28	9	-	-	-	-	-	13	-	-	69	3
2011	24	45	2	8	-	7	-	10	1	-	2	-	-	92	-
2016	1	35	-	11	2	-	-	1	-	-	2	-	-	51	-
year	Average Cover (%)														
1996	0.1	1.0	0.1	-	-	-	-	-	0.2	-	0.4	-	-	0.6	-
2001	0.1	1.4	-	0.1	-	-	0.0	-	-	0.0	0.5	0.0	0.0	0.4	-
2006	0.0	0.8	-	0.1	0.1	-	-	-	-	-	0.2	-	-	1.7	0.0
2011	0.3	1.9	0.0	0.0	-	0.2	-	0.2	0.0	-	0.0	-	-	2.9	-
2016	0.0	2.1	-	0.0	0.0	-	-	0.4	-	-	0.0	-	-	1.1	-

a - Annual/Biennial; n - Noxious Weed; i - Introduced Species

Table 04-02.12 - Shrub and Tree Species. Average modified Daubenmire quadrat and line intercept cover by year.

SHRUB SPECIES	Artemisia tridentata ssp. wyomingensis ^p (Wyoming big sagebrush)	Chrysothamnus viscidiflorus ssp. viscidiflorus (yellow rabbitbrush)	Ericameria nauseosa ssp. nauseosa var. speciosa ^p (rubber rabbitbrush)	Gutierrezia sarothrae (broom snakeweed)	Opuntia polyacantha (plains pricklypear)	Symphoricarpos oreophilus (mountain snowberry)
year	Line Intercept Cover (%)					
1996	-	-	-	-	-	-
2001	-	-	-	-	-	-
2006	11.8	0.1	-	0.1	0.2	1.2
2011	5.9	0.2	-	-	-	1.5
2016	7.1	0.3	-	-	0.1	2.8
year	Quadrat Cover (%)					
1996	14.2	0.5	-	0.3	-	0.2
2001	14.9	0.5	-	0.9	-	0.0
2006	9.5	0.7	-	0.0	0.1	0.1
2011	4.0	0.0	0.1	0.0	-	0.7
2016	4.8	0.6	0.4	0.2	0.0	1.4

t - Tree Species; p - Preferred Browse; i - Introduced

Table 04-02.13 - Shrub/Tree Characteristics. Population characteristics of shrub/tree species populations including density reproduction (seedlings), age distribution, utilization, vigor and average size (height/crown) of plants.

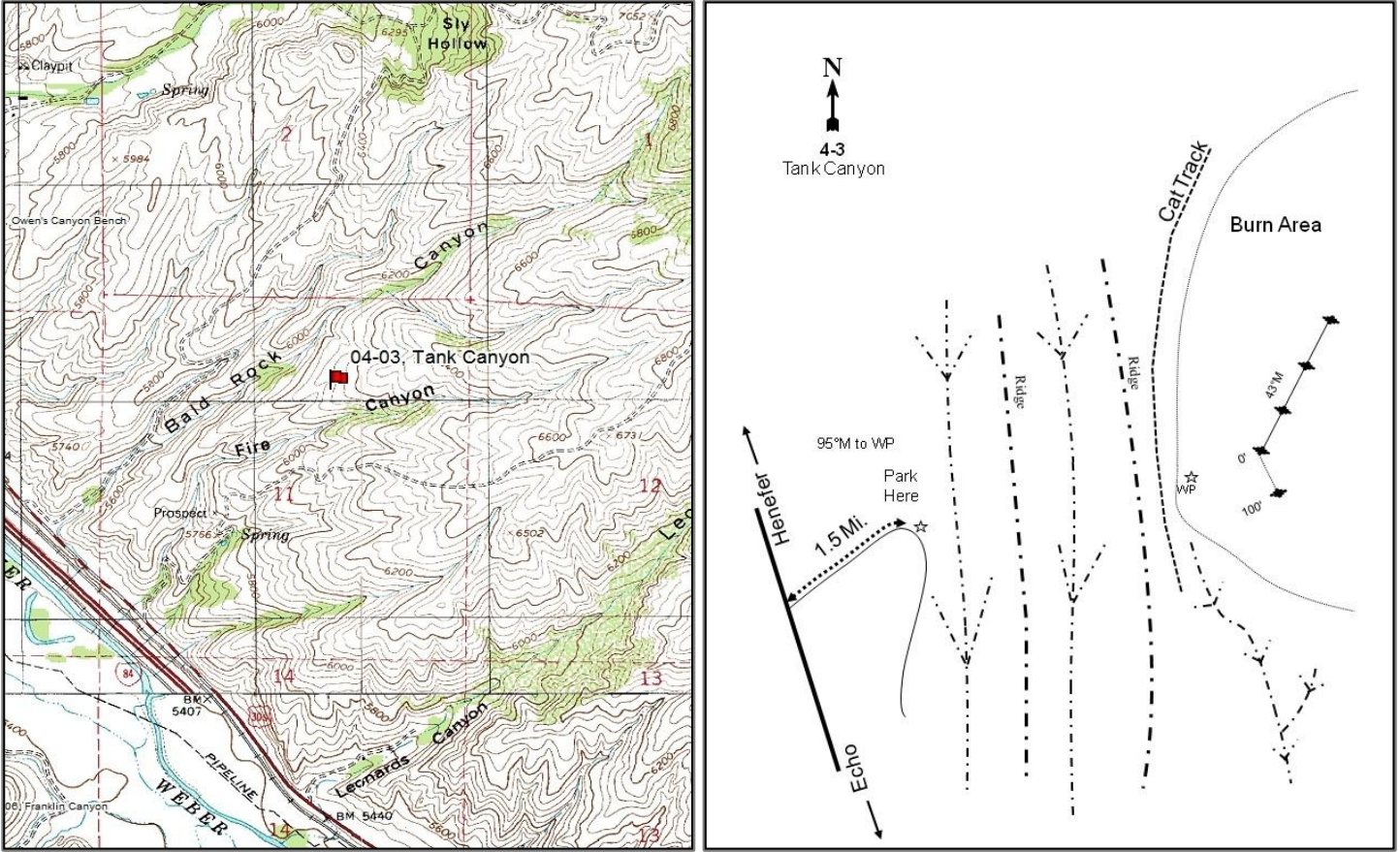
Year	Density		Age Class Distribution			Utilization		Poor Vigor (%)	Average Height Crown (cm)
	Plants Per Acre		Excluding Seedlings			Moderate (%)	Heavy (%)		
	Excluding Seedlings	Seedling	Young (%)	Mature (%)	Decadent (%)				
Amelanchier alnifolia^P -- (Saskatoon serviceberry)									
1996	-	-	-	-	-	-	-	-	82/74
2001	-	-	-	-	-	-	-	-	87/95
2006	-	-	-	-	-	-	-	-	128/131
2011	-	-	-	-	-	-	-	-	127/127
2016	40	-	50	50	0	0	0	0	120/139
Artemisia tridentata ssp. wyomingensis^P -- (Wyoming big sagebrush)									
1996	3300	20	16	64	19	44	4	1	45/93
2001	2780	80	0	69	31	53	12	11	59/113
2006	1880	280	1	51	48	40	37	30	61/99
2011	1180	20	2	31	68	56	14	63	57/95
2016	1040	-	2	75	23	10	10	8	53/96
Chrysothamnus viscidiflorus ssp. viscidiflorus -- (yellow rabbitbrush)									
1996	80	-	0	100	0	0	0	0	27/49
2001	40	-	0	100	0	0	0	0	25/44
2006	100	-	0	100	0	0	0	0	34/61
2011	40	-	0	100	0	0	0	0	29/44
2016	100	-	0	100	0	0	0	0	39/63
Ericameria nauseosa ssp. nauseosa var. speciosa^P -- (rubber rabbitbrush)									
1996	80	-	0	100	0	0	0	0	44/69
2001	20	-	0	100	0	0	0	0	70/99
2006	20	-	0	100	0	0	0	0	74/116
2011	-	-	-	-	-	-	-	-	70/107
2016	40	-	0	100	0	0	0	0	77/123
Gutierrezia sarothrae -- (broom snakeweed)									
1996	1340	980	39	61	0	0	0	0	21/29
2001	1540	-	3	91	7	0	0	3	16/23
2006	140	-	14	86	0	0	0	0	18/24
2011	20	20	0	100	0	0	0	0	12/11
2016	120	-	0	100	0	0	0	0	20/21
Opuntia polyacantha -- (plains pricklypear)									
1996	240	-	8	92	0	0	0	0	14/36
2001	260	-	15	85	0	8	0	23	12/23
2006	80	-	0	100	0	0	0	0	11/33
2011	20	-	0	100	0	0	0	0	15/46
2016	40	-	0	100	0	0	0	0	15/42
Symphoricarpos oreophilus -- (mountain snowberry)									
1996	80	-	75	25	0	0	0	0	64/63
2001	120	-	0	100	0	0	0	0	40/55
2006	80	-	0	100	0	0	0	0	63/107
2011	160	-	0	100	0	0	0	0	64/89
2016	120	-	0	100	0	0	0	0	77/104

t - Tree Species; p - Preferred Browse; i - Introduced Species

Table -04-02.15 - Deer Desirable Components Index: Mid Potential Scale.

Year	Preferred Browse Cover	Preferred Browse Decadence	Preferred Browse Young	Perennial Grass Cover	Annual Grass Cover	Perennial Forb Cover	Noxious Weeds	Total Score	Ranking
1996	17.9	9.3	8.0	19.0	-10.3	10.0	0.0	53.9	Fair
2001	18.8	5.7	0.0	30.0	-3.3	10.0	0.0	61.2	Fair
2006	12.0	0.6	0.5	30.0	-3.4	10.0	0.0	49.7	Poor-Fair
2011	5.3	0.0	0.0	26.5	-3.5	10.0	0.0	38.3	Poor
2016	6.0	0.0	0.0	30.0	-5.8	10.0	0.0	40.2	Poor

TANK CANYON - STUDY No. 04-3



Location Information

USGS 7.5 min Map Info	Henefer SW; Township 3N, Range 4E, Section 11
GPS (0' Stake)	NAD 83 UTM ZONE 12, 461262 East 4540256 North

Transect Information

Browse Tag # (0' Stake)	7944
Transect Bearing	146° magnetic (Line 2-4: 43° magnetic)
Length	400ft
Belt Placement	Line 1 (11ft & 95ft), Line 2 (59ft), Line 3 (34ft), Line 4 (71ft)
Belt Marker Placement	Standard

Directions to Site

From the East Henefer/Echo Exit, travel east parallel to the freeway. Turn left (north) up Fire Canyon to the DWR gate. Proceed 0.8 miles on the Fire Canyon access road to a point where the road switchbacks. Park at 3 full high posts before the switchback. Walk at a bearing of 11 degrees magnetic walking down and back up the ravine to the next ridge to an open area that has been burned. A witness post is in the opening. The 0-foot baseline stake is just north of the witness post. The 0-foot baseline stake is marked with browse tag #7944.

Site Information

Land Ownership	State
Land Administrator	UDWR
Allotment	No data
Elevation	6,100ft (1,859m)
Aspect	West
Slope	23%
Sample Dates	06/27/1996, 06/19/2001, 06/20/2006, 06/08/2011, 06/15/2016

Table 04-03.1 Disturbance History. Recorded history of major disturbances.

Treatment/Disturbance	Name	WRI DB#	Date	Size (acres)
Fire - Wildfire	-	-	1982	-
Seeding - Seed Unknown	-	-	1982	-
Fire - Wildfire	-	-	1984-1990	40
Seeding - Aerial After	Henefer Echo WMA Project	1212	December 2008	261
Chaining - Two-Way Ely	Henefer Echo WMA Project	1212	November-December 2008	261

Table 04-03.2 Seed Mix. List of known seeded plant species and rates (if available).

Mix Name			Application Type	Application Date	Acres
Henefer Echo WMA			Aerial	Dec 2008	300
Type	Species	Common Name	Cultivar/Source ID	Bulk lbs/acre	PLS lbs/acre
F	Achillea millefolium	Western Yarrow		0.10	0.10
F	Astragalus cicer	Cicer Milkvetch	Lutana	0.50	0.48
F	Balsamorhiza sagittata	Arrowleaf Balsamroot	Box Elder/Cache UT, Franklin/Bear Lake ID	0.17	0.15
F	Heliomeris multiflora var. multiflora	Showy Goldeneye	Sanpete UT	0.03	0.03
F	Linum perenne	Blue Flax	Appar	0.49	0.44
F	Medicago sativa	Alfalfa	Ladak	1.75	1.59
F	Medicago sativa	Alfalfa	Ranger	1.50	1.38
F	Onobrychis viciifolia	Sainfoin	Eski	3.00	2.91
F	Sanguisorba minor	Small Burnet	Delar	3.00	2.84
S	Artemisia tridentata ssp. vaseyana	Mountain Big Sagebrush	Sanpete UT	3.00	0.52
S	Bassia prostrata	Forage Kochia	Humbolt/Lander NV	3.00	2.02
S	Chrysothamnus viscidiflorus	Low Rabbitbrush		0.14	0.00

Wildlife Habitat and Vegetation History

Table 04-03.3 - Wildlife Seasonal Habitat. UDWR wildlife habitat and seasonality.

Species	Habitat	Season	Brood/Young Rearing
Deer	crucial	winter	
Elk	crucial	winter	
Greater Sage Grouse	Crucial	occupied & Winter	brood-rearing
Moose	crucial	summer	

Table 04-03.4 - Vegetation History. The dominant vegetation type(s) and phase of woodland succession (Tausch, Miller, Roundy, & Chambers, 2009).

Year	Vegetation Type	Woodland Succession
1984	Mountain Big Sagebrush	NA
1990	Mountain Big Sagebrush	NA
1996	Perennial Grass	NA
2001	Perennial Grass	NA
2006	Perennial Grass	NA
2011	Perennial Grass	NA
2016	Perennial Grass	NA

Site Notes

This study samples crucial deer winter range on the Division of Wildlife Resources (DWR) Henefer-Echo Wildlife Management Area (WMA) between Tank Canyon and Bald Rock Canyon. The area was dominated by mountain big sagebrush (*Artemisia tridentata* ssp. *vaseyana*) prior to a 1982 fire, and appears to have been seeded following the fire. Another small fire burned 40 acres of the area, including the study, between 1984 and 1990. In 1990, the frequency data was collected where it had burned and density data was collected mainly in an unburned area, which caused an incongruity between the two. During the 1996 reading, the sampling area was enlarged and the entire study was moved completely into the burned area. Therefore all data and trends from 1984 and 1990 can be found in previous reports, but only data collected since 1996 will be discussed in this report.

Soils

Table 04-03.5 - Soil Analysis Data. List of chemical and textural soil characteristics determined by laboratory analysis.

Texture	pH	%sand	%silt	%clay	%OM	PPM P	PPM K	ds/m	Sample Date
Clay Loam	7.0	41.9	29.7	28.4	3.8	9.8	108.8	0.6	06/27/1996

Site Potential

1981-2010 Average Annual Precipitation 17 inches
 NRCS Ecological Site Upland Loam (Bonneville Big Sagebrush)
 NRCS Ecological Site # R047XA314UT
 States and Transitions No state and transition model is available for this ecological site.

Since the location shift in 1996 this study site has remained dominated by perennial grasses, mainly bluebunch wheatgrass (*Pseudoroegneria spicata*) and bulbous bluegrass (*Poa bulbosa*) (Table 04-03.10). Browse species such as mountain big sagebrush (*Artemisia tridentata* ssp. *vaseyana*), yellow rabbitbrush (*Chrysothamnus viscidiflorus* ssp. *viscidiflorus*), and forage kochia (*Bassia prostrata*) are present, but contribute very little cover (Table 04-03.12); competition with grasses could be preventing seedling establishment of these species (Table 04-03.13). Perennial forbs are prevalent, yet not diverse -- the seeded species alfalfa (*Medicago sativa*) has been the most abundant forb since 1996 (Table 04-03.11). Annual forbs remain rare, and annual grasses have not been sampled on this site since 2001 (Table 04-03.7). Without a disturbance to reduce perennial grasses, it is predicted that browse will remain relatively rare on this site.

Trend Summary Tables

Table 04-03.6 - Shrub/Tree Summary. Average modified Daubenmire quadrat and line intercept cover by year for shrubs/trees.

Year	Quadrat Cover (%)			Line-intercept Cover (%)		
	Preferred Shrub	Other Shrub	Tree	Preferred Shrub	Other Shrub	Tree
1996	1.2	3.0	-	-	-	-
2001	1.5	1.4	-	-	-	-
2006	1.3	2.6	-	1.1	1.4	-
2011	1.5	1.8	-	0.3	1.5	-
2016	2.2	2.3	-	0.6	1.9	-

Table 04-03.7 - Herbaceous Summary. Nested frequency and average modified Daubenmire quadrat cover by year for herbaceous functional groups.

Year	Nested Frequency				Quadrat Cover (%)			
	Annual Grass	Perennial Grass	Annual/Biennial Forb	Perennial Forb	Annual Grass	Perennial Grass	Annual/Biennial Forb	Perennial Forb
1996	20	457	94	295	0.2	35.7	0.4	13.1
2001	1	481	73	280	0.0	57.1	0.6	18.0
2006	-	471	40	180	-	50.3	0.1	10.9
2011	-	479	82	182	-	49.1	0.4	6.3
2016	-	481	73	184	-	68.6	0.2	9.9

Table 04-03.8 - Basic Ground Cover. Average modified Daubenmire quadrat cover by year for basic ground cover types.

Year	Cover Type (%)					
	Bare Ground	Cryptograms	Litter	Pavement	Rock	Vegetation
1996	1.6	0.4	63.2	1.3	3.1	53.0
2001	3.5	0.6	34.5	3.8	2.7	68.3
2006	4.7	0.3	28.9	4.4	3.7	66.3
2011	8.1	0.3	36.5	4.0	2.1	64.5
2016	11.3	8.3	15.6	3.0	2.4	72.0

Table 04-03.9 - Pellet Group Data. Quadrat frequency and pellet group transect data for animal pellets. Rabbit pellet groups are not sampled in the pellet group transect.

Year	Cattle	Mule Deer	Elk	Rabbit	Domestic Sheep
	Quadrat Frequency				
1996	-	11	9	-	26
2001	4	12	15	6	-
2006	24	12	63	26	-
2011	7	13	15	8	-
2016	12	14	17	31	-
Year	Days Use Per Acre (ha)				
1996	-	-	-	-	-
2001	-	20.8 (51.3)	45.6 (112.6)	-	-
2006	34.9 (86.1)	17.4 (43.0)	55.6 (137.4)	-	-
2011	50.8 (125.5)	10.7 (26.5)	36.8 (91.0)	-	-
2016	30.5 (75.3)	5.3 (13.2)	12.8 (31.5)	-	-

Table 04-03.10 - Grass Species. Nested frequency and modified Daubenmire average cover by year.

GRASS SPECIES	Agropyron cristatum ⁱ (crested wheatgrass)	Bromus arvensis ^{ai} (field brome)	Bromus inermis ⁱ (smooth brome)	Bromus tectorum ^{ai} (cheatgrass)	Elymus elymoides (squirreltail)	Elymus lanceolatus (thickspike wheatgrass)	Festuca ovina ⁱ (sheep fescue)	Poa bulbosa ⁱ (bulbous bluegrass)	Poa pratensis ⁱ (Kentucky bluegrass)	Poa secunda (Sandberg bluegrass)	Pseudoroegneria spicata (bluebunch wheatgrass)	Thinopyrum intermedium ⁱ (intermediate wheatgrass)
year	Nested Frequency											
1996	327	3	58	17	1	13	3	346	-	-	16	64
2001	389	-	22	1	1	-	3	440	-	19	4	79
2006	384	-	38	-	-	-	-	404	-	62	-	48
2011	199	-	192	-	-	-	-	417	16	32	21	19
2016	440	-	41	-	-	-	-	441	10	19	-	63
year	Average Cover (%)											
1996	14.3	0.0	0.7	0.2	0.0	0.1	0.2	18.5	-	-	1.1	0.8
2001	28.5	-	0.4	0.0	0.0	-	0.0	24.3	-	0.8	0.2	2.9
2006	14.7	-	0.6	-	-	-	-	28.9	-	5.0	-	1.0
2011	7.4	-	6.9	-	-	-	-	29.7	1.4	2.3	1.1	0.4
2016	29.1	-	0.7	-	-	-	-	37.4	0.1	0.1	-	1.1

a - Annual; n - Noxious Weed; i - Introduced Species

Table 04-03.11 - Forb Species. Nested frequency and modified Daubenmire average cover by year.

FORB SPECIES	Achillea millefolium (Common yarrow)	Agoseris glauca (pale agoseris)	Allium (onion)	Alyssum desertorum ^{ai} (desert madwort)	Astragalus (milkvetch)	Astragalus cibaricus (browse milkvetch)	Calochortus nuttallii (sego lily)	Ceratocephala testiculata ^{ai} (curveseed butterwort)	Cirsium undulatum ^a (wavyleaf thistle)	Collinsia parviflora ^a (maiden blue eyed Mary)	Collomia linearis ^a (tiny trumpet)	Comandra umbellata (bastard toadflax)	Cymopterus (springparsley)	Descurainia pinnata ^a (western tansymustard)	Epilobium brachycarpum ^a (tall annual willowherb)	Eriogonum ovalifolium (cushion buckwheat)	Erodium cicutarium ^{ai} (redstem stork's bill)	
year	Nested Frequency																	
1996	-	-	-	75	-	-	-	-	2	-	-	1	-	-	-	3	-	
2001	-	-	-	58	-	-	3	-	4	2	2	-	5	1	-	-	7	
2006	-	-	-	27	2	0	-	-	4	13	-	-	3	-	9	-	1	
2011	0	4	1	66	4	-	-	3	-	3	1	-	5	14	4	-	2	
2016	-	0	-	66	-	4	-	-	2	2	-	-	5	2	-	-	-	
year	Average Cover (%)																	
1996	-	-	-	0.3	-	-	-	-	0.0	-	-	0.0	-	-	-	0.0	-	
2001	-	-	-	0.2	-	-	0.0	-	0.3	0.0	0.0	-	0.0	0.0	-	-	0.0	
2006	-	-	-	0.1	0.0	0.0	-	-	0.0	0.0	-	-	0.0	-	0.0	-	0.0	
2011	0.0	0.0	0.0	0.3	0.2	-	-	0.0	-	0.0	0.0	-	0.1	0.0	0.0	-	0.0	
2016	-	0.0	-	0.1	-	0.0	-	-	0.0	0.0	-	-	0.0	0.0	-	-	-	

a - Annual/Biennial; n - Noxious Weed; i - Introduced Species

FORB SPECIES	Lactuca serriola ^{ai} (prickly lettuce)	Lesquerella (bladderpod)	Linum lewisii (Lewis flax)	Medicago sativa ⁱ (alfalfa)	Microsteris gracilis ^a (slender phlox)	Onobrychis viciifolia ⁱ (sainfoin)	Pedicularis centranthera (dwarf lousewort)	Polygonum douglasii ^a (Douglas' knotweed)	Sanguisorba minor ⁱ (small burnet)	Sisymbrium altissimum ^{ai} (tall tumblemustard)	Sphaeralcea coccinea (scarlet globemallow)	Taraxacum officinale (common dandelion)	Tragopogon dubius ^{ai} (yellow salsify)	Vicia americana (American vetch)	
year	Nested Frequency														
1996	-	-	-	186	-	-	-	5	9	-	2	-	25	183	
2001	-	3	-	201	-	-	-	-	6	1	-	-	7	111	
2006	-	-	-	138	4	-	1	3	-	-	-	-	1	55	
2011	15	-	-	132	-	-	-	-	6	-	-	-	-	54	
2016	-	-	1	139	-	1	-	-	-	-	-	3	3	48	
year	Average Cover (%)														
1996	-	-	-	11.7	-	-	-	0.0	0.1	-	0.0	-	0.1	1.2	
2001	-	0.0	-	16.3	-	-	-	-	0.2	0.0	-	-	0.1	1.5	
2006	-	-	-	10.3	0.0	-	0.1	0.0	-	-	-	-	0.0	0.4	
2011	0.1	-	-	5.3	-	-	-	-	0.1	-	-	-	-	0.7	
2016	-	-	0.0	9.2	-	0.0	-	-	-	-	-	0.0	0.0	0.7	

a - Annual/Biennial; n - Noxious Weed; i - Introduced Species

Table 04-03.12 - Shrub and Tree Species. Average modified Daubenmire quadrat and line intercept cover by year.

SHRUB SPECIES	Artemisia tridentata ssp. vaseyana ^p (mountain big sagebrush)	Bassia prostrata ⁱ (forage kochia)	Chrysothamnus viscidiflorus ssp. viscidiflorus (yellow rabbitbrush)	Ericameria nauseosa ssp. nauseosa var. speciosa ^p (rubber rabbitbrush)	Gutierrezia sarothrae (broom snakeweed)	Tetradymia canescens (spineless horsebrush)
year	Line Intercept Cover (%)					
1996	-	-	-	-	-	-
2001	-	-	-	-	-	-
2006	0.2	-	1.3	0.9	0.1	-
2011	0.1	-	1.5	0.2	-	-
2016	0.2	-	1.5	0.4	0.4	-
year	Quadrat Cover (%)					
1996	0.7	-	3.0	0.5	0.0	-
2001	1.1	-	1.4	0.4	-	-
2006	0.4	-	2.6	0.9	0.0	-
2011	0.9	-	1.7	0.6	0.0	0.0
2016	1.3	0.1	1.8	0.9	0.4	-

t - Tree Species; p - Preferred Browse; i - Introduced

Table 04-03.13 - Shrub/Tree Characteristics. Population characteristics of shrub/tree species populations including density reproduction (seedlings), age distribution, utilization, vigor and average size (height/crown) of plants.

Year	Density		Age Class Distribution			Utilization		Poor Vigor (%)	Average Height Crown (cm)
	Plants Per Acre		Excluding Seedlings			Moderate (%)	Heavy (%)		
	Excluding Seedlings	Seedling	Young (%)	Mature (%)	Decadent (%)				
Amelanchier alnifolia^P -- (Saskatoon serviceberry)									
1996	60	-	0	100	0	67	33	0	55/65
2001	220	-	100	0	0	0	0	0	37/52
2006	20	-	0	100	0	0	0	0	36/64
2011	20	-	100	0	0	0	0	0	47/69
2016	-	-	-	-	-	-	-	-	51/85
Artemisia tridentata ssp. vaseyana^P -- (mountain big sagebrush)									
1996	200	-	40	60	0	10	0	0	51/65
2001	60	-	0	100	0	0	33	0	60/69
2006	60	160	33	33	33	0	0	33	68/108
2011	140	-	57	29	14	14	43	14	42/75
2016	140	80	29	71	0	57	0	0	43/87
Bassia prostrataⁱ -- (forage kochia)									
1996	-	-	-	-	-	-	-	-	-/-
2001	-	-	-	-	-	-	-	-	-/-
2006	-	-	-	-	-	-	-	-	-/-
2011	-	-	-	-	-	-	-	-	-/-
2016	460	-	61	39	0	26	9	0	12/16
Chrysothamnus viscidiflorus ssp. viscidiflorus -- (yellow rabbitbrush)									
1996	3500	140	16	82	2	26	0	2	33/49
2001	1900	-	6	88	5	0	0	3	21/30
2006	2060	20	11	86	3	10	0	3	21/31
2011	1440	-	42	58	0	15	6	0	26/38
2016	1160	-	9	91	0	2	2	2	30/43

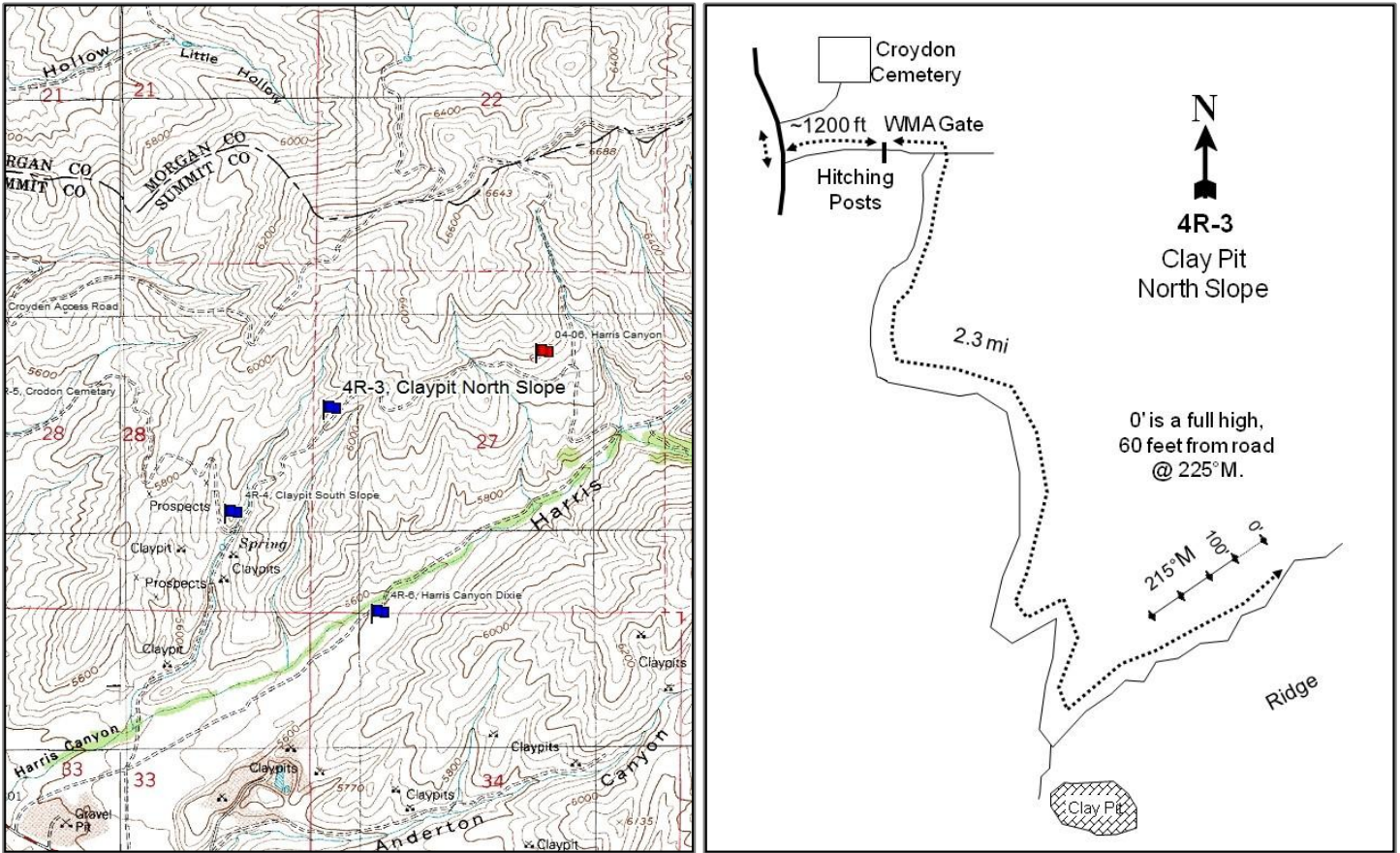
Year	Density		Age Class Distribution			Utilization		Poor Vigor (%)	Average Height Crown (cm)
	Plants Per Acre		Excluding Seedlings			Moderate (%)	Heavy (%)		
	Excluding Seedlings	Seedling	Young (%)	Mature (%)	Decadent (%)				
Ericameria nauseosa ssp. nauseosa var. speciosa^P -- (rubber rabbitbrush)									
1996	140	-	14	71	14	0	0	0	60/81
2001	140	-	14	43	43	0	0	0	50/59
2006	140	-	29	57	14	57	0	0	66/97
2011	180	40	44	33	22	33	11	22	54/71
2016	120	40	17	67	17	50	33	17	63/89
Gutierrezia sarothrae -- (broom snakeweed)									
1996	220	40	64	36	0	0	0	0	20/28
2001	280	-	7	93	0	0	0	0	25/28
2006	120	-	0	83	17	0	0	17	26/28
2011	20	-	100	0	0	0	0	0	13/11
2016	320	20	13	88	0	6	6	0	23/24
Opuntia polyacantha -- (plains pricklypear)									
1996	-	-	-	-	-	-	-	-	14/53
2001	-	-	-	-	-	-	-	-	-/-
2006	-	-	-	-	-	-	-	-	7/19
2011	-	20	0	0	0	0	0	0	10/18
2016	-	-	-	-	-	-	-	-	14/48
Symphoricarpos oreophilus -- (mountain snowberry)									
1996	-	-	-	-	-	-	-	-	46/114
2001	-	-	-	-	-	-	-	-	-/-
2006	-	-	-	-	-	-	-	-	39/71
2011	-	-	-	-	-	-	-	-	61/89
2016	20	-	0	100	0	0	0	0	57/75
Tetradymia canescens -- (spineless horsebrush)									
1996	-	-	-	-	-	-	-	-	-/-
2001	-	-	-	-	-	-	-	-	-/-
2006	-	-	-	-	-	-	-	-	33/52
2011	-	40	0	0	0	0	0	0	16/29
2016	-	-	-	-	-	-	-	-	42/85

t - Tree Species; p - Preferred Browse; i - Introduced Species

Table -04-03.15 - Deer Desirable Components Index: Mid Potential Scale.

Year	Preferred Browse Cover	Preferred Browse Decadence	Preferred Browse Young	Perennial Grass Cover	Annual Grass Cover	Perennial Forb Cover	Noxious Weeds	Total Score	Ranking
1996	1.5	0.0	0.0	30.0	-0.2	10.0	0.0	41.3	Poor
2001	1.9	0.0	0.0	30.0	0.0	10.0	0.0	41.9	Poor
2006	1.7	0.0	0.0	30.0	0.0	10.0	0.0	41.7	Poor
2011	1.9	0.0	0.0	30.0	0.0	10.0	0.0	41.9	Poor
2016	1.8	0.0	0.0	30.0	0.0	10.0	0.0	41.8	Poor

CLAYPIT NORTH SLOPE - STUDY NO. 04R-3



Location Information

USGS 7.5 min Map Info Henefer SW; Township 4N, Range 4E, Section 27
 GPS (0' Stake) NAD 83 UTM ZONE 12, 458791 East 4544720 North

Transect Information

Browse Tag # (0' Stake) Not Available
 Transect Bearing 215° magnetic
 Length 400ft
 Belt Placement Line 1 (11ft & 95ft), Line 2 (34ft), Line 3 (59ft), Line 4 (71ft)
 Belt Marker Placement Standard, Belt 3: No Rebar

Directions to Site

About 250 feet from the Croydon cemetery road, turn left onto a dirt road and drive approximately 1,200 feet to a WMA gate. From the WMA gate, drive 2.3 miles (staying right) through the first fork in the road immediately after the WMA gate. Then, where the road splits to the right to a clay mine (about 1.8 miles), stay left until you reach a full high zero foot stake on the left about 60 feet from the road. No browse tag.

Only on belt 1 was quadrat cover and frequency read in 2006-2016, but in subsequent years, cover and frequency should be read on all belts.

Site Information

Land Ownership	State
Land Administrator	UDWR
Allotment	No data
Elevation	5,940ft (1,811m)
Aspect	Northwest
Slope	30%%
Sample Dates	08/30/2006, 07/06/2011, 06/22/2016

Table 04R-03.1 Disturbance History. Recorded history of major disturbances.

Treatment/Disturbance	Name	WRI DB#	Date	Size (acres)
Insect - Aroga Moth	Aroga Moth Study	-	Approx. 2006	-

Wildlife Habitat and Vegetation History

Table 04R-03.3 - Wildlife Seasonal Habitat. UDWR wildlife habitat and seasonality.

Species	Habitat	Season	Brood/Young Rearing
Deer	crucial	winter	
Elk	crucial	winter	
Greater Sage Grouse	Crucial	occupied & Winter	brood-rearing
Moose	crucial	summer	

Table 04R-03.4 - Vegetation History. The dominant vegetation type(s) and phase of woodland succession (Tausch, Miller, Roundy, & Chambers, 2009).

Year	Vegetation Type	Woodland Succession
2006	Mountain Big Sagebrush	NA
2011	Mountain Big Sagebrush	NA
2016	Mountain Big Sagebrush	NA

Site Notes

The study is located approximately one and half miles southeast of Croydon, in the Echo-Henefer Wildlife Management Area (WMA), north of Harris Canyon. The study samples a mountain big sagebrush (*Artemisia tridentata* ssp. *vaseyana*) community. The study was established in 2006 to monitor the effects of the sagebrush defoliator moth (*Aroga websteri*) on the sagebrush population. The defoliator moth had affected several sagebrush populations in northern Utah and the study was established to monitor the long-term effects of the moth. Two other studies, Claypit South Slope (4R-4) and Croydon Cemetery (4R-5), were also established in the area. On all three study sites, browse density and line intercept cover were read on all five belts, but cover and nested frequency were only read on belt 1, for purposes of this study cover and frequency data was extrapolated over all five belts. In subsequent sample years, cover and frequency should be read on all five belts. The area is heavily occupied by big game.

Soils

Table 04R-03.5 - Soil Analysis Data. List of chemical and textural soil characteristics determined by laborator analysis.

Texture	pH	%sand	%silt	%clay	%OM	PPM P	PPM K	ds/m	Sample Date
Sandy Clay Loam	7.0	53.3	21.8	24.9	2.1	29.1	364.8	0.7	08/30/2006

Site Potential

1981-2010 Average Annual Precipitation	18 inches
NRCS Ecological Site	Upland Loam (Bonneville Big Sagebrush)
NRCS Ecological Site #	R047XA314UT
States and Transitions	No state and transition model is available for this ecological site.

When established in 2006, the plant community has remained a stand of mountain big sagebrush (Table 04R-03.12). The herbaceous understory has remained abundant, though being dominated by the introduced perennial grass species crested wheatgrass (*Agropyron cristatum*) (Table 04R-03.10). When first established in 2006, most of the sagebrush had poor vigor due the sagebrush defoliator moth, but since then vigor has improved substantially (Table 04R-03.13).

Trend Summary Tables

Table 04R-03.6 - Shrub/Tree Summary. Average modified Daubenmire quadrat and line intercept cover by year for shrubs/trees.

Year	Quadrat Cover (%)			Line-intercept Cover (%)		
	Preferred Shrub	Other Shrub	Tree	Preferred Shrub	Other Shrub	Tree
2006	22.9	1.8	-	14.8	2.7	-
2011	20.6	3.1	-	17.9	4.6	-
2016	21.0	4.9	-	20.0	8.6	-

Table 04R-03.7 - Herbaceous Summary. Nested frequency and average modified Daubenmire quadrat cover by year for herbaceous functional groups.

Year	Nested Frequency				Quadrat Cover (%)			
	Annual Grass	Perennial Grass	Annual/Biennial Forb	Perennial Forb	Annual Grass	Perennial Grass	Annual/Biennial Forb	Perennial Forb
2006	-	395	185	220	-	26.3	0.6	3.8
2011	15	345	400	370	0.1	24.1	14.6	14.2
2016	50	380	370	270	3.2	29.0	7.7	5.7

Table 04R-03.8 - Basic Ground Cover. Average modified Daubenmire quadrat cover by year for basic ground cover types.

Year	Cover Type (%)					
	Bare Ground	Cryptograms	Litter	Pavement	Rock	Vegetation
2006	8.1	5.8	51.0	4.4	4.6	58.1
2011	9.9	0.3	54.1	2.9	1.1	66.6
2016	9.6	0.9	36.1	5.0	1.1	57.3

Table 04R-03.9 - Pellet Group Data. Quadrat frequency and pellet group transect data for animal pellets. Rabbit pellet groups are not sampled in the pellet group transect.

Year	Cattle	Mule Deer	Elk	Rabbit
	Quadrat Frequency			
2006	10	40	15	25
2011	5	25	5	10
2016	-	30	-	-
Year	Days Use Per Acre (ha)			
2006	2.9 (7.2)	91.8 (226.8)	15.4 (38.1)	-
2011	18.1 (44.8)	63.0 (155.6)	10.7 (26.5)	-
2016	12.3 (30.5)	49.6 (122.5)	-	-

Table 04R-03.10 - Grass Species. Nested frequency and modified Daubenmire average cover by year.

GRASS SPECIES	Agropyron cristatum ⁱ (crested wheatgrass)	Bromus tectorum ^{ai} (cheatgrass)	Melica bulbosa (oniongrass)	Pascopyrum smithii (western wheatgrass)	Poa bulbosa ⁱ (bulbous bluegrass)	Poa pratensis ⁱ (Kentucky bluegrass)	Poa secunda (Sandberg bluegrass)	Pseudoroegneria spicata (bluebunch wheatgrass)	Thinopyrum intermedium ⁱ (intermediate wheatgrass)
year	Nested Frequency								
2006	260	-	-	0	-	5	255	40	20
2011	190	15	5	-	-	-	155	100	20
2016	190	50	-	-	15	-	230	55	100
year	Average Cover (%)								
2006	15.8	-	-	0.0	-	0.1	8.8	1.2	0.3
2011	12.3	0.1	0.2	-	-	-	5.8	4.0	1.9
2016	11.3	3.2	-	-	0.8	-	13.3	2.6	1.1

a - Annual; n - Noxious Weed; i - Introduced Species

Table 04R-03.11 - Forb Species. Nested frequency and modified Daubenmire average cover by year.

FORB SPECIES	Achillea millefolium (Common yarrow)	Allium (onion)	Alyssum desertorum ^{ai} (desert madwort)	Arabis (rockcress)	Calochortus nuttallii (sego lily)	Ceratocephala testiculata ^{ai} (curvseed butterwort)	Collinsia parviflora ^a (maiden blue eyed Mary)	Collomia linearis ^a (tiny trumpet)	Crepis acuminata (tapertip hawkbeard)	Cryptantha (cryptantha)	Cymopterus (springparsley)	Descurainia ^a (tansymustard)	Draba ^a (draba)	Gayophytum ramosissimum ^a (pinyon groundsmoke)	Helianthus annuus ^a (common sunflower)	Holosteum umbellatum ^{ai} (jagged chicweed)	Lomatium triternatum (nineleaf biscuitroot)
year	Nested Frequency																
2006	-	30	70	25	-	-	135	20	-	0	25	-	-	15	-	-	-
2011	5	180	95	0	20	-	160	55	15	-	-	165	225	-	-	270	55
2016	10	65	105	-	-	10	235	10	-	-	-	20	180	55	15	75	0
year	Average Cover (%)																
2006	-	0.1	0.1	0.3	-	-	0.3	0.1	-	0.0	0.5	-	-	0.0	-	-	-
2011	0.1	3.1	0.2	0.0	0.0	-	3.4	0.2	0.0	-	-	2.5	3.0	-	-	4.8	0.4
2016	0.2	0.6	3.0	-	-	0.1	1.2	0.1	-	-	-	0.2	0.6	0.6	0.0	1.7	0.0

a - Annual/Biennial; n - Noxious Weed; i - Introduced Species

FORB SPECIES	Microsteris gracilis ^a (slender phlox)	Tragopogon dubius ^{ai} (yellow salsify)	Trifolium (clover)	Vicia americana (American vetch)	Viola (violet)	Zigadenus paniculatus (foothill deathcamas)
year	Nested Frequency					
2006	-	-	-	205	-	10
2011	40	20	15	310	45	-
2016	50	-	-	245	5	-
year	Average Cover (%)					
2006	-	-	-	2.8	-	0.1
2011	0.4	0.2	0.1	9.8	0.5	-
2016	0.1	-	-	4.8	0.0	-

a - Annual/Biennial; n - Noxious Weed; i - Introduced Species

Table 04R-03.12 - Shrub and Tree Species. Average modified Daubenmire quadrat and line intercept cover by year.

SHRUB SPECIES	Line Intercept Cover (%)		
	year	2006	2011
Artemisia tridentata ssp. vaseyana ^P (mountain big sagebrush)	13	17.8	19.8
Chrysothamnus viscidiflorus ssp. viscidiflorus (yellow rabbitbrush)	2.7	4.6	8.6
Ericameria nauseosa ssp. nauseosa var. speciosa ^P (rubber rabbitbrush)	1.8	0.1	0.2
SHRUB SPECIES	Quadrat Cover (%)		
	year	2006	2011
Artemisia tridentata ssp. vaseyana ^P (mountain big sagebrush)	22.9	20.6	21.0
Chrysothamnus viscidiflorus ssp. viscidiflorus (yellow rabbitbrush)	1.8	3.1	4.9
Ericameria nauseosa ssp. nauseosa var. speciosa ^P (rubber rabbitbrush)	0.0	0.0	0.0

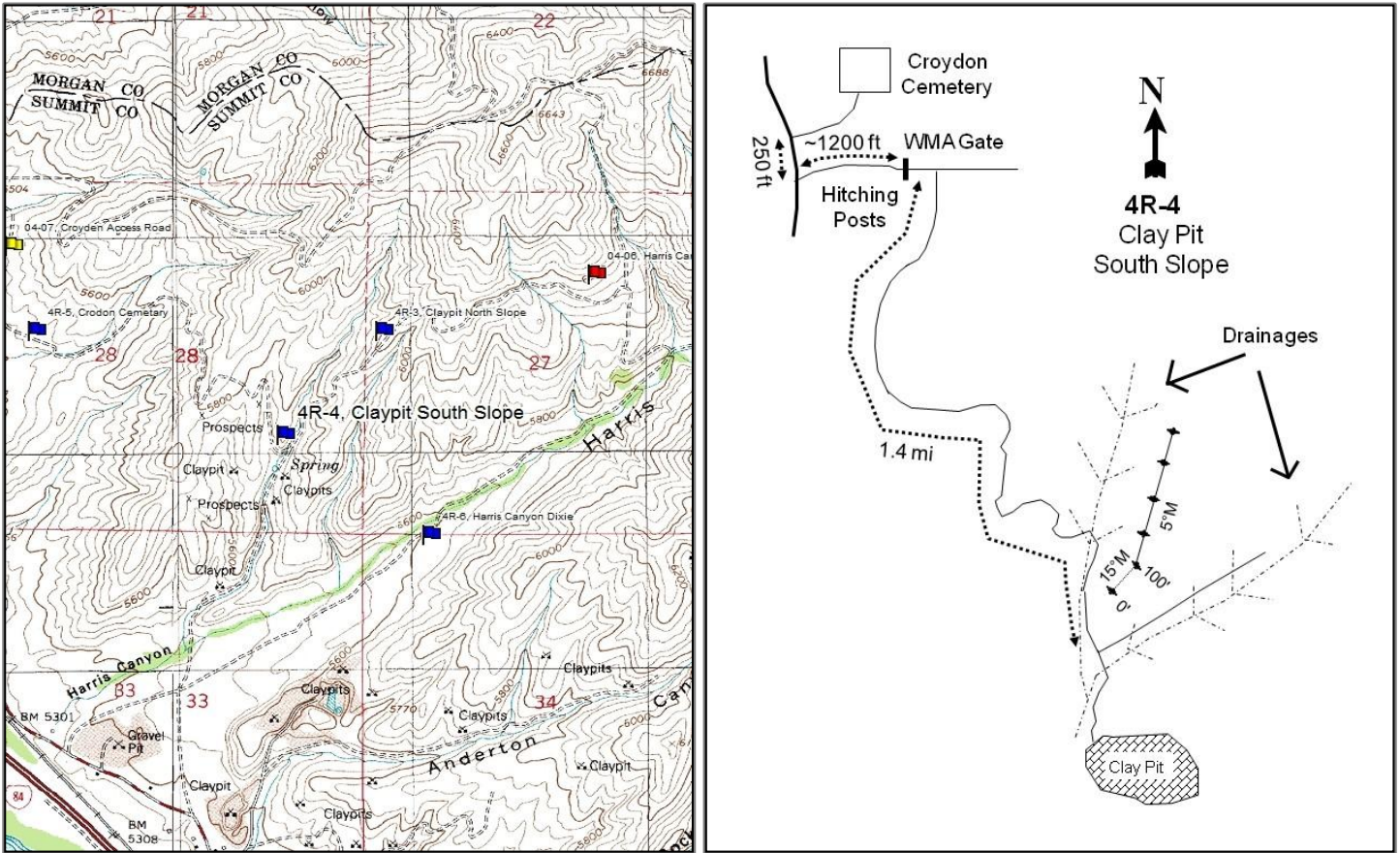
t - Tree Species; p - Preferred Browse; i - Introduced

Table 04R-03.13 - Shrub/Tree Characteristics. Population characteristics of shrub/tree species populations including density reproduction (seedlings), age distribution, utilization, vigor and average size (height/crown) of plants.

Year	Density		Age Class Distribution			Utilization		Poor Vigor (%)	Average Height Crown (cm)
	Plants Per Acre		Excluding Seedlings			Moderate (%)	Heavy (%)		
	Excluding Seedlings	Seedling	Young (%)	Mature (%)	Decadent (%)				
Artemisia tridentata ssp. vaseyana^P -- (mountain big sagebrush)									
2006	2800	140	7	57	36	26	5	83	93/121
2011	2140	3340	3	54	43	35	2	29	85/119
2016	2600	1600	12	49	40	22	25	19	81/125
Chrysothamnus viscidiflorus ssp. viscidiflorus -- (yellow rabbitbrush)									
2006	1600	40	3	96	1	0	0	0	35/43
2011	1960	-	8	92	0	0	0	0	34/48
2016	2020	20	2	97	1	1	0	2	43/62
Ericameria nauseosa ssp. nauseosa var. speciosa^P -- (rubber rabbitbrush)									
2006	40	20	0	100	0	0	0	0	88/110
2011	80	-	50	0	50	0	0	50	76/81
2016	40	-	0	100	0	0	0	0	69/101
Gutierrezia sarothrae -- (broom snakeweed)									
2006	-	-	-	-	-	-	-	-	-/-
2011	-	-	-	-	-	-	-	-	42/49

t - Tree Species; p - Preferred Browse; i - Introduced Species

CLAYPIT SOUTH SLOPE - STUDY No. 04R-4



Location Information

USGS 7.5 min Map Info Henefer SW; Township 4N, Range 4E, Section 28
 GPS (0' Stake) NAD 83 UTM ZONE 12, 458371 East 4544241 North

Transect Information

Browse Tag # (0' Stake) Not Available
 Transect Bearing 15° magnetic (Line 2-5: 5° 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

About 250 feet from the Croydon cemetery road, turn left onto a dirt road and drive approximately 1,200 feet to a WMA gate. From the WMA gate, drive 1.4 miles (staying right) through the first fork in the road immediately after the WMA gate. Stop where two drainages meet and the road takes a sharp bend. The zero foot stake is a full high on the ridge to the left. No browse tag.

Only on belt 1 was quadrat cover and frequency read in 2006-2016, but in subsequent years, cover and frequency should be read on all belts.

Site Information

Land Ownership	State
Land Administrator	UDWR
Allotment	No data
Elevation	5,700ft (1,737m)
Aspect	Southeast
Slope	20%
Sample Dates	08/30/2006, 07/06/2011, 06/22/2016

Table 04R-04.1 Disturbance History. Recorded history of major disturbances.

Treatment/Disturbance	Name	WRI DB#	Date	Size (acres)
Insect - Aroga Moth	Aroga Moth Study	-	Approx. 2006	-

Wildlife Habitat and Vegetation History**Table 04R-04.3 - Wildlife Seasonal Habitat.** UDWR wildlife habitat and seasonality.

Species	Habitat	Season	Brood/Young Rearing
Deer	crucial	winter	
Elk	crucial	winter	
Greater Sage Grouse	Crucial	occupied & Winter	brood-rearing
Moose	crucial	summer	

Table 04R-04.4 - Vegetation History. The dominant vegetation type(s) and phase of woodland succession (Tausch, Miller, Roundy, & Chambers, 2009).

Year	Vegetation Type	Woodland Succession
2006	Annual-Perennial Grass/Mountain Big Sagebrush	NA
2011	Annual-Perennial Grass/Mountain Big Sagebrush	NA
2016	Annual-Perennial Grass/Mountain Big Sagebrush	NA

Site Notes

The study is located approximately one and half miles southeast of Croydon, in the Echo-Henefer Wildlife Management Area (WMA), north of Harris Canyon. The study samples a mountain big sagebrush (*Artemisia tridentata* ssp. *vaseyana*) community within the WMA. The study was established in 2006 to monitor the effects of the sagebrush defoliator moth (*Aroga websteri*) on the sagebrush population. The defoliator moth had affected several sagebrush populations in northern Utah, and the study was established to monitor the long-term effects of the moth. Two other studies, Claypit North Slope (4R-3) and Croydon Cemetery (4R-5), were also established in the area. On all three study sites, browse density and line intercept cover were read on all five belts, but cover and nested frequency were only read on belt 1, for purposes of this study cover and frequency data was extrapolated over all five belts. In subsequent sample years, cover and frequency should be read on all five belts. The area is heavily occupied by big game.

Soils**Table 04R-04.5 - Soil Analysis Data.** List of chemical and textural soil characteristics determined by laboratory analysis.

Texture	pH	% sand	% silt	% clay	% OM	PPM P	PPM K	ds/m	Sample Date
Loam	7.1	43.3	31.8	24.9	2.2	26.8	368.0	0.7	08/30/2006

Site Potential

1981-2010 Average Annual Precipitation	18 inches
NRCS Ecological Site	Upland Stony Loam (Mountain Big Sagebrush)
NRCS Ecological Site #	R047XA334UT
States and Transitions	No state and transition model is available for this ecological site.

When established in 2006, the plant community has remained in a perennial grass reduced shrub state (Table 04R- 04.12). The herbaceous understory has remained abundant, though the annual grass species cheatgrass (*Bromus tectorum*) has been sampled in moderate to high amounts (Table 04R-04.7). When first established in 2006, most of the sagebrush had poor vigor due the sagebrush defoliator moth, but since then vigor has improved substantially (Table 04R-04.13). With continued decreases in sagebrush density, this site is at risk of transitioning to a introduced perennial grass state.

Trend Summary Tables

Table 04R-04.6 - Shrub/Tree Summary. Average modified Daubenmire quadrat and line intercept cover by year for shrubs/trees.

Year	Quadrat Cover (%)			Line-intercept Cover (%)		
	Preferred Shrub	Other Shrub	Tree	Preferred Shrub	Other Shrub	Tree
2006	7.9	0.2	-	5.9	-	-
2011	3.5	0.9	-	5.2	0.1	-
2016	6.5	0.1	-	6.6	0.3	-

Table 04R-04.7 - Herbaceous Summary. Nested frequency and average modified Daubenmire quadrat cover by year for herbaceous functional groups.

Year	Nested Frequency				Quadrat Cover (%)			
	Annual Grass	Perennial Grass	Annual/Biennial Forb	Perennial Forb	Annual Grass	Perennial Grass	Annual/Biennial Forb	Perennial Forb
2006	405	285	70	15	11.6	14.3	0.3	0.0
2011	385	370	395	150	12.9	25.6	5.8	0.8
2016	395	320	180	30	10.0	19.8	1.6	0.2

Table 04R-04.8 - Basic Ground Cover. Average modified Daubenmire quadrat cover by year for basic ground cover types.

Year	Cover Type (%)					
	Bare Ground	Cryptograms	Litter	Pavement	Rock	Vegetation
2006	11.9	0.5	44.1	7.8	10.6	34.7
2011	13.1	0.0	41.0	10.9	11.0	46.3
2016	33.0	0.2	40.4	8.0	5.6	33.1

Table 04R-04.9 - Pellet Group Data. Quadrat frequency and pellet group transect data for animal pellets. Rabbit pellet groups are not sampled in the pellet group transect.

Year	Cattle	Mule Deer	Elk	Rabbit
	Quadrat Frequency			
2006	5	35	10	15
2011	5	-	-	-
2016	-	5	-	15
Year	Days Use Per Acre (ha)			
2006	5.8 (14.3)	46.9 (115.9)	35.5 (87.7)	-
2011	0.7 (1.8)	12.8 (31.5)	6.0 (14.9)	-
2016	2.9 (7.2)	13.4 (33.1)	-	-

Table 04R-04.10 - Grass Species. Nested frequency and modified Daubenmire average cover by year.

GRASS SPECIES	Agropyron cristatum ⁱ (crested wheatgrass)	Bromus arvensis ^{ai} (field brome)	Bromus tectorum ^{ai} (cheatgrass)	Pascopyrum smithii (western wheatgrass)	Poa bulbosa ⁱ (bulbous bluegrass)	Poa secunda (Sandberg bluegrass)	Pseudoroegneria spicata (bluebunch wheatgrass)	Thinopyrum intermedium ⁱ (intermediate wheatgrass)	Vulpia octoflora ^a (sixweeks fescue)
year	Nested Frequency								
2006	25	-	405	55	-	120	45	165	10
2011	40	65	380	285	-	180	30	25	-
2016	40	15	395	265	30	-	30	-	-
year	Average Cover (%)								
2006	2.2	-	11.6	2.3	-	1.0	2.5	6.3	0.0
2011	1.8	0.6	12.4	17.1	-	2.1	1.5	3.1	-
2016	1.2	0.1	9.9	17.6	0.1	-	0.9	-	-

a - Annual; n - Noxious Weed; i - Introduced Species

Table 04R-04.11 - Forb Species. Nested frequency and modified Daubenmire average cover by year.

FORB SPECIES	Allium (onion)	Alyssum desertorum ^{ai} (desert madwort)	Astragalus (milkvetch)	Astragalus utahensis (Utah milkvetch)	Ceratocephala testiculata ^{ai} (curvseed butterwort)	Cirsium undulatum ^a (wavyleaf thistle)	Collinsia parviflora ^a (maiden blue eyed Mary)	Collomia linearis ^a (tiny trumpet)	Cymopterus (springparsley)	Descurainia ^a (tansymustard)	Draba ^a (draba)	Erodium cicutarium ^{ai} (redstem stork's bill)	Helianthus annuus ^a (common sunflower)	Holosteum umbellatum ^{ai} (jagged chickweed)	Lactuca serriola ^{ai} (prickly lettuce)	Microsteris gracilis ^a (slender phlox)
year	Nested Frequency															
2006	15	-	-	-	-	-	65	-	-	-	15	-	5	5	-	-
2011	100	95	5	5	65	15	-	25	55	220	235	-	-	290	25	40
2016	-	80	-	25	40	5	-	-	5	20	10	125	15	-	-	-
year	Average Cover (%)															
2006	0.0	-	-	-	-	-	0.1	-	-	-	0.1	-	0.0	0.0	-	-
2011	0.5	0.4	0.0	0.0	0.1	0.8	-	0.2	0.3	1.2	1.3	-	-	1.3	0.5	0.1
2016	-	0.1	-	0.2	0.1	0.0	-	-	0.0	0.1	0.0	1.3	0.0	-	-	-

a - Annual/Biennial; n - Noxious Weed; i - Introduced Species

Table 04R-04.12 - Shrub and Tree Species. Average modified Daubenmire quadrat and line intercept cover by year.

SHRUB SPECIES	Artemisia tridentata ssp. vaseyana ^p (mountain big sagebrush)	Ericameria nauseosa ssp. nauseosa var. spectiosa ^p (rubber rabbitbrush)	Gutierrezia sarothrae (broom snakeweed)	Opuntia polyacantha (plains pricklypear)
year	Line Intercept Cover (%)			
2006	5.5	0.4	-	-
2011	3.2	2	-	0.1
2016	5.8	0.8	-	0.3
year	Quadrat Cover (%)			
2006	4.8	3.1	0.2	-
2011	2.6	0.9	0.9	0.0
2016	3.9	2.6	0.1	0.0

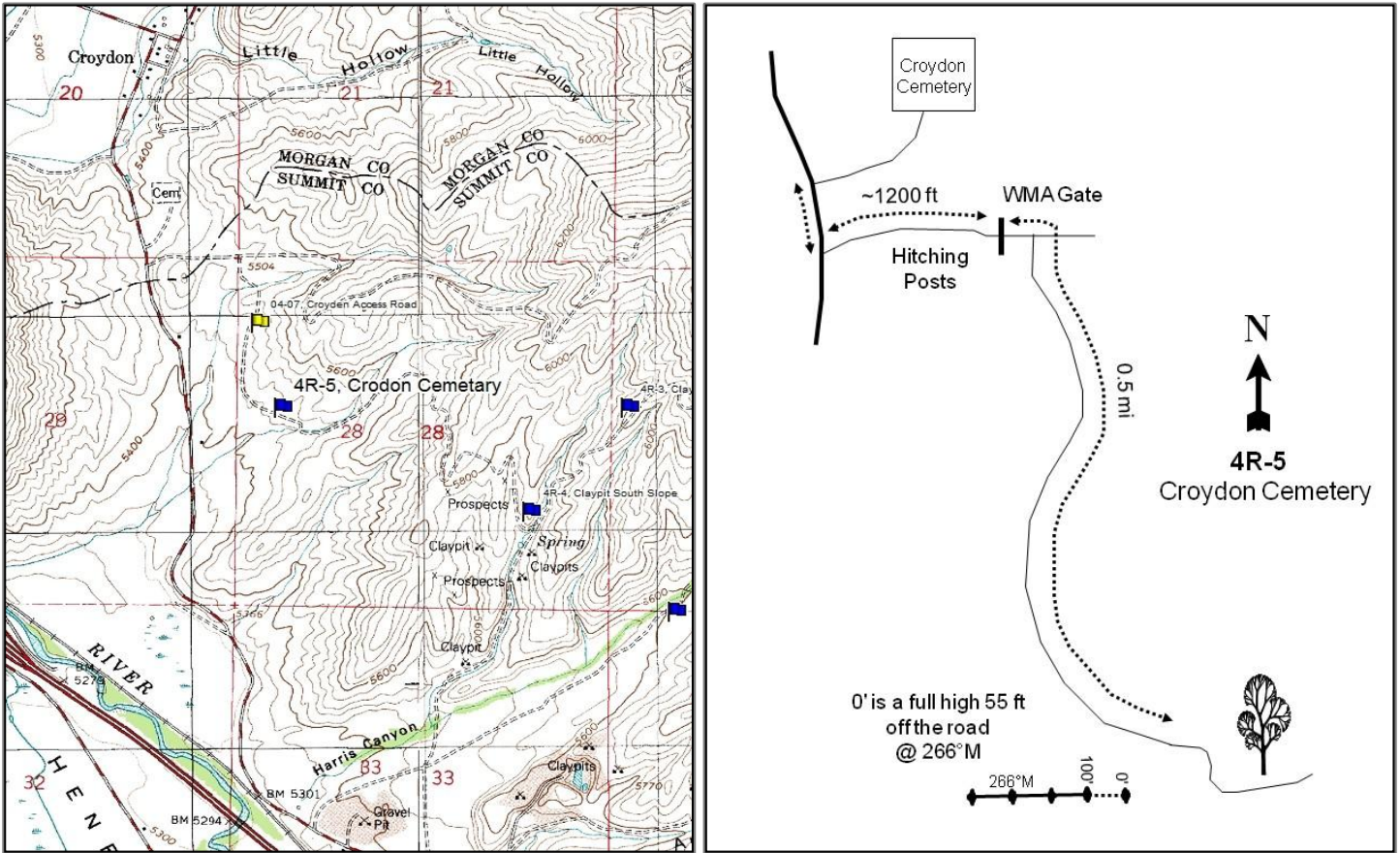
t - Tree Species; p - Preferred Browse; i - Introduced

Table 04R-04.13 - Shrub/Tree Characteristics. Population characteristics of shrub/tree species populations including density reproduction (seedlings), age distribution, utilization, vigor and average size (height/crown) of plants.

Year	Density		Age Class Distribution			Utilization		Poor Vigor (%)	Average Height Crown (cm)
	Plants Per Acre		Excluding Seedlings			Moderate (%)	Heavy (%)		
	Excluding Seedlings	Seedling	Young (%)	Mature (%)	Decadent (%)				
<i>Artemisia tridentata</i> ssp. <i>vaseyana</i> ^P -- (mountain big sagebrush)									
2006	1240	-	3	48	48	37	10	97	65/101
2011	760	-	5	50	45	26	16	40	59/97
2016	720	40	0	58	42	36	6	22	59/117
<i>Ericameria nauseosa</i> ssp. <i>nauseosa</i> var. <i>speciosa</i> ^P -- (rubber rabbitbrush)									
2006	140	-	14	86	0	0	0	0	73/78
2011	160	-	0	75	25	13	0	38	62/87
2016	160	-	0	50	50	0	0	25	67/108
<i>Gutierrezia sarothrae</i> -- (broom snakeweed)									
2006	200	-	0	100	0	0	0	0	22/26
2011	140	-	0	100	0	0	0	0	30/34
2016	40	-	0	50	50	0	0	50	35/39
<i>Opuntia polyacantha</i> -- (plains pricklypear)									
2006	220	-	18	82	0	0	0	0	13/22
2011	180	-	22	67	11	0	0	0	7/14
2016	380	-	5	95	0	0	0	0	13/30

t - Tree Species; p - Preferred Browse; i - Introduced Species

CRODON CEMETARY - STUDY NO. 04R-5



Location Information

USGS 7.5 min Map Info Devils Slide SE; Township 4N, Range 4E, Section 28
 GPS (0' Stake) NAD 83 UTM ZONE 12, 457306 East 4544722 North

Transect Information

Browse Tag # (0' Stake) Not Available
 Transect Bearing 266° magnetic
 Length 400ft
 Belt Placement Line 1 (11ft & 95ft), Line 2 (34ft), Line 3 (59ft), Line 4 (71ft)
 Belt Marker Placement Standard, Belt 5: 1ft

Directions to Site

About 250 feet from the Croydon cemetery road, turn left onto a dirt road and drive approximately 1,200 feet to a WMA gate. From the WMA gate, drive 0.5 miles (staying right) through the first fork in the road immediately after the WMA gate. The zero foot stake is a full high 55 feet off the road. No browse tag.

***Only on belt 1 was quadrat cover and frequency read in 2006-2016, but in subsequent years, cover and frequency should be read on all belts.

Site Information

Land Ownership	State
Land Administrator	UDWR
Allotment	No data
Elevation	5,450ft (1,661m)
Aspect	Southwest
Slope	5%
Sample Dates	08/30/2006, 07/06/2011, 06/22/2016

Table 04R-05.1 Disturbance History. Recorded history of major disturbances.

Treatment/Disturbance	Name	WRI DB#	Date	Size (acres)
Insect - Aroga Moth	Aroga Moth Study	-	Approx. 2006	-

Wildlife Habitat and Vegetation History

Table 04R-05.3 - Wildlife Seasonal Habitat. UDWR wildlife habitat and seasonality.

Species	Habitat	Season	Brood/Young Rearing
Deer	crucial	winter	
Elk	crucial	winter	
Greater Sage Grouse	Crucial	occupied & Winter	brood-rearing
Moose	crucial	summer	

Table 04R-05.4 - Vegetation History. The dominant vegetation type(s) and phase of woodland succession (Tausch, Miller, Roundy, & Chambers, 2009).

Year	Vegetation Type	Woodland Succession
2006	Mountain Big Sagebrush	NA
2011	Mountain Big Sagebrush	NA
2016	Mountain Big Sagebrush	NA

Site Notes

The study is located approximately one mile southeast of Croydon, in the Echo-Henefer Wildlife Management Area (WMA), north of the mouth of Harris Canyon. The study samples a mountain big sagebrush (*Artemisia tridentata* ssp. *vaseyana*) community in the WMA. The study was established in 2006 to monitor the effects of the sagebrush defoliator moth (*Aroga websteri*) on the sagebrush population. The defoliator moth had affected several sagebrush populations in northern Utah and the study was established to monitor the long-term effects of the moth. Two other studies, Claypit North Slope (4R-3) and Claypit South Slope (4R-4), were also established in the area. On all three study sites, browse density and line intercept cover were read on all five belts, but cover and nested frequency were only read on belt 1, for purposes of this study cover and frequency data was extrapolated over all five belts. In subsequent sample years, it is planned to read cover and frequency on all five belts. The area is heavily occupied by big game.

Soils

Table 04R-05.5 - Soil Analysis Data. List of chemical and textural soil characteristics determined by laboratory analysis.

Texture	pH	%sand	%silt	%clay	%OM	PPM P	PPM K	ds/m	Sample Date
Clay Loam	7.7	28.0	42.7	29.3	1.9	31.1	323.2	0.7	08/30/2006

Site Potential

1981-2010 Average Annual Precipitation	18 inches
NRCS Ecological Site	Upland Loam (Bonneville Big Sagebrush)
NRCS Ecological Site #	R047XA314UT
States and Transitions	No state and transition model is available for this ecological site.

When established in 2006, the plant community has remained a stand of mountain big sagebrush (Table 04R-05.12). The herbaceous understory has remained abundant, though being dominated by the introduced perennial grass species crested wheatgrass (*Agropyron cristatum*) and bulbous bluegrass (*Poa bulbosa*) (Table 04R-05.10). When first established in 2006, most of the sagebrush had poor vigor due the sagebrush defoliator moth, but since then vigor has improved substantially (Table 04R-05.12).

Trend Summary Tables

Table 04R-05.6 - Shrub/Tree Summary. Average modified Daubenmire quadrat and line intercept cover by year for shrubs/trees.

Year	Quadrat Cover (%)			Line-intercept Cover (%)		
	Preferred Shrub	Other Shrub	Tree	Preferred Shrub	Other Shrub	Tree
2006	14.1	0.6	-	15.7	0.8	-
2011	17.2	3.1	-	20.2	4.0	-
2016	16.4	5.2	-	24.6	7.6	-

Table 04R-05.7 - Herbaceous Summary. Nested frequency and average modified Daubenmire quadrat cover by year for herbaceous functional groups.

Year	Nested Frequency				Quadrat Cover (%)			
	Annual Grass	Perennial Grass	Annual/Biennial Forb	Perennial Forb	Annual Grass	Perennial Grass	Annual/Biennial Forb	Perennial Forb
2006	-	400	40	-	-	31.7	0.5	-
2011	20	425	205	10	0.2	39.0	3.4	0.1
2016	20	420	100	-	0.0	25.3	0.6	-

Table 04R-05.8 - Basic Ground Cover. Average modified Daubenmire quadrat cover by year for basic ground cover types.

Year	Cover Type (%)					
	Bare Ground	Cryptograms	Litter	Pavement	Rock	Vegetation
2006	28.7	1.1	32.4	0.6	0.3	48.6
2011	30.8	0.2	36.4	0.4	-	53.4
2016	44.0	1.1	35.4	0.1	0.1	43.0

Table 04R-05.9 - Pellet Group Data. Quadrat frequency and pellet group transect data for animal pellets. Rabbit pellet groups are not sampled in the pellet group transect.

Year	Cattle	Mule Deer	Elk	Rabbit
	Quadrat Frequency			
2006	5	20	-	15
2011	-	5	-	5
2016	-	15	-	5
Year	Days Use Per Acre (ha)			
2006	11.6 (28.7)	46.2 (114.2)	2.7 (6.6)	-
2011	10.2 (25.1)	2.7 (6.6)	-	-
2016	10.2 (25.1)	21.5 (53.0)	-	-

Table 04R-05.10 - Grass Species. Nested frequency and modified Daubenmire average cover by year.

GRASS SPECIES	Agropyron cristatum ⁱ (crested wheatgrass)	Bromus arvensis ^{ai} (field brome)	Bromus tectorum ^{ai} (cheatgrass)	Poa bulbosa ⁱ (bulbous bluegrass)	Poa secunda (Sandberg bluegrass)
year	Nested Frequency				
2006	280	-	-	295	35
2011	315	5	15	355	5
2016	350	20	-	305	15
year	Average Cover (%)				
2006	11.2	-	-	20.3	0.3
2011	17.5	0.0	0.2	21.4	0.1
2016	12.3	0.0	-	12.8	0.1

a - Annual; n - Noxious Weed; i - Introduced Species

Table 04R-05.11 - Forb Species. Nested frequency and modified Daubenmire average cover by year.

FORB SPECIES	Alyssum desertorum ^{ai} (desert madwort)	Ceratocephala testiculata ^{ai} (curvseed butterwort)	Cirsium undulatum ^a (wavyleaf thistle)	Collomia linearis ^a (tiny trumpet)	Cordylanthus ^a (bird's-beak)	Hackelia patens (spotted stickseed)	Helianthus annuus ^a (common sunflower)	Holosteum umbellatum ^{ai} (jagged chickweed)	Tragopogon dubius ^{ai} (yellow salsify)
year	Nested Frequency								
2006	10	-	-	-	20	-	10	-	0
2011	90	45	15	5	90	10	15	15	-
2016	35	5	10	-	65	-	5	-	-
year	Average Cover (%)								
2006	0.0	-	-	-	0.5	-	0.0	-	0.0
2011	0.2	0.2	0.8	0.0	2.1	0.1	0.1	0.1	-
2016	0.1	0.0	0.2	-	0.3	-	0.0	-	-

a - Annual/Biennial; n - Noxious Weed; i - Introduced Species

Table 04R-05.12 - Shrub and Tree Species. Average modified Daubenmire quadrat and line intercept cover by year.

SHRUB SPECIES	Artemisia tridentata ssp. vaseyana ^p (mountain big sagebrush)	Ericameria nauseosa ssp. nauseosa var. speciosa ^p (rubber rabbitbrush)	Gutierrezia sarothrae (broom snakeweed)
year	Line Intercept Cover (%)		
2006	15.7	-	0.8
2011	20.2	-	4
2016	24.6	0	7.6
year	Quadrat Cover (%)		
2006	14.1	-	0.6
2011	17.2	-	3.1
2016	16.4	0.0	5.2

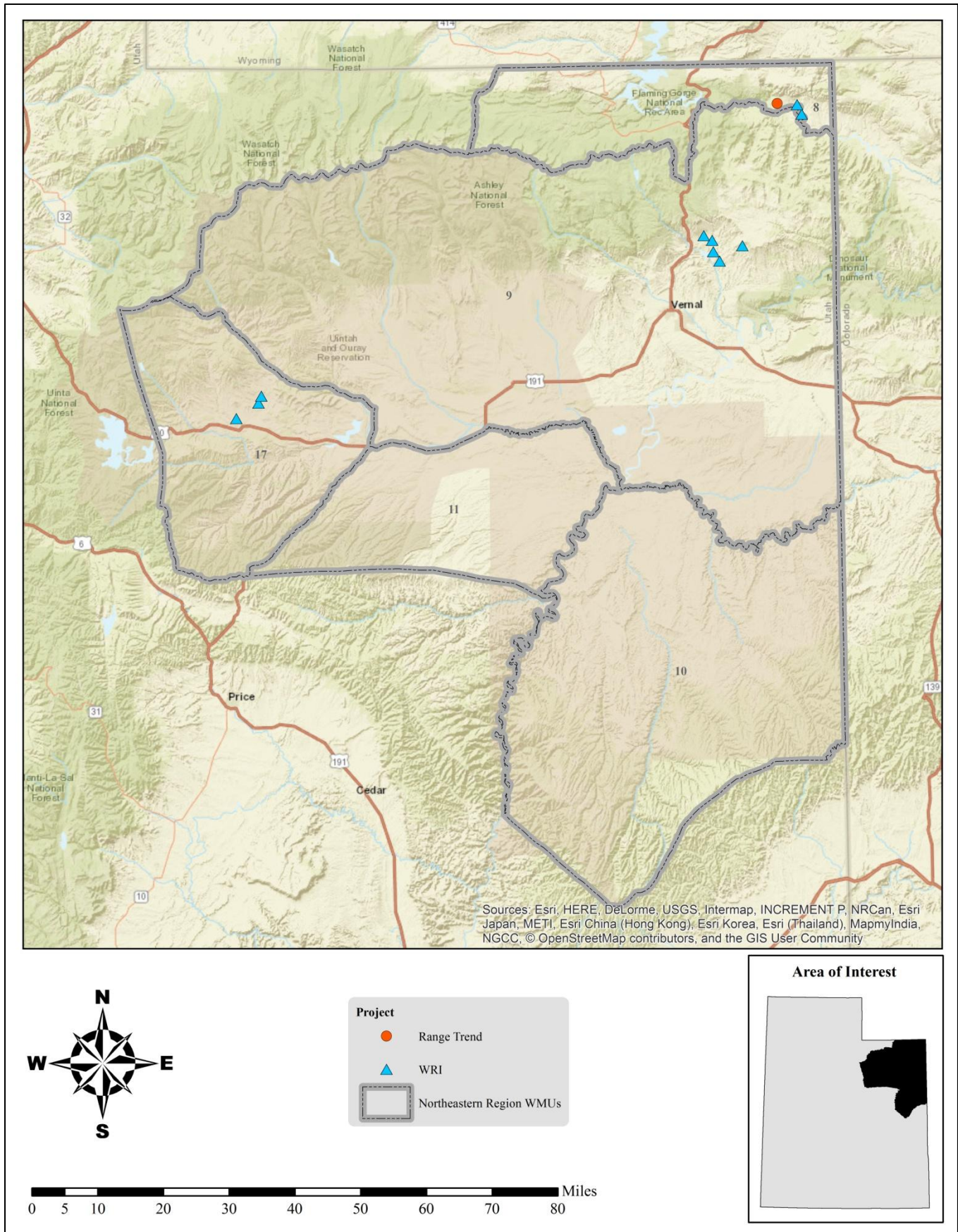
t - Tree Species; p - Preferred Browse; i - Introduced

Table 04R-05.13 - Shrub/Tree Characteristics. Population characteristics of shrub/tree species populations including density reproduction (seedlings), age distribution, utilization, vigor and average size (height/crown) of plants.

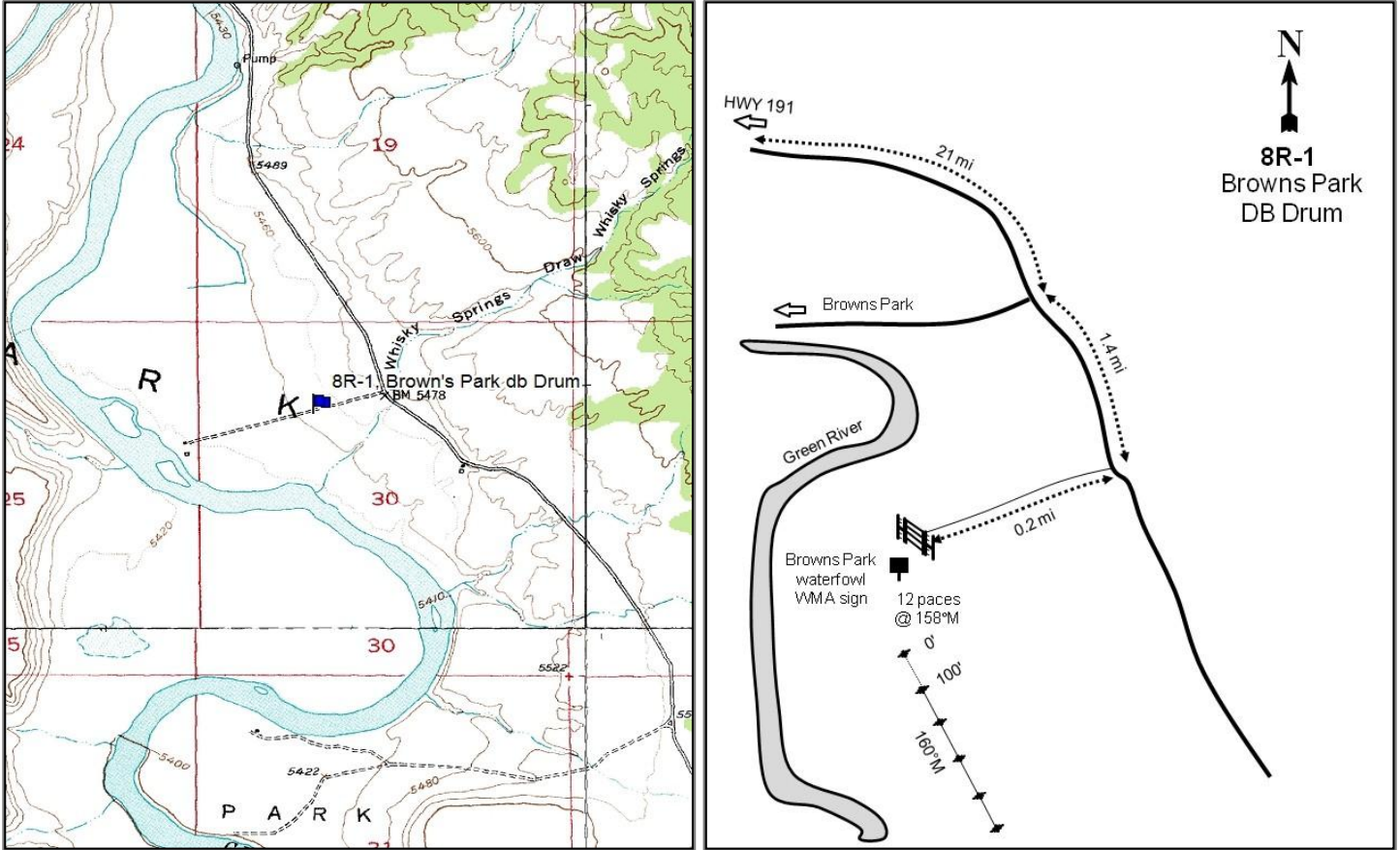
Year	Density		Age Class Distribution			Utilization		Poor Vigor (%)	Average Height Crown (cm)
	Plants Per Acre		Excluding Seedlings			Moderate (%)	Heavy (%)		
	Excluding Seedlings	Seedling	Young (%)	Mature (%)	Decadent (%)				
Artemisia tridentata ssp. vaseyana^P -- (mountain big sagebrush)									
2006	3380	140	2	40	58	30	5	91	71/86
2011	2660	-	5	48	47	48	0	26	76/97
2016	2940	1080	8	44	48	14	2	33	69/105
Chrysothamnus viscidiflorus ssp. viscidiflorus -- (yellow rabbitbrush)									
2006	140	-	0	100	0	43	29	0	24/34
2011	200	-	0	100	0	0	0	0	33/51
2016	220	-	0	91	9	0	0	9	39/53
Ericameria nauseosa ssp. nauseosa var. speciosa^P -- (rubber rabbitbrush)									
2006	20	-	100	0	0	0	0	0	141/187
2011	40	-	0	100	0	0	0	0	56/97
2016	20	-	0	0	100	0	0	100	76/133
Gutierrezia sarothrae -- (broom snakeweed)									
2006	1040	20	6	94	0	0	0	0	22/26
2011	2800	-	7	91	2	0	0	1	29/36
2016	10920	40	7	93	0	2	0	0	26/28

t - Tree Species; p - Preferred Browse; i - Introduced Species

NORTHEASTERN REGION



BROWN'S PARK DB DRUM - STUDY NO. 08R-1



Location Information

USGS 7.5 min Map Info Clay Basin SE; Township 2N, Range 25E, Section 30
 GPS (0' Stake) NAD 83 UTM ZONE 12, 656749 East 4527529 North

Transect Information

Browse Tag # (0' Stake) 84
 Transect Bearing 160° 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 toward Antelope Flat on Highway US 191 for approximately 8 miles. Turn east onto the Antelope Flat Road (before reaching the Wyoming border) toward Goslin Mountain. Drive for 21 miles to a fork. Continue south on the main road for 1.4 miles to another fork. Turn right (west) and drive 0.2 miles to a UDWR gate. From the southernmost post of the gate, walk 12 paces at 158 degrees magnetic to the 0-foot stake which is marked with browse tag #84.

Site Information

Land Ownership	State
Land Administrator	UDWR
Allotment	No data
Elevation	5,445ft (1,660m)
Aspect	Southwest
Slope	2-4%
Sample Dates	07/28/2005, 07/29/2008, 06/13/2012, 08/09/2016

Table 08R-01.1 Disturbance History. Recorded history of major disturbances.

Treatment/Disturbance	Name	WRI DB#	Date	Size (acres)
Herbicide - 2,4-D/Tordon	Brown's Park	26	June 2005	141
Aerator - Double Drum/Seed	Brown's Park	26	2005	141
Seeding - Broadcast After	Brown's Park	26	2005	141

Table 08R-01.2 Seed Mix. List of known seeded plant species and rates (if available).

Mix Name			Application Type	Application Date	Acres
Brown's Park Greasewood			Aerator	Sep 2005	150
Type	Species	Common Name	Cultivar/Source ID	Bulk lbs/acre	PLS lbs/acre
G	Agropyron cristatum	Crested Wheatgrass	Douglas	2.00	1.59
G	Elymus lanceolatus	Thickspike Wheatgrass	Critana	2.00	1.70
G	Leymus cinereus	Great Basin Wildrye	Trailhead	2.00	1.76
G	Psathyrostachys juncea	Russian Wildrye		2.00	1.80
F	Medicago sativa	Alfalfa	Ladak+	1.00	0.95
F	Sanguisorba minor	Small Burnet	Delar	2.00	1.88
S	Bassia prostrata	Forage Kochia	Beaver UT	1.50	0.60

Wildlife Habitat and Vegetation History

Table 08R-01.3 - Wildlife Seasonal Habitat. UDWR wildlife habitat and seasonality.

Species	Habitat	Season	Brood/Young Rearing
Deer	crucial	winter	
Greater Sage Grouse		occupied	brood-rearing
Moose	crucial	summer	
Pronghorn	substantial	year-long	

Table 08R-01.4 - Vegetation History. The dominant vegetation type(s) and phase of woodland succession (Tausch, Miller, Roundy, & Chambers, 2009).

Year	Vegetation Type	Woodland Succession
2005	Black Greasewood	No Encroachment
2008	Black Greasewood	No Encroachment
2012	Black Greasewood	No Encroachment
2016	Black Greasewood	No Encroachment

Site Notes

No Notes

Soils

Table 08R-01.5 - Soil Analysis Data. List of chemical and textural soil characteristics determined by laboratory analysis.

Texture	pH	%sand	%silt	%clay	%OM	PPM P	PPM K	ds/m	Sample Date
Sandy Loam	7.9	60.2	24.0	15.8	0.3	11.5	761.6	1.3	07/28/2005

Site Potential

1981-2010 Average Annual Precipitation 8 inches
 NRCS Ecological Site Semidesert - Alkali Flat (Black Greasewood)
 NRCS Ecological Site # R034XY006UT
 States and Transitions No state and transition model is available for this ecological site.

The states and transitions for this site are likely similar to those of the Alkaki Flat (Greasewood), R035XY009UT ecological site. Since establishment in 1983 and despite a project to revitalize the deer winter range, this site has remained as a black greasewood (*Sarcobatus vermiculatus*) dominated plant community (Table 08R-01.6, Table 08R- 01.12). In 2008, however, cover of greasewood decreased substantially, but has steadily increased in abundance since treatment. The herbaceous understory has been a dominated by annual forbs since establishment (Table 08R-01.10). The invasive annual grass cheatgrass (*Bromus tectorum*) has been observed on the site in low abundance in various sample years (Table 08R-01.10). It is likely that without significant input this site will remain in a degraded state without increasing herbaceous and browse species diversity.

Trend Summary Tables

Table 08R-01.6 - Shrub/Tree Summary. Average modified Daubenmire quadrat and line intercept cover by year for shrubs/trees.

Year	Quadrat Cover (%)			Line-intercept Cover (%)		
	Preferred Shrub	Other Shrub	Tree	Preferred Shrub	Other Shrub	Tree
2005	0.7	28.8	-	0.4	39.8	-
2008	0.0	8.0	-	0.2	9.4	-
2012	-	12.7	-	-	16.5	-
2016	0.1	18.2	-	0.5	19.9	-

Table 08R-01.7 - Herbaceous Summary. Nested frequency and average modified Daubenmire quadrat cover by year for herbaceous functional groups.

Year	Nested Frequency				Quadrat Cover (%)			
	Annual Grass	Perennial Grass	Annual/Biennial Forb	Perennial Forb	Annual Grass	Perennial Grass	Annual/Biennial Forb	Perennial Forb
2005	5	3	174	14	0.0	0.0	5.3	0.6
2008	7	17	338	-	0.0	0.4	25.6	-
2012	3	7	182	-	0.0	0.1	5.2	-
2016	8	11	256	81	0.1	0.4	24.3	2.4

Table 08R-01.8 - Basic Ground Cover. Average modified Daubenmire quadrat cover by year for basic ground cover types.

Year	Cover Type (%)					
	Bare Ground	Cryptograms	Litter	Pavement	Rock	Vegetation
2005	20.6	3.6	65.9	0.1	0.2	33.5
2008	29.6	0.6	49.7	0.2	0.2	33.2
2012	22.3	0.4	70.5	0.1	0.2	17.1
2016	17.5	4.2	54.5	0.0	0.2	44.3

Table 08R-01.9 - Pellet Group Data. Quadrat frequency and pellet group transect data for animal pellets. Rabbit pellet groups are not sampled in the pellet group transect.

Year	Cattle	Mule Deer	Elk	Rabbit
	Quadrat Frequency			
2005	-	10	3	40
2008	-	6	1	56
2012	-	25	10	16
2016	-	6	-	74
Year	Days Use Per Acre (ha)			
2005	-	5.3 (13.2)	43.6 (107.6)	-
2008	0.7 (1.8)	15.4 (38.1)	1.3 (3.3)	-
2012	-	97.2 (240.0)	-	-
2016	-	12.1 (29.8)	1.3 (3.3)	-

Table 08R-01.10 - Grass Species. Nested frequency and modified Daubenmire average cover by year.

GRASS SPECIES	Agropyron cristatum ⁱ (crested wheatgrass)	Bromus tectorum ^{ai} (cheatgrass)	Elymus elymoides (squirreltail)	Elymus lanceolatus (thickspike wheatgrass)	Psathyrostachys juncea ⁱ (Russian wildrye)	Vulpia octoflora ^a (sixweeks fescue)
year	Nested Frequency					
2005	-	-	3	-	-	5
2008	1	-	7	-	11	7
2012	-	3	4	2	1	-
2016	5	-	5	-	3	8
year	Average Cover (%)					
2005	-	-	0.0	-	-	0.0
2008	0.0	-	0.2	-	0.2	0.0
2012	-	0.0	0.0	0.0	0.0	-
2016	0.0	-	0.0	-	0.3	0.1

a - Annual; n - Noxious Weed; i - Introduced Species

Table 08R-01.11 - Forb Species. Nested frequency and modified Daubenmire average cover by year.

FORB SPECIES	Alyssum desertorum ^{ai} (desert madwort)	Bassia scoparia ^{ai} (burningbush)	Chenopodium album ^a (lambquarters)	Chenopodium leptophyllum ^a (narrowleaf goosefoot)	Descurainia pinnata ^a (western tansymustard)	Eriogonum cernuum ^a (nodding buckwheat)	Halogeton glomeratus ^{ai} (saltlover)	Lepidium latifolium ^{ai} (broadleaved pepperweed)	Salsola tragus ^{ai} (prickly Russian thistle)	Sisymbrium altissimum ^{ai} (tall tumblemustard)
year	Nested Frequency									
2005	63	65	66	6	17	6	-	14	2	-
2008	19	335	2	-	-	-	-	-	6	2
2012	-	175	3	1	4	-	-	-	5	-
2016	3	225	-	11	7	-	3	81	2	83
year	Average Cover (%)									
2005	1.0	2.4	1.6	0.0	0.2	0.1	-	0.6	0.0	-
2008	0.1	25.4	0.0	-	-	-	-	-	0.2	0.0
2012	-	5.1	0.0	0.0	0.0	-	-	-	0.0	-
2016	0.0	16.6	-	0.0	0.1	-	0.0	2.4	0.0	7.5

a - Annual/Biennial; n - Noxious Weed; i - Introduced Species

Table 08R-01.12 - Shrub and Tree Species. Average modified Daubenmire quadrat and line intercept cover by year.

SHRUB SPECIES	Atriplex canescens ^p (fourwing saltbush)	Atriplex confertifolia ^p (shadscale saltbush)	Chrysothamnus viscidiflorus ssp. viscidiflorus (yellow rabbitbrush)	Ericameria nauseosa (rubber rabbitbrush)	Gutierrezia sarothrae (broom snakeweed)	Opuntia (pricklypear)	Sarcobatus vermiculatus (greasewood)
year	Line Intercept Cover (%)						
2005	-	0.4	0.5	-	0.2	0.1	39
2008	-	0.2	-	-	-	-	9.4
2012	-	-	-	-	-	0.5	16
2016	0.5	-	-	-	1.2	0.2	18.5
year	Quadrat Cover (%)						
2005	-	0.7	0.0	0.1	0.0	0.1	28.4
2008	0.0	0.0	-	-	0.0	-	7.9
2012	-	-	0.1	-	-	0.1	12.4
2016	0.1	-	-	-	0.7	0.1	17.4

t - Tree Species; p - Preferred Browse; i - Introduced

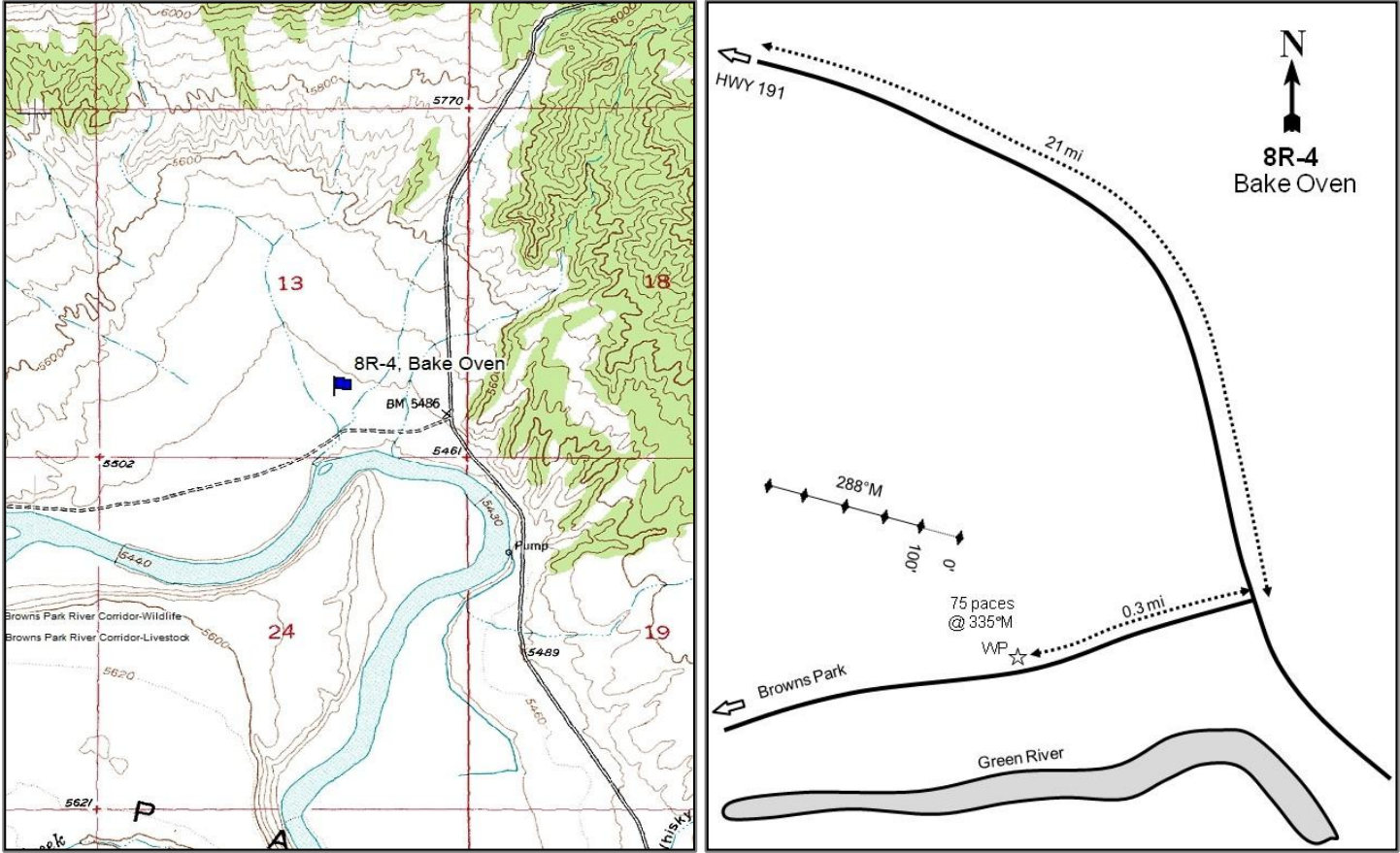
Table 08R-01.13 - Shrub/Tree Characteristics. Population characteristics of shrub/tree species populations including density reproduction (seedlings), age distribution, utilization, vigor and average size (height/crown) of plants.

Year	Density Plants Per Acre		Age Class Distribution Excluding Seedlings			Utilization		Poor Vigor (%)	Average Height Crown (cm)
	Excluding Seedlings	Seedling	Young (%)	Mature (%)	Decadent (%)	Moderate (%)	Heavy (%)		
Artemisia tridentata ssp. tridentata ^p -- (basin big sagebrush)									
2005	-	-	-	-	-	-	-	-	65/57
2008	-	-	-	-	-	-	-	-	- / -
2012	-	-	-	-	-	-	-	-	56/89
2016	-	-	-	-	-	-	-	-	- / -
Atriplex canescens ^p -- (fourwing saltbush)									
2005	-	-	-	-	-	-	-	-	- / -
2008	20	-	100	0	0	0	0	0	- / -
2012	-	-	-	-	-	-	-	-	46/45
2016	40	-	50	50	0	50	0	0	85/80
Atriplex confertifolia ^p -- (shadscale saltbush)									
2005	220	20	0	73	27	0	0	55	37/51
2008	20	-	0	100	0	0	0	0	34/21
2012	40	-	0	100	0	0	0	0	28/34
2016	-	-	-	-	-	-	-	-	39/34
Bassia prostrata ⁱ -- (forage kochia)									
2005	-	-	-	-	-	-	-	-	- / -
2008	-	-	-	-	-	-	-	-	19/12
2012	-	-	-	-	-	-	-	-	- / -
2016	-	-	-	-	-	-	-	-	- / -
Chrysothamnus viscidiflorus ssp. viscidiflorus -- (yellow rabbitbrush)									
2005	120	-	0	67	33	17	0	33	41/54
2008	-	-	-	-	-	-	-	-	47/51
2012	20	-	0	0	100	0	100	100	48/58
2016	-	-	-	-	-	-	-	-	36/33

Year	Density		Age Class Distribution			Utilization		Poor Vigor (%)	Average Height Crown (cm)
	Plants Per Acre		Excluding Seedlings			Moderate (%)	Heavy (%)		
	Excluding Seedlings	Seedling	Young (%)	Mature (%)	Decadent (%)				
Ericameria nauseosa -- (rubber rabbitbrush)									
2005	-	-	-	-	-	-	-	-	66/90
2008	-	-	-	-	-	-	-	-	-/-
2012	-	-	-	-	-	-	-	-	-/-
2016	-	-	-	-	-	-	-	-	-/-
Gutierrezia sarothrae -- (broom snakeweed)									
2005	400	-	65	30	5	0	0	5	25/28
2008	260	-	0	100	0	0	0	0	30/35
2012	-	-	-	-	-	-	-	-	18/28
2016	500	-	0	100	0	0	0	0	30/34
Opuntia -- (pricklypear)									
2005	120	-	0	100	0	0	0	0	10/37
2008	60	-	0	67	33	0	0	33	7/15
2012	60	-	0	100	0	0	0	0	14/39
2016	100	-	0	100	0	0	0	0	10/23
Sarcobatus vermiculatus -- (greasewood)									
2005	2700	-	2	36	62	2	0	100	122/154
2008	660	-	12	85	3	0	0	12	88/133
2012	560	20	4	93	4	4	7	4	118/187
2016	2540	1060	76	24	0	0	0	7	142/200

t - Tree Species; p - Preferred Browse; i - Introduced Species

BAKE OVEN - STUDY NO. 08R-4



Location Information

USGS 7.5 min Map Info Clay Basin SE; Township 2N, Range 24E, Section 13
 GPS (0' Stake) NAD 83 UTM ZONE 12, 655632 East 4529839 North

Transect Information

Browse Tag # (0' Stake) Not Available
 Transect Bearing 288° magnetic
 Length 500ft
 Belt Placement Line 1 (11ft), Line 2 (34ft), Line 3 (59ft), Line 4 (71ft), Line 5 (87ft)
 Belt Marker Placement No Rebar, Belt 5: 92ft Long

Directions to Site

From Highway 191, drive 21 miles on Brown's Park Road to the junction of Highway 318. From the junction, turn right (west) onto Brown's Park Road for 0.3 miles to a witness post on the right-hand (north) side. From the witness post, walk 75 paces at 335 degrees magnetic to the 0-foot stake.

Site Information

Land Ownership	Federal
Land Administrator	BLM
Allotment	BRIDGEPORT
Elevation	5,460ft (1,664m)
Aspect	South
Slope	5%
Sample Dates	06/13/2012, 08/09/2016

Table 08R-04.1 Disturbance History. Recorded history of major disturbances.

Treatment/Disturbance	Name	WRI DB#	Date	Size (acres)
Herbicide - Arsenal	Bake Oven Sagebrush Restoration	2268	September 2013	150
Seeding - Truax Drill	Bake Oven Sagebrush Restoration	2268	September 2013	150
Seeding - Aerial After	Bake Oven Sagebrush Restoration	2268	January 2014	150

Table 08R-04.2 Seed Mix. List of known seeded plant species and rates (if available).

Mix Name			Application Type	Application Date	Acres
Bake Oven Sagebrush Restoration			Drill	Sep 2013	150
Type	Species	Common Name	Cultivar/Source ID	Bulk lbs/acre	PLS lbs/acre
G	Agropyron cristatum	Crested Wheatgrass	Hycrest	2.00	1.74
G	Agropyron fragile	Siberian Wheatgrass	Vavilov	1.00	0.79
G	Elymus wawawaiensis	Snake River Wheatgrass	Secar	2.00	1.83
G	Pascopyrum smithii	Western Wheatgrass	Arriba	2.00	1.75
F	Cleome serrulata	Rocky Mountain Beeplant		0.33	0.32
F	Cleome serrulata	Rocky Mountain Beeplant	Garfield UT	0.67	0.62
F	Medicago sativa	Alfalfa	Big Sky Ladak	1.00	0.94
F	Sanguisorba minor	Small Burnet	Delar	0.50	0.44
F	Sphaeralcea munroana	Munro Globemallow	Piute UT	0.50	0.29
S	Atriplex canescens	Fourwing Saltbush	Emery UT	2.00	1.05
S	Atriplex canescens	Fourwing Saltbush	Uintah UT	2.00	1.22
Mix Name			Application Type	Application Date	Acres
Bake Oven Sagebrush Restoration			Aerial	Jan 2014	150
Type	Species	Common Name	Cultivar/Source ID	Bulk lbs/acre	PLS lbs/acre
S	Artemisia tridentata ssp. wyomingensis	Wyoming Big Sagebrush	Uintah UT	0.50	0.07
S	Bassia prostrata	Forage Kochia	Beaver/Millard UT	0.50	0.42

Wildlife Habitat and Vegetation History

Table 08R-04.3 - Wildlife Seasonal Habitat. UDWR wildlife habitat and seasonality.

Species	Habitat	Season	Brood/Young Rearing
Deer	crucial	winter	
Greater Sage Grouse		occupied	brood-rearing
Pronghorn	substantial	year-long	

Table 08R-04.4 - Vegetation History. The dominant vegetation type(s) and phase of woodland succession (Tausch, Miller, Roundy, & Chambers, 2009).

Year	Vegetation Type	Woodland Succession
2012	Black Greasewood	No Encroachment
2016	Perennial Grass	No Encroachment

Site Notes

No Notes

Site Potential

1981-2010 Average Annual Precipitation 8 inches
 NRCS Ecological Site Semidesert - Alkali Flat (Black Greasewood)
 NRCS Ecological Site # R034XY006UT
 States and Transitions No state and transition model is available for this ecological site.

The states and transitions for this site are likely similar to those of the Alkaki Flat (Greasewood), R035XY009UT ecological site. When the study was established in 2012, the site was in an invaded shrub community type with black greasewood (*Sarcobatus vermiculatus*) being the dominant species (Table 08R-04.12). The herbaceous understory was in very poor condition with mostly weedy species being sampled with nearly no grass species observed (Table 08R- 04.10, Table 08R-04.11). Following the treatment in 2014, the community type transitioned from greasewood being the dominant species to a community with perennial wheatgrass species (*Agropyron* spp.) and the noxious weed broadleaved pepperweed (*Lepidium latifolium*) as the major components of the site (Table 08R-04.11).

Trend Summary Tables

Table 08R-04.6 - Shrub/Tree Summary. Average modified Daubenmire quadrat and line intercept cover by year for shrubs/trees.

Year	Quadrat Cover (%)			Line-intercept Cover (%)		
	Preferred Shrub	Other Shrub	Tree	Preferred Shrub	Other Shrub	Tree
2012	0.1	19.1	-	0.2	27.5	-
2016	-	0.2	-	-	0.1	-

Table 08R-04.7 - Herbaceous Summary. Nested frequency and average modified Daubenmire quadrat cover by year for herbaceous functional groups.

Year	Nested Frequency				Quadrat Cover (%)			
	Annual Grass	Perennial Grass	Annual/Biennial Forb	Perennial Forb	Annual Grass	Perennial Grass	Annual/Biennial Forb	Perennial Forb
2012	3	-	117	11	0.0	-	1.0	0.0
2016	76	258	208	206	1.5	16.2	7.0	8.9

Table 08R-04.8 - Basic Ground Cover. Average modified Daubenmire quadrat cover by year for basic ground cover types.

Year	Cover Type (%)					
	Bare Ground	Cryptograms	Litter	Pavement	Rock	Vegetation
2012	63.0	1.5	21.2	5.9	0.4	20.7
2016	28.2	0.2	42.3	1.5	0.3	36.1

Table 08R-04.9 - Pellet Group Data. Quadrat frequency and pellet group transect data for animal pellets. Rabbit pellet groups are not sampled in the pellet group transect.

Year	Cattle	Mule Deer	Rabbit
	Quadrat Frequency		
2012	-	3	22
2016	-	13	69
Year	Days Use Per Acre (ha)		
2012	-	10.0 (24.8)	-
2016	3.6 (9.0)	5.3 (13.2)	-

Table 08R-04.10 - Grass Species. Nested frequency and modified Daubenmire average cover by year.

GRASS SPECIES	Agropyron cristatum ⁱ (crested wheatgrass)	Agropyron fragile ⁱ (Siberian wheatgrass)	Bromus tectorum ^{ai} (cheatgrass)	Elymus wawawaiensis (Snake River wheatgrass)	Pascopyron smithii (western wheatgrass)	Vulpia octoflora ^a (sixweeks fescue)
year	Nested Frequency					
2012	-	-	3	-	-	1
2016	49	210	71	26	1	8
year	Average Cover (%)					
2012	-	-	0.0	-	-	0.0
2016	2.1	13.4	1.4	0.7	0.0	0.0

a - Annual; n - Noxious Weed; i - Introduced Species

Table 08R-04.11 - Forb Species. Nested frequency and modified Daubenmire average cover by year.

FORB SPECIES	Alyssum desertorum ^{ai} (desert madwort)	Chenopodium leptophyllum ^a (narrowleaf goosefoot)	Cleome serrulata ^a (Rocky Mountain beeplant)	Cryptantha gracilis ^a (narrowstem cryptantha)	Halogeton glomeratus ^{ai} (saltlover)	Lactuca scariola ^{ai} (prickly lettuce)	Lepidium latifolium ^{ai} (broadleaved pepperweed)	Salsola tragus ^{ai} (prickly Russian thistle)	Sisymbrium altissimum ^{ai} (tall tumbledustard)
year	Nested Frequency								
2012	-	-	-	24	96	-	11	6	-
2016	40	1	11	-	-	6	206	148	66
year	Average Cover (%)								
2012	-	-	-	0.2	0.7	-	0.0	0.0	-
2016	0.8	0.0	0.3	-	-	0.0	8.9	4.0	1.9

a - Annual/Biennial; n - Noxious Weed; i - Introduced Species

Table 08R-04.12 - Shrub and Tree Species. Average modified Daubenmire quadrat and line intercept cover by year.

SHRUB SPECIES	Artemisia frigida ^p (prairie sagewort)	Atriplex confertifolia ^p (shadscale saltbush)	Opuntia polyacantha (plains pricklypear)	Sarcobatus vermiculatus (greasewood)
	year	Line Intercept Cover (%)		
2012	0.1	0.1	5.8	21.7
2016	-	-	0.1	-
year	Quadrat Cover (%)			
2012	0.1	0.0	5.7	13.5
2016	-	-	0.2	-

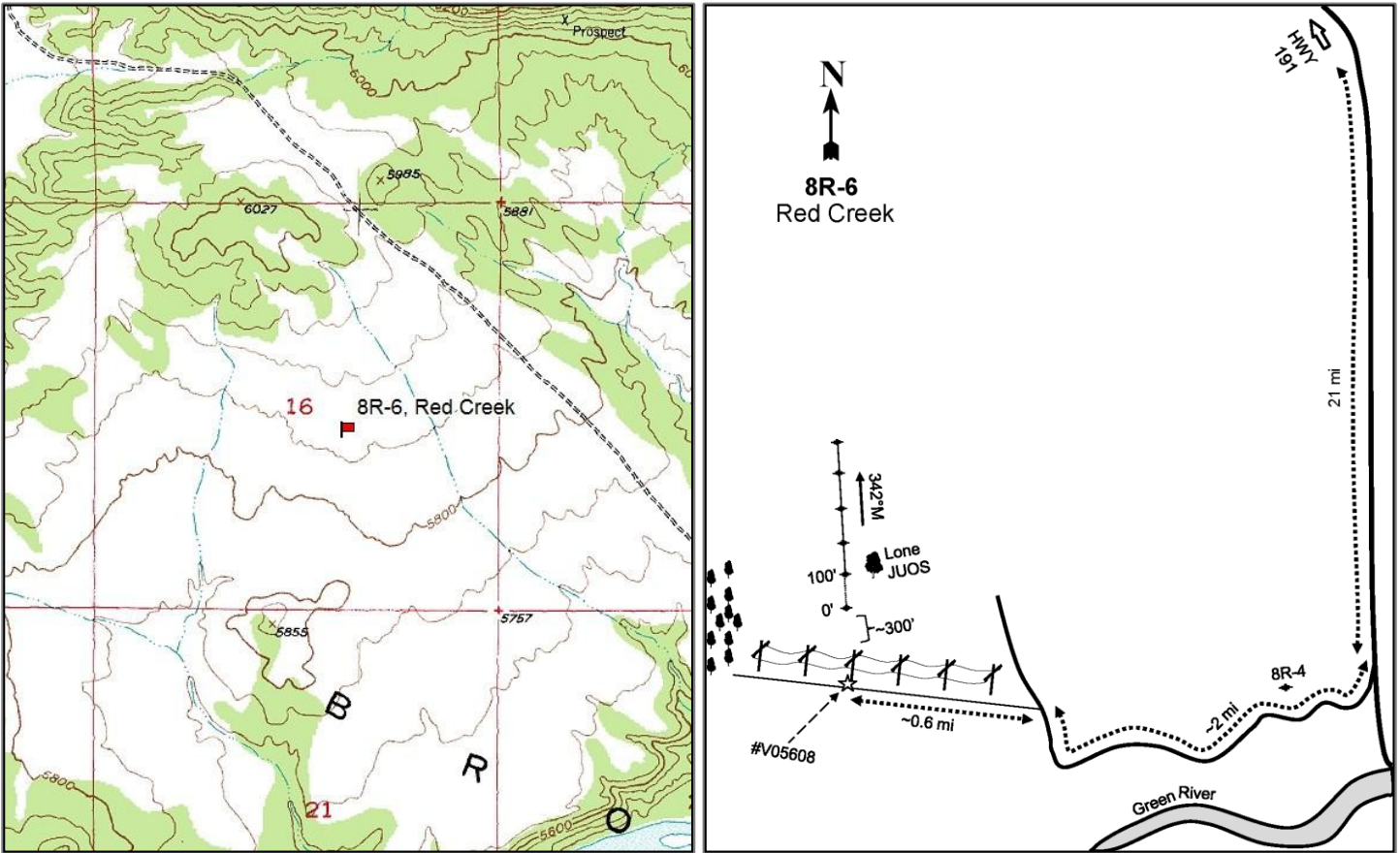
t - Tree Species; p - Preferred Browse; i - Introduced

Table 08R-04.13 - Shrub/Tree Characteristics. Population characteristics of shrub/tree species populations including density reproduction (seedlings), age distribution, utilization, vigor and average size (height/crown) of plants.

Year	Density		Age Class Distribution			Utilization		Poor Vigor (%)	Average Height Crown (cm)
	Plants Per Acre		Excluding Seedlings			Moderate (%)	Heavy (%)		
	Excluding Seedlings	Seedling	Young (%)	Mature (%)	Decadent (%)				
Artemisia frigida ^p -- (prairie sagewort)									
2012	340	-	0	82	18	0	100	100	9/14
2016	-	-	-	-	-	-	-	-	-/-
Artemisia tridentata ssp. wyomingensis ^p -- (Wyoming big sagebrush)									
2012	-	-	-	-	-	-	-	-	-/-
2016	-	-	-	-	-	-	-	-	-/-
Atriplex confertifolia ^p -- (shadscale saltbush)									
2012	160	-	13	88	0	38	0	25	24/31
2016	-	20	0	0	0	0	0	0	-/-
Opuntia polyacantha -- (plains pricklypear)									
2012	1220	-	0	87	13	0	0	13	14/80
2016	480	-	4	50	46	0	0	46	9/16
Sarcobatus vermiculatus -- (greasewood)									
2012	1920	-	3	79	18	0	2	15	67/98
2016	40	-	100	0	0	0	0	0	39/52

t - Tree Species; p - Preferred Browse; i - Introduced Species

RED CREEK - STUDY NO. 08R-6



Location Information

USGS 7.5 min Map Info Clay Basin SW; Township 2N, Range 24E, Section 16
 GPS (0' Stake) NAD 83 UTM ZONE 12, 650769 East 4530138 North

Transect Information

Browse Tag # (0' Stake) Not Available
 Transect Bearing 342° 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, drive 21 miles on Brown's Park Road to the junction of Highway 318. From the junction, turn right (west) onto Brown's Park Road. Continue for about 2 miles (you will pass study 08R-4) to a fork in the road. Stay left (west) at the fork onto a powerline road and travel for about 0.6 miles to power pole #V05608. From the power pole, the 0-foot baseline stake is about 300 feet away at 205 degrees magnetic. The baseline runs at 342 degrees magnetic and there is a lone Utah juniper to the left (east) of the transect.

Site Information

Land Ownership	State
Land Administrator	UDWR
Allotment	RED CREEK FLAT
Elevation	5,850ft (1,783m)
Aspect	Northwest
Slope	4%
Sample Dates	08/09/2016

Table 08R-06.1 Disturbance History. Recorded history of major disturbances.

Treatment/Disturbance	Name	WRI DB#	Date	Size (acres)
Hand Crew - Lop and Scatter	Red Creek Flat Phase 2 Lop and Scatter	359	May 2007	503

Wildlife Habitat and Vegetation History

Table 08R-06.3 - Wildlife Seasonal Habitat. UDWR wildlife habitat and seasonality.

Species	Habitat	Season	Brood/Young Rearing
Deer	crucial	winter	
Elk	substantial	winter	
Greater Sage Grouse		occupied & Winter	brood-rearing
Pronghorn	substantial	year-long	

Table 08R-06.4 - Vegetation History. The dominant vegetation type(s) and phase of woodland succession (Tausch, Miller, Roundy, & Chambers, 2009).

Year	Vegetation Type	Woodland Succession
2016	Wyoming Big Sagebrush	No Encroachment

Site Notes

No Notes

Site Potential

1981-2010 Average Annual Precipitation	9 inches
NRCS Ecological Site	Semidesert Loam (Wyoming Big Sagebrush)
NRCS Ecological Site #	R034XY212UT
States and Transitions	No state and transition model is available for this ecological site.

The state and transition model is likely similar the Semidesert Loam (Wyoming Big Sagebrush), R035XY209UT ecological site. When the study was established in 2016, the dominant plant community was Wyoming big sagebrush (*Artemisia tridentata* ssp. *wyomingensis*) (Table 08R-06.12) with a poor herbaceous understory (Table 08R-06.7). However, the perennial grass needle and thread (*Hesperostipa comata*) is the most abundant species in the herbaceous understory (Table 08R-06.10). Encroachment of conifer trees have been active in the past, so future encroachment may become a threat to the stability of the sagebrush community (Table 08R-06.1).

Trend Summary Tables

Table 08R-06.6 - Shrub/Tree Summary. Average modified Daubenmire quadrat and line intercept cover by year for shrubs/trees.

Year	Quadrat Cover (%)			Line-intercept Cover (%)		
	Preferred Shrub	Other Shrub	Tree	Preferred Shrub	Other Shrub	Tree
2016	12.6	2.9	-	14.9	2.5	-

Table 08R-06.7 - Herbaceous Summary. Nested frequency and average modified Daubenmire quadrat cover by year for herbaceous functional groups.

Year	Nested Frequency				Quadrat Cover (%)			
	Annual Grass	Perennial Grass	Annual/Biennial Forb	Perennial Forb	Annual Grass	Perennial Grass	Annual/Biennial Forb	Perennial Forb
2016	342	302	8	5	6.3	11.2	0.0	0.0

Table 08R-06.8 - Basic Ground Cover. Average modified Daubenmire quadrat cover by year for basic ground cover types.

Year	Cover Type (%)					
	Bare Ground	Cryptograms	Litter	Pavement	Rock	Vegetation
2016	38.9	1.1	25.4	9.0	0.0	32.4

Table 08R-06.9 - Pellet Group Data. Quadrat frequency and pellet group transect data for animal pellets. Rabbit pellet groups are not sampled in the pellet group transect.

Year	Cattle	Mule Deer	Elk	Rabbit
	Quadrat Frequency			
2016	4	27	-	63
Year	Days Use Per Acre (ha)			
2016	24.0 (59.2)	16.8 (41.4)	32.2 (79.5)	-

Table 08R-06.10 - Grass Species. Nested frequency and modified Daubenmire average cover by year.

GRASS SPECIES	Achmatherum hymenoides (Indian ricegrass)	Bromus tectorum ⁿⁱ (cheatgrass)	Elymus elymoides (squirreltail)	Hesperostipa comata (needle and thread)	Vulpia octoflora ^a (sixweeks fescue)
year	Nested Frequency				
2016	1	4	27	293	342
year	Average Cover (%)				
2016	0.0	0.0	0.6	10.6	6.3

a - Annual; n - Noxious Weed; i - Introduced Species

Table 08R-06.11 - Forb Species. Nested frequency and modified Daubenmire average cover by year.

FORB SPECIES	Descurainia pinnata ^a (western tansymustard)	Lappula occidentalis ^a (flatspine stickseed)	Phacelia ivesiana ^a (Ives' phacelia)	Phlox hoodii (spiny phlox)	Sphaeralcea grossularifolia (gooseberry/leaf globemallow)	Townsendia incana (hoary Townsend daisy)
year	Nested Frequency					
2016	5	1	2	1	2	2
year	Average Cover (%)					
2016	0.0	0.0	0.0	0.0	0.0	0.0

a - Annual/Biennial; n - Noxious Weed; i - Introduced Species

Table 08R-06.12 - Shrub and Tree Species. Average modified Daubenmire quadrat and line intercept cover by year.

SHRUB SPECIES	Line Intercept Cover (%)				
	year	Line Intercept Cover (%)			
Artemisia tridentata ssp. wyomingensis ^p (Wyoming big sagebrush)	2016	14.9	-	1.4	1.1
Chrysothamnus viscidiflorus ssp. viscidiflorus var. stenophyllus (yellow rabbitbrush)	2016	12.6	0.1	1.4	1.3
Gutierrezia sarothrae (broom snakeweed)					
Opuntia polyacantha (plains pricklypear)					

t - Tree Species; p - Preferred Browse; i - Introduced

Table 08R-06.13 - Shrub/Tree Characteristics. Population characteristics of shrub/tree species populations including density reproduction (seedlings), age distribution, utilization, vigor and average size (height/crown) of plants.

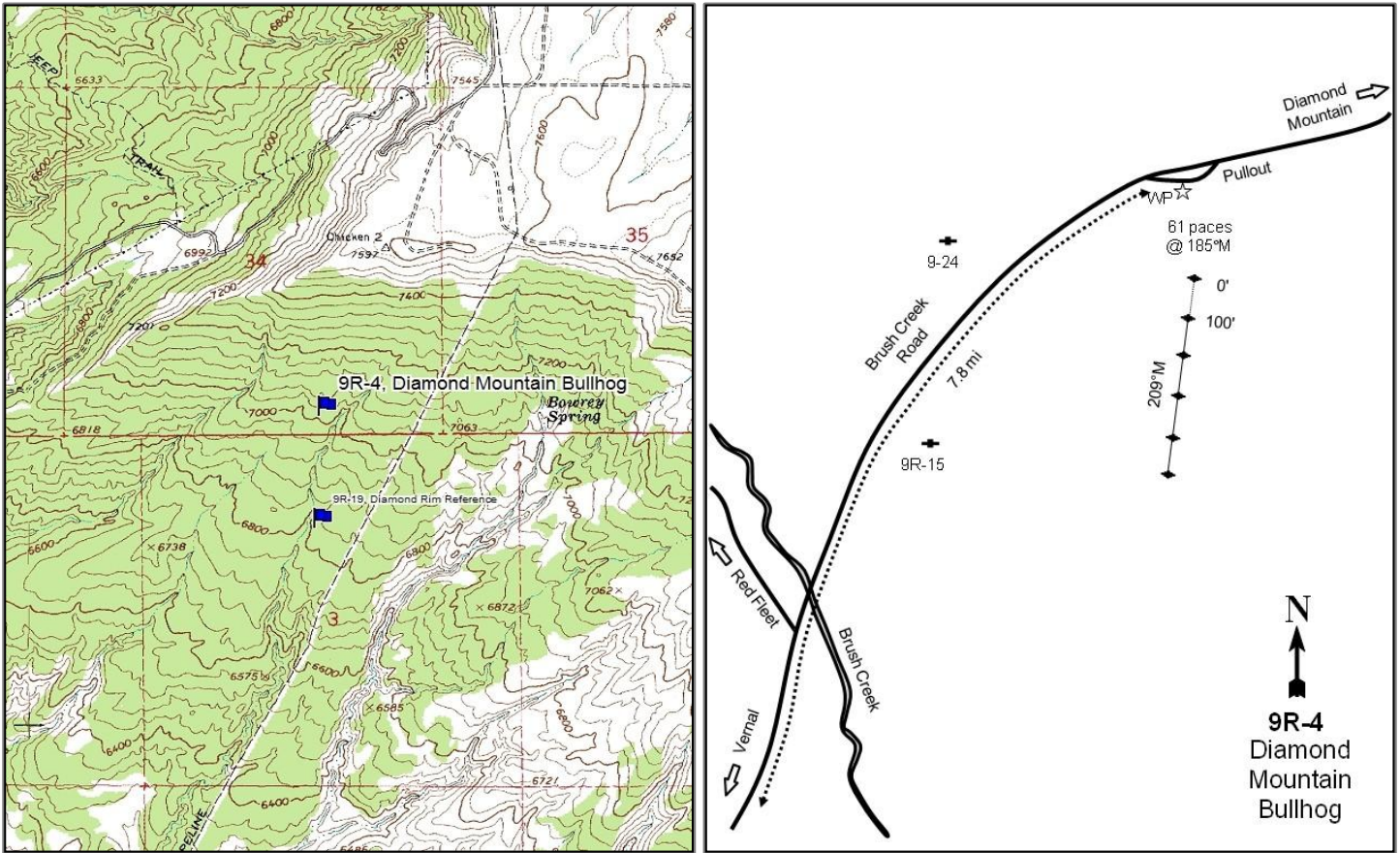
Year	Density		Age Class Distribution			Utilization		Poor Vigor (%)	Average Height Crown (cm)
	Plants Per Acre		Excluding Seedlings			Moderate (%)	Heavy (%)		
	Excluding Seedlings	Seedling	Young (%)	Mature (%)	Decadent (%)				
Artemisia tridentata ssp. wyomingensis ^p -- (Wyoming big sagebrush)									
2016	5060	20	9	52	39	38	55	42	34/69
Chrysothamnus viscidiflorus ssp. viscidiflorus var. stenophyllus -- (yellow rabbitbrush)									
2016	20	-	0	100	0	0	0	0	16/24
Gutierrezia sarothrae -- (broom snakeweed)									
2016	4080	40	7	93	0	0	0	0	18/16
Opuntia polyacantha -- (plains pricklypear)									
2016	1660	-	0	100	0	0	0	0	9/33

t - Tree Species; p - Preferred Browse; i - Introduced Species

Table 08R-06.14 - Tree Characteristics. Point-quarter tree density, size class distribution, and average diameter.

Year	Density	Size Class Distribution					Average Diameter (cm)
	Trees per Acre	Seedling (%)	1-4'	4-8'	8-12'	>12' (%)	
Juniperus osteosperma (Utah juniper)							
2016	1	-	100	-	-	-	24.0

DIAMOND MOUNTAIN BULLHOG - STUDY No. 09R-4



Location Information

USGS 7.5 min Map Info Jensen Ridge NW; Township 2S, Range 23E, Section 34
 GPS (0' Stake) NAD 83 UTM ZONE 12, 642204 East 4495283 North

Transect Information

Browse Tag # (0' Stake) 133
 Transect Bearing 209° 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 Vernal, travel northeast on Brush Creek Road heading toward Diamond Mountain for 7.8 miles to a pull off on the right (south); park in the pull off. The witness post is on the south side of the pull off. The 0-foot stake is 185 feet from the witness post at 185 degrees magnetic and is marked with browse tag #133.

Site Information

Land Ownership	Federal
Land Administrator	BLM
Allotment	S.J. HATCH
Elevation	7,000ft (2,134m)
Aspect	South
Slope	10-13%
Sample Dates	06/29/2004, 08/01/2007, 07/28/2009, 07/27/2010, 06/12/2012, 08/08/2016

Table 09R-04.1 Disturbance History. Recorded history of major disturbances.

Treatment/Disturbance	Name	WRI DB#	Date	Size (acres)
Mechanical - Bullhog	Diamond Rim	PDB	September 2004	320
Seeding - Aerial Before	Diamond Rim	PDB	September 2004	320
Seeding - Aerial After	Diamond Rim	PDB	November 2004	320

Table 09R-04.2 Seed Mix. List of known seeded plant species and rates (if available).

Mix Name			Application Type	Application Date	Acres
Diamond Rim			Aerial	Sep 2004	320
Type	Species	Common Name	Cultivar/Source ID	Bulk lbs/acre	PLS lbs/acre
G	Dactylis glomerata	Orchardgrass	Paiute	2.03	1.74
G	Pascopyrum smithii	Western Wheatgrass	Arriba	2.03	1.85
G	Poa secunda	Sandberg Bluegrass	Toole MT	0.47	0.38
F	Linum perenne	Blue Flax	Appar	0.94	0.79
F	Medicago sativa	Alfalfa	Ladak+	2.03	1.93
F	Melilotus officinalis	Yellow Sweetclover		0.94	0.87
F	Onobrychis viciifolia	Sainfoin		1.09	1.05
F	Sanguisorba minor	Small Burnet	Delar	2.03	1.93
S	Atriplex canescens	Fourwing Saltbush		0.47	0.21
Mix Name			Application Type	Application Date	Acres
Diamond Rim Shrubs			Aerial	Nov 2004	320
Type	Species	Common Name	Cultivar/Source ID	Bulk lbs/acre	PLS lbs/acre
		Rice Hulls		1.00	0.00
S	Artemisia tridentata ssp. wyomingensis	Wyoming Big Sagebrush	Sanpete UT	1.00	0.28

Wildlife Habitat and Vegetation History

Table 09R-04.3 - Wildlife Seasonal Habitat. UDWR wildlife habitat and seasonality.

Species	Habitat	Season	Brood/Young Rearing
Deer	crucial	winter	
Elk	crucial	winter	
Greater Sage Grouse	Substantial	occupied	brood-rearing

Table 09R-04.4 - Vegetation History. The dominant vegetation type(s) and phase of woodland succession (Tausch, Miller, Roundy, & Chambers, 2009).

Year	Vegetation Type	Woodland Succession
2004	Utah Juniper	Phase III
2007	Annual Grass/Perennial Grass	Phase I
2009	Black Sagebrush/Wyoming Big Sagebrush	Phase I
2010	Black Sagebrush/Wyoming Big Sagebrush	Phase I
2012	Wyoming Big Sagebrush/Black Sagebrush	Phase I
2016	Wyoming Big Sagebrush/Black Sagebrush	Phase I

Site Notes

The study is located approximately five and one half miles east of Red Fleet Reservoir within a treated two-needle pinyon (*Pinus edulis*) and Utah juniper (*Juniperus osteosperma*) woodland.

Soils

Table 09R-04.5 - Soil Analysis Data. List of chemical and textural soil characteristics determined by laboratory analysis.

Texture	pH	%sand	%silt	%clay	%OM	PPM P	PPM K	ds/m	Sample Date
Sandy Loam	6.6	61.4	19.1	19.5	2.0	7.0	153.6	0.6	06/29/2004

Site Potential

1981-2010 Average Annual Precipitation 13 inches
 NRCS Ecological Site Upland Shallow Loam (Black Sagebrush)
 NRCS Ecological Site # R034XY330UT
 States and Transitions No state and transition model is available for this ecological site.

This site was dominated by Utah juniper (*Juniperus osteosperma*) when it was established in 2004. Following the bull-hog treatment in 2004, juniper cover was greatly reduced (Table 09R-04.12) and the annual and perennial grasses, particularly cheatgrass (*Bromus tectorum*) and squirrel-tail (*Elymus elymoides*), were the dominant community components in 2007 (Table 09R-04.7, Table 09R-04.10). Since 2009, Wyoming big sagebrush (*Artemisia tridentata* ssp. *wyomingensis*) and black sagebrush (*Artemisia nova*) have increased in abundance to become the main component of the community (Table 09R-04.12, Table 09R-04.13). Few seedlings of Utah juniper have been sampled in post treatment samplings and may indicate an encroachment process (Table 09R-04.14).

Trend Summary Tables

Table 09R-04.6 - Shrub/Tree Summary. Average modified Daubenmire quadrat and line intercept cover by year for shrubs/trees.

Year	Quadrat Cover (%)			Line-intercept Cover (%)		
	Preferred Shrub	Other Shrub	Tree	Preferred Shrub	Other Shrub	Tree
2004	3.0	0.0	16.7	2.3	-	39.0
2007	3.3	-	-	4.6	-	-
2009	6.3	0.0	-	11.9	-	-
2010	8.3	-	-	10.0	0.9	-
2012	8.7	0.6	-	14.2	0.2	-
2016	15.1	0.0	-	17.0	0.2	-

Table 09R-04.7 - Herbaceous Summary. Nested frequency and average modified Daubenmire quadrat cover by year for herbaceous functional groups.

Year	Nested Frequency				Quadrat Cover (%)			
	Annual Grass	Perennial Grass	Annual/Biennial Forb	Perennial Forb	Annual Grass	Perennial Grass	Annual/Biennial Forb	Perennial Forb
2004	132	107	3	95	0.8	0.6	0.0	1.2
2007	344	175	30	125	14.0	8.6	0.2	5.8
2009	302	195	51	109	5.4	7.3	1.4	4.0
2010	164	241	103	151	1.5	7.5	1.7	6.1
2012	145	246	29	174	0.7	7.8	0.1	4.6
2016	154	250	47	154	2.9	11.0	0.3	8.3

Table 09R-04.8 - Basic Ground Cover. Average modified Daubenmire quadrat cover by year for basic ground cover types.

Year	Cover Type (%)					
	Bare Ground	Cryptograms	Litter	Pavement	Rock	Vegetation
2004	15.1	2.4	46.3	9.5	22.9	21.0
2007	3.8	0.0	62.2	2.2	8.6	32.1
2009	2.5	0.0	65.1	2.6	11.3	26.2
2010	3.3	0.0	65.6	2.8	10.1	27.1
2012	2.7	0.0	72.1	1.1	8.2	25.6
2016	1.8	0.0	58.5	2.7	7.9	38.1

Table 09R-04.9 - Pellet Group Data. Quadrat frequency and pellet group transect data for animal pellets. Rabbit pellet groups are not sampled in the pellet group transect.

Year	Cattle	Coyote	Mule Deer	Elk	Rabbit
	Quadrat Frequency				
2004	-	-	1	7	65
2007	-	-	1	19	23
2009	6	-	12	10	3
2010	2	-	9	3	-
2012	3	-	2	6	1
2016	1	-	18	6	15
Year	Days Use Per Acre (ha)				
2004	-	-	5.3 (13.2)	8.7 (21.5)	-
2007	2.2 (5.4)	8.7 (21.5)*	7.4 (18.2)	25.5 (62.9)	-
2009	10.9 (26.9)	-	6.0 (14.9)	20.1 (49.7)	-
2010	5.8 (14.3)	-	6.0 (14.9)	12.8 (31.5)	-
2012	2.9 (7.2)	-	0.7 (1.7)	8.1 (19.9)	-
2016	13.8 (34.1)	-	30.8 (76.1)	31.5 (77.8)	-

*Pellets per acre (ha)

Table 09R-04.10 - Grass Species. Nested frequency and modified Daubenmire average cover by year.

GRASS SPECIES												
	Achnatherum hymenoides (Indian ricegrass)	Achnatherum lettermanii (Letterman's needlegrass)	Agropyron cristatum ⁱ (crested wheatgrass)	Bromus tectorum ⁿⁱ (cheatgrass)	Carex (sedge)	Dactylis glomerata ⁱ (orchardgrass)	Elymus elymoides (squirreltail)	Pascopyrum smithii (western wheatgrass)	Poa fendleriana (muttongrass)	Poa secunda (Sandberg bluegrass)	Pseudoroegneria spicata (bluebunch wheatgrass)	
year	Nested Frequency											
2004	50	14	-	132	-	-	22	-	-	27	-	
2007	9	2	3	344	4	17	133	10	-	35	-	
2009	17	0	23	302	-	23	144	37	-	27	3	
2010	10	7	17	164	2	19	184	26	-	44	2	
2012	3	4	35	145	6	21	165	42	1	21	2	
2016	21	4	31	154	-	3	130	80	-	23	-	
year	Average Cover (%)											
2004	0.2	0.1	-	0.8	-	-	0.2	-	-	0.1	-	
2007	0.5	0.0	0.2	14.0	0.1	0.5	6.7	0.2	-	0.4	-	
2009	0.6	0.0	0.4	5.4	-	0.7	4.2	0.9	-	0.3	0.0	
2010	0.1	0.2	0.4	1.5	0.0	0.6	5.3	0.6	-	0.3	0.0	
2012	0.2	0.0	0.7	0.7	0.1	0.3	5.1	1.0	0.0	0.3	0.0	
2016	0.5	0.1	1.2	2.9	-	0.2	2.5	6.2	-	0.3	-	

a - Annual; n - Noxious Species; i - Introduced Species

Table 09R-04.11 - Forb Species. Nested frequency and modified Daubenmire average cover by year.

FORB SPECIES	Agoseris glauca (pale agoseris)	Alyssum desertorum ^{ai} (desert madwort)	Arabis (rockcross)	Arenaria fendleri (Fendler's sandwort)	Astragalus convallarius (lesser rusly milkvetch)	Astragalus utahensis (Utah milkvetch)	Chaenactis douglasii (Douglas' dustymaiden)	Chenopodium fremontii ^a (Fremont's goosefoot)	Cirsium (thistle)	Cryptantha (cryptantha)	Cymopterus (springparsley)	Descurainia pinnata ^a (western tansymustard)	Draba ^a (draba)	Erigeron (fleabane)	Eriogonum umbellatum (sulphur-flower buckwheat)	Gilia ^a (gilia)	Grindelia squarrosa (curlycup gumweed)
year	Nested Frequency																
2004	-	-	27	-	5	-	-	-	-	9	1	-	-	-	-	-	-
2007	-	-	2	6	45	-	-	-	-	2	35	3	-	-	-	16	-
2009	-	1	-	7	18	-	-	-	-	-	2	-	-	-	-	-	-
2010	-	-	-	13	85	-	1	4	1	-	21	-	1	-	-	3	-
2012	4	-	-	11	75	2	-	-	-	-	22	3	-	-	-	-	2
2016	-	1	3	19	95	-	-	3	-	1	10	6	-	1	4	9	-
year	Average Cover (%)																
2004	-	-	0.1	-	0.0	-	-	-	-	0.0	0.0	-	-	-	-	-	-
2007	-	-	0.0	0.0	2.1	-	-	-	-	0.0	0.2	0.1	-	-	-	0.0	-
2009	-	0.0	-	0.0	0.7	-	-	-	-	-	0.0	-	-	-	-	-	-
2010	-	-	-	0.1	2.7	-	0.0	0.0	0.1	-	0.1	-	0.0	-	-	0.0	-
2012	0.0	-	-	0.0	1.6	0.0	-	-	-	-	0.1	0.0	-	-	-	-	0.1
2016	-	0.0	0.0	0.0	4.0	-	-	0.0	-	0.0	0.0	0.0	-	0.0	0.0	0.0	-

a - Annual/Biennial; n - Noxious Weed; i - Introduced Species

FORB SPECIES	Ipomopsis aggregata (scarlet gilia)	Lactuca serriola ^{ai} (prickly lettuce)	Lappula occidentalis ^a (flatspine stickseed)	Lesquerella (bladderpod)	Linum perenne ⁱ (blue flax)	Lithospermum incisum (narrowleaf stoneseed)	Medicago sativa ^a (alfalfa)	Melilotus officinalis ⁱ (sweetclover)	Microsteris gracilis ^a (slender phlox)	Oenothera (evening primrose)	Onobrychis vicifolia ⁱ (sainfoin)	Penstemon humilis (low beardtongue)	Petradoria pumila (rock goldenrod)	Phlox austromontana (mountain phlox)	Phlox longifolia (longleaf phlox)	Polygonum douglasii ^a (Douglas' knotweed)	Salsola tragus ^{ai} (prickly Russian thistle)
year	Nested Frequency																
2004	-	-	-	-	-	-	-	-	-	-	-	3	56	1	2	-	3
2007	1	-	-	-	20	-	14	-	-	-	1	4	33	6	-	-	11
2009	-	38	-	-	23	-	16	-	-	-	0	-	42	10	10	-	27
2010	1	83	2	3	12	-	17	1	-	-	1	4	47	2	3	1	20
2012	-	19	-	-	27	1	20	-	-	3	2	2	52	6	9	-	-
2016	3	16	-	-	6	2	8	-	3	-	0	2	46	1	1	3	2
year	Average Cover (%)																
2004	-	-	-	-	-	-	-	-	-	-	-	0.0	1.0	0.0	0.0	-	0.0
2007	0.1	-	-	-	1.0	-	0.4	-	-	-	0.0	0.0	1.7	0.0	-	-	0.1
2009	-	0.4	-	-	1.2	-	0.3	-	-	-	0.0	-	1.5	0.2	0.1	-	0.9
2010	0.0	1.0	0.0	0.0	0.4	-	0.9	0.1	-	-	0.0	0.1	1.4	0.0	0.0	0.0	0.5
2012	-	0.1	-	-	0.2	0.1	1.0	-	-	0.0	0.0	0.0	1.2	0.0	0.0	-	-
2016	0.1	0.1	-	-	0.0	0.0	0.8	-	0.0	-	0.0	0.0	3.0	0.0	0.0	0.0	0.0

a - Annual/Biennial; n - Noxious Weed; i - Introduced Species

FORB SPECIES	Sanguisorba minor ⁱ (small burnet)	Sphaeralcea coccinea (scarlet globemallow)	Townsendia (Townsend daisy)	Tragopogon dubius ⁿⁱ (yellow salsify)	Trifolium longipes (longstalk clover)	unknown annual forb ^a (unknown forb)
year	Nested Frequency					
2004	-	-	-	-	6	-
2007	6	-	5	-	-	-
2009	1	-	-	2	5	0
2010	0	3	1	4	8	-
2012	6	-	4	7	12	-
2016	-	-	4	9	4	-
year	Average Cover (%)					
2004	-	-	-	-	0.0	-
2007	0.2	-	0.0	-	-	-
2009	0.0	-	-	0.0	0.0	0.0
2010	0.0	0.0	0.0	0.2	0.0	-
2012	0.1	-	0.0	0.0	0.0	-
2016	-	-	0.1	0.1	0.0	-

a - Annual/Biennial; n - Noxious Weed; i - Introduced Species

Table 09R-04.12 - Shrub and Tree Species. Average modified Daubenmire quadrat and line intercept cover by year.

SHRUB SPECIES	Artemisia nova ^p (black sagebrush)	Artemisia tridentata ssp. wyomingensis ^p (Wyoming big sagebrush)	Atriplex canescens ^p (fourwing saltbush)	Ericameria nauseosa (rubber rabbitbrush)	Ericameria nauseosa ssp. nauseosa var. speciosa ^p (rubber rabbitbrush)	Eriogonum microthecum ^p (slender buckwheat)	Gutierrezia sarothrae (broom snakeweed)	Juniperus osteosperma ⁱ (Utah juniper)	Opuntia polyacantha (plains pricklypear)	Purshia tridentata ^p (antelope bitterbrush)
year	Line Intercept Cover (%)									
2004	2.3	-	-	-	-	-	-	39	-	0
2007	2.6	1.6	0.4	-	-	-	-	-	-	-
2009	6.3	4.3	0.6	-	0.5	-	-	-	-	0.2
2010	4.4	4.6	0.8	0.9	0.1	-	-	-	-	0.1
2012	5.5	6.3	0.9	0.2	1.3	-	-	-	-	0.2
2016	6	9.1	-	-	1.6	-	0.2	-	-	0.3
year	Quadrat Cover (%)									
2004	3.0	-	-	-	-	0.0	-	16.7	0.0	0.0
2007	1.8	1.4	0.0	-	0.1	-	-	-	-	-
2009	3.6	2.4	0.0	-	0.4	-	0.0	-	-	0.0
2010	3.3	3.8	0.1	0.0	1.0	-	-	-	-	0.0
2012	2.9	4.0	0.6	0.6	1.1	-	-	-	-	0.0
2016	5.0	8.2	-	-	1.8	0.0	0.0	-	-	0.1

t - Tree Species; p - Preferred Browse; i - Introduced

Table 09R-04.13 - Shrub/Tree Characteristics. Population characteristics of shrub/tree species populations including density reproduction (seedlings), age distribution, utilization, vigor and average size (height/crown) of plants.

Year	Density		Age Class Distribution			Utilization		Poor Vigor (%)	Average Height Crown (cm)
	Plants Per Acre		Excluding Seedlings			Moderate (%)	Heavy (%)		
	Excluding Seedlings	Seedling	Young (%)	Mature (%)	Decadent (%)				
Artemisia nova^P -- (black sagebrush)									
2004	2560	180	26	53	21	21	44	7	21/39
2007	1700	860	6	91	4	6	0	1	26/46
2009	-	-	-	-	-	-	-	-	29/49
2010	4340	2520	49	51	0	11	12	1	25/53
2012	3620	200	47	53	1	50	1	0	25/52
2016	3300	40	41	58	2	32	10	5	29/61
Artemisia tridentata ssp. wyomingensis^P -- (Wyoming big sagebrush)									
2004	-	-	-	-	-	-	-	-	-/-
2007	2020	1460	36	64	0	1	0	0	45/53
2009	-	-	-	-	-	-	-	-	52/66
2010	2900	4980	57	43	1	12	11	6	52/73
2012	2080	5300	39	62	0	73	12	4	58/77
2016	4200	-	54	45	1	20	21	1	51/77
Atriplex canescens^P -- (fourwing saltbush)									
2004	-	-	-	-	-	-	-	-	-/-
2007	20	-	0	100	0	0	0	0	75/126
2009	-	-	-	-	-	-	-	-	54/65
2010	20	-	0	100	0	0	0	0	56/86
2012	20	-	0	100	0	100	0	0	92/160
2016	-	-	-	-	-	-	-	-	99/157
Chrysothamnus viscidiflorus -- (yellow rabbitbrush)									
2004	-	-	-	-	-	-	-	-	-/-
2007	-	-	-	-	-	-	-	-	-/-
2009	-	-	-	-	-	-	-	-	-/-
2010	-	-	-	-	-	-	-	-	32/56
2012	-	-	-	-	-	-	-	-	-/-
2016	-	-	-	-	-	-	-	-	-/-
Eriogonum microthecum^P -- (slender buckwheat)									
2004	60	-	33	33	33	0	100	0	3/3
2007	20	-	0	100	0	0	0	0	17/15
2009	-	-	-	-	-	-	-	-	-/-
2010	-	-	-	-	-	-	-	-	-/-
2012	-	-	-	-	-	-	-	-	-/-
2016	-	-	-	-	-	-	-	-	-/-
Ericameria nauseosa -- (rubber rabbitbrush)									
2004	-	-	-	-	-	-	-	-	-/-
2007	20	-	0	100	0	0	0	0	62/108
2009	-	-	-	-	-	-	-	-	-/-
2010	-	-	-	-	-	-	-	-	83/132
2012	20	-	0	100	0	0	0	0	67/105
2016	-	-	-	-	-	-	-	-	-/-
Ericameria nauseosa ssp. nauseosa var. speciosa^P -- (rubber rabbitbrush)									
2004	-	-	-	-	-	-	-	-	-/-
2007	20	-	0	100	0	0	0	0	52/56
2009	-	-	-	-	-	-	-	-	66/96
2010	60	-	0	100	0	0	0	0	71/113
2012	20	-	0	100	0	0	0	0	84/134
2016	100	100	60	40	0	0	0	0	95/131

t - Tree Species; p - Preferred Browse; i - Introduced Species

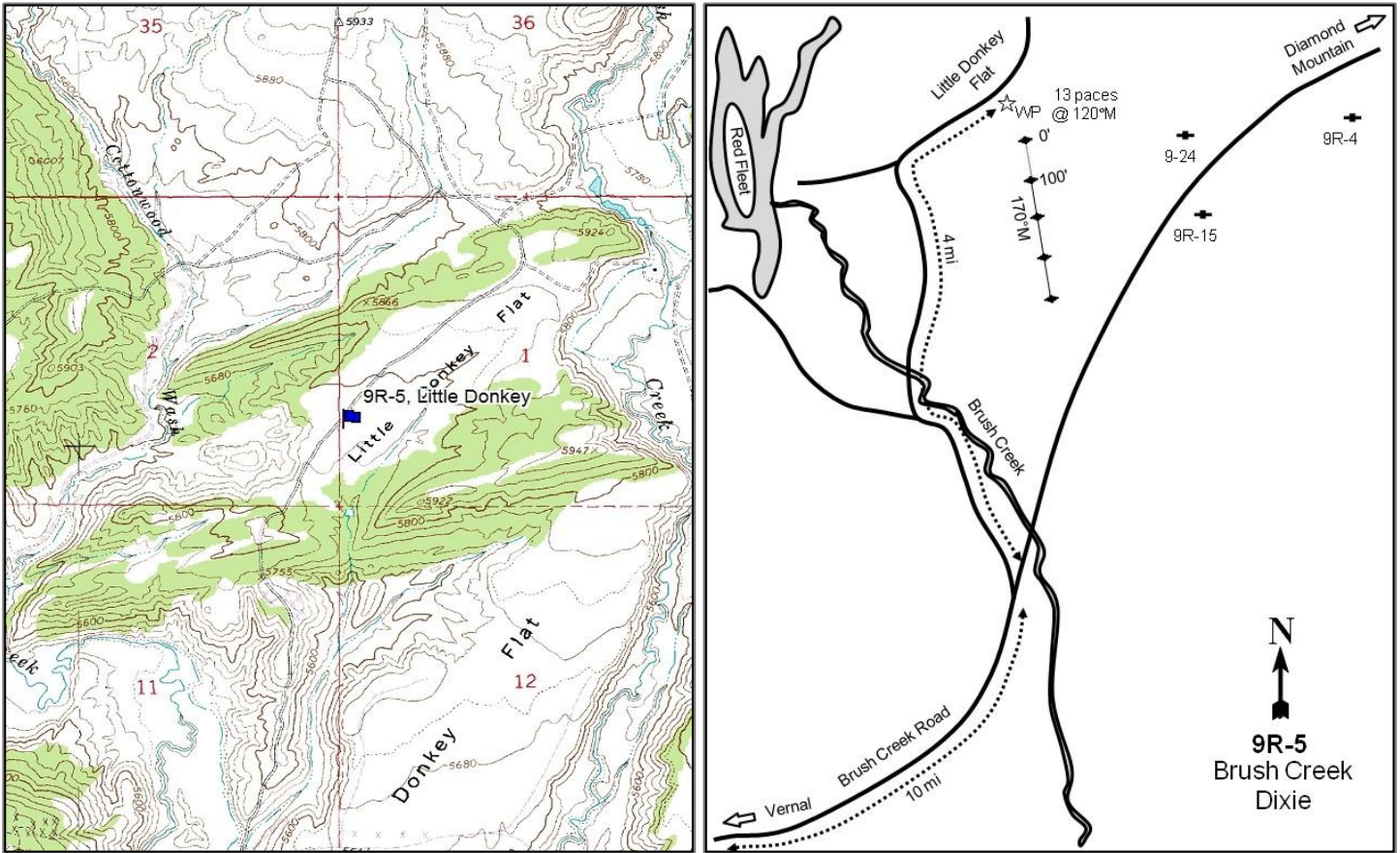
Year	Density		Age Class Distribution			Utilization		Poor Vigor (%)	Average Height Crown (cm)
	Plants Per Acre		Excluding Seedlings			Moderate (%)	Heavy (%)		
	Excluding Seedlings	Seedling	Young (%)	Mature (%)	Decadent (%)				
Gutierrezia sarothrae -- (broom snakeweed)									
2004	20	-	100	0	0	0	0	0	- / -
2007	-	-	-	-	-	-	-	-	28/37
2009	-	-	-	-	-	-	-	-	25/38
2010	-	-	-	-	-	-	-	-	23/29
2012	-	-	-	-	-	-	-	-	16/18
2016	260	-	31	69	0	0	0	0	22/28
Juniperus osteosperma^t -- (Utah juniper)									
2004	500	20	12	76	12	4	0	0	- / -
2007	-	-	-	-	-	-	-	-	- / -
2009	-	-	-	-	-	-	-	-	- / -
2010	-	20	0	0	0	0	0	0	- / -
2012	-	20	0	0	0	0	0	0	- / -
2016	-	20	0	0	0	0	0	0	- / -
Opuntia polyacantha -- (plains pricklypear)									
2004	40	-	0	100	0	0	0	0	9/40
2007	-	-	-	-	-	-	-	-	- / -
2009	-	-	-	-	-	-	-	-	10/26
2010	-	-	-	-	-	-	-	-	- / -
2012	-	-	-	-	-	-	-	-	12/35
2016	20	-	0	100	0	0	0	0	12/18
Purshia tridentata^p -- (antelope bitterbrush)									
2004	60	-	0	67	33	0	100	33	18/120
2007	40	-	0	100	0	0	100	0	21/139
2009	-	-	-	-	-	-	-	-	26/109
2010	40	-	0	100	0	0	100	0	22/94
2012	40	-	0	100	0	0	100	0	22/132
2016	60	-	0	100	0	100	0	0	30/160
Symphoricarpos oreophilus -- (mountain snowberry)									
2004	-	-	-	-	-	-	-	-	- / -
2007	-	-	-	-	-	-	-	-	- / -
2009	-	-	-	-	-	-	-	-	- / -
2010	-	-	-	-	-	-	-	-	- / -
2012	-	-	-	-	-	-	-	-	- / -
2016	-	-	-	-	-	-	-	-	27/23

t - Tree Species; p - Preferred Browse; i - Introduced Species

Table 09R-04.14 - Tree Characteristics. Point-quarter tree density, size class distribution, and average diameter.

Year	Density	Seedling (%)	Size Class Distribution				Average Diameter (cm)
	Trees per Acre		1-4'	4-8'	8-12'	>12' (%)	
Juniperus osteosperma (Utah juniper)							
2004	444	-	10	20	20	50	33.9
2007	9	57	43	-	-	-	12.9
2009	10	11	89	-	-	-	3.4
2012	7	-	100	-	-	-	16.7
2016	12	83	17	-	-	-	9.5

LITTLE DONKEY - STUDY No. 09R-5



Location Information

USGS 7.5 min Map Info Donkey Flat NE; Township 3S, Range 22E, Section 01
 GPS (0' Stake) NAD 83 UTM ZONE 12, 635070 East 4493818 North

Transect Information

Browse Tag # (0' Stake) Not Available
 Transect Bearing 170° 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 Vernal, travel northeast on Brush Creek Road heading toward Diamond Mountain. Turn left (north) at the Red Fleet turnoff just before crossing Brush Creek. Follow the road as it turns north toward Little Donkey Flat. There is a witness post on the right-hand (southeast) side of the road. The 0-foot stake is 13 paces from the witness post at 120 degrees magnetic.

Site Information

Land Ownership	Federal
Land Administrator	BLM
Allotment	DONKEY FLAT
Elevation	5,800ft (1,768m)
Aspect	South
Slope	3%
Sample Dates	06/29/2004, 07/31/2007, 06/11/2012, 08/10/2016

Table 09R-05.1 Disturbance History. Recorded history of major disturbances.

Treatment/Disturbance	Name	WRI DB#	Date	Size (acres)
Herbicide - Roundup	Red Fleet	PDB	October 2004	-
Seeding - Truax Drill	Red Fleet	PDB	November 2004	470

Table 09R-05.2 Seed Mix. List of known seeded plant species and rates (if available).

Mix Name		Application Type	Application Date	Acres	
Red Fleet		Drill	Nov 2004	470	
Type	Species	Common Name	Cultivar/Source ID	Bulk lbs/acre	PLS lbs/acre
G	Pascopyrum smithii	Western Wheatgrass	Arriba	1.00	0.83
G	Psathyrostachys juncea	Russian Wildrye	Bozoisky	1.00	0.92
F	Achillea millefolium	Western Yarrow		0.11	0.10
F	Astragalus cicer	Cicer Milkvetch	Lutana	1.00	0.90
F	Linum perenne	Blue Flax	Appar	0.11	0.10
F	Medicago sativa	Alfalfa	Ladak+	1.49	1.37
F	Onobrychis viciifolia	Sainfoin	Eski	1.49	1.36
F	Sanguisorba minor	Small Burnet	Delar	2.50	2.36
S	Artemisia tridentata ssp. wyomingensis	Wyoming Big Sagebrush	Sanpete UT	0.43	0.12
S	Artemisia tridentata ssp. wyomingensis	Wyoming Big Sagebrush		0.53	0.05
S	Atriplex canescens	Fourwing Saltbush	Emery UT	1.00	0.45
S	Bassia prostrata	Forage Kochia	Immigrant	1.06	0.71

Wildlife Habitat and Vegetation History**Table 09R-05.3 - Wildlife Seasonal Habitat.** UDWR wildlife habitat and seasonality.

Species	Habitat	Season
Deer	crucial	winter
Elk	crucial	winter
Greater Sage Grouse		occupied & Winter

Table 09R-05.4 - Vegetation History. The dominant vegetation type(s) and phase of woodland succession (Tausch, Miller, Roundy, & Chambers, 2009).

Year	Vegetation Type	Woodland Succession
2004	Perennial Grass	No Encroachment
2007	Annual Grass	No Encroachment
2012	Wyoming Big Sagebrush	No Encroachment
2016	Forage Kochia	No Encroachment

Site Notes

This study is located approximately one mile northeast of the Red Fleet Reservoir Dam.

Soils**Table 09R-05.5 - Soil Analysis Data.** List of chemical and textural soil characteristics determined by laboratory analysis.

Texture	pH	%sand	%silt	%clay	%OM	PPM P	PPM K	ds/m	Sample Date
Sandy Loam	6.7	60.4	22.1	17.5	0.9	14.7	316.8	0.6	06/29/2004

Site Potential

1981-2010 Average Annual Precipitation 10 inches
 NRCS Ecological Site Semidesert Loam (Wyoming Big Sagebrush)
 NRCS Ecological Site # R034XY212UT
 States and Transitions No state and transition model is available for this ecological site.

The state and transition model is likely similar the Semidesert Loam (Wyoming Big Sagebrush), R035XY209UT ecological site. When the study was established in 2004, the plant community was dominated by the perennial grass crested wheatgrass (*Agropyron cristatum*) (Table 09R-05.7, Table 09R-05.10), which was targeted for reduction in the fall of 2004. In 2007, the annual grass sixweeks fescue (*Vulpia octoflora*) along with the annual forb woolly plantain (*Plantago patagonica*) responded with an increase in both cover and abundance. They were also the dominant plants in the community (Table 09R-05.11). In 2011, the community transitioned from a site influenced by annuals to a community with Wyoming big sagebrush (*Artemisia tridentata* ssp. *wyomingensis*) as the major component (Table 09R-05.6, Table 09R-05.12, Table 09R-05.13). In 2016, forage kochia (*Bassia prostrata*) increased significantly in cover and density; However, the annual grass cheatgrass (*Bromus tectorum*) was also sampled in high abundance (Table 09R-05.10). The community appears to be very dynamic and has large population shifts between sample years. With consideration of this variability, it may be difficult to determine outcomes of future land treatments if implemented.

Trend Summary Tables

Table 09R-05.6 - Shrub/Tree Summary. Average modified Daubenmire quadrat and line intercept cover by year for shrubs/trees.

Year	Quadrat Cover (%)			Line-intercept Cover (%)		
	Preferred Shrub	Other Shrub	Tree	Preferred Shrub	Other Shrub	Tree
2004	0.4	2.7	-	0.2	2.8	-
2007	2.4	1.5	-	1.7	2.0	-
2012	8.2	6.9	-	10.2	2.7	-
2016	4.5	16.5	-	7.0	20.4	-

Table 09R-05.7 - Herbaceous Summary. Nested frequency and average modified Daubenmire quadrat cover by year for herbaceous functional groups.

Year	Nested Frequency				Quadrat Cover (%)			
	Annual Grass	Perennial Grass	Annual/Biennial Forb	Perennial Forb	Annual Grass	Perennial Grass	Annual/Biennial Forb	Perennial Forb
2004	301	266	237	177	5.3	17.2	3.0	2.7
2007	490	109	450	107	20.5	1.7	16.9	0.6
2012	258	141	263	80	2.1	2.9	1.1	0.3
2016	402	119	275	76	14.5	5.3	3.7	0.2

Table 09R-05.8 - Basic Ground Cover. Average modified Daubenmire quadrat cover by year for basic ground cover types.

Year	Cover Type (%)					
	Bare Ground	Cryptograms	Litter	Pavement	Rock	Vegetation
2004	53.7	1.0	17.3	0.1	-	37.9
2007	36.2	0.4	29.0	0.0	0.0	47.3
2012	63.1	0.0	18.9	0.0	0.0	23.0
2016	35.5	0.0	29.6	0.0	-	41.6

Table 09R-05.9 - Pellet Group Data. Quadrat frequency and pellet group transect data for animal pellets. Rabbit pellet groups are not sampled in the pellet group transect.

Year	Cattle	Mule Deer	Elk	Greater Sage-Grouse	Horse	Moose	Rabbit
	Quadrat Frequency						
2004	16	35	11	1	-	-	77
2007	5	10	1	-	-	-	96
2012	5	41	-	-	1	-	21
2016	7	30	-	-	-	-	61
Year	Days Use Per Acre (ha)						
2004	6.5 (16.1)	10.7 (26.5)	7.4 (18.2)	-	-	0.5 (1.2)	-
2007	7.2 (17.9)	11.4 (28.1)	6.0 (14.9)	-	-	-	-
2012	7.2 (17.9)	40.9 (101.0)	-	-	-	-	-
2016	45.7 (113.0)	31.5 (77.8)	-	-	-	-	-

Table 09R-05.10 - Grass Species. Nested frequency and modified Daubenmire average cover by year.

GRASS SPECIES	Achnatherum hymenoides (Indian ricegrass)	Agropyron cristatum ⁱ (crested wheatgrass)	Bromus arvensis ^{ai} (field brome)	Bromus tectorum ^{ai} (cheatgrass)	Pascopyrum smithii (western wheatgrass)	Pleuraphis jamesii (James' galleta)	Poa secunda (Sandberg bluegrass)	Psathyrostachys juncea ⁱ (Russian wildrye)	Vulpia octoflora ^a (sixweeks fescue)
year	Nested Frequency								
2004	3	241	-	-	-	6	42	-	301
2007	-	101	-	145	-	-	4	6	490
2012	9	103	-	187	17	5	18	8	132
2016	-	105	0	402	5	-	4	6	12
year	Average Cover (%)								
2004	0.0	16.3	-	-	-	0.2	0.7	-	5.3
2007	-	1.6	-	1.0	-	-	0.0	0.1	19.6
2012	0.2	2.2	-	1.7	0.1	0.3	0.1	0.1	0.3
2016	-	5.1	0.0	14.5	0.2	-	0.0	0.1	0.1

a - Annual; n - Noxious Weed; i - Introduced Species

Table 09R-05.11 - Forb Species. Nested frequency and modified Daubenmire average cover by year.

FORB SPECIES	Alysum desertorum ^{ai} (desert madwort)	Calochortus nuttallii (sego lily)	Chenopodium leptophyllum ^a (narrowleaf goosefoot)	Chorispora tenella ^{ai} (crossflower)	Collinsia parviflora ^a (maiden blue eyed Mary)	Descurainia pinnata ^a (western tansymustard)	Lappula occidentalis ^a (flatspine stickseed)	Machaeranthera canescens (hoary tansyaster)	Medicago sativa ⁱ (alfalfa)	Plantago patagonica ^a (woolly plantain)	Sisymbrium altissimum ^{ai} (tall tumbledmustard)	Sphaeralcea coccinea (scarlet globemallow)	unknown perennial forb (unknown forb)
year	Nested Frequency												
2004	-	6	48	-	-	-	31	1	-	207	-	170	3
2007	2	-	-	-	-	7	85	1	7	442	59	99	-
2012	26	-	-	3	3	-	37	11	2	249	7	70	-
2016	41	18	2	-	-	-	52	-	-	254	2	61	-
year	Average Cover (%)												
2004	-	0.0	0.1	-	-	-	0.8	0.0	-	2.1	-	2.6	0.0
2007	0.0	-	-	-	-	0.1	0.9	0.0	0.0	15.4	0.5	0.5	-
2012	0.1	-	-	0.0	0.0	-	0.1	0.0	0.0	0.6	0.3	0.3	-
2016	0.7	0.0	0.0	-	-	-	0.5	-	-	2.5	0.0	0.2	-

a - Annual/Biennial; n - Noxious Weed; i - Introduced Species

Table 09R-05.12 - Shrub and Tree Species. Average modified Daubenmire quadrat and line intercept cover by year.

SHRUB SPECIES	Artemisia tridentata ssp. wyomingensis ^p (Wyoming big sagebrush)	Atriplex canescens ^p (fourwing saltbush)	Bassia prostrata ⁱ (forage kochia)	Chrysothamnus viscidiflorus (yellow rabbitbrush)	Ericameria nauseosa (rubber rabbitbrush)	Grayia spinosa (spiny hopsage)	Gutierrezia sarothrae (broom snakeweed)	Opuntia polyacantha (plains pricklypear)
year	Line Intercept Cover (%)							
2004	0.2	-	-	-	-	-	1.2	1.6
2007	1.7	-	0.2	-	0	-	1.6	0.2
2012	10.2	-	1.5	-	-	-	0.6	0.6
2016	7	-	15.9	-	-	-	3.4	1.1
year	Quadrat Cover (%)							
2004	0.4	-	-	-	-	-	1.2	1.5
2007	2.4	-	0.5	0.0	0.0	0.0	0.9	0.1
2012	8.2	-	5.4	-	-	-	0.8	0.7
2016	4.4	0.1	13.0	-	-	-	1.1	2.5

t - Tree Species; p - Preferred Browse; i - Introduced

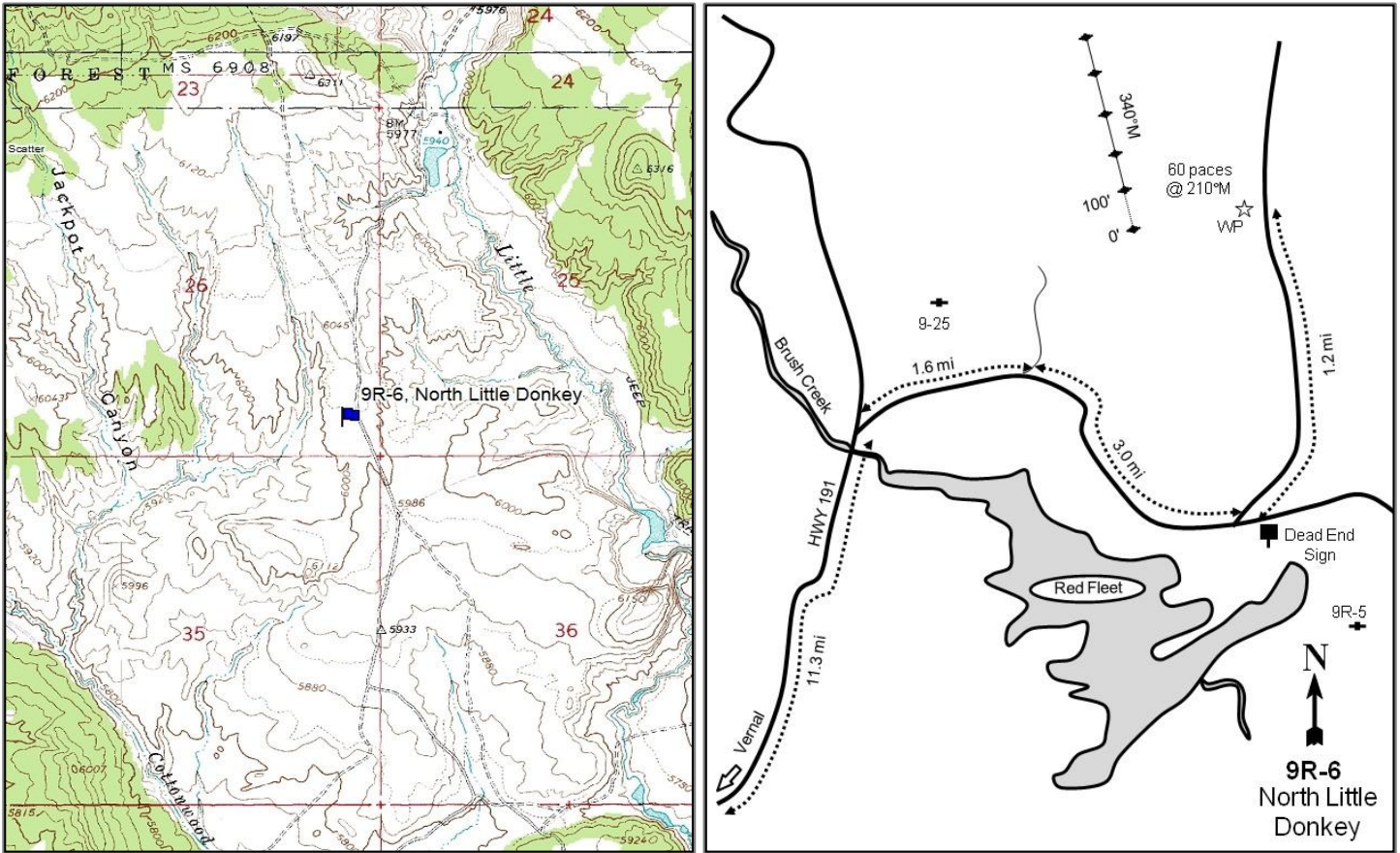
Table 09R-05.13 - Shrub/Tree Characteristics. Population characteristics of shrub/tree species populations including density reproduction (seedlings), age distribution, utilization, vigor and average size (height/crown) of plants.

Year	Density		Age Class Distribution			Utilization		Poor Vigor (%)	Average Height Crown (cm)
	Plants Per Acre		Excluding Seedlings			Moderate (%)	Heavy (%)		
	Excluding Seedlings	Seedling	Young (%)	Mature (%)	Decadent (%)				
Artemisia nova^p -- (black sagebrush)									
2004	20	-	0	0	100	0	100	100	25/37
2007	-	-	-	-	-	-	-	-	-/-
2012	-	-	-	-	-	-	-	-	-/-
2016	-	-	-	-	-	-	-	-	-/-
Artemisia tridentata ssp. wyomingensis^p -- (Wyoming big sagebrush)									
2004	80	-	0	75	25	0	100	0	35/58
2007	6440	5380	68	32	0	22	3	0	21/25
2012	10240	60	23	77	0	8	89	74	31/42
2016	5420	20	7	63	30	49	35	31	31/44
Atriplex canescens^p -- (fourwing saltbush)									
2004	-	-	-	-	-	-	-	-	-/-
2007	-	-	-	-	-	-	-	-	-/-
2012	-	-	-	-	-	-	-	-	33/43
2016	20	-	0	100	0	0	0	0	65/67
Bassia prostrataⁱ -- (forage kochia)									
2004	-	-	-	-	-	-	-	-	-/-
2007	2880	540	24	76	0	24	25	0	12/19
2012	36720	54020	87	13	0	12	40	2	15/19
2016	39700	1600	24	76	0	10	0	0	15/24
Chrysothamnus viscidiflorus -- (yellow rabbitbrush)									
2004	40	-	0	100	0	0	0	0	10/17
2007	200	20	20	80	0	0	0	0	14/18
2012	-	-	-	-	-	-	-	-	19/28
2016	-	-	-	-	-	-	-	-	-/-

Year	Density		Age Class Distribution			Utilization		Poor Vigor (%)	Average Height Crown (cm)
	Plants Per Acre		Excluding Seedlings			Moderate (%)	Heavy (%)		
	Excluding Seedlings	Seedling	Young (%)	Mature (%)	Decadent (%)				
Ericameria nauseosa -- (rubber rabbitbrush)									
2004	20	-	0	100	0	0	0	0	20/34
2007	100	20	60	40	0	20	0	0	23/27
2012	40	-	0	100	0	100	0	0	41/43
2016	-	-	-	-	-	-	-	-	-/-
Gutierrezia sarothrae -- (broom snakeweed)									
2004	4520	-	26	74	1	0	0	0	12/15
2007	1800	320	8	68	24	4	0	22	16/21
2012	1860	-	23	77	0	4	8	11	10/14
2016	5680	80	22	79	0	0	0	0	20/19
Opuntia polyacantha -- (plains pricklypear)									
2004	1260	-	5	91	5	0	0	0	10/45
2007	1000	-	2	54	44	0	0	32	8/31
2012	1220	-	8	90	2	0	0	2	9/30
2016	4380	-	1	99	1	1	0	1	10/39

t - Tree Species; p - Preferred Browse; i - Introduced Species

NORTH LITTLE DONKEY STUDY No. 09R-6



Location Information

USGS 7.5 min Map Info	Donkey Flat NE; Township 2S, Range 22E, Section 26
GPS (0' Stake)	NAD 83 UTM ZONE 12, 634830 East 4496614 North

Transect Information

Browse Tag # (0' Stake)	36
Transect Bearing	340° 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 Vernal, travel north on Highway 191 for about 11.3 miles to a road that comes in from the right (east). Turn here, travel 1.6 miles to a fork, and stay to the right. Continue for 3.0 miles, passing Red Fleet Reservoir, to another fork with a dead end sign and continue left (north). Drive for 1.2 miles to a witness post on the left (west) side of the road. The 0-foot stake is 60 paces from the witness post at 210 degrees magnetic and is marked with browse tag #36.

Site Information

Land Ownership	Federal
Land Administrator	BLM
Allotment	DONKEY FLAT
Elevation	6,000ft (1,829m)
Aspect	Southwest
Slope	12%
Sample Dates	06/30/2004, 07/31/2007, 06/14/2012, 08/10/2016

Table 09R06.1 Disturbance History. Recorded history of major disturbances.

Treatment/Disturbance	Name	WRI DB#	Date	Size (acres)
Seeding Truax	Red Fleet	PDB	Fall 2004	470

Table 09R06.2 Seed Mix. List of known seeded plant species and rates (if available).

Mix Name			Application Type	Application Date	Acres
Red Fleet			Drill	Nov 2004	470
Type	Species	Common Name	Cultivar/Source ID	Bulk lbs/acre	PLS lbs/acre
G	Pascopyrum smithii	Western Wheatgrass	Arriba	1.00	0.83
G	Psathyrostachys juncea	Russian Wildrye	Bozoisky	1.00	0.92
F	Achillea millefolium	Western Yarrow		0.11	0.10
F	Astragalus cicer	Cicer Milkvetch	Lutana	1.00	0.90
F	Linum perenne	Blue Flax	Appar	0.11	0.10
F	Medicago sativa	Alfalfa	Ladak+	1.49	1.37
F	Onobrychis viciifolia	Sainfoin	Eski	1.49	1.36
F	Sanguisorba minor	Small Burnet	Delar	2.50	2.36
S	Artemisia tridentata ssp. wyomingensis	Wyoming Big Sagebrush	Sanpete UT	0.43	0.12
S	Artemisia tridentata ssp. wyomingensis	Wyoming Big Sagebrush		0.53	0.05
S	Atriplex canescens	Fourwing Saltbush	Emery UT	1.00	0.45
S	Bassia prostrata	Forage Kochia	Immigrant	1.06	0.71

Wildlife Habitat and Vegetation History

Table 09R06.3 Wildlife Seasonal Habitat. UDWR wildlife habitat and seasonality.

Species	Habitat	Season	Brood/Young Rearing
Deer	crucial	winter	
Elk	crucial	winter	
Greater Sage Grouse		occupied & Winter	broodrearing

Table 09R06.4 Vegetation History. The dominant vegetation type(s) and phase of woodland succession (Tausch, Miller, Roundy, & Chambers, 2009).

Year	Vegetation Type	Woodland Succession
2004	Annual Forb	No Encroachment
2007	Perennial Grass	No Encroachment
2012	Perennial Grass	No Encroachment
2016	Perennial Grass/Forage Kochia	No Encroachment

Site Notes

This study is located approximately 2 miles north of Little Donkey Flat within a Wyoming big sagebrush (*Artemisia tridentata* ssp. *wyomingensis*) flat.

Soils

Table 09R06.5 Soil Analysis Data. List of chemical and textural soil characteristics determined by laboratory analysis.

Texture	pH	%sand	%silt	%clay	%OM	PPM P	PPM K	ds/m	Sample Date
Clay Loam	7.2	33.0	39.5	27.5	1.3	5.0	300.8	0.6	06/30/2004

Site Potential

1981-2010 Average Annual Precipitation 10 inches
 NRCS Ecological Site Semidesert Loam (Wyoming Big Sagebrush)
 NRCS Ecological Site # R034XY212UT
 States and Transitions No state and transition model is available for this ecological site.

This Wyoming big sagebrush (*Artemisia tridentata* ssp. *wyomingensis*) community likely behaves similar to the Semidesert Loam (Wyoming Big Sagebrush), R035XY209UT ecological site when subjected to disturbances (USDA NRCS, 2011). When established in 2004, this site was dominated by the annual forb flatspine stickseed (*Lappula occidentalis*) with introduced perennial grasses being the subordinate species (Table 09R06.11, Table 09R06.10). Since site establishment, browse cover of sagebrush has remained low with little increase; However, forage kochia (*Bassia prostrata*) has had significant increases in cover each sample year since its seeding in 2004 (Table 09R06.12, Table 09R06.1).

Trend Summary Tables

Table 09R06.6 Shrub/Tree Summary. Average modified Daubenmire quadrat and line intercept cover by year for shrubs/trees.

Year	Quadrat Cover (%)			Lineintercept Cover (%)		
	Preferred Shrub	Other Shrub	Tree	Preferred Shrub	Other Shrub	Tree
2004	1.0	0.0		1.1		
2007	0.8	0.3		1.0	0.4	
2012	1.8	2.4		2.3	2.1	
2016	2.0	7.1		3.1	8.6	

Table 09R06.7 Herbaceous Summary. Nested frequency and average modified Daubenmire quadrat cover by year for herbaceous functional groups.

Year	Nested Frequency				Quadrat Cover (%)			
	Annual Grass	Perennial Grass	Annual/Biennial Forb	Perennial Forb	Annual Grass	Perennial Grass	Annual/Biennial Forb	Perennial Forb
2004		207	437	156		5.1	19.1	2.2
2007	6	407	337	129	0.0	11.6	3.7	0.5
2012	9	381	30	123	0.0	20.6	0.1	0.6
2016		378	17	115		23.2	0.0	0.4

Table 09R06.8 Basic Ground Cover. Average modified Daubenmire quadrat cover by year for basic ground cover types.

Year	Cover Type (%)					
	Bare Ground	Cryptograms	Litter	Pavement	Rock	Vegetation
2004	61.9	0.9	17.8	0.5	0.0	28.5
2007	59.8	1.2	31.0	0.1		18.9
2012	61.4	0.9	18.8	0.3		28.1
2016	53.4	0.2	16.9	0.8	0.0	33.8

Table 09R06.9 Pellet Group Data. Quadrat frequency and pellet group transect data for animal pellets. Rabbit pellet groups are not sampled in the pellet group transect.

Year	Cattle	Mule Deer	Elk	Horse	Rabbit
	Quadrat Frequency				
2004	9	30	17		69
2007	4	7	3		91
2012	4	16	1	1	28
2016	19	7			98
Year	Days Use Per Acre (ha)				
2004	24.7 (61.0)	21.5 (53.0)	18.1 (44.7)		
2007	20.3 (50.2)	11.4 (28.1)	7.4 (18.2)		
2012		10.7 (26.5)			
2016	56.6 (139.9)	2.7 (6.6)			

Table 09R-06.10 - Grass Species. Nested frequency and modified Daubenmire average cover by year.

GRASS SPECIES	Achnatherum hymenoides (Indian ricegrass)	Agropyron cristatum ⁱ (crested wheatgrass)	Bromus tectorum ^{ai} (cheatgrass)	Hesperostipa comata (needle and thread)	Pascopyrum smithii (western wheatgrass)	Poa secunda (Sandberg bluegrass)	Psathyrostachys juncea ⁱ (Russian wildrye)
year	Nested Frequency						
2004	1	199	-	-	-	24	8
2007	-	302	6	-	47	194	5
2012	3	369	9	2	-	61	19
2016	-	373	-	13	14	29	-
year	Average Cover (%)						
2004	0.0	4.6	-	-	-	0.2	0.3
2007	-	10.0	0.0	-	0.2	1.3	0.2
2012	0.0	18.6	0.0	0.0	-	1.2	0.8
2016	-	22.3	-	0.4	0.3	0.2	-

a - Annual; n - Noxious Weed; i - Introduced Species

Table 09R-06.11 - Forb Species. Nested frequency and modified Daubenmire average cover by year.

FORB SPECIES	Alysum desertorum ^{ai} (desert madwort)	Calochortus nuttallii (sego lily)	Ceratocephala testiculata ^{ai} (curvseed butterwort)	Chenopodium leptophyllum ^a (narrowleaf goosefoot)	Collinsia parviflora ^a (maiden blue eyed Mary)	Comandra umbellata (bastard toadflax)	Descurainia pinnata ^a (western tansymustard)	Halogeton glomeratus ^{ai} (saltlover)	Lappula occidentalis ^a (flatspine stickseed)	Machaeranthera canescens (hoary tansyaster)	Phlox longifolia (longleaf phlox)	Salsola tragus ^{ai} (prickly Russian thistle)	Sphaeralcea coccinea (scarlet globemallow)	Townsendia (Townsend daisy)
year	Nested Frequency													
2004	-	-	-	4	-	-	2	2	430	-	10	20	149	3
2007	-	-	27	-	1	1	63	9	322	-	9	-	119	-
2012	-	-	3	-	8	-	-	5	15	5	3	2	114	2
2016	6	3	-	-	-	-	-	-	15	-	7	-	95	20
year	Average Cover (%)													
2004	-	-	-	0.0	-	-	0.0	0.0	18.6	-	0.0	0.5	2.2	0.0
2007	-	-	0.0	-	0.0	0.0	0.2	0.1	3.3	-	0.0	-	0.5	-
2012	-	-	0.0	-	0.0	-	-	0.0	0.0	0.0	0.0	0.0	0.5	0.0
2016	0.0	0.0	-	-	-	-	-	-	0.0	-	0.0	-	0.4	0.0

a - Annual/Biennial; n - Noxious Weed; i - Introduced Species

Table 09R-06.12 - Shrub and Tree Species. Average modified Daubenmire quadrat and line intercept cover by year.

SHRUB SPECIES	Line Intercept Cover (%)		
	Artemisia tridentata ssp. wyomingensis ^P (Wyoming big sagebrush)	Bassia prostrata ⁱ (forage kochia)	Gutierrezia sarothrae (broom snakeweed)
year	Line Intercept Cover (%)		
2004	1.1	-	-
2007	1	0.3	0.1
2012	2.3	2.1	-
2016	3.1	7.9	0.7
year	Quadrat Cover (%)		
2004	1.0	-	0.0
2007	0.8	0.3	0.0
2012	1.8	2.4	0.0
2016	2.0	6.8	0.3

t - Tree Species; p - Preferred Browse; i - Introduced

Table 09R06.13 Shrub/Tree Characteristics. Population characteristics of shrub/tree species populations including density reproduction (seedlings), age distribution, utilization, vigor and average size (height/crown) of plants.

Year	Density		Age Class Distribution			Utilization		Poor Vigor (%)	Average Height Crown (cm)
	Plants Per Acre		Excluding Seedlings			Moderate (%)	Heavy (%)		
	Excluding Seedlings	Seedling	Young (%)	Mature (%)	Decadent (%)				
Artemisia tridentata ssp. wyomingensis^P (Wyoming big sagebrush)									
2004	1720	160	1	26	73	4	97	57	27/45
2007	2440	4040	35	45	20	48	36	18	21/28
2012	3760	80	28	67	5	57	41	48	21/29
2016	2640	1020	14	81	5	65	18	5	23/34
Atriplex canescens^P (fourwing saltbush)									
2004									59/64
2007									64/81
2012									52/70
2016									67/65
Bassia prostrataⁱ (forage kochia)									
2004									/
2007	2220	2200	41	59	0	3	3	0	10/13
2012	8620	12360	8	92	0	60	34	1	14/18
2016	19520	580	14	86	0	7	5	0	16/28
Ericameria nauseosa (rubber rabbitbrush)									
2004									27/35
2007									/
2012									/
2016									/
Gutierrezia sarothrae (broom snakeweed)									
2004	140		14	86	0	0	14	0	13/18
2007	220	60	0	46	55	18	0	46	16/24
2012	140		0	100	0	0	0	0	13/13
2016	1220	260	38	62	0	0	0	0	23/25

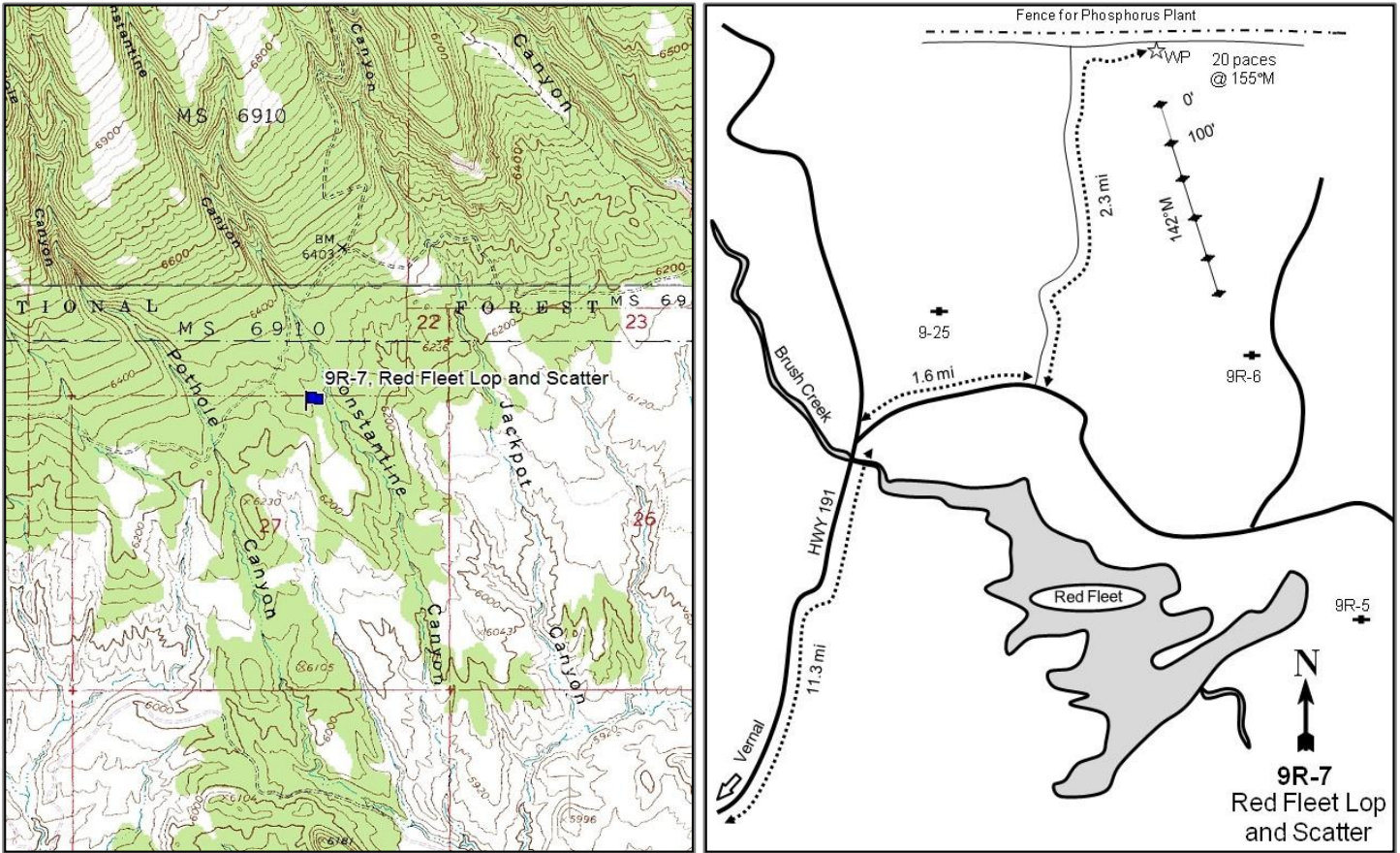
Year	Density		Age Class Distribution			Utilization		Poor Vigor (%)	Average Height Crown (cm)
	Plants Per Acre		Excluding Seedlings			Moderate (%)	Heavy (%)		
	Excluding Seedlings	Seedling	Young (%)	Mature (%)	Decadent (%)				
Linanthus pungens (granite prickly phlox)									
2004									/
2007									/
2012									17/30
2016									/
Opuntia polyacantha (plains pricklypear)									
2004	60		0	33	67	0	0	0	9/30
2007	20		100	0	0	0	0	0	9/17
2012									11/24
2016									10/42

t Tree Species; p Preferred Browse; i Introduced Species

Table 09R06.14 Tree Characteristics. Pointquarter tree density, size class distribution, and average diameter.

Year	Density	Size Class Distribution					Average Diameter (cm)
	Trees per Acre	Seedling (%)	14'	48'	812'	>12' (%)	
Juniperus osteosperma (Utah juniper)							
2016	1		100				9.0

RED FLEET LOP AND SCATTER - STUDY NO. 09R-7



Location Information

USGS 7.5 min Map Info Donkey Flat NE; Township 2S, Range 22E, Section 27
 GPS (0' Stake) NAD 83 UTM ZONE 12, 632742 East 4497729 North

Transect Information

Browse Tag # (0' Stake) 37
 Transect Bearing 142° 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 Vernal, travel north on Highway 191 for about 11.3 miles to a road that comes in from the right (east). Turn here and travel 1.6 miles to a fork. Turn left (north) and travel 2.3 miles to a T intersection just before a fence for the phosphorus plant. Turn right (east) and drive for a short distance to the witness post on the right (south) side. From the witness post, walk down a very faint road at 155 degrees magnetic for about 200 feet to the 0-foot stake marked with browse tag #37.

Site Information

Land Ownership	Federal
Land Administrator	BLM
Allotment	DONKEY FLAT
Elevation	6,300ft (1,920m)
Aspect	Southeast
Slope	4-6%
Sample Dates	06/30/2004, 07/31/2007, 06/14/2012, 08/10/2016

Table 09R-07.1 Disturbance History. Recorded history of major disturbances.

Treatment/Disturbance	Name	WRI DB#	Date	Size (acres)
Chaining - Unknown	-	-	1960s or 70s	-
Hand Crew - Lop and Scatter	Red Fleet Lop and Scatter	PDB	Fall 2004	-

Wildlife Habitat and Vegetation History**Table 09R-07.3 - Wildlife Seasonal Habitat.** UDWR wildlife habitat and seasonality.

Species	Habitat	Season	Brood/Young Rearing
Deer	crucial	winter	
Elk	crucial	winter	
Greater Sage Grouse		occupied & Winter	brood-rearing

Table 09R-07.4 - Vegetation History. The dominant vegetation type(s) and phase of woodland succession (Tausch, Miller, Roundy, & Chambers, 2009).

Year	Vegetation Type	Woodland Succession
2004	Perennial Grass	Phase I
2007	Perennial Grass	Phase I
2012	Perennial Grass	Phase I
2016	Perennial Grass	Phase I

Site Notes

The study is located approximately three miles north of Red Fleet reservoir. The study monitors an old Utah juniper (*Juniperus osteosperma*) chaining that was treated in the 1960s or 1970s.

Soils**Table 09R-07.5 - Soil Analysis Data.** List of chemical and textural soil characteristics determined by laboratory analysis.

Texture	pH	% sand	% silt	% clay	% OM	PPM P	PPM K	ds/m	Sample Date
Loam	7.2	40.6	35.9	23.5	4.2	13.3	217.6	1.3	06/30/2004

Site Potential

1981-2010 Average Annual Precipitation	11 inches
NRCS Ecological Site	Upland Shallow Loam (Black Sagebrush)
NRCS Ecological Site #	R047XC320UT
States and Transitions	No state and transition model is available for this ecological site.

Since establishment in 2004, this site has been dominated by perennial grasses with black sagebrush (*Artemisia nova*) as a subordinate species. Cover of sagebrush has remained relatively stable (Table 09R-07.10, Table 09R-07.12). The herbaceous understory has remained dominated by crested wheatgrass (*Agropyron cristatum*) with forbs remaining rare (Table 09R-07.7, Table 09R-07.11). Following the removal of Utah juniper in 2004, cover and density for juniper decreased substantially. However, young juniper trees remain on the site and provide a source for future encroachment (Table 09R-07.12, Table 09R-07.13).

Trend Summary Tables

Table 09R-07.6 - Shrub/Tree Summary. Average modified Daubenmire quadrat and line intercept cover by year for shrubs/trees.

Year	Quadrat Cover (%)			Line-intercept Cover (%)		
	Preferred Shrub	Other Shrub	Tree	Preferred Shrub	Other Shrub	Tree
2004	2.2	0.7	7.6	0.9	0.7	9.2
2007	1.8	0.3	0.7	0.7	0.4	2.5
2012	2.2	2.1	0.7	1.9	0.8	2.1
2016	2.5	5.3	0.0	2.9	5.5	0.4

Table 09R-07.7 - Herbaceous Summary. Nested frequency and average modified Daubenmire quadrat cover by year for herbaceous functional groups.

Year	Nested Frequency				Quadrat Cover (%)			
	Annual Grass	Perennial Grass	Annual/Biennial Forb	Perennial Forb	Annual Grass	Perennial Grass	Annual/Biennial Forb	Perennial Forb
2004	-	260	20	102	-	13.2	0.1	3.4
2007	28	417	96	89	0.1	20.3	0.4	1.4
2012	6	398	18	107	0.0	22.9	0.0	1.3
2016	3	380	-	125	0.0	28.7	-	1.1

Table 09R-07.8 - Basic Ground Cover. Average modified Daubenmire quadrat cover by year for basic ground cover types.

Year	Cover Type (%)					
	Bare Ground	Cryptograms	Litter	Pavement	Rock	Vegetation
2004	24.8	3.4	27.6	26.7	2.3	26.6
2007	24.6	0.9	41.1	15.9	1.4	25.6
2012	24.9	0.2	39.4	14.2	1.9	29.8
2016	6.8	0.0	32.5	28.2	2.0	37.7

Table 09R-07.9 - Pellet Group Data. Quadrat frequency and pellet group transect data for animal pellets. Rabbit pellet groups are not sampled in the pellet group transect.

Year	Cattle	Mule Deer	Elk	Horse	Rabbit
	Quadrat Frequency				
2004	2	25	47	-	26
2007	6	9	12	-	67
2012	7	11	3	-	15
2016	10	12	-	1	65
Days Use Per Acre (ha)					
2004	21.1 (52.0)	35.5 (87.7)	46.2 (114.2)	-	-
2007	19.6 (48.4)	18.1 (44.7)	28.8 (71.2)	-	-
2012	-	14.1 (34.8)	2.0 (5.0)	0.6 (1.4)	-
2016	36.3 (89.7)	5.3 (13.2)	-	1.2 (2.9)	-

Table 09R-07.10 - Grass Species. Nested frequency and modified Daubenmire average cover by year.

GRASS SPECIES	Agropyron cristatum ⁱ (crested wheatgrass)	Bromus tectorum ^{ai} (cheatgrass)	Hesperostipa comata (needle and thread)	Poa secunda (Sandberg bluegrass)
year	Nested Frequency			
2004	257	-	4	3
2007	416	28	3	19
2012	380	6	-	69
2016	380	3	2	2
year	Average Cover (%)			
2004	13.2	-	0.0	0.0
2007	20.2	0.1	0.0	0.1
2012	21.0	0.0	-	1.9
2016	28.7	0.0	0.1	0.0

a - Annual; n - Noxious Weed; i - Introduced Species

Table 09R-07.11 - Forb Species. Nested frequency and modified Daubenmire average cover by year.

FORB SPECIES	Astragalus convallarius (lesser rishy milkvetch)	Chenopodium leptophyllum ^a (narrowleaf goosefoot)	Cryptantha (cryptantha)	Descurainia pinnata ^a (western tansymustard)	Draba ^a (draba)	Erigeron (fleabane)	Gilia ^a (gilia)	Ipomopsis congesta (ballhead ipomopsis)	Lappula occidentalis ^a (flatspine stickseed)	Sphaeralcea coccinea (scarlet globemallow)	Townsendia (Townsend daisy)
year	Nested Frequency										
2004	35	19	3	0	-	-	1	10	0	61	3
2007	7	1	2	41	3	1	-	-	70	80	-
2012	19	-	12	3	-	-	-	-	18	78	1
2016	42	-	19	-	-	2	-	-	-	66	-
year	Average Cover (%)										
2004	1.1	0.1	0.0	0.0	-	-	0.0	0.1	0.0	2.2	0.0
2007	0.1	0.0	0.0	0.1	0.0	0.0	-	-	0.3	1.3	-
2012	0.1	-	0.0	0.0	-	-	-	-	0.0	1.2	0.0
2016	0.5	-	0.1	-	-	0.0	-	-	-	0.5	-

a - Annual/Biennial; n - Noxious Weed; i - Introduced Species

Table 09R-07.12 - Shrub and Tree Species. Average modified Daubenmire quadrat and line intercept cover by year.

SHRUB SPECIES	Line Intercept Cover (%)								
	year	Line Intercept Cover (%)							
Artemisia nova ^p (black sagebrush)	2004	0.9	-	-	-	-	-	9.2	0.7
Artemisia tridentata ssp. wyomingensis ^p (Wyoming big sagebrush)	2007	0.7	-	-	0.2	-	-	2.5	0.2
Bassia prostrata ⁱ (forage kochia)	2012	1.8	0.1	-	-	-	0.8	2.1	-
Chrysothamnus viscidiflorus ssp. viscidiflorus (yellow rabbitbrush)	2016	2.8	0.1	-	-	-	5.2	0.4	0.3
Ericameria nauseosa (rubber rabbitbrush)	year	Quadrat Cover (%)							
Gutierrezia sarothrae (broom snakeweed)	2004	2.2	-	-	-	0.1	0.1	7.6	0.5
Juniperus osteosperma ^t (Utah juniper)	2007	1.8	-	-	0.0	-	0.1	0.7	0.2
Opuntia polyacantha (plains pricklypear)	2012	2.2	0.0	0.4	-	-	1.7	0.7	0.0
	2016	2.5	0.0	-	0.0	-	5.2	0.0	0.1

t - Tree Species; p - Preferred Browse; i - Introduced

Table 09R-07.13 - Shrub/Tree Characteristics. Population characteristics of shrub/tree species populations including density reproduction (seedlings), age distribution, utilization, vigor and average size (height/crown) of plants.

Year	Density		Age Class Distribution			Utilization		Poor Vigor (%)	Average Height Crown (cm)
	Plants Per Acre		Excluding Seedlings			Moderate (%)	Heavy (%)		
	Excluding Seedlings	Seedling	Young (%)	Mature (%)	Decadent (%)				
Artemisia nova^p -- (black sagebrush)									
2004	1880	-	12	70	18	40	1	12	14/30
2007	2260	240	25	70	5	11	79	5	18/35
2012	3800	2580	37	63	1	0	67	1	14/32
2016	2860	-	31	62	8	25	55	8	17/36
Artemisia tridentata ssp. wyomingensis^p -- (Wyoming big sagebrush)									
2004	-	-	-	-	-	-	-	-	26/48
2007	-	-	-	-	-	-	-	-	37/56
2012	20	-	0	100	0	100	0	0	47/63
2016	20	-	0	0	100	100	0	100	44/68
Chrysothamnus viscidiflorus ssp. viscidiflorus -- (yellow rabbitbrush)									
2004	20	-	0	100	0	0	0	0	-/-
2007	20	-	0	100	0	0	0	0	18/30
2012	-	-	-	-	-	-	-	-	-/-
2016	20	-	100	0	0	0	0	0	-/-
Ericameria nauseosa -- (rubber rabbitbrush)									
2004	20	-	0	100	0	0	0	0	22/32
2007	-	-	-	-	-	-	-	-	40/31
2012	-	-	-	-	-	-	-	-	58/71
2016	-	-	-	-	-	-	-	-	61/49
Gutierrezia sarothrae -- (broom snakeweed)									
2004	200	20	20	80	0	0	0	0	16/26
2007	500	1720	8	56	36	4	32	44	20/29
2012	5660	20	1	99	0	0	0	31	11/16
2016	15860	300	10	90	0	0	0	0	19/20
Juniperus osteosperma^t -- (Utah juniper)									
2004	160	-	0	100	0	13	0	0	-/-
2007	100	-	0	80	20	0	0	80	-/-
2012	160	-	75	25	0	0	0	25	-/-
2016	80	-	75	25	0	0	0	0	-/-

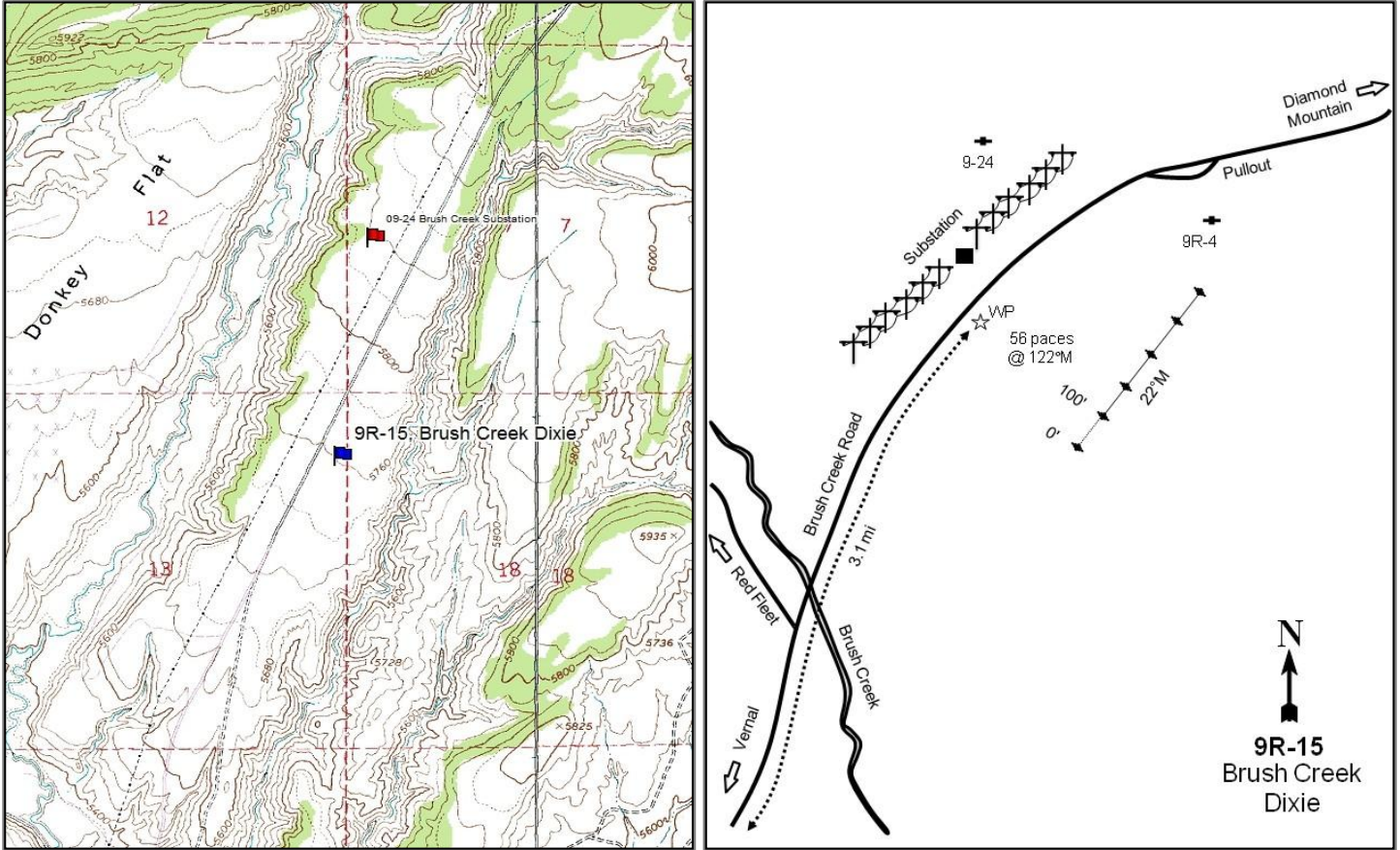
Year	Density		Age Class Distribution			Utilization		Poor Vigor (%)	Average Height Crown (cm)
	Plants Per Acre		Excluding Seedlings			Moderate (%)	Heavy (%)		
	Excluding Seedlings	Seedling	Young (%)	Mature (%)	Decadent (%)				
Opuntia polyacantha -- (plains pricklypear)									
2004	300	-	0	93	7	0	0	7	10/41
2007	220	20	0	73	27	0	9	18	9/30
2012	180	-	0	89	11	0	0	33	8/23
2016	380	-	0	100	0	0	0	0	9/27
Purshia tridentata^P -- (antelope bitterbrush)									
2004	-	-	-	-	-	-	-	-	-/-
2007	-	-	-	-	-	-	-	-	37/190
2012	-	-	-	-	-	-	-	-	-/-
2016	-	-	-	-	-	-	-	-	26/128

t - Tree Species; p - Preferred Browse; i - Introduced Species

Table 09R-07.14 - Tree Characteristics. Point-quarter tree density, size class distribution, and average diameter.

Year	Density	Size Class Distribution					Average Diameter (cm)
	Trees per Acre	Seedling (%)	1-4'	4-8'	8-12'	>12' (%)	
Juniperus osteosperma (Utah juniper)							
2004	66	-	50	45	5	-	10.6
2007	36	-	100	-	-	-	8.7
2012	30	-	75	19	6	-	8.1
2016	13	44	44	11	-	-	10.8

BRUSH CREEK DIXIE - STUDY No. 09R-15



Location Information

USGS 7.5 min Map Info Donkey Flat NE; Township 3S, Range 22E, Section 13
 GPS (0' Stake) NAD 83 UTM ZONE 12, 636649 East 4491523 North

Transect Information

Browse Tag # (0' Stake) 134
 Transect Bearing 22° 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 500 North in Vernal, travel north on Brush Creek Road for 3.1 miles to a witness post on the right (east) side of the road. From the witness post, the 0-foot stake is 56 paces at 122 degrees magnetic and is marked with browse tag #134.

Site Information

Land Ownership	Federal
Land Administrator	BLM
Allotment	S.J. HATCH
Elevation	5,750ft (1,753m)
Aspect	Southwest
Slope	2%
Sample Dates	08/01/2007, 07/27/2009, 07/26/2010, 06/12/2012, 08/11/2016

Table 09R-15.1 Disturbance History. Recorded history of major disturbances.

Treatment/Disturbance	Name	WRI DB#	Date	Size (acres)
Herbicide - Plateau	Brush Creek Bench Sage Restoration	315	September 2008	280
Harrow - One-Way Dixie	Brush Creek Bench Sage Restoration	315	September 2008	280
Seeding - Broadcast Before	Brush Creek Bench Sage Restoration	315	December 2008	280
Seeding - Aerial After	Brush Creek Bench Sage Restoration	315	March 2009	280
Seeding - Rangeland Drill	Brush Creek Bench Seeding	1659	October 2010	400

Table 09R-15.2 Seed Mix. List of known seeded plant species and rates (if available).

Mix Name			Application Type	Application Date	Acres
Brush Creek Bench Sage Restoration			Broadcast	Dec 2008	300
Type	Species	Common Name	Cultivar/Source ID	Bulk lbs/acre	PLS lbs/acre
G	Agropyron cristatum	Crested Wheatgrass	Douglas	1.50	1.23
G	Agropyron cristatum	Crested Wheatgrass	Hycrest	1.00	0.91
G	Elymus lanceolatus	Thickspike Wheatgrass	Critana	1.00	0.87
G	Elymus wawawaiensis	Snake River Wheatgrass	Secar	1.00	0.76
G	Poa secunda	Sandberg Bluegrass	Toole MT	0.50	0.42
G	Psathyrostachys juncea	Russian Wildrye	Bozoisky	1.00	0.85
F	Medicago sativa	Alfalfa	Ladak	2.00	1.81
Mix Name			Application Type	Application Date	Acres
Brush Creek Bench - Sagebrush/Kochia			Aerial	Mar 2009	300
Type	Species	Common Name	Cultivar/Source ID	Bulk lbs/acre	PLS lbs/acre
S	Artemisia tridentata ssp. wyomingensis	Wyoming Big Sagebrush	Sanpete UT	1.00	0.19
S	Bassia prostrata	Forage Kochia	Lander NV	1.00	0.66
Mix Name			Application Type	Application Date	Acres
Brush Creek Bench Seeding			Drill	Oct 2010	410
Type	Species	Common Name	Cultivar/Source ID	Bulk lbs/acre	PLS lbs/acre
G	Agropyron cristatum	Crested Wheatgrass	Ephraim	0.98	0.92
G	Agropyron cristatum	Crested Wheatgrass	Nordan	0.98	0.82
G	Agropyron fragile	Siberian Wheatgrass	Vavilov (NC)	0.49	0.38
G	Elymus wawawaiensis	Snake River Wheatgrass	Secar	1.10	0.87
G	Pascopyrum smithii	Western Wheatgrass	Arriba	1.10	0.94
G	Poa secunda	Sandberg Bluegrass	UP/Colorado Plateau	0.49	0.45
G	Psathyrostachys juncea	Russian Wildrye	Bozoisky	0.98	0.79
F	Linum perenne	Blue Flax	Appar	0.98	0.87
F	Medicago sativa	Alfalfa	Ladak Plus	0.49	0.46
F	Medicago sativa	Alfalfa	Ranger	0.49	0.46
F	Medicago sativa	Alfalfa	Spredor 4	0.49	0.43
F	Sanguisorba minor	Small Burnet	Delar	0.98	0.92
S	Atriplex canescens	Fourwing Saltbush	Grand UT	0.16	0.06
S	Atriplex canescens	Fourwing Saltbush	Emery/Grand UT	0.85	0.33
Mix Name			Application Type	Application Date	Acres
Brush Creek Bench Seeding - Browse			Aerial	Nov 2010	410
Type	Species	Common Name	Cultivar/Source ID	Bulk lbs/acre	PLS lbs/acre
S	Artemisia tridentata ssp. wyomingensis	Wyoming Big Sagebrush	Sanpete UT	0.98	0.14
S	Bassia prostrata	Forage Kochia	Sanpete UT	0.73	0.37

Wildlife Habitat and Vegetation History

Table 09R-15.3 - Wildlife Seasonal Habitat. UDWR wildlife habitat and seasonality.

Species	Habitat	Season	Brood/Young Rearing
Deer	crucial	winter	
Elk	crucial	winter	
Greater Sage Grouse		occupied & Winter	brood-rearing

Table 09R-15.4 - Vegetation History. The dominant vegetation type(s) and phase of woodland succession (Tausch, Miller, Roundy, & Chambers, 2009).

Year	Vegetation Type	Woodland Succession
2007	Wyoming Big Sagebrush	No Encroachment
2009	Wyoming Big Sagebrush	No Encroachment
2010	Wyoming Big Sagebrush/Annual Grass	No Encroachment
2012	Wyoming Big Sagebrush/Annual Grass	No Encroachment
2016	Wyoming Big Sagebrush	No Encroachment

Site Notes

This study is located approximately two miles to the east of Red Fleet Reservoir on Brush Creek Bench.

Soils

Table 09R-15.5 - Soil Analysis Data. List of chemical and textural soil characteristics determined by laboratory analysis.

Texture	pH	% sand	% silt	% clay	%OM	PPM P	PPM K	ds/m	Sample Date
Sandy Clay Loam	6.7	52.2	26.4	21.4	1.1	19.6	176.0	0.5	08/01/2007

Site Potential

1981-2010 Average Annual Precipitation 10 inches
 NRCS Ecological Site Semidesert Loam (Wyoming Big Sagebrush)
 NRCS Ecological Site # R034XY212UT
 States and Transitions No state and transition model is available for this ecological site.

When the study was established in 2007, the dominant plant community was Wyoming big sagebrush (*Artemisia tridentata* ssp. *wyomingensis*) (Table 09R-15.12) with a poor herbaceous understory (Table 09R-15.7) dominated by the invasive annual grass cheatgrass (*Bromus tectorum*) that filled the majority of the interspaces between shrubs. Following the herbicide treatment in 2007, cheatgrass decreased significantly in abundance and remained low until 2016 when cheatgrass cover was at its highest cover (Table 09R-15.10). In 2016 and following the rangeland drill treatment, the site remained a sagebrush type community but dominated by weedy annual species (Table 09R-15.10, Table 09R-15.13).

Trend Summary Tables

Table 09R-15.6 - Shrub/Tree Summary. Average modified Daubenmire quadrat and line intercept cover by year for shrubs/trees.

Year	Quadrat Cover (%)			Line-intercept Cover (%)		
	Preferred Shrub	Other Shrub	Tree	Preferred Shrub	Other Shrub	Tree
2007	5.9	0.3	-	6.7	0.3	-
2009	7.7	0.2	-	6.1	0.2	-
2010	7.4	0.2	-	12.5	0.4	-
2012	10.4	0.1	-	13.7	0.2	-
2016	6.5	0.6	-	8.1	1.5	-

Table 09R-15.7 - Herbaceous Summary. Nested frequency and average modified Daubenmire quadrat cover by year for herbaceous functional groups.

Year	Nested Frequency				Quadrat Cover (%)			
	Annual Grass	Perennial Grass	Annual/Biennial Forb	Perennial Forb	Annual Grass	Perennial Grass	Annual/Biennial Forb	Perennial Forb
2007	480	47	225	166	31.5	0.9	1.3	2.3
2009	360	56	5	33	9.3	1.3	0.0	0.7
2010	299	60	206	121	6.3	0.7	6.2	1.8
2012	399	93	79	88	12.2	1.0	0.2	1.2
2016	457	117	242	106	42.5	2.4	3.4	1.0

Table 09R-15.8 - Basic Ground Cover. Average modified Daubenmire quadrat cover by year for basic ground cover types.

Year	Cover Type (%)					
	Bare Ground	Cryptograms	Litter	Pavement	Rock	Vegetation
2007	23.0	1.0	45.8	0.2	0.0	41.0
2009	28.4	0.2	47.9	0.1	0.0	22.5
2010	40.0	0.2	45.7	0.1	-	23.2
2012	29.9	0.2	47.2	0.2	0.0	28.6
2016	16.4	-	28.9	2.2	0.2	57.8

Table 09R-15.9 - Pellet Group Data. Quadrat frequency and pellet group transect data for animal pellets. Rabbit pellet groups are not sampled in the pellet group transect.

Year	Cattle	Coyote	Mule Deer	Elk	Greater Sage- Grouse	Rabbit
	Quadrat Frequency					
2007	1	-	48	4	1	49
2009	1	-	44	5	-	5
2010	1	-	52	4	-	10
2012	3	-	34	5	-	6
2016	4	-	23	-	-	70
Year	Days Use Per Acre (ha)					
2007	5.8 (14.3)	8.7 (21.5)*	64.3 (158.9)	2.0 (5.0)	-	-
2009	16.7 (41.2)	-	117.3 (289.7)	24.1 (59.6)	-	-
2010	5.1 (12.6)	8.7 (21.5)*	62.3 (153.9)	0.7 (1.7)	-	-
2012	-	-	66.4 (163.9)	2.7 (6.6)	-	-
2016	25.4 (62.8)	-	27.5 (67.9)	-	-	-

*Pellets per acre (ha)

Table 09R-15.10 - Grass Species. Nested frequency and modified Daubenmire average cover by year.

GRASS SPECIES	Achnatherum hymenoides (Indian ricegrass)	Agropyron cristatum ⁱ (crested wheatgrass)	Bromus tectorum ⁿ (cheatgrass)	Elymus elymoides (squirreltail)	Hesperostipa comata (needle and thread)	Pascopyrum smithii (western wheatgrass)	Poa bulbosa ⁱ (bulbous bluegrass)	Poa secunda (Sandberg bluegrass)	Pseudoroegneria spicata (bluebunch wheatgrass)	Vulpia octiflora ^a (sixweeks fescue)
year	Nested Frequency									
2007	5	-	480	13	19	10	-	4	-	108
2009	-	-	360	18	26	6	0	8	-	-
2010	-	4	299	16	37	3	1	8	-	3
2012	3	22	398	4	36	13	-	22	1	14
2016	-	79	457	7	18	14	-	12	-	-
year	Average Cover (%)									
2007	0.0	-	30.3	0.3	0.4	0.1	-	0.0	-	1.2
2009	-	-	9.3	0.2	0.6	0.4	0.0	0.1	-	-
2010	-	0.0	6.3	0.1	0.5	0.0	0.0	0.1	-	0.0
2012	0.0	0.3	12.2	0.0	0.4	0.1	-	0.3	0.0	0.0
2016	-	2.0	42.5	0.0	0.3	0.1	-	0.1	-	-

a - Annual; n - Noxious Weed; i - Introduced Species

Table 09R-15.11 - Forb Species. Nested frequency and modified Daubenmire average cover by year.

FORB SPECIES	Allium (onion)	Astragalus convallarius (lesser rusby milkvetch)	Bassia scoparia ^{ai} (burningbush)	Chenopodium leptophyllum ^a (narrowleaf goosefoot)	Cryptantha ^a (annual cryptantha)	Descurainia pinnata ^a (western tansymustard)	Grindelia squarrosa (curlycup gumweed)	Lappula occidentalis ^a (flatspine stickseed)	Lepidium ^a (pepperweed)	Lygodesmia (skeletonplant)	Machaeranthera canescens (hoary tansyaster)	Penstemon (beardtongue)	Phlox longifolia (longleaf phlox)	Plantago patagonica ^a (woolly plantain)	Salsola tragus ^{ai} (prickly Russian thistle)	Sisymbrium altissimum ^{ai} (tall tumblemustard)	Sphaeralcea coccinea (scarlet globemallow)
year	Nested Frequency																
2007	7	1	-	-	-	44	-	36	-	-	1	9	1	178	4	-	159
2009	-	0	-	-	-	-	2	2	-	-	1	-	-	3	-	-	31
2010	4	8	173	10	-	1	-	11	-	7	25	-	13	42	22	-	74
2012	-	-	21	-	-	9	3	23	-	-	19	-	17	43	5	-	65
2016	-	3	-	-	3	13	-	12	2	-	20	-	-	216	7	28	87
year	Average Cover (%)																
2007	0.0	0.0	-	-	-	0.1	-	0.1	-	-	0.0	0.0	0.0	1.0	0.0	-	2.3
2009	-	0.0	-	-	-	-	0.0	0.0	-	-	0.0	-	-	0.0	-	-	0.6
2010	0.0	0.1	4.8	0.1	-	0.0	-	0.0	-	0.0	0.2	-	0.0	0.6	0.7	-	1.3
2012	-	-	0.1	-	-	0.0	0.0	0.1	-	-	0.1	-	0.1	0.1	0.0	-	1.0
2016	-	0.1	-	-	0.0	0.1	-	0.0	0.0	-	0.2	-	-	2.7	0.1	0.5	0.6

a - Annual/Biennial; n - Noxious Weed; i - Introduced Species

FORB SPECIES	Townsendia (Townsend daisy)
year	Nested Frequency
2007	2
2009	-
2010	4
2012	4
2016	10
year	Average Cover (%)
2007	0.0
2009	-
2010	0.1
2012	0.1
2016	0.1

a - Annual/Biennial; n - Noxious Weed; i - Introduced Species

Table 09R-15.12 - Shrub and Tree Species. Average modified Daubenmire quadrat and line intercept cover by year.

SHRUB SPECIES	Line Intercept Cover (%)			
	Artemisia tridentata ssp. wyomingensis ^p (Wyoming big sagebrush)	Bassia prostrata ⁱ (forage kochia)	Gutierrezia sarothrae (broom snakeweed)	Opuntia polyacantha (plains pricklypear)
year	Line Intercept Cover (%)			
2007	6.7	-	0.1	0.2
2009	6.1	-	0	0.2
2010	12.5	-	0.2	0.2
2012	13.7	-	-	0.2
2016	8.1	0.4	0.1	1
year	Quadrat Cover (%)			
2007	5.9	-	0.1	0.1
2009	7.7	-	0.1	0.1
2010	7.4	0.0	0.0	0.1
2012	10.4	0.0	-	0.1
2016	6.5	0.2	0.1	0.3

t - Tree Species; p - Preferred Browse; i - Introduced

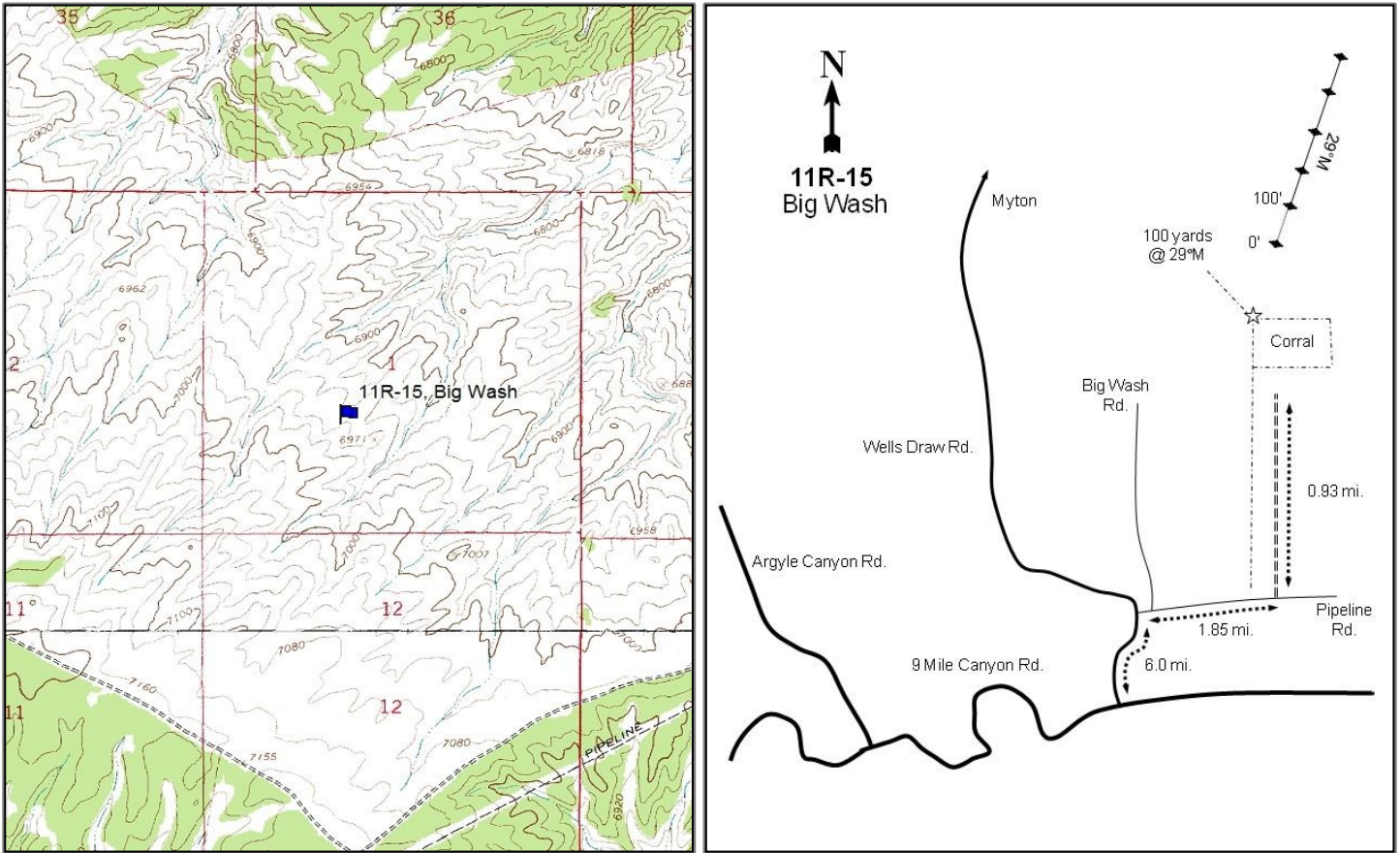
Table 09R-15.13 - Shrub/Tree Characteristics. Population characteristics of shrub/tree species populations including density reproduction (seedlings), age distribution, utilization, vigor and average size (height/crown) of plants.

Year	Density		Age Class Distribution			Utilization		Poor Vigor (%)	Average Height Crown (cm)
	Plants Per Acre		Excluding Seedlings			Moderate (%)	Heavy (%)		
	Excluding Seedlings	Seedling	Young (%)	Mature (%)	Decadent (%)				
Artemisia tridentata ssp. wyomingensis^p -- (Wyoming big sagebrush)									
2007	4420	2640	1	10	90	64	28	62	33/47
2009	-	-	-	-	-	-	-	-	35/51
2010	5100	100	8	71	21	8	41	24	38/53
2012	4340	8760	23	60	17	50	35	21	38/57
2016	4560	-	8	61	31	65	25	35	32/55
Atriplex canescens^p -- (fourwing saltbush)									
2007	-	-	-	-	-	-	-	-	-/-
2009	-	-	-	-	-	-	-	-	-/-
2010	-	-	-	-	-	-	-	-	-/-
2012	-	-	-	-	-	-	-	-	64/162
2016	-	-	-	-	-	-	-	-	-/-
Bassia prostrataⁱ -- (forage kochia)									
2007	-	-	-	-	-	-	-	-	-/-
2009	-	-	-	-	-	-	-	-	-/-
2010	20	100	100	0	0	0	0	0	-/-
2012	20	20	100	0	0	0	100	0	4/7
2016	120	-	0	100	0	0	0	0	24/83
Gutierrezia sarothrae -- (broom snakeweed)									
2007	220	-	9	91	0	0	0	0	19/22
2009	-	-	-	-	-	-	-	-	23/32
2010	160	-	0	100	0	0	0	13	29/42
2012	100	-	40	60	0	0	20	0	15/21
2016	260	20	23	77	0	0	0	0	21/23

Year	Density		Age Class Distribution			Utilization		Poor Vigor (%)	Average Height Crown (cm)
	Plants Per Acre		Excluding Seedlings			Moderate (%)	Heavy (%)		
	Excluding Seedlings	Seedling	Young (%)	Mature (%)	Decadent (%)				
Krascheninnikovia lanata^P -- (winterfat)									
2007	20	-	0	100	0	0	100	0	23/26
2009	-	-	-	-	-	-	-	-	-/-
2010	-	-	-	-	-	-	-	-	-/-
2012	-	-	-	-	-	-	-	-	-/-
2016	-	-	-	-	-	-	-	-	-/-
Opuntia polyacantha -- (plains pricklypear)									
2007	140	-	0	57	43	0	0	43	11/30
2009	-	-	-	-	-	-	-	-	10/30
2010	240	-	0	92	8	17	0	8	9/34
2012	340	-	18	82	0	0	0	0	8/21
2016	1360	20	0	100	0	0	0	0	11/34

t - Tree Species; p - Preferred Browse; i - Introduced Species

BIG WASH - STUDY NO. 11R-15



Location Information

USGS 7.5 min Map Info	Gilsonite Draw SE; Township 11S, Range 15E, Section 01
GPS (0' Stake)	NAD 83 UTM ZONE 12, 569634 East 4415145 North

Transect Information

Browse Tag # (0' Stake)	Not Available
Transect Bearing	29° 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

On 9 Mile Canyon Road, turn (north) on Wells Draw Road toward Myton. Drive 6 miles and turn right (east) onto Pipeline Road. Follow this road for 1.85 miles then turn left (north) onto a two track that runs along a fence line. Drive on this road for 0.93 miles and stop just before the corral. About 100 yards from the fence corner at a bearing of 29 degrees magnetic is the start of study. The 0 and 500-foot stakes are normal posts, but stakes 100-400 are rebar.

Site Information

Land Ownership	Federal
Land Administrator	BLM
Allotment	BIG WASH
Elevation	6,898ft (2,103m)
Aspect	Northeast
Slope	8%
Sample Dates	06/27/2013, 08/04/2016

Table 11R-15.1 Disturbance History. Recorded history of major disturbances.

Treatment/Disturbance	Name	WRI DB#	Date	Size (acres)
Chaining - Unknown	-	-	Historic	-
Mechanical - Bullhog	Anthro Mountain P-J Treatment	2465	January 2014	403

Wildlife Habitat and Vegetation History**Table 11R-15.3 - Wildlife Seasonal Habitat.** UDWR wildlife habitat and seasonality.

Species	Habitat	Season
Deer	substantial	winter
Elk	substantial	year-long
Greater Sage Grouse		occupied & Winter
Pronghorn	substantial	year-long

Table 11R-15.4 - Vegetation History. The dominant vegetation type(s) and phase of woodland succession (Tausch, Miller, Roundy, & Chambers, 2009).

Year	Vegetation Type	Woodland Succession
2013	Wyoming Big Sagebrush/Pinyon-Juniper	Phase II
2016	Wyoming Big Sagebrush	Phase I

Site Notes

In 2016 the 200, 300, 400, and 500-foot stakes were shifted slightly and placed to the east of the original transect.

Site Potential

1981-2010 Average Annual Precipitation	13 inches
NRCS Ecological Site	Upland Shallow Loam (Bonneville Big Sagebrush)
NRCS Ecological Site #	R048AY324UT
States and Transitions	No state and transition model is available for the above ecological site.

When established in 2013, the site was a depleted Wyoming big sagebrush (*Artemisia tridentata* ssp. *wyomingensis*) site with encroaching Utah juniper (*Juniperus osteosperma*) (Table 11R-15.4, Table 11R-15.6). The herbaceous understory cover was minimal on the site. With the removal of juniper trees from the site in 2014, sagebrush decreased slightly in both cover and density; However, it is expected that sagebrush will increase and become a more dominant component (Table 11R-15.4, Table 11R-15.6). The perennial grass Russian wildrye (*Psathyrostachys juncea*) and bluebunch wheatgrass (*Pseudoroegneria spicata*) were more abundant in a Phase I woodland community type (Table 11R-15.4, Table 11R-15.6, Table 11R-15.10).

Trend Summary Tables

Table 11R-15.6 - Shrub/Tree Summary. Average modified Daubenmire quadrat and line intercept cover by year for shrubs/trees.

Year	Quadrat Cover (%)			Line-intercept Cover (%)		
	Preferred Shrub	Other Shrub	Tree	Preferred Shrub	Other Shrub	Tree
2013	7.5	0.4	10.5	7.3	0.3	12.7
2016	2.8	0.4	0.2	5.7	0.4	0.2

Table 11R-15.7 - Herbaceous Summary. Nested frequency and average modified Daubenmire quadrat cover by year for herbaceous functional groups.

Year	Nested Frequency				Quadrat Cover (%)			
	Annual Grass	Perennial Grass	Annual/Biennial Forb	Perennial Forb	Annual Grass	Perennial Grass	Annual/Biennial Forb	Perennial Forb
2013	-	136	10	34	-	4.9	0.0	0.2
2016	-	212	7	71	-	10.9	0.0	0.4

Table 11R-15.8 - Basic Ground Cover. Average modified Daubenmire quadrat cover by year for basic ground cover types.

Year	Cover Type (%)					
	Bare Ground	Cryptograms	Litter	Pavement	Rock	Vegetation
2013	12.0	0.3	30.1	32.5	12.2	23.8
2016	6.2	0.2	39.1	41.2	2.1	15.2

Table 11R-15.9 - Pellet Group Data. Quadrat frequency and pellet group transect data for animal pellets. Rabbit pellet groups are not sampled in the pellet group transect.

Year	Cattle	Mule Deer	Elk	Rabbit
	Quadrat Frequency			
2013	-	-	-	9
2016	-	4	7	67
Year	Days Use Per Acre (ha)			
	2013	-	-	4.0 (9.9)
2016	8.0 (19.7)	0.7 (1.7)	14.1 (34.8)	-

Table 11R-15.10 - Grass Species. Nested frequency and modified Daubenmire average cover by year.

GRASS SPECIES	Achnatherum hymenoides (Indian ricegrass)	Agropyron cristatum ⁱ (crested wheatgrass)	Bouteloua gracilis (blue grama)	Elymus elymoides (squirreltail)	Elymus lanceolatus (thickspike wheatgrass)	Poa secunda (Sandberg bluegrass)	Psathyrostachys juncea ⁱ (Russian wildrye)	Pseudoroegneria spicata (bluebunch wheatgrass)
year	Nested Frequency							
2013	21	11	-	13	21	6	62	14
2016	12	-	5	36	9	8	127	34
year	Average Cover (%)							
2013	0.5	0.2	-	0.3	0.6	0.0	3.0	0.3
2016	1.4	-	0.0	0.7	0.0	0.0	6.1	2.6

a - Annual; n - Noxious Weed; i - Introduced Species

Table 11R-15.11 - Forb Species. Nested frequency and modified Daubenmire average cover by year.

FORB SPECIES	Arabis (rockcress)	Arenaria (sandwort)	Astragalus (milkvetch)	Caulanthus crassicaulis ^a (thickstem wild cabbage)	Chamaeyce albomarginata (whitemargin sandmat)	Cryptantha (cryptantha)	Descurainia pinnata ^a (western tansymustard)	Eriogonum (buckwheat)	Ipomopsis congesta (ballhead ipomopsis)	Lappula occidentalis ^a (flatspine stickseed)	Schoenocrambe limifolia (flaxleaf plainsmustard)
year	Nested Frequency										
2013	-	5	-	4	9	10	1	2	14	5	-
2016	0	1	11	7	38	27	0	2	1	-	5
year	Average Cover (%)										
2013	-	0.0	-	0.0	0.0	0.1	0.0	0.0	0.1	0.0	-
2016	0.0	0.0	0.1	0.0	0.1	0.1	0.0	0.1	0.0	-	0.0

a - Annual/Biennial; n - Noxious Weed; i - Introduced Species

Table 11R-15.12 - Shrub and Tree Species. Average modified Daubenmire quadrat and line intercept cover by year.

SHRUB SPECIES	Artemisia nova ^p (black sagebrush)	Artemisia tridentata ssp. wyomingensis ^p (Wyoming big sagebrush)	Gutierrezia sarothrae (broom snakeweed)	Juniperus osteosperma ^t (Utah juniper)	Linanthus pungens (granite prickly phlox)	Opuntia (pricklypear)	Pinus edulis ^t (twoneedle pinyon)
year	Line Intercept Cover (%)						
2013	0.9	6.4	0.2	12.5	-	0.1	0.2
2016	0.5	5.2	0.4	0.2	-	-	-
year	Quadrat Cover (%)						
2013	1.3	6.2	0.0	10.5	0.0	0.3	0.0
2016	0.6	2.3	0.4	0.2	-	0.0	-

t - Tree Species; p - Preferred Browse; i - Introduced

Table 11R-15.13 - Shrub/Tree Characteristics. Population characteristics of shrub/tree species populations including density reproduction (seedlings), age distribution, utilization, vigor and average size (height/crown) of plants.

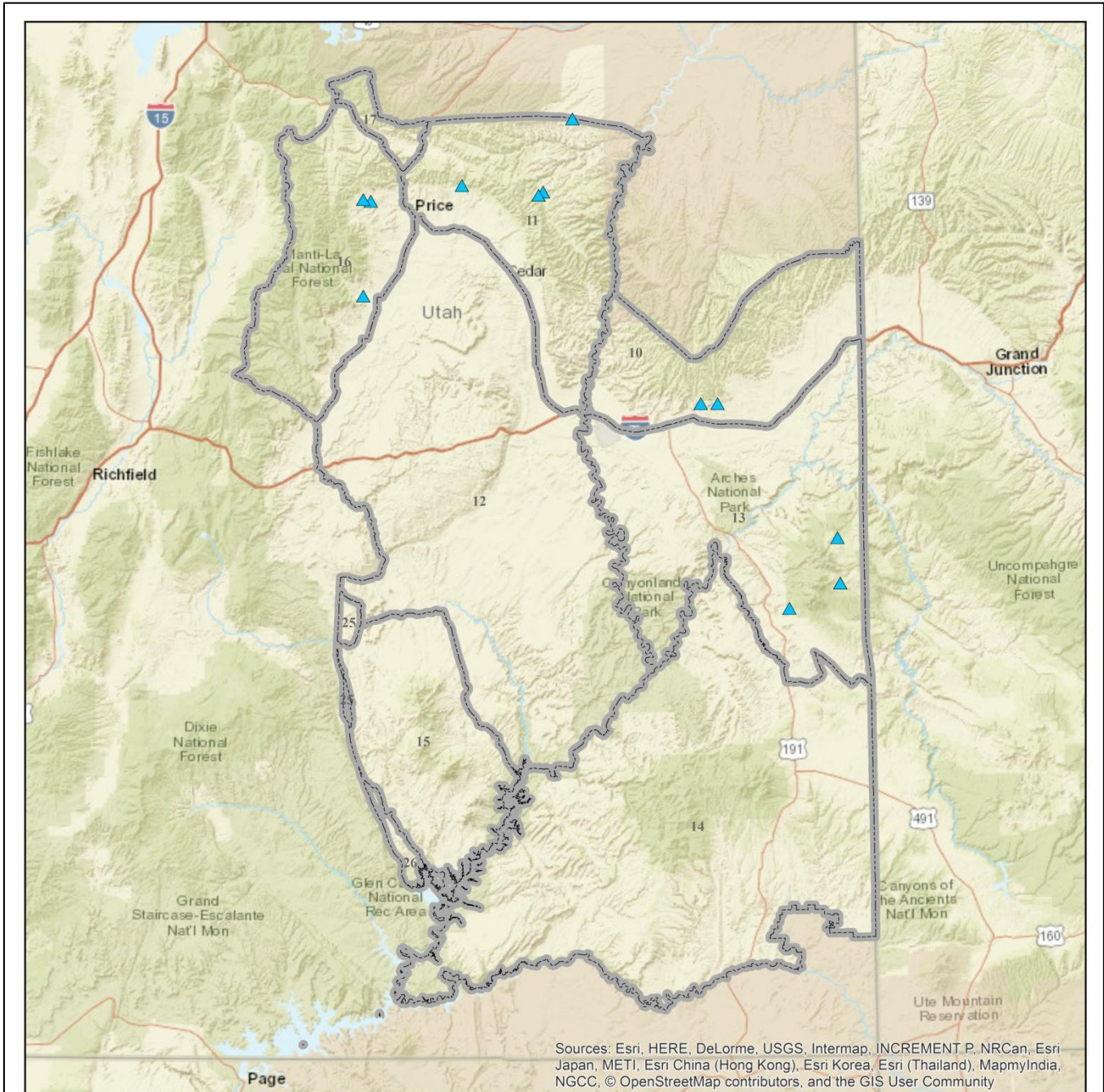
Year	Density		Age Class Distribution			Utilization		Poor Vigor (%)	Average Height Crown (cm)
	Plants Per Acre		Excluding Seedlings			Moderate (%)	Heavy (%)		
	Excluding Seedlings	Seedling	Young (%)	Mature (%)	Decadent (%)				
Artemisia nova^P -- (black sagebrush)									
2013	540	-	33	56	11	0	0	4	23/50
2016	200	-	0	90	10	0	90	10	25/56
Artemisia tridentata ssp. wyomingensis^P -- (Wyoming big sagebrush)									
2013	1440	-	13	40	47	33	0	49	41/80
2016	1220	200	8	43	49	2	15	49	48/84
Gutierrezia sarothrae -- (broom snakeweed)									
2013	560	-	29	71	0	0	0	4	13/17
2016	2240	220	33	66	1	0	0	1	16/19
Juniperus osteosperma^t -- (Utah juniper)									
2013	180	20	33	67	0	0	0	11	- / -
2016	40	40	50	50	0	0	0	50	- / -
Linanthus pungens -- (granite prickly phlox)									
2013	20	-	0	100	0	0	0	0	9/15
2016	-	-	-	-	-	-	-	-	- / -
Opuntia -- (pricklypear)									
2013	80	-	0	100	0	0	0	0	11/37
2016	-	20	0	0	0	0	0	0	9/46
Pinus edulis^t -- (twoneedle pinyon)									
2013	-	-	-	-	-	-	-	-	- / -
2016	-	20	0	0	0	0	0	0	- / -

t - Tree Species; p - Preferred Browse; i - Introduced Species



Table 11R-15.14 - Tree Characteristics. Point-quarter tree density, size class distribution, and average diameter.

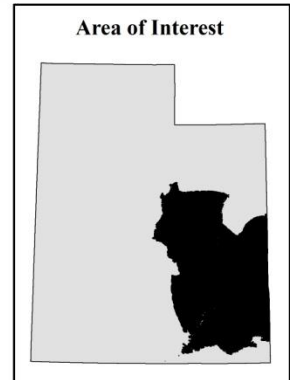
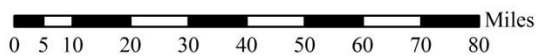
Year	Density	Size Class Distribution					Average Diameter (cm)
	Trees per Acre	Seedling (%)	1-4'	4-8'	8-12'	>12' (%)	
Juniperus osteosperma (Utah juniper)							
2013	213	-	30	40	30	-	10.8
2016	29	87	13	-	-	-	4.9
Pinus edulis (two-needle pinyon)							
2013	30	-	18	55	27	-	8.8
2016	3	100	-	-	-	-	1.0

SOUTHEASTERN REGION

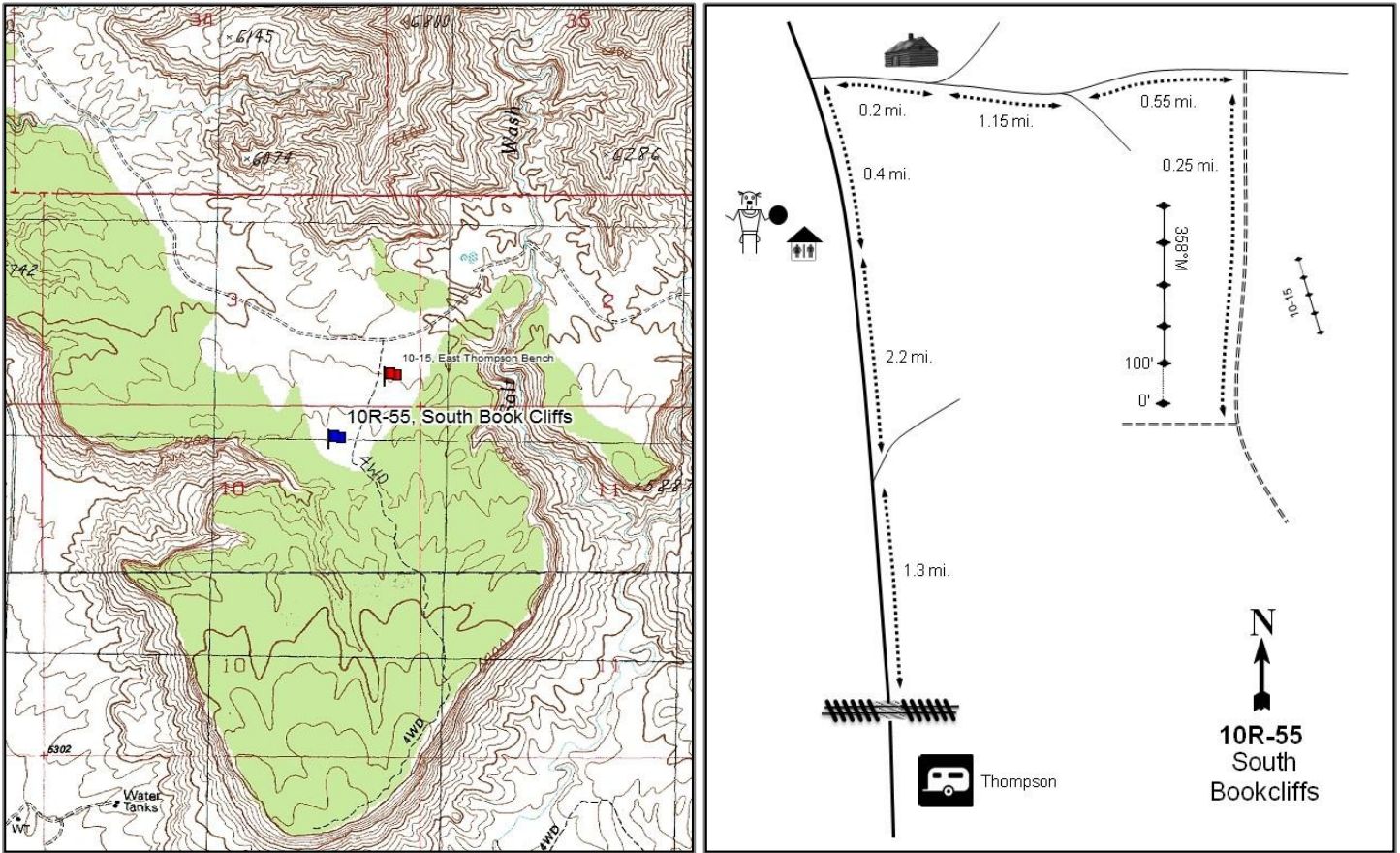


Project

-  WRI
-  Southeastern Region WMUs



SOUTH BOOK CLIFFS - STUDY No. 10R-55



Location Information

USGS 7.5 min Map Info Sego Canyon SW; Township 21S, Range 20E, Section 10
 GPS (0' Stake) NAD 83 UTM ZONE 12, 613435 East 4318158 North

Transect Information

Browse Tag # (0' Stake) Not Available
 Transect Bearing 180° 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 railroad crossing in the town of Thompson, travel 1.3 miles north up the main road to a fork. Stay left and go 2.2 miles to the Thompson Canyon pictographs. Continue for 0.4 miles. Make a sharp right turn and go 0.2 miles past an old house and a railroad cut to a fork. Turn right across a deep gully and travel 1.15 miles to another fork. Stay left and continue 0.55 miles to a very faint road on the right. Turn on this road and drive south for 0.25 miles. The stakes are rebar.

Site Information

Land Ownership	Federal
Land Administrator	BLM
Allotment	CISCO
Elevation	6,253ft (1,906m)
Aspect	North
Slope	7%
Sample Dates	06/27/2013, 08/01/2016

Table 10R-55.1 Disturbance History. Recorded history of major disturbances.

Treatment/Disturbance	Name	WRI DB#	Date	Size (acres)
Mechanical - Bullhog	South Book Cliffs Vegetation Phase 1	2593	November 2013	512
Seeding - Aerial Before	South Book Cliffs Vegetation Phase 1	2593	October 2013	512
Seeding - Aerial After	South Book Cliffs Vegetation Phase 1	2593	January 2014	512

Table 10R-55.2 Seed Mix. List of known seeded plant species and rates (if available).

Mix Name			Application Type	Application Date	Acres
South Book Cliffs I			Aerial	Oct 2013	315
Type	Species	Common Name	Cultivar/Source ID	Bulk lbs/acre	PLS lbs/acre
G	Achnatherum hymenoides	Indian Ricegrass	Emery UT	0.16	0.11
G	Achnatherum hymenoides	Indian Ricegrass	Rio Grande CO	3.02	2.86
G	Pascopyrum smithii	Western Wheatgrass	Arriba	2.38	2.13
G	Pleuraphis jamesii	Galleta		0.48	0.35
G	Pleuraphis jamesii	Galleta		0.32	0.19
G	Poa secunda	Sandberg Bluegrass	UP/Colorado Plateau	0.63	0.47
G	Sporobolus cryptandrus	Sand Dropseed	Washington CO	0.08	0.08
F	Linum perenne	Blue Flax	Appar	1.59	1.38
F	Sanguisorba minor	Small Burnet		1.59	1.46
F	Sphaeralcea coccinea	Scarlet Globemallow		0.10	0.04
S	Atriplex canescens	Fourwing Saltbush	Kane UT	0.11	0.04
S	Atriplex canescens	Fourwing Saltbush	Kane UT	3.02	1.12
Mix Name			Application Type	Application Date	Acres
South Book Cliffs I Shrub			Aerial	Jan 2014	500
Type	Species	Common Name	Cultivar/Source ID	Bulk lbs/acre	PLS lbs/acre
S	Artemisia tridentata ssp. wyomingensis	Wyoming Big Sagebrush	Uintah UT	1.00	0.14

Wildlife Habitat and Vegetation History

Table 10R-55.3 - Wildlife Seasonal Habitat. UDWR wildlife habitat and seasonality.

Species	Habitat	Season
Deer	crucial	winter
Rocky Mountain Bighorn	crucial	year-long

Table 10R-55.4 - Vegetation History. The dominant vegetation type(s) and phase of woodland succession (Tausch, Miller, Roundy, & Chambers, 2009).

Year	Vegetation Type	Woodland Succession
2013	Wyoming Big Sagebrush/Pinyon-Juniper	Phase I transitioning to Phase II

Site Notes

In 2016, a deer carcass was strewn between the 200 and 400-foot stakes.

Site Potential

1981-2010 Average Annual Precipitation 12 inches
 NRCS Ecological Site Semidesert Loam (Wyoming Big Sagebrush)
 NRCS Ecological Site # R034XY212UT
 States and Transitions No state and transition model is available for this ecological site.

This site was established in 2013 and was dominated by Wyoming big sagebrush (*Artemisia tridentata ssp. wyomingensis*) with a few other shrubs present that provided limited cover (Table 10R-55.12). Pinyon pine (*Pinus edulis*) and Utah juniper (*Juniperus osteosperma*) trees were in phase I of encroachment but transitioning to phase II; thus posing a risk to the resilience of this site (Table 10R-55.6, Table 10R-55.12). The herbaceous understory was composed of invasive annual grasses and forbs that have relatively low cover (Table 10R-55.11). Following the bull-hog and herbicide treatments, cover and density of conifer decreased which transitioned the community to phase I of woodland succession. Despite the herbicide application cheatgrass (*Bromus tectorum*) increased in cover and abundance (Table 10R-55.12, Table 10R-55.10). It is expected that sagebrush will continue to increase in dominance as cheatgrass and conifer are removed from the community through treatment.

Trend Summary Tables

Table 10R-55.6 - Shrub/Tree Summary. Average modified Daubenmire quadrat and line intercept cover by year for shrubs/trees.

Year	Quadrat Cover (%)			Line-intercept Cover (%)		
	Preferred Shrub	Other Shrub	Tree	Preferred Shrub	Other Shrub	Tree
2013	10.3	0.3	2.3	12.2	0.1	6.6
2016	7.1	4.0	0.3	7.1	8.7	-

Table 10R-55.7 - Herbaceous Summary. Nested frequency and average modified Daubenmire quadrat cover by year for herbaceous functional groups.

Year	Nested Frequency				Quadrat Cover (%)			
	Annual Grass	Perennial Grass	Annual/Biennial Forb	Perennial Forb	Annual Grass	Perennial Grass	Annual/Biennial Forb	Perennial Forb
2013	286	27	324	56	2.1	0.3	5.8	1.2
2016	380	49	369	96	6.0	0.9	2.4	5.0

Table 10R-55.8 - Basic Ground Cover. Average modified Daubenmire quadrat cover by year for basic ground cover types.

Year	Cover Type (%)					
	Bare Ground	Cryptograms	Litter	Pavement	Rock	Vegetation
2013	46.8	5.7	34.1	-	0.1	26.4
2016	45.9	7.1	37.4	-	-	22.4

Table 10R-55.9 - Pellet Group Data. Quadrat frequency and pellet group transect data for animal pellets. Rabbit pellet groups are not sampled in the pellet group transect.

Year	Mule Deer	Elk	Rabbit
	Quadrat Frequency		
2013	55	18	14
2016	38	1	57
Year	Days Use Per Acre (ha)		
2013	138.7 (342.6)	4.7 (11.6)	-
2016	50.2 (124.1)	12.8 (31.5)	-

Table 10R-55.10 - Grass Species. Nested frequency and modified Daubenmire average cover by year.

GRASS SPECIES	Achnatherum hymenoides (Indian ricegrass)	Agropyron cristatum ⁱ (crested wheatgrass)	Bromus tectorum ^{ai} (cheatgrass)	Elymus elymoides (squirreltail)	Poa secunda (Sandberg bluegrass)	Sporobolus cryptandrus (sand dropseed)	Vulpia octoflora ^a (sixweeks fescue)
year	Nested Frequency						
2013	3	1	284	16	7	-	5
2016	6	-	380	35	-	11	-
year	Average Cover (%)						
2013	0.0	0.0	2.1	0.2	0.1	-	0.0
2016	0.2	-	6.0	0.6	-	0.1	-

a - Annual; n - Noxious Weed; i - Introduced Species

Table 10R-55.11 - Forb Species. Nested frequency and modified Daubenmire average cover by year.

FORB SPECIES	Alyssum desertorum ^{ai} (desert madwort)	Astragalus coltonii (Colton's milkvetch)	Calochortus nuttallii (sego lily)	Collinsia parviflora ^a (maiden blue eyed Mary)	Cryptantha (cryptantha)	Descurainia pinnata ^a (western tansymustard)	Eriogonum cernuum ^a (nodding buckwheat)	Erodium cicutarium ^{ai} (redstem stork's bill)	Gilia ^a (gilia)	Lappula occidentalis ^a (flatspine stickseed)	Linum perenne ⁱ (blue flax)	Orobanche fasciculata (clustered broomrape)	Plantago patagonica ^a (woolly plantain)	Sanguisorba minor ⁱ (small burnet)	Sisymbrium altissimum ^{ai} (tall tumbledmustard)	Sphaeralcea coccinea (scarlet globemallow)
year	Nested Frequency															
2013	324	52	1	1	-	30	-	-	2	20	-	1	-	-	-	2
2016	353	66	-	-	3	9	7	6	8	29	31	2	10	1	6	-
year	Average Cover (%)															
2013	5.5	1.1	0.0	0.0	-	0.2	-	-	0.0	0.1	-	0.0	-	-	-	0.0
2016	1.9	3.4	-	-	0.0	0.0	0.2	0.0	0.0	0.1	1.6	0.0	0.0	0.1	0.2	-

a - Annual/Biennial; n - Noxious Weed; i - Introduced Species

Table 10R-55.12 - Shrub and Tree Species. Average modified Daubenmire quadrat and line intercept cover by year.

SHRUB SPECIES	Artemisia tridentata ssp. wyomingensis ^p (Wyoming big sagebrush)	Ephedra viridis ^p (mormon tea)	Gutierrezia sarothrae (broom snakeweed)	Juniperus osteosperma ^t (Utah juniper)	Opuntia (pricklypear)	Pinus edulis ^t (two-needle pinyon)	Purshia tridentata ^p (antelope bitterbrush)
year	Line Intercept Cover (%)						
2013	12.2	-	0.1	5.6	0	1	-
2016	6.7	0.2	7.4	-	1.3	-	0.2
year	Quadrat Cover (%)						
2013	10.3	-	0.1	2.1	0.3	0.1	-
2016	7.1	0.0	2.9	0.3	1.1	-	0.0

t - Tree Species; p - Preferred Browse; i - Introduced

Table 10R-55.13 - Shrub/Tree Characteristics. Population characteristics of shrub/tree species populations including density reproduction (seedlings), age distribution, utilization, vigor and average size (height/crown) of plants.

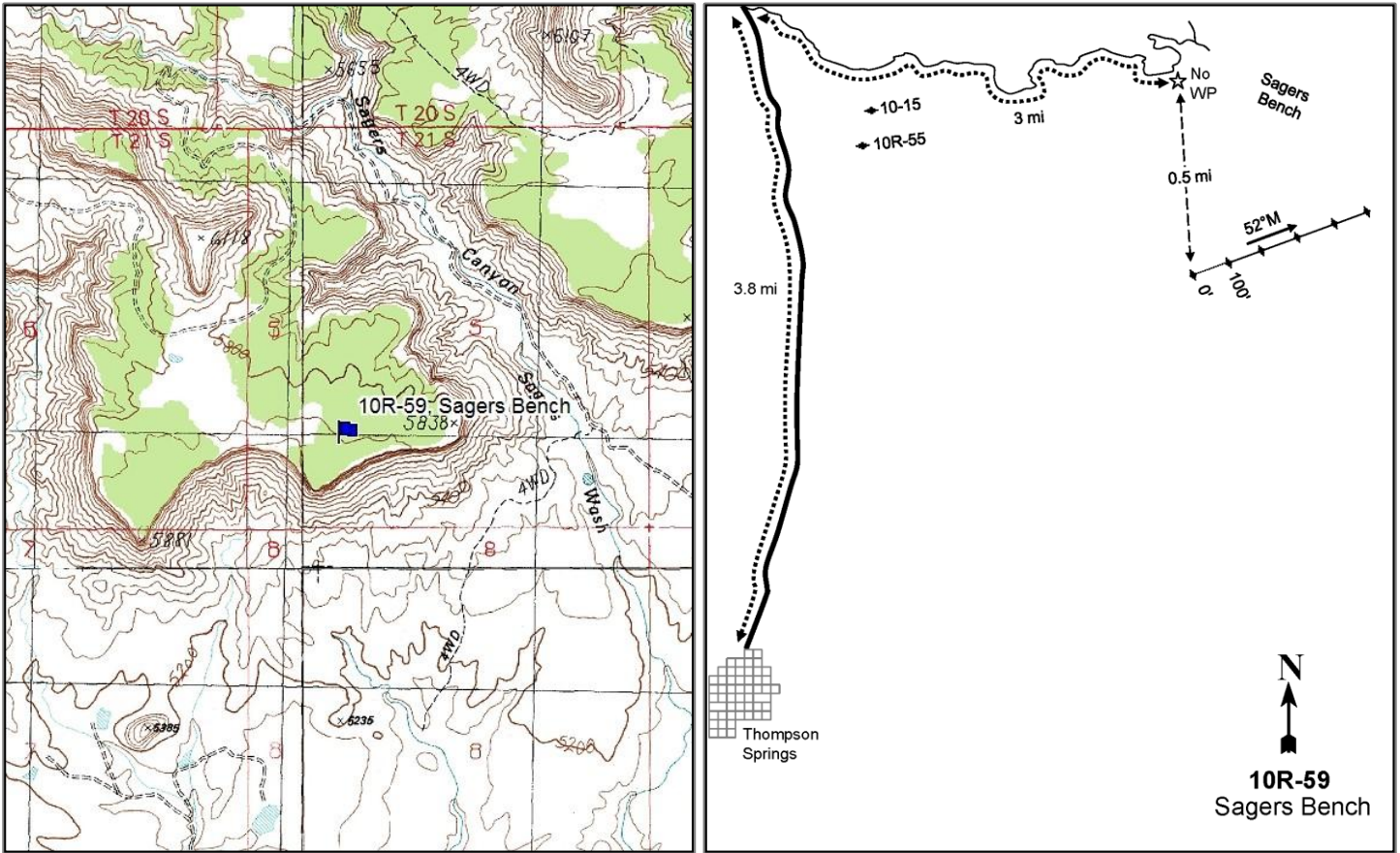
Year	Density		Age Class Distribution			Utilization		Poor Vigor (%)	Average Height Crown (cm)
	Plants Per Acre		Excluding Seedlings			Moderate (%)	Heavy (%)		
	Excluding Seedlings	Seedling	Young (%)	Mature (%)	Decadent (%)				
Artemisia tridentata ssp. wyomingensis ^p -- (Wyoming big sagebrush)									
2013	1880	60	1	60	39	35	61	63	56/80
2016	2760	-	29	48	23	17	41	28	51/86
Ephedra viridis ^p -- (mormon tea)									
2013	-	-	-	-	-	-	-	-	-/-
2016	20	-	100	0	0	0	0	0	-/-
Gutierrezia sarothrae -- (broom snakeweed)									
2013	160	40	75	13	13	0	13	13	13/17
2016	3800	20	4	96	0	0	0	0	34/49
Juniperus osteosperma ^t -- (Utah juniper)									
2013	40	-	50	50	0	0	0	0	-/-
2016	-	100	0	0	0	0	0	0	-/-
Opuntia -- (pricklypear)									
2013	240	-	0	67	33	0	0	50	12/50
2016	600	-	7	93	0	3	0	10	16/58

t - Tree Species; p - Preferred Browse; i - Introduced Species

Table 10R-55.14 - Tree Characteristics. Point-quarter tree density, size class distribution, and average diameter.

Year	Density	Size Class Distribution					Average Diameter (cm)
	Trees per Acre	Seedling (%)	1-4'	4-8'	8-12'	>12' (%)	
Juniperus osteosperma (Utah juniper)							
2013	24	8	-	42	50	-	16.3
2016	9	-	75	13	13	-	7.3
Pinus edulis (two-needle pinyon)							
2016	1	-	-	-	100	-	10.0

SAGERS BENCH - STUDY NO. 10R-59



Location Information

USGS 7.5 min Map Info Calf Canyon SW; Township 21S, Range 21E, Section 05
 GPS (0' Stake) NAD 83 UTM ZONE 12, 619151 East 4318167 North

Transect Information

Browse Tag # (0' Stake) Not Available
 Transect Bearing 53° 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 Thompson, travel north on Thompson Canyon Road for 3.8 miles to a road on the right (east). Turn here, continue for 3 miles (past studies 10-15 and 10R-55) and stop. The transect is about 1/2 mile south of the road.

Site Information

Land Ownership	Federal
Land Administrator	BLM
Allotment	CISCO
Elevation	5,827ft (1,776m)
Aspect	North
Slope	4%
Sample Dates	08/04/2016

Table 10R-59.1 Disturbance History. Recorded history of major disturbances.

Treatment/Disturbance	Name	WRI DB#	Date	Size (acres)
Seeding - Aerial After	South Bookcliffs Phase 4 (Sagers)	3673	December 2016	471
Mechanical - Bullhog	South Bookcliffs Phase 4 (Sagers)	3673	October-December 2016	471
Seeding - Aerial Before	South Bookcliffs Phase 4 (Sagers)	3673	October 2016	471

Table 10R-59.2 Seed Mix. List of known seeded plant species and rates (if available).

Mix Name			Application Type	Application Date	Acres
South Bookcliffs Sagers			Aerial	Oct 2016	471
Type	Species	Common Name	Cultivar/Source ID	Bulk lbs/acre	PLS lbs/acre
G	Achnatherum hymenoides	Indian Ricegrass	White River	0.79	0.73
G	Achnatherum hymenoides	Indian Ricegrass	Emery UT	0.21	0.20
G	Elymus lanceolatus	Thickspike Wheatgrass	Critana	0.42	0.36
G	Elymus lanceolatus	Thickspike Wheatgrass	Critana	0.11	0.09
G	Poa secunda	Sandberg Bluegrass	UP/Colorado Plateau	0.96	0.72
F	Cleome lutea	Rocky Mountain Beeplant	Davis UT	0.34	0.28
F	Cleome lutea	Rocky Mountain Beeplant	Piute UT	0.47	0.43
F	Cleome lutea	Rocky Mountain Beeplant	Sanpete UT	0.11	0.10
F	Dalea purpurea	Purple Prairie Clover		0.31	0.25
F	Dalea purpurea	Purple Prairie Clover	Bismark	0.64	0.63
F	Achillea millefolium	Western Yarrow	Lincoln WA	0.11	0.10
F	Helianthus annuus	Annual Sunflower	Montezuma CO	0.53	0.47
F	Linum perenne	Blue Flax	Appar	0.96	0.85
F	Medicago sativa	Alfalfa	Ladak+	0.64	0.61
F	Onobrychis viciifolia	Sainfoin	Eski	0.96	0.73
F	Penstemon palmeri	Palmer Penstemon	Carbon UT	0.21	0.17
F	Ratibida columnifera	Prairie Coneflower	Stillwater	0.32	0.29
F	Sanguisorba minor	Small Burnet		0.96	0.89
F	Sphaeralcea grossulariifolia	Gooseberryleaf Globemallow	Beaver UT	0.21	0.08
S	Atriplex canescens	Fourwing Saltbush	Wayne/Carbon/Emery UT	0.96	0.40
Mix Name			Application Type	Application Date	Acres
South Bookcliffs Sagers Sagebrush			Aerial	Dec 2016	471
Type	Species	Common Name	Cultivar/Source ID	Bulk lbs/acre	PLS lbs/acre
F	Medicago sativa	Alfalfa	Ladak	0.32	0.30
S	Artemisia tridentata ssp. wyomingensis	Wyoming Big Sagebrush	Sanpete UT	0.53	0.10

Wildlife Habitat and Vegetation History

Table 10R-59.3 - Wildlife Seasonal Habitat. UDWR wildlife habitat and seasonality.

Species	Habitat	Season
Deer	crucial	winter
Rocky Mountain Bighorn	crucial	year-long

Table 10R-59.4 - Vegetation History. The dominant vegetation type(s) and phase of woodland succession (Tausch, Miller, Roundy, & Chambers, 2009).

Year	Vegetation Type	Woodland Succession
2016	Utah Juniper	Phase III

Site Notes

No Notes

Site Potential

1981-2010 Average Annual Precipitation 11 inches
 NRCS Ecological Site Upland Shallow Loam (Cliffrose)
 NRCS Ecological Site # R035XY313UT
 States and Transitions No state and transition model is available for this ecological site.

When established in 2016, the site was a degraded Stansbury cliffrose (*Purshia stansburiana*) community type dominated by older Utah juniper (*Juniperus osteosperma*) and two-needle pine (*Pinus edulis*) trees in Phase III of woodland succession (Table 10R-59.12, Photos). There were a number of other browse species but they provided limited cover (Table 10R-59.12, Table 10R-59.13). Cover and diversity for the herbaceous community were both low; Grass presence was especially lacking. The invasive annual grass Cheatgrass (*Bromus tectorum*) was sampled on the site, which may pose a risk to the resilience of the community if released following a treatment or wildfire (Table 10R- 59.10, Table 10R-59.11).

Trend Summary Tables

Table 10R-59.6 - Shrub/Tree Summary. Average modified Daubenmire quadrat and line intercept cover by year for shrubs/trees.

Year	Quadrat Cover (%)			Line-intercept Cover (%)		
	Preferred Shrub	Other Shrub	Tree	Preferred Shrub	Other Shrub	Tree
2016	1.1	3.1	5.7	3.5	5.8	18.5

Table 10R-59.7 - Herbaceous Summary. Nested frequency and average modified Daubenmire quadrat cover by year for herbaceous functional groups.

Year	Nested Frequency				Quadrat Cover (%)			
	Annual Grass	Perennial Grass	Annual/Biennial Forb	Perennial Forb	Annual Grass	Perennial Grass	Annual/Biennial Forb	Perennial Forb
2016	18	0	119	73	0.0	0.0	0.3	1.7

Table 10R-59.8 - Basic Ground Cover. Average modified Daubenmire quadrat cover by year for basic ground cover types.

Year	Cover Type (%)					
	Bare Ground	Cryptograms	Litter	Pavement	Rock	Vegetation
2016	47.4	1.0	34.7	9.2	11.5	10.4

Table 10R-59.9 - Pellet Group Data. Quadrat frequency and pellet group transect data for animal pellets. Rabbit pellet groups are not sampled in the pellet group transect.

Year	Mule Deer	Rabbit
	Quadrat Frequency	
2016	11	32
Year	Days Use Per Acre (ha)	
	2016	7.4 (18.2)

Table 10R-59.10 - Grass Species. Nested frequency and modified Daubenmire average cover by year.

GRASS SPECIES	Nested Frequency	
	Achnatherum hymenoides (Indian ricegrass)	0
Bromus tectorum ^{ai} (cheatgrass)	0.0	0.0

a - Annual; n - Noxious Weed; i - Introduced Species

Table 10R-59.11 - Forb Species. Nested frequency and modified Daubenmire average cover by year.

FORB SPECIES	Androsace septentrionalis ^a (pygmyflower rockjasmine)	Antennaria dimorpha (low pussytoes)	Chamaesyce (sandmat)	Cryptantha ^a (annual cryptantha)	Cryptantha (cryptantha)	Cymopterus (springparsley)	Draba ^a (draba)	Gilia ^a (gilia)	Lappula occidentalis ^a (flatspine stickseed)	Machaeranthera grindelioides (rayless tansyaster)	Penstemon (beardtongue)	Petroradia pumila (rock goldenrod)	Stenotus acaulis (stemless mock goldenweed)	Townsendia (Townsend daisy)
year	Nested Frequency													
2016	2	1	18	2	19	1	114	10	6	12	8	18	4	2
year	Average Cover (%)													
2016	0.0	0.0	0.2	0.0	0.3	0.0	0.3	0.0	0.0	0.1	0.0	1.0	0.0	0.0

a - Annual/Biennial; n - Noxious Weed; i - Introduced Species

Table 10R-59.12 - Shrub and Tree Species. Average modified Daubenmire quadrat and line intercept cover by year.

SHRUB SPECIES	Ephedra viridis ^p (mormon tea)	Eriogonum microthecum ^p (slender buckwheat)	Gutierrezia sarothrae (broom snakeweed)	Juniperus osteosperma ^t (Utah juniper)	Linanthus pungens (granite prickly phlox)	Pinus edulis ⁱ (twoneedle pinyon)	Purshia stansburiana ^p (Stansbury cliffrose)	Symphoricarpos oreophilus (mountain snowberry)
year	Line Intercept Cover (%)							
2016	0.2	0.1	4.9	16.3	0.1	2.2	3.2	0.8
year	Quadrat Cover (%)							
2016	0.1	0.1	3.0	4.3	0.1	1.5	0.8	0.1

t - Tree Species; p - Preferred Browse; i - Introduced

Table 10R-59.13 - Shrub/Tree Characteristics. Population characteristics of shrub/tree species populations including density reproduction (seedlings), age distribution, utilization, vigor and average size (height/crown) of plants.

Year	Density		Age Class Distribution			Utilization		Poor Vigor (%)	Average Height Crown (cm)
	Plants Per Acre		Excluding Seedlings			Moderate (%)	Heavy (%)		
	Excluding Seedlings	Seedling	Young (%)	Mature (%)	Decadent (%)				
Ephedra viridis ^p -- (mormon tea)									
2016		-	20	80	0	20	0	0	74/79
Eriogonum microthecum ^p -- (slender buckwheat)									
2016	920	80	20	80	0		30	0	11/17
Gutierrezia sarothrae -- (broom snakeweed)									
2016	17460	80	31	68	1	0	0	1	18/21
Juniperus osteosperma ^t -- (Utah juniper)									
2016	160	-	13	63	25	0	0	38	- / -
Linanthus pungens -- (granite prickly phlox)									
2016	480	-	29	71	0	25	33	13	8/12
Opuntia -- (pricklypear)									
2016	60	-	33	67	0	0	0	0	12/30
Pinus edulis ^t -- (twoneedle pinyon)									
2016	80	60	75	25	0	0	0	0	- / -

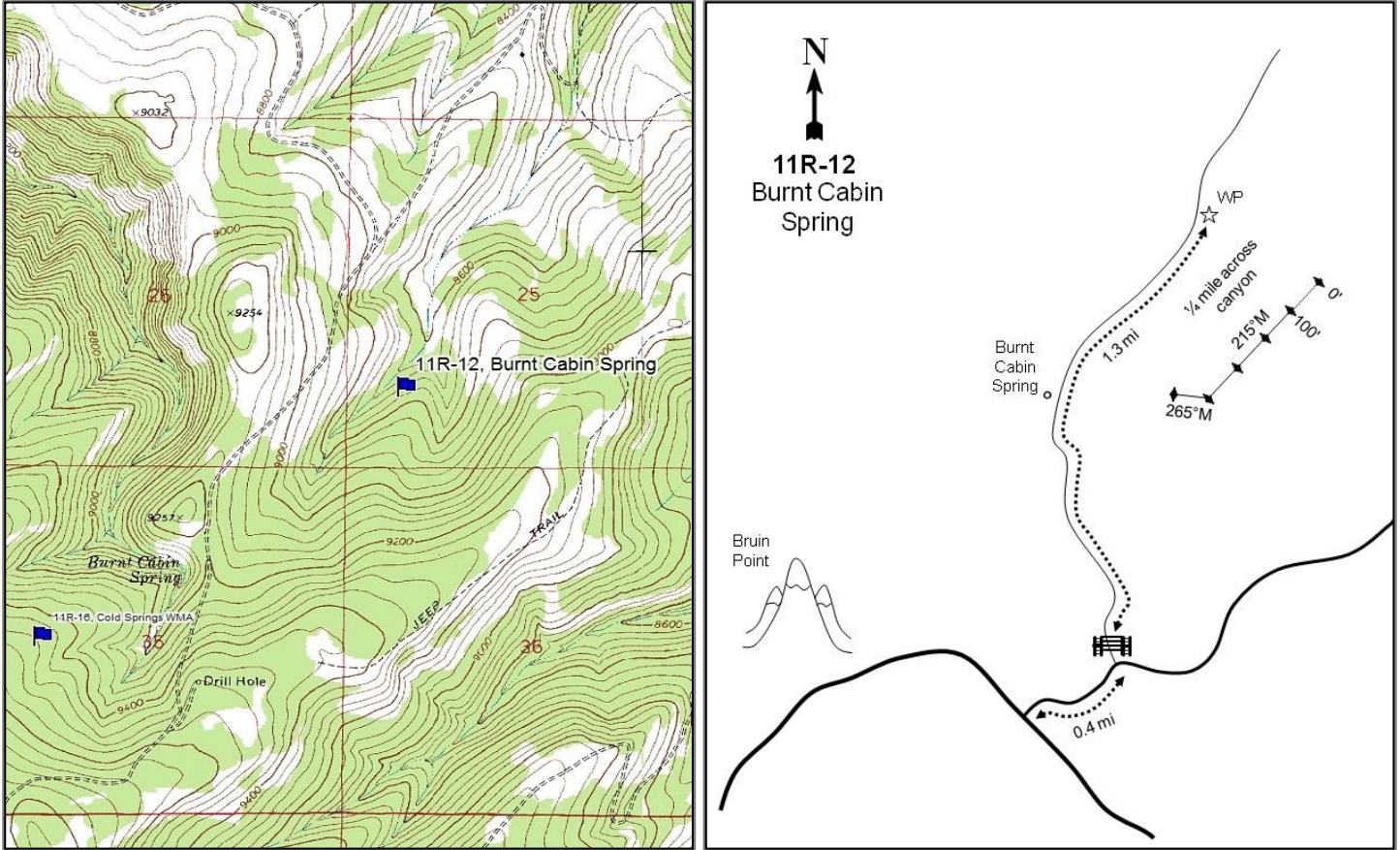
Year	Density		Age Class Distribution			Utilization		Poor Vigor (%)	Average Height Crown (cm)
	Plants Per Acre		Excluding Seedlings			Moderate (%)	Heavy (%)		
	Excluding Seedlings	Seedling	Young (%)	Mature (%)	Decadent (%)				
Purshia stansburiana ^p -- (Stansbury cliffrose)									
2016	340	20	47	41	12	29	24	12	67/87
Symphoricarpos oreophilus -- (mountain snowberry)									
2016	280	-	7	93	0	43	43	0	39/58
Yucca -- (yucca)									
2016	-	-	-	-	-	-	-	-	32/42

t - Tree Species; p - Preferred Browse; i - Introduced Species

Table 10R-59.14 - Tree Characteristics. Point-quarter tree density, size class distribution, and average diameter.

Year	Density	Size Class Distribution					Average Diameter (cm)
	Trees per Acre	Seedling (%)	1-4'	4-8'	8-12'	>12' (%)	
Juniperus osteosperma (Utah juniper)							
2016	255	-	15	35	35	15	27.5
Pinus edulis (two-needle pinyon)							
2016	54	-	67	7	7	20	11.9

BURNT CABIN SPRING - STUDY NO. 11R-12



Location Information

USGS 7.5 min Map Info	Bruin Point SE; Township 13S, Range 14E, Section 25
GPS (0' Stake)	NAD 83 UTM ZONE 12, 559658 East 4390313 North

Transect Information

Browse Tag # (0' Stake)	Not Available
Transect Bearing	215° magnetic (Line 5: 265° 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 Bruin Point, travel east to the entrance of the WMA and turn left. Drive 0.4 miles to a locked gate on the left. Proceed through the gate and continue 1.3 miles to a witness post. The study site is across the canyon to the southeast on the lower portion of the hill slope.

Site Information

Land Ownership	State
Land Administrator	UDWR
Allotment	GREEN RIVER
Elevation	8,777ft (2,675m)
Aspect	Northwest
Slope	25%
Sample Dates	08/21/2012, 08/17/2016

Table 11R-12.1 Disturbance History. Recorded history of major disturbances.

Treatment/Disturbance	Name	WRI DB#	Date	Size (acres)
Fire - Prescribed	Cold Spring Aspen Enhancement Phase 2: Tavaputs Ranch	1932	2015	191

Wildlife Habitat and Vegetation History

Table 11R-12.3 - Wildlife Seasonal Habitat. UDWR wildlife habitat and seasonality.

Species	Habitat	Season	Brood/Young Rearing
Deer	crucial	summer	
Elk	crucial	summer	
Greater Sage Grouse	Crucial	occupied & Winter	brood-rearing

Table 11R-12.4 - Vegetation History. The dominant vegetation type(s) and phase of woodland succession (Tausch, Miller, Roundy, & Chambers, 2009).

Year	Vegetation Type	Woodland Succession
2012	Quaking Aspen-Conifer Encroached	NA
2016	Quaking Aspen	NA

Site Notes

This study is located two and a half miles northeast of Bruin Point within the Range Creek Wildlife Management Area.

Site Potential

1981-2010 Average Annual Precipitation	22 inches
NRCS Ecological Site	High Mountain Loam (Aspen)
NRCS Ecological Site #	R048AY506UT
States and Transitions	No state and transition model is available for this ecological site.

When established in 2012, this site was a Douglas Fir (*Pseudotsuga menziesii*) and subalpine fir (*Abies lasiocarpa*) dominated forest. Many fallen and dead quaking aspen (*Populus tremuloides*) trees were present on the site, but few live trees were sampled. The shrub understory consisted of dense patches of creeping barberry (*Mahonia repens*) (Table 11R-12.12, Table 11R-12.13). The herbaceous understory was very low in abundance and lacked diversity (Table 11R-12.11). Following the controlled burn in 2015, many of the conifer species were removed with aspen becoming the dominant species in the community (Table 11R-12.12, Table 11R-12.13). Species diversity increased significantly among the herbaceous understory; However, the noxious annual weed species gypsyflower (*Cynoglossum officinale*) was observed in low abundance (Table 11R-12.11).

Trend Summary Tables

Table 11R-12.6 - Shrub/Tree Summary. Average modified Daubenmire quadrat and line intercept cover by year for shrubs/trees.

Year	Quadrat Cover (%)			Line-intercept Cover (%)		
	Preferred Shrub	Other Shrub	Tree	Preferred Shrub	Other Shrub	Tree
2012	0.8	4.6	62.9	1.2	6.7	101.3
2016	2.4	3.5	6.7	2.9	4.4	12.3

Table 11R-12.7 - Herbaceous Summary. Nested frequency and average modified Daubenmire quadrat cover by year for herbaceous functional groups.

Year	Nested Frequency				Quadrat Cover (%)			
	Annual Grass	Perennial Grass	Annual/Biennial Forb	Perennial Forb	Annual Grass	Perennial Grass	Annual/Biennial Forb	Perennial Forb
2012	-	47	1	152	-	0.6	0.0	5.7
2016	-	68	150	157	-	0.9	17.6	5.2

Table 11R-12.8 - Basic Ground Cover. Average modified Daubenmire quadrat cover by year for basic ground cover types.

Year	Cover Type (%)					
	Bare Ground	Cryptograms	Litter	Pavement	Rock	Vegetation
2012	0.6	1.1	85.3	-	-	65.9
2016	4.6	-	69.1	1.2	0.3	31.2

Table 11R-12.9 - Pellet Group Data. Quadrat frequency and pellet group transect data for animal pellets. Rabbit pellet groups are not sampled in the pellet group transect.

Year	Cattle	Coyote	Mule Deer	Elk	Horse	Rabbit
	Quadrat Frequency					
2012	-	-	1	-	-	-
2016	-	-	4	6	-	1
Year	Days Use Per Acre (ha)					
	2012	-	8.7 (21.5)*	8.7 (21.5)	5.3 (13.2)	-
2016	5.8 (14.3)	-	12.8 (31.5)	30.8 (76.1)	0.6 (1.4)	-

*Pellets per acre (ha)

Table 11R-12.10 - Grass Species. Nested frequency and modified Daubenmire average cover by year.

GRASS SPECIES	Nested Frequency				
	Achnatherum nelsonii (Columbia needlegrass)				
Bromus porteri (Porter brome)					
Carex rossii (Ross' sedge)					
Poa pratensis ⁱ (Kentucky bluegrass)					
year	Nested Frequency				
2012	-	20	24	11	
2016	8	4	56	2	
year	Average Cover (%)				
2012	-	0.2	0.2	0.2	
2016	0.1	0.0	0.8	0.0	

a - Annual; n - Noxious Weed; i - Introduced Species

Table 11R-12.11 - Forb Species. Nested frequency and modified Daubenmire average cover by year.

FORB SPECIES	Nested Frequency																	
	Achillea millefolium (Common yarrow)																	
Alyssum desertorum ⁿⁱ (desert madwort)																		
Androsace septentrionalis ^a (pygmyflower rockjasmine)																		
Aquilegia coerulea (Colorado blue columbine)																		
Astragalus miser var. oblongifolius (timber milkvetch)																		
Chenopodium fremontii ^a (Fremont's goosefoot)																		
Cirsium (thistle)																		
Corydalis ^a (fumewort)																		
Cynoglossum officinale ^{ani} (gypsyflower)																		
Descurainia californica ^a (Sierra tansymustard)																		
Dracocephalum parviflorum (American dragonhead)																		
Epilobium (willowherb)																		
Eucephalus engelmannii (Engelmann's aster)																		
Fragaria virginiana (Virginia strawberry)																		
Iliamna rivularis (streambank wild hollyhock)																		
Ipomopsis aggregata (scarlet gilia)																		
Ligusticum (licorice-root)																		
year	Nested Frequency																	
2012	8	-	-	-	10	-	-	-	-	1	-	-	12	13	-	-	-	-
2016	8	13	1	11	5	64	3	76	3	21	3	1	6	7	2	3	1	1
year	Average Cover (%)																	
2012	0.1	-	-	-	0.2	-	-	-	-	0.0	-	-	0.1	0.3	-	-	-	-
2016	0.5	0.2	0.0	0.4	0.1	2.4	0.0	10.1	0.1	4.2	0.0	0.0	0.1	0.2	0.1	0.0	0.0	0.0

a - Annual/Biennial; n - Noxious Weed; i - Introduced Species

FORB SPECIES										
Maianthemum racemosum ssp. amplexicaule (feathery false lily of the valley)										
Maianthemum stellatum (starry false lily of the valley)										
Osmorhiza berteroi (sweet cicely)										
Phacelia sericea ^a (silky phacelia)										
Ranunculus inamoenus (graceful buttercup)										
Silene menziesii (Menzies' campion)										
Symphotrichum ascendens (western aster)										
Taraxacum officinale (common dandelion)										
Thalictrum fendleri (Fendler's meadow-rue)										
Viola (violet)										
year	Nested Frequency									
2012	9	39	47	-	-	-	-	-	38	80
2016	2	13	15	16	10	10	3	1	38	106
year	Average Cover (%)									
2012	0.6	1.7	0.4	-	-	-	-	-	1.2	1.2
2016	0.1	0.1	0.3	0.6	0.1	0.3	0.0	0.0	0.9	2.0

a - Annual/Biennial; n - Noxious Weed; i - Introduced Species

Table 11R-12.12 - Shrub and Tree Species. Average modified Daubenmire quadrat and line intercept cover by year.

SHRUB SPECIES															
Abies lasiocarpa ^t (subalpine fir)															
Acer negundo var. negundo ^t (boxelder)															
Amelanchier utahensis ^p (Utah serviceberry)															
Arctostaphylos patula (greenleaf manzanita)															
Artemisia tridentata ssp. vaseyana ^p (mountain big sagebrush)															
Mahonia repens (creeping barberry)															
Paxistima myrsinites (Oregon boxleaf)															
Populus tremuloides ^t (quaking aspen)															
Pseudotsuga menziesii ^t (Douglas-fir)															
Ribes ^p (currant)															
Ribes cereum var. cereum (wax currant)															
Rosa woodsii ^p (Woods' rose)															
Rubus (blackberry)															
Sambucus nigra ssp. cerulea ^p (blue elderberry)															
Symphoricarpos oreophilus (mountain snowberry)															
year	Line Intercept Cover (%)														
2012	73.8	-	-	-	-	0.3	3	21.4	6.1	0.1	-	1.1	-	-	3.4
2016	2.9	-	-	-	-	2.2	0.4	9.4	-	-	0	2.9	-	0	1.8
year	Quadrat Cover (%)														
2012	49.3	0.0	-	-	-	0.7	2.0	2.7	10.9	0.0	0.0	0.8	-	-	1.9
2016	2.4	-	0.0	0.3	0.0	1.0	0.3	4.3	-	-	0.0	2.2	0.0	0.1	1.7

t - Tree Species; p - Preferred Browse; i - Introduced

Table 11R-12.13 - Shrub/Tree Characteristics. Population characteristics of shrub/tree species populations including density reproduction (seedlings), age distribution, utilization, vigor and average size (height/crown) of plants.

Year	Density		Age Class Distribution			Utilization		Poor Vigor (%)	Average Height Crown (cm)
	Plants Per Acre		Excluding Seedlings			Moderate (%)	Heavy (%)		
	Excluding Seedlings	Seedling	Young (%)	Mature (%)	Decadent (%)				
Abies lasiocarpa ^t -- (subalpine fir)									
2012	3500	920	78	15	6	0	0	9	- / -
2016	20	80	100	0	0	0	0	0	- / -
Amelanchier utahensis ^p -- (Utah serviceberry)									
2012	-	-	-	-	-	-	-	-	- / -
2016	-	20	0	0	0	0	0	0	24/20
Artemisia tridentata ssp. vaseyana ^p -- (mountain big sagebrush)									
2012	-	-	-	-	-	-	-	-	- / -
2016	40	-	100	0	0	0	0	0	- / -

Year	Density		Age Class Distribution			Utilization		Poor Vigor (%)	Average Height Crown (cm)
	Plants Per Acre		Excluding Seedlings			Moderate (%)	Heavy (%)		
	Excluding Seedlings	Seedling	Young (%)	Mature (%)	Decadent (%)				
Mahonia repens -- (creeping barberry)									
2012	1540	-	0	100	0	0	0	0	14/13
2016	1820	-	0	100	0	0	0	0	15/21
Paxistima myrsinites -- (Oregon boxleaf)									
2012	6860	-	11	88	1	0	0	0	12/14
2016	3320	320	40	60	0	0	0	0	9/9
Pseudotsuga menziesiiⁱ -- (Douglas-fir)									
2012	180	-	22	56	22	0	44	11	- / -
2016	-	-	-	-	-	-	-	-	- / -
Ribes cereum var. cereum -- (wax currant)									
2012	60	-	67	33	0	0	0	0	63/50
2016	20	180	100	0	0	0	0	0	11/13
Rosa woodsii^p -- (Woods' rose)									
2012	2780	-	9	91	0	0	0	0	25/22
2016	4320	100	27	73	0	1	0	2	24/28
Rubus -- (blackberry)									
2012	-	-	-	-	-	-	-	-	- / -
2016	80	-	25	75	0	0	0	0	7/11
Sambucus nigra ssp. cerulea^p -- (blue elderberry)									
2012	-	-	-	-	-	-	-	-	- / -
2016	20	200	100	0	0	0	0	0	26/24
Symphoricarpos oreophilus -- (mountain snowberry)									
2012	3560	-	4	96	0	0	0	1	48/37
2016	2200	60	36	65	0	32	12	0	25/38

t - Tree Species; p - Preferred Browse; i - Introduced Species

Table 11R-12.13a - Aspen Characteristics. Characteristics of aspen populations including density, size class distribution, and vigor of plants.

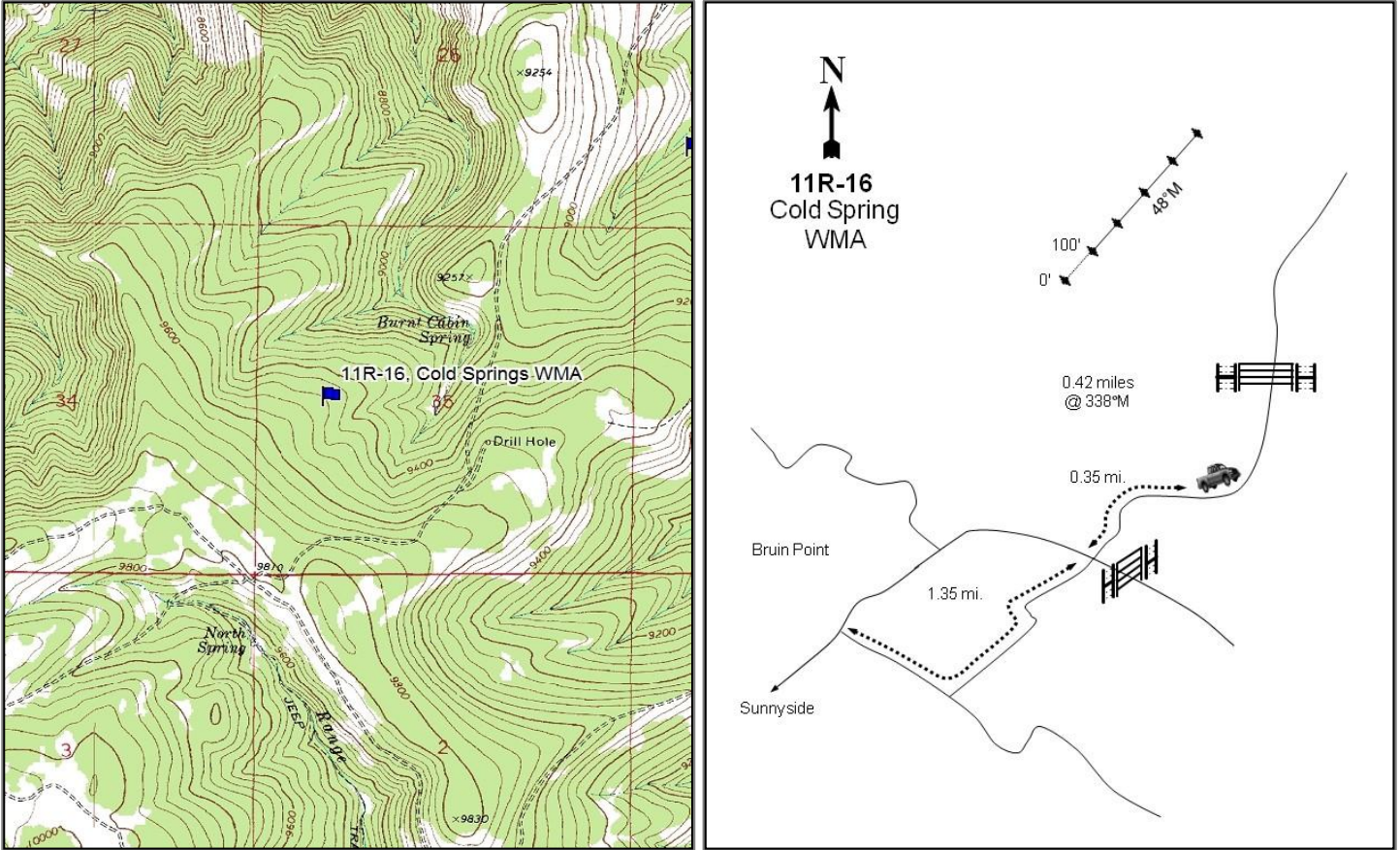
Year	Density	Size Class Distribution				Utilization		Poor Vigor (%)
	Plants per Acre	Class I (%)	Class II (%)	Class III (%)	Class IV (%)	Moderate (%)	Heavy (%)	
Populus tremuloides (quaking aspen)								
2012	960	46	10	44	-	0	0	0
2016	4580	23	70	7	1	20	49	5

Class I - Less than or equal to 1.5 feet
 Class II - Greater than 1.5 feet to 5 feet
 Class III - Greater than 5 feet and up to 1 inch diameter at breast height (dbh)
 Class IV - Greater than 1 in diameter at breast height (dbh)

Table 11R-12.14 - Tree Characteristics. Point-quarter tree density, size class distribution, and average diameter.

Year	Density	Size Class Distribution					Average Diameter (cm)
	Trees per Acre	Seedling (%)	1-4'	4-8'	8-12'	>12' (%)	
Abies lasiocarpa (subalpine fir)							
2012	2569	60	15	10	5	10	2.6
2016	9	-	50	50	-	-	2.3
Populus tremuloides (quaking aspen)							
2012	287	6	28	6	-	61	8.6
2016	1097	30	60	-	-	10	3.3

COLD SPRINGS WMA - STUDY NO. 11R-16



Location Information

USGS 7.5 min Map Info	Bruin Point SW; Township 13S, Range 14E, Section 35
GPS (0' Stake)	NAD 83 UTM ZONE 12, 558116 East 4389152 North

Transect Information

Browse Tag # (0' Stake)	Not Available
Transect Bearing	332° magnetic (Line 3: 350° magnetic, Line 4: 96° magnetic)
Length	400ft
Belt Placement	Line 1 (11ft & 95ft), Line 2 (34ft), Line 3 (59ft), Line 4 (71ft)
Belt Marker Placement	No Stakes or Rebar

Directions to Site

From Bruin Point, travel east to the entrance to the WMA and turn left. Drive 0.4 miles to a locked gate on the left. The study site is across the canyon to the Northwest on the ridge approximately one half mile away.

Site Information

Land Ownership	State
Land Administrator	UDWR
Allotment	GREEN RIVER
Elevation	9,305ft (2,836m)
Aspect	Northeast
Slope	8-10%
Sample Dates	07/02/2013, 08/17/2016

Table 11R-16.1 Disturbance History. Recorded history of major disturbances.

Treatment/Disturbance	Name	WRI DB#	Date	Size (acres)
Mechanical - Push	Cold Springs Conifer Removal/Aspen Regeneration Phase II	2637	July 2013-June 2014	45

Wildlife Habitat and Vegetation History

Table 11R-16.3 - Wildlife Seasonal Habitat. UDWR wildlife habitat and seasonality.

Species	Habitat	Season	Brood/Young Rearing
Deer	crucial	summer	
Elk	crucial	summer	
Greater Sage Grouse	Crucial	occupied & Winter	brood-rearing

Table 11R-16.4 - Vegetation History. The dominant vegetation type(s) and phase of woodland succession (Tausch, Miller, Roundy, & Chambers, 2009).

Year	Vegetation Type	Woodland Succession
2013	Subalpine Fir	NA
2016	Quaking Aspen	NA

Site Notes

The lines of this transect were shifted in 2016 to avoid large piles of litter from the push treatment. There was also a doe carcass found near the site.

Site Potential

1981-2010 Average Annual Precipitation	23 inches
NRCS Ecological Site	High Mountain Loam (Aspen)
NRCS Ecological Site #	R048AY506UT
States and Transitions	No state and transition model is available for this ecological site.

When established in 2012, this site was a subalpine fir (*Abies lasiocarpa*) dominated forest. Many fallen and dead quaking aspen (*Populus tremuloides*) trees were present on the site, but few live trees were sampled (Table 11R-16.12, Table 11R-16.13). The herbaceous understory had moderate abundance and lacked diversity (Table 11R-16.11). Following the push treatment in 2015, the conifer species were removed with young aspen becoming the dominant species in the community (Table 11R-16.12, Table 11R-16.13). Species diversity increased significantly among the herbaceous understory, but annual forb species specifically were more abundant than perennial forb species (Table 11R-16.11).

Trend Summary Tables

Table 11R-16.6 - Shrub/Tree Summary. Average modified Daubenmire quadrat and line intercept cover by year for shrubs/trees.

Year	Quadrat Cover (%)			Line-intercept Cover (%)		
	Preferred Shrub	Other Shrub	Tree	Preferred Shrub	Other Shrub	Tree
2013	1.1	0.6	29.3	0.9	0.8	75.1
2016	0.9	0.2	8.0	1.6	0.3	7.0

Table 11R-16.7 - Herbaceous Summary. Nested frequency and average modified Daubenmire quadrat cover by year for herbaceous functional groups.

Year	Nested Frequency				Quadrat Cover (%)			
	Annual Grass	Perennial Grass	Annual/Biennial Forb	Perennial Forb	Annual Grass	Perennial Grass	Annual/Biennial Forb	Perennial Forb
2013	-	42	7	149	-	0.5	0.1	7.5
2016	-	205	318	257	-	8.1	10.0	13.4

Table 11R-16.8 - Basic Ground Cover. Average modified Daubenmire quadrat cover by year for basic ground cover types.

Year	Cover Type (%)					
	Bare Ground	Cryptograms	Litter	Pavement	Rock	Vegetation
2013	0.5	0.1	86.0	0.2	0.1	40.6
2016	17.8	0.4	46.6	2.3	0.4	35.0

Table 11R-16.9 - Pellet Group Data. Quadrat frequency and pellet group transect data for animal pellets. Rabbit pellet groups are not sampled in the pellet group transect.

Year	Black Bear	Cattle	Mule Deer	Elk
	Quadrat Frequency			
2013	-	-	-	1
2016	-	2	6	2
Year	Days Use Per Acre (ha)			
2013	8.7 (21.5)*	1.5 (3.6)	0.7 (1.7)	3.4 (8.3)
2016	-	3.6 (9.0)	6.0 (14.9)	2.0 (5.0)

*Pellets per acre (ha)

Table 11R-16.10 - Grass Species. Nested frequency and modified Daubenmire average cover by year.

GRASS SPECIES	Achnatherum lettermanii (Letterman's needlegrass)	Achnatherum nelsonii (Columbia needlegrass)	Bromus marginatus (mountain brome)	Carex rossii (Ross' sedge)	Elymus elymoides (squirreltail)	Elymus trachycaulus (slender wheatgrass)	Poa pratensis' (Kentucky bluegrass)	Poa secunda (Sandberg bluegrass)
year	Nested Frequency							
2013	-	9	4	31	-	-	-	-
2016	4	10	5	200	2	1	2	0
year	Average Cover (%)							
2013	-	0.0	0.0	0.4	-	-	-	-
2016	0.1	0.3	0.1	7.4	0.0	0.0	0.1	0.0

a - Annual; n - Noxious Weed; i - Introduced Species

Table 11R-16.11 - Forb Species. Nested frequency and modified Daubenmire average cover by year.

FORB SPECIES	Achillea millefolium (Common yarrow)	Agoseris glauca (pale agoseris)	Alyssum desertorum ^{ai} (desert madwort)	Androsace septentrionalis ^a (pygmyflower rockjasmine)	Antennaria (pussytoes)	Aquilegia coerulea (Colorado blue columbine)	Arabis drummondii (Drummond's rockcress)	Arnica cordifolia (heartleaf arnica)	Astragalus (milkvetch)	Astragalus miser var. oblongifolius (timber milkvetch)	Chenopodium fremontii ^a (Fremont's goosefoot)	Collomia linearis ^a (tiny trumpet)	Descurainia pinnata ^a (western tansymustard)	Dracocephalum parviflorum (American dragonhead)	Eucephalus engelmannii (Engelmann's aster)	Fragaria virginiana (Virginia strawberry)	Gayophytum ramosissimum ^a (pinyon groundsmoke)	
year	Nested Frequency																	
2013	13	6	-	6	-	-	4	59	-	14	-	-	-	-	58	8	-	
2016	41	-	1	32	5	2	20	57	14	47	179	61	0	1	3	32	61	
year	Average Cover (%)																	
2013	0.1	0.0	-	0.0	-	-	0.0	1.6	-	0.5	-	-	-	-	1.8	0.2	-	
2016	2.3	-	0.0	0.3	0.2	0.0	0.2	0.9	0.2	0.9	3.1	0.9	0.0	0.1	0.0	0.6	1.0	

a - Annual/Biennial; n - Noxious Weed; i - Introduced Species

FORB SPECIES														
Gentiana amarella ssp. heterosepala ^a (autumn dwarf gentian)														
Heliomeris multiflora var. multiflora (showy goldeneye)														
Ligusticum (licorice-root)														
Lupinus argenteus (silvery lupine)														
Osmorhiza berteroi (sweetcicely)														
Phacelia sericea ^a (silky phacelia)														
Polygonum douglasii ^a (Douglas' knotweed)														
Ranunculus inamoenus (graceful buttercup)														
Silene menziesii (Menzies' campion)														
Stenotus acaulis (stemless mock goldenweed)														
Symphyotrichum ascendens (western aster)														
Taraxacum officinale (common dandelion)														
Viola adunca (hookedspur violet)														
year	Nested Frequency													
2013	-	-	-	38	-	1	-	-	17	-	-	11	16	
2016	15	1	7	75	2	48	207	34	2	1	17	144	38	
year	Average Cover (%)													
2013	-	-	-	2.4	-	0.0	-	-	0.0	-	-	0.3	0.6	
2016	0.3	0.0	0.0	3.0	0.0	0.9	3.5	0.9	0.0	0.0	0.5	2.8	0.6	

a - Annual/Biennial; n - Noxious Weed; i - Introduced Species

Table 11R-16.12 - Shrub and Tree Species. Average modified Daubenmire quadrat and line intercept cover by year.

SHRUB SPECIES							
Abies lasiocarpa ^t (subalpine fir)							
Paxistima myrsinites (Oregon boxleaf)							
Picea engelmannii ^t (Engelmann spruce)							
Populus tremuloides ^t (quaking aspen)							
Ribes cereum (wax currant)							
Rosa woodsii ^p (Woods' rose)							
Symphoricarpos oreophilus (mountain snowberry)							
year	Line Intercept Cover (%)						
2013	63.4	0.2	1.6	10.1	-	0.9	0.6
2016	-	-	-	7	0.1	1.6	0.2
year	Quadrat Cover (%)						
2013	28.5	0.2	0.2	0.6	-	1.1	0.4
2016	-	-	-	8.0	0.0	0.9	0.2

t - Tree Species; p - Preferred Browse; i - Introduced

Table 11R-16.13 - Shrub/Tree Characteristics. Population characteristics of shrub/tree species populations including density reproduction (seedlings), age distribution, utilization, vigor and average size (height/crown) of plants.

Year	Density		Age Class Distribution			Utilization		Poor Vigor (%)	Average Height Crown (cm)
	Plants Per Acre		Excluding Seedlings			Moderate (%)	Heavy (%)		
	Excluding Seedlings	Seedling	Young (%)	Mature (%)	Decadent (%)				
Abies lasiocarpa^t -- (subalpine fir)									
2013	3900	1740	70	25	6	6	7	10	- / -
2016	20	-	100	0	0	0	0	0	- / -
Artemisia tridentata ssp. vaseyana^p -- (mountain big sagebrush)									
2013	-	-	-	-	-	-	-	-	- / -
2016	-	-	-	-	-	-	-	-	42/37
Paxistima myrsinites -- (Oregon boxleaf)									
2013	520	-	0	100	0	0	0	0	11/28
2016	-	-	-	-	-	-	-	-	12/11
Picea engelmannii^t -- (Engelmann spruce)									
2013	60	-	33	33	33	0	0	0	- / -
2016	-	-	-	-	-	-	-	-	- / -
Ribes cereum -- (wax currant)									
2013	-	-	-	-	-	-	-	-	64/28
2016	40	20	100	0	0	0	0	0	41/26
Rosa woodsii^p -- (Woods' rose)									
2013	1340	20	33	67	0	3	0	0	29/29
2016	1300	-	5	95	0	25	0	0	32/36
Sambucus nigra ssp. cerulea^p -- (blue elderberry)									
2013	-	-	-	-	-	-	-	-	- / -
2016	-	-	-	-	-	-	-	-	44/39
Symphoricarpos oreophilus -- (mountain snowberry)									
2013	540	-	41	59	0	4	0	0	52/52
2016	440	-	23	77	0	91	0	0	47/79

t - Tree Species; p - Preferred Browse; i - Introduced Species

Table 11R-16.13a - Aspen Characteristics. Characteristics of aspen populations including density, size class distribution, and vigor of plants.

Year	Density	Size Class Distribution				Utilization		Poor Vigor (%)
	Plants per Acre	Class I (%)	Class II (%)	Class III (%)	Class IV (%)	Moderate (%)	Heavy (%)	
Populus tremuloides (quaking aspen)								
2013	500	4	20	36	40	8	0	4
2016	5400	12	86	1	-	38	10	0

Class I - Less than or equal to 1.5 feet

Class II - Greater than 1.5 feet to 5 feet

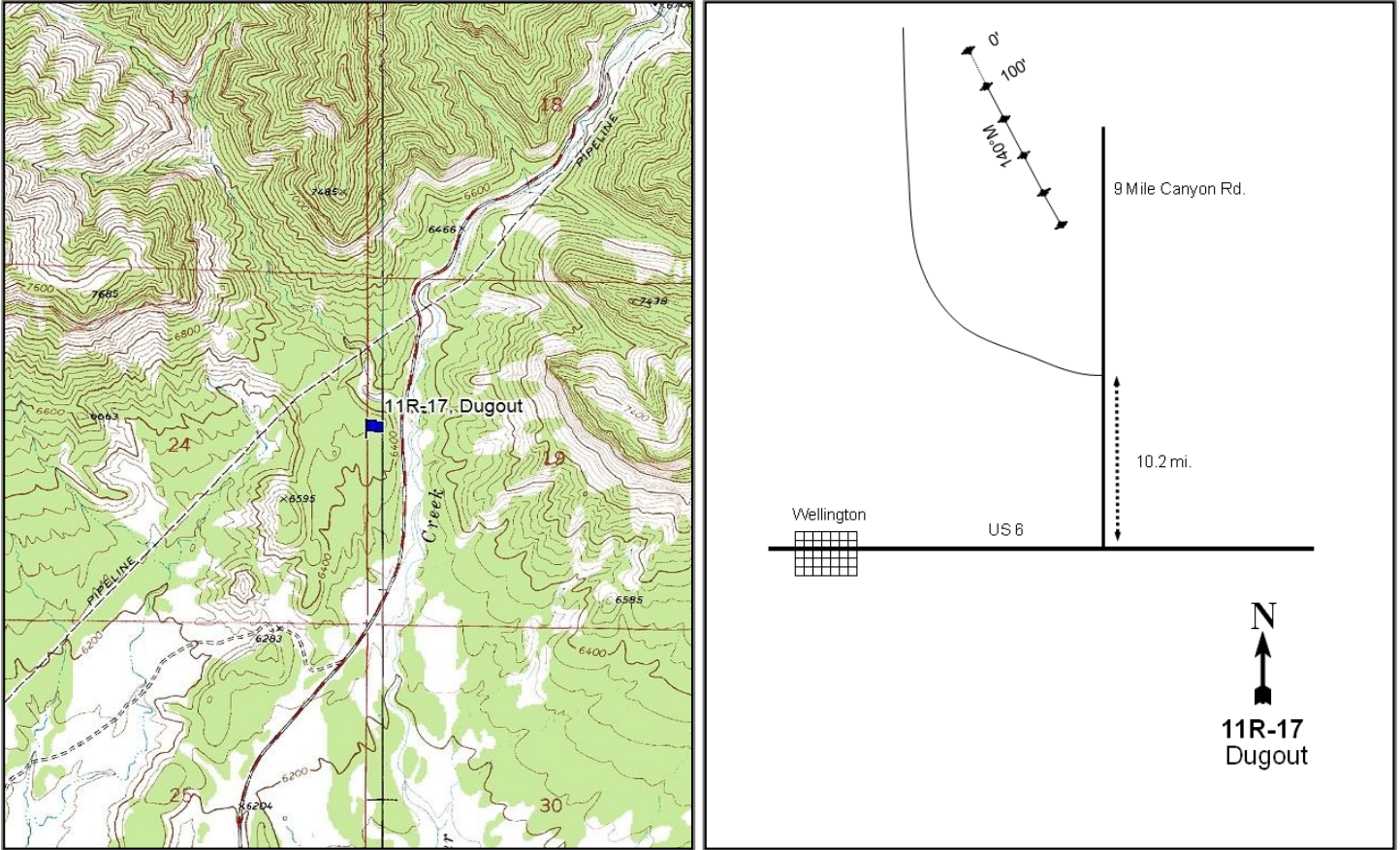
Class III - Greater than 5 feet and up to 1 inch diameter at breast height (dbh)

Class IV - Greater than 1 in diameter at breast height (dbh)

Table 11R-16.14 - Tree Characteristics. Point-quarter tree density, size class distribution, and average diameter.

Year	Density	Size Class Distribution				Average Diameter (cm)	
	Trees per Acre	Seedling (%)	1-4'	4-8'	8-12'		>12' (%)
Abies concolor (white fir)							
2013	1451	30	20	35	5	10	5.2
Picea pungens (blue spruce)							
2013	28	-	31	15	-	54	17.3
Populus tremuloides (quaking aspen)							
2013	357	-	-	-	-	-	11.8
2016	7291	5	95	-	-	-	1.1

DUGOUT - STUDY NO. 11R-17



Location Information

USGS 7.5 min Map Info Deadman Canyon SE; Township 13S, Range 11E, Section 24
 GPS (0' Stake) NAD 83 UTM ZONE 12, 532029 East 4392485 North

Transect Information

Browse Tag # (0' Stake) Not Available
 Transect Bearing 168° magnetic (Line 3: 130° magnetic, Line 4-5: 167° 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 east out of Wellington turn left (north) onto 9 Mile Canyon Rd. Drive 10.2 miles and turn left (west) onto a power line road. The study will be an indeterminate distance and bearing to the right.

Site Information

Land Ownership	Federal
Land Administrator	BLM
Allotment	SOLDIERS CANYON
Elevation	6,323ft (1,927m)
Aspect	Southeast
Slope	2-8%
Sample Dates	07/03/2013, 08/15/2016

Table 11R-17.1 Disturbance History. Recorded history of major disturbances.

Treatment/Disturbance	Name	WRI DB#	Date	Size (acres)
Mechanical - Bullhog	Dugout Creek Fuels Reduction and Habitat Restoration: Phase III	2540	Fall 2013	395
Seeding - Aerial Before	Dugout Creek Fuels Reduction and Habitat Restoration: Phase III	2540	Fall 2013	395

Table 11R-17.2 Seed Mix. List of known seeded plant species and rates (if available).

Mix Name		Application Type	Application Date	Acres	
Dugout Creek Fuels Reduction		Aerial	Oct 2013	395	
Type	Species	Common Name	Cultivar/Source ID	Bulk lbs/acre	PLS lbs/acre
G	Achnatherum hymenoides	Indian Ricegrass	Emery UT	0.10	0.06
G	Achnatherum hymenoides	Indian Ricegrass	Emery UT	1.01	0.71
G	Achnatherum hymenoides	Indian Ricegrass	Emery UT	2.53	1.79
G	Elymus elymoides	Bottlebrush Squirreltail	Fish Creek	1.56	1.14
G	Elymus elymoides	Bottlebrush Squirreltail	Juab UT	0.25	0.23
G	Hesperostipa comata	Needle and Threadgrass	Beaver UT	0.88	0.54
G	Hesperostipa comata	Needle and Threadgrass	Iron UT	0.25	0.15
G	Poa secunda	Big Bluegrass	Sherman	0.51	0.44
G	Sporobolus cryptandrus	Sand Dropseed	Washington CO	0.10	0.10
F	Penstemon comarrhenus	Dusty Penstemon	UP Delta CO	0.13	0.09
F	Sphaeralcea munroana	Munro Globemallow	Emery UT	0.13	0.08
S	Atriplex confertifolia	Shadscale Saltbrush	Sevier UT	0.63	0.29
S	Atriplex confertifolia	Shadscale Saltbrush		0.38	0.18
S	Krascheninnikovia lanata	Winterfat	Torrance NM	1.52	0.79

Wildlife Habitat and Vegetation History

Table 11R-17.3 - Wildlife Seasonal Habitat. UDWR wildlife habitat and seasonality.

Species	Habitat	Season
Deer	crucial	winter
Elk	crucial	year-long

Table 11R-17.4 - Vegetation History. The dominant vegetation type(s) and phase of woodland succession (Tausch, Miller, Roundy, & Chambers, 2009).

Year	Vegetation Type	Woodland Succession
2013	Pinyon-Juniper	Phase III
2016	Pinyon-Juniper	Phase I

Site Notes

The original site did not receive treatment so the study was moved to the south approximately 200 feet southwest of the previous transects 500 stake in order to capture the treated area. Additionally, the new transect doglegs in order to accommodate for the patchiness of the treatment.

Site Potential

1981-2010 Average Annual Precipitation 13 inches
 NRCS Ecological Site Upland Shallow Loam (Birchleaf Mountain mahogany)
 NRCS Ecological Site # R034XY321UT
 States and Transitions No state and transition model is available for this ecological site.

When established in 2013, two-needle pine (*Pinus edulis*) and Utah juniper (*Juniperus osteosperma*) trees were in phase III of encroachment on this site (Table 11R-17.4, Table 11R-17.6). The majority of the shrub and herbaceous understory species were sparse with no species being dominant. There were no grass species sampled on this site (Table 11R-17.11, Table 11R-17.10). With the removal some of the pinyon and juniper trees in 2013, the herbaceous understory increased in diversity, but most of that increase in due to annual species being observed following the bull-hog treatment (Table 11R-17.7). The shrub community showed relatively little change in community characteristics; However, it is expected that as a Phase I woodland community and with much of the canopy cover removed, beneficial browse and herbaceous species will increase in abundance (Table 11R-17.4, Table 11R-17.12). However, there remains a high risk of future encroachment due to the remaining pinyon and juniper trees as a seed source.

Trend Summary Tables

Table 11R-17.6 - Shrub/Tree Summary. Average modified Daubenmire quadrat and line intercept cover by year for shrubs/trees.

Year	Quadrat Cover (%)			Line-intercept Cover (%)		
	Preferred Shrub	Other Shrub	Tree	Preferred Shrub	Other Shrub	Tree
2013	0.8	0.5	16.2	2.9	0.2	45.8
2016	1.0	0.2	4.6	2.2	0.5	7.2

Table 11R-17.7 - Herbaceous Summary. Nested frequency and average modified Daubenmire quadrat cover by year for herbaceous functional groups.

Year	Nested Frequency				Quadrat Cover (%)			
	Annual Grass	Perennial Grass	Annual/Biennial Forb	Perennial Forb	Annual Grass	Perennial Grass	Annual/Biennial Forb	Perennial Forb
2013	-	-	7	35	-	-	0.0	0.2
2016	-	1	61	45	-	0.0	2.4	0.7

Table 11R-17.8 - Basic Ground Cover. Average modified Daubenmire quadrat cover by year for basic ground cover types.

Year	Cover Type (%)					
	Bare Ground	Cryptograms	Litter	Pavement	Rock	Vegetation
2013	23.2	0.5	52.7	5.1	12.9	19.5
2016	12.6	-	63.9	4.1	12.8	9.5

Table 11R-17.9 - Pellet Group Data. Quadrat frequency and pellet group transect data for animal pellets. Rabbit pellet groups are not sampled in the pellet group transect.

Year	Mule Deer	Rabbit
	Quadrat Frequency	
2013	14	4
2016	13	28
Year	Days Use Per Acre (ha)	
2013	20.1 (49.7)	-
2016	10.0 (24.8)	-

Table 11R-17.10 - Grass Species. Nested frequency and modified Daubenmire average cover by year.

GRASS SPECIES	
Achnatherum hymenoides (Indian ricegrass)	
year	Nested Frequency
2013	-
2016	1
year	Average Cover (%)
2013	-
2016	0.0

a - Annual; n - Noxious Weed; i - Introduced Species

Table 11R-17.11 - Forb Species. Nested frequency and modified Daubenmire average cover by year.

FORB SPECIES	Achillea millefolium (Common yarrow)	Arabis (rockcross)	Caulanthus crassicaulis ^a (thickstem wild cabbage)	Chaenactis douglasii (Douglas' dustymaiden)	Chamaesyce (sandmat)	Cryptantha (cryptantha)	Descurainia pinnata ^a (western tansymustard)	Euphorbia (spurge)	Hedysarum boreale (Utah sweetvetch)	Ipomopsis aggregata (scarlet gilia)	Lactuca serriola ^{ai} (prickly lettuce)	Lepidium ^a (pepperweed)	Packera multilobata (lobeleaf groundsel)	Penstemon (beardtongue)	Penstemon pachyphyllus (thickleaf beardtongue)	Physaria (twinpod)	Salsola tragus ^{ai} (prickly Russian thistle)
year	Nested Frequency																
2013	-	11	-	1	7	11	3	-	-	2	-	2	5	3	-	2	2
2016	2	12	2	-	13	2	22	2	2	5	43	-	10	-	7	6	-
year	Average Cover (%)																
2013	-	0.0	-	0.0	0.1	0.1	0.0	-	-	0.0	-	0.0	0.0	0.0	-	0.0	0.0
2016	0.0	0.1	0.1	-	0.2	0.0	0.4	0.1	0.0	0.2	1.9	-	0.1	-	0.1	0.0	-

a - Annual/Biennial; n - Noxious Weed; i - Introduced Species

FORB SPECIES			
	Streptanthus cordatus (heartleaf twistflower)		
	Taraxacum officinale (common dandelion)		
	Tragopogon dubius ^{ai} (yellow salsify)		
year	Nested Frequency		
2013	1	-	-
2016	-	1	2
year	Average Cover (%)		
2013	0.0	-	-
2016	-	0.0	0.0

a - Annual/Biennial; n - Noxious Weed; i - Introduced Species

Table 11R-17.12 - Shrub and Tree Species. Average modified Daubenmire quadrat and line intercept cover by year.

SHRUB SPECIES						
	Cercocarpus montanus ^p (alderleaf mountain mahogany)					
	Ephedra viridis ^p (mormon tea)					
	Juniperus osteosperma ^t (Utah juniper)					
	Opuntia (pricklypear)					
	Pinus edulis ^t (twoneedle pinyon)					
	Rhus trilobata var. trilobata (skunkbush sumac)					
year	Line Intercept Cover (%)					
2013	2	0.9	26.2	0.2	19.6	-
2016	2.2	-	4.3	-	2.9	0.5
year	Quadrat Cover (%)					
2013	0.4	0.4	7.4	0.5	8.8	-
2016	1.0	-	2.8	0.1	1.8	0.1

t - Tree Species; p - Preferred Browse; i - Introduced

Table 11R-17.13 - Shrub/Tree Characteristics. Population characteristics of shrub/tree species populations including density reproduction (seedlings), age distribution, utilization, vigor and average size (height/crown) of plants.

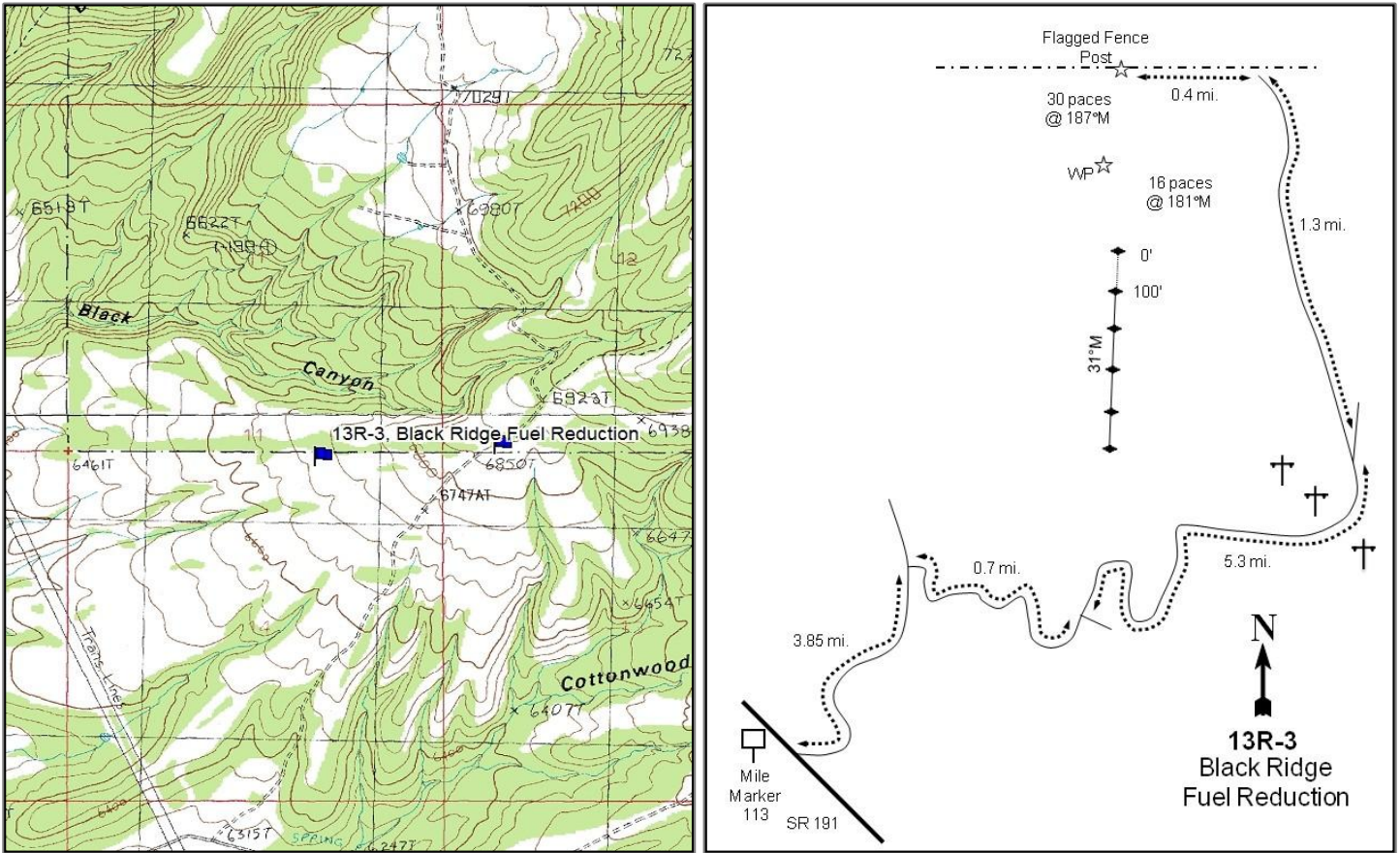
Year	Density		Age Class Distribution			Utilization		Poor Vigor (%)	Average Height Crown (cm)
	Plants Per Acre		Excluding Seedlings			Moderate (%)	Heavy (%)		
	Excluding Seedlings	Seedling	Young (%)	Mature (%)	Decadent (%)				
Cercocarpus montanus^p -- (alderleaf mountain mahogany)									
2013	180	-	22	67	11	22	56	11	132/146
2016	80	-	50	50	0	0	75	0	96/121
Ephedra viridis^p -- (mormon tea)									
2013	20	-	0	100	0	0	0	0	113/117
2016	40	-	100	0	0	0	0	0	80/95
Juniperus osteosperma^t -- (Utah juniper)									
2013	240	-	0	92	8	0	0	0	- / -
2016	80	200	0	50	50	0	0	0	- / -
Opuntia -- (pricklypear)									
2013	320	-	0	100	0	0	0	13	9/30
2016	160	-	0	100	0	0	0	0	9/31
Pinus edulis^t -- (two-needle pinyon)									
2013	500	-	52	48	0	0	0	0	- / -
2016	140	80	57	43	0	0	0	14	- / -
Purshia stansburiana^p -- (Stansbury cliffrose)									
2013	-	-	-	-	-	-	-	-	- / -
2016	-	-	-	-	-	-	-	-	230/290
Rhus trilobata var. trilobata -- (skunkbush sumac)									
2013	-	-	-	-	-	-	-	-	- / -
2016	20	-	0	100	0	0	0	0	91/129

t - Tree Species; p - Preferred Browse; i - Introduced Species

Table 11R-17.14 - Tree Characteristics. Point-quarter tree density, size class distribution, and average diameter.

Year	Density	Seedling (%)	Size Class Distribution				Average Diameter (cm)
	Trees per Acre		1-4'	4-8'	8-12'	>12' (%)	
Juniperus osteosperma (Utah juniper)							
2013	157	-	-	5	5	90	49.0
2016	162	21	21	-	16	42	28.1
Pinus edulis (two-needle pinyon)							
2013	409	5	50	10	10	25	9.1
2016	207	20	75	5	-	-	2.5

BLACK RIDGE FUEL REDUCTION - STUDY NO. 13R-3



Location Information

USGS 7.5 min Map Info La Sal West NW; Township 28S, Range 23E, Section 14
 GPS (0' Stake) NAD 83 UTM ZONE 12, 643665 East 4248461 North

Transect Information

Browse Tag # (0' Stake) 288
 Transect Bearing 180° 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 Moab, travel south on State Route 191 just past mile marker 113 where a road turns off to Black Ridge and Yellow Circle Mine. Turn left (east) and go 3.85 miles on the main road. Turn right and continue 0.7 miles up the ridge to a fork. Go left and stay on the main road for 5.3 miles (passing a gate at 2.6 miles). Turn left onto a jeep trail 0.1 miles after crossing under some power lines, and continue on main trail 1.3 miles to a cattleguard at the Forest Service boundary. Turn left before the cattleguard onto a two track and continue for 0.4 miles (a fence post should be wrapped in flagging). From the marked post, walk 30 paces at 187 degrees magnetic to a witness post. From the witness post, walk 16 paces at 181 degrees magnetic to the 0-foot stake which is marked with browse tag #288.

Site Information

Land Ownership	Federal
Land Administrator	BLM
Allotment	BLACK RIDGE
Elevation	6,635ft (2,022m)
Aspect	West
Slope	10%
Sample Dates	06/17/2010, 06/26/2013, 08/03/2016

Table 13R-03.1 Disturbance History. Recorded history of major disturbances.

Treatment/Disturbance	Name	WRI DB#	Date	Size (acres)
Chaining - Unknown	Black Ridge Fuels Reduction and Vegetation Restoration	-	Early 1960s	-
Mechanical - Bull-hog	Black Ridge Fuels Reduction and Vegetation Restoration	1408	Fall 2010	1803
Seeding - Aerial Unknown	Black Ridge Fuels Reduction and Vegetation Restoration	1408	Fall 2010	1471

Table 13R-03.2 Seed Mix. List of known seeded plant species and rates (if available).

Mix Name		Application Type	Application Date	Acres	
Black Ridge Phase 1		Aerial	Sep 2010	1473	
Type	Species	Common Name	Cultivar/Source ID	Bulk lbs/acre	PLS lbs/acre
G	Achnatherum hymenoides	Indian Ricegrass	Emery UT	1.73	1.43
G	×Triticosecale rimpaii	Sterile Triticale	Quickguard	0.68	0.66
G	Agropyron cristatum	Crested Wheatgrass	Hycrest	0.07	0.06
G	Agropyron cristatum	Crested Wheatgrass	Hycrest	0.17	0.15
G	Bouteloua gracilis	Blue Grama	Alma	0.68	0.52
G	Hesperostipa comata	Needle and Threadgrass	Utah UT	0.07	0.05
G	Hesperostipa comata	Needle and Threadgrass	Kane UT	0.68	0.49
G	Pascopyrum smithii	Western Wheatgrass	Arriba	2.75	2.27
G	Poa secunda	Sandberg Bluegrass	UP/Colorado Plateau	0.41	0.38
G	Sporobolus cryptandrus	Sand Dropseed		0.07	0.07
G	Sporobolus cryptandrus	Sand Dropseed		0.03	0.03
G	Sporobolus cryptandrus	Sand Dropseed		0.05	0.05
F	Astragalus cicer	Cicer Milkvetch	Lutana	1.49	1.36
F	Linum perenne	Blue Flax	Appar	0.58	0.56
F	Linum perenne	Blue Flax	Appar	0.14	0.11
F	Onobrychis viciifolia	Sainfoin	Eski	2.00	1.90
F	Penstemon strictus	Rocky Mountain Penstemon		0.14	0.12
F	Sanguisorba minor	Small Burnet	Delar	0.14	0.12
F	Sanguisorba minor	Small Burnet	Delar	0.22	0.19
F	Sanguisorba minor	Small Burnet	Delar	0.88	0.84
S	Atriplex canescens	Fourwing Saltbush	Emery UT	1.73	0.87
S	Atriplex canescens	Fourwing Saltbush	Emery UT	0.27	0.13
S	Purshia stansburiana	Stansbury Cliffrose	Millard UT	0.09	0.07
S	Purshia stansburiana	Stansbury Cliffrose	Millard UT	0.05	0.04
S	Purshia tridentata	Bitterbrush		0.10	0.07
S	Purshia tridentata	Bitterbrush	Beaver UT	0.80	0.62
S	Purshia tridentata	Bitterbrush	Elko NV	0.19	0.13

Wildlife Habitat and Vegetation History

Table 13R-03.3 - Wildlife Seasonal Habitat. UDWR wildlife habitat and seasonality.

Species	Habitat	Season
Deer	crucial	winter
Elk	crucial	winter

Table 13R-03.4 - Vegetation History. The dominant vegetation type(s) and phase of woodland succession (Tausch, Miller, Roundy, & Chambers, 2009).

Year	Vegetation Type	Woodland Succession
2010	Pinyon-Juniper	Phase II transitioning to Phase III
2013	Broom Snakeweed/Green Ephedra	Phase I
2016	Broom Snakeweed/Green Ephedra	Phase I

Site Notes

In 2013 the transect was moved slightly to better represent the treatment.

Site Potential

1981-2010 Average Annual Precipitation 13 inches
 NRCS Ecological Site Upland Gravelly Loam (Pinyon-Juniper)
 NRCS Ecological Site # R035XY303UT
 States and Transitions No state and transition model is available for this ecological site.

When established in 2010, the site was in phase II two-needle pine (*Pinus edulis*) and Utah juniper (*Juniperus osteosperma*) tree encroachment. Shrubs and forbs provided minimal cover on the site (Table 13R-03.12). Crested wheatgrass (*Agropyron cristatum*) was the dominant herbaceous species (Table 13R-03.10) prior to treatment. The bull-hog treatment removed most of the trees from the study area setting back woodland succession to phase I. A few of the shrubs increased in cover. None of the seeded species were sampled in the browse or herbaceous understory with the exception of crested wheatgrass, which was present pre-treatment (Table 13R-03.10, Table 13R-03.12). With the removal of pinyon and juniper trees on the site, the herbaceous and shrub layers will likely increase in abundance on the site.

Trend Summary Tables

Table 13R-03.6 - Shrub/Tree Summary. Average modified Daubenmire quadrat and line intercept cover by year for shrubs/trees.

Year	Quadrat Cover (%)			Line-intercept Cover (%)		
	Preferred Shrub	Other Shrub	Tree	Preferred Shrub	Other Shrub	Tree
2010	4.2	0.5	15.3	4.7	0.2	20.6
2013	0.8	1.6	-	4.3	5.4	-
2016	1.1	3.4	-	4.3	4.3	-

Table 13R-03.7 - Herbaceous Summary. Nested frequency and average modified Daubenmire quadrat cover by year for herbaceous functional groups.

Year	Nested Frequency				Quadrat Cover (%)			
	Annual Grass	Perennial Grass	Annual/Biennial Forb	Perennial Forb	Annual Grass	Perennial Grass	Annual/Biennial Forb	Perennial Forb
2010	27	249	24	46	0.3	11.1	0.1	2.5
2013	7	226	2	84	0.0	8.7	0.0	3.4
2016	45	288	6	101	0.4	16.7	0.1	5.2

Table 13R-03.8 - Basic Ground Cover. Average modified Daubenmire quadrat cover by year for basic ground cover types.

Year	Cover Type (%)					
	Bare Ground	Cryptograms	Litter	Pavement	Rock	Vegetation
2010	24.1	0.2	54.5	7.4	6.1	31.2
2013	17.8	0.0	61.4	3.6	4.5	15.1
2016	19.1	0.0	59.8	4.0	3.7	25.9

Table 13R-03.9 - Pellet Group Data. Quadrat frequency and pellet group transect data for animal pellets. Rabbit pellet groups are not sampled in the pellet group transect.

Year	Cattle	Mule Deer	Elk	Rabbit
	Quadrat Frequency			
2010	-	26	1	4
2013	2	10	7	9
2016	2	10	8	44
Year	Days Use Per Acre (ha)			
2010	3.6 (9.0)	63.7 (157.3)	2.0 (5.0)	-
2013	5.1 (12.6)	35.5 (87.7)	8.1 (19.9)	-
2016	7.2 (17.9)	19.4 (48.0)	3.4 (8.3)	-

Table 13R-03.10 - Grass Species. Nested frequency and modified Daubenmire average cover by year.

GRASS SPECIES	Achnatherum hymenoides (Indian ricegrass)	Agropyron cristatum ⁱ (crested wheatgrass)	Bromus tectorum ^{ai} (cheatgrass)	Hesperostipa comata (needle and thread)	Pascopyrum smithii (western wheatgrass)	Psathyrostachys juncea ⁱ (Russian wildrye)
year	Nested Frequency					
2010	-	249	27	-	-	-
2013	10	213	7	1	15	-
2016	10	276	45	1	24	4
year	Average Cover (%)					
2010	-	11.1	0.3	-	-	-
2013	0.1	8.3	0.0	0.1	0.1	-
2016	0.0	16.0	0.4	0.1	0.5	0.1

a - Annual; n - Noxious Weed; i - Introduced Species

Table 13R-03.11 - Forb Species. Nested frequency and modified Daubenmire average cover by year.

FORB SPECIES	Antennaria (pussytoes)	Astragalus cicer ⁱ (chickpea milkvetch)	Chamaesyce (sandmat)	Chenopodium fremontii ^{ai} (Fremont's goosefoot)	Collinsia parviflora ^a (maiden blue eyed Mary)	Cordylanthus ^a (bird's-beak)	Draba ^a (draba)	Gilia ^a (gilia)	Ipomopsis aggregata (scarlet gilia)	Lactuca serriola ^{ai} (prickly lettuce)	Lappula occidentalis ^a (flatspine stickseed)	Lepidium ^a (pepperweed)	Lesquerella (bladderpod)	Linum perenne ⁱ (blue flax)	Lithospermum ruderale (western stoneseed)	Penstemon strictus (Rocky Mountain penstemon)	Petroradia pumila (rock goldenrod)
year	Nested Frequency																
2010	-	-	-	5	4	-	5	12	-	-	3	-	4	-	-	-	45
2013	3	2	16	-	-	1	-	-	-	-	-	-	-	15	2	1	53
2016	1	7	41	-	-	-	5	-	3	1	-	0	-	1	2	-	64
year	Average Cover (%)																
2010	-	-	-	0.0	0.0	-	0.0	0.1	-	-	0.0	-	0.0	-	-	-	2.5
2013	0.0	0.0	0.1	-	-	0.0	-	-	-	-	-	-	-	0.3	0.0	0.0	2.9
2016	0.0	0.9	0.4	-	-	-	0.0	-	0.0	0.0	-	0.0	-	0.0	0.0	-	3.8

a - Annual/Biennial; n - Noxious Weed; i - Introduced Species

FORB SPECIES			
	Salsola tragus ⁿⁱ (prickly Russian thistle)	Tetaneuris acaulis (stemless four-nerve daisy)	Townsendia (Townsend daisy)
year	Nested Frequency		
2010	-	-	-
2013	1	3	1
2016	-	-	6
year	Average Cover (%)		
2010	-	-	-
2013	0.0	0.0	0.0
2016	-	-	0.0

a - Annual/Biennial; n - Noxious Weed; i - Introduced Species

Table 13R-03.12 - Shrub and Tree Species. Average modified Daubenmire quadrat and line intercept cover by year.

SHRUB SPECIES							
	Artemisia frigida ^p (prairie sagewort)	Atriplex canescens ^p (fourwing saltbush)	Ephedra viridis ^p (mormon tea)	Gutierrezia sarothrae (broom snakeweed)	Juniperus osteosperma ^t (Utah juniper)	Opuntia (pricklypear)	Pinus edulis ^t (twoneedle pinyon)
year	Line Intercept Cover (%)						
2010	-	-	4.7	0.2	5.9	-	14.7
2013	-	0.1	4.2	5.4	-	-	-
2016	-	1.2	3.1	4.3	-	-	-
year	Quadrat Cover (%)						
2010	0.4	-	3.8	0.5	4.6	-	10.7
2013	-	0.0	0.8	1.6	-	0.0	-
2016	-	0.2	0.9	3.4	-	0.0	-

t - Tree Species; p - Preferred Browse; i - Introduced

Table 13R-03.13 - Shrub/Tree Characteristics. Population characteristics of shrub/tree species populations including density reproduction (seedlings), age distribution, utilization, vigor and average size (height/crown) of plants.

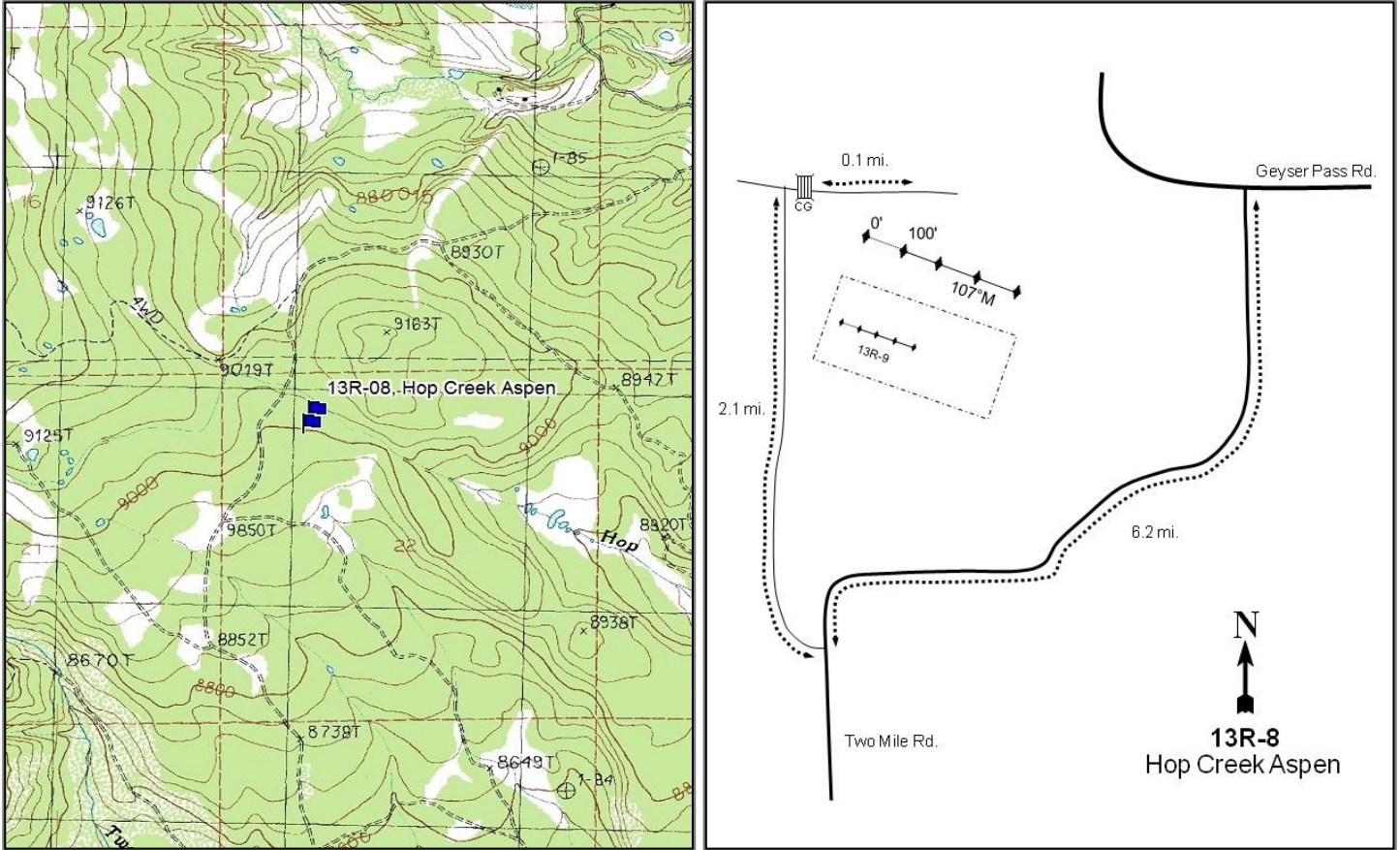
Year	Density		Age Class Distribution			Utilization		Poor Vigor (%)	Average Height Crown (cm)
	Plants Per Acre		Excluding Seedlings			Moderate (%)	Heavy (%)		
	Excluding Seedlings	Seedling	Young (%)	Mature (%)	Decadent (%)				
Artemisia frigida^P -- (prairie sagewort)									
2010	-	-	-	-	-	-	-	-	-/-
2013	-	-	-	-	-	-	-	-	23/32
2016	-	-	-	-	-	-	-	-	-/-
Atriplex canescens^P -- (four-wing saltbush)									
2010	-	-	-	-	-	-	-	-	46/55
2013	40	-	50	50	0	0	0	0	64/76
2016	100	40	40	60	0	40	20	0	63/76
Echinocereus -- (hedgehog cactus)									
2010	-	-	-	-	-	-	-	-	-/-
2013	-	-	-	-	-	-	-	-	2/5
2016	-	-	-	-	-	-	-	-	14/13
Ephedra viridis^P -- (mormon tea)									
2010	380	-	26	74	0	0	11	0	107/142
2013	860	-	30	70	0	0	0	0	69/86
2016	700	-	26	74	0	0	17	0	68/86
Gutierrezia sarothrae -- (broom snakeweed)									
2010	520	40	19	81	0	0	0	0	16/21
2013	2340	20	23	77	0	1	0	0	22/29
2016	5080	40	17	79	4	0	0	4	21/30
Juniperus osteosperma^t -- (Utah juniper)									
2010	160	20	0	100	0	0	0	0	- / -
2013	-	-	-	-	-	-	-	-	-/-
2016	-	-	-	-	-	-	-	-	-/-
Opuntia -- (pricklypear)									
2010	-	-	-	-	-	-	-	-	13/100
2013	40	-	0	100	0	0	0	50	10/28
2016	40	-	0	100	0	0	0	0	8/34
Pediocactus simpsonii -- (mountain ball cactus)									
2010	-	-	-	-	-	-	-	-	-/-
2013	20	-	0	100	0	0	0	0	- / -
2016	-	-	-	-	-	-	-	-	-/-
Pinus edulis^t -- (two-needle pinyon)									
2010	160	-	25	75	0	0	0	0	- / -
2013	-	-	-	-	-	-	-	-	-/-
2016	-	-	-	-	-	-	-	-	-/-
Purshia stansburiana^P -- (Stansbury cliffrose)									
2010	-	-	-	-	-	-	-	-	-/-
2013	-	-	-	-	-	-	-	-	-/-
2016	-	-	-	-	-	-	-	-	57/61

t - Tree Species; p - Preferred Browse; i - Introduced Species

Table 13R-03.14 - Tree Characteristics. Point-quarter tree density, size class distribution, and average diameter.

Year	Density	Size Class Distribution					Average Diameter (cm)
	Trees per Acre	Seedling (%)	1-4'	4-8'	8-12'	>12' (%)	
Juniperus osteosperma (Utah juniper)							
2010	69	-	21	68	5	5	7.2
2013	33	-	100	-	-	-	5.5
2016	39	-	100	-	-	-	12.1
Pinus edulis (two-needle pinyon)							
2010	178	-	10	45	35	10	9.3
2013	5	-	100	-	-	-	3.0
2016	7	-	100	-	-	-	9.5

HOP CREEK ASPEN - STUDY No. 13R-8



Location Information

USGS 7.5 min Map Info Mount Peale NE; Township 27S, Range 25E, Section 22
 GPS (0' Stake) NAD 83 UTM ZONE 12, 661010 East 4257063 North

Transect Information

Browse Tag # (0' Stake) 165
 Transect Bearing 90° 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 Geyser Pass Road, turn south onto Two Mile Road. Drive for 6.2 miles and then turn right. Drive for 2.1 miles; there will be a T intersection in the road. Turn right (east), cross the cattleguard, and drive for 0.1 miles. The study will be south of the road and north of the enclosure.

Site Information

Land Ownership	State
Land Administrator	SITLA
Allotment	No data
Elevation	9,032ft (2,753m)
Aspect	South
Slope	6-7%
Sample Dates	08/27/2013, 08/02/2016

Table 13R-08.1 Disturbance History. Recorded history of major disturbances.

Treatment/Disturbance	Name	WRI DB#	Date	Size (acres)
Logging - Logging/Clear-Cut	-	-	2011-2012	-

Wildlife Habitat and Vegetation History

Table 13R-08.3 - Wildlife Seasonal Habitat. UDWR wildlife habitat and seasonality.

Species	Habitat	Season
Deer	crucial	summer
Elk	crucial	summer

Table 13R-08.4 - Vegetation History. The dominant vegetation type(s) and phase of woodland succession (Tausch, Miller, Roundy, & Chambers, 2009).

Year	Vegetation Type	Woodland Succession
2013	Quaking Aspen	NA
2016	Quaking Aspen	NA

Site Notes

This site was established in conjunction with 13R-9. This study is outside the enclosure while 13R-9 is inside the enclosure.

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 this ecological site.

When established in 2013, the site consisted of healthy seedling/young quaking aspen (*Populus tremuloides*) trees. There was also a diverse component of other browse species, which provided some cover. In 2016, the herbaceous understory increased substantially in cover and was diverse for both grasses and forbs. The perennial grass Kentucky bluegrass (*Poa pratensis*) was the main contributor to the increase in herbaceous cover (Table 13R-08.7, Table 13R- 08.10). Aspen has continued to increase in both size and cover since the initial sampling (Table 13R-08.12, Table 13R-08.13a).

Trend Summary Tables

Table 13R-08.6 - Shrub/Tree Summary. Average modified Daubenmire quadrat and line intercept cover by year for shrubs/trees.

Year	Quadrat Cover (%)			Line-intercept Cover (%)		
	Preferred Shrub	Other Shrub	Tree	Preferred Shrub	Other Shrub	Tree
2013	1.4	4.3	27.4	1.4	5.1	37.3
2016	1.3	8.2	47.6	0.9	9.8	78.5

Table 13R-08.7 - Herbaceous Summary. Nested frequency and average modified Daubenmire quadrat cover by year for herbaceous functional groups.

Year	Nested Frequency				Quadrat Cover (%)			
	Annual Grass	Perennial Grass	Annual/Biennial Forb	Perennial Forb	Annual Grass	Perennial Grass	Annual/Biennial Forb	Perennial Forb
2013	-	388	6	319	-	21.7	0.2	19.3
2016	-	458	1	335	-	39.2	0.0	25.1

Table 13R-08.8 - Basic Ground Cover. Average modified Daubenmire quadrat cover by year for basic ground cover types.

Year	Cover Type (%)					
	Bare Ground	Cryptograms	Litter	Pavement	Rock	Vegetation
2013	4.5	0.0	58.2	0.0	0.0	66.5
2016	3.3	0.0	54.8	-	0.0	79.0

Table 13R-08.9 - Pellet Group Data. Quadrat frequency and pellet group transect data for animal pellets. Rabbit pellet groups are not sampled in the pellet group transect.

Year	Cattle	Mule Deer	Elk
	Quadrat Frequency		
2013	-	2	6
2016	-	-	-
Year	Days Use Per Acre (ha)		
2013	1.5 (3.6)	2.0 (5.0)	17.4 (43.0)
2016	13.8 (34.1)	3.4 (8.3)	10.0 (24.8)

Table 13R-08.10 - Grass Species. Nested frequency and modified Daubenmire average cover by year.

GRASS SPECIES	Achnatherum lettermanii (Letterman's needlegrass)	Achnatherum nelsonii (Columbia needlegrass)	Bromus marginatus (mountain brome)	Carex (sedge)	Dactylis glomerata ¹ (orchardgrass)	Elymus lanceolatus (thickspike wheatgrass)	Elymus trachycaulus (slender wheatgrass)	Festuca thurberi (Thurber's fescue)	Leucopoa kingii (spike fescue)	Muhlenbergia montana (mountain muhly)	Poa pratensis ¹ (Kentucky bluegrass)
year	Nested Frequency										
2013	1	72	2	3	109	11	14	-	10	-	292
2016	-	8	2	1	141	-	44	0	35	0	395
year	Average Cover (%)										
2013	0.0	2.1	0.0	0.0	5.0	0.3	0.4	-	0.5	-	13.4
2016	-	0.3	0.1	0.1	5.1	-	1.1	0.0	1.1	0.0	31.4

a - Annual; n - Noxious Weed; i - Introduced Species

Table 13R-08.11 - Forb Species. Nested frequency and modified Daubenmire average cover by year.

FORB SPECIES	Achillea millefolium (Common yarrow)	Agoseris glauca (pale agoseris)	Allium (onion)	Aquilegia (columbine)	Cirsium (thistle)	Cymopterus (springparsley)	Cynoglossum officinale ^{ami} (gypsyflower)	Frasera speciosa (elkweed)	Galium boreale (northern bedstraw)	Hymenoxys hoopesii (owl's-claws)	Iris missouriensis (Rocky Mountain iris)	Lathyrus lanszwertii (Nevada pea)	Ligusticum porteri (Porter's licorice-root)	Lomatium (desertparsley)	Lupinus argenteus (silvery lupine)	Potentilla gracilis (slender cinquefoil)	Pseudostellaria jamesiana (tuber starwort)
year	Nested Frequency																
2013	49	1	1	2	65	100	-	-	32	33	25	50	6	116	7	2	25
2016	70	3	-	-	92	179	1	3	64	72	46	67	24	-	-	12	17
year	Average Cover (%)																
2013	1.1	0.0	0.0	0.0	2.1	1.8	-	-	0.3	2.1	0.5	0.7	0.5	2.2	0.1	0.0	0.1
2016	1.9	0.4	-	-	2.2	1.9	0.0	0.1	0.8	4.1	0.9	1.4	1.3	-	-	0.1	0.3

a - Annual/Biennial; n - Noxious Weed; i - Introduced Species

FORB SPECIES						
Senecio integerrimus ^a (lambstongue ragwort)						
Symphyotrichum eatonii (Eaton's aster)						
Taraxacum officinale (common dandelion)						
Thermopsis montana (mountain goldenbanner)						
Vicia americana (American vetch)						
Viola (violet)						
year	Nested Frequency					
2013	6	12	83	79	43	91
2016	-	50	60	77	4	109
year	Average Cover (%)					
2013	0.2	0.2	2.7	2.3	0.6	1.9
2016	-	0.9	1.0	4.6	0.0	3.0

a - Annual/Biennial; n - Noxious Weed; i - Introduced Species

Table 13R-08.12 - Shrub and Tree Species. Average modified Daubenmire quadrat and line intercept cover by year.

SHRUB SPECIES					
Amelanchier alnifolia ^p (Saskatoon serviceberry)					
Mahonia repens (creeping barberry)					
Populus tremuloides ⁱ (quaking aspen)					
Rosa woodsii ^p (Woods' rose)					
Symphoricarpos oreophilus (mountain snowberry)					
year	Line Intercept Cover (%)				
2013	1.1	0.8	37.3	0.3	4.3
2016	0.7	0.6	78.5	0.2	9.2
year	Quadrat Cover (%)				
2013	1.0	0.5	27.4	0.4	3.9
2016	0.9	0.9	47.6	0.4	7.2

t - Tree Species; p - Preferred Browse; i - Introduced

Table 13R-08.13 - Shrub/Tree Characteristics. Population characteristics of shrub/tree species populations including density reproduction (seedlings), age distribution, utilization, vigor and average size (height/crown) of plants.

Year	Density		Age Class Distribution			Utilization		Poor Vigor (%)	Average Height Crown (cm)
	Plants Per Acre		Excluding Seedlings			Moderate (%)	Heavy (%)		
	Excluding Seedlings	Seedling	Young (%)	Mature (%)	Decadent (%)				
Amelanchier alnifolia ^P -- (Saskatoon serviceberry)									
2013	1700	120	67	29	4	12	18	11	51/40
2016	760	100	24	76	0	13	0	0	57/46
Mahonia repens -- (creeping barberry)									
2013	2820	-	4	97	0	0	0	0	11/16
2016	2900	240	0	100	0	0	0	0	11/14
Rosa woodsii ^P -- (Woods' rose)									
2013	780	60	15	85	0	0	8	0	36/25
2016	560	-	4	96	0	0	0	0	41/24
Symphoricarpos oreophilus -- (mountain snowberry)									
2013	4960	260	37	63	0	5	1	0	36/42
2016	5820	240	19	81	0	1	0	0	48/50

t - Tree Species; p - Preferred Browse; i - Introduced Species

Table 13R-08.13a - Aspen Characteristics. Characteristics of aspen populations including density, size class distribution, and vigor of plants.

Year	Density	Size Class Distribution				Utilization		Poor Vigor (%)
	Plants per Acre	Class I (%)	Class II (%)	Class III (%)	Class IV (%)	Moderate (%)	Heavy (%)	
Populus tremuloides (quaking aspen)								
2013	19140	17	80	3	-	3	1	0
2016	20520	4	31	64	0	1	1	1

Class I - Less than or equal to 1.5 feet

Class II - Greater than 1.5 feet to 5 feet

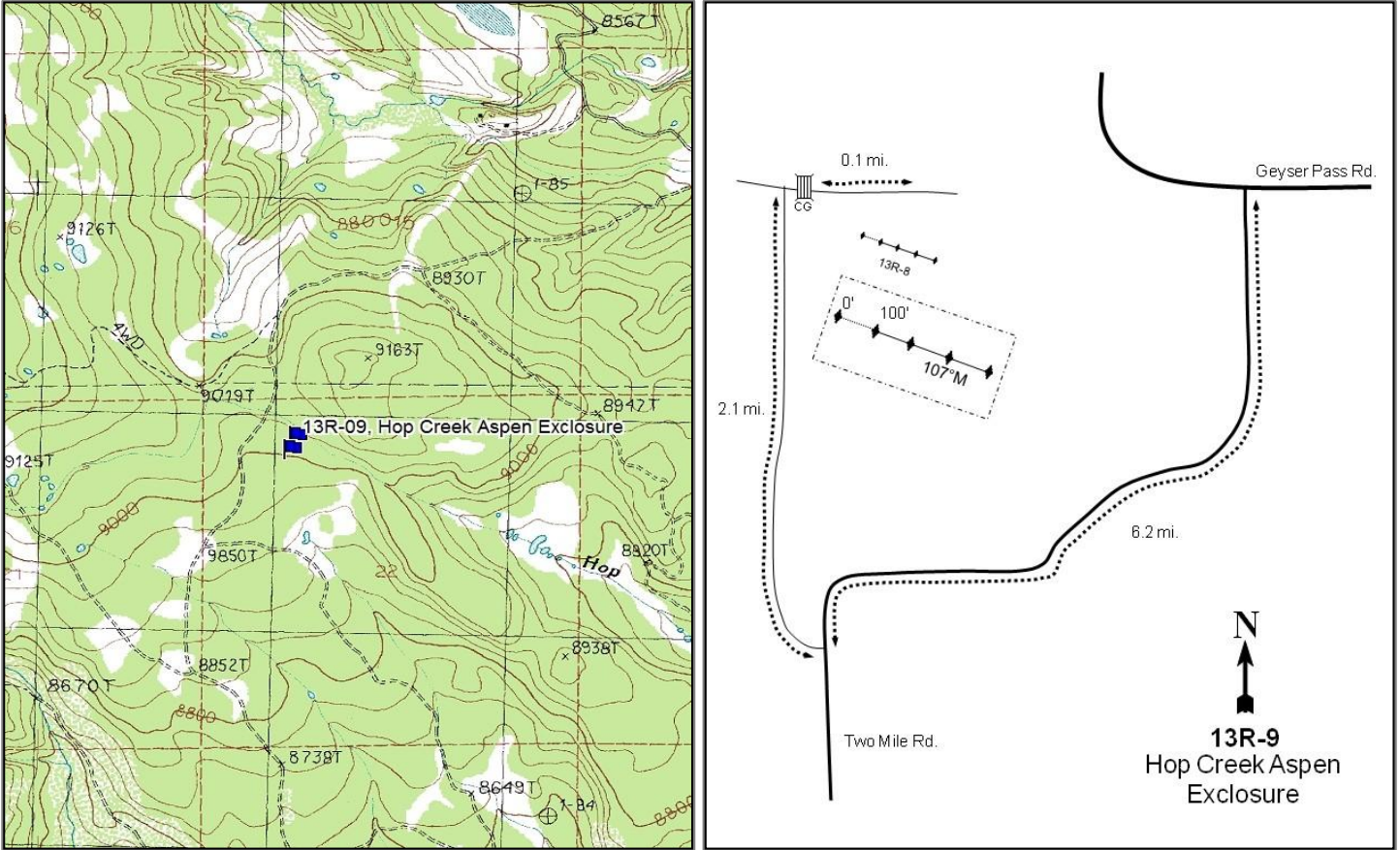
Class III - Greater than 5 feet and up to 1 inch diameter at breast height (dbh)

Class IV - Greater than 1 in diameter at breast height (dbh)

Table 13R-08.14 - Tree Characteristics. Point-quarter tree density, size class distribution, and average diameter.

Year	Density	Size Class Distribution				Average Diameter (cm)
	Trees per Acre	Seedling (%)	1-4'	4-8'	8-12'	
Populus tremuloides (quaking aspen)						
2013	14094	40	60	-	-	1.8
2016	11825	-	40	60	-	6.0

HOP CREEK ASPEN ENCLOSURE - STUDY No. 13R-9



Location Information

USGS 7.5 min Map Info	Mount Peale NE; Township 27S, Range 25E, Section 22
GPS (0' Stake)	NAD 83 UTM ZONE 12, 660984 East 4257000 North

Transect Information

Browse Tag # (0' Stake)	176
Transect Bearing	90° 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 Geyser Pass Road, turn south onto Two Mile Road. Drive for 6.2 miles and then turn right. Drive for 2.1 miles; there will be a T intersection in the road. Turn right (east), cross the cattleguard, and drive for 0.1 miles. The study will be in the enclosure.

Site Information

Land Ownership	State
Land Administrator	SITLA
Allotment	No data
Elevation	9,009ft (2,746m)
Aspect	South
Slope	6-7%
Sample Dates	08/27/2013, 08/02/2016

Table 13R-09.1 Disturbance History. Recorded history of major disturbances.

Treatment/Disturbance	Name	WRI DB#	Date	Size (acres)
Logging - Logging/Clear-Cut	-	-	2011-2012	-

Wildlife Habitat and Vegetation History

Table 13R-09.3 - Wildlife Seasonal Habitat. UDWR wildlife habitat and seasonality.

Species	Habitat	Season
Deer	crucial	summer
Elk	crucial	summer

Table 13R-09.4 - Vegetation History. The dominant vegetation type(s) and phase of woodland succession (Tausch, Miller, Roundy, & Chambers, 2009).

Year	Vegetation Type	Woodland Succession
2013	Quaking Aspen	NA
2016	Quaking Aspen	NA

Site Notes

This site was established in conjunction with 13R-8. This study is inside the exclosure while 13R-8 is outside the exclosure.

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 this ecological site.

When established in 2013, the site consisted of healthy seedling/young quaking aspen (*Populus tremuloides*) trees. There was also a diverse component of other browse species, which provided some cover. In 2016, the herbaceous understory increased substantially in cover and was diverse for both grasses and forbs. The perennial grass Kentucky bluegrass (*Poa pratensis*) was the main contributor to the increase in herbaceous cover (Table 13R-09.7, Table 13R- 09.10). Aspen has continued to increase in both size and cover since the initial sampling (Table 13R-09.12, Table 13R-09.13a).

Trend Summary Tables

Table 13R-09.6 - Shrub/Tree Summary. Average modified Daubenmire quadrat and line intercept cover by year for shrubs/trees.

Year	Quadrat Cover (%)			Line-intercept Cover (%)		
	Preferred Shrub	Other Shrub	Tree	Preferred Shrub	Other Shrub	Tree
2013	0.7	3.3	30.1	0.5	6.0	40.5
2016	1.0	9.0	48.0	0.8	11.1	68.4

Table 13R-09.7 - Herbaceous Summary. Nested frequency and average modified Daubenmire quadrat cover by year for herbaceous functional groups.

Year	Nested Frequency				Quadrat Cover (%)			
	Annual Grass	Perennial Grass	Annual/Biennial Forb	Perennial Forb	Annual Grass	Perennial Grass	Annual/Biennial Forb	Perennial Forb
2013	-	404	8	331	-	20.9	0.5	23.8
2016	-	454	-	333	-	40.5	-	28.0

Table 13R-09.8 - Basic Ground Cover. Average modified Daubenmire quadrat cover by year for basic ground cover types.

Year	Cover Type (%)					
	Bare Ground	Cryptograms	Litter	Pavement	Rock	Vegetation
2013	1.4	0.2	64.4	-	0.1	71.0
2016	2.3	-	61.7	-	0.0	79.5

Table 13R-09.9 - Pellet Group Data. Quadrat frequency and pellet group transect data for animal pellets. Rabbit pellet groups are not sampled in the pellet group transect.

Year	Cattle	Mule Deer	Dusky Grouse	Elk
	Quadrat Frequency			
2013	-	2	-	1
2016	-	-	-	-
Year	Days Use Per Acre (ha)			
2013	1.5 (3.6)	2.7 (6.6)	8.7 (21.5)*	10.0 (24.8)
2016	0.7 (1.8)	-	-	-

*Pellets per acre (ha)

Table 13R-09.10 - Grass Species. Nested frequency and modified Daubenmire average cover by year.

GRASS SPECIES	Achnatherum nelsonii (Columbia needlegrass)	Bromus marginatus (mountain brome)	Bromus porteri (Porter brome)	Carex (sedge)	Dactylis glomerata ⁱ (orchardgrass)	Elymus lanceolatus (thickspike wheatgrass)	Elymus trachycaulus (slender wheatgrass)	Festuca thurberi (Thurber's fescue)	Hesperostipa comata (needle and thread)	Leucopoa kingii (spike fescue)	Phleum alpinum (alpine timothy)	Poa fendleriana (muttongrass)	Poa pratensis ⁱ (Kentucky bluegrass)	Poa secunda (Sandberg bluegrass)
year	Nested Frequency													
2013	139	27	4	64	37	64	17	-	1	-	7	5	319	-
2016	20	18	-	6	32	-	102	9	-	24	-	-	402	14
year	Average Cover (%)													
2013	4.0	0.5	0.1	0.9	0.9	2.2	0.2	-	0.0	-	0.2	0.0	12.0	-
2016	1.0	0.3	-	0.2	1.5	-	2.9	0.7	-	0.9	-	-	32.1	0.9

a - Annual; n - Noxious Weed; i - Introduced Species

Table 13R-09.11 - Forb Species. Nested frequency and modified Daubenmire average cover by year.

FORB SPECIES	Achillea millefolium (Common yarrow)	Allium (onion)	Aquilegia coerulea (Colorado blue columbine)	Cirsium (thistle)	Cymopterus (springparsley)	Fragaria virginiana (Virginia strawberry)	Galium boreale (northern bedstraw)	Hackelia patens (spotted stickseed)	Hymenoxys hoopesii (owl's-claws)	Iris missouriensis (Rocky Mountain iris)	Lathyrus lanszwertii (Nevada pea)	Ligusticum porteri (Porter's licorice-root)	Lomatium (desertparsley)	Pseudostellaria jamesiana (tuber starwort)	Senecio integerrimus ^a (lambstongue ragwort)	Symphotrichum eatonii (Eaton's aster)	Taraxacum officinale (common dandelion)
year	Nested Frequency																
2013	28	9	7	9	100	1	72	-	22	32	73	-	128	24	8	17	65
2016	64	-	1	44	162	-	99	0	33	38	33	15	3	8	-	19	37
year	Average Cover (%)																
2013	0.6	0.0	0.3	0.5	3.1	0.0	0.9	-	0.5	0.5	2.1	-	3.7	0.2	0.5	0.5	1.6
2016	1.1	-	0.0	0.9	2.2	-	1.8	0.0	1.6	1.5	0.4	0.6	0.1	0.1	-	0.6	0.4

a - Annual/Biennial; n - Noxious Weed; i - Introduced Species

FORB SPECIES			
	Thermopsis montana (mountain goldenbanner)		
	Vicia americana (American vetch)		
	Viola (violet)		
year	Nested Frequency		
2013	146	22	120
2016	168	3	175
year	Average Cover (%)		
2013	5.5	0.4	3.5
2016	11.2	0.1	5.3

a - Annual/Biennial; n - Noxious Weed; i - Introduced Species

Table 13R-09.12 - Shrub and Tree Species. Average modified Daubenmire quadrat and line intercept cover by year.

SHRUB SPECIES					
	Amelanchier alnifolia ^p (Saskatoon serviceberry)				
	Mahonia repens (creeping barberry)				
	Populus tremuloides ⁱ (quaking aspen)				
	Rosa woodsii ^p (Woods' rose)				
	Symphoricarpos oreophilus (mountain snowberry)				
year	Line Intercept Cover (%)				
2013	0.4	0.3	40.5	0.1	5.7
2016	0.4	0.1	68.4	0.4	11
year	Quadrat Cover (%)				
2013	0.7	0.2	30.1	0.0	3.1
2016	0.5	0.2	48.0	0.5	8.8

t - Tree Species; p - Preferred Browse; i - Introduced

Table 13R-09.13 - Shrub/Tree Characteristics. Population characteristics of shrub/tree species populations including density reproduction (seedlings), age distribution, utilization, vigor and average size (height/crown) of plants.

Year	Density		Age Class Distribution			Utilization		Poor Vigor (%)	Average Height Crown (cm)
	Plants Per Acre		Excluding Seedlings			Moderate (%)	Heavy (%)		
	Excluding Seedlings	Seedling	Young (%)	Mature (%)	Decadent (%)				
Amelanchier alnifolia^P -- (Saskatoon serviceberry)									
2013	540	-	48	52	0	26	0	11	42/31
2016	500	-	84	16	0	0	0	0	57/43
Mahonia repens -- (creeping barberry)									
2013	580	-	10	90	0	0	0	0	9/13
2016	1060	-	0	100	0	0	0	0	10/15
Rosa woodsii^P -- (Woods' rose)									
2013	320	-	38	63	0	13	0	0	25/17
2016	340	-	0	100	0	0	0	0	58/35
Symphoricarpos oreophilus -- (mountain snowberry)									
2013	4420	100	48	52	0	5	0	7	40/40
2016	4780	-	8	93	0	0	0	1	50/48

t - Tree Species; p - Preferred Browse; i - Introduced Species

Table 13R-09.13a - Aspen Characteristics. Characteristics of aspen populations including density, size class distribution, and vigor of plants.

Year	Density	Size Class Distribution				Utilization		Poor Vigor (%)
	Plants per Acre	Class I (%)	Class II (%)	Class III (%)	Class IV (%)	Moderate (%)	Heavy (%)	
Populus tremuloides (quaking aspen)								
2013	26920	21	77	2	0	0	0	15
2016	17440	2	29	65	4	0	0	0

Class I - Less than or equal to 1.5 feet

Class II - Greater than 1.5 feet to 5 feet

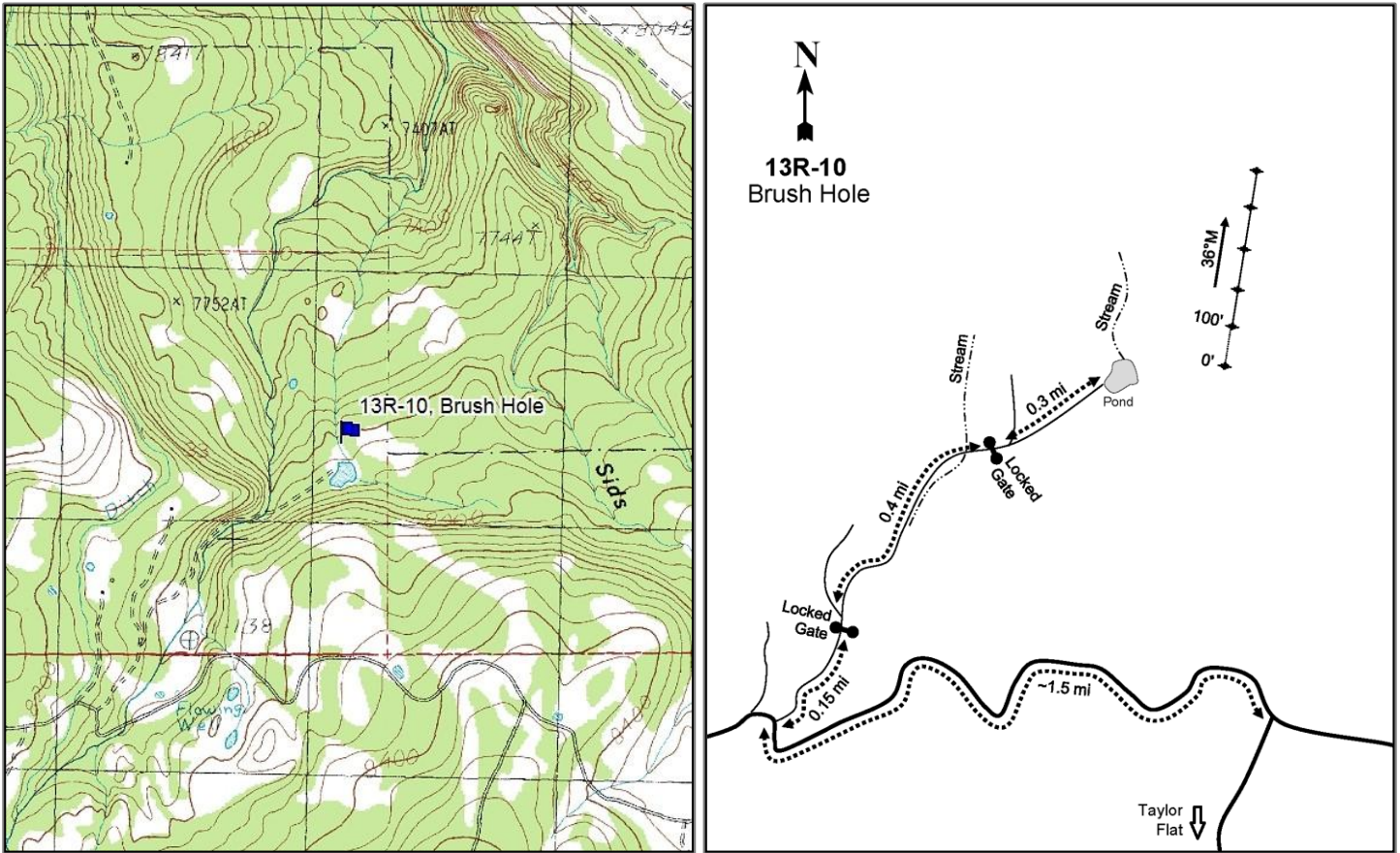
Class III - Greater than 5 feet and up to 1 inch diameter at breast height (dbh)

Class IV - Greater than 1 in diameter at breast height (dbh)

Table 13R-09.14 - Tree Characteristics. Point-quarter tree density, size class distribution, and average diameter.

Year	Density	Size Class Distribution				Average Diameter (cm)
	Trees per Acre	Seedling (%)	1-4'	4-8'	8-12'	
Populus tremuloides (quaking aspen)						
2013	14682	45	50	5	-	1.6
2016	14682	-	50	30	20	6.7

BRUSH HOLE - STUDY NO. 13R-10



Location Information

USGS 7.5 min Map Info	Mount Waas NE; Township 25S, Range 25E, Section 33
GPS (0' Stake)	NAD 83 UTM ZONE 12, 660055 East 4272513 North

Transect Information

Browse Tag # (0' Stake)	Not Available
Transect Bearing	36° 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 Taylor Flat Road, turn left (west) onto North End Road and drive for about 1.5 miles to a road on the right (north). Turn onto this road and travel 0.15 miles to a locked gate. Continue through the gate and proceed for 0.4 miles (past a stream) to another locked gate. Proceed through the gate and drive for another 0.3 miles to a pond. The transect is east of the pond.

Site Information

Land Ownership	Private
Land Administrator	Private
Allotment	No data
Elevation	7,822ft (2,384m)
Aspect	North
Slope	5-15%
Sample Dates	08/03/2016

Table 13R-10.1 Disturbance History. Recorded history of major disturbances.

Treatment/Disturbance	Name	WRI DB#	Date	Size (acres)
Mechanical - Bullhog	Brush Hole Shrub Treatment	3630	Fall 2016?	359

Wildlife Habitat and Vegetation History

Table 13R-10.3 - Wildlife Seasonal Habitat. UDWR wildlife habitat and seasonality.

Species	Habitat	Season
Deer	crucial	summer
Elk	crucial	spring/fall

Table 13R-10.4 - Vegetation History. The dominant vegetation type(s) and phase of woodland succession (Tausch, Miller, Roundy, & Chambers, 2009).

Year	Vegetation Type	Woodland Succession
2016	Gambel Oak	Phase I

Site Notes

No Notes

Site Potential

1981-2010 Average Annual Precipitation	24 inches
NRCS Ecological Site	Mountain Loam (Oak)
NRCS Ecological Site #	R048AY415UT
States and Transitions	No state and transition model is available for this ecological site.

When established in 2016, this site was dominated by Gambel oak (*Quercus gambelii*) and Rocky Mountain juniper (*Juniperus scopulorum*) (Table 13R-10.12). There were a number of other browse species found in the community but they provided limited cover on the site as a whole and were sparse (Table 13R-10.12, Table 13R-10.13). The herbaceous understory provided high cover though much of the herbaceous cover was provided by two grass species, namely Kentucky bluegrass (*Poa pratensis*) and Carex (*sedge* sp.). Additionally, species diversity was moderate on the site (Table 13R-10.11). With the removal of juniper trees and revitalization of oak, it is predicted that the herbaceous plant community will increase in species diversity while broadening the age class structure of oak and shrub populations in the community.

Trend Summary Tables

Table 13R-10.6 - Shrub/Tree Summary. Average modified Daubenmire quadrat and line intercept cover by year for shrubs/trees.

Year	Quadrat Cover (%)			Line-intercept Cover (%)		
	Preferred Shrub	Other Shrub	Tree	Preferred Shrub	Other Shrub	Tree
2016	40.8	7.4	4.2	85.1	7.9	7.9

Table 13R-10.7 - Herbaceous Summary. Nested frequency and average modified Daubenmire quadrat cover by year for herbaceous functional groups.

Year	Nested Frequency				Quadrat Cover (%)			
	Annual Grass	Perennial Grass	Annual/Biennial Forb	Perennial Forb	Annual Grass	Perennial Grass	Annual/Biennial Forb	Perennial Forb
2016	-	415	81	163	-	13.5	0.3	3.4

Table 13R-10.8 - Basic Ground Cover. Average modified Daubenmire quadrat cover by year for basic ground cover types.

Year	Cover Type (%)					
	Bare Ground	Cryptograms	Litter	Pavement	Rock	Vegetation
2016	4.3	0.2	79.2	0.4	0.6	57.6

Table 13R-10.9 - Pellet Group Data. Quadrat frequency and pellet group transect data for animal pellets. Rabbit pellet groups are not sampled in the pellet group transect.

Year	Cattle	Mule Deer	Elk	Rabbit
	Quadrat Frequency			
2016	-	-	-	2
Year	Days Use Per Acre (ha)			
2016	15.3 (37.7)	1.3 (3.3)	2.0 (5.0)	-

Table 13R-10.10 - Grass Species. Nested frequency and modified Daubenmire average cover by year.

GRASS SPECIES	Achnatherum lettermanii (Letterman's needlegrass)	Carex (sedge)	Elymus elymoides (squirreltail)	Poa fendleriana (muttongrass)	Poa pratensis ⁱ (Kentucky bluegrass)
year	Nested Frequency				
2016	1	304	2	3	265
year	Average Cover (%)				
2016	0.0	6.1	0.4	0.1	6.9

a - Annual; n - Noxious Weed; i - Introduced Species

Table 13R-10.11 - Forb Species. Nested frequency and modified Daubenmire average cover by year.

FORB SPECIES	Achillea millefolium (Common yarrow)	Allium (onion)	Androsace septentrionalis ^a (pygmyflower rockjasmine)	Antennaria parvifolia (small-leaf pussytoes)	Arabis (rockcress)	Arenaria (sandwort)	Astragalus scopulorum (Rocky Mountain milkvetch)	Calochortus nuttallii (sego lily)	Clematis hirsutissima (hairy clematis)	Collinsia parviflora ^a (maiden blue eyed Mary)	Cymopterus (springparsley)	Erigeron flagellaris (trailing fleabane)	Eriogonum racemosum (redroot buckwheat)	Galium ^a (bedstraw)	Hackelia patens (spotted stickseed)	Heterotheca villosa (hairy false goldenaster)	Iris missouriensis (Rocky Mountain iris)
year	Nested Frequency																
2016	8	4	8	11	3	32	3	1	2	29	1	10	5	47	5	1	2
year	Average Cover (%)																
2016	0.0	0.0	0.0	0.5	0.0	0.6	0.0	0.0	0.2	0.1	0.0	0.2	0.0	0.2	0.0	0.0	0.0

a - Annual/Biennial; n - Noxious Weed; i - Introduced Species

FORB SPECIES	Lathyrus brachycalyx (Bonneville pea)	Lupinus argenteus (silvery lupine)	Packera multilobata (lobeleaf groundsel)	Petroradia pumila (rock goldenrod)	Phlox longifolia (longleaf phlox)	Polygonum douglasii ^a (Douglas' knotweed)	Pseudostellaria jamesiana (tuber starwort)	Symphyotrichum ascendens (western aster)	Taraxacum officinale (common dandelion)
year	Nested Frequency								
2016	100	3	2	3	13	2	11	1	12
year	Average Cover (%)								
2016	1.4	0.0	0.0	0.1	0.0	0.0	0.1	0.0	0.0

a - Annual/Biennial; n - Noxious Weed; i - Introduced Species

Table 13R-10.12 - Shrub and Tree Species. Average modified Daubenmire quadrat and line intercept cover by year.

SHRUB SPECIES	Amelanchier utahensis ^p (Utah serviceberry)	Juniperus scopulorum ^t (Rocky Mountain juniper)	Mahonia repens (creeping barberry)	Pinus edulis ^t (two-needle pinyon)	Prunus virginiana ^p (chokecherry)	Quercus gambelii ^p (Gambel oak)	Rosa woodsii ^p (Woods' rose)	Symphoricarpos oreophilus (mountain snowberry)
year	Line Intercept Cover (%)							
2016	1.5	6.5	3.6	1.4	0	83.2	0.4	4.3
year	Quadrat Cover (%)							
2016	0.8	3.8	3.5	0.4	0.7	39.2	0.1	3.9

t - Tree Species; p - Preferred Browse; i - Introduced

Table 13R-10.13 - Shrub/Tree Characteristics. Population characteristics of shrub/tree species populations including density reproduction (seedlings), age distribution, utilization, vigor and average size (height/crown) of plants.

Year	Density		Age Class Distribution			Utilization		Poor Vigor (%)	Average Height Crown (cm)
	Plants Per Acre		Excluding Seedlings			Moderate (%)	Heavy (%)		
	Excluding Seedlings	Seedling	Young (%)	Mature (%)	Decadent (%)				
Amelanchier utahensis ^p -- (Utah serviceberry)									
2016	420	-	14	81	5	10	0	5	72/54
Artemisia tridentata ssp. wyomingensis ^p -- (Wyoming big sagebrush)									
2016	180	-	44	56	0	44	0	0	41/53
Juniperus scopulorum ^t -- (Rocky Mountain juniper)									
2016	40	20	50	50	0	0	0	0	- / -
Mahonia repens -- (creeping barberry)									
2016	13540	200	5	95	0	0	0	0	12/14
Pinus edulis ^t -- (two-needle pinyon)									
2016	20	-	0	100	0	0	0	0	- / -
Prunus virginiana ^p -- (chokecherry)									
2016	300	40	100	0	0	0	0	0	49/52
Quercus gambelii ^p -- (Gambel oak)									
2016	11860	1180	53	46	2	0	0	2	157/94

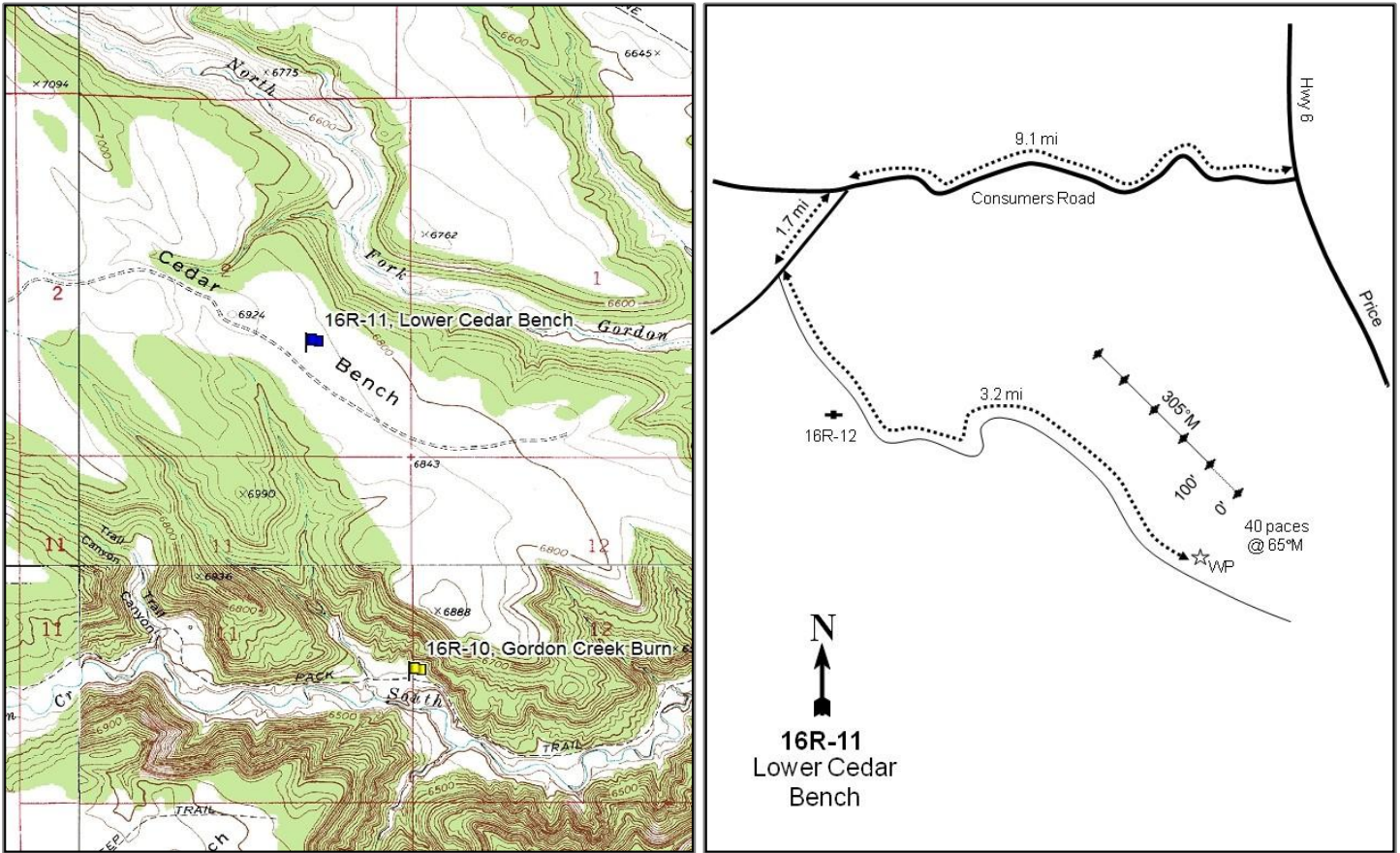
Year	Density		Age Class Distribution			Utilization		Poor Vigor (%)	Average Height Crown (cm)
	Plants Per Acre		Excluding Seedlings			Moderate (%)	Heavy (%)		
	Excluding Seedlings	Seedling	Young (%)	Mature (%)	Decadent (%)				
Rosa woodsii ^P -- (Woods' rose)									
2016	280	-	7	93	0	0	0	0	38/34
Symphoricarpos oreophilus -- (mountain snowberry)									
2016	1820	40	8	92	0	3	1	0	43/67

t - Tree Species; p - Preferred Browse; i - Introduced Species

Table 13R-10.14 - Tree Characteristics. Point-quarter tree density, size class distribution, and average diameter.

Year	Density	Size Class Distribution					Average Diameter (cm)
	Trees per Acre	Seedling (%)	1-4'	4-8'	8-12'	>12' (%)	
Juniperus scopulorum (Rocky Mountain juniper)							
2016	22	17	-	-	17	67	43.0
Pinus edulis (two-needle pinyon)							
2016	23	-	-	-	-	100	26.8
Quercus gambelii (Gambel oak)							
2016	5052	15	45	20	15	5	12.4

LOWER CEDAR BENCH - STUDY NO. 16R-11



Location Information

USGS 7.5 min Map Info	Standardville SW; Township 14S, Range 8E, Section 02
GPS (0' Stake)	NAD 83 UTM ZONE 12, 500911 East 4387112 North

Transect Information

Browse Tag # (0' Stake)	47
Transect Bearing	305° 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 6 north of Price, turn west onto Consumers Road. Travel 9.1 miles to a road that comes in from the left (south). Turn here and follow this road for 1.7 miles to another road that comes in from the left. Turn onto this road and travel 1.3 miles to a witness post on the right, passing study 16R-12. Continue for 1.9 miles to another witness post on the left hand (north) side of the road. The 0-foot stake is 40 paces from the witness post at 65 degrees magnetic and is marked with browse tag #47.

Site Information

Land Ownership	State
Land Administrator	UDWR
Allotment	GORDON CRK WITHDRAWL
Elevation	6,800ft (2,073m)
Aspect	Northeast
Slope	1-5%
Sample Dates	07/26/2004, 06/28/2007, 07/30/2012, 08/16/2016, 08/16/2016

Table 16R-11.1 Disturbance History. Recorded history of major disturbances.

Treatment/Disturbance	Name	WRI DB#	Date	Size (acres)
Mechanical - Push	Cedar Bench	PDB	Spring 2005	-
Seeding - Broadcast Before	Cedar Bench	PDB	Spring 2005	-
Hand Crew - Lop and Scatter	North Springs PJ Removal Phase II	3583	2016?	4484

Table 16R-11.2 Seed Mix. List of known seeded plant species and rates (if available).

Mix Name		Application Type	Application Date	Acres	
Cedar Bench		Broadcast	Apr 2005	150	
Type	Species	Common Name	Cultivar/Source ID	Bulk lbs/acre	PLS lbs/acre
G	Leymus cinereus	Great Basin Wildrye	Trailhead	0.53	0.50
F	Linum perenne	Blue Flax	Appar	0.22	0.20
F	Medicago sativa	Alfalfa	Spredor 3	1.17	0.99
S	Artemisia tridentata ssp. wyomingensis	Wyoming Big Sagebrush	Sanpete UT	0.67	0.19
S	Atriplex canescens	Fourwing Saltbush	Emery UT	0.67	0.30
S	Purshia tridentata	Bitterbrush	Ada/Boise ID	0.36	0.30

Wildlife Habitat and Vegetation History

Table 16R-11.3 - Wildlife Seasonal Habitat. UDWR wildlife habitat and seasonality.

Species	Habitat	Season
Deer	crucial	winter
Elk	crucial	winter
Greater Sage Grouse		occupied

Table 16R-11.4 - Vegetation History. The dominant vegetation type(s) and phase of woodland succession (Tausch, Miller, Roundy, & Chambers, 2009).

Year	Vegetation Type	Woodland Succession
2004	Twoneedle Pine	Phase II transitioning to Phase III
2007	Wyoming Big Sagebrush	Phase I
2012	Wyoming Big Sagebrush	Phase I
2016	Wyoming Big Sagebrush	Phase I

Site Notes

This study is located approximately ten miles west of Price on Cedar Bench and about one mile south of Consumers Road (State Route 139).

Soils

Table 16R-11.5 - Soil Analysis Data. List of chemical and textural soil characteristics determined by laboratory analysis.

Texture	pH	%sand	%silt	%clay	%OM	PPM P	PPM K	ds/m	Sample Date
Sandy Clay Loam	6.8	45.6	27.2	27.1	1.4	14.9	105.6	0.6	07/26/2004

Site Potential

1981-2010 Average Annual Precipitation 13 inches
 NRCS Ecological Site Upland Loam (Wyoming Big Sagebrush)
 NRCS Ecological Site # R034XY306UT
 States and Transitions No state and transition model is available for this ecological site.

The states and transitions for this site are likely similar to those of the Upland Loam (Wyoming Big Sagebrush), R025XY314UT ecological site. Upon establishment in 2004, this site was a Wyoming big sagebrush (*Artemisia tridentata* ssp. *wyomingensis*) shrub land that had been encroached by two-needle pinyon (*Pinus edulis*) and Utah juniper (*Juniperus osteosperma*) (Table 16R-11.12, Photos). The herbaceous understory was moderately diverse and abundant (Table 16R-11.7, Table 16R-11.10, Table 16R-11.11). following the tree removing disturbances, the community transitioned to a phase I woodland community with cover and density of pinyon and juniper decreasing substantially. With the canopy open, sagebrush has generally increased in cover and density (Table Table 16R-11.6, Table 16R-11.12, Table 16R-11.13). Despite successful treatments that removed much of the encroaching conifer trees, many young trees remain and will likely continue to encroach on the community without frequent maintenance in the area.

Trend Summary Tables

Table 16R-11.6 - Shrub/Tree Summary. Average modified Daubenmire quadrat and line intercept cover by year for shrubs/trees.

Year	Quadrat Cover (%)			Line-intercept Cover (%)		
	Preferred Shrub	Other Shrub	Tree	Preferred Shrub	Other Shrub	Tree
2004	3.3	2.8	19.8	4.2	3.0	26.8
2007	5.6	2.1	3.6	7.8	3.2	5.4
2012	8.0	1.6	0.5	12.0	3.6	1.0
2016	5.2	0.9	2.5	10.3	2.2	1.6

Table 16R-11.7 - Herbaceous Summary. Nested frequency and average modified Daubenmire quadrat cover by year for herbaceous functional groups.

Year	Nested Frequency				Quadrat Cover (%)			
	Annual Grass	Perennial Grass	Annual/Biennial Forb	Perennial Forb	Annual Grass	Perennial Grass	Annual/Biennial Forb	Perennial Forb
2004	9	184	187	66	0.2	5.1	1.0	1.0
2007	28	235	136	106	0.3	14.4	3.8	2.9
2012	25	268	23	74	0.3	16.9	0.1	1.2
2016	2	266	7	74	0.0	15.2	0.0	0.7

Table 16R-11.8 - Basic Ground Cover. Average modified Daubenmire quadrat cover by year for basic ground cover types.

Year	Cover Type (%)					
	Bare Ground	Cryptograms	Litter	Pavement	Rock	Vegetation
2004	32.7	5.0	49.7	0.3	1.4	33.1
2007	29.4	1.6	51.5	0.1	0.2	32.3
2012	27.0	0.9	60.4	0.0	1.4	28.9
2016	33.9	0.5	44.6	0.0	-	25.4

Table 16R-11.9 - Pellet Group Data. Quadrat frequency and pellet group transect data for animal pellets. Rabbit pellet groups are not sampled in the pellet group transect.

Year	Cattle	Mule Deer	Elk	Rabbit
	Quadrat Frequency			
2004	-	33	3	20
2007	-	26	8	41
2012	-	22	9	1
2016	-	41	1	51
Year	Days Use Per Acre (ha)			
2004	-	120.0 (296.3)	12.8 (31.5)	-
2007	-	93.8 (231.7)	25.5 (62.9)	-
2012	-	72.4 (178.8)	24.1 (59.6)	-
2016	0.7 (1.8)	65.7 (162.2)	18.1 (44.7)	-

Table 16R-11.10 - Grass Species. Nested frequency and modified Daubenmire average cover by year.

GRASS SPECIES	Achnatherum hymenoides (Indian ricegrass)	Agropyron cristatum ⁱ (crested wheatgrass)	Bouteloua gracilis (blue grama)	Bromus tectorum ^{ai} (cheatgrass)	Elymus elymoides (squirreltail)	Hesperostipa comata (needle and thread)	Leymus salinus (saline wildrye)	Pascopyrum smithii (western wheatgrass)	Poa fendleriana (muttongrass)	Poa secunda (Sandberg bluegrass)	Pseudoroegneria spicata (bluebunch wheatgrass)
year	Nested Frequency										
2004	10	-	31	9	60	71	26	9	8	6	0
2007	21	-	23	28	113	122	2	3	27	-	15
2012	50	-	46	25	52	130	34	9	25	9	28
2016	51	5	21	2	95	139	23	10	0	22	6
year	Average Cover (%)										
2004	0.3	-	0.9	0.2	0.9	1.4	1.2	0.2	0.1	0.1	0.0
2007	1.3	-	0.8	0.3	3.0	6.6	0.4	0.0	1.2	-	1.2
2012	2.1	-	2.5	0.3	1.3	5.5	3.0	0.5	0.9	0.1	1.1
2016	1.8	0.0	0.8	0.0	1.9	7.2	2.7	0.3	0.0	0.2	0.3

a - Annual; n - Noxious Weed; i - Introduced Species

Table 16R-11.11 - Forb Species. Nested frequency and modified Daubenmire average cover by year.

FORB SPECIES	Ambrosia psilostachya (Cuman ragweed)	Arabis (rockress)	Astragalus convallarius (lesser rushy milkvetch)	Astragalus tenellus (looseflower milkvetch)	Calochortus nuttallii (sego lily)	Castilleja lamarifolia (Wyoming Indian painbrush)	Chaenactis douglasii (Douglas' dustymaiden)	Chenopodium fremontii ^a (Fremont's goosefoot)	Collinsia parviflora ^a (maiden blue eyed Mary)	Descurainia pinnata ^a (western tansymustard)	Eriogonum cernuum ^a (nodding buckwheat)	Gayophytum ramosissimum ^a (pinyon groundsmoke)	Lactuca serriola ^{ai} (prickly lettuce)	Lappula occidentalis ^a (flatspine stickseed)	Lepidium ^a (pepperweed)	Lesquerella (bladderpod)	Machaeranthera canescens (hoary tansyaster)
year	Nested Frequency																
2004	-	10	8	2	3	-	0	55	0	13	-	38	-	11	-	7	8
2007	-	13	9	3	4	2	5	1	-	23	1	11	88	37	4	18	20
2012	-	2	1	4	-	5	3	3	-	10	9	1	-	-	-	7	10
2016	0	2	-	-	1	-	-	4	-	1	-	-	-	2	-	-	6
year	Average Cover (%)																
2004	-	0.0	0.4	0.0	0.0	-	0.0	0.2	0.0	0.1	-	0.2	-	0.1	-	0.0	0.1
2007	-	0.1	0.3	0.1	0.0	0.1	0.2	0.0	-	0.2	0.0	0.2	2.9	0.2	0.0	0.4	0.4
2012	-	0.0	0.0	0.2	-	0.0	0.0	0.0	-	0.1	0.0	0.0	-	-	-	0.0	0.1
2016	0.0	0.0	-	-	0.0	-	-	0.0	-	0.0	-	-	-	0.0	-	-	0.0

a - Annual/Biennial; n - Noxious Weed; i - Introduced Species

FORB SPECIES							
	Penstemon comarrhenus (dusty beardtongue)	Penstemon pachyphyllus (thickleaf beardtongue)	Phlox longifolia (longleaf phlox)	Polygonum douglasii ⁿ (Douglas' knotweed)	Schoenocrambe limifolia (flaxleaf plainsmustard)	Sphaeralcea coccinea (scarlet globemallow)	Streptanthus cordatus (heartleaf twistflower)
year	Nested Frequency						
2004	3	10	4	151	3	16	-
2007	8	14	6	21	6	33	-
2012	5	7	13	-	3	48	-
2016	-	5	-	-	-	47	24
year	Average Cover (%)						
2004	0.0	0.1	0.0	0.5	0.0	0.3	-
2007	0.0	0.4	0.0	0.2	0.1	0.8	-
2012	0.2	0.0	0.0	-	0.0	0.6	-
2016	-	0.0	-	-	-	0.3	0.4

a - Annual/Biennial; n - Noxious Weed; i - Introduced Species

Table 16R-11.12 - Shrub and Tree Species. Average modified Daubenmire quadrat and line intercept cover by year.

SHRUB SPECIES							
	Artemisia tridentata ssp. wyomingensis ^p (Wyoming big sagebrush)	Chrysothamnus viscidiflorus ssp. viscidiflorus (yellow rabbitbrush)	Gutierrezia sarothrae (broom snakeweed)	Juniperus osteosperma ^t (Utah juniper)	Opuntia (pricklypear)	Pediocactus simpsonii (mountain ball cactus)	Pinus edulis ^t (twoneedle piñon)
year	Line Intercept Cover (%)						
2004	4.2	2.8	-	5.8	0.1	0.1	21
2007	7.8	3.1	-	1.9	0.1	-	3.5
2012	12	3.4	-	1	0.2	-	-
2016	10.3	1.5	0.2	1.6	0.5	0	-
year	Quadrat Cover (%)						
2004	3.3	1.9	-	3.9	0.9	0.0	15.9
2007	5.6	2.1	0.0	1.7	0.0	-	1.9
2012	8.0	1.6	0.0	0.5	0.0	-	-
2016	5.2	0.4	0.1	2.5	0.3	0.0	-

t - Tree Species; p - Preferred Browse; i - Introduced

Table 16R-11.13 - Shrub/Tree Characteristics. Population characteristics of shrub/tree species populations including density reproduction (seedlings), age distribution, utilization, vigor and average size (height/crown) of plants.

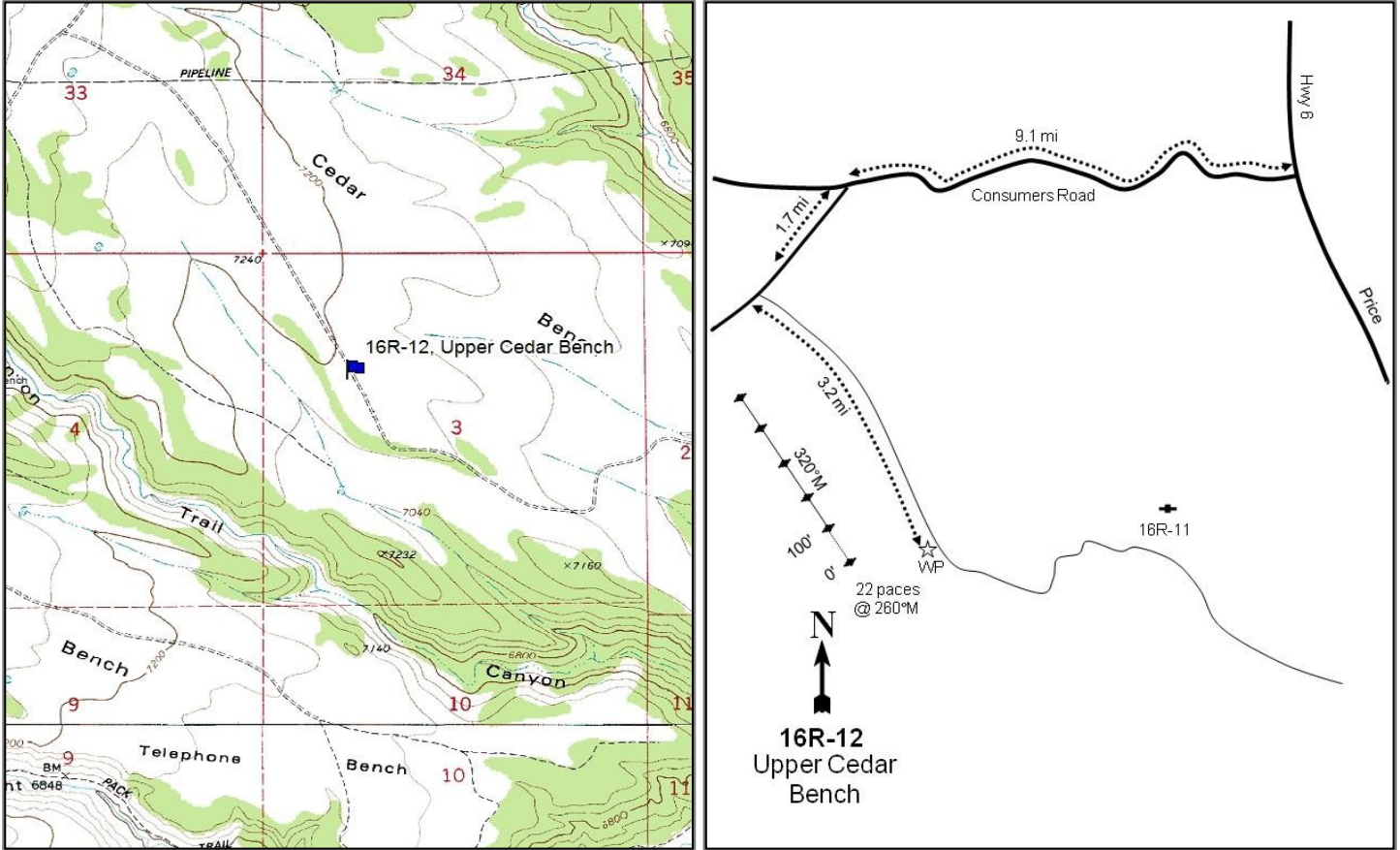
Year	Density		Age Class Distribution			Utilization		Poor Vigor (%)	Average Height Crown (cm)
	Plants Per Acre		Excluding Seedlings			Moderate (%)	Heavy (%)		
	Excluding Seedlings	Seedling	Young (%)	Mature (%)	Decadent (%)				
Artemisia tridentata ssp. wyomingensis^P -- (Wyoming big sagebrush)									
2004	2200	100	6	28	66	44	34	49	48/60
2007	2800	13660	39	36	24	14	11	16	59/78
2012	8480	1100	64	33	4	16	10	2	49/69
2016	7300	-	24	64	12	15	64	7	38/61
Chrysothamnus viscidiflorus ssp. viscidiflorus -- (yellow rabbitbrush)									
2004	2520	-	3	96	1	0	0	1	21/34
2007	2700	740	10	90	0	0	2	0	20/32
2012	2820	-	16	81	3	24	31	1	15/35
2016	2340	-	4	92	3	22	40	3	16/24
Gutierrezia sarothrae -- (broom snakeweed)									
2004	20	-	0	100	0	0	0	0	22/27
2007	-	40	0	0	0	0	0	0	25/31
2012	20	-	0	100	0	0	0	0	20/20
2016	940	-	0	100	0	0	0	0	14/26
Juniperus osteosperma^t -- (Utah juniper)									
2004	220	-	36	64	0	0	0	0	- / -
2007	120	20	33	67	0	0	0	50	- / -
2012	100	20	100	0	0	0	0	0	- / -
2016	40	-	0	100	0	0	0	0	- / -
Opuntia -- (pricklypear)									
2004	520	-	15	85	0	0	0	0	10/34
2007	320	-	31	56	13	0	0	6	8/21
2012	320	-	0	100	0	0	0	0	8/21
2016	300	-	7	60	33	0	0	33	7/21
Pediocactus simpsonii -- (mountain ball cactus)									
2004	80	-	50	50	0	0	0	0	6/10
2007	-	-	-	-	-	-	-	-	- / -
2012	20	-	0	100	0	0	0	0	9/16
2016	-	-	-	-	-	-	-	-	2/6
Pinus edulis^t -- (two-needle pinyon)									
2004	340	-	47	47	6	0	0	6	- / -
2007	160	-	13	88	0	0	0	50	- / -
2012	-	-	-	-	-	-	-	-	- / -

t - Tree Species; p - Preferred Browse; i - Introduced Species

Table 16R-11.14 - Tree Characteristics. Point-quarter tree density, size class distribution, and average diameter.

Year	Density	Seedling (%)	Size Class Distribution				Average Diameter (cm)
	Trees per Acre		1-4'	4-8'	8-12'	>12' (%)	
Juniperus osteosperma (Utah juniper)							
2004	84	6	39	39	6	11	8.4
2007	48	-	47	35	12	6	7.3
2012	42	-	50	50	-	-	5.8
2016	44	-	67	33	-	-	4.8
Pinus edulis (two-needle pinyon)							
2004	285	5	45	20	-	30	10.8
2007	56	-	83	17	-	-	3.8
2012	43	6	76	18	-	-	2.9
2016	61	11	67	22	-	-	3.1

UPPER CEDAR BENCH - STUDY NO. 16R-12



Location Information

USGS 7.5 min Map Info Jump Creek SE; Township 14S, Range 8E, Section 03
 GPS (0' Stake) NAD 83 UTM ZONE 12, 498400 East 4387722 North

Transect Information

Browse Tag # (0' Stake) 48
 Transect Bearing 320° 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 6 north of Price, turn west onto Consumers Road. Travel 9.1 miles to a road that comes in from the left (south). Turn here and follow this road 1.7 miles to another road that comes in from the left. Turn onto this road and travel 1.3 miles to a witness post on the right hand (south) side of the road. The 0-foot stake is 22 paces from the witness post at 260 degrees magnetic and is marked with browse tag #48.

Site Information

Land Ownership	State
Land Administrator	UDWR
Allotment	GORDON CRK WITHDRAWL
Elevation	7,200ft (2,195m)
Aspect	Southwest
Slope	3%
Sample Dates	07/26/2004, 07/02/2007, 07/30/2012, 08/16/2016, 08/16/2016

Table 16R-12.1 Disturbance History. Recorded history of major disturbances.

Treatment/Disturbance	Name	WRI DB#	Date	Size (acres)
Mechanical - Push	Cedar Bench	PDB	Spring 2005	-
Seeding - Broadcast Before	Cedar Bench	PDB	Spring 2005	-

Table 16R-12.2 Seed Mix. List of known seeded plant species and rates (if available).

Mix Name		Application Type	Application Date	Acres	
Cedar Bench		Broadcast	Apr 2005	150	
Type	Species	Common Name	Cultivar/Source ID	Bulk lbs/acre	PLS lbs/acre
G	Leymus cinereus	Great Basin Wildrye	Trailhead	0.53	0.50
F	Linum perenne	Blue Flax	Appar	0.22	0.20
F	Medicago sativa	Alfalfa	Spredor 3	1.17	0.99
S	Artemisia tridentata ssp. wyomingensis	Wyoming Big Sagebrush	Sanpete UT	0.67	0.19
S	Atriplex canescens	Fourwing Saltbush	Emery UT	0.67	0.30
S	Purshia tridentata	Bitterbrush	Ada/Boise ID	0.36	0.30

Wildlife Habitat and Vegetation History

Table 16R-12.3 - Wildlife Seasonal Habitat. UDWR wildlife habitat and seasonality.

Species	Habitat	Season
Deer	crucial	winter
Elk	crucial	winter
Greater Sage Grouse		occupied

Table 16R-12.4 - Vegetation History. The dominant vegetation type(s) and phase of woodland succession (Tausch, Miller, Roundy, & Chambers, 2009).

Year	Vegetation Type	Woodland Succession
2004	Black Sagebrush/Two-needle Pine	Phase I transitioning to Phase II
2007	Black Sagebrush	Phase I
2012	Black Sagebrush	Phase I
2016	Black Sagebrush	Phase I

Site Notes

This study is located approximately ten miles west of Price on Cedar Bench. In spring of 2005, seed was hand broadcast on the treatment area and trees were removed by pushing with D-6 CAT bulldozers. When speaking with the habitat biologist in 2007, it was mentioned that the treatment may not have been seeded. However, in 2012 there were portions of the treatment area that had good stands of Great Basin wildrye (*Leymus cinereus*) which was in the seed mix.

Soils

Table 16R-12.5 - Soil Analysis Data. List of chemical and textural soil characteristics determined by laboratory analysis.

Texture	pH	%sand	%silt	%clay	%OM	PPM P	PPM K	ds/m	Sample Date
Clay Loam	7.1	39.6	29.1	31.3	2.1	11.2	70.4	0.6	07/26/2004

Site Potential

1981-2010 Average Annual Precipitation 14 inches
 NRCS Ecological Site Upland Loam (Mountain Big Sagebrush-Indian Ricegrass)
 NRCS Ecological Site # R047XB308UT
 States and Transitions No state and transition model is available for this ecological site.

Upon establishment in 2004, this site was a Wyoming big sagebrush (*Artemisia nova*) and mountain big sagebrush (*Artemisia tridentata* ssp. *vaseyana*) shrub land that had been encroached by two-needle pinyon (*Pinus edulis*) and Utah juniper (*Juniperus osteosperma*) (Table 16R-12.12, Photos). The herbaceous understory was lacking in abundance but was moderately diverse (Table 16R-12.7, Table 16R-12.10, Table 16R-12.11). following the tree removing disturbances, the community transitioned to a phase I woodland community with cover and density of pinyon and juniper decreasing substantially. With the canopy open, sagebrush has generally increased in cover and density (Table Table 16R-12.6, Table 16R-12.12, Table 16R-12.13). Despite successful treatments that removed much of the encroaching conifer trees, many young trees remain and will likely continue to encroach on the community without frequent maintenance in the area.

Trend Summary Tables

Table 16R-12.6 - Shrub/Tree Summary. Average modified Daubenmire quadrat and line intercept cover by year for shrubs/trees.

Year	Quadrat Cover (%)			Line-intercept Cover (%)		
	Preferred Shrub	Other Shrub	Tree	Preferred Shrub	Other Shrub	Tree
2004	8.8	2.5	7.5	6.5	3.2	7.9
2007	6.4	2.1	-	7.0	2.3	-
2012	7.7	1.3	-	7.1	1.8	-
2016	8.3	1.8	-	9.0	1.2	-

Table 16R-12.7 - Herbaceous Summary. Nested frequency and average modified Daubenmire quadrat cover by year for herbaceous functional groups.

Year	Nested Frequency				Quadrat Cover (%)			
	Annual Grass	Perennial Grass	Annual/Biennial Forb	Perennial Forb	Annual Grass	Perennial Grass	Annual/Biennial Forb	Perennial Forb
2004	-	351	47	180	-	13.7	0.1	3.2
2007	15	380	29	217	0.1	22.1	0.1	4.2
2012	1	405	19	137	0.0	23.7	0.1	0.8
2016	-	402	5	158	-	30.3	0.0	0.9

Table 16R-12.8 - Basic Ground Cover. Average modified Daubenmire quadrat cover by year for basic ground cover types.

Year	Cover Type (%)					
	Bare Ground	Cryptograms	Litter	Pavement	Rock	Vegetation
2004	32.9	3.9	41.5	1.4	0.2	36.1
2007	27.8	3.6	41.6	0.2	0.1	37.2
2012	35.7	0.7	52.3	0.6	0.1	37.7
2016	27.3	1.5	34.9	0.4	0.1	43.1

Table 16R-12.9 - Pellet Group Data. Quadrat frequency and pellet group transect data for animal pellets. Rabbit pellet groups are not sampled in the pellet group transect.

Year	Cattle	Mule Deer	Elk	Rabbit
	Quadrat Frequency			
2004	-	32	28	12
2007	-	20	28	34
2012	-	16	25	-
2016	4	25	3	52
Year	Days Use Per Acre (ha)			
2004	-	53.6 (132.4)	53.0 (130.8)	-
2007	-	40.2 (99.3)	28.8 (71.2)	-
2012	-	48.3 (119.2)	85.8 (211.9)	-
2016	2.9 (7.2)	27.5 (67.9)	2.0 (5.0)	-

Table 16R-12.10 - Grass Species. Nested frequency and modified Daubenmire average cover by year.

GRASS SPECIES	Achnatherum hymenoides (Indian ricegrass)	Bouteloua gracilis (blue grama)	Bromus tectorum ^{ai} (cheatgrass)	Elymus elymoides (squirreltail)	Hesperostipa comata (needle and thread)	Leymus salinus (saline wildrye)	Pascopyrum smithii (western wheatgrass)	Poa fendleriana (muttongrass)	Poa secunda (Sandberg bluegrass)	Pseudoroegneria spicata (bluebunch wheatgrass)
year	Nested Frequency									
2004	6	11	-	6	39	222	28	147	11	17
2007	6	5	15	16	32	109	46	257	86	97
2012	23	10	1	3	78	202	70	130	74	137
2016	2	-	-	1	101	129	36	66	63	149
year	Average Cover (%)									
2004	0.3	0.4	-	0.1	1.1	7.0	0.2	4.1	0.1	0.5
2007	0.0	0.2	0.1	0.3	1.4	4.0	0.4	10.4	1.4	3.9
2012	0.6	0.1	0.0	0.0	1.5	9.8	0.8	3.2	1.6	6.0
2016	0.0	-	-	0.0	6.5	8.2	1.7	3.3	1.5	9.1

a - Annual; n - Noxious Weed; i - Introduced Species

Table 16R-12.11 - Forb Species. Nested frequency and modified Daubenmire average cover by year.

FORB SPECIES	Agoseris glauca (pale agoseris)	Arabis (rockress)	Astragalus convallarius (lesser rushy milkvetch)	Astragalus tenellus (looseflower milkvetch)	Calochortus nuttallii (sego lily)	Castilleja lamarifolia (Wyoming Indian paintbrush)	Chaenactis douglasii (Douglas' dustymaiden)	Collinsia parviflora ^a (maiden blue eyed Mary)	Comandra umbellata (bastard toadflax)	Cymopterus (springparsley)	Descurainia pinnata ^a (western tansymustard)	Eriogonum racemosum (redroot buckwheat)	Gayophytum ramosissimum ^a (pinyon groundsmoke)	Hedysarum boreale (Utah sweetvetch)	Lactuca serriola ^{ai} (prickly lettuce)	Lappula occidentalis ^a (flatspine stickseed)	Machaeranthera canescens (hoary tansyaster)
year	Nested Frequency																
2004	-	2	60	8	2	-	-	-	64	1	-	2	1	-	-	7	1
2007	12	-	55	23	4	9	-	3	89	1	2	-	-	-	2	21	5
2012	-	-	4	12	-	-	8	-	60	-	-	3	15	-	-	-	-
2016	-	-	13	-	-	4	-	2	53	-	-	-	-	1	-	2	-
year	Average Cover (%)																
2004	-	0.0	1.4	0.2	0.0	-	-	-	0.8	0.0	-	0.0	0.0	-	-	0.0	0.0
2007	0.1	-	0.7	0.7	0.0	0.0	-	0.0	1.4	0.0	0.0	-	-	-	0.0	0.1	0.1
2012	-	-	0.0	0.1	-	-	0.0	-	0.3	-	-	0.0	0.1	-	-	-	-
2016	-	-	0.1	-	-	0.0	-	0.0	0.3	-	-	-	-	0.0	-	0.0	-

a - Annual/Biennial; n - Noxious Weed; i - Introduced Species

FORB SPECIES	Packera multilobata (lobeleaf groundsel)	Penstemon pachyphyllus (thickleaf beardtongue)	Phlox longifolia (longleaf phlox)	Polygonum douglasii ⁿ (Douglas' knotweed)	Schoenocrambe limifolia (flaxleaf plainsmustard)	Sedum lanceolatum (spearleaf stonecrop)	Sphaeralcea coccinea (scarlet globemallow)	Symphotrichum (aster)	Tragopogon dubius ⁱⁱ (yellow salsify)	Trifolium (clover)
year	Nested Frequency									
2004	43	9	41	40	1	-	8	-	1	23
2007	26	11	96	-	11	2	1	1	1	30
2012	9	13	59	4	-	-	12	5	-	-
2016	30	10	88	-	-	-	6	1	1	2
year	Average Cover (%)									
2004	0.2	0.1	0.1	0.1	0.0	-	0.0	-	0.0	0.3
2007	0.4	0.1	0.5	-	0.1	0.0	0.0	0.0	0.0	0.1
2012	0.1	0.1	0.2	0.0	-	-	0.1	0.0	-	-
2016	0.1	0.0	0.3	-	-	-	0.0	0.0	0.0	0.0

a - Annual/Biennial; n - Noxious Weed; i - Introduced Species

Table 16R-12.12 - Shrub and Tree Species. Average modified Daubenmire quadrat and line intercept cover by year.

SHRUB SPECIES	Amelanchier utahensis ^p (Utah serviceberry)	Artemisia nova ^p (black sagebrush)	Artemisia tridentata ssp. vaseyana ^p (mountain big sagebrush)	Chrysothamnus viscidiflorus ssp. viscidiflorus (yellow rabbitbrush)	Gutierrezia sarothrae (broom snakeweed)	Juniperus osteosperma ^t (Utah juniper)	Opuntia (pricklypear)	Pinus edulis ^t (twoneedle pinyon)
year	Line Intercept Cover (%)							
2004	-	5.2	1.3	1.5	1.7	0.6	-	7.3
2007	0.3	5.7	1	1.4	0.9	-	-	-
2012	0.2	5.3	1.6	1.7	0.1	-	0	-
2016	-	7.3	1.7	0.1	1	-	0.1	-
year	Quadrat Cover (%)							
2004	0.2	6.4	2.3	1.4	1.0	0.0	-	7.5
2007	0.3	5.3	0.8	1.3	0.8	-	-	-
2012	0.2	5.8	1.7	1.3	0.0	-	0.0	-
2016	0.0	6.6	1.7	1.8	0.0	-	0.0	-

t - Tree Species; p - Preferred Browse; i - Introduced

Table 16R-12.13 - Shrub/Tree Characteristics. Population characteristics of shrub/tree species populations including density reproduction (seedlings), age distribution, utilization, vigor and average size (height/crown) of plants.

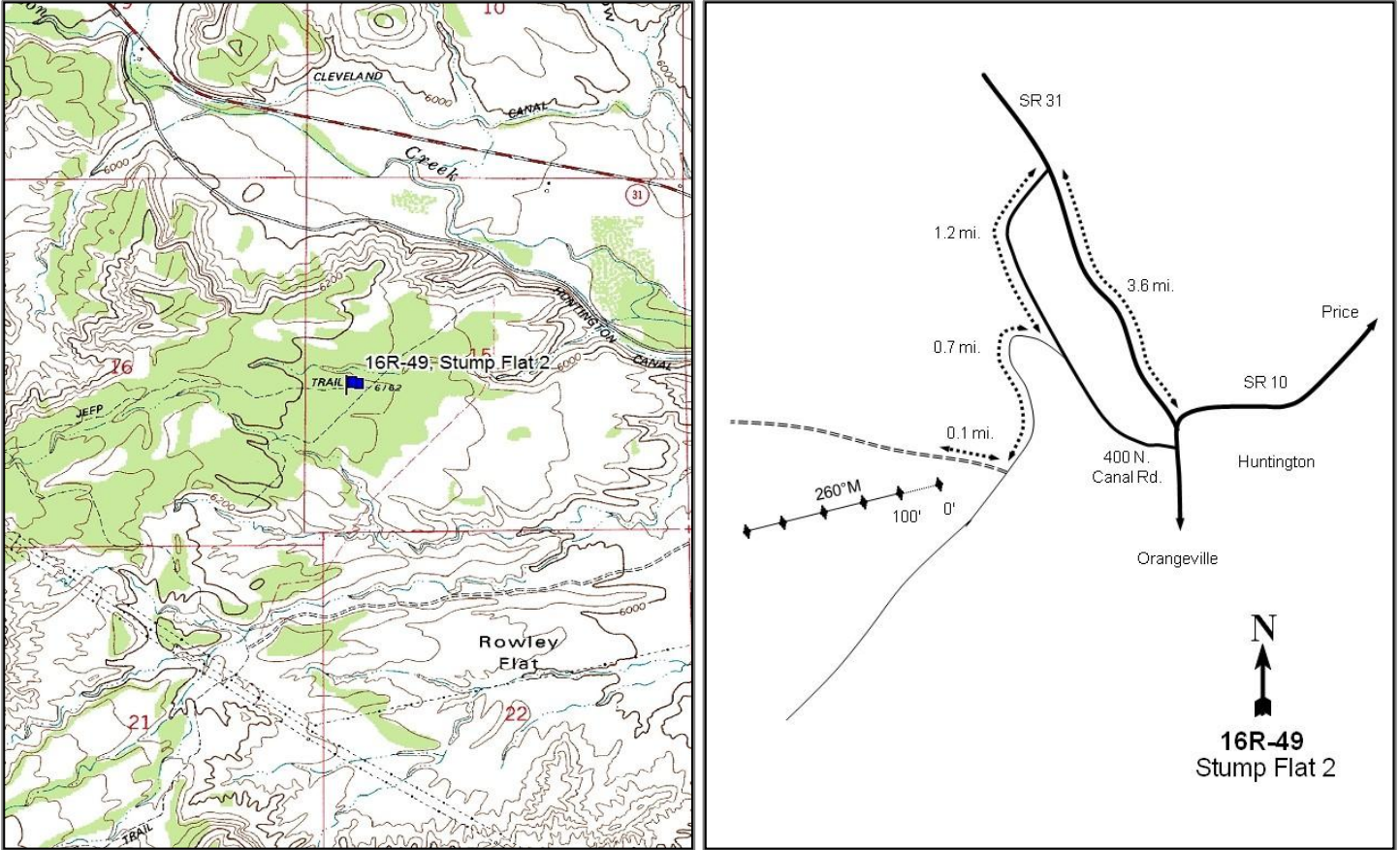
Year	Density		Age Class Distribution			Utilization		Poor Vigor (%)	Average Height Crown (cm)
	Plants Per Acre		Excluding Seedlings			Moderate (%)	Heavy (%)		
	Excluding Seedlings	Seedling	Young (%)	Mature (%)	Decadent (%)				
Amelanchier utahensis^p -- (Utah serviceberry)									
2004	40	-	0	100	0	0	100	0	69/82
2007	40	-	0	100	0	50	50	0	85/97
2012	40	-	0	100	0	50	50	0	93/112
2016	20	-	0	0	100	0	100	100	84/100
Artemisia nova^p -- (black sagebrush)									
2004	4000	10400	40	38	22	11	1	15	31/53
2007	2200	8120	9	60	31	21	8	25	31/55
2012	6700	700	64	29	7	54	10	3	29/58
2016	5320	-	21	68	11	13	35	9	23/47
Artemisia tridentata ssp. vaseyana^p -- (mountain big sagebrush)									
2004	980	440	27	31	43	22	16	39	47/60
2007	580	2440	10	35	55	48	17	31	50/82
2012	1560	600	56	33	10	14	14	6	46/59
2016	1640	-	12	76	12	27	33	7	38/59
Chrysothamnus viscidiflorus ssp. viscidiflorus -- (yellow rabbitbrush)									
2004	1320	-	5	96	0	0	0	0	18/30
2007	1340	100	9	90	2	22	0	2	21/38
2012	1180	40	25	68	7	22	25	9	18/37
2016	2060	-	2	97	1	3	18	18	16/34
Gutierrezia sarothrae -- (broom snakeweed)									
2004	2820	-	4	97	0	0	0	0	18/26
2007	2080	140	7	91	2	0	0	1	14/20
2012	560	40	11	89	0	0	11	0	14/23
2016	160	-	0	100	0	0	0	0	91/26
Juniperus osteosperma^t -- (Utah juniper)									
2004	20	-	100	0	0	0	0	0	- / -
2007	-	-	-	-	-	-	-	-	- / -
2012	-	-	-	-	-	-	-	-	- / -
2016	-	-	-	-	-	-	-	-	- / -
Opuntia -- (pricklypear)									
2004	100	-	0	100	0	0	0	0	8/25
2007	100	-	60	40	0	0	0	0	11/22
2012	80	-	0	100	0	0	0	25	8/21
2016	40	20	0	100	0	0	0	0	8/28
Pediocactus simpsonii -- (mountain ball cactus)									
2004	20	-	0	100	0	0	0	0	4/6
2007	20	-	100	0	0	0	0	0	9/20
2012	40	-	50	50	0	0	0	0	3/4
2016	-	-	-	-	-	-	-	-	- / -
Pinus edulis^t -- (two-needle pinyon)									
2004	120	-	67	33	0	0	0	0	- / -
2007	60	-	33	67	0	0	0	0	- / -
2012	20	-	100	0	0	0	0	0	- / -
2016	20	-	100	0	0	0	0	0	- / -

t - Tree Species; p - Preferred Browse; i - Introduced Species

Table 16R-12.14 - Tree Characteristics. Point-quarter tree density, size class distribution, and average diameter.

Year	Density	Size Class Distribution				Average Diameter (cm)	
	Trees per Acre	Seedling (%)	1-4'	4-8'	8-12'		>12' (%)
Juniperus osteosperma (Utah juniper)							
2004	72	5	11	47	26	11	10.2
2007	24	8	54	38	-	-	7.5
2012	14	22	67	11	-	-	3.6
2016	16	-	83	17	-	-	4.6
Pinus edulis (twoneedle pinyon)							
2004	84	6	24	35	6	29	9.4
2007	29	8	92	-	-	-	3.8
2012	12	20	80	-	-	-	2.0
2016	14	-	100	-	-	-	1.8

STUMP FLAT 2 - STUDY NO. 16R-49



Location Information

USGS 7.5 min Map Info	Red Point NE; Township 17S, Range 8E, Section 15
GPS (0' Stake)	NAD 83 UTM ZONE 12, 498338 East 4354819 North

Transect Information

Browse Tag # (0' Stake)	Not Available
Transect Bearing	260° 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

On State Route (SR) 10 between Price and Huntington, turn west onto Huntington Canyon Road (SR-31). Drive for 3.6 miles and turn left onto 400 N (Canal Road). Drive 1.2 miles and turn right onto an unnamed road. Continue for 0.7 miles and turn right (west) onto another unnamed road and drive for 0.1 miles. The transect will be to the left (south) of the road.

Site Information

Land Ownership	State
Land Administrator	SITLA
Allotment	WEST HUNTINGTON
Elevation	6,164ft (1,879m)
Aspect	Southeast
Slope	3-4%
Sample Dates	07/03/2013, 08/16/2016, 08/16/2016

Table 16R-49.1 Disturbance History. Recorded history of major disturbances.

Treatment/Disturbance	Name	WRI DB#	Date	Size (acres)
Seeding - Aerial After	Stump Flat Pinyon/Juniper Removal Project	2693	December 2013	460
Mechanical - Bullhog	Stump Flat Pinyon/Juniper Removal Project	2693	October 2013	460
Seeding - Aerial Before	Stump Flat Pinyon/Juniper Removal Project	2693	October 2013	460

Table 16R-49.2 Seed Mix. List of known seeded plant species and rates (if available).

Mix Name			Application Type	Application Date	Acres
Stump Flat			Aerial	Oct 2013	460
Type	Species	Common Name	Cultivar/Source ID	Bulk lbs/acre	PLS lbs/acre
G	Achnatherum hymenoides	Indian Ricegrass	Emery UT	1.41	1.00
G	Agropyron fragile	Siberian Wheatgrass	Vavilov	0.56	0.47
G	Elymus lanceolatus	Thickspike Wheatgrass	Bannock	0.60	0.52
G	Poa secunda	Sandberg Bluegrass	UP/Colorado Plateau	0.60	0.44
F	Achillea millefolium	Western Yarrow	Hanford WA	0.11	0.10
F	Linum perenne	Blue Flax	Appar	0.65	0.49
F	Medicago sativa	Alfalfa	Ranger (NC)	1.58	1.50
F	Melilotus officinalis	Yellow Sweetclover		1.52	1.34
F	Sphaeralcea grossulariifolia	Gooseberryleaf Globemallow	Beaver UT	0.33	0.27
S	Atriplex canescens	Four-wing Saltbush	Juab/Utah/Carbon UT	1.09	0.53
S	Krascheninnikovia lanata	Winterfat	Torrance NM	0.48	0.25
Mix Name			Application Type	Application Date	Acres
Stump Flat Shrub			Aerial	Dec 2013	460
Type	Species	Common Name	Cultivar/Source ID	Bulk lbs/acre	PLS lbs/acre
S	Artemisia tridentata ssp. wyomingensis	Wyoming Big Sagebrush	Sanpete UT	0.50	0.09
S	Bassia prostrata	Forage Kochia	Beaver UT	0.50	0.33

Wildlife Habitat and Vegetation History

Table 16R-49.3 - Wildlife Seasonal Habitat. UDWR wildlife habitat and seasonality.

Species	Habitat	Season
Deer	crucial	winter

Table 16R-49.4 - Vegetation History. The dominant vegetation type(s) and phase of woodland succession (Tausch, Miller, Roundy, & Chambers, 2009).

Year	Vegetation Type	Woodland Succession
2013	Pinyon-Juniper	Phase III
2016	Annual Forb	Phase I

Site Notes

Several dead deer carcasses were found near the site in 2013. There is also oil and gas development in this area.

Site Potential

1981-2010 Average Annual Precipitation 9 inches
 NRCS Ecological Site Semidesert Shallow Loam (Black Sagebrush)
 NRCS Ecological Site # R034BY227UT
 States and Transitions No state and transition model is available for this ecological site.

When established in 2013, this site was dominated by encroaching pinyon pine (*Pinus edulis*) and Utah juniper (*Juniperus osteosperma*). Other browse species provided little cover (Table 16R-49.12, Table 16R-49.13). The herbaceous understory was also sparse (Table 16R-49.7). Following the bull-hog treatment, cover and density of conifer trees decreased substantially though shrubs were sampled in lower abundance. The herbaceous understory increased significantly in cover; However, much of the herbaceous understory was composed of annual species (Table 16R-49.7, Table 16R-49.11). Over time, it is expected that black sagebrush (*Artemisia nova*) and other browse species will likely increase in abundance. However, rehabilitation will likely be slow due to the lower potential of the site.

Trend Summary Tables

Table 16R-49.6 - Shrub/Tree Summary. Average modified Daubenmire quadrat and line intercept cover by year for shrubs/trees.

Year	Quadrat Cover (%)			Line-intercept Cover (%)		
	Preferred Shrub	Other Shrub	Tree	Preferred Shrub	Other Shrub	Tree
2013	0.4	0.1	10.6	0.2	0.2	18.7
2016	0.7	0.6	0.0	0.3	0.5	0.6

Table 16R-49.7 - Herbaceous Summary. Nested frequency and average modified Daubenmire quadrat cover by year for herbaceous functional groups.

Year	Nested Frequency				Quadrat Cover (%)			
	Annual Grass	Perennial Grass	Annual/Biennial Forb	Perennial Forb	Annual Grass	Perennial Grass	Annual/Biennial Forb	Perennial Forb
2013	-	2	9	11	-	0.0	0.2	0.1
2016	-	13	355	61	-	0.5	12.2	1.0

Table 16R-49.8 - Basic Ground Cover. Average modified Daubenmire quadrat cover by year for basic ground cover types.

Year	Cover Type (%)					
	Bare Ground	Cryptograms	Litter	Pavement	Rock	Vegetation
2013	55.5	1.5	19.3	10.6	10.2	11.1
2016	53.6	0.2	25.7	8.5	4.0	13.2

Table 16R-49.9 - Pellet Group Data. Quadrat frequency and pellet group transect data for animal pellets. Rabbit pellet groups are not sampled in the pellet group transect.

Year	Mule Deer	Elk	Rabbit
	Quadrat Frequency		
2013	13	1	7
2016	4	-	41
Year	Days Use Per Acre (ha)		
2013	22.8 (56.3)	-	-
2016	8.7 (21.5)	-	-

Table 16R-49.10 - Grass Species. Nested frequency and modified Daubenmire average cover by year.

GRASS SPECIES	Nested Frequency		
	Achnatherum hymenoides (Indian ricegrass)		
Dactylis glomerata ⁱ (orchardgrass)			
Elymus elymoides (squirriltail)			
year	Average Cover (%)		
2013	-	-	2
2016	4	1	8
year	Average Cover (%)		
2013	-	-	0.0
2016	0.3	0.0	0.1

a - Annual; n - Noxious Weed; i - Introduced Species

Table 16R-49.11 - Forb Species. Nested frequency and modified Daubenmire average cover by year.

FORB SPECIES	Nested Frequency																	
	Arabidopsis ^{ai} (rockcross)																	
Arabis (rockcross)																		
Caulanthus crassicaulis ^a (thickstem wild cabbage)																		
Chamaesyce (sandmat)																		
Cryptantha (cryptantha)																		
Descurainia pinnata ^a (western tansymustard)																		
Eriogonum (buckwheat)																		
Eriogonum cernuum ^a (nodding buckwheat)																		
Euphorbia (spurge)																		
Halogeton glomeratus ^{ai} (saltlover)																		
Hymenoxys richardsonii (pingue rubberweed)																		
Lactuca serriola ^{ai} (prickly lettuce)																		
Lepidium ^a (pepperweed)																		
Lomatium (desertparsley)																		
Penstemon pachyphyllus (thickleaf beardtongue)																		
Salsola tragus ^{ai} (prickly Russian thistle)																		
Taraxacum officinale (common dandelion)																		
year	Average Cover (%)																	
2013	-	-	2	3	8	-	-	-	-	-	0	-	3	-	-	4	-	-
2016	1	5	2	11	5	22	6	9	10	32	23	20	36	5	2	350	4	-
year	Average Cover (%)																	
2013	-	-	0.0	0.0	0.0	-	-	-	-	-	0.0	-	0.1	-	-	0.0	-	-
2016	0.0	0.1	0.0	0.1	0.3	0.1	0.0	0.1	0.1	0.1	0.1	0.5	0.8	0.1	0.2	10.6	0.1	-

a - Annual/Biennial; n - Noxious Weed; i - Introduced Species

Table 16R-49.12 - Shrub and Tree Species. Average modified Daubenmire quadrat and line intercept cover by year.

SHRUB SPECIES	Artemisia nova ^p (black sagebrush)	Ephedra nevadensis ^p (Nevada jointfir)	Eriogonum microthecum ^p (slender buckwheat)	Glossopetalon spinescens var. aridum (spiny greasebush)	Grayia spinosa (spiny hopsage)	Gutierrezia sarothrae (broom snakeweed)	Juniperus osteosperma ^t (Utah juniper)	Opuntia (pricklypear)	Pinus edulis ^t (twoneedle pinyon)
year	Line Intercept Cover (%)								
2013	0.2	-	0	0.1	-	0	14.9	0.1	3.8
2016	0.1	0	0.2	0.1	0.1	0.3	0.6	-	-
year	Quadrat Cover (%)								
2013	0.4	0.0	0.0	0.0	-	0.0	8.9	0.0	1.7
2016	0.2	0.0	0.5	0.2	0.0	0.5	0.0	-	-

t - Tree Species; p - Preferred Browse; i - Introduced

Table 16R-49.13 - Shrub/Tree Characteristics. Population characteristics of shrub/tree species populations including density reproduction (seedlings), age distribution, utilization, vigor and average size (height/crown) of plants.

Year	Density		Age Class Distribution			Utilization		Poor Vigor (%)	Average Height Crown (cm)
	Plants Per Acre		Excluding Seedlings			Moderate (%)	Heavy (%)		
	Excluding Seedlings	Seedling	Young (%)	Mature (%)	Decadent (%)				
Artemisia nova ^p -- (black sagebrush)									
2013	500	-	8	32	60	8	36	56	10/26
2016	160	-	25	38	38	38	0	0	17/41
Artemisia tridentata ssp. wyomingensis ^p -- (Wyoming big sagebrush)									
2013	-	-	-	-	-	-	-	-	-/-
2016	140	-	14	86	0	0	0	0	36/28
Bassia prostrata ⁱ -- (forage kochia)									
2013	-	-	-	-	-	-	-	-	-/-
2016	40	-	0	100	0	0	50	0	7/17
Cercocarpus montanus ^p -- (alderleaf mountain mahogany)									
2013	-	-	-	-	-	-	-	-	-/-
2016	-	-	-	-	-	-	-	-	52/54
Ephedra nevadensis ^p -- (Nevada jointfir)									
2013	80	-	100	0	0	0	0	0	22/24
2016	20	-	0	100	0	100	0	0	33/48
Eriogonum microthecum ^p -- (slender buckwheat)									
2013	720	-	25	75	0	8	0	3	7/8
2016	1420	100	0	100	0	1	0	0	11/19
Glossopetalon spinescens var. aridum -- (spiny greasebush)									
2013	140	-	0	100	0	0	43	0	14/25
2016	180	-	11	89	0	0	89	0	16/35
Grayia spinosa -- (spiny hopsage)									
2013	-	-	-	-	-	-	-	-	-/-
2016	-	-	-	-	-	-	-	-	18/40
Gutierrezia sarothrae -- (broom snakeweed)									
2013	260	-	100	0	0	0	0	0	13/17
2016	240	-	0	100	0	0	0	0	27/36
Juniperus osteosperma ^t -- (Utah juniper)									
2013	800	40	63	35	3	0	0	3	-/-
2016	280	120	71	14	14	7	29	21	-/-

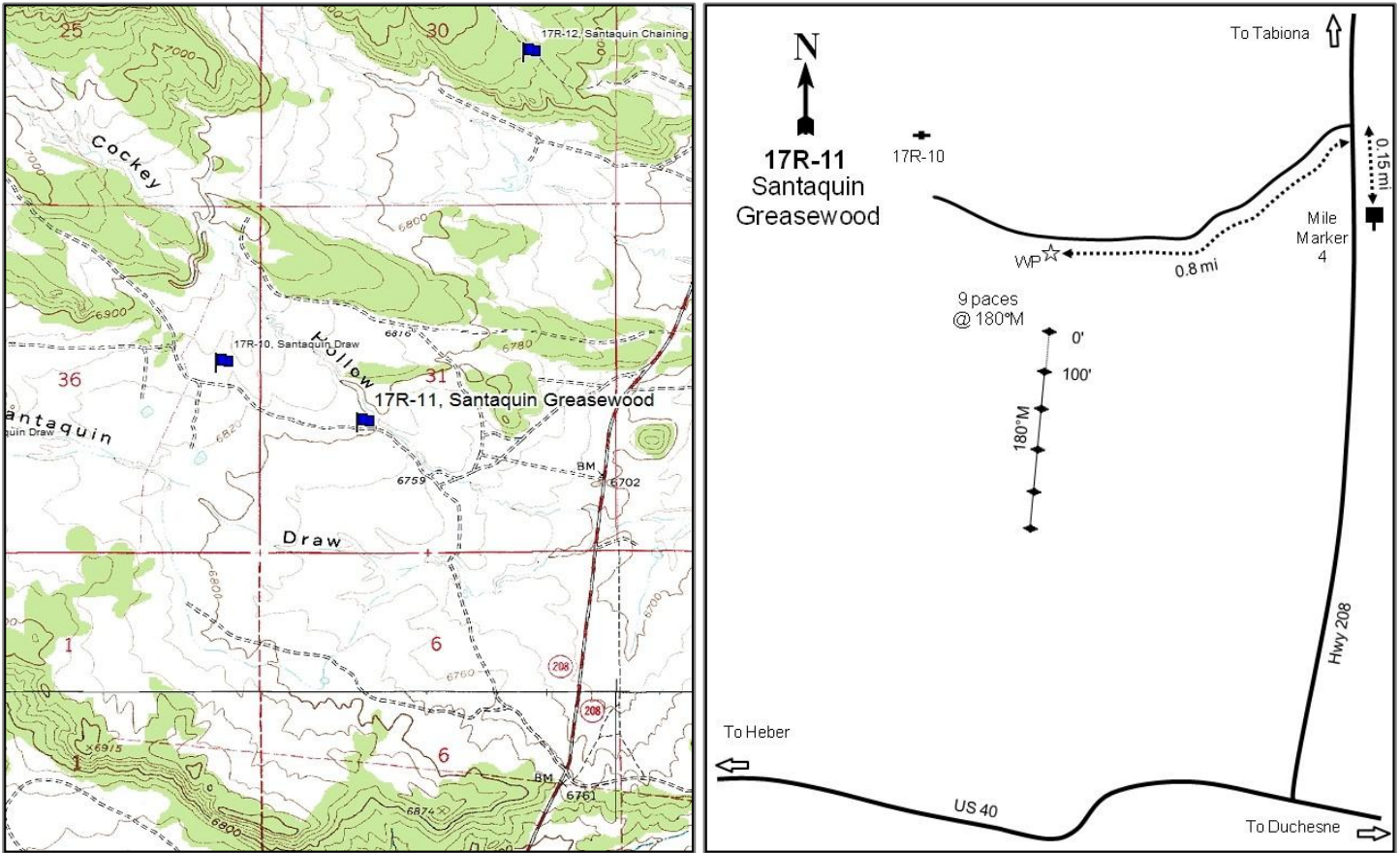
Year	Density		Age Class Distribution			Utilization		Poor Vigor (%)	Average Height Crown (cm)
	Plants Per Acre		Excluding Seedlings			Moderate (%)	Heavy (%)		
	Excluding Seedlings	Seedling	Young (%)	Mature (%)	Decadent (%)				
Opuntia -- (pricklypear)									
2013	20	-	0	0	100	0	0	0	9/18
2016	40	-	0	100	0	0	0	0	8/24
Pinus edulis ¹ -- (two-needle pinyon)									
2013	200	-	70	20	10	0	0	20	- / -

t - Tree Species; p - Preferred Browse; i - Introduced Species

Table 16R-49.14 - Tree Characteristics. Point-quarter tree density, size class distribution, and average diameter.

Year	Density	Size Class Distribution					Average Diameter (cm)
	Trees per Acre	Seedling (%)	1-4'	4-8'	8-12'	>12' (%)	
Juniperus osteosperma (Utah juniper)							
2013	561	5	55	25	15	-	8.0
2016	242	35	65	-	-	-	5.5
Pinus edulis (two-needle pinyon)							
2013	97	11	37	42	11	-	7.1
2016	8	-	100	-	-	-	5.3

SANTAQUIN GREASEWOOD - STUDY No. 17R-11



Location Information

USGS 7.5 min Map Info	Tabiona SW; Township 2S, Range 7W, Section 31
GPS (0' Stake)	NAD 83 UTM ZONE 12, 523633 East 4456728 North

Transect Information

Browse Tag # (0' Stake)	40
Transect Bearing	180° 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 US 40, turn north onto Highway 208. Travel 0.15 miles north of mile marker 4 to a road that comes in from the left (west). Turn onto this road and drive 0.8 miles to a witness post on the left hand (south) side of the road. The 0-foot stake is 9 paces from the witness post at 180 degrees magnetic and is marked with browse tag #40.

Site Information

Land Ownership	State
Land Administrator	UDWR
Allotment	No data
Elevation	6,810ft (2,076m)
Aspect	South
Slope	2%
Sample Dates	07/15/2004, 07/26/2007, 07/07/2009, 06/28/2010, 07/10/2012, 08/02/2016

Table 17R-11.1 Disturbance History. Recorded history of major disturbances.

Treatment/Disturbance	Name	WRI DB#	Date	Size (acres)
Chaining - One-Way Smooth	Santaquin Greasewood	PDB	Fall 2004	380
Seeding - Aerial Before	Santaquin Greasewood	PDB	Fall 2004	380
Seeding - Dribbler	Santaquin Greasewood	PDB	Fall 2004	380
Seeding - Aerial After	Santaquin Greasewood	PDB	Winter 2004	1755

Table 17R-11.2 Seed Mix. List of known seeded plant species and rates (if available).

Mix Name		Application Type	Application Date	Acres	
Santaquin Greasewood		Aerial	Oct 2004	380	
Type	Species	Common Name	Cultivar/Source ID	Bulk lbs/acre	PLS lbs/acre
G	Agropyron fragile	Siberian Wheatgrass	Vavilov	1.05	0.96
G	Elymus lanceolatus	Thickspike Wheatgrass	Critana	1.97	1.85
G	Leymus cinereus	Great Basin Wildrye	Trailhead	1.97	1.84
G	Psathyrostachys juncea	Russian Wildrye	Bozoisky	1.97	1.84
F	Medicago sativa	Alfalfa	Ladak+	0.53	0.48
F	Onobrychis viciifolia	Sainfoin		1.05	1.01
S	Atriplex canescens	Fourwing Saltbush	Juab UT	0.79	0.40
Mix Name		Application Type	Application Date	Acres	
Santaquin Greasewood Shrub		Dribbler	Oct 2004	40	
Type	Species	Common Name	Cultivar/Source ID	Bulk lbs/acre	PLS lbs/acre
F	Medicago sativa	Alfalfa	Ladak+	0.50	0.47
F	Onobrychis viciifolia	Sainfoin		1.00	0.96
S	Artemisia tridentata ssp. wyomingensis	Wyoming Big Sagebrush	Sanpete UT	1.00	0.28
Mix Name		Application Type	Application Date	Acres	
Santaquin Sagebrush Browse		Aerial	Dec 2004	1755	
Type	Species	Common Name	Cultivar/Source ID	Bulk lbs/acre	PLS lbs/acre
F	Medicago sativa	Alfalfa	Ladak+	0.57	0.52
F	Onobrychis viciifolia	Sainfoin	Eski	0.57	0.52
S	Artemisia tridentata ssp. wyomingensis	Wyoming Big Sagebrush	Sanpete UT	0.75	0.21
S	Artemisia tridentata ssp. wyomingensis	Wyoming Big Sagebrush		0.08	0.01
S	Bassia prostrata	Forage Kochia	Immigrant	0.46	0.31
S	Krascheninnikovia lanata	Winterfat	Duchesne/Uintah UT	0.17	0.08

Wildlife Habitat and Vegetation History

Table 17R-11.3 - Wildlife Seasonal Habitat. UDWR wildlife habitat and seasonality.

Species	Habitat	Season	Brood/Young Rearing
Deer	crucial	winter	
Elk	crucial	winter	
Greater Sage Grouse	Crucial	occupied & Winter	brood-rearing

Table 17R-11.4 - Vegetation History. The dominant vegetation type(s) and phase of woodland succession (Tausch, Miller, Roundy, & Chambers, 2009).

Year	Vegetation Type	Woodland Succession
2004	Black Greasewood-Basin Big Sagebrush	No Encroachment
2007	Black Greasewood-Basin Big Sagebrush	No Encroachment
2009	Black Greasewood-Basin Big Sagebrush	No Encroachment
2010	Black Greasewood-Basin Big Sagebrush	No Encroachment
2012	Black Greasewood-Mountain Big Sagebrush	No Encroachment
2016	Mountain Big Sagebrush-Black Greasewood	No Encroachment

Site Notes

This study is located eighteen miles northwest of Duchesne within a greasewood (*Sarcobatus vermiculatus*) and big sagebrush (*Artemisia tridentata*) flat.

Soils

Table 17R-11.5 - Soil Analysis Data. List of chemical and textural soil characteristics determined by laboratory analysis.

Texture	pH	% sand	% silt	% clay	% OM	PPM P	PPM K	ds/m	Sample Date
Loam	7.2	49.6	32.9	17.5	1.1	4.5	137.6	1.0	07/15/2004

Site Potential

1981-2010 Average Annual Precipitation 13 inches
 NRCS Ecological Site Upland Loam (Mountain Big Sagebrush)
 NRCS Ecological Site # R047XC310UT
 States and Transitions No state and transition model is available for this ecological site.

From study establishment in 2004 through the 2010 sample year, this site was dominated by black greasewood (*Sarcobatus vermiculatus*) and basin big sagebrush (*Artemisia tridentata* ssp. *tridentata*) with mountain big sagebrush (*A. tridentata* ssp. *vaseyana*) as a subordinate species. Cover of basin big sagebrush decreased each sample year since 2010 while that of mountain big sagebrush increased, and mountain big sagebrush replaced basin big sagebrush as a co-dominant component in 2012. In 2016, cover of mountain big sagebrush surpassed that of greasewood (Table 17R- 11.12). The herbaceous understory has been mainly comprised of perennial grasses in most sample years, and forbs have remained depauperate in both composition and quantity. The invasive annual grass species cheatgrass has been observed in most years, but in extremely low amounts (Table 17R-11.10, Table 17R-11.11).

Trend Summary Tables

Table 17R-11.6 - Shrub/Tree Summary. Average modified Daubenmire quadrat and line intercept cover by year for shrubs/trees.

Year	Quadrat Cover (%)			Line-intercept Cover (%)		
	Preferred Shrub	Other Shrub	Tree	Preferred Shrub	Other Shrub	Tree
2004	7.5	11.9	-	4.7	14.4	-
2007	5.1	11.1	-	6.0	19.4	-
2009	7.8	13.2	-	7.2	19.9	-
2010	11.5	11.8	-	17.2	20.0	-
2012	11.5	11.7	-	10.8	13.5	-
2016	8.8	10.4	-	9.8	8.7	-

Table 17R-11.7 - Herbaceous Summary. Nested frequency and average modified Daubenmire quadrat cover by year for herbaceous functional groups.

Year	Nested Frequency				Quadrat Cover (%)			
	Annual Grass	Perennial Grass	Annual/Biennial Forb	Perennial Forb	Annual Grass	Perennial Grass	Annual/Biennial Forb	Perennial Forb
2004	2	53	233	9	0.0	1.6	3.2	0.0
2007	7	150	256	99	0.0	5.6	1.5	2.3
2009	-	146	39	127	-	6.2	0.2	1.2
2010	8	185	58	95	0.0	5.7	0.5	2.1
2012	1	226	25	57	0.0	6.8	0.1	0.2
2016	2	220	23	23	0.0	8.5	0.1	0.0

Table 17R-11.8 - Basic Ground Cover. Average modified Daubenmire quadrat cover by year for basic ground cover types.

Year	Cover Type (%)					
	Bare Ground	Cryptograms	Litter	Pavement	Rock	Vegetation
2004	35.2	10.0	43.7	0.2	0.4	25.2
2007	34.5	3.8	49.7	0.1	0.0	25.2
2009	26.9	1.0	55.4	0.0	0.0	31.9
2010	31.5	1.3	49.7	-	0.1	31.6
2012	33.5	1.1	52.6	0.0	0.2	29.9
2016	37.3	0.8	42.1	0.0	0.0	29.1

Table 17R-11.9 - Pellet Group Data. Quadrat frequency and pellet group transect data for animal pellets. Rabbit pellet groups are not sampled in the pellet group transect.

Year	Cattle	Mule Deer	Elk	Greater Sage-Grouse	Rabbit
	Quadrat Frequency				
2004	-	49	7	-	13
2007	-	33	17	2	42
2009	2	27	12	-	35
2010	2	10	11	-	14
2012	5	13	27	1	42
2016	3	34	8	-	68
Year	Days Use Per Acre (ha)				
2004	0.7 (1.8)	243.3 (600.9)	27.5 (67.9)	-	-
2007	0.7 (1.8)	27.5 (67.9)	28.8 (71.2)	-	-
2009	7 (16.1)	11.4 (28.1)	47.6 (117.5)	-	-
2010	12.3 (30.5)	23.4 (57.9)	28.1 (69.5)	-	-
2012	8.7 (21.5)	2.7 (6.6)	34.9 (86.1)	-	-
2016	5.8 (14.3)	38.9 (96.0)	31.5 (77.8)	-	-

Table 17R-11.10 - Grass Species. Nested frequency and modified Daubenmire average cover by year.

GRASS SPECIES	Achnatherum hymenoides (Indian ricegrass)	Agropyron fragile ⁱ (Siberian wheatgrass)	Bromus tectorum ^{ai} (cheatgrass)	Elymus elymoides (squirreltail)	Hesperostipa comata (needle and thread)	Pascopyrum smithii (western wheatgrass)	Poa secunda (Sandberg bluegrass)	Psathyrostachys juncea ⁱ (Russian wildrye)	Pseudoroegneria spicata (bluebunch wheatgrass)
year	Nested Frequency								
2004	-	-	2	1	-	31	35	-	-
2007	12	7	7	16	5	36	78	35	-
2009	7	49	-	13	-	19	65	10	20
2010	38	39	8	5	12	32	89	11	14
2012	17	69	1	6	3	35	109	31	24
2016	4	62	2	27	-	72	85	48	-
year	Average Cover (%)								
2004	-	-	0.0	0.0	-	1.1	0.5	-	-
2007	0.7	0.3	0.0	0.3	0.0	1.3	1.4	1.6	-
2009	0.1	2.7	-	0.2	-	0.3	2.0	0.5	0.4
2010	1.3	1.8	0.0	0.0	0.1	0.8	1.2	0.2	0.2
2012	0.1	2.9	0.0	0.2	0.0	0.5	1.7	0.6	0.8
2016	0.0	1.2	0.0	0.7	-	1.6	1.6	3.3	-

a - Annual; n - Noxious Weed; i - Introduced Species

Table 17R-11.11 - Forb Species. Nested frequency and modified Daubenmire average cover by year.

FORB SPECIES	Alyssum desertorum ^{ai} (desert madwort)	Arabis (rockcross)	Chenopodium album ^a (lambsquarters)	Chenopodium leptophyllum ^a (narrowleaf goosefoot)	Collinsia parviflora ^a (maiden blue eyed Mary)	Descurainia pinnata ^a (western tansymustard)	Erigeron (fleabane)	Gilia ^a (gilia)	Lappula occidentalis ^a (flatspine stickseed)	Linum lewisii (Lewis flax)	Phlox longifolia (longleaf phlox)	Schoenocrambe limifolia (flaxleaf plainsmustard)	Sphaeralcea coccinea (scarlet globemallow)
year	Nested Frequency												
2004	-	-	27	111	5	199	8	3	13	-	1	-	-
2007	1	10	-	18	-	242	78	-	48	3	6	11	2
2009	1	-	4	39	-	-	102	-	-	4	2	27	4
2010	20	-	3	26	-	7	74	-	9	2	4	19	-
2012	5	1	-	16	3	6	55	-	-	-	1	3	-
2016	9	7	-	-	9	11	4	-	-	-	-	15	-
year	Average Cover (%)												
2004	-	-	0.2	1.0	0.0	1.9	0.0	0.0	0.1	-	0.0	-	-
2007	0.0	0.0	-	0.0	-	1.2	2.0	-	0.2	0.2	0.0	0.1	0.0
2009	0.0	-	0.0	0.2	-	-	1.0	-	-	0.1	0.0	0.1	0.0
2010	0.0	-	0.0	0.4	-	0.0	1.9	-	0.0	0.0	0.0	0.2	-
2012	0.0	0.0	-	0.0	0.0	0.0	0.2	-	-	-	0.0	0.0	-
2016	0.0	0.0	-	-	0.0	0.1	0.0	-	-	-	-	0.0	-

a - Annual/Biennial; n - Noxious Weed; i - Introduced Species

Table 17R-11.12 - Shrub and Tree Species. Average modified Daubenmire quadrat and line intercept cover by year.

SHRUB SPECIES	Artemisia tridentata ssp. tridentata ^p (basin big sagebrush)	Artemisia tridentata ssp. vaseyana ^p (mountain big sagebrush)	Atriplex confertifolia ^p (shadscale saltbush)	Bassia prostrata ⁱ (forage kochia)	Krascheninnikovia lanata ^p (winterfat)	Opuntia (pricklypear)	Sarcobatus vermiculatus (greasewood)
year	Line Intercept Cover (%)						
2004	4.4	-	0.3	-	-	0.4	14
2007	5.7	-	0.3	-	-	0.7	18.7
2009	6.5	0.5	0.2	0.1	-	1.2	18.6
2010	10.9	5.2	1.1	1.8	-	0.3	17.9
2012	3.3	7.2	0.3	0.9	-	0.4	12.2
2016	1	8.7	0.1	2.8	-	0.6	5.3
year	Quadrat Cover (%)						
2004	6.7	0.3	0.5	-	-	0.5	11.4
2007	4.8	-	0.3	0.0	0.0	0.5	10.6
2009	5.8	1.5	0.4	0.8	-	0.2	12.3
2010	5.6	5.8	0.1	3.0	-	0.1	8.7
2012	5.0	6.1	0.4	0.8	-	0.1	10.8
2016	1.0	7.7	0.1	1.8	0.0	0.4	8.2

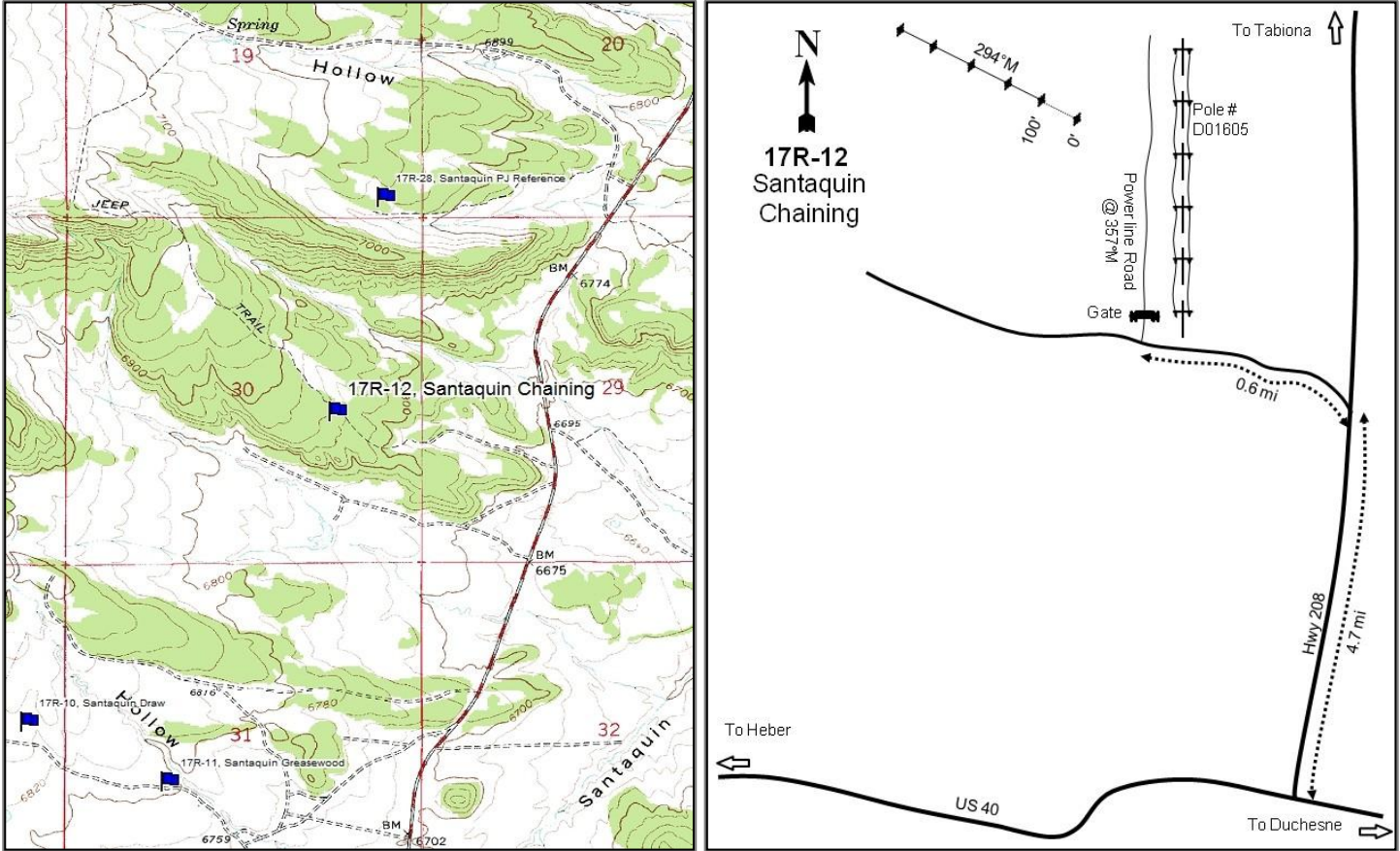
t - Tree Species; p - Preferred Browse; i - Introduced

Table 17R-11.13 - Shrub/Tree Characteristics. Population characteristics of shrub/tree species populations including density reproduction (seedlings), age distribution, utilization, vigor and average size (height/crown) of plants.

Year	Density		Age Class Distribution			Utilization		Poor Vigor (%)	Average Height Crown (cm)
	Plants Per Acre		Excluding Seedlings			Moderate (%)	Heavy (%)		
	Excluding Seedlings	Seedling	Young (%)	Mature (%)	Decadent (%)				
Artemisia tridentata ssp. tridentata^P -- (basin big sagebrush)									
2004	2640	2260	4	11	85	25	7	66	75/77
2007	3760	9860	60	12	29	5	1	27	46/60
2009	-	-	-	-	-	-	-	-	39/41
2010	7000	640	44	53	4	15	0	37	49/55
2012	3520	-	44	53	3	11	0	34	51/49
2016	460	-	0	74	26	13	83	61	47/48
Artemisia tridentata ssp. vaseyana^P -- (mountain big sagebrush)									
2004	-	-	-	-	-	-	-	-	45/95
2007	-	-	-	-	-	-	-	-	-/-
2009	-	-	-	-	-	-	-	-	29/33
2010	5480	2840	72	27	1	0	0	1	40/48
2012	8040	100	45	51	4	18	28	41	34/37
2016	5100	40	4	52	44	19	20	51	37/43
Atriplex confertifolia^P -- (shadscale saltbush)									
2004	160	200	13	75	13	0	13	0	31/47
2007	1040	440	75	25	0	0	0	0	23/37
2009	-	-	-	-	-	-	-	-	26/41
2010	780	260	44	56	0	0	0	0	28/42
2012	1080	-	6	93	2	6	6	2	21/31
2016	720	-	33	64	3	3	0	0	11/20
Bassia prostrataⁱ -- (forage kochia)									
2004	-	-	-	-	-	-	-	-	-/-
2007	60	140	33	67	0	0	0	0	12/14
2009	-	-	-	-	-	-	-	-	11/14
2010	8880	200	50	50	0	0	0	0	16/22
2012	4660	60	5	95	0	1	94	0	7/18
2016	4580	-	1	99	0	2	11	0	18/28
Echinocereus -- (hedgehog cactus)									
2004	-	-	-	-	-	-	-	-	-/-
2007	-	-	-	-	-	-	-	-	-/-
2009	-	-	-	-	-	-	-	-	2/8
2010	-	-	-	-	-	-	-	-	-/-
2012	-	-	-	-	-	-	-	-	-/-
2016	-	-	-	-	-	-	-	-	-/-
Krascheninnikovia lanata^P -- (winterfat)									
2004	-	-	-	-	-	-	-	-	-/-
2007	20	-	100	0	0	0	0	0	-/-
2009	-	-	-	-	-	-	-	-	-/-
2010	-	-	-	-	-	-	-	-	-/-
2012	-	-	-	-	-	-	-	-	-/-
2016	80	60	100	0	0	0	0	0	12/13
Opuntia -- (pricklypear)									
2004	1120	-	7	59	34	0	0	16	13/30
2007	920	-	0	74	26	2	0	13	11/25
2009	-	-	-	-	-	-	-	-	13/24
2010	560	-	0	93	7	7	0	14	9/23
2012	1380	-	0	93	7	0	0	7	7/19
2016	1680	20	0	100	0	0	0	0	12/26
Sarcobatus vermiculatus -- (greasewood)									
2004	1340	2140	16	79	5	3	0	2	80/128
2007	1280	3060	16	75	9	0	0	16	86/126
2009	-	-	-	-	-	-	-	-	83/112
2010	1380	20	23	77	0	4	0	12	84/115
2012	2260	40	43	57	0	4	5	1	74/103
2016	1700	140	22	69	8	6	9	8	66/90

t - Tree Species; p - Preferred Browse; i - Introduced Species

SANTAQUIN CHAINING - STUDY No. 17R-12



Location Information

USGS 7.5 min Map Info Tabiona SW; Township 2S, Range 7W, Section 30
 GPS (0' Stake) NAD 83 UTM ZONE 12, 524344 East 4458436 North

Transect Information

Browse Tag # (0' Stake) 136
 Transect Bearing 294° 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 US 40, turn north onto Highway 208. Travel 4.7 miles north to a road that comes in from the left (west). Turn here and drive for 0.6 miles to a powerline road that comes in from the right (this road may be impassable in a vehicle and you may have to continue on foot). Turn here, pass through a gate, and travel on this road at 357 degrees magnetic to pole #D01605. The 0-foot stake is 40 paces from this pole at 330 magnetic and is marked with browse tag #136.

Site Information

Land Ownership	State
Land Administrator	UDWR
Allotment	No data
Elevation	6,870ft (2,094m)
Aspect	East
Slope	2-5%
Sample Dates	09/07/2004, 07/27/2007, 07/13/2009, 06/29/2010, 07/09/2012, 08/02/2016

Table 17R-12.1 Disturbance History. Recorded history of major disturbances.

Treatment/Disturbance	Name	WRI DB#	Date	Size (acres)
Chaining - Two-Way Ely	Santaquin P-J	PDB	Fall 2004	300
Seeding - Aerial Before	Santaquin P-J	PDB	Fall 2004	300
Seeding - Aerial After	Santaquin P-J	PDB	Winter 2004	1755

Table 17R-12.2 Seed Mix. List of known seeded plant species and rates (if available).

Mix Name			Application Type	Application Date	Acres
Santaquin Pinyon/Juniper			Aerial	Oct 2004	305
Type	Species	Common Name	Cultivar/Source ID	Bulk lbs/acre	PLS lbs/acre
G	Agropyron cristatum	Crested Wheatgrass	Ephraim	0.98	0.88
G	Dactylis glomerata	Orchardgrass	Paiute	0.98	0.92
G	Elymus lanceolatus	Thickspike Wheatgrass	Critana	1.15	1.10
G	Psathyrostachys juncea	Russian Wildrye	Bozoisky	0.98	0.92
F	Linum perenne	Blue Flax	Appar	0.49	0.45
F	Medicago sativa	Alfalfa	Nomad	0.33	0.31
F	Medicago sativa	Alfalfa	Ladak+	0.82	0.75
F	Onobrychis viciifolia	Sainfoin		0.98	0.90
F	Sanguisorba minor	Small Burnet	Delar	1.97	1.86
S	Atriplex canescens	Fourwing Saltbush	Juab UT	0.98	0.50
Mix Name			Application Type	Application Date	Acres
Santaquin PJ Shrub			Dribbler	Oct 2004	40
Type	Species	Common Name	Cultivar/Source ID	Bulk lbs/acre	PLS lbs/acre
F	Medicago sativa	Alfalfa	Ladak+	0.50	0.47
F	Onobrychis viciifolia	Sainfoin		1.00	0.96
S	Artemisia tridentata ssp. wyomingensis	Wyoming Big Sagebrush	Sanpete UT	0.50	0.14
S	Ericameria nauseosa	Whitestem Rubber Rabbitbrush		0.50	0.20
Mix Name			Application Type	Application Date	Acres
Santaquin Sagebrush Browse			Aerial	Dec 2004	1755
Type	Species	Common Name	Cultivar/Source ID	Bulk lbs/acre	PLS lbs/acre
F	Medicago sativa	Alfalfa	Ladak+	0.57	0.52
F	Onobrychis viciifolia	Sainfoin	Eski	0.57	0.52
S	Artemisia tridentata ssp. wyomingensis	Wyoming Big Sagebrush	Sanpete UT	0.75	0.21
S	Artemisia tridentata ssp. wyomingensis	Wyoming Big Sagebrush		0.08	0.01
S	Bassia prostrata	Forage Kochia	Immigrant	0.46	0.31
S	Krascheninnikovia lanata	Winterfat	Duchesne/Uintah UT	0.17	0.08

Wildlife Habitat and Vegetation History

Table 17R-12.3 - Wildlife Seasonal Habitat. UDWR wildlife habitat and seasonality.

Species	Habitat	Season	Brood/Young Rearing
Deer	crucial	winter	
Elk	crucial	winter	
Greater Sage Grouse	Crucial	occupied & Winter	brood-rearing

Table 17R-12.4 - Vegetation History. The dominant vegetation type(s) and phase of woodland succession (Tausch, Miller, Roundy, & Chambers, 2009).

Year	Vegetation Type	Woodland Succession
2004	Pinyon-Juniper	Phase III
2007	Perennial Grass	Phase I
2009	Perennial Grass/Sagebrush	Phase I
2010	Perennial Grass/Sagebrush	Phase I
2012	Perennial Grass/Sagebrush	Phase I
2016	Perennial Grass/Sagebrush	Phase I

Site Notes

This study is located approximately eighteen miles northwest of Duchesne within a chained two-needle pinyon (*Pinus edulis*) and Utah juniper (*Juniperus osteosperma*) woodland.

Soils

Table 17R-12.5 - Soil Analysis Data. List of chemical and textural soil characteristics determined by laboratory analysis.

Texture	pH	% sand	% silt	% clay	% OM	PPM P	PPM K	ds/m	Sample Date
Sandy Loam	7.0	65.4	15.1	19.5	3.5	16.3	128.0	0.9	09/07/2004

Site Potential

1981-2010 Average Annual Precipitation 13 inches
 NRCS Ecological Site Upland Loam (Mountain Big Sagebrush)
 NRCS Ecological Site # R047XC310UT
 States and Transitions No state and transition model is available for this ecological site.

Prior to a chaining and seeding treatment in 2004 (Table 17R-12.1), this study site was a two-needle pinyon (*Pinus edulis*) and Utah juniper (*Juniperus osteosperma*) woodland that was considered to be in Phase III of woodland succession. The site transitioned into one dominated by perennial grasses in 2007 (Table 17R-12.7, Table 17R-12.10), and a shrub overstory largely comprised of sagebrush species (*Artemisia tridentata* ssp. *vaseyana*, *A. nova*) became co-dominant in 2009 (Table 17R-12.12). Although cover and density of pinyon and juniper were relatively low in 2016, their presence indicates that this site has the potential for future infilling (Table 17R-12.12, Table 17R-12.13).

Trend Summary Tables

Table 17R-12.6 - Shrub/Tree Summary. Average modified Daubenmire quadrat and line intercept cover by year for shrubs/trees.

Year	Quadrat Cover (%)			Line-intercept Cover (%)		
	Preferred Shrub	Other Shrub	Tree	Preferred Shrub	Other Shrub	Tree
2004	1.9	0.3	7.8	3.0	0.3	45.8
2007	2.2	0.3	0.9	3.5	0.4	0.5
2009	3.6	0.6	1.1	4.4	0.4	0.5
2010	4.4	0.3	0.7	4.8	0.2	0.4
2012	4.0	0.6	0.4	6.2	0.7	0.5
2016	4.7	0.5	1.2	5.3	0.1	0.2

Table 17R-12.7 - Herbaceous Summary. Nested frequency and average modified Daubenmire quadrat cover by year for herbaceous functional groups.

Year	Nested Frequency				Quadrat Cover (%)			
	Annual Grass	Perennial Grass	Annual/Biennial Forb	Perennial Forb	Annual Grass	Perennial Grass	Annual/Biennial Forb	Perennial Forb
2004	1	156	11	149	0.0	2.1	0.0	1.8
2007	62	240	58	170	0.5	9.8	0.8	5.2
2009	40	287	32	123	0.9	20.0	0.9	6.0
2010	47	300	19	116	1.1	18.6	0.1	3.4
2012	70	347	13	142	0.8	17.5	0.1	2.6
2016	13	330	9	59	0.1	21.3	0.0	1.1

Table 17R-12.8 - Basic Ground Cover. Average modified Daubenmire quadrat cover by year for basic ground cover types.

Year	Cover Type (%)					
	Bare Ground	Cryptograms	Litter	Pavement	Rock	Vegetation
2004	17.3	7.7	61.4	6.3	2.9	13.1
2007	24.7	0.4	55.5	2.6	4.5	22.2
2009	19.6	0.1	55.0	2.3	4.0	33.0
2010	19.1	0.0	50.2	1.8	3.5	31.9
2012	20.0	0.2	51.3	3.6	5.4	30.3
2016	19.7	0.1	43.1	4.2	5.7	32.0

Table 17R-12.9 - Pellet Group Data. Quadrat frequency and pellet group transect data for animal pellets. Rabbit pellet groups are not sampled in the pellet group transect.

Year	Cattle	Mule Deer	Elk	Rabbit
	Quadrat Frequency			
2004	-	33	11	19
2007	1	25	19	26
2009	-	31	31	18
2010	-	19	29	8
2012	-	11	28	23
2016	-	25	32	19
Year	Days Use Per Acre (ha)			
2004	-	26.2 (64.6)	16.8 (41.4)	-
2007	-	39.6 (97.7)	36.2 (89.4)	-
2009	-	-	-	-
2010	-	28.8 (71.2)	77.1 (190.4)	-
2012	-	6.0 (14.9)	27.5 (67.9)	-
2016	-	17.4 (43.0)	63.0 (155.6)	-

Table 17R-12.10 - Grass Species. Nested frequency and modified Daubenmire average cover by year.

GRASS SPECIES	Achnatherum hymenoides (Indian ricegrass)	Achnatherum lettermanii (Letterman's needlegrass)	Agropyron cristatum ⁱ (crested wheatgrass)	Bouteloua gracilis (blue grama)	Bromus tectorum ⁱⁱ (cheatgrass)	Carex (sedge)	Carex geyeri (Geyeri's sedge)	Carex obtusata (obtusate sedge)	Dactylis glomerata ⁱ (orchardgrass)	Elymus elymoides (squirreltail)	Elymus lanceolatus (thickspike wheatgrass)	Hesperostipa comata (needle and thread)	Pascopyrum smithii (western wheatgrass)	Poa secunda (Sandberg bluegrass)	Psathyrostachys juncea ⁱ (Russian wildrye)	Pseudoroegneria spicata (bluebunch wheatgrass)
year	Nested Frequency															
2004	52	-	-	7	1	9	-	-	-	33	-	9	45	19	-	-
2007	43	-	93	6	62	19	-	-	6	55	-	5	24	17	3	56
2009	60	-	110	6	40	11	-	-	10	66	48	8	40	24	9	13
2010	93	0	130	11	47	16	-	-	-	58	30	17	61	18	27	-
2012	81	5	181	8	70	-	10	39	10	52	132	5	-	27	8	3
2016	55	-	179	7	13	-	23	-	3	41	102	12	-	20	38	3
year	Average Cover (%)															
2004	0.7	-	-	0.0	0.0	0.1	-	-	-	0.2	-	0.5	0.2	0.4	-	-
2007	2.1	-	2.4	0.0	0.5	0.2	-	-	0.3	1.8	-	0.2	0.5	0.1	0.2	2.0
2009	4.1	-	6.2	0.2	0.9	0.4	-	-	0.3	3.0	1.8	0.2	2.1	0.6	0.6	0.6
2010	5.3	0.0	4.6	0.2	1.1	0.3	-	-	-	1.2	0.3	0.8	4.3	0.1	1.4	-
2012	4.3	0.0	7.2	0.1	0.8	-	0.1	0.3	0.1	0.6	3.9	0.1	-	0.5	0.1	0.0
2016	3.3	-	9.6	0.5	0.1	-	0.3	-	0.0	2.2	2.9	1.2	-	0.1	1.1	0.0

a - Annual; n - Noxious Weed; i - Introduced Species

Table 17R-12.11 - Forb Species. Nested frequency and modified Daubenmire average cover by year.

FORB SPECIES	Arabis (rockcross)	Astragalus (milkvetch)	Astragalus convallarius (lesser rusty milkvetch)	Astragalus utahensis (Utah milkvetch)	Chaenactis douglasii (Douglas' dustymaiden)	Chenopodium ^a (goosefoot)	Chenopodium album ^a (lambsquarters)	Chenopodium leptophyllum ^a (narrowleaf goosefoot)	Cryptantha (cryptantha)	Cymopterus (springparsley)	Descurainia pinnata ^a (western tansymustard)	Erigeron eatonii (Eaton's fleabane)	Gayophytum ramosissimum ^a (pinyon groundsmoke)	Ipomopsis aggregata (scarlet gilia)	Ipomopsis congesta (ballhead ipomopsis)	Lactuca serriola ^a (prickly lettuce)	Lappula occidentalis ^a (flatspine stickseed)
year	Nested Frequency																
2004	21	-	10	-	-	2	-	-	1	11	4	1	-	4	-	-	-
2007	6	-	-	5	3	1	2	-	12	7	17	-	-	4	11	10	29
2009	-	2	-	19	6	-	20	2	-	1	6	-	-	-	-	-	5
2010	-	-	-	27	16	-	10	-	-	-	-	2	4	-	10	-	7
2012	3	-	12	20	10	-	3	-	4	23	4	-	5	12	6	-	1
2016	11	-	-	2	-	-	5	-	-	1	2	3	-	2	-	3	-
year	Average Cover (%)																
2004	0.1	-	0.0	-	-	0.0	-	-	0.0	0.0	0.0	0.0	-	0.0	-	-	-
2007	0.0	-	-	0.1	0.0	0.0	0.0	-	0.1	0.0	0.0	-	-	0.0	0.2	0.1	0.6
2009	-	0.0	-	0.8	0.0	-	0.7	0.0	-	0.0	0.1	-	-	-	-	-	0.2
2010	-	-	-	1.0	0.0	-	0.0	-	-	-	-	0.0	0.0	-	0.1	-	0.0
2012	0.0	-	0.0	0.7	0.0	-	0.0	-	0.0	0.1	0.0	-	0.0	0.0	0.0	-	0.0
2016	0.1	-	-	0.0	-	-	0.0	-	-	0.0	0.0	0.0	-	0.0	-	0.0	-

a - Annual/Biennial; n - Noxious Weed; i - Introduced Species

FORB SPECIES	Linum perenne ⁱ (blue flax)	Machaeranthera canescens (hoary tansyaster)	Onobrychis vicifolia ⁱ (sainfoin)	Packera multilobata (lobeleaf groundsel)	Penstemon (beardtongue)	Penstemon humilis (low beardtongue)	Phlox hoodii (spiny phlox)	Polygonum douglasii ^a (Douglas' knotweed)	Sanguisorba minor ⁱ (small burnet)	Schoenocrambe linifolia (flaxleaf plainsmustard)	Streptanthus cordatus (heartleaf twistflower)	Tragopogon dubius ^{ai} (yellow salsify)	Trifolium (clover)	Zigadenus paniculatus (foothill deathcamas)
year	Nested Frequency													
2004	-	3	-	87	-	20	19	5	-	4	-	-	11	-
2007	37	-	2	89	-	5	17	-	22	17	5	-	3	-
2009	59	3	-	3	5	-	11	-	14	13	-	1	4	-
2010	45	9	-	4	1	4	19	-	8	12	5	-	2	-
2012	29	4	2	56	-	-	32	-	20	3	-	-	-	1
2016	1	-	-	10	-	-	20	-	1	11	-	-	3	-
year	Average Cover (%)													
2004	-	0.0	-	0.5	-	0.5	0.6	0.0	-	0.0	-	-	0.0	-
2007	1.6	-	0.0	1.7	-	0.5	0.3	-	0.5	0.1	0.0	-	0.0	-
2009	4.0	0.0	-	0.0	0.3	-	0.3	-	0.4	0.2	-	0.0	0.0	-
2010	0.9	0.2	-	0.0	0.0	0.2	0.5	-	0.2	0.5	0.0	-	0.0	-
2012	0.2	0.0	0.0	0.3	-	-	1.1	-	0.1	0.0	-	-	-	0.0
2016	0.0	-	-	0.2	-	-	0.8	-	0.0	0.1	-	-	0.0	-

a - Annual/Biennial; n - Noxious Weed; i - Introduced Species

Table 17R-12.12 - Shrub and Tree Species. Average modified Daubenmire quadrat and line intercept cover by year.

SHRUB SPECIES	Artemisia nova ^p (black sagebrush)	Artemisia tridentata ssp. vaseyana ^p (mountain big sagebrush)	Bassia prostrata ⁱ (forage kochia)	Chrysothamnus viscidiflorus ssp. viscidiflorus var. stenophyllus (yellow rabbitbrush)	Gutierrezia sarothrae (broom snakeweed)	Juniperus osteosperma ⁱ (Utah juniper)	Linanthus pungens (granite prickly phlox)	Opuntia fragilis (brittle pricklypear)	Pinus edulis ⁱ (twoneedle pinyon)	Tetradymia canescens (spineless horsebrush)
year	Line Intercept Cover (%)									
2004	3	-	-	-	-	18.5	0.2	0.1	27.3	-
2007	2.7	0.8	0	-	0.2	0	-	0.2	0.5	-
2009	3.3	1.1	-	-	0.1	0.1	0.3	-	0.4	-
2010	3.5	1.3	-	-	-	0.1	0.1	0.1	0.3	-
2012	4.5	1.7	0.1	-	0	0.2	0.5	0	0.3	0.1
2016	3.3	2	-	-	-	0.1	0.1	-	0.1	-
year	Quadrat Cover (%)									
2004	1.9	-	-	-	0.0	1.1	0.3	0.1	6.8	-
2007	1.7	0.5	0.0	-	0.0	0.4	0.3	0.1	0.5	-
2009	2.8	0.7	0.2	0.0	0.0	0.5	0.4	0.1	0.5	-
2010	2.9	1.5	-	-	-	0.6	0.2	0.0	0.0	-
2012	3.0	1.1	0.2	-	0.0	0.2	0.3	0.0	0.2	0.0
2016	3.3	1.4	-	-	0.0	1.1	0.1	0.4	0.0	-

t - Tree Species; p - Preferred Browse; i - Introduced

Table 17R-12.13 - Shrub/Tree Characteristics. Population characteristics of shrub/tree species populations including density reproduction (seedlings), age distribution, utilization, vigor and average size (height/crown) of plants.

Year	Density		Age Class Distribution			Utilization		Poor Vigor (%)	Average Height Crown (cm)
	Plants Per Acre		Excluding Seedlings			Moderate (%)	Heavy (%)		
	Excluding Seedlings	Seedling	Young (%)	Mature (%)	Decadent (%)				
Artemisia nova^p -- (black sagebrush)									
2004	3440	80	20	33	48	4	0	25	21/38
2007	1260	380	10	91	0	30	2	5	21/37
2009	-	-	-	-	-	-	-	-	25/35
2010	2720	780	24	75	1	1	17	10	21/39
2012	3420	480	47	48	5	10	43	8	19/38
2016	3640	-	34	65	2	28	26	3	24/51
Artemisia tridentata ssp. vaseyana^p -- (mountain big sagebrush)									
2004	20	-	0	100	0	0	0	0	- / -
2007	740	360	62	35	3	8	5	3	38/37
2009	-	-	-	-	-	-	-	-	32/31
2010	820	200	44	56	0	5	5	2	44/48
2012	1060	120	32	62	6	21	30	40	37/41
2016	1340	-	30	67	3	33	33	16	49/63
Atriplex canescens^p -- (fourwing saltbush)									
2004	-	-	-	-	-	-	-	-	- / -
2007	-	-	-	-	-	-	-	-	53/41
2009	-	-	-	-	-	-	-	-	46/43
2010	-	-	-	-	-	-	-	-	64/55
2012	-	-	-	-	-	-	-	-	68/58
2016	-	-	-	-	-	-	-	-	81/81

Year	Density		Age Class Distribution			Utilization		Poor Vigor (%)	Average Height Crown (cm)
	Plants Per Acre		Excluding Seedlings			Moderate (%)	Heavy (%)		
	Excluding Seedlings	Seedling	Young (%)	Mature (%)	Decadent (%)				
Atriplex confertifolia^P -- (shadscale saltbush)									
2004	-	-	-	-	-	-	-	-	-/-
2007	-	-	-	-	-	-	-	-	-/-
2009	-	-	-	-	-	-	-	-	37/32
2010	-	-	-	-	-	-	-	-	-/-
2012	-	-	-	-	-	-	-	-	-/-
2016	-	-	-	-	-	-	-	-	-/-
Bassia prostrataⁱ -- (forage kochia)									
2004	-	-	-	-	-	-	-	-	-/-
2007	60	-	0	100	0	0	0	0	21/21
2009	-	-	-	-	-	-	-	-	21/22
2010	-	-	-	-	-	-	-	-	23/26
2012	300	-	0	100	0	47	47	0	15/15
2016	20	-	0	100	0	0	0	0	10/15
Chrysothamnus depressus^P -- (longflower rabbitbrush)									
2004	-	-	-	-	-	-	-	-	-/-
2007	-	-	-	-	-	-	-	-	8/16
2009	-	-	-	-	-	-	-	-	-/-
2010	-	-	-	-	-	-	-	-	-/-
2012	-	-	-	-	-	-	-	-	-/-
2016	-	-	-	-	-	-	-	-	-/-
Chrysothamnus viscidiflorus ssp. viscidiflorus var. stenophyllus -- (yellow rabbitbrush)									
2004	-	-	-	-	-	-	-	-	-/-
2007	-	-	-	-	-	-	-	-	34/56
2009	-	-	-	-	-	-	-	-	-/-
2010	-	-	-	-	-	-	-	-	-/-
2012	-	-	-	-	-	-	-	-	-/-
2016	60	-	33	67	0	0	0	0	19/18
Ericameria nauseosa -- (rubber rabbitbrush)									
2004	-	-	-	-	-	-	-	-	-/-
2007	-	-	-	-	-	-	-	-	-/-
2009	-	-	-	-	-	-	-	-	-/-
2010	20	-	0	100	0	100	0	0	35/38
2012	-	-	-	-	-	-	-	-	-/-
2016	-	-	-	-	-	-	-	-	-/-
Gutierrezia sarothrae -- (broom snakeweed)									
2004	200	-	0	100	0	0	0	30	16/18
2007	160	-	0	100	0	0	0	0	15/20
2009	-	-	-	-	-	-	-	-	18/23
2010	60	-	33	67	0	0	0	0	18/20
2012	100	-	0	80	20	0	0	60	14/15
2016	120	-	0	100	0	0	0	0	15/19
Juniperus osteosperma^t -- (Utah juniper)									
2004	260	-	31	54	15	8	0	23	-/-
2007	60	-	67	33	0	0	0	0	-/-
2009	-	-	-	-	-	-	-	-	-/-
2010	60	-	100	0	0	0	0	33	-/-
2012	100	-	100	0	0	0	0	0	-/-
2016	160	-	50	50	0	0	50	0	-/-
Krascheninnikovia lanata^P -- (winterfat)									
2004	-	-	-	-	-	-	-	-	-/-
2007	-	-	-	-	-	-	-	-	21/23
2009	-	-	-	-	-	-	-	-	16/20
2010	-	-	-	-	-	-	-	-	22/17
2012	-	-	-	-	-	-	-	-	-/-
2016	-	-	-	-	-	-	-	-	40/39

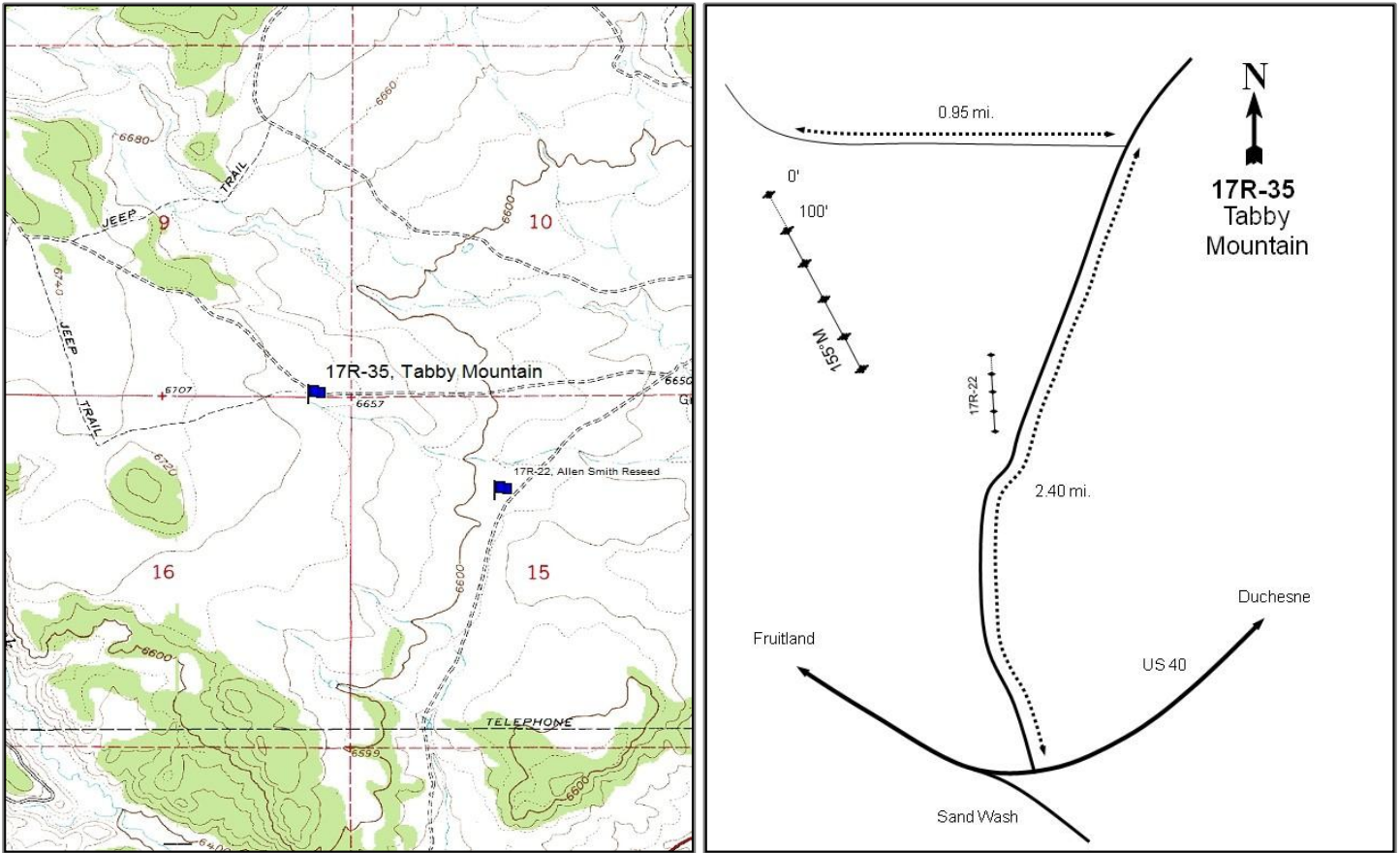
Year	Density		Age Class Distribution			Utilization		Poor Vigor (%)	Average Height Crown (cm)
	Plants Per Acre		Excluding Seedlings			Moderate (%)	Heavy (%)		
	Excluding Seedlings	Seedling	Young (%)	Mature (%)	Decadent (%)				
Linanthus pungens -- (granite prickly phlox)									
2004	440	-	0	68	32	0	0	14	12/17
2007	360	-	0	100	0	11	0	0	9/16
2009	-	-	-	-	-	-	-	-	10/20
2010	240	100	0	100	0	0	0	0	12/24
2012	340	-	0	100	0	0	0	65	11/20
2016	320	-	6	94	0	0	0	6	12/16
Opuntia fragilis -- (brittle pricklypear)									
2004	640	-	9	63	28	0	0	9	8/29
2007	360	-	11	89	0	0	0	0	8/22
2009	-	-	-	-	-	-	-	-	10/21
2010	300	40	47	53	0	7	0	0	6/14
2012	120	20	0	83	17	0	0	17	6/12
2016	520	-	0	100	0	0	0	0	9/24
Pediocactus simpsonii -- (mountain ball cactus)									
2004	20	-	0	100	0	0	0	0	3/7
2007	-	-	-	-	-	-	-	-	-/-
2009	-	-	-	-	-	-	-	-	-/-
2010	-	-	-	-	-	-	-	-	3/8
2012	-	-	-	-	-	-	-	-	5/21
2016	-	-	-	-	-	-	-	-	6/20
Pinus edulis^t -- (twoneedle pinyon)									
2004	400	80	65	35	0	0	0	0	- / -
2007	20	60	100	0	0	0	0	0	- / -
2009	-	-	-	-	-	-	-	-	-/-
2010	20	60	100	0	0	0	0	0	- / -
2012	160	-	88	13	0	0	0	0	- / -
2016	100	-	100	0	0	0	0	0	- / -
Purshia tridentata^p -- (antelope bitterbrush)									
2004	-	-	-	-	-	-	-	-	-/-
2007	-	-	-	-	-	-	-	-	-/-
2009	-	-	-	-	-	-	-	-	-/-
2010	-	-	-	-	-	-	-	-	-/-
2012	-	-	-	-	-	-	-	-	67/174
2016	-	-	-	-	-	-	-	-	-/-
Tetradymia canescens -- (spineless horsebrush)									
2004	-	-	-	-	-	-	-	-	-/-
2007	-	-	-	-	-	-	-	-	-/-
2009	-	-	-	-	-	-	-	-	-/-
2010	-	-	-	-	-	-	-	-	-/-
2012	20	-	100	0	0	0	0	0	26/16
2016	-	-	-	-	-	-	-	-	42/42

t - Tree Species; p - Preferred Browse; i - Introduced Species

Table 17R-12.14 - Tree Characteristics. Point-quarter tree density, size class distribution, and average diameter.

Year	Density	Size Class Distribution					Average Diameter (cm)
	Trees per Acre	Seedling (%)	1-4'	4-8'	8-12'	>12' (%)	
Juniperus osteosperma (Utah juniper)							
2004	235	-	25	15	20	40	24.4
2007	30	-	91	9	-	-	9.4
2009	18	-	75	25	-	-	6.1
2010	39	29	71	-	-	-	12.4
2012	29	15	77	8	-	-	4.1
2016	42	13	40	40	-	7	6.3
Pinus edulis (two-needle pinyon)							
2004	209	10	60	-	-	30	11.8
2007	54	-	100	-	-	-	2.8
2009	25	-	100	-	-	-	3.4
2010	46	20	80	-	-	-	2.9
2012	61	12	88	-	-	-	3.5
2016	46	19	31	44	6	-	5.3

TABBY MOUNTAIN - STUDY No. 17R-35



Location Information

USGS 7.5 min Map Info Fruitland NE; Township 3S, Range 8W, Section 16
 GPS (0' Stake) NAD 83 UTM ZONE 12, 518227 East 4452922 North

Transect Information

Browse Tag # (0' Stake) 160
 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

Directions to Site

Traveling east on US 40, drive to the farthest west turnoff to the Strawberry Pinnacles. From there, drive east for 0.2 miles to a road on the left (north) side. Turn here and drive north for 2.4 miles (0.3 miles to a fork that leads to a group of trailers. Stay to the right and drive 0.4 miles, passing a trailer compound and coming to another fork. Stay to the right and drive for 0.3 miles to a gate. Go through the gate and continue for 0.5 miles to power lines crossing the road. Proceed for another 0.9 miles). Turn left and continue for another 0.95 miles. The study is on the left (south) side of the road.

Site Information

Land Ownership	State
Land Administrator	UDWR
Allotment	No data
Elevation	6,667ft (2,032m)
Aspect	Southeast
Slope	2%
Sample Dates	07/08/2013, 08/02/2016

Table 17R-35.1 Disturbance History. Recorded history of major disturbances.

Treatment/Disturbance	Name	WRI DB#	Date	Size (acres)
Mechanical - Scalper	Tabby Browse Plots	2681	September 2013	160

Table 17R-35.2 Seed Mix. List of known seeded plant species and rates (if available).

Mix Name			Application Type	Application Date	Acres
Tabby Browse Plots			Scalper	Nov 2013	40
Type	Species	Common Name	Cultivar/Source ID	Bulk lbs/acre	PLS lbs/acre
S	Atriplex canescens	Four-wing Saltbush	Duchesne UT	2.50	0.88
S	Purshia tridentata	Bitterbrush	Elko/White Pine NV	2.00	1.72
Mix Name			Application Type	Application Date	Acres
Tabby Browse Plots- Sagebrush			Scalper	Nov 2013	40
Type	Species	Common Name	Cultivar/Source ID	Bulk lbs/acre	PLS lbs/acre
S	Artemisia tridentata ssp. wyomingensis	Wyoming Big Sagebrush	Uintah UT	1.00	0.14

Wildlife Habitat and Vegetation History

Table 17R-35.3 - Wildlife Seasonal Habitat. UDWR wildlife habitat and seasonality.

Species	Habitat	Season	Brood/Young Rearing
Deer	crucial	winter	
Elk	crucial	winter	
Greater Sage Grouse	Crucial	occupied & Winter	brood-rearing

Table 17R-35.4 - Vegetation History. The dominant vegetation type(s) and phase of woodland succession (Tausch, Miller, Roundy, & Chambers, 2009).

Year	Vegetation Type	Woodland Succession
2013	Perennial Grass	No Encroachment
2016	Perennial Grass	No Encroachment

Site Notes

No Notes

Site Potential

1981-2010 Average Annual Precipitation	12 inches
NRCS Ecological Site	Upland Loam (Mountain Big Sagebrush)
NRCS Ecological Site #	R047XC310UT
States and Transitions	No state and transition model is available for this ecological site.

This site was established in 2013 and has remained dominated by the perennial grass species crested wheatgrass (*Agropyron cristatum*) since that time (Table 17R-35.10). Forbs have remained depauperate in both composition and abundance, and forage kochia (*Bassia prostrata*) contributed nearly all of the shrub cover in 2016 (Table 17R-35.11, Table 17R-35.12).

Trend Summary Tables

Table 17R-35.6 - Shrub/Tree Summary. Average modified Daubenmire quadrat and line intercept cover by year for shrubs/trees.

Year	Quadrat Cover (%)			Line-intercept Cover (%)		
	Preferred Shrub	Other Shrub	Tree	Preferred Shrub	Other Shrub	Tree
2013	0.0	1.1	-	0.3	1.5	-
2016	0.0	2.6	-	0.2	3.8	-

Table 17R-35.7 - Herbaceous Summary. Nested frequency and average modified Daubenmire quadrat cover by year for herbaceous functional groups.

Year	Nested Frequency				Quadrat Cover (%)			
	Annual Grass	Perennial Grass	Annual/Biennial Forb	Perennial Forb	Annual Grass	Perennial Grass	Annual/Biennial Forb	Perennial Forb
2013	-	388	-	72	-	22.9	-	1.1
2016	-	383	-	81	-	31.1	-	0.8

Table 17R-35.8 - Basic Ground Cover. Average modified Daubenmire quadrat cover by year for basic ground cover types.

Year	Cover Type (%)					
	Bare Ground	Cryptograms	Litter	Pavement	Rock	Vegetation
2013	36.5	0.1	42.2	2.2	0.2	25.5
2016	35.9	-	28.4	7.4	0.9	35.1

Table 17R-35.9 - Pellet Group Data. Quadrat frequency and pellet group transect data for animal pellets. Rabbit pellet groups are not sampled in the pellet group transect.

Year	Cattle	Mule Deer	Elk	Rabbit
	Quadrat Frequency			
2013	5	18	59	5
2016	3	15	37	45
Days Use Per Acre (ha)				
2013	10.2 (25.1)	20.8 (51.3)	48.9 (120.8)	-
2016	14.5 (35.9)	8.7 (21.5)	39.6 (97.7)	-

Table 17R-35.10 - Grass Species. Nested frequency and modified Daubenmire average cover by year.

GRASS SPECIES	Achnatherum hymenoides (Indian ricegrass)	Agropyron cristatum ⁱ (crested wheatgrass)	Elymus elymoides (squirreltail)	Hesperostipa comata (needle and thread)	Thinopyrum intermedium ⁱ (intermediate wheatgrass)
year	Nested Frequency				
2013	-	388	4	1	14
2016	2	368	4	8	17
year	Average Cover (%)				
2013	-	22.6	0.0	0.0	0.2
2016	0.0	30.3	0.1	0.2	0.5

a - Annual; n - Noxious Weed; i - Introduced Species

Table 17R-35.11 - Forb Species. Nested frequency and modified Daubenmire average cover by year.

FORB SPECIES									
Astragalus convallarius (lesser rusby milkvetch)									
Chaetopappa ericoides (rose heath)									
Machaeranthera canescens (hoary tansyaster)									
Medicago sativa ⁱ (alfalfa)									
Melilotus officinalis ⁱ (sweetclover)									
Phlox hoodii (spiny phlox)									
Schoenocrambe limifolia (flaxleaf plainsmustard)									
Sphaeralcea grossularifolia (gooseberryleaf globemallow)									
Trifolium (clover)									
year	Nested Frequency								
2013	9	1	2	9	6	7	0	36	13
2016	5	-	-	4	-	12	9	59	5
year	Average Cover (%)								
2013	0.1	0.0	0.0	0.3	0.2	0.1	0.0	0.4	0.1
2016	0.0	-	-	0.0	-	0.2	0.0	0.5	0.0

a - Annual/Biennial; n - Noxious Weed; i - Introduced Species

Table 17R-35.12 - Shrub and Tree Species. Average modified Daubenmire quadrat and line intercept cover by year.

SHRUB SPECIES						
Artemisia tridentata ssp. wyomingensis ^p (Wyoming big sagebrush)						
Bassia prostrata ⁱ (forage kochia)						
Chrysothamnus viscidiflorus (yellow rabbitbrush)						
Ephedra viridis ^p (mormon tea)						
Ericameria nauseosa (rubber rabbitbrush)						
Opuntia (pricklypear)						
year	Line Intercept Cover (%)					
2013	0.3	1.3	-	-	0.1	0.1
2016	0.2	3.6	-	-	-	0.2
year	Quadrat Cover (%)					
2013	0.0	0.7	0.0	0.0	0.4	0.0
2016	0.0	2.6	-	-	-	0.0

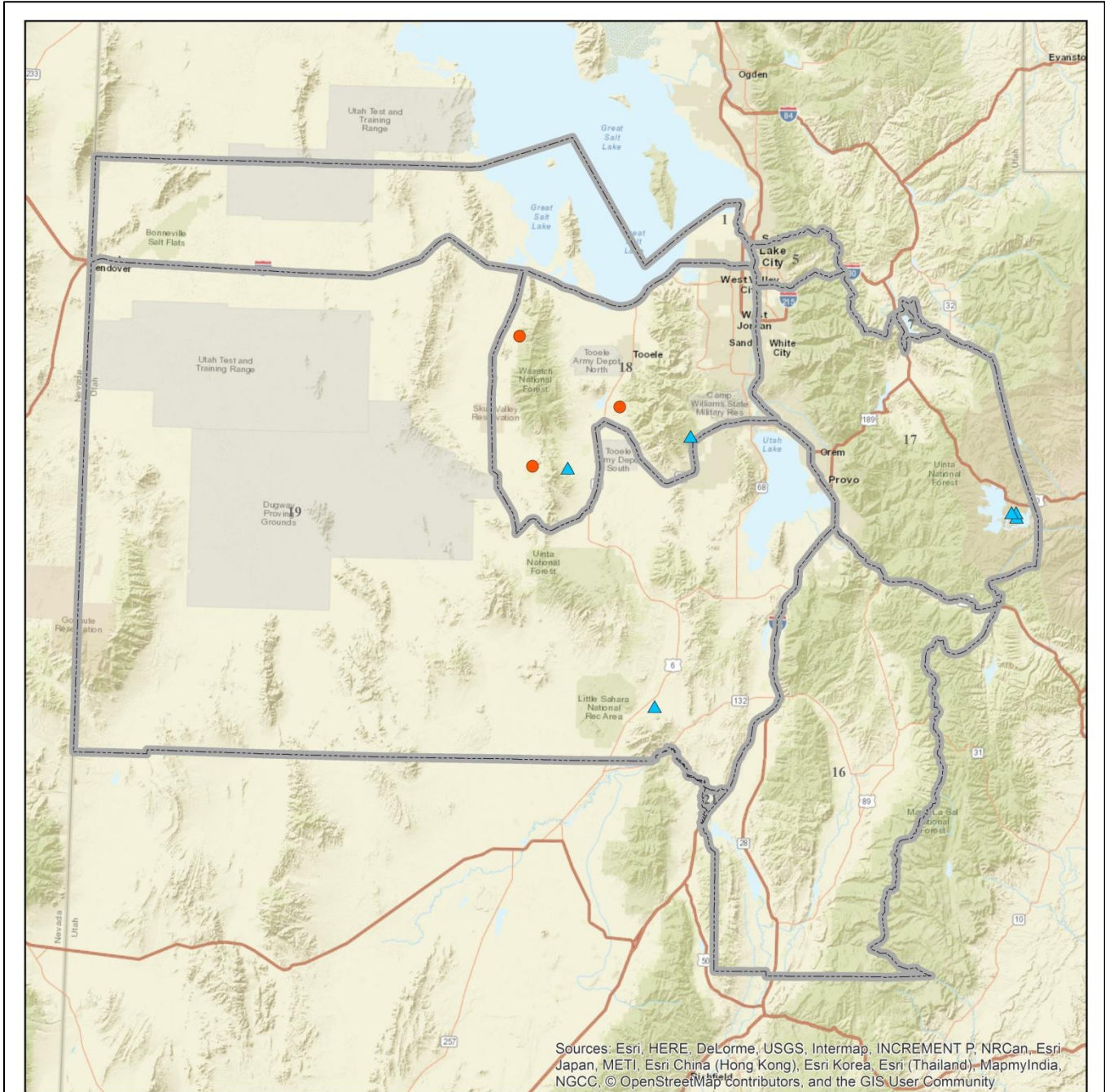
t - Tree Species; p - Preferred Browse; i - Introduced

Table 17R-35.13 - Shrub/Tree Characteristics. Population characteristics of shrub/tree species populations including density reproduction (seedlings), age distribution, utilization, vigor and average size (height/crown) of plants.

Year	Density		Age Class Distribution			Utilization		Poor Vigor (%)	Average Height Crown (cm)
	Plants Per Acre		Excluding Seedlings			Moderate (%)	Heavy (%)		
	Excluding Seedlings	Seedling	Young (%)	Mature (%)	Decadent (%)				
Artemisia tridentata ssp. wyomingensis^P -- (Wyoming big sagebrush)									
2013	140	-	14	86	0	14	71	0	31/37
2016	180	-	11	78	11	11	78	11	35/47
Bassia prostrataⁱ -- (forage kochia)									
2013	880	2360	61	39	0	2	2	0	29/38
2016	6080	960	48	52	0	0	1	0	25/37
Chrysothamnus viscidiflorus -- (yellow rabbitbrush)									
2013	60	-	0	100	0	0	0	0	18/25
2016	-	-	-	-	-	-	-	-	21/36
Ephedra viridis^P -- (mormon tea)									
2013	20	-	0	100	0	0	100	0	17/16
2016	-	-	-	-	-	-	-	-	-/-
Ericameria nauseosa -- (rubber rabbitbrush)									
2013	20	-	0	100	0	0	0	0	47/46
2016	-	-	-	-	-	-	-	-	64/72
Ericameria nauseosa ssp. nauseosa var. speciosa^P -- (rubber rabbitbrush)									
2013	-	-	-	-	-	-	-	-	54/86
2016	-	-	-	-	-	-	-	-	-/-
Gutierrezia sarothrae -- (broom snakeweed)									
2013	-	-	-	-	-	-	-	-	-/-
2016	20	40	0	100	0	0	0	0	33/36
Linanthus pungens -- (granite prickly phlox)									
2013	20	-	0	100	0	0	0	0	20/16
2016	-	-	-	-	-	-	-	-	-/-
Opuntia -- (pricklypear)									
2013	120	-	0	50	50	0	0	50	11/24
2016	280	-	0	100	0	0	0	0	13/26

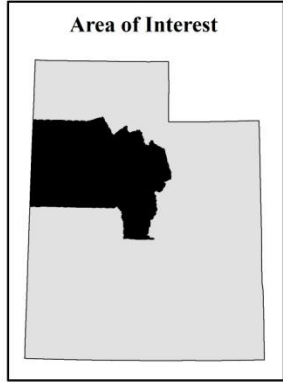
t - Tree Species; p - Preferred Browse; i - Introduced Species

CENTRAL REGION

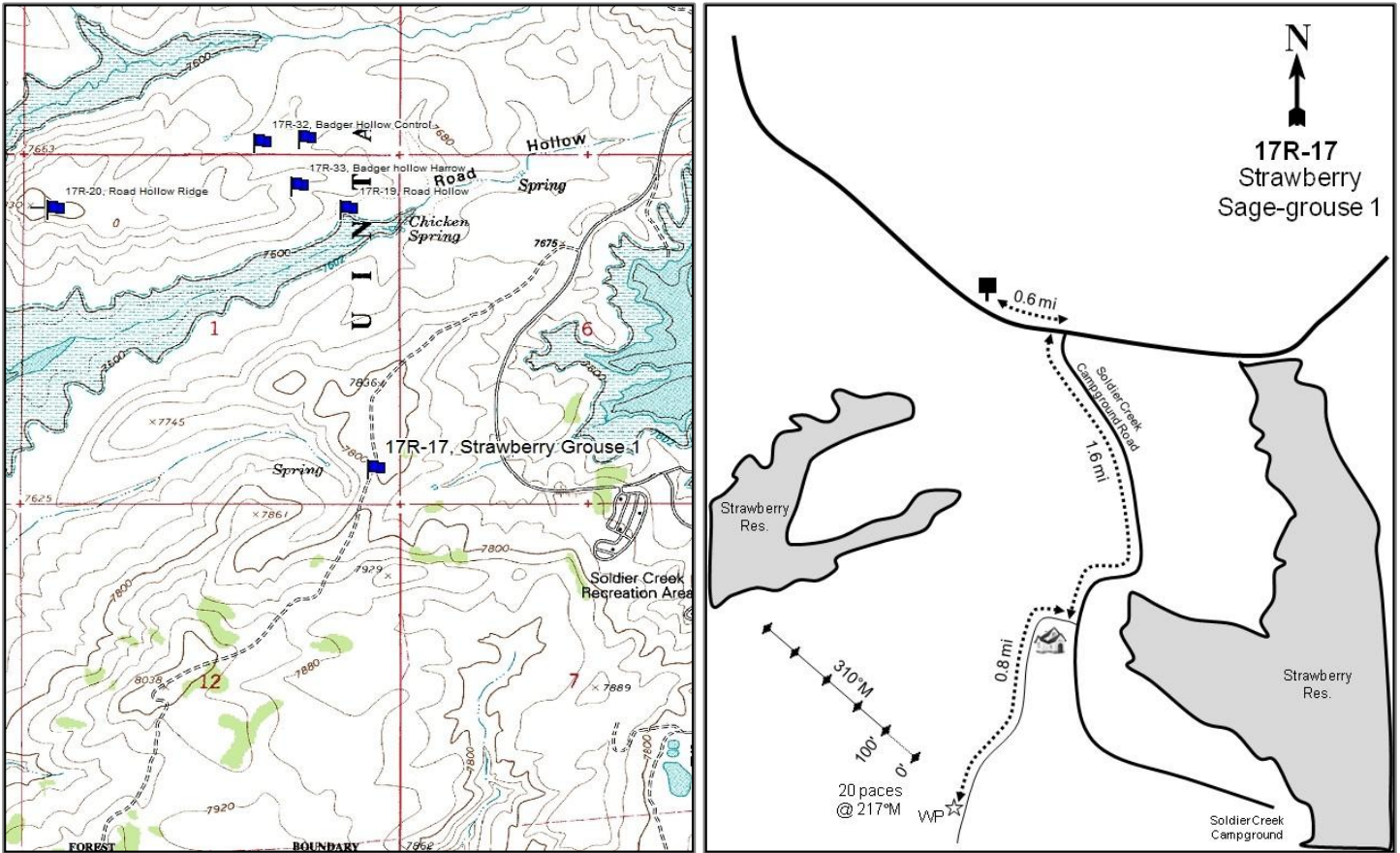


Project

- Range Trend
- ▲ WRI
- Central Region WMUs



STRAWBERRY GROUSE 1 - STUDY No. 17R-17



Location Information

USGS 7.5 min Map Info Strawberry Reservoir; Township 4S, Range 11W, Section 01
 GPS (0' Stake) NAD 83 UTM ZONE 12, 494219 East 4444987 North

Transect Information

Browse Tag # (0' Stake) 93
 Transect Bearing 310° 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

On US 40, drive past Strawberry Reservoir to mile marker 49 (not positive on mile marker number). Continue for 0.6 miles past the mile marker to Soldier Creek Campground Road (FS 480) on the right (south). Turn right and drive 1.6 miles to another road on the right (west). Turn right and drive 0.1 miles to an intersection, then turn left (southwest). Drive 0.8 miles on this two-track road to the witness post on the right-hand (northwest) side. From the witness post, walk 20 feet at 217 degrees to the 0-foot stake which is marked with browse tag #93.

Site Information

Land Ownership	Federal
Land Administrator	USFS
Allotment	No data
Elevation	7,440ft (2,268m)
Aspect	Southwest
Slope	8-10%
Sample Dates	08/11/2005, 07/12/2012, 08/01/2016

Wildlife Habitat and Vegetation History

Table 17R-17.3 - Wildlife Seasonal Habitat. UDWR wildlife habitat and seasonality.

Species	Habitat	Season	Brood/Young Rearing
Deer	substantial	summer/fall	
Elk	crucial	summer	
Greater Sage Grouse	Crucial	occupied & Winter	brood-rearing
Moose	crucial	spring/fall	

Table 17R-17.4 - Vegetation History. The dominant vegetation type(s) and phase of woodland succession (Tausch, Miller, Roundy, & Chambers, 2009).

Year	Vegetation Type	Woodland Succession
2005	Mountain Big Sagebrush/Perennial Grass	No Encroachment
2012	Mountain Big Sagebrush/Perennial Grass	No Encroachment
2016	Mountain Big Sagebrush/Perennial Grass	No Encroachment

Site Notes

The Strawberry Sage Grouse 1 study is one of four established in 2005 to monitor habitat for sage grouse in the Strawberry Valley and surrounding brood area.

Soils

Table 17R-17.5 - Soil Analysis Data. List of chemical and textural soil characteristics determined by laboratory analysis.

Texture	pH	%sand	%silt	%clay	%OM	PPM P	PPM K	ds/m	Sample Date
Loam	7.3	47.4	34.7	17.9	1.3	10.3	150.4	0.5	08/11/2005

Site Potential

1981-2010 Average Annual Precipitation	21 inches
NRCS Ecological Site	Mountain Loam (Mountain Big Sagebrush)
NRCS Ecological Site #	R048XA430UT
States and Transitions	No state and transition model is available for this ecological site.

The states and transitions for this site are likely similar to those of the Mountain Loam (Mountain Big Sagebrush), R047XA430UT ecological site. Since study establishment in 2005, the shrub overstory has been mainly comprised of mountain big sagebrush (*Artemisia tridentata* ssp. *vaseyana*), although numerous other species are present (Table 17R-17.12). The perennial grass species crested wheatgrass (*Agropyron cristatum*) has consistently contributed the most herbaceous cover. Perennial forbs have been fairly abundant in all sample years, with looseflower milkvetch (*Astragalus tenellus*) and mountain phlox (*Phlox austromontana*) as the most prevalent species. Annual grasses are not a concern on this study site (Table 17R-17.10, Table 17R-17.11).

Trend Summary Tables

Table 17R-17.6 - Shrub/Tree Summary. Average modified Daubenmire quadrat and line intercept cover by year for shrubs/trees.

Year	Quadrat Cover (%)			Line-intercept Cover (%)		
	Preferred Shrub	Other Shrub	Tree	Preferred Shrub	Other Shrub	Tree
2005	17.4	5.6	-	26.8	6.8	-
2012	18.4	7.3	-	25.1	6.7	-
2016	16.3	5.8	-	23.2	7.1	-

Table 17R-17.7 - Herbaceous Summary. Nested frequency and average modified Daubenmire quadrat cover by year for herbaceous functional groups.

Year	Nested Frequency				Quadrat Cover (%)			
	Annual Grass	Perennial Grass	Annual/Biennial Forb	Perennial Forb	Annual Grass	Perennial Grass	Annual/Biennial Forb	Perennial Forb
2005	-	386	64	261	-	16.1	0.7	13.5
2012	-	381	20	191	-	21.6	0.1	6.9
2016	-	409	40	186	-	27.5	1.1	8.4

Table 17R-17.8 - Basic Ground Cover. Average modified Daubenmire quadrat cover by year for basic ground cover types.

Year	Cover Type (%)					
	Bare Ground	Cryptograms	Litter	Pavement	Rock	Vegetation
2005	22.3	3.3	47.7	0.6	4.9	45.6
2012	21.2	0.6	45.0	0.8	6.5	52.0
2016	17.2	2.0	34.2	0.6	5.8	50.7

Table 17R-17.9 - Pellet Group Data. Quadrat frequency and pellet group transect data for animal pellets. Rabbit pellet groups are not sampled in the pellet group transect.

Year	Cattle	Mule Deer	Elk	Greater Sage-Grouse	Rabbit
	Quadrat Frequency				
2005	1	10	4	17	30
2012	-	2	1	8	2
2016	-	8	1	7	5
Year	Days Use Per Acre (ha)				
2005	1.5 (3.6)	7.4 (18.2)	10.7 (26.5)	200.4 (494.9)*	-
2012	-	8.1 (19.9)	-	52.3 (129.1)*	-
2016	-	8.7 (21.5)	2.0 (5.0)	8.7 (21.5)*	-

*Pellets per acre (ha)

Table 17R-17.10 - Grass Species. Nested frequency and modified Daubenmire average cover by year.

GRASS SPECIES	Achnatherum hymenoides (Indian ricegrass)	Achnatherum lettermanii (Letterman's needlegrass)	Agropyron cristatum ⁱ (crested wheatgrass)	Bromus porteri (Porter brome)	Carex (sedge)	Elymus lanceolatus (thickspike wheatgrass)	Festuca ovina ⁱ (sheep fescue)	Hesperostipa comata (needle and thread)	Koeleria macrantha (prairie Junegrass)	Poa fendleriana (muttongrass)	Poa pratensis ⁱ (Kentucky bluegrass)	Poa secunda (Sandberg bluegrass)	Pseudoroegneria spicata (bluebunch wheatgrass)
year	Nested Frequency												
2005	14	8	149	2	38	94	4	15	56	162	13	68	17
2012	6	6	235	7	39	61	9	12	54	67	3	78	30
2016	-	16	249	12	10	37	3	-	18	5	12	169	14
year	Average Cover (%)												
2005	0.1	0.1	6.9	0.0	0.7	0.7	0.0	0.6	0.7	4.7	0.2	0.7	0.4
2012	0.6	0.1	14.1	0.0	0.4	0.9	0.1	0.1	1.6	1.1	0.0	1.1	1.6
2016	-	0.9	18.2	0.1	0.2	0.4	0.0	-	0.4	0.0	0.1	6.3	0.8

a - Annual; n - Noxious Weed; i - Introduced Species

Table 17R-17.11 - Forb Species. Nested frequency and modified Daubenmire average cover by year.

FORB SPECIES	Androsace septentrionalis ^a (pygmy flower rockjasmine)	Antennaria (pussytoes)	Arabis (rockcress)	Astragalus convallarius (lesser rusby milkvetch)	Astragalus kentrophyta (spiny milkvetch)	Astragalus tenellus (looseflower milkvetch)	Calochortus nuttallii (sego lily)	Camissonia ^a (suncup)	Chaenactis douglasii (Douglas' dustymaiden)	Collinsia parviflora ^a (maiden blue eyed Mary)	Comandra umbellata (bastard toadflax)	Cryptantha (cryptantha)	Eriogonum brevicale (shortstem buckwheat)	Eriogonum umbellatum (sulphur-flower buckwheat)	Gayophytum ramosissimum ^a (pinyon groundsmoke)	Lappula occidentalis ^a (flatspine stickseed)	Lesquerella (bladderpod)
year	Nested Frequency																
2005	2	11	5	10	3	112	3	6	3	15	85	2	13	6	28	10	3
2012	8	5	4	5	-	55	-	-	7	2	50	2	14	3	15	-	-
2016	1	-	-	-	-	60	-	-	-	19	50	-	3	16	-	-	-
year	Average Cover (%)																
2005	0.0	0.1	0.0	0.1	0.0	4.8	0.0	0.0	0.0	0.0	0.8	0.2	0.4	0.1	0.1	0.0	0.0
2012	0.1	0.0	0.0	0.0	-	1.0	-	-	0.0	0.0	0.2	0.0	0.3	0.0	0.0	-	-
2016	0.0	-	-	-	-	2.7	-	-	-	0.1	0.5	-	0.0	0.5	-	-	-

a - Annual/Biennial; n - Noxious Weed; i - Introduced Species

FORB SPECIES	Lupinus argenteus (silvery lupine)	Machaeranthera grindelioides (rayless tansyaster)	Orobanche (broomrape)	Orthocarpus luteus ^a (yellow owl's-clover)	Orthocarpus tolmiei ^a (Tolmie's owl's-clover)	Packera multilobata (lobeleaf groundsel)	Penstemon (beardtongue)	Penstemon caespitosus (mat penstemon)	Phlox austromontana (mountain phlox)	Phlox longifolia (longleaf phlox)	Polygonum douglasii ^a (Douglas' knotweed)	Potentilla gracilis (slender cinquefoil)	Symphotrichum ascendens (western aster)	Taraxacum officinale (common dandelion)	Tragopogon dubius ^a (yellow salsify)
year	Nested Frequency														
2005	0	47	1	7	17	1	7	-	126	3	34	4	0	4	0
2012	-	55	-	-	-	4	5	12	116	-	-	1	7	-	-
2016	2	41	-	-	21	5	-	13	104	0	5	-	9	-	-
year	Average Cover (%)														
2005	0.0	1.6	0.0	0.0	0.4	0.0	0.1	-	5.3	0.0	0.1	0.0	0.0	0.0	0.0
2012	-	1.2	-	-	-	0.0	0.0	0.2	3.5	-	-	0.0	0.4	-	-
2016	0.1	1.2	-	-	1.0	0.0	-	0.1	2.4	0.0	0.0	-	0.7	-	-

a - Annual/Biennial; n - Noxious Weed; i - Introduced Species

Table 17R-17.12 - Shrub and Tree Species. Average modified Daubenmire quadrat and line intercept cover by year.

SHRUB SPECIES	Artemisia frigida ^p (prairie sagewort)	Artemisia tridentata ssp. vaseyana ^p (mountain big sagebrush)	Chrysothamnus depressus ^p (longflower rabbitbrush)	Chrysothamnus viscidiflorus ssp. viscidiflorus (yellow rabbitbrush)	Ericameria parryi var. parryi (Parry's rabbitbrush)	Gutierrezia sarothrae (broom snakeweed)	Mahonia repens (creeping barberry)	Rosa woodsii ^p (Woods' rose)	Tetradymia canescens (spineless horsebrush)
year	Line Intercept Cover (%)								
2005	1.1	25.7	-	4.6	0.9	0.9	-	-	0.4
2012	0.3	24.8	-	3.7	2.1	0.3	0.2	-	0.4
2016	1.2	21.9	-	4.9	0.5	0.6	0.5	0.1	0.6
year	Quadrat Cover (%)								
2005	1.1	16.3	0.0	2.8	1.1	0.4	0.2	-	1.1
2012	0.1	17.9	0.3	4.5	2.1	0.2	0.2	-	0.4
2016	1.1	15.2	0.0	3.6	0.7	0.6	0.4	0.0	0.5

t - Tree Species; p - Preferred Browse; i - Introduced

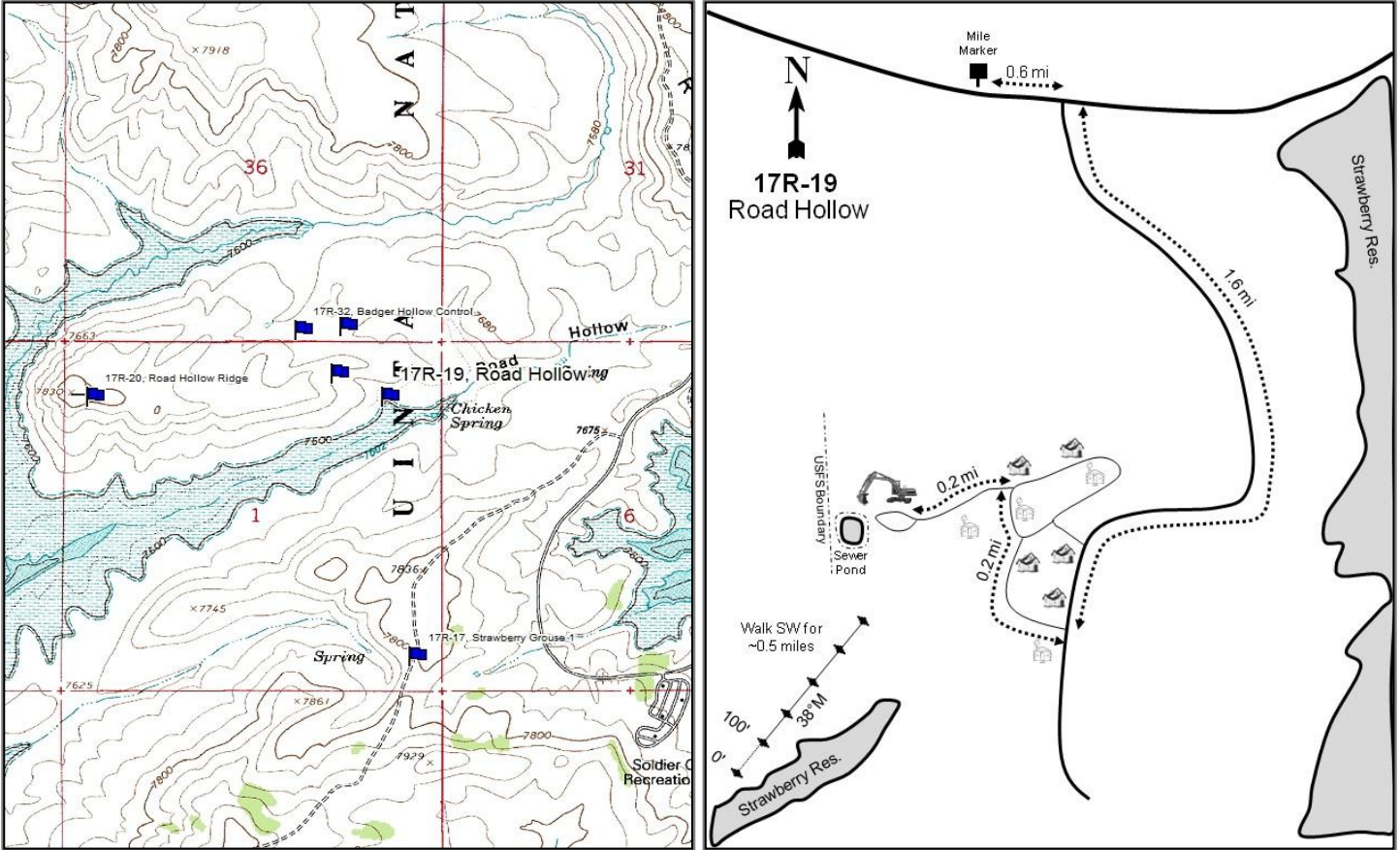
Table 17R-17.13 - Shrub/Tree Characteristics. Population characteristics of shrub/tree species populations including density reproduction (seedlings), age distribution, utilization, vigor and average size (height/crown) of plants.

Year	Density		Age Class Distribution			Utilization		Poor Vigor (%)	Average Height Crown (cm)
	Plants Per Acre		Excluding Seedlings			Moderate (%)	Heavy (%)		
	Excluding Seedlings	Seedling	Young (%)	Mature (%)	Decadent (%)				
Artemisia frigida^p -- (prairie sagewort)									
2005	3880	40	12	83	5	3	0	5	17/25
2012	880	20	0	100	0	34	9	14	11/17
2016	1540	-	3	97	0	13	12	0	13/24
Artemisia tridentata ssp. vaseyana^p -- (mountain big sagebrush)									
2005	6740	-	3	59	38	2	0	20	42/60
2012	4520	-	4	79	17	9	1	34	46/73
2016	4480	-	4	75	21	18	55	17	51/87
Cercocarpus montanus^p -- (alderleaf mountain mahogany)									
2005	-	-	-	-	-	-	-	-	-/-
2012	-	-	-	-	-	-	-	-	39/89
2016	-	-	-	-	-	-	-	-	-/-
Chrysothamnus depressus^p -- (longflower rabbitbrush)									
2005	80	-	0	100	0	0	0	0	19/14
2012	340	-	6	94	0	0	0	0	15/19
2016	40	-	0	100	0	0	0	0	17/24
Chrysothamnus viscidiflorus ssp. viscidiflorus -- (yellow rabbitbrush)									
2005	4660	-	1	87	12	0	0	5	23/31
2012	4160	20	1	89	10	0	0	38	23/27
2016	3560	-	1	94	5	0	0	6	27/37
Ericameria parryi var. parryi -- (Parry's rabbitbrush)									
2005	1860	-	5	90	4	5	1	1	18/28
2012	1520	-	7	93	0	0	0	0	16/28
2016	720	-	0	100	0	0	0	0	16/23
Gutierrezia sarothrae -- (broom snakeweed)									
2005	1320	-	17	83	0	0	0	0	14/21
2012	820	-	0	100	0	0	0	0	14/18
2016	720	20	31	69	0	0	0	0	19/31
Mahonia repens -- (creeping barberry)									
2005	720	-	0	100	0	0	0	0	7/8
2012	920	-	0	100	0	0	0	0	9/13
2016	2720	-	0	100	0	0	0	0	10/13

Year	Density		Age Class Distribution			Utilization		Poor Vigor (%)	Average Height Crown (cm)
	Plants Per Acre		Excluding Seedlings			Moderate (%)	Heavy (%)		
	Excluding Seedlings	Seedling	Young (%)	Mature (%)	Decadent (%)				
Rosa woodsii^P -- (Woods' rose)									
2005	-	-	-	-	-	-	-	-	19/20
2012	60	-	0	100	0	0	0	0	23/22
2016	80	-	0	100	0	0	0	0	31/17
Tetradymia canescens -- (spineless horsebrush)									
2005	520	-	8	77	15	0	0	8	25/34
2012	520	-	0	69	31	0	0	31	24/26
2016	460	-	17	78	4	26	0	4	26/37

t - Tree Species; p - Preferred Browse; i - Introduced Species

ROAD HOLLOW - STUDY NO. 17R-19



Location Information

USGS 7.5 min Map Info Strawberry Reservoir; Township 4S, Range 11W, Section 01
 GPS (0' Stake) NAD 83 UTM ZONE 12, 494105 East 4446193 North

Transect Information

Browse Tag # (0' Stake) 138
 Transect Bearing 38° magnetic
 Length 500ft
 Belt Placement Line 1 (11ft), Line 2 (34ft), Line 3 (59ft), Line 4 (71ft), Line 5 (95ft)
 Belt Marker Placement Standard, Belt 2, 4 5: No Rebar

Directions to Site

On US 40, drive east past Strawberry Reservoir to mile marker 49 (not positive on mile marker number). Continue for 0.6 miles past the mile marker to Soldier Creek Campground Road (FS 480) on the right (south). Turn right and drive 1.6 miles to another road on the right (west). Turn right and proceed 0.1 miles to an intersection. Turn right here and travel for 0.1 miles to a two-track road on the left (northwest). Turn left and drive up to the pump house. From the pump house, walk along the two-track road for 0.54 miles at 250 degrees magnetic to the 0-foot stake which is marked with browse tag #138. There are no 300 or 500-foot stakes, although a rock cairn indicates where the 300-foot stake should be.

Site Information

Land Ownership	Federal
Land Administrator	USFS
Allotment	No data
Elevation	7,600ft (2,316m)
Aspect	Southeast
Slope	5-10%
Sample Dates	08/22/2005, 07/10/2012, 08/03/2016

Table 17R-19.1 Disturbance History. Recorded history of major disturbances.

Treatment/Disturbance	Name	WRI DB#	Date	Size (acres)
Mechanical - Mower	Badger Hollow /Chicken Spring Ridge Habitat Improvement	1816	August 2011	60
Harrow - One-Way Chain	Badger Hollow /Chicken Spring Ridge Habitat Improvement	1816	August 2011	125

Wildlife Habitat and Vegetation History

Table 17R-19.3 - Wildlife Seasonal Habitat. UDWR wildlife habitat and seasonality.

Species	Habitat	Season
Deer	substantial	summer/fall
Elk	crucial	summer
Moose	crucial	spring/fall

Table 17R-19.4 - Vegetation History. The dominant vegetation type(s) and phase of woodland succession (Tausch, Miller, Roundy, & Chambers, 2009).

Year	Vegetation Type	Woodland Succession
2005	Mountain Big Sagebrush/Perennial Grass	NA
2012	Mountain Big Sagebrush/Perennial Grass	NA
2016	Mountain Big Sagebrush/Perennial Grass	NA

Site Notes

The study is located approximately twelve miles west of Fruitland on the east side of Strawberry Reservoir. The study was established in 2005 to monitor habitat for sage grouse.

Soils

Table 17R-19.5 - Soil Analysis Data. List of chemical and textural soil characteristics determined by laboratory analysis.

Texture	pH	%sand	%silt	%clay	%OM	PPM P	PPM K	ds/m	Sample Date
Sandy Loam	6.9	54.4	26.8	18.8	2.3	21.8	185.6	0.5	08/22/2005

Site Potential

1981-2010 Average Annual Precipitation	21 inches
NRCS Ecological Site	Mountain Shallow Loam (Mountain Big Sagebrush)
NRCS Ecological Site #	R047XA446UT
States and Transitions	A defined state and transition model is available.

This study site has remained dominated by mountain big sagebrush (*Artemisia tridentata* ssp. *vaseyana*) and an abundant, increasing herbaceous understory mainly comprised of perennial grasses with perennial forbs to a lesser extent: these characteristics place the site in Community Phase 2.1 of the Mountain Big Sagebrush/Introduced Non- Natives state (State 2) (Table 17R-19.7, Table 17R-19.10, Table 17R-19.11, Table 17R-19.12). Although the understory has generally increased throughout the study years, the model provided states that prolonged absence of fire and continuous heavy grazing could cause this site to transition (Transition T2a) to the Mountain Big Sagebrush Superdominance state (State 3). This state is defined as having a substantially reduced herbaceous understory and increased dominance of sagebrush and other shrubs (USDA-NRCS, 2013).

Trend Summary Tables

Table 17R-19.6 - Shrub/Tree Summary. Average modified Daubenmire quadrat and line intercept cover by year for shrubs/trees.

Year	Quadrat Cover (%)			Line-intercept Cover (%)		
	Preferred Shrub	Other Shrub	Tree	Preferred Shrub	Other Shrub	Tree
2005	22.4	9.2	-	28.8	10.8	-
2012	12.4	6.3	-	14.5	7.0	-
2016	13.7	8.1	-	17.6	12.4	-

Table 17R-19.7 - Herbaceous Summary. Nested frequency and average modified Daubenmire quadrat cover by year for herbaceous functional groups.

Year	Nested Frequency				Quadrat Cover (%)			
	Annual Grass	Perennial Grass	Annual/Biennial Forb	Perennial Forb	Annual Grass	Perennial Grass	Annual/Biennial Forb	Perennial Forb
2005	-	373	172	241	-	13.7	3.0	9.1
2012	-	378	33	213	-	24.2	0.2	5.7
2016	-	364	47	248	-	26.5	0.4	11.3

Table 17R-19.8 - Basic Ground Cover. Average modified Daubenmire quadrat cover by year for basic ground cover types.

Year	Cover Type (%)					
	Bare Ground	Cryptogams	Litter	Pavement	Rock	Vegetation
2005	24.4	4.2	32.9	0.5	0.7	51.2
2012	22.3	1.0	49.5	0.1	0.4	44.8
2016	16.0	1.7	40.3	0.5	0.8	52.8

Table 17R-19.9 - Pellet Group Data. Quadrat frequency and pellet group transect data for animal pellets. Rabbit pellet groups are not sampled in the pellet group transect.

Year	Cattle	Mule Deer	Elk	Greater Sage-Grouse	Rabbit
	Quadrat Frequency				
2005	1	4	-	4	8
2012	-	-	-	-	12
2016	-	11	1	15	25
Year	Days Use Per Acre (ha)				
2005	0.7 (1.8)	2.0 (5.0)	-	52.3 (129.1)*	-
2012	-	0.7 (1.7)	-	-	-
2016	-	12.1 (29.8)	-	61.0 (150.6)*	-

*Pellets per acre (ha)

Table 17R-19.10 - Grass Species. Nested frequency and modified Daubenmire average cover by year.

GRASS SPECIES	Achnatherum lettermanii (Letterman's needlegrass)	Achnatherum nelsonii (Columbia needlegrass)	Carex (sedge)	Carex geyeri (Geyer's sedge)	Carex obtusata (obtuse sedge)	Deschampsia cespitosa (tufted hairgrass)	Elymus elymoides (squirreltail)	Elymus lanceolatus (thickspike wheatgrass)	Festuca ovina' (sheep fescue)	Hesperostipa comata (needle and thread)	Juncus (rush)	Koeleria macrantha (prairie Junegrass)	Poa fendleriana (muttongrass)	Poa pratensis' (Kentucky bluegrass)	Poa secunda (Sandberg bluegrass)
year	Nested Frequency														
2005	100	30	70	-	-	14	10	17	97	10	24	118	45	80	1
2012	140	1	-	22	52	34	21	61	35	7	-	108	17	100	46
2016	151	2	11	3	27	7	24	120	12	-	9	61	-	71	62
year	Average Cover (%)														
2005	3.0	0.9	1.4	-	-	0.2	0.3	0.1	3.2	0.2	0.3	2.2	0.7	1.1	0.0
2012	2.2	0.0	-	0.5	0.7	5.2	0.2	2.1	0.3	0.2	-	5.0	0.3	6.5	1.2
2016	7.1	0.1	0.2	0.0	0.3	0.4	1.0	5.0	0.2	-	0.2	5.8	-	4.4	1.8

a - Annual; n - Noxious Weed; i - Introduced Species

Table 17R-19.11 - Forb Species. Nested frequency and modified Daubenmire average cover by year.

FORB SPECIES	Achillea millefolium (Common yarrow)	Androsace septentrionalis ^a (pygmyflower rockjasmine)	Antennaria (pussytoes)	Arenaria fendleri (Fendler's sandwort)	Astragalus convallarius (lesser rusby milkvetch)	Astragalus tenellus (looseflower milkvetch)	Chaenactis douglasii (Douglas' dustymaiden)	Cirsium (thistle)	Collinsia parviflora ^a (maiden blue eyed Mary)	Comandra umbellata (bastard toadflax)	Cymopterus (springparsley)	Eriogonum heracleoides (parsnipflower buckwheat)	Eriogonum umbellatum (sulphur-flower buckwheat)	Gayophytum ramosissimum ^a (pinyon groundsmoke)	Gentiana calycosa (Raimier pleated gentian)	Gilia ^a (gilia)	Lactuca serriola ^a (prickly lettuce)
year	Nested Frequency																
2005	-	-	44	67	-	-	-	2	-	1	-	-	25	25	6	7	-
2012	1	3	40	52	3	1	5	4	-	-	3	-	26	15	3	1	1
2016	2	-	37	54	4	1	4	7	4	1	-	2	39	-	5	-	-
year	Average Cover (%)																
2005	-	-	1.6	1.0	-	-	-	0.0	-	0.0	-	-	0.8	0.1	0.2	0.0	-
2012	0.0	0.0	0.6	0.8	0.0	0.0	0.0	0.0	-	-	0.1	-	0.8	0.0	0.0	0.0	0.0
2016	0.0	-	0.8	2.7	0.0	0.0	0.0	0.1	0.0	0.0	-	0.4	1.6	-	0.0	-	-

a - Annual/Biennial; n - Noxious Weed; i - Introduced Species

FORB SPECIES	Linum lewisii (Lewis flax)	Lupinus caespitosus var. utahensis (Utah lupine)	Machaeranthera canescens (hoary tansyaster)	Orthocarpus luteus ^a (yellow owl's-clover)	Pedicularis groenlandica (elephanthead lousewort)	Penstemon caespitosus (mat penstemon)	Penstemon watsonii (Watson's penstemon)	Phlox austromontana (mountain phlox)	Phlox longifolia (longleaf phlox)	Physaria (twinpod)	Polygonum douglasii ^a (Douglas' knotweed)	Potentilla gracilis (slender cinquefoil)	Symphotrichum ascendens (western aster)	Trifolium (clover)	Viola (violet)
year	Nested Frequency														
2005	2	-	2	153	15	5	12	65	3	-	17	5	76	-	6
2012	1	1	13	21	-	9	-	69	-	2	-	10	63	3	-
2016	2	5	10	43	16	-	-	84	-	-	-	7	73	-	-
year	Average Cover (%)														
2005	0.0	-	0.0	2.8	0.2	0.0	0.1	3.5	0.0	-	0.0	0.0	1.4	-	0.1
2012	0.0	0.0	0.0	0.2	-	0.1	-	2.5	-	0.0	-	0.1	0.5	0.0	-
2016	0.0	0.0	0.1	0.4	0.3	-	-	3.6	-	-	-	0.0	1.6	-	-

a - Annual/Biennial; n - Noxious Weed; i - Introduced Species

Table 17R-19.12 - Shrub and Tree Species. Average modified Daubenmire quadrat and line intercept cover by year.

SHRUB SPECIES	Artemisia cana (silver sagebrush)	Artemisia tridentata ssp. vaseyana ^p (mountain big sagebrush)	Chrysothamnus viscidiflorus ssp. viscidiflorus (yellow rabbitbrush)	Ericameria nauseosa (rubber rabbitbrush)	Ericameria parryi var. parryi (Parry's rabbitbrush)	Tetradymia canescens (spineless horsebrush)
year	Line Intercept Cover (%)					
2005	7.6	28.8	1.6	-	1.6	-
2012	5.2	14.5	0.7	-	1.1	-
2016	5.6	17.6	5.2	-	1.5	0.1
year	Quadrat Cover (%)					
2005	5.9	22.4	1.4	0.0	1.8	0.0
2012	4.6	12.4	0.7	-	1.0	0.0
2016	3.1	13.7	3.5	-	1.5	0.0

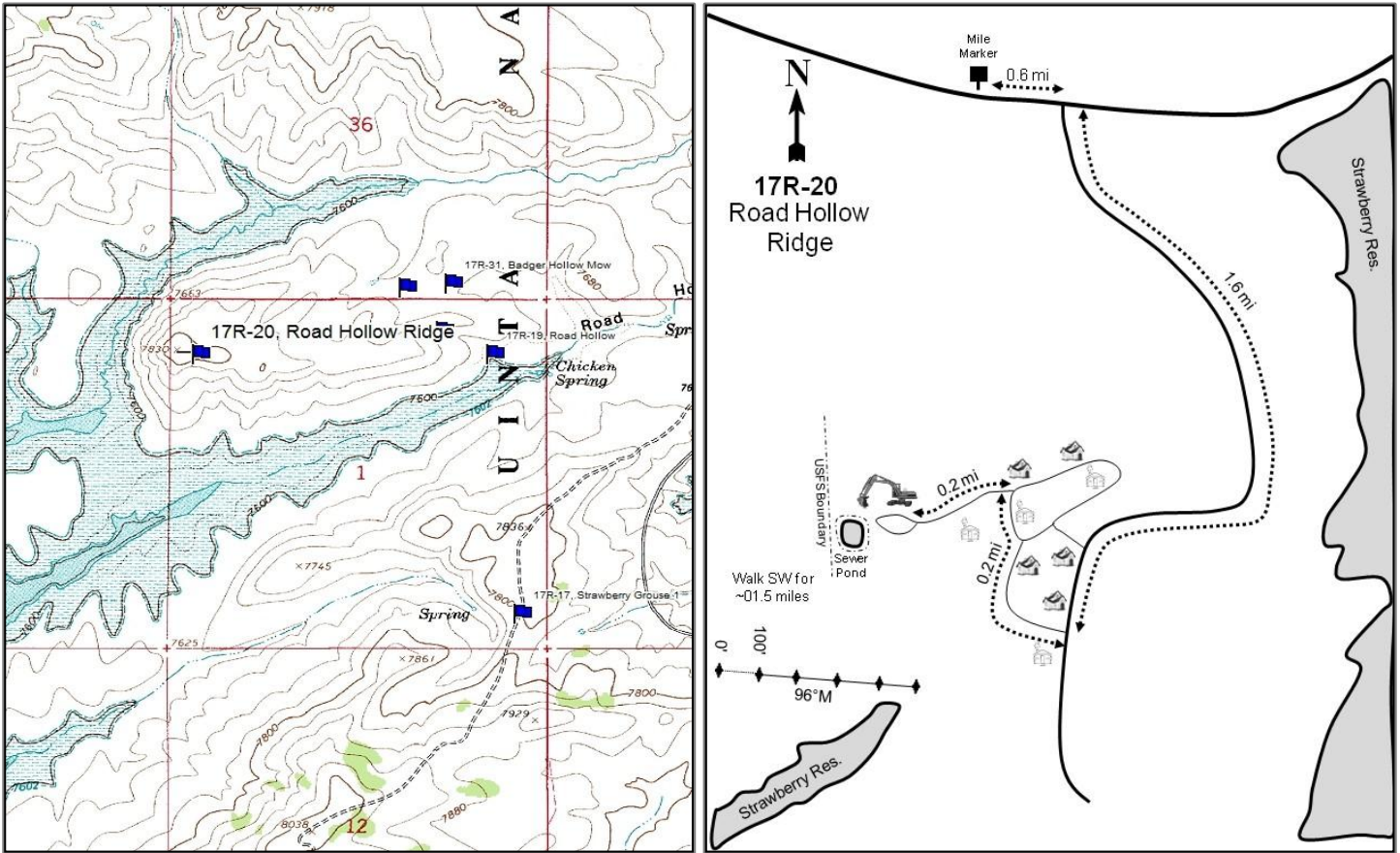
t - Tree Species; p - Preferred Browse; i - Introduced

Table 17R-19.13 - Shrub/Tree Characteristics. Population characteristics of shrub/tree species populations including density reproduction (seedlings), age distribution, utilization, vigor and average size (height/crown) of plants.

Year	Density		Age Class Distribution			Utilization		Poor Vigor (%)	Average Height Crown (cm)
	Plants Per Acre		Excluding Seedlings			Moderate (%)	Heavy (%)		
	Excluding Seedlings	Seedling	Young (%)	Mature (%)	Decadent (%)				
Artemisia cana -- (silver sagebrush)									
2005	2220	80	5	73	23	4	0	4	37/62
2012	2800	20	6	92	2	0	0	0	27/35
2016	2140	-	23	62	15	15	0	14	38/52
Artemisia tridentata ssp. vaseyana ^p -- (mountain big sagebrush)									
2005	7020	3440	2	66	31	2	17	13	45/72
2012	3580	20	7	59	35	0	0	22	31/46
2016	4720	-	2	65	33	29	30	30	37/54
Chrysothamnus viscidiflorus ssp. viscidiflorus -- (yellow rabbitbrush)									
2005	3460	-	1	81	18	0	0	9	17/25
2012	2000	20	8	92	0	0	0	0	12/20
2016	5660	-	0	99	1	0	0	1	18/29
Eriogonum heracleoides -- (parsnipflower buckwheat)									
2005	-	-	-	-	-	-	-	-	-/-
2012	-	-	-	-	-	-	-	-	-/-
2016	-	-	-	-	-	-	-	-	14/28
Ericameria nauseosa -- (rubber rabbitbrush)									
2005	60	-	67	33	0	0	0	0	13/48
2012	-	-	-	-	-	-	-	-	-/-
2016	-	-	-	-	-	-	-	-	-/-
Ericameria parryi var. parryi -- (Parry's rabbitbrush)									
2005	1780	-	1	81	18	0	0	16	17/32
2012	2660	-	5	96	0	0	0	0	12/22
2016	2780	40	4	96	0	0	0	0	11/19
Tetradymia canescens -- (spineless horsebrush)									
2005	60	-	0	67	33	0	0	33	27/25
2012	60	-	0	100	0	0	0	0	14/20
2016	60	-	0	100	0	0	0	0	25/29

t - Tree Species; p - Preferred Browse; i - Introduced Species

ROAD HOLLOW RIDGE - STUDY NO. 17R-20



Location Information

USGS 7.5 min Map Info	Strawberry Reservoir; Township 4S, Range 11W, Section 01
GPS (0' Stake)	NAD 83 UTM ZONE 12, 492846 East 4446195 North

Transect Information

Browse Tag # (0' Stake)	94
Transect Bearing	96° 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

On US 40, drive east past Strawberry Reservoir to mile marker 49 (not positive on mile marker number). Continue 0.6 miles past the mile marker to Soldier Creek Campground Road (FS 480) on the right (south). Turn right and drive 1.6 miles to another road on the right (west). Turn right and drive to an intersection. Turn right here and continue for 0.1 miles to a two-track road on the left (northwest). Turn left onto this road and drive up to the pump house. From the pump house, walk along the two-track road for 1.3 miles at 260 degrees magnetic to the 0-foot stake which is marked with browse tag #94. The site is north of the two-track near a rock outcrop and runs through a stand of Great Basin wildrye.

Site Information

Land Ownership	Federal
Land Administrator	USFS
Allotment	No data
Elevation	7,760ft (2,365m)
Aspect	South
Slope	25%
Sample Dates	08/22/2005, 07/10/2012, 08/03/2016

Wildlife Habitat and Vegetation History

Table 17R-20.3 - Wildlife Seasonal Habitat. UDWR wildlife habitat and seasonality.

Species	Habitat	Season	Brood/Young Rearing
Deer	substantial	summer/fall	
Elk	crucial	summer	
Greater Sage Grouse	Crucial	occupied & Winter	brood-rearing
Moose	crucial	spring/fall	

Table 17R-20.4 - Vegetation History. The dominant vegetation type(s) and phase of woodland succession (Tausch, Miller, Roundy, & Chambers, 2009).

Year	Vegetation Type	Woodland Succession
2005	Mountain Big Sagebrush/Perennial Grass	NA
2012	Mountain Big Sagebrush/Perennial Grass	NA
2016	Mountain Big Sagebrush/Perennial Grass	NA

Site Notes

This study is located approximately thirteen miles west of Fruitland on the east side of Strawberry Reservoir. The study was established in 2005 to monitor habitat for sage grouse.

Soils

Table 17R-20.5 - Soil Analysis Data. List of chemical and textural soil characteristics determined by laboratory analysis.

Texture	pH	%sand	%silt	%clay	%OM	PPM P	PPM K	ds/m	Sample Date
Loam	7.4	44.7	33.1	22.2	2.2	9.3	140.8	0.7	08/22/2005

Site Potential

1981-2010 Average Annual Precipitation	22 inches
NRCS Ecological Site	Mountain Loam (Mountain Big Sagebrush)
NRCS Ecological Site #	R047XA430UT
States and Transitions	A defined state and transition model is available.

The dominance of mountain big sagebrush (*Artemisia tridentata* ssp. *vaseyana*) and the diverse and abundant perennial grass-dominated herbaceous understory (Table 17R-20.7, Table 17R-20.10, Table 17R-20.12) indicate that this site has remained in Community Phase 2.1 in the Mountain Big Sagebrush-Steppe/Non-Natives state (State 2) since study establishment in 2005. Without a significant disturbance, it is expected that this study site will remain in this phase in future study years. However, the model states that a transition (Transition T2a) to the Mountain Big Sagebrush Superdominance/Low Shrub state (State 3) is possible through continuous heavy grazing and a lack of fire; This state is defined as having a substantially decreased herbaceous understory and a super dominant shrub component (USDA-NRCS, 2013).

Trend Summary Tables

Table 17R-20.6 - Shrub/Tree Summary. Average modified Daubenmire quadrat and line intercept cover by year for shrubs/trees.

Year	Quadrat Cover (%)			Line-intercept Cover (%)		
	Preferred Shrub	Other Shrub	Tree	Preferred Shrub	Other Shrub	Tree
2005	20.0	13.5	-	24.8	14.6	-
2012	23.9	11.1	-	26.7	9.2	-
2016	18.9	12.7	-	26.4	19.7	-

Table 17R-20.7 - Herbaceous Summary. Nested frequency and average modified Daubenmire quadrat cover by year for herbaceous functional groups.

Year	Nested Frequency				Quadrat Cover (%)			
	Annual Grass	Perennial Grass	Annual/Biennial Forb	Perennial Forb	Annual Grass	Perennial Grass	Annual/Biennial Forb	Perennial Forb
2005	40	304	170	166	0.4	10.3	3.7	8.6
2012	29	297	65	176	0.1	13.5	0.4	3.5
2016	89	295	243	161	3.6	18.1	3.2	7.6

Table 17R-20.8 - Basic Ground Cover. Average modified Daubenmire quadrat cover by year for basic ground cover types.

Year	Cover Type (%)					
	Bare Ground	Cryptograms	Litter	Pavement	Rock	Vegetation
2005	23.3	1.3	35.3	1.3	3.4	51.5
2012	25.9	0.4	40.9	0.5	2.8	51.6
2016	19.9	0.0	33.6	1.6	2.0	54.9

Table 17R-20.9 - Pellet Group Data. Quadrat frequency and pellet group transect data for animal pellets. Rabbit pellet groups are not sampled in the pellet group transect.

Year	Mule Deer	Elk	Greater Sage-Grouse	Rabbit
	Quadrat Frequency			
2005	7	1	6	6
2012	1	-	3	1
2016	5	-	3	14
Year	Days Use Per Acre (ha)			
2005	7.4 (18.2)	0.7 (1.7)	426.9 (1054.4)*	-
2012	8.1 (19.9)	-	191.7 (473.4)*	-
2016	20.1 (49.7)	-	113.2 (279.7)*	-

*Pellets per acre (ha)

Table 17R-20.10 - Grass Species. Nested frequency and modified Daubenmire average cover by year.

GRASS SPECIES	Achnatherum hymenoides (Indian ricegrass)	Achnatherum lettermanii (Letterman's needlegrass)	Bromus porteri (Porter brome)	Bromus tectorum ^a (cheatgrass)	Carex (sedge)	Elymus elymoides (squirreltail)	Elymus lanceolatus (thickspike wheatgrass)	Festuca ovina ⁱ (sheep fescue)	Hesperostipa comata (needle and thread)	Koeleria macrantha (prairie Junegrass)	Poa fendleriana (muttongrass)	Poa pratensis ⁱ (Kentucky bluegrass)	Poa secunda (Sandberg bluegrass)	Pseudoroegneria spicata (bluebunch wheatgrass)
year	Nested Frequency													
2005	12	161	-	40	42	1	55	15	30	23	52	10	-	5
2012	25	79	-	29	16	3	80	10	1	34	48	3	35	110
2016	24	30	7	89	2	-	82	0	-	3	4	57	62	124
year	Average Cover (%)													
2005	0.7	4.2	-	0.4	0.9	0.0	1.0	0.5	1.3	0.2	1.2	0.1	-	0.2
2012	0.7	2.9	-	0.1	0.2	0.0	1.2	0.2	0.1	0.6	1.2	0.0	0.5	6.0
2016	1.2	1.2	0.1	3.6	0.0	-	0.9	0.0	-	0.0	0.0	2.6	1.8	10.2

a - Annual; n - Noxious Weed; i - Introduced Species

Table 17R-20.11 - Forb Species. Nested frequency and modified Daubenmire average cover by year.

FORB SPECIES	Allium (onion)	Alyssum desertorum ^{ai} (desert madwort)	Antennaria (pussytoes)	Astragalus convallarius (lesser rusby milkvetch)	Astragalus tenellus (looseflower milkvetch)	Castilleja linearifolia (Wyoming Indian paintbrush)	Chaenactis douglasii (Douglas' dustymaiden)	Cirsium (thistle)	Collinsia parviflora ^a (maiden blue eyed Mary)	Collomia linearis ^a (tiny trumpet)	Comandra umbellata (bastard toadflax)	Cryptantha (cryptantha)	Descurainia pinnata ^a (western tansymustard)	Eriogonum alatum (winged buckwheat)	Eriogonum brevicaulis (shortstem buckwheat)	Eriogonum heracleoides (parsnipflower buckwheat)	Eriogonum umbellatum (sulphur-flower buckwheat)	
year	Nested Frequency																	
2005	61	128	11	3	16	9	3	8	3	-	12	11	-	2	-	25	1	
2012	2	49	7	11	20	3	4	11	5	3	20	13	1	5	14	3	8	
2016	-	239	5	0	16	8	6	9	7	-	22	1	-	2	19	11	15	
year	Average Cover (%)																	
2005	0.3	2.3	0.2	0.0	0.7	0.1	0.2	0.5	0.0	-	0.1	0.4	-	0.1	-	0.9	0.0	
2012	0.0	0.1	0.2	0.0	0.1	0.0	0.0	0.1	0.0	0.0	0.1	0.1	0.0	0.1	0.2	0.2	0.2	
2016	-	3.1	0.0	0.0	1.0	0.1	0.0	0.0	0.0	-	0.3	0.0	-	0.0	0.4	0.7	0.3	

a - Annual/Biennial; n - Noxious Weed; i - Introduced Species

FORB SPECIES	Gayophytum ramosissimum ^a (pinyon groundsmoke)	Geranium richardsonii (Richardson's geranium)	Grindelia squarrosa (curlycup gumweed)	Lappula occidentalis ^a (flatspine stickseed)	Lesquerella (bladderpod)	Linum lewisii (Lewis flax)	Lithospermum ruderale (western stoneseed)	Lupinus argenteus (silvery lupine)	Machaeranthera grindelioides (rayless tansyaster)	Orthocarpus tolmiei ^a (Tolmie's owl's-clover)	Packera multilobata (lobeleaf groundsel)	Penstemon caespitosus (mat penstemon)	Phacelia hastata (silverleaf phacelia)	Phlox austromontana (mountain phlox)	Phlox longifolia (longleaf phlox)	Polygonum douglasii ^a (Douglas' knotweed)	Potentilla gracilis (slender cinquefoil)	
year	Nested Frequency																	
2005	1	-	-	2	-	4	35	10	8	52	-	-	-	42	1	5	3	
2012	2	1	3	-	2	6	39	9	28	2	6	1	8	56	-	6	23	
2016	-	-	-	-	-	-	30	19	45	12	3	-	-	44	-	-	-	
year	Average Cover (%)																	
2005	0.0	-	-	0.0	-	0.1	1.7	0.8	0.4	1.4	-	-	-	1.9	0.0	0.0	0.0	
2012	0.1	0.0	0.0	-	0.0	0.0	0.7	0.0	0.3	0.0	0.0	0.0	0.0	1.0	-	0.0	0.1	
2016	-	-	-	-	-	-	1.3	0.7	1.1	0.1	0.0	-	-	1.5	-	-	-	

a - Annual/Biennial; n - Noxious Weed; i - Introduced Species

FORB SPECIES			
	Schoenocrambe linifolia (flaxleaf plainsmustard)		
	Symphyotrichum (aster)		
	Tragopogon dubius ^{a,i} (yellow salsify)		
year	Nested Frequency		
2005	1	6	1
2012	4	3	-
2016	-	9	1
year	Average Cover (%)		
2005	0.0	0.0	0.0
2012	0.0	0.0	-
2016	-	0.0	0.0

a - Annual/Biennial; n - Noxious Weed; i - Introduced Species

Table 17R-20.12 - Shrub and Tree Species. Average modified Daubenmire quadrat and line intercept cover by year.

SHRUB SPECIES										
	Artemisia frigida ^p (prairie sagewort)	Artemisia tridentata ssp. vaseyana ^p (mountain big sagebrush)	Chrysothamnus viscidiflorus ssp. viscidiflorus (yellow rabbitbrush)	Ericameria parryi var. parryi (Parry's rabbitbrush)	Eriogonum heracleoides (parsnipflower buckwheat)	Gutierrezia sarothrae (broom snakeweed)	Mahonia repens (creeping barberry)	Rosa woodsii ^p (Woods' rose)	Symphoricarpos oreophilus (mountain snowberry)	Tetradymia canescens (spineless horsebrush)
year	Line Intercept Cover (%)									
2005	-	24.8	8.7	2.1	1.3	1	1.1	-	0.2	0.2
2012	-	26.7	5.9	1.2	-	0.4	1.5	-	0.1	0.1
2016	-	26.4	7.9	0.8	1.5	3.7	5.3	-	0.3	0.2
year	Quadrat Cover (%)									
2005	0.0	19.9	9.1	0.9	0.0	0.7	2.0	0.0	0.6	0.2
2012	0.1	23.7	8.0	0.2	-	0.9	1.8	0.0	0.1	0.0
2016	0.0	18.8	6.2	0.2	0.0	3.3	2.7	0.0	0.4	0.0

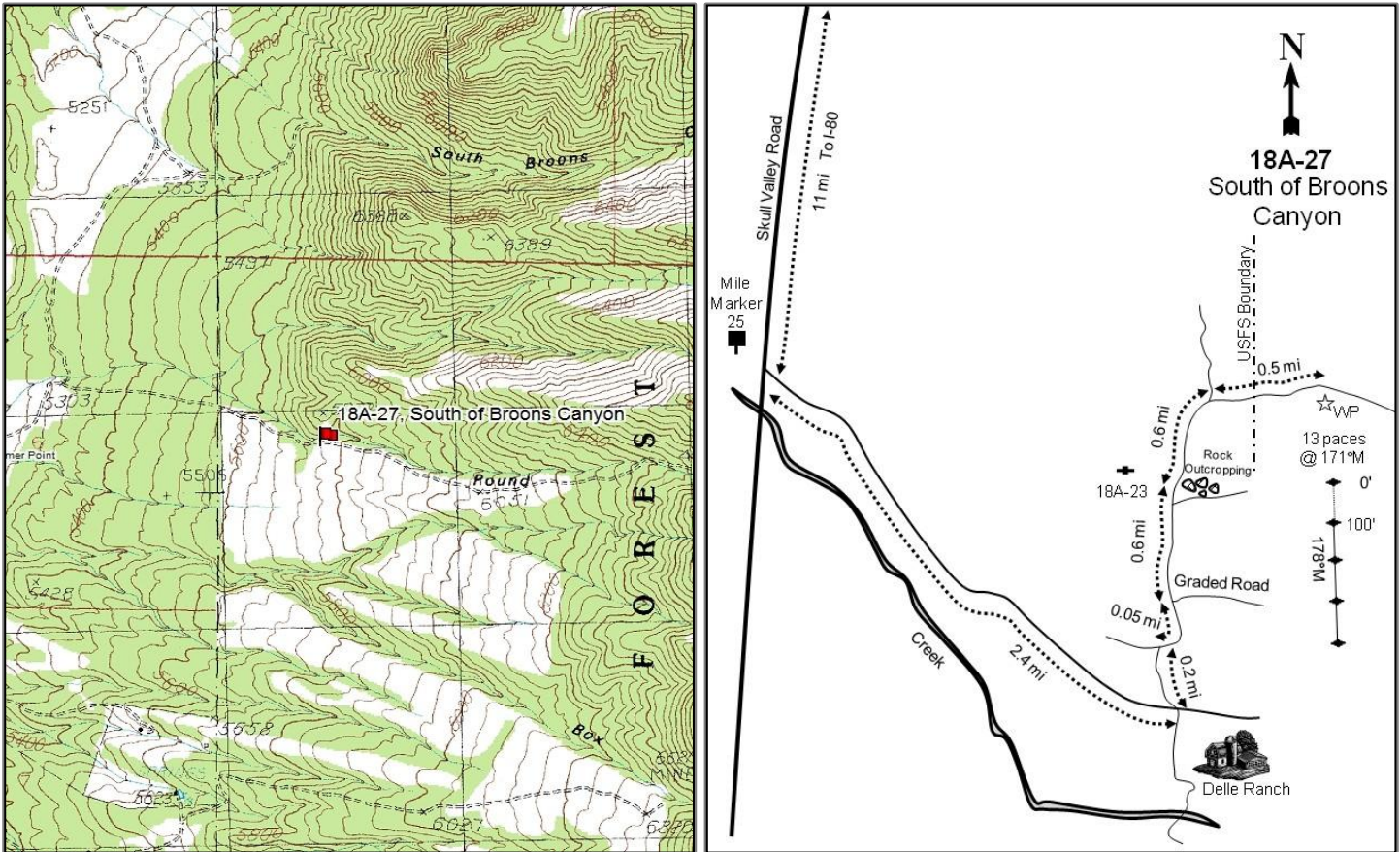
t - Tree Species; p - Preferred Browse; i - Introduced

Table 17R-20.13 - Shrub/Tree Characteristics. Population characteristics of shrub/tree species populations including density reproduction (seedlings), age distribution, utilization, vigor and average size (height/crown) of plants.

Year	Density		Age Class Distribution			Utilization		Poor Vigor (%)	Average Height Crown (cm)
	Plants Per Acre		Excluding Seedlings			Moderate (%)	Heavy (%)		
	Excluding Seedlings	Seedling	Young (%)	Mature (%)	Decadent (%)				
Artemisia frigida^P -- (prairie sagewort)									
2005	40	-	0	0	100	0	0	0	13/28
2012	20	-	0	100	0	0	0	0	- / -
2016	40	-	0	100	0	0	0	0	4/20
Artemisia tridentata ssp. vaseyana^P -- (mountain big sagebrush)									
2005	3320	-	1	75	25	24	19	9	57/92
2012	3420	-	2	82	16	33	5	25	49/89
2016	3300	-	1	81	18	31	30	32	51/83
Chrysothamnus viscidiflorus ssp. viscidiflorus -- (yellow rabbitbrush)									
2005	5100	20	6	87	7	0	0	2	29/48
2012	3420	20	1	91	9	0	0	14	26/46
2016	2720	-	1	98	2	0	0	5	31/45
Eriogonum heracleoides -- (parsnipflower buckwheat)									
2005	780	-	0	100	0	10	0	0	20/39
2012	40	-	50	0	50	0	0	50	- / -
2016	900	20	0	100	0	0	0	0	13/28
Ericameria parryi var. parryi -- (Parry's rabbitbrush)									
2005	960	-	2	98	0	0	0	0	15/28
2012	780	-	0	100	0	0	0	0	16/26
2016	880	-	2	98	0	0	0	0	15/29
Gutierrezia sarothrae -- (broom snakeweed)									
2005	820	-	0	95	5	0	0	0	13/23
2012	1060	20	8	93	0	0	0	0	10/18
2016	3400	20	1	99	0	0	0	1	21/37
Mahonia repens -- (creeping barberry)									
2005	9180	-	2	98	1	0	0	0	8/11
2012	6300	-	0	100	0	0	0	1	8/10
2016	11580	-	0	100	0	0	0	0	8/10
Pediocactus simpsonii -- (mountain ball cactus)									
2005	-	-	-	-	-	-	-	-	- / -
2012	-	-	-	-	-	-	-	-	6/10
2016	-	-	-	-	-	-	-	-	- / -
Purshia tridentata^P -- (antelope bitterbrush)									
2005	-	-	-	-	-	-	-	-	- / -
2012	-	-	-	-	-	-	-	-	16/64
2016	-	-	-	-	-	-	-	-	- / -
Rosa woodsii^P -- (Woods' rose)									
2005	180	-	78	22	0	0	22	0	20/12
2012	60	-	0	100	0	33	0	0	30/10
2016	80	-	0	100	0	0	0	0	25/12
Symphoricarpos oreophilus -- (mountain snowberry)									
2005	180	-	0	44	56	0	0	11	42/79
2012	140	-	14	43	43	29	14	43	37/47
2016	140	-	0	100	0	0	14	0	32/46
Tetradymia canescens -- (spineless horsebrush)									
2005	220	-	0	73	27	0	0	9	25/53
2012	140	-	0	100	0	0	0	0	22/35
2016	160	-	13	75	13	0	0	38	28/46

t - Tree Species; p - Preferred Browse; i - Introduced Species

SOUTH OF BROONS CANYON - STUDY NO. 18A-27

**Location Information**

USGS 7.5 min Map Info
GPS (0' Stake)

Salt Mountain NE; Township 3S, Range 7W, Section 05
NAD 83 UTM ZONE 12, 359359 East 4494035 North

Transect Information

Browse Tag # (0' Stake)	Not available
Transect Bearing	178° 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 I-80, proceed south on Skull Valley Road for 11 miles. Turn east of a dirt road (between mile posts 25 and 26) and continue along this road for 2.4 miles to Delle Ranch. From the creek crossing on the road at Delle Ranch, proceed north towards Broons Canyon for 0.2 miles to an intersection. Go east for 0.5 miles to another intersection. Turn left and go north for 0.65 miles until you reach a rock outcropping on the right-hand side of the road and the location of study 18A-23. Continue 0.6 miles to a fork and go right (east). Continue approximately 0.5 miles to the USFS boundary fence. From the fence, go 0.4 miles to a witness post on the right side of the road. From this short fencepost, travel 13 paces south to the 0-foot baseline stake. The 400-foot stake has multiple stakes in the vicinity; the baseline should be based off of the one that is shorter and bent over.

Site Information

Land Ownership	Federal
Land Administrator	USFS
Allotment	SKULL VALLEY NORTH
Elevation	5,800ft (1,768m)
Aspect	West
Slope	18%
Sample Dates	07/22/1997, 07/31/2002, 06/04/2007, 06/11/2012, 07/19/2016

Table 18A-27.1 Disturbance History. Recorded history of major disturbances.

Treatment/Disturbance	Name	WRI DB#	Date	Size (acres)
Fire - Prescribed Fire	Stansbury juniper prescribed burn and mechanical treatment	727	September 2007	80
Fire - Wildfire	Big Pole	-	August 2009	44470

Wildlife Habitat and Vegetation History

Table 18A-27.3 - Wildlife Seasonal Habitat. UDWR wildlife habitat and seasonality.

Species	Habitat	Season
California Bighorn	substantial	year-long
Deer	crucial	winter/spring
Elk	substantial	spring/fall

Table 18A-27.4 - Vegetation History. The dominant vegetation type(s) and phase of woodland succession (Tausch, Miller, Roundy, & Chambers, 2009).

Year	Vegetation Type	Woodland Succession
1983	Bitterbrush	Phase I
1989	Bitterbrush	Phase I
1997	Bitterbrush/Annual Grass	Phase I
2002	Bitterbrush/Annual Grass	Phase I
2007	Bitterbrush/Annual Grass	Phase I
2012	Annual Grass	No Encroachment
2016	Annual Grass	No Encroachment

Site Notes

The study lies on land administered by the U.S. Forest Service just above the enclosure located in Round Canyon. The area was an antelope bitterbrush (*Purshia tridentata*) community with interspersed mountain big sagebrush (*Artemisia tridentata* ssp. *vaseyana*) at study establishment. The site was treated as part of the Stansbury juniper prescribed burn and mechanical treatment project in the fall of 2007 following the site being read that year. The whole area then burned as part of the Big Pole wildfire in 2009, which burned 44,470 acres. The wildfire removed all of the shrub species from the site.

Soils

Table 18A-27.5 - Soil Analysis Data. List of chemical and textural soil characteristics determined by laboratory analysis.

Texture	pH	%sand	%silt	%clay	%OM	PPM P	PPM K	ds/m	Sample Date
Sandy Clay Loam	6.7	50.0	27.4	22.6	3.6	16.8	275.2	0.4	07/22/1997

Site Potential

1981-2010 Average Annual Precipitation	17 inches
NRCS Ecological Site	Mountain Stony Loam (Antelope Bitterbrush)
NRCS Ecological Site #	R028AY456UT
States and Transitions	No state and transition model is available for this ecological site.

From study establishment in 1983 through 2007, this site was dominated by a dense stand of antelope bitterbrush (*Purshia tridentata*) with mountain big sagebrush (*Artemisia tridentata* ssp. *vaseyana*) to a lesser extent. Utah juniper (*Juniperus osteosperma*) was scattered throughout the site, placing it in Phase I of woodland succession. In 2009, this overstory shrub and tree component was completely removed by a wildfire (Table 18A-27.12). The herbaceous understory has remained dominated by the invasive annual grass species cheatgrass (*Bromus tectorum*) since 1997; but due to differences in sampling methodologies, annual grasses were not recorded in 1983 or 1992, but photos show that they may have been present in these sample years (Table 18A-27.10). Forbs have been diverse throughout the study years and cover has fluctuated, but they have generally been composed of annual and weedy species (Table 18A-27.11). The large amounts of cheatgrass threaten the resiliency of the site and increase fuel loads, exacerbating the risk of catastrophic fire.

Trend Summary Tables

Table 18A-27.6 - Shrub/Tree Summary. Average modified Daubenmire quadrat and line intercept cover by year for shrubs/trees.

Year	Quadrat Cover (%)			Line-intercept Cover (%)		
	Preferred Shrub	Other Shrub	Tree	Preferred Shrub	Other Shrub	Tree
1997	36.4	0.8	0.0	-	-	-
2002	45.8	0.5	1.0	54.6	0.3	0.2
2007	31.2	0.4	0.8	48.7	-	1.8
2012	-	-	-	-	-	-
2016	-	0.1	-	-	-	-

Table 18A-27.7 - Herbaceous Summary. Nested frequency and average modified Daubenmire quadrat cover by year for herbaceous functional groups.

Year	Nested Frequency				Quadrat Cover (%)			
	Annual Grass	Perennial Grass	Annual/Biennial Forb	Perennial Forb	Annual Grass	Perennial Grass	Annual/Biennial Forb	Perennial Forb
1997	408	254	202	193	10.8	8.2	1.9	5.9
2002	409	78	80	104	25.2	1.7	0.4	2.6
2007	420	173	362	264	15.9	6.2	11.4	14.5
2012	466	95	439	99	39.4	3.3	15.2	2.8
2016	422	125	368	28	31.4	4.1	23.2	0.3

Table 18A-27.8 - Basic Ground Cover. Average modified Daubenmire quadrat cover by year for basic ground cover types.

Year	Cover Type (%)					
	Bare Ground	Cryptograms	Litter	Pavement	Rock	Vegetation
1997	3.7	1.2	61.8	1.6	7.9	56.4
2002	4.0	1.0	48.8	0.6	8.0	66.8
2007	4.5	1.4	34.8	1.2	10.6	68.4
2012	4.5	0.0	44.1	1.2	17.9	54.1
2016	8.8	0.2	22.3	5.7	12.5	55.5

Table 18A-27.9 - Pellet Group Data. Quadrat frequency and pellet group transect data for animal pellets. Rabbit pellet groups are not sampled in the pellet group transect.

Year	Cattle	Mule Deer	Elk	Rabbit
	Quadrat Frequency			
1997	1	27	1	35
2002	-	24	-	36
2007	-	17	8	32
2012	-	-	-	1
2016	6	2	-	-
Days Use Per Acre (ha)				
1997	-	-	-	-
2002	-	55.6 (137.4)	-	-
2007	-	79.1 (195.3)	0.7 (1.7)	-
2012	-	-	-	-
2016	1.5 (3.6)	0.7 (1.7)	-	-

Table 18A-27.10 - Grass Species. Nested frequency and modified Daubenmire average cover by year.

GRASS SPECIES	Bromus tectorum ^{ai} (cheatgrass)	Melica bulbosa (oniongrass)	Poa bulbosa ⁱ (bulbous bluegrass)	Poa fendleriana (nuttongrass)	Poa secunda (Sandberg bluegrass)	Pseudoroegneria spicata (bluebunch wheatgrass)
year	Nested Frequency					
1997	408	23	-	5	156	144
2002	409	8	-	5	23	48
2007	420	22	-	1	121	76
2012	466	10	20	6	39	38
2016	422	-	16	3	53	57
year	Average Cover (%)					
1997	10.8	0.3	-	0.0	4.2	3.7
2002	25.2	0.4	-	0.1	0.2	1.0
2007	15.9	0.2	-	0.0	2.6	3.4
2012	39.4	0.2	0.1	0.2	0.8	2.0
2016	31.4	-	0.1	0.0	0.7	3.3

a - Annual; n - Noxious Weed; i - Introduced Species

Table 18A-27.11 - Forb Species. Nested frequency and modified Daubenmire average cover by year.

FORB SPECIES	Agoseris glauca (pale agoseris)	Allium (onion)	Alyssum desertorum ^{ai} (desert madwort)	Astragalus (milkvetch)	Balsamorhiza sagittata (arrowleaf balsamroot)	Calochortus nuttallii (sego lily)	Castilleja linariifolia (Wyoming Indian paintbrush)	Ceratocephala testiculata ^{ai} (curvseed butterwort)	Chenopodium ^a (goosefoot)	Cirsium neomexicanum ^a (New Mexico thistle)	Collinsia parviflora ^a (maiden blue eyed Mary)	Comandra umbellata (bastard toadflax)	Crepis intermedia (limestone hawkbeard)	Descurainia ^a (tansymustard)	Draba ^a (draba)	Epilobium brachycarpum ^a (tall annual willowherb)	Eriogonum racemosum (redroot buckwheat)
year	Nested Frequency																
1997	3	66	44	1	2	5	5	6	5	5	36	0	4	3	-	16	2
2002	-	27	32	-	1	-	-	7	-	-	29	-	13	-	-	-	-
2007	10	35	69	4	0	2	-	56	-	1	70	5	11	59	5	-	1
2012	1	11	282	-	-	-	-	1	-	18	81	2	16	-	3	12	-
2016	-	-	55	-	-	-	-	-	-	26	-	4	12	-	-	4	-
year	Average Cover (%)																
1997	0.0	0.5	0.2	0.0	0.2	0.0	0.0	0.0	0.0	0.2	0.1	0.0	0.1	0.0	-	0.1	0.0
2002	-	0.5	0.1	-	0.0	-	-	0.0	-	-	0.1	-	0.2	-	-	-	-
2007	0.5	0.2	0.5	0.1	0.0	0.0	-	0.2	-	0.0	1.3	0.0	0.2	0.5	0.0	-	0.0
2012	0.0	0.0	2.8	-	-	-	-	0.0	-	1.6	0.6	0.0	0.5	-	0.0	0.0	-
2016	-	-	0.3	-	-	-	-	-	-	1.3	-	0.0	0.2	-	-	0.0	-

a - Annual/Biennial; n - Noxious Weed; i - Introduced Species

FORB SPECIES	Erodium cicutarium ^{ai} (redstem stork's bill)	Galium boreale (northern bedstraw)	Hackelia patens (spotted stickseed)	Helianthus annuus ^a (common sunflower)	Holosteum umbellatum ^{ai} (jagged chickweed)	Lactuca serriola ^{ai} (prickly lettuce)	Lappula occidentalis ^{ai} (flatspine stickseed)	Lithospermum ruderale (western stoneseed)	Lomatium grayi (Gray's biscuitroot)	Lygodesmia (skeletonplant)	Machaeranthera canescens (hoary tansyaster)	Microsteris gracilis ^a (slender phlox)	Phlox hoodii (spiny phlox)	Phlox longifolia (longleaf phlox)	Polygonum douglasii ^a (Douglas' knotweed)	Sisymbrium altissimum ^{ai} (tall tumbled mustard)	Tragopogon dubius ^{ai} (yellow salsify)
year	Nested Frequency																
1997	34	18	93	-	110	11	-	3	19	13	14	11	-	60	2	-	11
2002	5	-	41	-	13	-	-	2	10	-	-	3	-	31	-	2	3
2007	95	176	42	-	323	5	-	4	73	-	-	62	2	35	-	7	-
2012	148	-	-	-	257	97	1	0	19	-	-	45	-	67	-	9	11
2016	319	-	4	6	-	79	-	0	5	-	-	-	-	1	-	-	32
year	Average Cover (%)																
1997	0.3	0.4	3.3	-	0.7	0.1	-	0.6	0.4	0.1	0.0	0.2	-	0.3	0.0	-	0.1
2002	0.0	-	1.2	-	0.1	-	-	0.3	0.1	-	-	0.0	-	0.2	-	0.0	0.0
2007	0.9	8.0	1.5	-	7.5	0.0	-	0.5	3.3	-	-	0.4	0.0	0.3	-	0.0	-
2012	5.5	-	-	-	3.1	0.5	0.0	0.0	1.5	-	-	0.1	-	0.8	-	0.6	0.4
2016	20.6	-	0.0	0.0	-	0.6	-	0.0	0.1	-	-	-	-	0.0	-	-	0.4

a - Annual/Biennial; n - Noxious Weed; i - Introduced Species

FORB SPECIES	Zizadenus paniculatus (foothill deathcamas)
year	Nested Frequency
1997	-
2002	-
2007	-
2012	1
2016	3
year	Average Cover (%)
1997	-
2002	-
2007	-
2012	0.0
2016	0.0

a - Annual/Biennial; n - Noxious Weed; i - Introduced Species

Table 18A-27.12 - Shrub and Tree Species. Average modified Daubenmire quadrat and line intercept cover by year.

SHRUB SPECIES	Line Intercept Cover (%)				
	year				
Artemisia tridentata ssp. vaseyana ^p (mountain big sagebrush)	1997	-	-	-	-
Chrysothamnus viscidiflorus ssp. viscidiflorus (yellow rabbitbrush)	2002	15.2	-	0.3	0.2
Gutierrezia sarothrae (broom snakeweed)	2007	16.7	0	-	1.8
Juniperus osteosperma ^t (Utah juniper)	2012	-	-	-	-
Purshia tridentata ^p (antelope bitterbrush)	2016	-	-	-	-
year	Quadrat Cover (%)				
1997	13.2	0.1	0.7	0.0	23.1
2002	12.5	0.3	0.1	1.0	33.3
2007	11.8	0.0	0.4	0.8	19.4
2012	-	-	-	-	-
2016	-	0.1	-	-	-

t - Tree Species; p - Preferred Browse; i - Introduced

Table 18A-27.13 - Shrub/Tree Characteristics. Population characteristics of shrub/tree species populations including density reproduction (seedlings), age distribution, utilization, vigor and average size (height/crown) of plants.

Year	Density		Age Class Distribution			Utilization		Poor Vigor (%)	Average Height Crown (cm)
	Plants Per Acre		Excluding Seedlings			Moderate (%)	Heavy (%)		
	Excluding Seedlings	Seedling	Young (%)	Mature (%)	Decadent (%)				
Amelanchier utahensis^p -- (Utah serviceberry)									
1997	-	-	-	-	-	-	-	-	-/-
2002	-	-	-	-	-	-	-	-	-/-
2007	-	-	-	-	-	-	-	-	231/287
2012	-	-	-	-	-	-	-	-	-/-
2016	-	-	-	-	-	-	-	-	54/82
Artemisia tridentata ssp. vaseyana^p -- (mountain big sagebrush)									
1997	1700	140	8	78	14	18	0	5	68/94
2002	2220	-	5	82	14	12	0	8	75/96
2007	2000	240	1	64	35	7	0	41	87/125
2012	-	-	-	-	-	-	-	-	-/-
2016	-	-	-	-	-	-	-	-	-/-
Chrysothamnus viscidiflorus ssp. viscidiflorus -- (yellow rabbitbrush)									
1997	100	-	20	80	0	0	0	0	41/73
2002	120	-	0	100	0	0	0	0	43/58
2007	60	-	0	67	33	0	0	0	37/61
2012	-	-	-	-	-	-	-	-	39/80
2016	40	-	0	100	0	0	0	0	59/128
Ericameria nauseosa ssp. nauseosa var. speciosa^p -- (rubber rabbitbrush)									
1997	-	-	-	-	-	-	-	-	-/-
2002	20	-	0	100	0	100	0	0	37/52
2007	20	-	0	0	100	0	0	100	-/-
2012	-	-	-	-	-	-	-	-	59/91
2016	-	-	-	-	-	-	-	-	135/197

Year	Density		Age Class Distribution			Utilization		Poor Vigor (%)	Average Height Crown (cm)
	Plants Per Acre		Excluding Seedlings			Moderate (%)	Heavy (%)		
	Excluding Seedlings	Seedling	Young (%)	Mature (%)	Decadent (%)				
Gutierrezia sarothrae -- (broom snakeweed)									
1997	840	40	12	88	0	0	0	0	32/30
2002	220	-	0	82	18	0	0	0	25/30
2007	20	-	0	100	0	0	0	0	26/41
2012	-	-	-	-	-	-	-	-	-/-
2016	-	-	-	-	-	-	-	-	-/-
Juniperus osteosperma^t -- (Utah juniper)									
1997	-	-	-	-	-	-	-	-	-/-
2002	20	-	0	100	0	0	0	0	-/-
2007	20	-	0	100	0	0	0	0	-/-
2012	-	-	-	-	-	-	-	-	-/-
2016	-	-	-	-	-	-	-	-	-/-
Purshia tridentata^p -- (antelope bitterbrush)									
1997	680	20	3	97	0	15	0	0	134/231
2002	1580	-	1	90	9	56	29	4	137/242
2007	900	40	2	89	9	27	22	9	143/225
2012	-	-	-	-	-	-	-	-	33/45
2016	-	-	-	-	-	-	-	-	45/133

t - Tree Species; p - Preferred Browse; i - Introduced Species

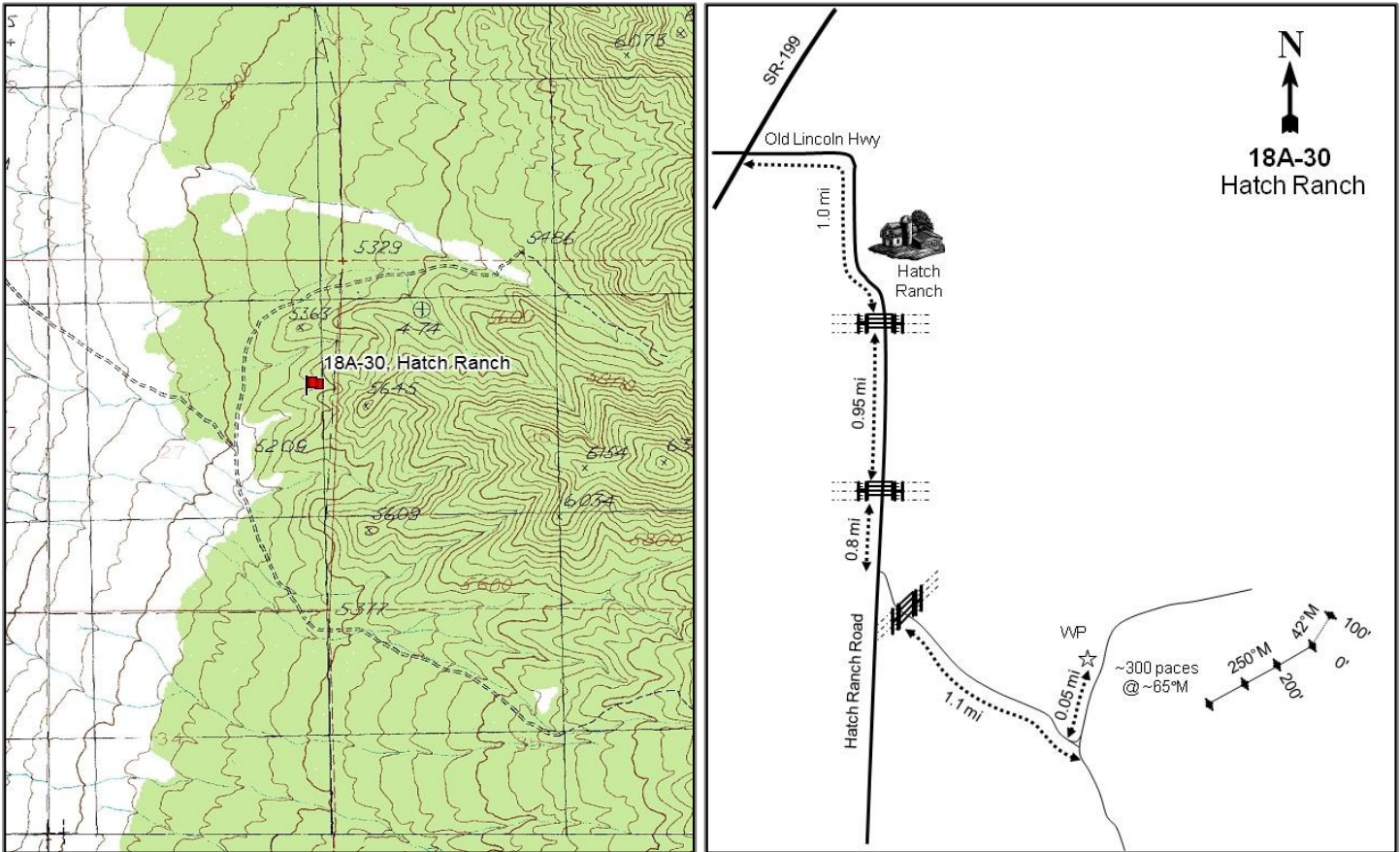
Table 18A-27.14 - Tree Characteristics. Point-quarter tree density, size class distribution, and average diameter.

Year	Density	Size Class Distribution					Average Diameter (cm)
	Trees per Acre	Seedling (%)	1-4'	4-8'	8-12'	>12' (%)	
Juniperus osteosperma (Utah juniper)							
2002	61	-	-	-	-	-	11.6
2007	61	-	-	65	35	-	17.8

Table -18A-27.15 - Deer Desirable Components Index: High Potential Scale.

Year	Preferred Browse Cover	Preferred Browse Decadence	Preferred Browse Young	Perennial Grass Cover	Annual Grass Cover	Perennial Forb Cover	Noxious Weeds	Total Score	Ranking
1997	30.0	13.5	2.4	16.4	-8.1	10.0	0.0	64.1	Fair
2002	30.0	11.9	1.0	3.4	-19.1	5.1	0.0	32.4	Very Poor
2007	30.0	9.4	0.8	12.4	-12.0	10.0	0.0	50.5	Poor
2012	0.0	0.0	0.0	6.4	-20.0	9.0	0.0	-4.6	Very Poor
2016	0	0	0	8	-20	0.6	0	-11.4	Very Poor

HATCH RANCH - STUDY NO. 18A-30

**Location Information**

USGS 7.5 min Map Info
GPS (0' Stake)

Johnson Pass SW; Township 6S, Range 7W, Section 27
NAD 83 UTM ZONE 12, 362869 East 4458762 North

Transect Information

Browse Tag # (0' Stake) 9081
Transect Bearing 42° magnetic (Line 2-4: 250° magnetic)
Length 400ft
Belt Placement Line 1 (11ft & 95ft), Line 2 (34ft), Line 3 (59ft), Line 4 (71ft)
Belt Marker Placement Standard, Belt 2: No Rebar

Directions to Site

Across from the Old Lincoln Road, turn east off of SR-199 onto Hatch Ranch Road. Go east and then south for 1.0 mile to the Hatch Ranch. From the south gate, continue down the valley for 0.95 miles to another gate. Continue 0.8 miles on the main road to a fork that angles southeast through a gate. Take this fork and travel 1.1 miles to a fork at the base of the Onaqui Mountains. Bear left, going just 300 yards to the base of a ridge. From here, walk up the ridge at ~60 degrees magnetic for about 400 yards to the 0-foot baseline stake (which is a short green fencepost marked with browse tag #9081) on the ridge top.

Site Information

Land Ownership	Federal
Land Administrator	BLM
Allotment	ONAQUI MOUNTAIN WEST
Elevation	5,350ft (1,631m)
Aspect	West
Slope	17%
Sample Dates	07/23/1997, 08/01/2002, 08/20/2007, 06/05/2012, 07/21/2016

Table 18A-30.1 Disturbance History. Recorded history of major disturbances.

Treatment/Disturbance	Name	WRI DB#	Date	Size (acres)
Mechanical - Bullhog	Terra East Juniper Thinning-Phase 2	1362	October 2009-February 2010	2190

Wildlife Habitat and Vegetation History

Table 18A-30.3 - Wildlife Seasonal Habitat. UDWR wildlife habitat and seasonality.

Species	Habitat	Season
Deer	crucial	winter/spring

Table 18A-30.4 - Vegetation History. The dominant vegetation type(s) and phase of woodland succession (Tausch, Miller, Roundy, & Chambers, 2009).

Year	Vegetation Type	Woodland Succession
1983	Stansbury Cliffrose-Wyoming Big Sagebrush/Annual Grass	Phase I
1989	Stansbury Cliffrose-Wyoming Big Sagebrush	Phase I
1997	Stansbury Cliffrose-Wyoming Big Sagebrush	Phase I
2002	Stansbury Cliffrose-Wyoming Big Sagebrush	Phase I
2007	Stansbury Cliffrose-Wyoming Big Sagebrush	Phase I
2012	Stansbury Cliffrose-Wyoming Big Sagebrush/Annual Grass	Phase I
2016	Stansbury Cliffrose-Wyoming Big Sagebrush/Annual Grass	Phase I

Site Notes

The study samples crucial deer winter range located at the base of the Onaqui Mountains, approximately three miles southeast of Hatch Ranch in Skull Valley. There was also sign of wild horses in the area in 2002, but not on the study. Stud piles were found down slope from the study, and 10 wild horses were seen on the nearby sagebrush flat.

Soils

Table 18A-30.5 - Soil Analysis Data. List of chemical and textural soil characteristics determined by laboratory analysis.

Texture	pH	%sand	%silt	%clay	%OM	PPM P	PPM K	ds/m	Sample Date
Clay Loam	7.1	35.1	32.7	32.2	2.5	9.5	233.6	0.7	07/22/1997

Site Potential

1981-2010 Average Annual Precipitation	15 inches
NRCS Ecological Site	Upland Gravelly Loam (Wyoming Big Sagebrush)
NRCS Ecological Site #	R028AY307UT
States and Transitions	A defined state and transition model is available.

This site has been dominated by Stansbury cliffrose (*Purshia stansburiana*) with Wyoming big sagebrush (*Artemisia tridentata* ssp. *wyomingensis*) to a lesser extent since establishment in 1983 (Table 18A-30.12): these characteristics place this site in a community phase that is not defined by the current model, but is likely similar to Community Phase 2.1 in the Current Potential state (State 2) (USDA-NRCS, 2007). The herbaceous understory has fluctuated throughout the study years, but has generally remained limited. Annual grasses such as red brome (*Bromus rubens*) and cheatgrass (*B. tectorum*) have been co-dominant site components in 1983, 2012, and 2016 (Table 18A-30.10, Photos). Although cover of Utah juniper (*Juniperus osteosperma*) was reduced by a 2010 bull-hog treatment (Table 18A-30.1), a small amount remains (Table 18A-30.12), indicating that this site has the potential to be encroached in the future.

Trend Summary Tables

Table 18A-30.6 - Shrub/Tree Summary. Average modified Daubenmire quadrat and line intercept cover by year for shrubs/trees.

Year	Quadrat Cover (%)			Line-intercept Cover (%)		
	Preferred Shrub	Other Shrub	Tree	Preferred Shrub	Other Shrub	Tree
1997	12.4	8.1	4.1	-	-	-
2002	15.2	0.4	4.5	18.8	0.1	6.2
2007	13.1	1.1	4.1	23.4	1.2	7.3
2012	14.6	0.6	0.8	19.6	0.6	0.5
2016	12.1	1.0	0.4	27.7	0.9	0.2

Table 18A-30.7 - Herbaceous Summary. Nested frequency and average modified Daubenmire quadrat cover by year for herbaceous functional groups.

Year	Nested Frequency				Quadrat Cover (%)			
	Annual Grass	Perennial Grass	Annual/Biennial Forb	Perennial Forb	Annual Grass	Perennial Grass	Annual/Biennial Forb	Perennial Forb
1997	335	292	179	44	8.0	6.1	0.8	0.5
2002	82	324	11	12	0.5	7.6	0.0	0.4
2007	239	309	262	7	4.3	8.7	1.6	0.2
2012	391	242	61	24	18.4	7.1	0.2	1.1
2016	351	111	220	50	12.2	2.1	3.3	0.4

Table 18A-30.8 - Basic Ground Cover. Average modified Daubenmire quadrat cover by year for basic ground cover types.

Year	Cover Type (%)					
	Bare Ground	Cryptograms	Litter	Pavement	Rock	Vegetation
1997	6.4	17.6	28.4	16.0	16.6	34.5
2002	9.9	22.1	25.6	15.3	19.4	26.9
2007	5.7	13.1	28.9	19.4	19.8	28.6
2012	10.1	6.6	36.8	7.1	15.7	41.2
2016	10.3	7.9	24.2	18.2	18.8	30.8

Table 18A-30.9 - Pellet Group Data. Quadrat frequency and pellet group transect data for animal pellets. Rabbit pellet groups are not sampled in the pellet group transect.

Year	Cattle	Mule Deer	Elk	Rabbit
	Quadrat Frequency			
1997	1	40	-	45
2002	-	8	-	12
2007	-	9	-	64
2012	-	3	-	3
2016	1	4	-	12
Days Use Per Acre (ha)				
1997	-	-	-	-
2002	-	30.8 (76.1)	-	-
2007	-	3.4 (8.3)	-	-
2012	-	2.7 (6.6)	-	-
2016	5.8 (14.3)	13.4 (33.1)	1.3 (3.3)	-

Table 18A-30.10 - Grass Species. Nested frequency and modified Daubenmire average cover by year.

GRASS SPECIES	Achnatherum hymenoides (Indian ricegrass)	Bromus rubens ^{ai} (red brome)	Bromus tectorum ^{ai} (cheatgrass)	Poa bulbosa ⁱ (bulbous bluegrass)	Poa secunda (Sandberg bluegrass)	Pseudoroegneria spicata (bluebunch wheatgrass)	Secale cereale ^{ai} (cereal rye)
year	Nested Frequency						
1997	6	-	335	-	290	26	-
2002	-	-	82	-	321	16	-
2007	3	126	173	-	306	1	-
2012	8	123	328	-	235	14	26
2016	9	193	189	3	95	22	52
year	Average Cover (%)						
1997	0.1	-	8.0	-	5.1	0.9	-
2002	-	-	0.5	-	7.0	0.6	-
2007	0.0	2.1	2.2	-	8.6	0.2	-
2012	0.2	3.6	14.7	-	6.2	0.8	0.1
2016	0.4	5.5	5.7	0.0	0.7	1.0	1.0

a - Annual; n - Noxious Weed; i - Introduced Species

Table 18A-30.11 - Forb Species. Nested frequency and modified Daubenmire average cover by year.

FORB SPECIES	Agoseris glauca (pale agoseris)	Allium (onion)	Alyssum desertorum ^{ai} (desert madwort)	Antennaria (pussytoes)	Arabis (rockcress)	Astragalus utahensis (Utah milkvetch)	Calochortus nuttallii (sego lily)	Ceratocephala testiculata ^{ai} (curvseed butterwort)	Chamaesyce (sandmat)	Cirsium (thistle)	Cryptantha (cryptantha)	Descurainia pinnata ^a (western tansymustard)	Draba ^a (draba)	Erigeron pumilus (shaggy fleabane)	Erodium cicutarium ^{ai} (redstem stork's bill)	Gilia ^a (gilia)	Lactuca serriola ^{ai} (prickly lettuce)
year	Nested Frequency																
1997	3	12	11	4	-	3	1	167	5	1	-	-	-	7	2	-	2
2002	-	-	-	4	-	-	-	11	-	-	-	-	-	-	-	-	-
2007	-	-	11	3	-	-	-	224	-	-	0	22	60	-	11	-	-
2012	3	7	28	-	-	-	3	25	-	-	-	-	4	-	11	-	1
2016	-	28	100	1	5	-	11	52	-	-	-	14	20	-	85	2	2
year	Average Cover (%)																
1997	0.0	0.1	0.0	0.0	-	0.0	0.0	0.7	0.0	0.0	-	-	-	0.0	0.0	-	0.0
2002	-	-	-	0.0	-	-	-	0.0	-	-	-	-	-	-	-	-	-
2007	-	-	0.0	0.0	-	-	-	1.2	-	-	0.0	0.1	0.1	-	0.1	-	-
2012	0.1	0.0	0.1	-	-	-	0.0	0.1	-	-	-	-	0.0	-	0.0	-	0.0
2016	-	0.1	1.5	0.0	0.0	-	0.0	0.2	-	-	-	0.1	0.0	-	1.5	0.0	0.0

a - Annual/Biennial; n - Noxious Weed; i - Introduced Species

FORB SPECIES	Lappula occidentalis ^a (flatspine stickseed)	Microsteris gracilis ^a (slender phlox)	Phlox hoodii (spiny phlox)	Phlox longifolia (longleaf phlox)	Sisymbrium altissimum ^{ai} (tall tumbled mustard)	Townsendia incana (hoary Townsend daisy)
year	Nested Frequency					
1997	-	2	9	1	-	4
2002	-	-	9	-	-	-
2007	8	13	3	-	3	1
2012	-	-	9	-	-	5
2016	-	5	6	-	3	-
year	Average Cover (%)					
1997	-	0.0	0.2	0.0	-	0.1
2002	-	-	0.4	-	-	-
2007	0.0	0.0	0.1	-	0.0	0.0
2012	-	-	0.9	-	-	0.0
2016	-	0.0	0.2	-	0.0	-

a - Annual/Biennial; n - Noxious Weed; i - Introduced Species

Table 18A-30.12 - Shrub and Tree Species. Average modified Daubenmire quadrat and line intercept cover by year.

SHRUB SPECIES	Artemisia tridentata ssp. wyomingensis ^p (Wyoming big sagebrush)	Chrysothamnus viscidiflorus ssp. viscidiflorus var. stenophyllus (yellow rabbitbrush)	Gutierrezia sarothrae (broom snakeweed)	Juniperus osteosperma ⁱ (Utah juniper)	Linanthus pungens (granite prickly phlox)	Pinus monophylla ⁱ (singleleaf pinyon)	Purshia stansburiana ^p (Stansbury cliffrose)	Tetradymia canescens (spineless horsebrush)	Tetradymia nuttallii (Nuttall's horsebrush)
year	Line Intercept Cover (%)								
1997	-	-	-	-	-	-	-	-	-
2002	4.1	0	0	6.2	-	-	14.7	-	0.1
2007	6.2	-	1.2	7.3	-	-	17.2	-	-
2012	6.1	-	0.2	0.5	0.1	-	13.5	-	0.3
2016	7.2	0.1	0.5	0.2	-	-	20.5	-	0.3
year	Quadrat Cover (%)								
1997	3.1	0.1	7.5	4.1	-	-	9.3	0.1	0.4
2002	3.3	0.0	0.3	4.5	0.0	0.0	11.9	-	0.1
2007	4.4	-	0.9	4.1	0.0	-	8.7	-	0.1
2012	6.4	0.0	0.4	0.8	0.0	-	8.2	-	0.1
2016	4.0	0.4	0.5	0.4	0.0	-	8.2	-	0.1

t - Tree Species; p - Preferred Browse; i - Introduced

Table 18A-30.13 - Shrub/Tree Characteristics. Population characteristics of shrub/tree species populations including density reproduction (seedlings), age distribution, utilization, vigor and average size (height/crown) of plants.

Year	Density		Age Class Distribution			Utilization		Poor Vigor (%)	Average Height Crown (cm)
	Plants Per Acre		Excluding Seedlings			Moderate (%)	Heavy (%)		
	Excluding Seedlings	Seedling	Young (%)	Mature (%)	Decadent (%)				
Artemisia tridentata ssp. wyomingensis^P -- (Wyoming big sagebrush)									
1997	960	320	10	73	17	4	0	33	50/74
2002	1260	-	19	59	22	5	3	8	54/79
2007	860	-	0	81	19	21	14	12	63/93
2012	1140	-	12	75	12	7	2	19	60/86
2016	660	-	3	97	0	24	6	0	62/101
Chrysothamnus viscidiflorus ssp. viscidiflorus var. stenophyllus -- (yellow rabbitbrush)									
1997	380	-	5	79	16	0	5	11	25/32
2002	-	-	-	-	-	-	-	-	24/35
2007	20	-	100	0	0	0	0	0	- / -
2012	40	-	0	100	0	0	0	50	21/33
2016	140	-	14	86	0	0	0	29	33/46
Gutierrezia sarothrae -- (broom snakeweed)									
1997	12920	-	14	83	3	0	0	1	23/25
2002	520	-	4	81	15	4	0	15	15/15
2007	2720	40	8	90	2	1	0	7	16/21
2012	360	160	11	78	11	0	0	6	16/20
2016	620	-	0	97	3	0	0	3	25/30
Juniperus osteosperma^t -- (Utah juniper)									
1997	100	20	40	60	0	0	0	0	- / -
2002	100	-	20	80	0	0	0	0	- / -
2007	120	20	33	67	0	0	0	0	- / -
2012	60	-	100	0	0	0	0	0	- / -
2016	60	-	67	33	0	0	0	0	- / -
Linanthus pungens -- (granite prickly phlox)									
1997	60	-	33	67	0	0	0	0	25/67
2002	20	-	0	0	100	0	0	100	- / -
2007	20	-	0	100	0	0	0	0	28/28
2012	80	-	0	100	0	0	0	0	22/20
2016	80	-	0	100	0	0	0	75	25/37
Pinus monophylla^t -- (singleleaf pinyon)									
1997	-	-	-	-	-	-	-	-	- / -
2002	20	-	100	0	0	0	0	0	- / -
2007	-	-	-	-	-	-	-	-	- / -
2012	-	-	-	-	-	-	-	-	- / -
2016	-	-	-	-	-	-	-	-	- / -
Purshia stansburiana^P -- (Stansbury cliffrose)									
1997	780	80	21	67	13	5	3	3	131/143
2002	1200	-	10	83	7	22	48	0	128/134
2007	980	20	6	78	16	31	22	4	140/163
2012	940	180	15	70	15	40	2	13	116/137
2016	860	-	12	74	14	44	9	12	118/133
Sclerocactus -- (fishhook cactus)									
1997	20	-	0	100	0	0	0	0	13/25
2002	40	-	0	50	50	0	0	0	19/30
2007	20	-	0	100	0	0	0	0	5/31
2012	-	-	-	-	-	-	-	-	12/29
2016	20	-	0	100	0	0	0	0	22/36
Tetradymia canescens -- (spineless horsebrush)									
1997	60	-	0	100	0	0	0	100	43/56
2002	40	-	0	0	100	0	0	50	51/72
2007	-	-	-	-	-	-	-	-	- / -
2012	-	-	-	-	-	-	-	-	63/117
2016	-	-	-	-	-	-	-	-	- / -

Year	Density		Age Class Distribution			Utilization		Poor Vigor (%)	Average Height Crown (cm)
	Plants Per Acre		Excluding Seedlings			Moderate (%)	Heavy (%)		
	Excluding Seedlings	Seedling	Young (%)	Mature (%)	Decadent (%)				
Tetradymia nuttallii -- (Nuttall's horsebrush)									
1997	580	-	7	10	83	0	0	35	42/55
2002	280	-	0	29	71	0	0	57	54/83
2007	80	-	0	25	75	25	0	75	46/67
2012	80	-	0	100	0	0	0	50	46/63
2016	40	-	0	50	50	0	0	50	50/73

t - Tree Species; p - Preferred Browse; i - Introduced Species

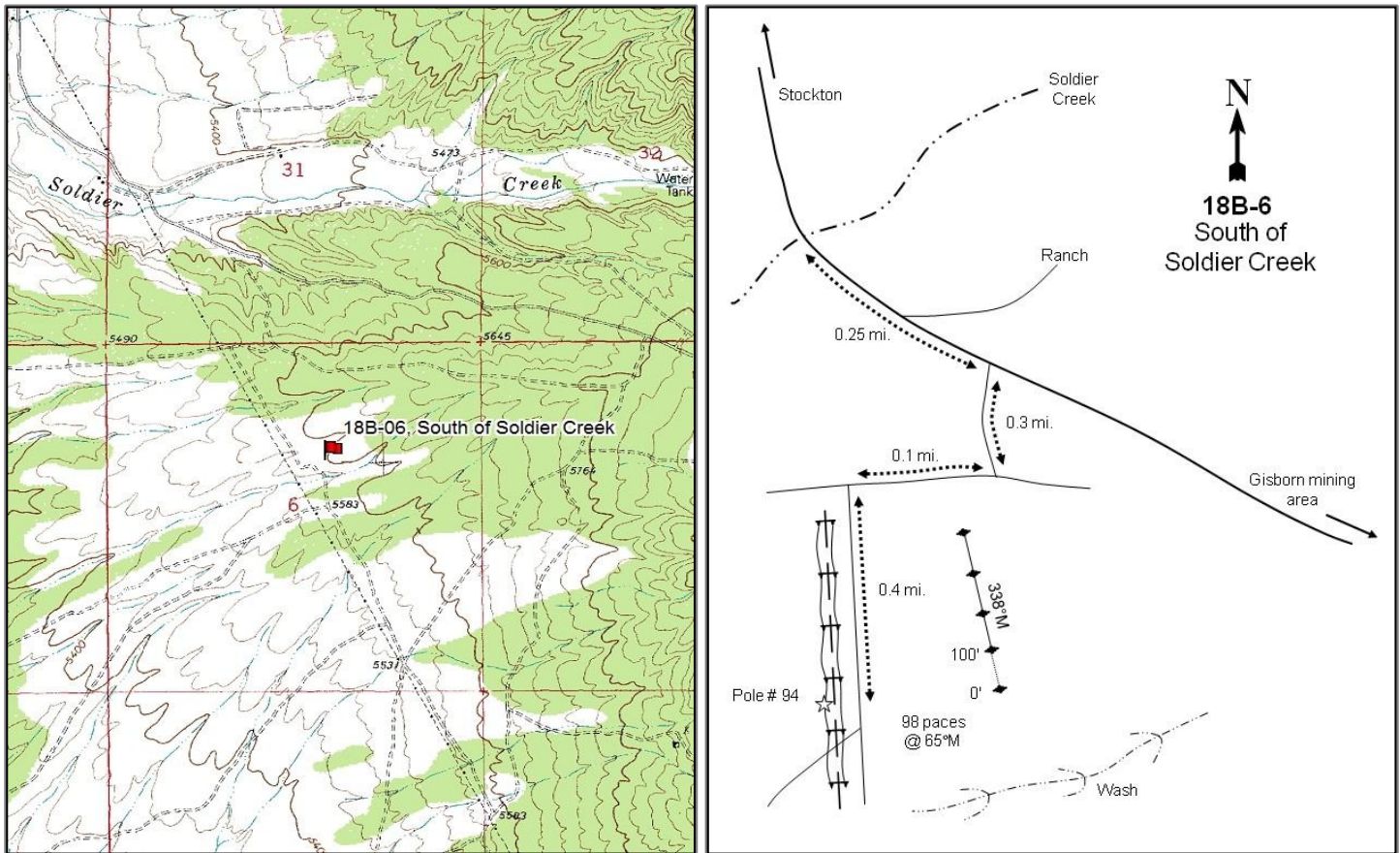
Table 18A-30.14 - Tree Characteristics. Point-quarter tree density, size class distribution, and average diameter.

Year	Density	Size Class Distribution					Average Diameter (cm)
	Trees per Acre	Seedling (%)	1-4'	4-8'	8-12'	>12' (%)	
Juniperus osteosperma (Utah juniper)							
2002	104	-	-	-	-	-	13.4
2007	102	-	24	24	24	29	14.9
2012	80	31	63	-	6	-	6.3
2016	102	22	67	6	6	-	10.7

Table -18A-30.15 - Deer Desirable Components Index: Mid Potential Scale.

Year	Preferred Browse Cover	Preferred Browse Decadence	Preferred Browse Young	Perennial Grass Cover	Annual Grass Cover	Perennial Forb Cover	Noxious Weeds	Total Score	Ranking
1997	17.9	10.8	9.1	12.2	-6.1	0.9	0.0	44.8	Poor
2002	22.2	11.9	6.0	15.2	-0.3	0.7	0.0	55.6	Fair
2007	18.7	9.9	2.0	17.5	-3.3	0.3	0.0	45.1	Poor
2012	17.8	11.0	6.8	14.3	-13.9	2.2	0.0	38.1	Poor
2016	17.3	12.2	4.5	4.2	-9.2	0.8	0.0	29.9	Very Poor

SOUTH OF SOLDIER CANYON - STUDY NO. 18B-6

**Location Information**

USGS 7.5 min Map Info
GPS (0' Stake)

Stockton SW; Township 5S, Range 4W, Section 06
NAD 83 UTM ZONE 12, 386565 East 4474868 North

Transect Information

Browse Tag # (0' Stake)	Not Available
Transect Bearing	338° 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

Heading north on SR-36 in Stockton, turn east on East Silver Avenue. Follow this road through town as it turns to the south and becomes Soldier Canyon Road. Proceed south on this road until it crosses over Soldier Creek. Go 0.25 miles past the creek and turn right (south) on a road that goes up on the bench to the south. Travel on this road for 0.3 miles to an intersection at the top of the hill. Turn right (west) and travel 0.1 miles to another intersection. Turn left (south) and travel 0.4 miles to where there is a double power pole on the west side of the road. From the power pole marked with #94, walk 98 paces at 65 degrees magnetic to the 0-foot stake.

Site Information

Land Ownership	Federal
Land Administrator	BLM
Allotment	MERCUR CAN-W. OPHIR
Elevation	5,600ft (1,707m)
Aspect	Southwest
Slope	6%
Sample Dates	06/17/1997, 06/06/2002, 06/07/2007, 06/05/2012, 07/18/2016

Table 18B-06.1 Disturbance History. Recorded history of major disturbances.

Treatment/Disturbance	Name	WRI DB#	Date	Size (acres)
Chaining - Unknown	-	-	Historic	-
Seeding - Unknown	-	-	Historic	-
Mechanical - Bullhog	Stockton Bullhog	1929	Spring 2012	1561
Seeding - Transplant	Stockton Bullhog	1929	April 2012	-

Wildlife Habitat and Vegetation History

Table 18B-06.3 - Wildlife Seasonal Habitat. UDWR wildlife habitat and seasonality.

Species	Habitat	Season	Brood/Young Rearing
Deer	crucial	winter	
Elk	crucial	winter	
Greater Sage Grouse	Crucial	occupied & Winter	brood-rearing

Table 18B-06.4 - Vegetation History. The dominant vegetation type(s) and phase of woodland succession (Tausch, Miller, Roundy, & Chambers, 2009).

Year	Vegetation Type	Woodland Succession
1983	Mountain Big Sagebrush/Perennial Grass	Phase I
1989	Mountain Big Sagebrush/Perennial Grass	Phase I
1997	Mountain Big Sagebrush/Perennial Grass	Phase I
2002	Mountain Big Sagebrush/Perennial Grass	Phase I
2007	Mountain Big Sagebrush/Perennial Grass	Phase I
2012	Mountain Big Sagebrush/Perennial Grass	Phase I
2016	Mountain Big Sagebrush/Perennial Grass	Phase I

Site Notes

This study is located south of Soldier Creek and samples crucial deer winter range that was formerly populated by a dense stand of Utah juniper (*Juniperus osteosperma*) and singleleaf pinyon pine (*Pinus monophylla*) trees.

Soils

Table 18B-06.5 - Soil Analysis Data. List of chemical and textural soil characteristics determined by laboratory analysis.

Texture	pH	%sand	%silt	%clay	%OM	PPM P	PPM K	ds/m	Sample Date
Clay Loam	7.5	36.0	34.4	29.6	3.2	5.6	284.8	0.6	06/17/1997

Site Potential

1981-2010 Average Annual Precipitation	17 inches
NRCS Ecological Site	Upland Loam (Mountain Big Sagebrush)
NRCS Ecological Site #	R028AY310UT
States and Transitions	No state and transition model is available for this ecological site.

Since study establishment in 1983, the shrub overstory of this site has been dominated by mountain big sagebrush (*Artemisia tridentata* ssp. *vaseyana*). Utah juniper (*Juniperus osteosperma*) was a notable component of the overstory throughout the study years, but a bull-hog treatment prior to the 2012 sampling eliminated most of the trees (Table 18B-06.12, Photos). Perennial grasses such as crested wheatgrass (*Agropyron cristatum*) and bluebunch wheatgrass (*Pseudoroegneria spicata*) contribute a majority of the herbaceous cover and have co-dominated the site in all study years. The invasive annual grass cheatgrass (*Bromus tectorum*) has been present in multiple sample years, but in low amounts (Table 18B-06.7, Table 18B-06.10). Although density is low, singleleaf pinyon (*Pinus monophylla*) has been observed in both sample years following the bull-hog treatment (Table 18B-06.13), indicating that this site has the potential for infilling in the future.

Trend Summary Tables

Table 18B-06.6 - Shrub/Tree Summary. Average modified Daubenmire quadrat and line intercept cover by year for shrubs/trees.

Year	Quadrat Cover (%)			Line-intercept Cover (%)		
	Preferred Shrub	Other Shrub	Tree	Preferred Shrub	Other Shrub	Tree
1997	2.3	3.2	4.1	-	-	-
2002	1.9	2.9	6.6	-	-	0.5
2007	2.8	2.4	6.3	2.1	1.7	7.2
2012	0.9	2.8	-	1.4	3.3	-
2016	1.8	2.5	-	4.6	2.7	-

Table 18B-06.7 - Herbaceous Summary. Nested frequency and average modified Daubenmire quadrat cover by year for herbaceous functional groups.

Year	Nested Frequency				Quadrat Cover (%)			
	Annual Grass	Perennial Grass	Annual/Biennial Forb	Perennial Forb	Annual Grass	Perennial Grass	Annual/Biennial Forb	Perennial Forb
1997	96	306	215	165	3.1	12.3	1.5	4.9
2002	73	297	209	175	1.8	14.6	0.8	4.9
2007	137	343	369	169	1.6	18.4	5.3	6.9
2012	55	285	111	148	0.2	17.4	0.4	3.7
2016	58	336	235	199	2.3	25.1	2.2	9.1

Table 18B-06.8 - Basic Ground Cover. Average modified Daubenmire quadrat cover by year for basic ground cover types.

Year	Cover Type (%)					
	Bare Ground	Cryptograms	Litter	Pavement	Rock	Vegetation
1997	13.6	7.6	31.0	16.9	2.0	29.0
2002	19.2	13.0	30.4	20.7	2.8	33.9
2007	24.8	10.4	25.8	16.2	1.8	37.5
2012	23.5	4.2	44.0	10.2	2.1	22.8
2016	14.6	3.9	37.3	18.8	1.4	40.9

Table 18B-06.9 - Pellet Group Data. Quadrat frequency and pellet group transect data for animal pellets. Rabbit pellet groups are not sampled in the pellet group transect.

Year	Cattle	Mule Deer	Elk	Rabbit
	Quadrat Frequency			
1997	-	19	1	29
2002	-	8	4	29
2007	-	6	6	54
2012	-	2	-	10
2016	-	4	1	16
Days Use Per Acre (ha)				
1997	-	-	-	-
2002	-	4.0 (9.9)	4.7 (11.6)	-
2007	1.5 (3.6)	53.0 (130.8)	28.8 (71.2)	-
2012	-	2.0 (5.0)	-	-
2016	-	0.7 (1.7)	-	-

Table 18B-06.10 - Grass Species. Nested frequency and modified Daubenmire average cover by year.

GRASS SPECIES	Achnatherum hymenoides (Indian ricegrass)	Agropyron cristatum ⁱ (crested wheatgrass)	Bromus tectorum ^{ai} (cheatgrass)	Elymus elymoides (squirreltail)	Poa secunda (Sandberg bluegrass)	Pseudoroegneria spicata (bluebunch wheatgrass)
year	Nested Frequency					
1997	9	178	96	-	145	76
2002	13	157	73	-	160	65
2007	5	139	137	-	229	104
2012	3	124	55	-	161	80
2016	8	177	58	12	107	154
year	Average Cover (%)					
1997	0.2	6.6	3.1	-	2.2	3.3
2002	0.3	7.0	1.8	-	2.8	4.4
2007	0.2	5.6	1.6	-	6.1	6.6
2012	0.0	8.6	0.2	-	4.3	4.4
2016	0.7	13.1	2.3	0.1	1.3	9.9

a - Annual; n - Noxious Weed; i - Introduced Species

Table 18B-06.11 - Forb Species. Nested frequency and modified Daubenmire average cover by year.

FORB SPECIES	Allium (onion)	Alyssum desertorum ^{ai} (desert madwort)	Antennaria (pussytoes)	Arabis (rockcress)	Astragalus (milkvetch)	Astragalus beckwithii (Beckwith's milkvetch)	Astragalus tenellus (looseflower milkvetch)	Astragalus utahensis (Utah milkvetch)	Calochortus nuttallii (sego lily)	Camelina microcapa ^{ai} (littelpod false flax)	Castilleja linariifolia (Wyoming Indian paintbrush)	Ceratocephala testiculata ^{ai} (curvseed butterwort)	Chaetopappa ericoides (rose heath)	Cirsium (thistle)	Erigeron pumilus (shaggy fleabane)	Eriogonum ovalifolium (cushion buckwheat)	Erodium cicutarium ^{ai} (redstem stork's bill)
year	Nested Frequency																
1997	-	-	1	4	6	13	15	-	6	3	-	212	-	-	1	-	6
2002	1	23	-	-	3	-	-	3	3	-	-	187	-	1	-	-	-
2007	-	78	-	2	-	13	-	-	6	-	1	311	1	-	-	1	25
2012	-	102	1	3	1	9	2	2	-	-	-	13	-	-	-	-	-
2016	-	188	1	-	7	22	1	5	11	-	-	99	-	3	-	-	-
year	Average Cover (%)																
1997	-	-	0.0	0.0	0.0	0.3	0.4	-	0.0	0.0	-	1.4	-	-	0.0	-	0.0
2002	0.0	0.2	-	-	0.0	-	-	0.0	0.0	-	-	0.6	-	0.0	-	-	-
2007	-	1.4	-	0.0	-	0.1	-	-	0.0	-	0.0	3.5	0.0	-	-	0.0	0.2
2012	-	0.2	0.0	0.0	0.0	0.1	0.0	0.0	-	-	-	0.0	-	-	-	-	-
2016	-	1.6	0.0	-	0.0	0.7	0.0	0.0	0.0	-	-	0.6	-	0.1	-	-	-

a - Annual/Biennial; n - Noxious Weed; i - Introduced Species

FORB SPECIES	Gilia ^a (gilia)	Holosteum umbellatum ^{ai} (jagged chickweed)	Lactuca scariola ^{ai} (prickly lettuce)	Lathyrus brachycalyx (Bonnevillie pea)	Petroradia pumila (rock goldenrod)	Phlox hoodii (spiny phlox)	Phlox longifolia (longleaf phlox)	Salsola tragus ^{ai} (prickly Russian thistle)	Sanguisorba minor ⁱ (small burnet)	Sisymbrium altissimum ^{ai} (tall tumbleweed)
year	Nested Frequency									
1997	-	-	-	22	58	71	15	-	-	3
2002	1	-	-	57	57	70	10	-	-	-
2007	1	27	-	59	51	62	13	-	-	6
2012	-	-	-	74	2	49	8	2	4	-
2016	-	2	1	89	51	46	9	-	-	-
year	Average Cover (%)									
1997	-	-	-	1.0	2.1	1.0	0.0	-	-	0.0
2002	0.0	-	-	2.1	1.7	0.9	0.1	-	-	-
2007	0.0	0.1	-	2.7	2.3	1.7	0.1	-	-	0.1
2012	-	-	-	2.5	0.1	0.9	0.1	0.1	0.0	-
2016	-	0.0	0.0	4.0	2.9	1.3	0.0	-	-	-

a - Annual/Biennial; n - Noxious Weed; i - Introduced Species

Table 18B-06.12 - Shrub and Tree Species. Average modified Daubenmire quadrat and line intercept cover by year.

SHRUB SPECIES	Artemisia tridentata ssp. vaseyana ^p (mountain big sagebrush)	Chrysothamnus viscidiflorus ssp. viscidiflorus var. stenophyllus (yellow rabbitbrush)	Ericameria nauseosa ssp. nauseosa var. speciosa ^p (rubber rabbitbrush)	Gutierrezia sarothrae (broom snakeweed)	Juniperus osteosperma ^t (Utah juniper)	Opuntia (pricklypear)	Pinus monophylla ^t (singleleaf pinyon)
year	Line Intercept Cover (%)						
1997	-	-	-	-	-	-	-
2002	-	-	-	-	0.5	-	-
2007	2.1	1.7	-	-	7.2	-	-
2012	1.4	2.1	-	1.2	-	-	-
2016	4.6	2.7	-	-	-	-	-
year	Quadrat Cover (%)						
1997	2.3	2.7	-	0.4	3.8	0.1	0.4
2002	1.9	2.3	-	0.4	6.0	0.1	0.5
2007	2.8	2.4	-	0.0	6.3	0.0	-
2012	0.9	1.7	-	1.0	-	-	-
2016	1.8	2.5	0.0	-	-	-	-

t - Tree Species; p - Preferred Browse; i - Introduced

Table 18B-06.13 - Shrub/Tree Characteristics. Population characteristics of shrub/tree species populations including density reproduction (seedlings), age distribution, utilization, vigor and average size (height/crown) of plants.

Year	Density		Age Class Distribution			Utilization		Poor Vigor (%)	Average Height Crown (cm)
	Plants Per Acre		Excluding Seedlings			Moderate (%)	Heavy (%)		
	Excluding Seedlings	Seedling	Young (%)	Mature (%)	Decadent (%)				
<i>Artemisia tridentata</i> ssp. <i>vaseyana</i> ^P -- (mountain big sagebrush)									
1997	680	-	24	68	9	18	3	3	53/78
2002	880	-	2	64	34	30	27	21	49/74
2007	920	-	4	76	20	52	2	13	45/64
2012	560	-	11	61	29	46	11	0	44/69
2016	760	-	11	71	18	8	24	16	48/77
<i>Chrysothamnus viscidiflorus</i> ssp. <i>viscidiflorus</i> var. <i>stenophyllus</i> -- (yellow rabbitbrush)									
1997	3220	-	6	73	21	0	0	16	24/39
2002	2660	-	3	70	27	5	1	10	19/31
2007	2540	-	1	79	21	34	6	13	21/34
2012	1240	-	0	86	14	2	0	3	22/34
2016	1600	-	3	89	9	3	3	11	26/41
<i>Ericameria nauseosa</i> ssp. <i>nauseosa</i> var. <i>speciosa</i> ^P -- (rubber rabbitbrush)									
1997	-	-	-	-	-	-	-	-	-/-
2002	-	-	-	-	-	-	-	-	-/-
2007	-	-	-	-	-	-	-	-	-/-
2012	-	-	-	-	-	-	-	-	-/-
2016	20	-	100	0	0	100	0	0	27/31
<i>Gutierrezia sarothrae</i> -- (broom snakeweed)									
1997	780	200	18	82	0	0	0	0	18/19
2002	780	-	0	80	21	0	0	0	12/20
2007	80	-	0	100	0	0	0	0	16/21
2012	2220	-	19	81	0	0	0	0	10/16
2016	-	-	-	-	-	-	-	-	28/37
<i>Juniperus osteosperma</i> ^t -- (Utah juniper)									
1997	100	-	0	100	0	0	0	0	-/-
2002	180	-	0	100	0	0	0	0	-/-
2007	140	-	0	100	0	14	0	0	-/-
2012	-	-	-	-	-	-	-	-	-/-
2016	-	-	-	-	-	-	-	-	-/-
<i>Opuntia</i> -- (pricklypear)									
1997	120	-	0	100	0	0	0	0	13/42
2002	100	-	0	80	20	0	0	20	12/38
2007	40	-	0	100	0	0	0	0	14/33
2012	-	-	-	-	-	-	-	-	17/41
2016	40	-	0	100	0	0	0	0	14/27
<i>Pinus monophylla</i> ^t -- (singleleaf pinyon)									
1997	20	-	0	100	0	0	0	0	-/-
2002	20	-	0	100	0	0	0	0	-/-
2007	-	-	-	-	-	-	-	-	-/-
2012	-	20	0	0	0	0	0	0	-/-
2016	20	-	100	0	0	0	0	0	-/-

t - Tree Species; p - Preferred Browse; i - Introduced Species

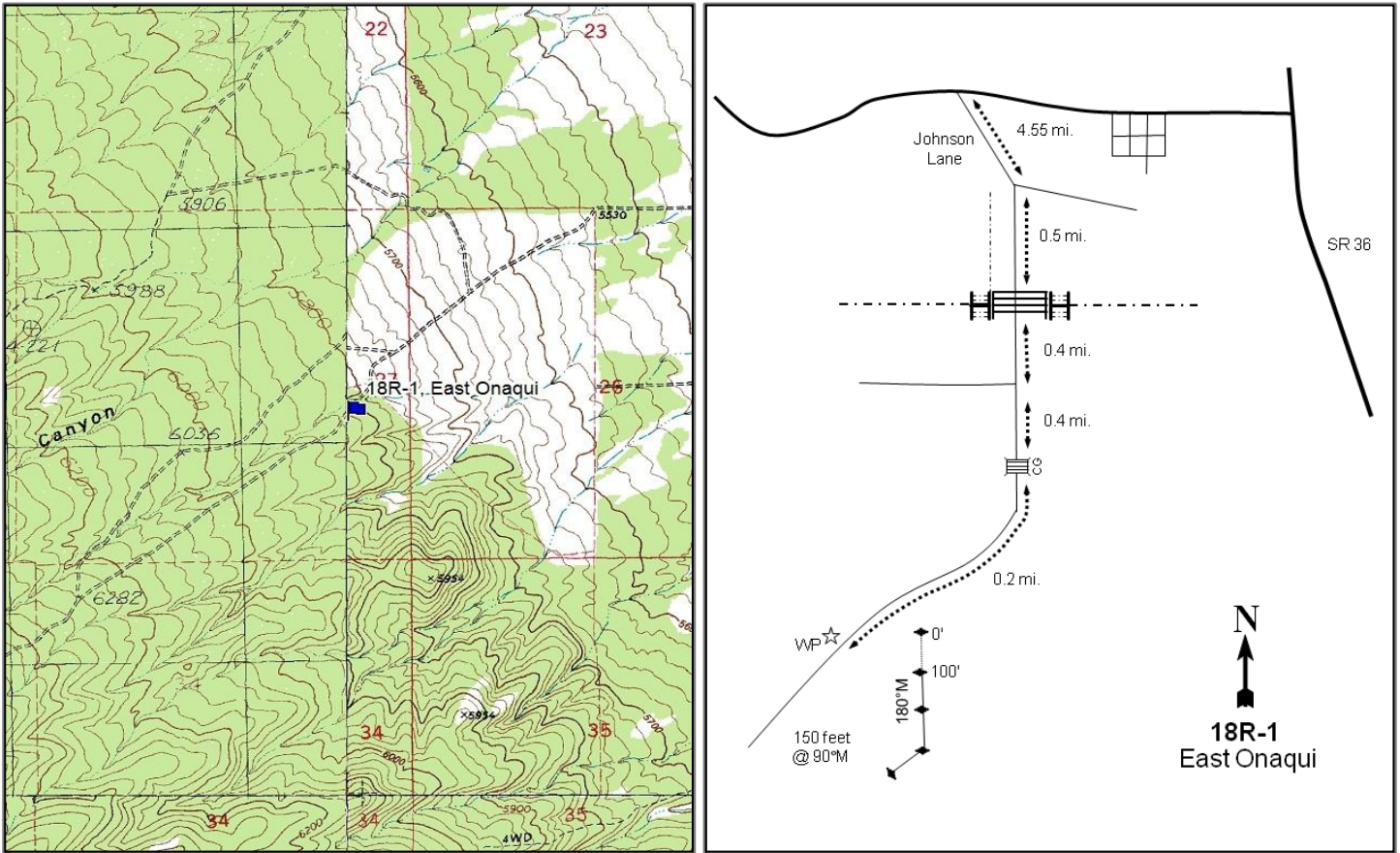
Table 18B-06.14 - Tree Characteristics. Point-quarter tree density, size class distribution, and average diameter.

Year	Density	Size Class Distribution					Average Diameter (cm)
	Trees per Acre	Seedling (%)	1-4'	4-8'	8-12'	>12' (%)	
Juniperus osteosperma (Utah juniper)							
1997	45	-	-	-	-	-	9.8
2002	85	-	-	-	-	-	11.7
2007	100	6	17	61	17	-	21.7
2012	10	-	100	-	-	-	2.5
2016	19	70	30	-	-	-	2.2
Pinus monophylla (singleleaf pinyon)							
2012	3	-	100	-	-	-	4.0
2016	7	50	50	-	-	-	3.5

Table -18B-06.15 - Deer Desirable Components Index: Mid Potential Scale.

Year	Preferred Browse Cover	Preferred Browse Decadence	Preferred Browse Young	Perennial Grass Cover	Annual Grass Cover	Perennial Forb Cover	Noxious Weeds	Total Score	Ranking
1997	2.9	0.0	0.0	24.8	-2.4	9.8	0.0	35.0	Very Poor-Poor
2002	2.4	0.0	0.0	29.4	-1.3	9.7	0.0	40.2	Poor
2007	3.5	0.0	0.0	30.0	-1.2	10.0	0.0	42.3	Poor
2012	1.2	0.0	0.0	30.0	-0.1	7.4	0.0	38.5	Poor
2016	2.3	0.0	0.0	30.0	-1.7	10.0	0.0	40.5	Poor

EAST ONAQUI - STUDY NO. 18R-1



Location Information

USGS 7.5 min Map Info	Johnson Pass SE; Township 6S, Range 6W, Section 27
GPS (0' Stake)	NAD 83 UTM ZONE 12, 372402 East 4458305 North

Transect Information

Browse Tag # (0' Stake)	148
Transect Bearing	180° magnetic (Line 4: ?° 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 State Route 36, turn west onto State Route 199 heading toward Clover. Turn south on Johnson Lane in Clover. Travel 4.55 miles to a fork and stay right. Drive for 0.5 miles to a gate and continue 0.8 miles to a cattleguard. Proceed for 0.2 miles to a witness post on the right side of the road. The 0-foot stake is about 150 feet from the witness post at 90 degrees magnetic and is marked with browse tag #148.

Site Information

Land Ownership	Federal
Land Administrator	BLM
Allotment	ONAQUI MOUNTAIN EAST
Elevation	5,820ft (1,774m)
Aspect	Northeast
Slope	5-7%
Sample Dates	09/02/2004, 07/11/2013, 07/19/2016

Table 18R-01.1 Disturbance History. Recorded history of major disturbances.

Treatment/Disturbance	Name	WRI DB#	Date	Size (acres)
Seeding - Aerial Before	East Onaqui Juniper Thinning and Seeding - Year 1	353	2007	332
Mechanical - Bullhog	East Onaqui Juniper Thinning and Seeding - Year 1	353	2007	418

Table 18R-01.2 Seed Mix. List of known seeded plant species and rates (if available).

Mix Name		Application Type	Application Date	Acres	
East Onaqui Juniper Thinning and Seeding		Aerial	Aug 2007	332	
Type	Species	Common Name	Cultivar/Source ID	Bulk lbs/acre	PLS lbs/acre
G	Agropyron cristatum	Crested Wheatgrass	Ephraim	0.81	0.73
G	Agropyron cristatum	Crested Wheatgrass	Hycrest	0.97	0.89
G	Agropyron fragile	Siberian Wheatgrass	Vavilov	0.91	0.78
G	Dactylis glomerata	Orchardgrass	Paiute	0.35	0.27
G	Elymus wawawaiensis	Snake River Wheatgrass	Secar	0.49	0.39
G	Pascopyrum smithii	Western Wheatgrass	Arriba	0.74	0.60
G	Poa secunda	Canby Bluegrass	Canbar	0.54	0.48
G	Psathyrostachys juncea	Russian Wildrye	Bozoisky	0.84	0.68
G	Pseudoroegneria spicata	Bluebunch Wheatgrass	Anatone	0.64	0.55
G	Pseudoroegneria spicata	Bluebunch Wheatgrass	Anatone	0.27	0.25
F	Medicago sativa	Alfalfa	Ladak	0.55	0.51
F	Medicago sativa	Alfalfa	Ranger	0.54	0.48
F	Medicago sativa	Alfalfa	Spredor 4	0.70	0.67
F	Onobrychis viciifolia	Sainfoin	Eski	1.90	1.74
F	Sanguisorba minor	Small Burnet	Delar	1.70	1.58

Wildlife Habitat and Vegetation History**Table 18R-01.3 - Wildlife Seasonal Habitat.** UDWR wildlife habitat and seasonality.

Species	Habitat	Season	Brood/Young Rearing
Deer	crucial	winter/spring	
Greater Sage Grouse	Crucial	occupied & Winter	brood-rearing

Table 18R-01.4 - Vegetation History. The dominant vegetation type(s) and phase of woodland succession (Tausch, Miller, Roundy, & Chambers, 2009).

Year	Vegetation Type	Woodland Succession
2004	Juniper	Phase III
2013	Perennial Grass	Phase I
2016	Perennial Grass/Mixed Shrub	Phase I

Site Notes

There are ravines to the north and south of this site but there is a lack of erosion in both.

Soils**Table 18R-01.5 - Soil Analysis Data.** List of chemical and textural soil characteristics determined by laboratory analysis.

Texture	pH	%sand	%silt	%clay	%OM	PPM P	PPM K	ds/m	Sample Date
Loam	7.1	36.4	41.1	22.5	3.7	8.2	182.4	0.7	09/02/2004

Site Potential

1981-2010 Average Annual Precipitation 13 inches
 NRCS Ecological Site Upland Loam (Mountain Big Sagebrush)
 NRCS Ecological Site # R028AY310UT
 States and Transitions No state and transition model is available for this ecological site.

When this site was established in 2004 it was dominated by encroaching Utah juniper (*Juniperus osteosperma*) with very little other browse or herbaceous cover. Following a 2007 bull-hog and seeding treatment, the site transitioned to one dominated by perennial grasses such as squirrel-tail (*Elymus elymoides*) and bluebunch wheatgrass (*Pseudoroegneria spicata*) (Table 18R-01.7, Table 18R-01.10). Other shrubs such as Stansbury cliffrose (*Purshia stansburiana*) and rubber rabbitbrush (*Ericameria nauseosa* ssp. *nauseosa* var. *speciosa*) have increased in cover since treatment and became a co-dominant component of the site in 2016. Although cover and density are currently low, juniper is present, indicating that this site has the potential for future infilling (Table 18R-01.12, Table 18R-01.13).

Trend Summary Tables

Table 18R-01.6 - Shrub/Tree Summary. Average modified Daubenmire quadrat and line intercept cover by year for shrubs/trees.

Year	Quadrat Cover (%)			Line-intercept Cover (%)		
	Preferred Shrub	Other Shrub	Tree	Preferred Shrub	Other Shrub	Tree
2004	0.2	-	25.5	1.0	-	38.5
2013	2.1	-	0.4	2.9	-	0.3
2016	4.0	0.0	0.1	7.0	0.4	-

Table 18R-01.7 - Herbaceous Summary. Nested frequency and average modified Daubenmire quadrat cover by year for herbaceous functional groups.

Year	Nested Frequency				Quadrat Cover (%)			
	Annual Grass	Perennial Grass	Annual/Biennial Forb	Perennial Forb	Annual Grass	Perennial Grass	Annual/Biennial Forb	Perennial Forb
2004	11	290	116	28	0.0	5.8	0.3	0.4
2013	130	305	256	110	1.3	15.4	1.0	2.4
2016	92	325	253	105	1.8	18.8	2.0	2.3

Table 18R-01.8 - Basic Ground Cover. Average modified Daubenmire quadrat cover by year for basic ground cover types.

Year	Cover Type (%)					
	Bare Ground	Cryptograms	Litter	Pavement	Rock	Vegetation
2004	9.4	5.6	43.3	32.7	3.5	28.7
2013	6.6	0.1	72.1	4.1	1.4	25.5
2016	8.9	0.5	58.7	5.3	0.3	31.0

Table 18R-01.9 - Pellet Group Data. Quadrat frequency and pellet group transect data for animal pellets. Rabbit pellet groups are not sampled in the pellet group transect.

Year	Cattle	Mule Deer	Horse	Rabbit
	Quadrat Frequency			
2004	-	-	-	52
2013	-	5	-	5
2016	3	3	-	18
Year	Days Use Per Acre (ha)			
2004	-	3.4 (8.3)	0.6 (1.4)	-
2013	7.2 (17.9)	18.1 (44.7)	-	-
2016	7.2 (17.9)	2.7 (6.6)	0.6 (1.4)	-

Table 18R-01.10 - Grass Species. Nested frequency and modified Daubenmire average cover by year.

GRASS SPECIES	Achnatherum hymenoides (Indian ricegrass)	Agropyron cristatum ⁱ (crested wheatgrass)	Bromus tectorum ^{ai} (cheatgrass)	Dactylis glomerata ⁱ (orchardgrass)	Elymus elymoides (squirreltail)	Elymus trachycaulus (slender wheatgrass)	Poa bulbosa ⁱ (bulbous bluegrass)	Poa secunda (Sandberg bluegrass)	Psathyrostachys juncea ⁱ (Russian wildrye)	Pseudoroegneria spicata (bluebunch wheatgrass)	Thinopyrum intermedium ⁱ (intermediate wheatgrass)
year	Nested Frequency										
2004	8	-	11	-	78	-	-	259	-	-	-
2013	27	42	130	-	182	15	38	148	3	59	24
2016	12	80	92	0	218	25	19	74	4	68	-
year	Average Cover (%)										
2004	0.2	-	0.0	-	1.1	-	-	4.5	-	-	-
2013	1.2	1.9	1.3	-	6.1	0.6	0.3	1.7	0.0	3.4	0.2
2016	0.8	5.5	1.8	0.0	7.7	0.7	0.1	0.8	0.3	2.8	-

a - Annual; n - Noxious Weed; i - Introduced Species

Table 18R-01.11 - Forb Species. Nested frequency and modified Daubenmire average cover by year.

FORB SPECIES	Alyssum desertorum ^{ai} (desert madwort)	Antennaria (pussytoes)	Arabis (rockcress)	Astragalus utahensis (Utah milkvetch)	Calochortus nuttallii (sego lily)	Ceratocephala testiculata ^{ai} (curvseed butterwort)	Chaenactis douglasii (Douglas' dustymaiden)	Cirsium (thistle)	Collinsia parviflora ^a (maiden blue eyed Mary)	Cryptantha (cryptantha)	Descurainia pinnata ^a (western tansymustard)	Lactuca serriola ^{ai} (prickly lettuce)	Lathyrus brachycalyx (Bonneville pea)	Medicago sativa ⁱ (alfalfa)	Microsteris gracilis ^a (slender phlox)	Onobrychis viciifolia ⁱ (sainfoin)	Packera multilobata (lobeleaf groundsel)
year	Nested Frequency																
2004	95	-	-	-	-	37	-	-	-	2	-	-	-	-	-	-	-
2013	229	3	3	1	5	80	10	-	2	3	7	10	-	14	1	8	-
2016	239	-	-	-	3	-	-	1	5	2	3	19	16	6	-	12	2
year	Average Cover (%)																
2004	0.2	-	-	-	-	0.1	-	-	-	0.0	-	-	-	-	-	-	-
2013	0.7	0.0	0.0	0.0	0.0	0.2	0.0	-	0.0	0.0	0.1	0.0	-	0.6	0.0	0.2	-
2016	1.7	-	-	-	0.0	-	-	0.0	0.0	0.0	0.0	0.1	0.3	0.4	-	0.2	0.0

a - Annual/Biennial; n - Noxious Weed; i - Introduced Species

FORB SPECIES									
Pedicularis centranthera (dwarf lousewort)									
Phlox hoodii (spiny phlox)									
Phlox longifolia (longleaf phlox)									
Sanguisorba minor ⁱ (small burnet)									
Streptanthus cordatus (heartleaf twistflower)									
Taraxacum officinale (common dandelion)									
Tragopogon dubius ⁱⁱ (yellow salsify)									
Vicia americana (American vetch)									
Zigadenus paniculatus (foothill deathcamas)									
year	Nested Frequency								
2004	-	28	-	-	-	-	-	-	-
2013	1	29	15	16	9	-	2	12	7
2016	1	29	-	41	4	1	25	-	10
year	Average Cover (%)								
2004	-	0.4	-	-	-	-	-	-	-
2013	0.0	0.7	0.0	0.3	0.1	-	0.0	0.2	0.1
2016	0.0	0.6	-	0.6	0.0	0.0	0.1	-	0.1

a - Annual/Biennial; n - Noxious Weed; i - Introduced Species

Table 18R-01.12 - Shrub and Tree Species. Average modified Daubenmire quadrat and line intercept cover by year.

SHRUB SPECIES					
Ericameria nauseosa ssp. nauseosa var. spectiosa ^p (rubber rabbitbrush)					
Gutierrezia sarothrae (broom snakeweed)					
Juniperus osteosperma ^t (Utah juniper)					
Purshia stansburiana ^p (Stansbury cliffrose)					
Purshia tridentata ^p (antelope bitterbrush)					
year	Line Intercept Cover (%)				
2004	-	-	38.5	1	-
2013	1.2	-	0.3	1.7	-
2016	3.7	0.4	-	3.3	-
year	Quadrat Cover (%)				
2004	-	-	25.5	0.2	-
2013	0.9	-	0.4	1.2	-
2016	2.5	0.0	0.1	1.5	0.0

t - Tree Species; p - Preferred Browse; i - Introduced

Table 18R-01.13 - Shrub/Tree Characteristics. Population characteristics of shrub/tree species populations including density reproduction (seedlings), age distribution, utilization, vigor and average size (height/crown) of plants.

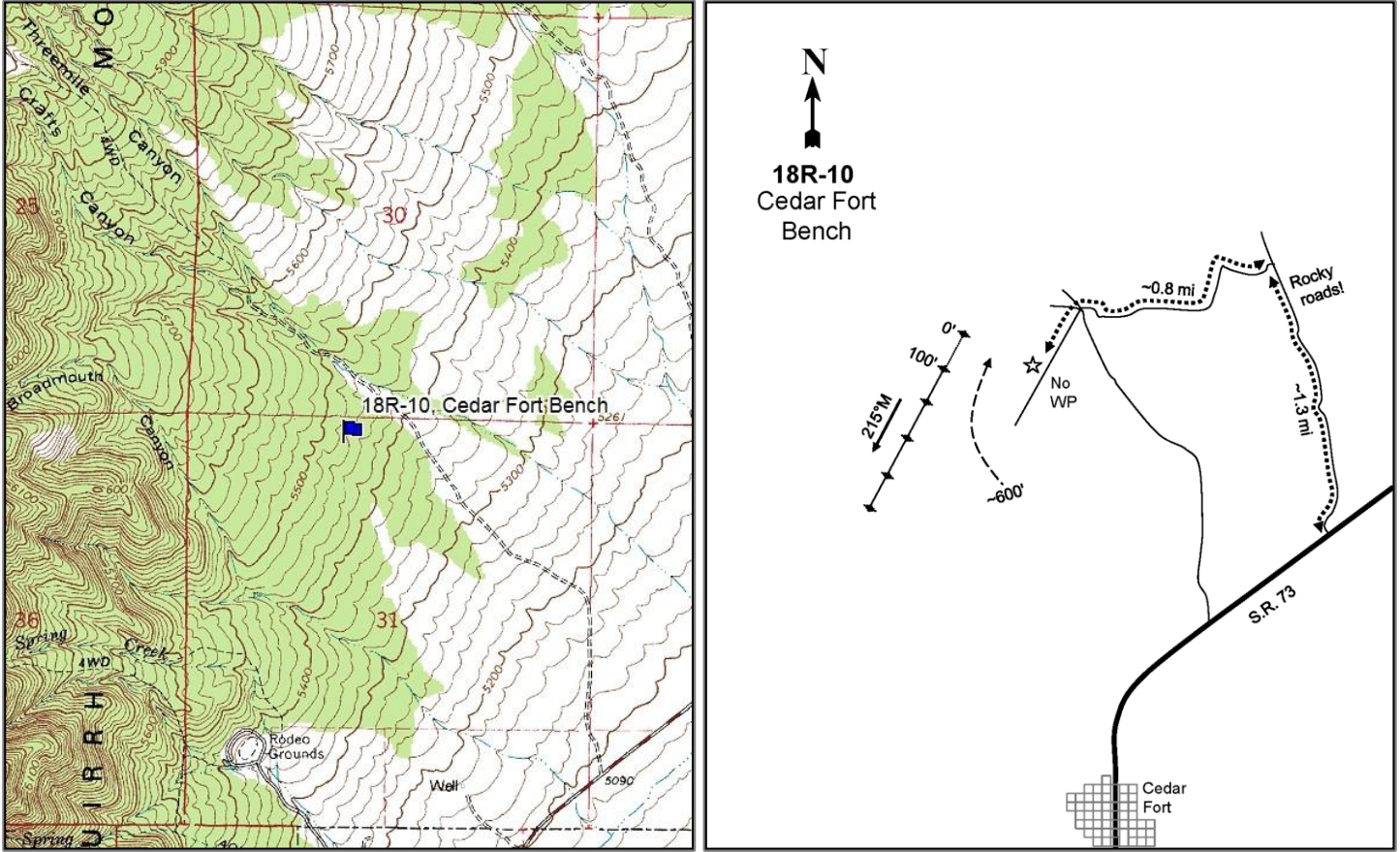
Year	Density		Age Class Distribution			Utilization		Poor Vigor (%)	Average Height Crown (cm)
	Plants Per Acre		Excluding Seedlings			Moderate (%)	Heavy (%)		
	Excluding Seedlings	Seedling	Young (%)	Mature (%)	Decadent (%)				
Artemisia tridentata ssp. vaseyana^P -- (mountain big sagebrush)									
2004	20	-	0	0	100	0	100	100	51/96
2013	20	-	0	100	0	0	0	0	31/62
2016	20	-	0	100	0	0	0	100	48/65
Chrysothamnus viscidiflorus ssp. viscidiflorus -- (yellow rabbitbrush)									
2004	-	-	-	-	-	-	-	-	-/-
2013	-	-	-	-	-	-	-	-	-/-
2016	20	-	100	0	0	100	0	0	32/36
Ericameria nauseosa ssp. consimilis var. oreophila -- (rubber rabbitbrush)									
2004	-	-	-	-	-	-	-	-	-/-
2013	-	-	-	-	-	-	-	-	-/-
2016	-	-	-	-	-	-	-	-	59/76
Ericameria nauseosa ssp. nauseosa var. speciosa^P -- (rubber rabbitbrush)									
2004	-	-	-	-	-	-	-	-	-/-
2013	240	-	17	83	0	25	8	17	44/60
2016	440	-	9	91	0	0	0	5	62/75
Gutierrezia sarothrae -- (broom snakeweed)									
2004	60	-	0	0	100	0	0	0	17/21
2013	140	-	29	71	0	0	0	0	26/34
2016	240	20	33	67	0	0	0	0	30/35
Juniperus osteosperma^I -- (Utah juniper)									
2004	620	-	0	74	26	0	0	7	-/-
2013	20	140	0	0	100	0	0	0	-/-
2016	60	20	67	33	0	0	0	0	-/-
Purshia stansburiana^P -- (Stansbury cliffrose)									
2004	60	-	0	100	0	0	67	0	167/188
2013	440	140	41	59	0	41	0	5	42/59
2016	560	-	32	68	0	39	4	0	68/72
Purshia tridentata^P -- (antelope bitterbrush)									
2004	-	-	-	-	-	-	-	-	-/-
2013	-	-	-	-	-	-	-	-	-/-
2016	40	-	100	0	0	0	0	0	-/-

t - Tree Species; p - Preferred Browse; i - Introduced Species

Table 18R-01.14 - Tree Characteristics. Point-quarter tree density, size class distribution, and average diameter.

Year	Density	Size Class Distribution					Average Diameter (cm)
	Trees per Acre	Seedling (%)	1-4'	4-8'	8-12'	>12' (%)	
Juniperus osteosperma (Utah juniper)							
2004	568	-	-	-	-	-	44.7
2013	25	40	60	-	-	-	2.0
2016	17	40	60	-	-	-	2.5

CEDAR FORT BENCH - STUDY NO. 18R-10



Location Information

USGS 7.5 min Map Info	Cedar Fort NW; Township 5S, Range 2W, Section 31
GPS (0' Stake)	NAD 83 UTM ZONE 12, 405766 East 4466879 North

Transect Information

Browse Tag # (0' Stake)	Not Available
Transect Bearing	215° 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

Traveling southwest on SR 73, turn right (north) onto a dirt road and continue for about 1.3 miles (this road gets very rocky). There is a road that comes in from the left (west): turn onto this road and continue for about 0.8 miles, passing an intersection. There is no witness post, but the study is about 600 feet away on the right-hand (northwest) side of the road.

Site Information

Land Ownership	Private
Land Administrator	Private
Allotment	DIAMOND VALLEY
Elevation	5,470ft (1,667m)
Aspect	East
Slope	14%
Sample Dates	08/18/2016

Table 18R-10.1 Disturbance History. Recorded history of major disturbances.

Treatment/Disturbance	Name	WRI DB#	Date	Size (acres)
Seeding - Aerial After	Cedar Fort Chaining	3662	December 2016	1028
Seeding - Aerial Before	Cedar Fort Chaining	3662	October 2016	1028
Chaining - Two-Way Ely	Cedar Fort Chaining	3662	October-December 2016	1028
Seeding - Dribbler After	Cedar Fort Chaining	3662	October-December 2016	1028

Table 18R-10.2 Seed Mix. List of known seeded plant species and rates (if available).

Mix Name			Application Type	Application Date	Acres
Cedar Fort Chaining			Aerial	Oct 2016	1028
Type	Species	Common Name	Cultivar/Source ID	Bulk lbs/acre	PLS lbs/acre
G	Achnatherum hymenoides	Indian Ricegrass	Nezpar	0.97	0.85
G	Agropyron cristatum	Crested Wheatgrass	Hycrest II	1.02	0.93
G	Dactylis glomerata	Orchardgrass	Paiute	0.31	0.28
G	Dactylis glomerata	Orchardgrass	Paiute	0.18	0.15
G	Pascopyrum smithii	Western Wheatgrass	Arriba	1.02	0.95
G	Poa secunda	Canby Bluegrass	Canbar	0.33	0.24
G	Pseudoroegneria spicata	Bluebunch Wheatgrass	Anatone	1.51	1.35
F	Achillea millefolium	Western Yarrow	Lincoln WA	0.10	0.09
F	Helianthus annuus	Annual Sunflower	Box Elder UT	0.41	0.32
F	Helianthus annuus	Annual Sunflower	Montezuma CO	0.08	0.07
F	Linum perenne	Blue Flax	Appar	0.49	0.43
F	Medicago sativa	Alfalfa	Ladak	0.72	0.67
F	Medicago sativa	Alfalfa	Ladak+	0.78	0.75
F	Onobrychis viciifolia	Sainfoin	Eski	1.99	1.53
F	Sanguisorba minor	Small Burnet		1.99	1.86
Mix Name			Application Type	Application Date	Acres
Cedar Fort Chaining Dribbler			Dribbler	Oct 2016	1028
Type	Species	Common Name	Cultivar/Source ID	Bulk lbs/acre	PLS lbs/acre
F	Sanguisorba minor	Small Burnet		0.39	0.36
S	Atriplex canescens	Fourwing Saltbush	Juab/Carbon UT	0.29	0.11
S	Purshia tridentata	Bitterbrush	Oneida ID	0.29	0.18
Mix Name			Application Type	Application Date	Acres
Cedar Fort Chaining Shrub			Aerial	Dec 2016	1028
Type	Species	Common Name	Cultivar/Source ID	Bulk lbs/acre	PLS lbs/acre
S	Artemisia tridentata ssp. wyomingensis	Wyoming Big Sagebrush	Sevier UT	0.49	0.09
S	Bassia prostrata	Forage Kochia	Box Elder UT	0.97	0.73

Wildlife Habitat and Vegetation History

Table 18R-10.3 - Wildlife Seasonal Habitat. UDWR wildlife habitat and seasonality.

Species	Habitat	Season
Deer	crucial	winter
Elk	substantial	year-long

Table 18R-10.4 - Vegetation History. The dominant vegetation type(s) and phase of woodland succession (Tausch, Miller, Roundy, & Chambers, 2009).

Year	Vegetation Type	Woodland Succession
2016	Juniper	Phase III

Site Notes

No Notes

Site Potential

1981-2010 Average Annual Precipitation 15 inches
 NRCS Ecological Site Upland Stony Loam (Wyoming Big Sagebrush)
 NRCS Ecological Site # R028AY334UT
 States and Transitions No state and transition model is available for this ecological site.

As of the 2016 sample year, this study site is dominated by Utah juniper (*Juniperus osteosperma*) and is considered to be within Phase III of woodland succession (Table 18R-10.4, Table 18R-10.12). The herbaceous understory is extremely depauperate in abundance and composition with the introduced annual forb desert madwort (*Alyssum desertorum*) contributing the most cover (Table 18R-10.7, Table 18R-10.10, Table 18R-10.11). Without a disturbance, one could reasonably expect juniper encroachment to continue, but a proposed chaining and seeding treatment will likely decrease tree cover and encourage recovery of understory components (Table 18R-10.1).

Trend Summary Tables

Table 18R-10.6 - Shrub/Tree Summary. Average modified Daubenmire quadrat and line intercept cover by year for shrubs/trees.

Year	Quadrat Cover (%)			Line-intercept Cover (%)		
	Preferred Shrub	Other Shrub	Tree	Preferred Shrub	Other Shrub	Tree
2016	0.0	-	15.3	0.2	-	31.6

Table 18R-10.7 - Herbaceous Summary. Nested frequency and average modified Daubenmire quadrat cover by year for herbaceous functional groups.

Year	Nested Frequency				Quadrat Cover (%)			
	Annual Grass	Perennial Grass	Annual/Biennial Forb	Perennial Forb	Annual Grass	Perennial Grass	Annual/Biennial Forb	Perennial Forb
2016	44	105	383	50	0.1	0.4	1.3	0.3

Table 18R-10.8 - Basic Ground Cover. Average modified Daubenmire quadrat cover by year for basic ground cover types.

Year	Cover Type (%)					
	Bare Ground	Cryptograms	Litter	Pavement	Rock	Vegetation
2016	14.0	7.5	38.9	26.3	14.8	18.4

Table 18R-10.9 - Pellet Group Data. Quadrat frequency and pellet group transect data for animal pellets. Rabbit pellet groups are not sampled in the pellet group transect.

Year	Mule Deer	Rabbit
	Quadrat Frequency	
2016	-	10
Year	Days Use Per Acre (ha)	
	2016	1.3 (3.3)

Table 18R-10.10 - Grass Species. Nested frequency and modified Daubenmire average cover by year.

GRASS SPECIES	Achnatherum hymenoides (Indian ricegrass)	Bromus tectorum ^{ai} (cheatgrass)	Elymus elymoides (squirreltail)	Poa secunda (Sandberg bluegrass)
year	Nested Frequency			
2016	1	44	63	50
year	Average Cover (%)			
2016	0.0	0.1	0.2	0.2

a - Annual; n - Noxious Weed; i - Introduced Species

Table 18R-10.11 - Forb Species. Nested frequency and modified Daubenmire average cover by year.

FORB SPECIES	Alyssum desertorum ^{ai} (desert madwort)	Arabis (rockcross)	Ceratocephala testiculata ^{ai} (curveseed butterwort)	Collinsia parviflora ^a (maiden blue eyed Mary)	Cryptantha (cryptantha)	Eriogonum (buckwheat)	Eriogonum racemosum (redroot buckwheat)	Eriogonum umbellatum (sulphur-flower buckwheat)	Lathyrus brachycalyx (Bonneville pea)	Tragopogon dubius ^{ai} (yellow salsify)
year	Nested Frequency									
2016	381	4	40	3	14	17	1	2	15	1
year	Average Cover (%)									
2016	1.2	0.0	0.1	0.0	0.0	0.1	0.0	0.0	0.1	0.0

a - Annual/Biennial; n - Noxious Weed; i - Introduced Species

Table 18R-10.12 - Shrub and Tree Species. Average modified Daubenmire quadrat and line intercept cover by year.

SHRUB SPECIES	Juniperus osteosperma ^t (Utah juniper)	Pinus monophylla ^t (singleleaf pinyon)	Purshia stansburiana ^p (Stansbury cliffrose)
year	Line Intercept Cover		
2016	31.1	0.5	0.2
year	Quadrat Cover (%)		
2016	15.0	0.4	0.0

t - Tree Species; p - Preferred Browse; i - Introduced

Table 18R-10.13 - Shrub/Tree Characteristics. Population characteristics of shrub/tree species populations including density reproduction (seedlings), age distribution, utilization, vigor and average size (height/crown) of plants.

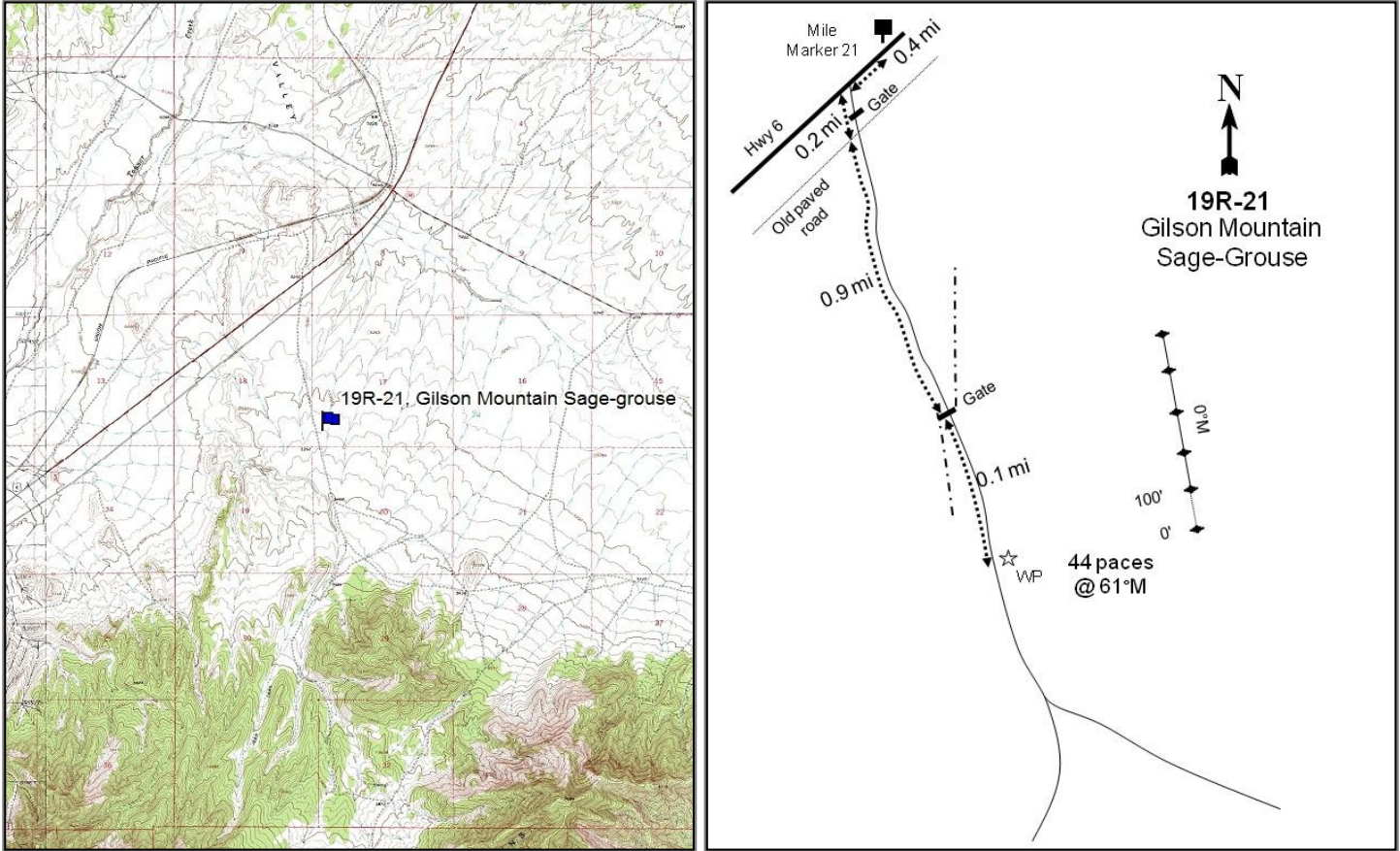
Year	Density		Age Class Distribution			Utilization		Poor Vigor (%)	Average Height Crown (cm)
	Plants Per Acre		Excluding Seedlings			Moderate (%)	Heavy (%)		
	Excluding Seedlings	Seedling	Young (%)	Mature (%)	Decadent (%)				
Gutierrezia sarothrae -- (broom snakeweed)									
2016	20	-	100	0	0	0	0	100	14/4
Juniperus osteosperma ^t -- (Utah juniper)									
2016	480	160	13	75	13	0	0	21	- / -
Opuntia -- (pricklypear)									
2016	20	-	0	100	0	0	0	0	11/33
Pinus monophylla ^t -- (singleleaf pinyon)									
2016	20	60	0	100	0	0	0	0	- / -
Purshia stansburiana ^p -- (Stansbury cliffrose)									
2016	20	-	0	100	0	100	0	0	82/94
Purshia tridentata ^p -- (antelope bitterbrush)									
2016	-	-	-	-	-	-	-	-	16/39

t - Tree Species; p - Preferred Browse; i - Introduced Species

Table 18R-10.14 - Tree Characteristics. Point-quarter tree density, size class distribution, and average diameter.

Year	Density	Size Class Distribution				Average Diameter (cm)	
	Trees per Acre	Seedling (%)	1-4'	4-8'	8-12'		>12' (%)
Juniperus osteosperma (Utah juniper)							
2016	317	-	10	5	15	70	17.1

GILSON MOUNTAIN SAGE-GROUSE - STUDY NO. 19R-21



Location Information

USGS 7.5 min Map Info Jericho SW; Township 13S, Range 3W, Section 17
 GPS (0' Stake) NAD 83 UTM ZONE 12, 395995 East 4393581 North

Transect Information

Browse Tag # (0' Stake) 228
 Transect Bearing 0° 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 south on Highway 6, 0.4 miles past mile marker 21, to a gate on the left. From the gate, drive 0.2 miles to an old paved road. Continue straight for 0.9 miles to another gate. Drive 0.1 miles to a witness post on the left. The 0-foot stake is 44 paces from the witness post at 61 degrees magnetic and is marked with browse tag #228.

Site Information

Land Ownership	Private
Land Administrator	Private
Allotment	No data
Elevation	5,350ft (1,631m)
Aspect	North
Slope	0-2%
Sample Dates	07/01/2008, 08/29/2011, 08/10/2016

Table 19R-21.1 Disturbance History. Recorded history of major disturbances.

Treatment/Disturbance	Name	WRI DB#	Date	Size (acres)
Seeding - Rangeland Drill	Gilson Mountain Sage-grouse Habitat Improvement	1103	March 2009	657
Fire - Wildfire	-	-	1996	-
Herbicide - Plateau	Gilson Mountain Sage-grouse Habitat Improvement	1103	September 2008	657
Seeding - Rangeland Drill	Gilson Mountain Sage-grouse Habitat Improvement	1103	November 2008	657

Table 19R-21.2 Seed Mix. List of known seeded plant species and rates (if available).

Mix Name		Application Type	Application Date	Acres	
Gilson Mountain		Drill	Nov 2008	640	
Type	Species	Common Name	Cultivar/Source ID	Bulk lbs/acre	PLS lbs/acre
G	Agropyron cristatum	Crested Wheatgrass	Hycrest	2.97	2.81
G	Leymus cinereus	Great Basin Wildrye	Trailhead	0.47	0.40
G	Pascopyrum smithii	Western Wheatgrass	Arriba	1.02	0.88
G	Psathyrostachys juncea	Russian Wildrye	Bozoisky	1.02	0.96
G	Pseudoroegneria spicata	Bluebunch Wheatgrass	Anatone	1.02	0.83
G	Thinopyrum intermedium	Pubescent Wheatgrass	Luna	2.03	1.83
F	Medicago sativa	Alfalfa	Ladak	1.48	1.35
F	Melilotus officinalis	Yellow Sweetclover		0.23	0.21
F	Sphaeralcea coccinea	Scarlet Globemallow	Duchesne/Uintah UT	0.03	0.03
S	Atriplex canescens	Fourwing Saltbush	Central UT	0.55	0.23
Mix Name		Application Type	Application Date	Acres	
Gilson Mountain - Sagebrush/Kochia		Drill	Mar 2009	640	
Type	Species	Common Name	Cultivar/Source ID	Bulk lbs/acre	PLS lbs/acre
S	Artemisia tridentata ssp. wyomingensis	Wyoming Big Sagebrush	Beaver UT	0.55	0.09
S	Bassia prostrata	Forage Kochia	Harney OR	1.02	0.73

Wildlife Habitat and Vegetation History

Table 19R-21.3 - Wildlife Seasonal Habitat. UDWR wildlife habitat and seasonality.

Species	Habitat	Season	Brood/Young Rearing
Greater Sage Grouse	Crucial	occupied & Winter	brood-rearing

Table 19R-21.4 - Vegetation History. The dominant vegetation type(s) and phase of woodland succession (Tausch, Miller, Roundy, & Chambers, 2009).

Year	Vegetation Type	Woodland Succession
2008	Annual Forb	NA
2011	Annual Forb	NA
2016	Annual Grass	NA

Site Notes

No Notes

Soils

Table 19R-21.5 - Soil Analysis Data. List of chemical and textural soil characteristics determined by laboratory analysis.

Texture	pH	% sand	% silt	% clay	% OM	PPM P	PPM K	ds/m	Sample Date
Loam	7.1	44.0	29.4	26.6	0.7	4.8	320.0	0.6	07/01/2008

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 this ecological site.

From site establishment in 2008 through the 2011 sample year, this site was dominated by annual forbs with the introduced species prickly Russian thistle (*Salsola tragus*) contributing the most cover (Table 19R-21.11). However, the introduced annual grass cheatgrass (*Bromus tectorum*) has increased in cover each sample year and the site transitioned to an annual grassland in 2016 (Table 19R-21.7, Table 19R-21.10). The browse component of this site is significantly limited and rubber rabbitbrush (*Ericameria nauseosa*) contributes the most cover of any shrub species (Table 19R-21.12). Without treatment to reduce annual grass loads, it is expected that this site will remain in a similar state in the future, placing it at an increased risk for catastrophic wildfire.

Trend Summary Tables

Table 19R-21.6 - Shrub/Tree Summary. Average modified Daubenmire quadrat and line intercept cover by year for shrubs/trees.

Year	Quadrat Cover (%)			Line-intercept Cover (%)		
	Preferred Shrub	Other Shrub	Tree	Preferred Shrub	Other Shrub	Tree
2008	-	-	-	-	-	-
2011	-	0.8	-	-	1.1	-
2016	-	1.0	-	-	1.1	-

Table 19R-21.7 - Herbaceous Summary. Nested frequency and average modified Daubenmire quadrat cover by year for herbaceous functional groups.

Year	Nested Frequency				Quadrat Cover (%)			
	Annual Grass	Perennial Grass	Annual/Biennial Forb	Perennial Forb	Annual Grass	Perennial Grass	Annual/Biennial Forb	Perennial Forb
2008	344	39	477	16	6.5	1.6	24.7	0.1
2011	383	82	457	13	13.1	3.9	21.7	0.3
2016	441	142	284	56	34.3	6.2	5.5	0.6

Table 19R-21.8 - Basic Ground Cover. Average modified Daubenmire quadrat cover by year for basic ground cover types.

Year	Cover Type (%)					
	Bare Ground	Cryptograms	Litter	Pavement	Rock	Vegetation
2008	31.3	1.1	31.1	10.5	0.3	36.4
2011	22.6	0.6	27.3	11.2	1.4	40.2
2016	31.1	-	32.9	3.2	0.9	45.0

Table 19R-21.9 - Pellet Group Data. Quadrat frequency and pellet group transect data for animal pellets. Rabbit pellet groups are not sampled in the pellet group transect.

Year	Cattle	Mule Deer	Elk	Horse	Rabbit
	Quadrat Frequency				
2008	11	3	-	-	3
2011	2	-	1	-	-
2016	6	1	-	1	2
Year	Days Use Per Acre (ha)				
2008	5.1 (12.6)	4.0 (9.9)	-	-	-
2011	2.9 (7.2)	-	-	-	-
2016	9.4 (23.3)	-	-	-	-

Table 19R-21.10 - Grass Species. Nested frequency and modified Daubenmire average cover by year.

GRASS SPECIES	Achnatherum hymenoides (Indian ricegrass)	Agropyron cristatum ⁱ (crested wheatgrass)	Bromus tectorum ^{ai} (cheatgrass)	Elymus elymoides (squirreltail)	Pascopyrum smithii (western wheatgrass)	Psathyrostachys juncea ⁱ (Russian wildrye)	Thinopyrum intermedium ⁱ (intermediate wheatgrass)
year	Nested Frequency						
2008	-	4	344	13	23	-	-
2011	-	47	383	16	9	-	18
2016	0	46	441	5	98	0	4
year	Average Cover (%)						
2008	-	0.2	6.5	0.1	1.3	-	-
2011	-	1.0	13.1	0.8	0.2	-	1.9
2016	0.0	2.0	34.3	0.2	4.0	0.0	0.1

a - Annual; n - Noxious Weed; i - Introduced Species

Table 19R-21.11 - Forb Species. Nested frequency and modified Daubenmire average cover by year.

FORB SPECIES	Alyssum desertorum ^{ai} (desert madwort)	Bassia scoparia ^{ai} (burningbush)	Ceratocephala testiculata ^{ai} (curvseed butterwort)	Chenopodium fremontii ^{ai} (Fremont's goosefoot)	Cryptantha (cryptantha)	Erodium cicutarium ^{ai} (redstem stork's bill)	Lactuca serriola ^{ai} (prickly lettuce)	Oenothera (evening primrose)	Phlox longifolia (longleaf phlox)	Plantago patagonica ^a (woolly plantain)	Salsola tragus ^{ai} (prickly Russian thistle)	Sisymbrium altissimum ^{ai} (tall tumblemustard)	Sphaeralcea munroana (Munro's globemallow)	Tragopogon dubius ^{ai} (yellow salsify)
year	Nested Frequency													
2008	336	-	-	2	2	47	3	-	5	1	452	90	9	28
2011	422	8	26	-	10	-	42	2	-	-	302	32	1	8
2016	172	-	1	-	-	96	-	-	1	-	123	9	56	11
year	Average Cover (%)													
2008	4.3	-	-	0.0	0.0	1.2	0.0	-	0.0	0.0	17.7	1.0	0.1	0.5
2011	6.5	0.2	0.0	-	0.3	-	1.2	0.0	-	-	12.9	0.6	0.0	0.3
2016	0.4	-	0.0	-	-	3.3	-	-	0.0	-	1.6	0.0	0.6	0.1

a - Annual/Biennial; n - Noxious Weed; i - Introduced Species

Table 19R-21.12 - Shrub and Tree Species. Average modified Daubenmire quadrat and line intercept cover by year.

SHRUB SPECIES	Line Intercept Cover (%)		
	Bassia prostrata ⁱ (forage kochia)	Ericameria nauseosa (rubber rabbitbrush)	Opuntia (pricklypear)
year	Line Intercept Cover (%)		
2008	-	-	-
2011	0.5	-	0.6
2016	-	1.1	-
year	Quadrat Cover (%)		
2008	-	-	-
2011	0.7	0.1	0.0
2016	0.0	0.9	0.1

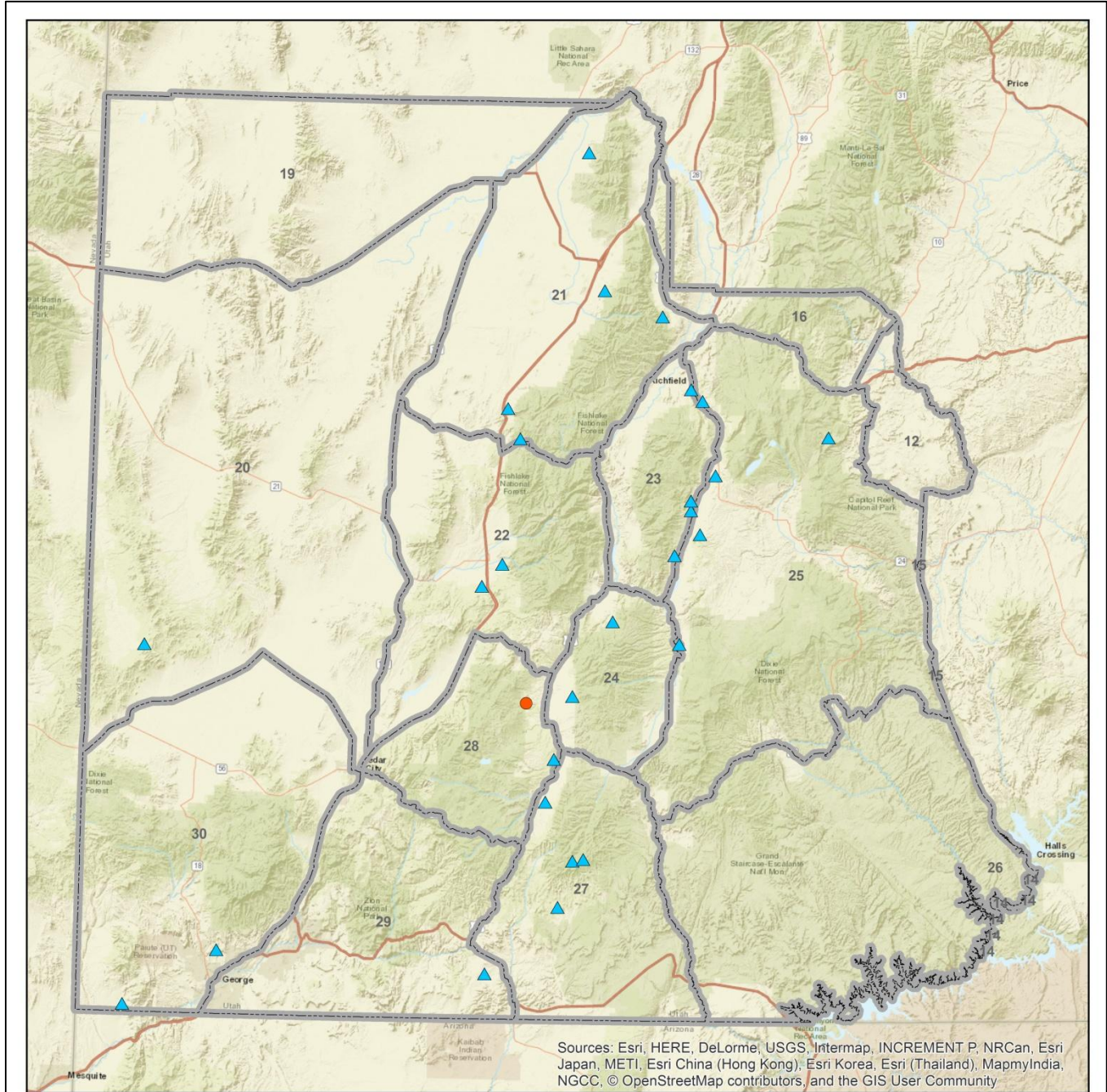
t - Tree Species; p - Preferred Browse; i - Introduced

Table 19R-21.13 - Shrub/Tree Characteristics. Population characteristics of shrub/tree species populations including density reproduction (seedlings), age distribution, utilization, vigor and average size (height/crown) of plants.

Year	Density		Age Class Distribution			Utilization		Poor Vigor (%)	Average Height Crown (cm)
	Plants Per Acre		Excluding Seedlings			Moderate (%)	Heavy (%)		
	Excluding Seedlings	Seedling	Young (%)	Mature (%)	Decadent (%)				
Artemisia tridentata ssp. wyomingensis^p -- (Wyoming big sagebrush)									
2008	-	-	-	-	-	-	-	-	37/47
2011	-	-	-	-	-	-	-	-	20/15
2016	-	-	-	-	-	-	-	-	37/56
Bassia prostrataⁱ -- (forage kochia)									
2008	-	-	-	-	-	-	-	-	-/-
2011	340	-	65	35	0	0	0	29	36/63
2016	-	20	0	0	0	0	0	0	-/-
Chrysothamnus viscidiflorus -- (yellow rabbitbrush)									
2008	-	-	-	-	-	-	-	-	19/20
2011	-	-	-	-	-	-	-	-	-/-
2016	-	-	-	-	-	-	-	-	-/-
Ericameria nauseosa -- (rubber rabbitbrush)									
2008	20	-	0	100	0	0	0	100	38/54
2011	40	-	0	100	0	0	0	0	60/89
2016	60	-	67	33	0	0	0	0	57/80
Gutierrezia sarothrae -- (broom snakeweed)									
2008	-	-	-	-	-	-	-	-	-/-
2011	-	-	-	-	-	-	-	-	-/-
2016	-	20	0	0	0	0	0	0	28/38
Opuntia -- (pricklypear)									
2008	40	-	50	50	0	0	0	0	19/57
2011	260	-	0	100	0	0	0	0	12/34
2016	100	-	0	100	0	0	0	0	13/51

t - Tree Species; p - Preferred Browse; i - Introduced Species

SOUTHERN REGION

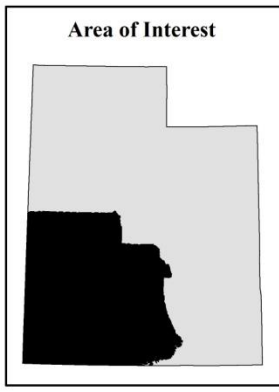
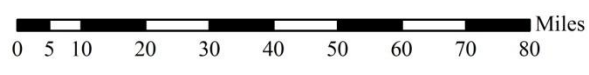


Sources: Esri, HERE, DeLorme, USGS, Intermap, INCREMENT P, NRCan, Esri Japan, METI, Esri China (Hong Kong), Esri Korea, Esri (Thailand), MapmyIndia, NGCC, © OpenStreetMap contributors, and the GIS User Community

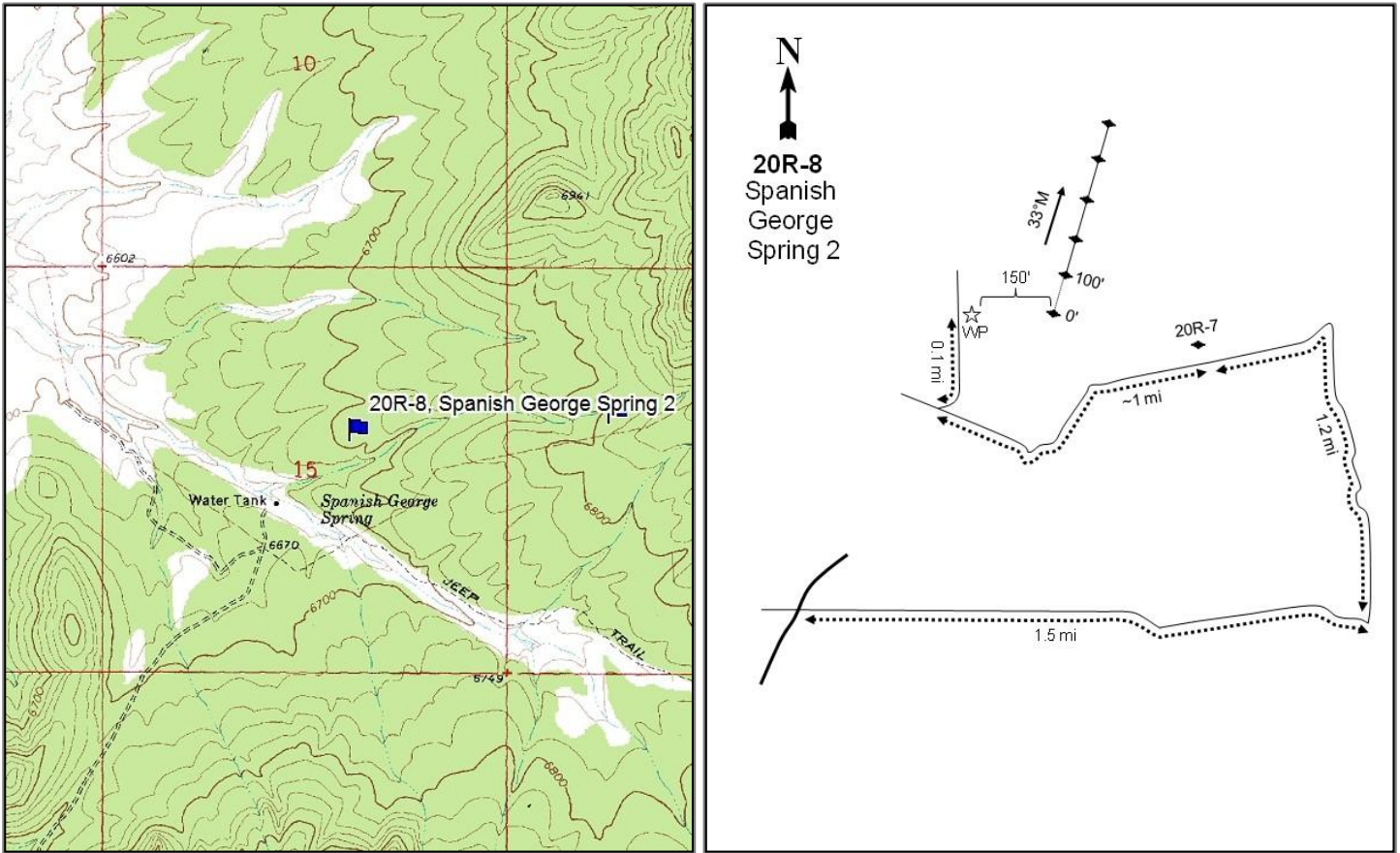


Project

- Range Trend
- ▲ WRI
- ▭ Southern Region WMUs



SPANISH GEORGE SPRING 2 - STUDY NO. 20R-8



Location Information

USGS 7.5 min Map Info
GPS (0' Stake)

Steamboat Mountain S; Township 32S, Range 18W, Section 15
NAD 83 UTM ZONE 12, 249929 East 4211985 North

Transect Information

Browse Tag # (0' Stake)
Transect Bearing
Length
Belt Placement
Belt Marker Placement

Not Available
33° magnetic
500ft
Line 1 (11ft), Line 2 (34ft), Line 3 (59ft), Line 4 (71ft), Line 5 (95ft)
No Rebar or Stakes

Directions to Site

Drive west from Indian Peaks cabin for 0.3 miles to a fork and turn left. Proceed 0.1 miles to another fork, again staying left. From there, drive 2.9 miles to a cattleguard. From the cattleguard, drive 1.4 miles to a junction. Turn right and proceed 1.2 miles to an intersection. Go straight, crossing a cattleguard. From the cattleguard, drive 5.8 miles, staying on the main road, to a fork. Proceed left and drive 4.1 miles to another fork. Go left again and continue for 4.6 miles to a fork leading to Arrowhead Pass. Stay on the main road for another 6.2 miles. Turn left onto North Hamblin Valley Road and continue onto Spanish George Road. Drive for 6.6 miles (the road will turn north). Turn left onto a dirt road and drive 1.5 miles to an intersection. Turn left (north) and continue for 2.2 miles, after passing the 20R-7 study the road will make a hairpin turn to the left. A road comes in from the right (north); turn onto this road and continue for 0.1 miles. The site is on the right-hand (east) side of the road, about 150 feet away; there is no witness post.

Site Information

Land Ownership	Federal
Land Administrator	BLM
Allotment	SPANISH GEORGE
Elevation	6,719ft (2,048m)
Aspect	South
Slope	3%
Sample Dates	08/29/2016

Table 20R-08.1 Disturbance History. Recorded history of major disturbances.

Treatment/Disturbance	Name	WRI DB#	Date	Size (acres)
Chaining - Two-Way Ely	Hamlin Valley Habitat Restoration Project - Sagebrush	3686	October-November 2016	4086
Seeding - Aerial Before	Hamlin Valley Habitat Restoration Project - Sagebrush	3686	November 2016	4086

Table 20R-08.2 Seed Mix. List of known seeded plant species and rates (if available).

Mix Name			Application Type	Application Date	Acres
Hamlin Valley 2			Aerial	Nov 2016	3550
Type	Species	Common Name	Cultivar/Source ID	Bulk lbs/acre	PLS lbs/acre
G	Achnatherum hymenoides	Indian Ricegrass	Nezpar	2.48	2.17
G	Elymus lanceolatus	Thickspike Wheatgrass	Bannock	0.62	0.55
G	Elymus lanceolatus	Thickspike Wheatgrass	Critana	0.10	0.09
G	Elymus lanceolatus	Thickspike Wheatgrass	Critana	0.28	0.24
G	Pascopyrum smithii	Western Wheatgrass	Arriba	0.51	0.47
G	Pascopyrum smithii	Western Wheatgrass	Recovery	0.49	0.43
G	Poa secunda	Sandberg Bluegrass	Mountain Home	0.14	0.12
G	Pseudoroegneria spicata	Bluebunch Wheatgrass	Anatone	1.52	1.36
G	Pseudoroegneria spicata	Bluebunch Wheatgrass	Anatone	0.11	0.09
G	Pseudoroegneria spicata	Bluebunch Wheatgrass	Anatone	0.51	0.48
G	Pseudoroegneria spicata	Bluebunch Wheatgrass	Columbia	0.28	0.25
F	Achillea millefolium	Western Yarrow	Lincoln WA	0.10	0.09
F	Balsamorhiza sagittata	Arrowleaf Balsamroot	Sevier UT	0.06	0.04
F	Balsamorhiza sagittata	Arrowleaf Balsamroot	Box Elder/Sevier/Sanpete UT	0.03	0.02
F	Balsamorhiza sagittata	Arrowleaf Balsamroot	Wasatch	0.03	0.02
F	Cleome lutea	Yellow Beeplant	Nye NV	0.01	0.01
F	Heliomeris multiflora	Showy Goldeneye	White Pine NV	0.14	0.11
F	Linum lewisii	Lewis Flax	Maple Grove	0.08	0.07
F	Linum lewisii	Lewis Flax	Maple Grove	0.23	0.18
F	Medicago sativa	Alfalfa	Ladak+	0.56	0.54
F	Penstemon eatonii	Firecracker Penstemon	Richfield	0.04	0.03
F	Penstemon eatonii	Firecracker Penstemon	Richfield	0.07	0.06
F	Penstemon pachyphyllus	Thickleaf Penstemon	White Pine NV	0.31	0.27
F	Penstemon palmeri	Palmer Penstemon	Elko NV	0.54	0.48
F	Sphaeralcea coccinea	Scarlet Globemallow	Iron UT	0.02	0.00
F	Sphaeralcea grossularifolia	Gooseberryleaf Globemallow	Beaver UT	0.14	0.12
F	Sphaeralcea munroana	Munro Globemallow	Iron UT	0.06	0.05

Wildlife Habitat and Vegetation History

Table 20R-08.3 - Wildlife Seasonal Habitat. UDWR wildlife habitat and seasonality.

Species	Habitat	Season	Brood/Young Rearing
Deer	substantial	summer	
Elk	substantial	year-long	
Greater Sage Grouse	Crucial	occupied	brood-rearing
Pronghorn	crucial	year-long	

Table 20R-08.4 - Vegetation History. The dominant vegetation type(s) and phase of woodland succession (Tausch, Miller, Roundy, & Chambers, 2009).

Year	Vegetation Type	Woodland Succession
2016	Pinyon-Juniper	Phase III

Site Notes

This site is encroached by Utah juniper (*Juniperus osteosperma*) and singleleaf pinyon (*Pinus monophylla*) as of study establishment in 2016. Black sagebrush (*Artemisia nova*) is the only preferred browse that is present and is relatively rare (Table 20R-08.12, Table 20R-08.13). The herbaceous understory is extremely depauperate in both composition and biodiversity (Table 20R-08.7, Table 20R-08.10, Table 20R-08.11). However, a seeding and chaining treatment planned for 2016 will likely reduce tree cover, allowing for the establishment of an herbaceous understory and valuable browse species (Table 20R-08.1).

Site Potential

1981-2010 Average Annual Precipitation 16 inches
 NRCS Ecological Site Upland Loam (Mountain Big Sagebrush)
 NRCS Ecological Site # R028AY310UT
 States and Transitions No state and transition model is available for this ecological site.

Trend Summary Tables

Table 20R-08.6 - Shrub/Tree Summary. Average modified Daubenmire quadrat and line intercept cover by year for shrubs/trees.

Year	Quadrat Cover (%)			Line-intercept Cover (%)		
	Preferred Shrub	Other Shrub	Tree	Preferred Shrub	Other Shrub	Tree
2016	0.2	-	11.2	-	-	42.9

Table 20R-08.7 - Herbaceous Summary. Nested frequency and average modified Daubenmire quadrat cover by year for herbaceous functional groups.

Year	Nested Frequency				Quadrat Cover (%)			
	Annual Grass	Perennial Grass	Annual/Biennial Forb	Perennial Forb	Annual Grass	Perennial Grass	Annual/Biennial Forb	Perennial Forb
2016	-	7	4	15	-	0.2	0.0	0.0

Table 20R-08.8 - Basic Ground Cover. Average modified Daubenmire quadrat cover by year for basic ground cover types.

Year	Cover Type (%)					
	Bare Ground	Cryptograms	Litter	Pavement	Rock	Vegetation
2016	19.4	1.4	49.2	27.7	2.3	10.6

Table 20R-08.9 - Pellet Group Data. Quadrat frequency and pellet group transect data for animal pellets. Rabbit pellet groups are not sampled in the pellet group transect.

Year	Cattle	Mule Deer	Elk	Rabbit
	Quadrat Frequency			
2016	1	1	2	29
Year	Days Use Per Acre (ha)			
	2016	-	-	5.3 (13.2)

Table 20R-08.10 - Grass Species. Nested frequency and modified Daubenmire average cover by year.

GRASS SPECIES		
	Achnatherum hymenoides (Indian ricegrass)	
	Elymus elymoides (squirreltail)	
year	Nested Frequency	
2016	2	5
year	Average Cover (%)	
2016	0.0	0.2

a - Annual; n - Noxious Weed; i - Introduced Species

Table 20R-08.11 - Forb Species. Nested frequency and modified Daubenmire average cover by year.

FORB SPECIES									
	Astragalus (milkvetch)	Astragalus calycosus (Torrey's milkvetch)	Dalea searlsiae (Searls' prairie clover)	Ipomopsis aggregata (scarlet gilia)	Lotus utahensis (Utah bird's-foot trefoil)	Meiblotus officinalis ⁱ (sweetclover)	Penstemon leonardii (Leonard's beardtongue)	Polygonum douglasii ^a (Douglas' knotweed)	Salsola tragus ^{ai} (prickly Russian thistle)
year	Nested Frequency								
2016	2	2	2	3	1	4	1	2	2
year	Average Cover (%)								
2016	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

a - Annual/Biennial; n - Noxious Weed; i - Introduced Species

Table 20R-08.12 - Shrub and Tree Species. Average modified Daubenmire quadrat and line intercept cover by year.

SHRUB SPECIES	Line Intercept Cover (%)		
	Artemisia nova ^p (black sagebrush)	Juniperus osteosperma ^t (Utah juniper)	Pinus monophylla ^t (singleleaf pinyon)
year	Line Intercept Cover (%)		
2016	-	20.4	22.5
year	Quadrat Cover (%)		
2016	0.2	4.5	6.7

t - Tree Species; p - Preferred Browse; i - Introduced

Table 20R-08.13 - Shrub/Tree Characteristics. Population characteristics of shrub/tree species populations including density reproduction (seedlings), age distribution, utilization, vigor and average size (height/crown) of plants.

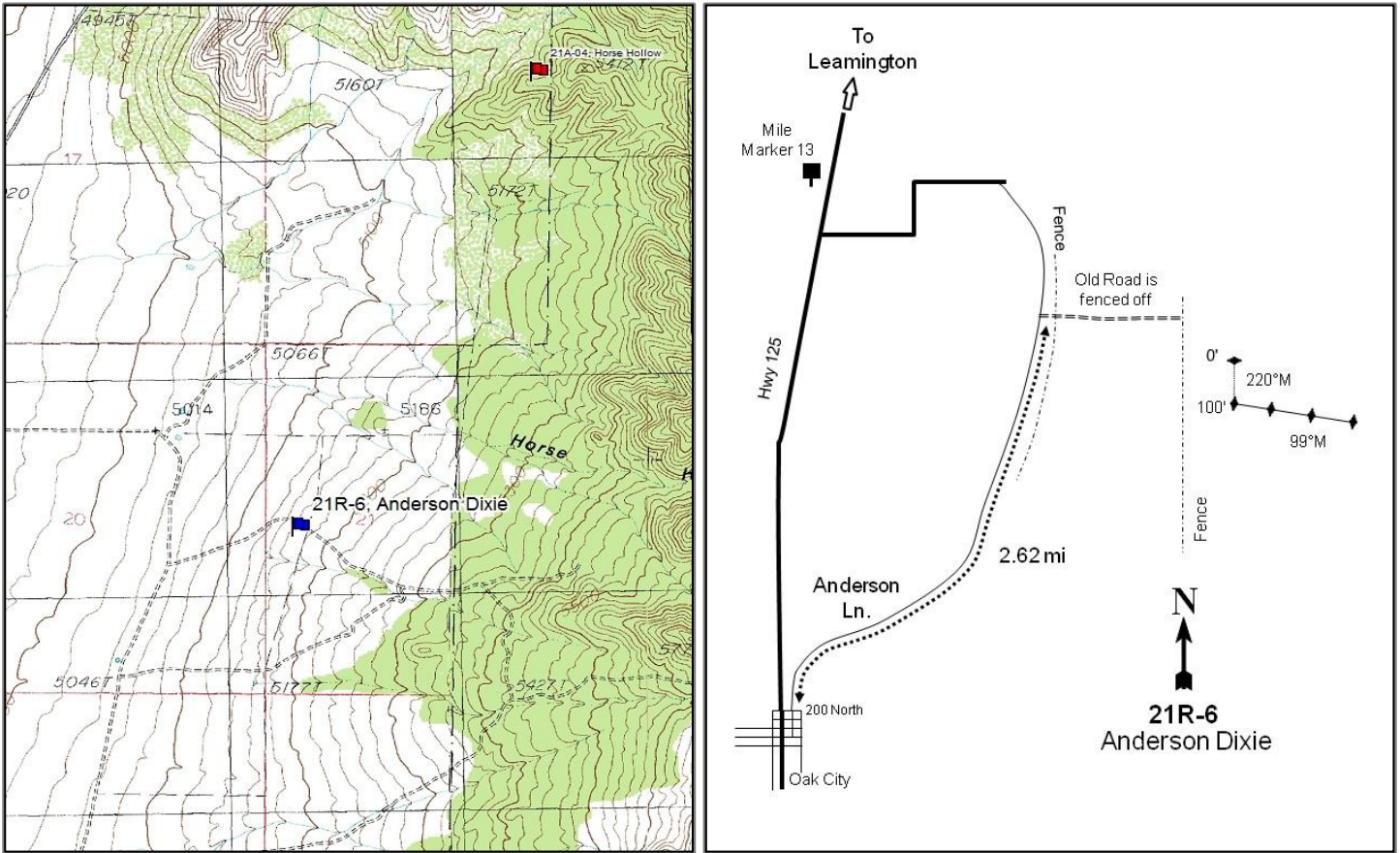
Year	Density		Age Class Distribution			Utilization		Poor Vigor (%)	Average Height Crown (cm)
	Plants Per Acre		Excluding Seedlings			Moderate (%)	Heavy (%)		
	Excluding Seedlings	Seedling	Young (%)	Mature (%)	Decadent (%)				
Artemisia nova ^p -- (black sagebrush)									
2016	280	-	21	21	57	0	36	64	20/30
Artemisia tridentata ssp. wyomingensis ^p -- (Wyoming big sagebrush)									
2016	-	-	-	-	-	-	-	-	34/61
Juniperus osteosperma ^t -- (Utah juniper)									
2016	340	40	47	53	0	0	0	6	- / -
Opuntia -- (pricklypear)									
2016	20	-	0	100	0	0	0	0	10/35
Pinus monophylla ^t -- (singleleaf pinyon)									
2016	600	260	67	33	0	0	0	13	- / -

t - Tree Species; p - Preferred Browse; i - Introduced Species

Table 20R-08.14 - Tree Characteristics. Point-quarter tree density, size class distribution, and average diameter.

Year	Density	Size Class Distribution					Average Diameter (cm)
	Trees per Acre	Seedling (%)	1-4'	4-8'	8-12'	>12' (%)	
Juniperus osteosperma (Utah juniper)							
2016	366	5	20	10	15	50	19.9
Pinus monophylla (singleleaf pinyon)							
2016	688	20	5	20	10	45	10.7

ANDERSON DIXIE - STUDY No. 21R-6



Location Information

USGS 7.5 min Map Info Oak City North SE; Township 16S, Range 4W, Section 21
 GPS (0' Stake) NAD 83 UTM ZONE 12, 387222 East 4363474 North

Transect Information

Browse Tag # (0' Stake) 139
 Transect Bearing 185° magnetic (Line 2-5: 99° 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

Heading south on Highway 125 between Leamington and Oak City, travel to mile marker 13 and continue south for 0.7 miles. There will be a road coming in from the left (east). Turn left (east) onto this road and proceed for 0.3 miles. The road will turn left (north) for 0.1 miles, then right (east) again for 0.45 miles to a T intersection in the road (the left leads to the Horse Hollow (21A-4) study). Turn right and proceed for 0.3 miles. There will be a faint dirt road to the left that is now fenced off: park here. Walk up the road (east) to another fence. From the end fence post on the south side of the road, the 0-foot stake is 51 paces at 220 degrees magnetic and is marked with browse tag #139 (the fence may not be there anymore).

Site Information

Land Ownership	Private
Land Administrator	Private
Allotment	No data
Elevation	5,170ft (1,576m)
Aspect	West
Slope	5-8%
Sample Dates	07/23/2007, 06/22/2010, 06/20/2011, 08/11/2016

Table 21R-06.1 Disturbance History. Recorded history of major disturbances.

Treatment/Disturbance	Name	WRI DB#	Date	Size (acres)
Harrow - One-Way Dixie	D. Anderson Dixie Harrow	797	October 2007	166
Seeding - Broadcast Before	D. Anderson Dixie Harrow	797	October 2007	166

Table 21R-06.2 Seed Mix. List of known seeded plant species and rates (if available).

Mix Name		Application Type	Application Date	Acres	
D. Anderson Dixie Harrow		Broadcast	Oct 2007	250	
Type	Species	Common Name	Cultivar/Source ID	Bulk lbs/acre	PLS lbs/acre
G	Agropyron cristatum	Crested Wheatgrass	Douglas	0.40	0.33
G	Agropyron cristatum	Crested Wheatgrass	Ephraim	0.29	0.26
G	Agropyron cristatum	Crested Wheatgrass	Hycrest	0.40	0.37
G	Elymus wawawaiensis	Snake River Wheatgrass	Secar	1.20	0.91
G	Poa secunda	Canby Bluegrass	Canbar	0.20	0.18
G	Thinopyrum intermedium	Intermediate Wheatgrass		1.00	0.96
F	Achillea millefolium	Western Yarrow		0.05	0.05
F	Medicago sativa	Alfalfa	Ladak	0.40	0.37
F	Medicago sativa	Alfalfa	Ranger	0.40	0.36
F	Medicago sativa	Alfalfa	Spredor 4	0.20	0.19
F	Onobrychis viciifolia	Sainfoin	Eski	2.20	2.02
F	Sanguisorba minor	Small Burnet	Delar	3.00	2.81
S	Artemisia tridentata ssp. wyomingensis	Wyoming Big Sagebrush	Juab UT	0.40	0.14
S	Bassia prostrata	Forage Kochia	Elko/Lander NV	0.50	0.32

Wildlife Habitat and Vegetation History

Table 21R-06.3 - Wildlife Seasonal Habitat. UDWR wildlife habitat and seasonality.

Species	Habitat	Season
Deer	crucial	winter

Table 21R-06.4 - Vegetation History. The dominant vegetation type(s) and phase of woodland succession (Tausch, Miller, Roundy, & Chambers, 2009).

Year	Vegetation Type	Woodland Succession
2007	Wyoming Big Sagebrush/Annual Grass	Phase I
2010	Wyoming Big Sagebrush/Annual Grass	Phase I
2011	Wyoming Big Sagebrush/Annual-Perennial Grass	Phase I
2016	Wyoming Big Sagebrush/Perennial Grass	Phase I

Site Notes

No Notes

Soils

Table 21R-06.5 - Soil Analysis Data. List of chemical and textural soil characteristics determined by laboratory analysis.

Texture	pH	%sand	%silt	%clay	%OM	PPM P	PPM K	ds/m	Sample Date
Loam	7.4	45.4	34.0	20.6	2.0	6.3	182.4	0.5	07/23/2007

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 this ecological site.

The dominant browse species on this site has been Wyoming big sagebrush (*Artemisia tridentata* ssp. *wyomingensis*) since study establishment in 2007, although cover has generally decreased. Other shrub species are present, but have contributed much less cover (Table 21R-06.12). The annual grass species cheatgrass (*Bromus tectorum*) was the main species in the herbaceous understory from 2007 to 2011, but was relatively rare in 2016. Perennial grasses have increased overall in cover, and were a co-dominant site component in 2011 and 2016. Forbs have remained rare (Table 21R-06.7, Table 21R-06.10, Table 21R-06.11). Utah juniper (*Juniperus osteosperma*) has been present in all sample years (Table 21R-06.12, Table 21R-06.13), indicating that this site has the potential for further encroachment.

Trend Summary Tables

Table 21R-06.6 - Shrub/Tree Summary. Average modified Daubenmire quadrat and line intercept cover by year for shrubs/trees.

Year	Quadrat Cover (%)			Line-intercept Cover (%)		
	Preferred Shrub	Other Shrub	Tree	Preferred Shrub	Other Shrub	Tree
2007	11.7	0.5	0.8	15.3	0.5	1.6
2010	13.6	1.8	0.6	17.4	1.8	1.8
2011	3.5	1.6	0.1	7.6	3.0	-
2016	6.3	2.1	-	8.4	2.8	-

Table 21R-06.7 - Herbaceous Summary. Nested frequency and average modified Daubenmire quadrat cover by year for herbaceous functional groups.

Year	Nested Frequency				Quadrat Cover (%)			
	Annual Grass	Perennial Grass	Annual/Biennial Forb	Perennial Forb	Annual Grass	Perennial Grass	Annual/Biennial Forb	Perennial Forb
2007	423	265	163	25	15.7	8.0	0.7	0.2
2010	318	203	99	81	13.7	7.2	1.0	1.2
2011	405	296	252	66	18.5	15.2	2.3	0.8
2016	235	269	225	49	3.9	10.8	1.8	0.2

Table 21R-06.8 - Basic Ground Cover. Average modified Daubenmire quadrat cover by year for basic ground cover types.

Year	Cover Type (%)					
	Bare Ground	Cryptograms	Litter	Pavement	Rock	Vegetation
2007	22.2	5.6	33.4	6.6	6.6	38.5
2010	21.8	3.6	41.1	10.2	7.2	37.8
2011	30.5	0.9	27.8	4.5	2.8	43.3
2016	51.4	-	30.9	3.4	2.4	24.7

Table 21R-06.9 - Pellet Group Data. Quadrat frequency and pellet group transect data for animal pellets. Rabbit pellet groups are not sampled in the pellet group transect.

Year	Cattle	Mule Deer	Elk	Rabbit
	Quadrat Frequency			
2007	5	5	-	59
2010	2	7	-	23
2011	1	5	-	15
2016	1	1	-	69
Year	Days Use Per Acre (ha)			
2007	5.8 (14.3)	22.8 (56.3)	2.0 (5.0)	-
2010	2.9 (7.2)	6.7 (16.6)	-	-
2011	15.3 (37.7)	4.7 (11.6)	-	-
2016	9.4 (23.3)	2.7 (6.6)	-	-

Table 21R-06.10 - Grass Species. Nested frequency and modified Daubenmire average cover by year.

GRASS SPECIES	Achnatherum hymenoides (Indian ricegrass)	Agropyron cristatum ⁱ (crested wheatgrass)	Bromus tectorum ^{ai} (cheatgrass)	Elymus elymoides (squirriltail)	Elymus wawawaiensis (Snake River wheatgrass)	Pascopyrum smithii (western wheatgrass)	Poa secunda (Sandberg bluegrass)	Secale cereale ^{ai} (cereal rye)	Thinopyrum intermedium ⁱ (intermediate wheatgrass)
year	Nested Frequency								
2007	-	-	423	10	-	-	260	-	-
2010	-	22	318	12	-	-	161	-	16
2011	1	147	405	11	10	39	184	5	19
2016	-	208	235	3	14	-	102	-	26
year	Average Cover (%)								
2007	-	-	15.7	0.1	-	-	7.9	-	-
2010	-	1.3	13.7	0.5	-	-	4.9	-	0.6
2011	0.0	5.7	18.5	0.7	0.3	1.1	6.6	0.0	0.9
2016	-	8.1	3.9	0.1	0.4	-	1.7	-	0.4

a - Annual; n - Noxious Weed; i - Introduced Species

Table 21R-06.11 - Forb Species. Nested frequency and modified Daubenmire average cover by year.

FORB SPECIES	Alyssum desertorum ^{ai} (desert madwort)	Astragalus (milkvetch)	Astragalus utahensis (Utah milkvetch)	Calochortus nuttallii (sego lily)	Ceratocephala testiculata ^{ai} (curvseed butterwort)	Descurainia pinnata ^a (western tansymustard)	Draba ^a (draba)	Erodium cicutarium ^{ai} (redstem stork's bill)	Gilia ^a (gilia)	Lactuca serriola ^{ai} (prickly lettuce)	Lomatium (desertparsley)	Medicago sativa ^a (alfalfa)	Microsteris gracilis ^a (slender phlox)	Onobrychis vicifolia ⁱ (sainfoin)	Phlox longifolia (longleaf phlox)	Sanguisorba minor ⁱ (small burnet)	Sisymbrium altissimum ^{ai} (tall tumbledustard)
year	Nested Frequency																
2007	-	-	-	0	138	17	21	3	6	-	2	-	-	-	22	-	-
2010	-	6	-	-	90	-	5	2	2	5	23	1	13	-	55	-	-
2011	34	-	1	-	235	10	-	-	5	3	17	4	-	1	41	4	1
2016	62	-	-	-	189	32	-	9	16	9	25	-	-	-	25	-	24
year	Average Cover (%)																
2007	-	-	-	0.0	0.6	0.1	0.0	0.0	0.0	-	0.0	-	-	-	0.1	-	-
2010	-	0.1	-	-	1.0	-	0.0	0.0	0.0	0.0	0.4	0.0	0.0	-	0.7	-	-
2011	0.1	-	0.0	-	2.2	0.0	-	-	0.0	0.0	0.1	0.0	-	0.0	0.6	0.2	0.0
2016	0.2	-	-	-	0.7	0.3	-	0.0	0.1	0.1	0.1	-	-	-	0.1	-	0.4

a - Annual/Biennial; n - Noxious Weed; i - Introduced Species

FORB SPECIES	
Zigadenus paniculatus (foothill deathcamas)	
year	Nested Frequency
2007	1
2010	4
2011	3
2016	0
year	Average Cover (%)
2007	0.0
2010	0.1
2011	0.0
2016	0.0

a - Annual/Biennial; n - Noxious Weed; i - Introduced Species

Table 21R-06.12 - Shrub and Tree Species. Average modified Daubenmire quadrat and line intercept cover by year.

SHRUB SPECIES	Line Intercept Cover (%)									
	year	2007	2010	2011	2016	year	2007	2010	2011	2016
Artemisia tridentata ssp. wyomingensis ^p (Wyoming big sagebrush)	14.9	-	0.4	0.1	1.6	-	0.4			
Bassia prostrata ⁱ (forage kochia)	17.3	-	0.6	1.2	1.8	0.1	-			
Chrysothamnus viscidiflorus ssp. viscidiflorus var. stenophyllus (yellow rabbitbrush)	7.6	0	1	2	-	-	-			
Gutierrezia sarothrae (broom snakeweed)	8.4	-	0.2	2.6	-	-	-			
Juniperus osteosperma ⁱ (Utah juniper)										
Purshia stansburiana ^p (Stansbury cliffrose)										
Purshia tridentata ^p (antelope bitterbrush)										
SHRUB SPECIES	Quadrat Cover (%)									
	year	2007	2010	2011	2016	year	2007	2010	2011	2016
Artemisia tridentata ssp. wyomingensis ^p (Wyoming big sagebrush)	11.7	-	0.2	0.3	0.8	0.0	0.0			
Bassia prostrata ⁱ (forage kochia)	13.5	-	0.2	1.6	0.6	0.1	-			
Chrysothamnus viscidiflorus ssp. viscidiflorus var. stenophyllus (yellow rabbitbrush)	3.5	0.1	0.6	1.0	0.1	-	-			
Gutierrezia sarothrae (broom snakeweed)	6.3	0.0	0.5	1.6	-	-	-			

t - Tree Species; p - Preferred Browse; i - Introduced

Table 21R-06.13 - Shrub/Tree Characteristics. Population characteristics of shrub/tree species populations including density reproduction (seedlings), age distribution, utilization, vigor and average size (height/crown) of plants.

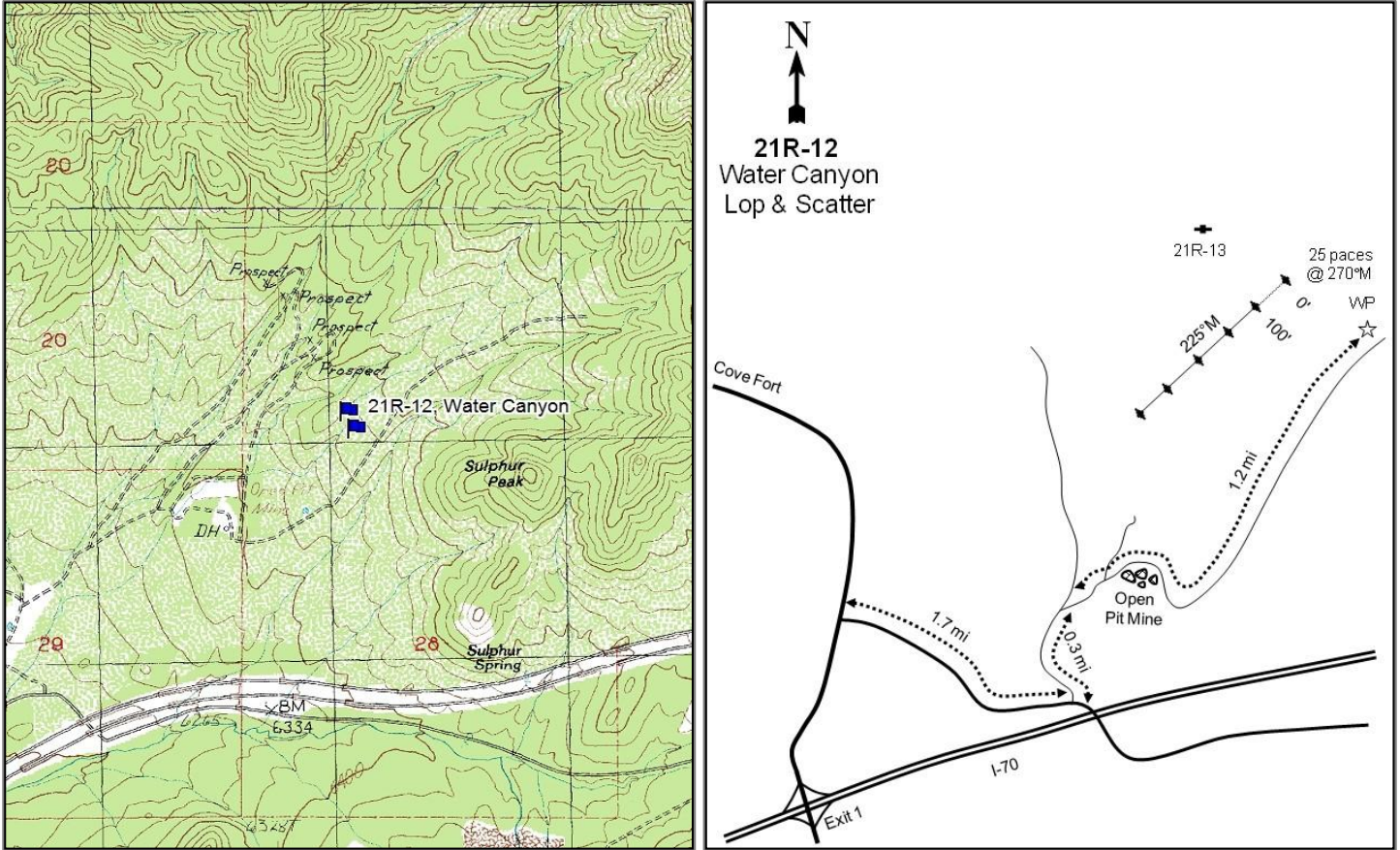
Year	Density		Age Class Distribution			Utilization		Poor Vigor (%)	Average Height Crown (cm)
	Plants Per Acre		Excluding Seedlings			Moderate (%)	Heavy (%)		
	Excluding Seedlings	Seedling	Young (%)	Mature (%)	Decadent (%)				
Artemisia tridentata ssp. wyomingensis^P -- (Wyoming big sagebrush)									
2007	2380	-	0	61	40	11	5	22	78/101
2010	2200	340	8	86	6	22	2	4	75/99
2011	1980	40	44	50	6	5	0	12	52/73
2016	1640	60	6	87	7	20	15	6	46/75
Bassia prostrataⁱ -- (forage kochia)									
2007	-	-	-	-	-	-	-	-	-/-
2010	-	-	-	-	-	-	-	-	-/-
2011	80	-	75	25	0	0	0	0	20/19
2016	40	-	0	100	0	0	100	0	3/9
Chrysothamnus viscidiflorus ssp. viscidiflorus var. stenophyllus -- (yellow rabbitbrush)									
2007	220	-	0	91	9	0	27	0	28/33
2010	400	560	25	75	0	0	0	0	31/45
2011	280	20	14	64	21	0	0	7	36/59
2016	300	-	0	100	0	0	0	0	34/56
Gutierrezia sarothrae -- (broom snakeweed)									
2007	680	80	3	94	3	0	0	12	19/24
2010	800	-	0	100	0	0	0	0	25/36
2011	1300	-	34	63	3	2	0	5	27/35
2016	2020	-	6	93	1	0	0	0	26/36
Juniperus osteosperma^t -- (Utah juniper)									
2007	20	-	0	100	0	0	0	0	-/-
2010	-	-	-	-	-	-	-	-	-/-
2011	40	-	50	50	0	50	0	0	-/-
2016	-	-	-	-	-	-	-	-	-/-
Purshia stansburiana^P -- (Stansbury cliffrose)									
2007	-	-	-	-	-	-	-	-	143/153
2010	20	-	0	0	100	0	0	100	204/225
2011	-	-	-	-	-	-	-	-	65/72
2016	-	-	-	-	-	-	-	-	56/67
Purshia tridentata^P -- (antelope bitterbrush)									
2007	20	-	0	100	0	0	0	0	125/149

t - Tree Species; p - Preferred Browse; i - Introduced Species

Table 21R-06.14 - Tree Characteristics. Point-quarter tree density, size class distribution, and average diameter.

Year	Density	Size Class Distribution					Average Diameter (cm)
	Trees per Acre	Seedling (%)	1-4'	4-8'	8-12'	>12' (%)	
Juniperus osteosperma (Utah juniper)							
2007	21	-	-	64	36	-	17.6
2010	17	-	-	45	55	-	12.5
2011	13	-	11	67	22	-	17.3
2016	11	-	29	71	-	-	14.3

WATER CANYON - STUDY NO. 21R-12



Location Information

USGS 7.5 min Map Info	Cove Fort NE; Township 25S, Range 6W, Section 21
GPS (0' Stake)	NAD 83 UTM ZONE 12, 366013 East 4275219 North

Transect Information

Browse Tag # (0' Stake)	155
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	Standard

Directions to Site

From Cove Fort, turn east at the road opposite a barn. Drive 1.7 miles and turn left. Proceed for 0.3 miles and continue right at the fork. Drive another 1.4 miles, staying to the right. There may be an attempted road closure on one of these roads. There is no witness post: please place one. The site runs parallel to the hillside. Please note that there are two routes to get to this site.

Site Information

Land Ownership	Federal
Land Administrator	USFS
Allotment	Grass Creek Allotment
Elevation	6,479ft (1,975m)
Aspect	South
Slope	4%
Sample Dates	08/13/2009, 06/25/2012, 08/08/2016

Table 21R-12.1 Disturbance History. Recorded history of major disturbances.

Treatment/Disturbance	Name	WRI DB#	Date	Size (acres)
Fire - Prescribed	-	-	Fall 2012-Spring 2013	-
Mechanical - Bull-hog	Cancelled (Water Canyon Forage Enhancement WRI #1493)	USFS	Spring 2009	-

Wildlife Habitat and Vegetation History

Table 21R-12.3 - Wildlife Seasonal Habitat. UDWR wildlife habitat and seasonality.

Species	Habitat	Season
Deer	crucial	winter
Elk	substantial	winter

Table 21R-12.4 - Vegetation History. The dominant vegetation type(s) and phase of woodland succession (Tausch, Miller, Roundy, & Chambers, 2009).

Year	Vegetation Type	Woodland Succession
2009	Mountain Big Sagebrush	Phase I
2012	Annual Grass	Phase I
2016	Perennial Grass	No Encroachment

Site Notes

This study is located approximately two and a half miles east of Cove Fort within a sagebrush flat that was invaded by two-needle pinyon (*Pinus edulis*) and Utah juniper (*Juniperus osteosperma*). The study was established in 2009 to monitor the Water Canyon Forage Enhancement Phase #1, which was cancelled as a Watershed Restoration Initiative project, but the USFS finished the brush-saw/bull-hog portion of the treatment. Data was collected only along the baseline on studies established in 2009. In subsequent sample years data was collected along the standard sample belts, so there may be slight variation in comparison with the 2009 data.

Site Potential

1981-2010 Average Annual Precipitation	17 inches
NRCS Ecological Site	Upland Loam (Mountain Big Sagebrush)
NRCS Ecological Site #	R028AY310UT
States and Transitions	No state and transition model is available for this ecological site.

When the study was established in 2009, the site was dominated by mountain big sagebrush (*Artemisia tridentata* ssp. *vaseyana*) while being encroached upon by Utah juniper (*Juniperus osteosperma*) and two-needle pinyon (*Pinus edulis*) (Table 21R-12.12, Table 21R-12.13). Following the removal of pinyon and juniper trees in 2012, the community was dominated by the invasive annual grass cheatgrass (*Bromus tectorum*) that filled in much of the interspaces. The herbaceous understory was not overly diverse with the introduced grass species, but following a controlled burn the community transitioned to a community dominated by the introduced perennial grass intermediate wheatgrass (*Thinopyrum intermedium*) (Table 21R-12.10). It is predicted that over time sagebrush will increase and become the dominant component in the community.

Trend Summary Tables

Table 21R-12.6 - Shrub/Tree Summary. Average modified Daubenmire quadrat and line intercept cover by year for shrubs/trees.

Year	Quadrat Cover (%)			Line-intercept Cover (%)		
	Preferred Shrub	Other Shrub	Tree	Preferred Shrub	Other Shrub	Tree
2009	2.9	0.0	0.7	5.3	-	1.3
2012	6.6	0.0	2.4	6.4	0.1	3.7
2016	1.2	0.4	-	1.1	1.0	-

Table 21R-12.7 - Herbaceous Summary. Nested frequency and average modified Daubenmire quadrat cover by year for herbaceous functional groups.

Year	Nested Frequency				Quadrat Cover (%)			
	Annual Grass	Perennial Grass	Annual/Biennial Forb	Perennial Forb	Annual Grass	Perennial Grass	Annual/Biennial Forb	Perennial Forb
2009	49	130	132	89	0.8	3.8	0.9	1.6
2012	286	167	264	139	11.3	9.1	3.5	5.6
2016	321	259	400	157	11.8	19.1	6.1	4.0

Table 21R-12.8 - Basic Ground Cover. Average modified Daubenmire quadrat cover by year for basic ground cover types.

Year	Cover Type (%)					
	Bare Ground	Cryptograms	Litter	Pavement	Rock	Vegetation
2009	18.9	-	59.7	8.5	2.2	12.3
2012	11.6	-	69.1	0.8	2.1	37.7
2016	13.1	-	48.6	2.7	1.9	44.6

Table 21R-12.9 - Pellet Group Data. Quadrat frequency and pellet group transect data for animal pellets. Rabbit pellet groups are not sampled in the pellet group transect.

Year	Cattle	Mule Deer	Elk	Rabbit
	Quadrat Frequency			
2009	2	3	1	22
2012	-	1	-	14
2016	4	5	-	50
Year	Days Use Per Acre (ha)			
2009	-	-	-	-
2012	5.8 (14.3)	2.0 (5.0)	2.0 (5.0)	-
2016	34.9 (86.1)	4.7 (11.6)	0.7 (1.7)	-

Table 21R-12.10 - Grass Species. Nested frequency and modified Daubenmire average cover by year.

GRASS SPECIES	Agropyron cristatum ⁱ (crested wheatgrass)	Bromus inermis ⁱ (smooth brome)	Bromus tectorum ^{ai} (cheatgrass)	Elymus elymoides (squirreltail)	Poa fendleriana (nuttongrass)	Poa secunda (Sandberg bluegrass)	Pseudoroegneria spicata (bluebunch wheatgrass)	Thinopyrum intermedium ⁱ (intermediate wheatgrass)
year	Nested Frequency							
2009	10	14	49	21	13	27	22	69
2012	13	2	286	42	1	27	11	102
2016	59	1	321	10	-	18	5	204
year	Average Cover (%)							
2009	0.1	0.1	0.8	0.9	0.3	0.1	0.4	1.9
2012	0.8	0.0	11.3	0.7	0.1	0.4	0.5	6.6
2016	2.7	0.0	11.8	0.2	-	0.1	0.4	15.7

a - Annual; n - Noxious Weed; i - Introduced Species

Table 21R-12.11 - Forb Species. Nested frequency and modified Daubenmire average cover by year.

FORB SPECIES	Alyssum desertorum ^{ai} (desert madwort)	Arabis (rockcress)	Argemone (pricklypoppy)	Astragalus (milkvetch)	Astragalus beckwithii (Beckwith's milkvetch)	Ceratocephala testiculata ^{ai} (curvseed butterwort)	Chaenactis douglasii (Douglas' dustymaiden)	Chenopodium fremontii ^a (Fremont's goosefoot)	Cirsium (thistle)	Collinsia parviflora ^a (maiden blue eyed Mary)	Eriogonum umbellatum (sulphur-flower buckwheat)	Erodium cicutarium ^{ai} (redstem stork's bill)	Gayophytum ramosissimum ^a (pinyon groundsmoke)	Lactuca serriola ^{ai} (prickly lettuce)	Lathyrus brachycalyx (Bonneville pea)	Lithospermum ruderale (western stone seed)	Microsteris gracilis ^a (slender phlox)
year	Nested Frequency																
2009	112	-	-	-	-	8	-	-	-	32	2	-	7	-	85	-	3
2012	261	2	-	-	15	31	5	-	3	11	-	-	-	2	117	1	6
2016	400	-	3	5	2	-	-	3	7	-	-	8	-	47	124	7	-
year	Average Cover (%)																
2009	0.5	-	-	-	-	0.0	-	-	-	0.1	0.0	-	0.2	-	1.6	-	0.0
2012	3.3	0.0	-	-	0.3	0.1	0.0	-	0.1	0.0	-	-	-	0.0	5.0	0.1	0.0
2016	5.6	-	0.4	0.0	0.0	-	-	0.0	0.2	-	-	0.0	-	0.2	3.2	0.2	-

a - Annual/Biennial; n - Noxious Weed; i - Introduced Species

FORB SPECIES	Penstemon (beardtongue)	Phlox longifolia (long/leaf phlox)	Polygonum douglasii ^{ai} (Douglas' knotweed)	Sisymbrium altissimum ^{ai} (tall tumblemustard)	Sphaeralcea coccinea (scarlet globemallow)	Sphaeralcea grossularifolia (gooseberry/leaf globemallow)	Tragopogon dubius ^{ai} (yellow salsify)
year	Nested Frequency						
2009	2	-	4	-	-	-	-
2012	4	2	-	-	-	-	-
2016	-	-	4	20	4	8	0
year	Average Cover (%)						
2009	0.0	-	0.0	-	-	-	-
2012	0.0	0.0	-	-	-	-	-
2016	-	-	0.0	0.3	0.0	0.0	0.0

a - Annual/Biennial; n - Noxious Weed; i - Introduced Species

Table 21R-12.12 - Shrub and Tree Species. Average modified Daubenmire quadrat and line intercept cover by year.

SHRUB SPECIES	Line Intercept Cover (%)					
	year	Line Intercept Cover (%)				
Artemisia tridentata ssp. vaseyana ^p (mountain big sagebrush)	2009	4.9	-	-	1.3	0.4
	2012	6.4	-	0.1	3.7	-
	2016	1.1	0.9	0.1	-	-
Ericameria nauseosa (rubber rabbitbrush)	2009	2.7	0.0	-	0.7	0.2
	2012	6.6	0.0	0.0	2.4	-
	2016	1.2	0.4	0.0	-	-
Gutierrezia sarothrae (broom snakeweed)	2009	2.7	0.0	-	0.7	0.2
	2012	6.6	0.0	0.0	2.4	-
	2016	1.2	0.4	0.0	-	-
Juniperus osteosperma ^t (Utah juniper)	2009	2.7	0.0	-	0.7	0.2
	2012	6.6	0.0	0.0	2.4	-
	2016	1.2	0.4	0.0	-	-
Purshia tridentata ^p (antelope bitterbrush)	2009	2.7	0.0	-	0.7	0.2
	2012	6.6	0.0	0.0	2.4	-
	2016	1.2	0.4	0.0	-	-

t - Tree Species; p - Preferred Browse; i - Introduced

Table 21R-12.13 - Shrub/Tree Characteristics. Population characteristics of shrub/tree species populations including density reproduction (seedlings), age distribution, utilization, vigor and average size (height/crown) of plants.

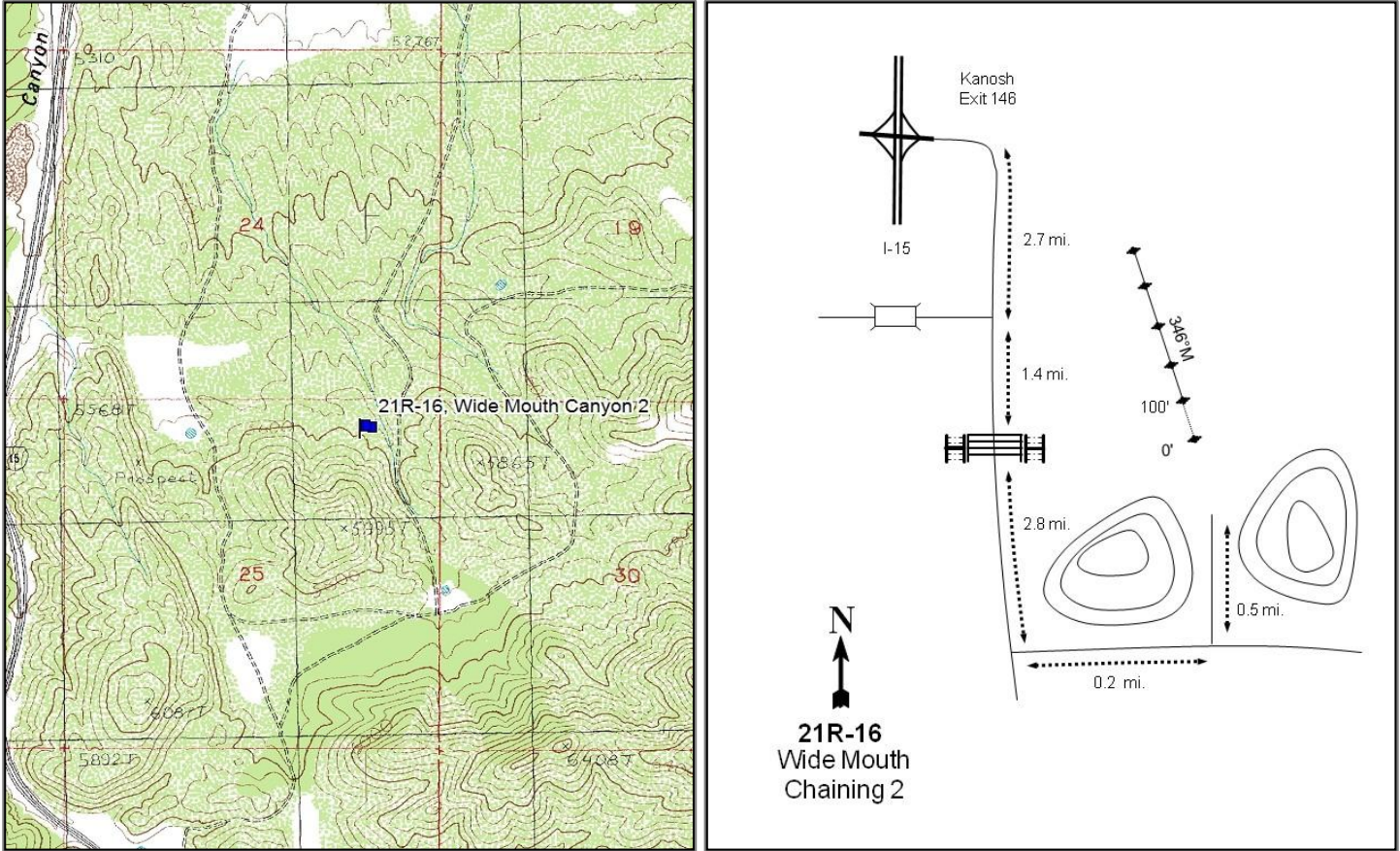
Year	Density		Age Class Distribution			Utilization		Poor Vigor (%)	Average Height Crown (cm)
	Plants Per Acre		Excluding Seedlings			Moderate (%)	Heavy (%)		
	Excluding Seedlings	Seedling	Young (%)	Mature (%)	Decadent (%)				
Artemisia tridentata ssp. vaseyana^p -- (mountain big sagebrush)									
2009	-	-	-	-	-	-	-	-	54/70
2012	3500	240	62	35	3	7	0	4	60/79
2016	540	-	22	78	0	7	0	4	36/50
Ericameria nauseosa -- (rubber rabbitbrush)									
2009	-	-	-	-	-	-	-	-	25/13
2012	80	-	50	50	0	0	0	0	39/42
2016	80	-	25	75	0	0	0	0	63/104
Gutierrezia sarothrae -- (broom snakeweed)									
2009	-	-	-	-	-	-	-	-	28/26
2012	20	-	0	100	0	0	0	0	29/35
2016	160	-	0	100	0	0	0	0	30/38
Juniperus osteosperma^t -- (Utah juniper)									
2009	-	-	-	-	-	-	-	-	-/-
2012	320	40	56	44	0	0	0	13	-/-
2016	20	-	0	100	0	0	0	0	-/-
Opuntia -- (pricklypear)									
2009	-	-	-	-	-	-	-	-	13/39
2012	20	-	0	100	0	0	0	0	16/27
2016	20	-	0	100	0	0	0	0	16/26
Purshia tridentata^p -- (antelope bitterbrush)									
2009	-	-	-	-	-	-	-	-	36/93
2012	-	-	-	-	-	-	-	-	70/151
2016	-	-	-	-	-	-	-	-	42/100
Sambucus nigra ssp. cerulea^p -- (blue elderberry)									
2009	-	-	-	-	-	-	-	-	-/-
2012	-	-	-	-	-	-	-	-	-/-
2016	-	-	-	-	-	-	-	-	85/122

t - Tree Species; p - Preferred Browse; i - Introduced Species

Table 21R-12.14 - Tree Characteristics. Point-quarter tree density, size class distribution, and average diameter.

Year	Density	Size Class Distribution					Average Diameter (cm)
	Trees per Acre	Seedling (%)	1-4'	4-8'	8-12'	>12' (%)	
Juniperus osteosperma (Utah juniper)							
2009	118	15	55	25	5	-	4.6
2012	82	5	63	26	-	5	6.1
2016	10	67	33	-	-	-	1.3
Pinus edulis (two-needle pinyon)							
2009	4	-	-	-	-	100	15.0
2012	3	-	50	-	-	50	13.5
2016	4	-	-	-	-	100	24.0

WIDE MOUTH CANYON 2 - STUDY NO. 21R-16



Location Information

USGS 7.5 min Map Info	Dog Valley Peak NW; Township 24S, Range 7W, Section 25
GPS (0' Stake)	NAD 83 UTM ZONE 12, 362221 East 4284568 North

Transect Information

Browse Tag # (0' Stake)	124
Transect Bearing	4° magnetic
Length	500ft
Belt Placement	Line 1 (11ft), Line 2 (34ft), Line 3 (59ft), Line 4 (71ft), Line 5 (95ft)
Belt Marker Placement	Standard, Belt 3, 4: 1ft

Directions to Site

From I-15, take the Kanosh exit 146 and follow the road east and then south for 2.7 miles. In another 1.4 miles there will be a gate. Passing through the gate, continue for another 2.8 miles and then turn left (east). Drive for 0.2 miles and turn left again (north), passing between two small hills. Drive for another 0.5 miles: the study will be slightly northwest of this point.

Site Information

Land Ownership	Private
Land Administrator	Private
Allotment	No data
Elevation	5,628ft (1,715m)
Aspect	Northwest
Slope	8-9%
Sample Dates	07/29/2013, 08/08/2016

Table 21R-16.1 Disturbance History. Recorded history of major disturbances.

Treatment/Disturbance	Name	WRI DB#	Date	Size (acres)
Chaining - Two-Way Ely/Smooth	Widemouth Canyon Chaining Phase V	2727	Fall 2013	1240
Seeding - Aerial Before	Widemouth Canyon Chaining Phase V	2727	Fall 2013	1240
Seeding - Aerial Before	Widemouth Canyon Chaining Phase V	2727	Fall 2013	1240
Seeding - Dribbler	Widemouth Canyon Chaining Phase V	2727	Fall 2013	1240

Table 21R-16.2 Seed Mix. List of known seeded plant species and rates (if available).

Mix Name		Application Type	Application Date	Acres	
Widemouth Canyon Chaining 5		Aerial	Sep 2013	1240	
Type	Species	Common Name	Cultivar/Source ID	Bulk lbs/acre	PLS lbs/acre
G	<i>Achnatherum hymenoides</i>	Indian Ricegrass	Rimrock	1.49	1.39
G	<i>Agropyron cristatum</i>	Crested Wheatgrass	Hycrest II	1.98	1.72
G	<i>Elymus lanceolatus</i>	Thickspike Wheatgrass	Bannock	1.49	1.05
G	<i>Poa secunda</i>	Sandberg Bluegrass	Mountain Home	1.01	0.92
G	<i>Poa secunda</i>	Big Bluegrass	Sherman	0.08	0.07
G	<i>Poa secunda</i>	Canby Bluegrass	Canbar	0.42	0.22
G	<i>Pseudoroegneria spicata</i>	Bluebunch Wheatgrass	Anatone	0.25	0.22
G	<i>Pseudoroegneria spicata</i>	Bluebunch Wheatgrass	Anatone	0.73	0.69
G	<i>Pseudoroegneria spicata</i>	Bluebunch Wheatgrass	Anatone	1.01	0.78
G	<i>Thinopyrum intermedium</i>	Intermediate Wheatgrass	Clarke	1.49	0.93
F	<i>Astragalus cicer</i>	Cicer Milkvetch	Lutana	0.48	0.46
F	<i>Helianthus annuus</i>	Annual Sunflower	Tooele UT	0.10	0.09
F	<i>Linum perenne</i>	Blue Flax	Appar	0.16	0.14
F	<i>Medicago sativa</i>	Alfalfa	Ranger	0.56	0.51
F	<i>Medicago sativa</i>	Alfalfa	Spredor 4	0.44	0.41
F	<i>Medicago sativa</i>	Alfalfa	Ranger (NC)	1.45	1.37
F	<i>Onobrychis viciifolia</i>	Sainfoin	Eski	1.41	1.37
F	<i>Onobrychis viciifolia</i>	Sainfoin	Eski	0.60	0.53
F	<i>Sanguisorba minor</i>	Small Burnet	Delar	2.02	1.75
Mix Name		Application Type	Application Date	Acres	
Widemouth Canyon Chaining 5 - Dribbler		Dribbler	Sep 2013	1240	
Type	Species	Common Name	Cultivar/Source ID	Bulk lbs/acre	PLS lbs/acre
F	<i>Sanguisorba minor</i>	Small Burnet	Delar	0.12	0.11
S	<i>Cercocarpus ledifolius</i>	Curleaf Mountain Mahogany	Sevier UT	0.08	0.07
S	<i>Purshia stansburiana</i>	Stansbury Cliffrose	Millard UT	0.12	0.08
S	<i>Purshia tridentata</i>	Bitterbrush	Elko/White Pine NV	0.12	0.10
Mix Name		Application Type	Application Date	Acres	
Widemouth Canyon Chaining 5 - Sage Kochia		Aerial	Feb 2014	1240	
Type	Species	Common Name	Cultivar/Source ID	Bulk lbs/acre	PLS lbs/acre
S	<i>Artemisia tridentata</i> ssp. <i>wyomingensis</i>	Wyoming Big Sagebrush	Beaver UT	0.35	0.06
S	<i>Bassia prostrata</i>	Forage Kochia	Beaver UT	0.97	0.77

Wildlife Habitat and Vegetation History

Table 21R-16.3 - Wildlife Seasonal Habitat. UDWR wildlife habitat and seasonality.

Species	Habitat	Season
Deer	crucial	winter
Elk	substantial	winter

Table 21R-16.4 - Vegetation History. The dominant vegetation type(s) and phase of woodland succession (Tausch, Miller, Roundy, & Chambers, 2009).

Year	Vegetation Type	Woodland Succession
2013	Juniper	Phase III
2016	Perennial Grass	Phase I

Site Notes

In 2016, the transect bearing was shifted to 4 degrees magnetic from 352 degrees magnetic. A couple of small deer shed antlers were found on the site in 2013.

Site Potential

1981-2010 Average Annual Precipitation 15 inches
 NRCS Ecological Site Upland Gravelly Loam (Wyoming Big Sagebrush)
 NRCS Ecological Site # R028AY307UT
 States and Transitions A defined state and transition model is available.

When established in 2013, this study site was in Community Phase 3.2 of the Utah Juniper Invasion state (State 3), which is defined by the dominance of Utah juniper (*Juniperus osteosperma*) and a sparse understory (Table 21R- 16.12). A chaining and seeding that occurred in the fall of 2013 caused the site to transition (Transition T3a) to Community Phase 6.1 of the Seeded Range state (State 6), and the site was a perennial grassland when sampled in 2016 (Table 21R-16.7, Table 21R-16.10). According to the model provided, prescribed grazing and appropriate climate conditions could cause this site to transition (Community Pathway 6.1a) to Community Phase 6.2, a phase in which Wyoming big sagebrush (*Artemisia tridentata* ssp. *wyomingensis*) is co-dominant with introduced perennial grasses (USDA-NRCS, 2010). Although it was seeded, Wyoming big sagebrush has not been recorded in either cover or density measurements as of 2016. Juniper is still present in lower amounts, indicating that this site could be infilled in the future (Table 21R- 16.12, Table 21R-16.13).

Trend Summary Tables

Table 21R-16.6 - Shrub/Tree Summary. Average modified Daubenmire quadrat and line intercept cover by year for shrubs/trees.

Year	Quadrat Cover (%)			Line-intercept Cover (%)		
	Preferred Shrub	Other Shrub	Tree	Preferred Shrub	Other Shrub	Tree
2013	3.1	-	9.3	4.3	-	36.7
2016	1.4	-	2.1	1.6	-	3.4

Table 21R-16.7 - Herbaceous Summary. Nested frequency and average modified Daubenmire quadrat cover by year for herbaceous functional groups.

Year	Nested Frequency				Quadrat Cover (%)			
	Annual Grass	Perennial Grass	Annual/Biennial Forb	Perennial Forb	Annual Grass	Perennial Grass	Annual/Biennial Forb	Perennial Forb
2013	194	197	353	22	0.9	3.5	1.0	0.1
2016	284	294	314	65	7.4	16.5	2.1	1.3

Table 21R-16.8 - Basic Ground Cover. Average modified Daubenmire quadrat cover by year for basic ground cover types.

Year	Cover Type (%)					
	Bare Ground	Cryptograms	Litter	Pavement	Rock	Vegetation
2013	18.7	1.7	49.2	14.6	10.5	16.9
2016	19.1	-	48.0	9.6	5.5	30.9

Table 21R-16.9 - Pellet Group Data. Quadrat frequency and pellet group transect data for animal pellets. Rabbit pellet groups are not sampled in the pellet group transect.

Year	Cattle	Mule Deer	Elk	Rabbit
	Quadrat Frequency			
2013	-	17	1	22
2016	4	6	1	14
Days Use Per Acre (ha)				
2013	-	13.4 (33.1)	4.7 (11.6)	-
2016	15.3 (37.7)	18.1 (44.7)	2.0 (5.0)	-

Table 21R-16.10 - Grass Species. Nested frequency and modified Daubenmire average cover by year.

GRASS SPECIES	Achnatherum hymenoides (Indian ricegrass)	Agropyron cristatum ⁱ (crested wheatgrass)	Bromus arvensis ^{ai} (field brome)	Bromus tectorum ^{ai} (cheatgrass)	Elymus elymoides (squirriltail)	Elymus trachycaulus (slender wheatgrass)	Pascopyrum smithii (western wheatgrass)	Poa secunda (Sandberg bluegrass)	Pseudoroegneria spicata (bluebunch wheatgrass)	Thinopyrum intermedium ⁱ (intermediate wheatgrass)
year	Nested Frequency									
2013	-	-	-	194	4	-	10	192	1	-
2016	11	166	1	284	-	53	17	40	39	60
year	Average Cover (%)									
2013	-	-	-	0.9	0.2	-	0.4	2.8	0.1	-
2016	0.3	6.5	0.0	7.4	-	2.9	0.4	1.0	1.9	3.5

a - Annual; n - Noxious Weed; i - Introduced Species

Table 21R-16.11 - Forb Species. Nested frequency and modified Daubenmire average cover by year.

FORB SPECIES	Allium (onion)	Alyssum desertorum ^{ai} (desert madwort)	Arabis (rockcress)	Arenaria (sandwort)	Astragalus eurekaensis (Eureka milkvech)	Calochortus nuttallii (sego lily)	Ceratocephala testiculata ^{ai} (curveseed butterwort)	Cirsium (thistle)	Collinsia parviflora ^a (maiden blue eyed Mary)	Descurainia pinnata ^a (western tansymustard)	Draba ^a (draba)	Gilia ^a (gilia)	Helianthus annuus ^a (common sunflower)	Lactuca serriola ^{ai} (prickly lettuce)	Linum perenne ⁱ (blue flax)	Medicago sativa ⁱ (alfalfa)	Microsteris gracilis ^a (slender phlox)
year	Nested Frequency																
2013	0	299	17	5	2	-	75	-	28	7	1	2	-	1	-	-	37
2016	-	305	-	5	4	2	-	1	-	5	-	-	44	8	26	3	-
year	Average Cover (%)																
2013	0.0	0.6	0.1	0.0	0.0	-	0.2	-	0.0	0.0	0.0	0.0	-	0.0	-	-	0.1
2016	-	1.8	-	0.2	0.0	0.0	-	0.0	-	0.1	-	-	0.1	0.0	0.6	0.1	-

a - Annual/Biennial; n - Noxious Weed; i - Introduced Species

FORB SPECIES	Onobrychis viciifolia ^a (sainfoin)	Phlox hoodii (spiny phlox)	Sanguisorba minor ⁱ (small burnet)	Sisymbrium altissimum ^{ai} (all tumbledustard)	Zigadenus paniculatus (foothill deathcamas)
year	Nested Frequency				
2013	-	-	-	-	1
2016	12	1	19	1	-
year	Average Cover (%)				
2013	-	-	-	-	0.0
2016	0.2	0.0	0.3	0.0	-

a - Annual/Biennial; n - Noxious Weed; i - Introduced Species

Table 21R-16.12 - Shrub and Tree Species. Average modified Daubenmire quadrat and line intercept cover by year.

SHRUB SPECIES	Artemisia nova ^p (black sagebrush)	Juniperus osteosperma ⁱ (Utah juniper)	Purshia stansburiana ^p (Stansbury cliffrose)	Purshia tridentata ^p (antelope bitterbrush)
year	Line Intercept Cover (%)			
2013	0.5	36.7	3.8	-
2016	0.9	3.4	0.6	0.1
year	Quadrat Cover (%)			
2013	0.7	9.3	2.3	0.0
2016	0.2	2.1	1.0	0.2

t - Tree Species; p - Preferred Browse; i - Introduced

Table 21R-16.13 - Shrub/Tree Characteristics. Population characteristics of shrub/tree species populations including density reproduction (seedlings), age distribution, utilization, vigor and average size (height/crown) of plants.

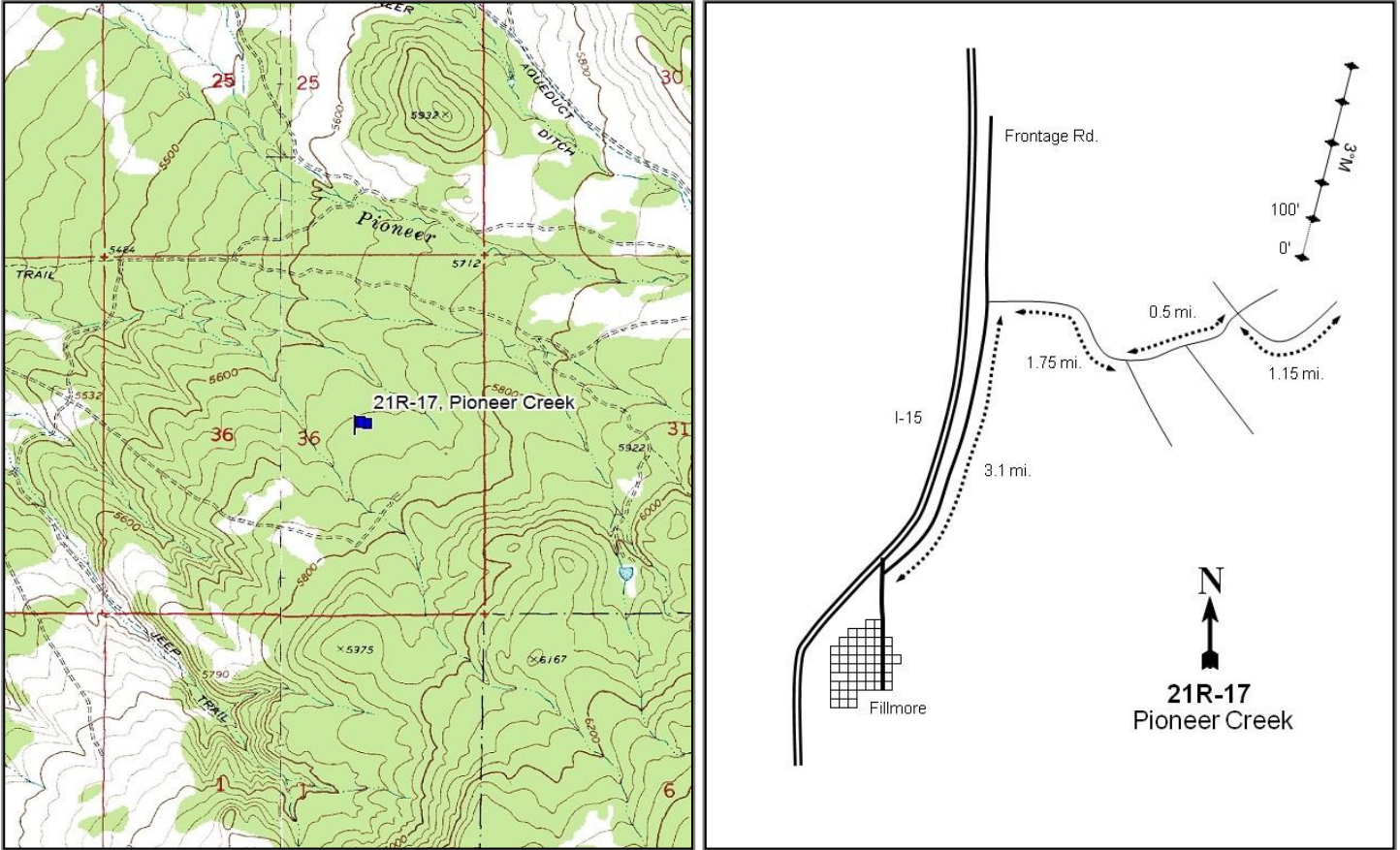
Year	Density		Age Class Distribution			Utilization		Poor Vigor (%)	Average Height Crown (cm)
	Plants Per Acre		Excluding Seedlings			Moderate (%)	Heavy (%)		
	Excluding Seedlings	Seedling	Young (%)	Mature (%)	Decadent (%)				
Artemisia nova^p -- (black sagebrush)									
2013	340	-	6	65	29	12	0	12	25/56
2016	240	-	0	92	8	33	0	0	24/62
Bassia prostrataⁱ -- (forage kochia)									
2013	-	-	-	-	-	-	-	-	-/-
2016	20	-	0	100	0	0	0	0	13/24
Chrysothamnus viscidiflorus -- (yellow rabbitbrush)									
2013	-	-	-	-	-	-	-	-	-/-
2016	-	-	-	-	-	-	-	-	43/47
Gutierrezia sarothrae -- (broom snakeweed)									
2013	-	-	-	-	-	-	-	-	31/36
2016	-	-	-	-	-	-	-	-	-/-
Juniperus osteosperma^t -- (Utah juniper)									
2013	480	100	29	71	0	0	0	4	- / -
2016	120	100	33	33	33	0	17	17	- / -
Purshia stansburiana^p -- (Stansbury cliffrose)									
2013	220	320	64	36	0	9	0	9	166/199
2016	840	-	52	45	2	17	10	0	43/65
Purshia tridentata^p -- (antelope bitterbrush)									
2013	20	-	100	0	0	0	0	0	16/32
2016	100	-	40	60	0	0	0	0	18/30

t - Tree Species; p - Preferred Browse; i - Introduced Species

Table 21R-16.14 - Tree Characteristics. Point-quarter tree density, size class distribution, and average diameter.

Year	Density	Seedling (%)	Size Class Distribution				Average Diameter (cm)
	Trees per Acre		1-4'	4-8'	8-12'	>12' (%)	
Juniperus osteosperma (Utah juniper)							
2013	386	-	10	20	25	45	37.0
2016	173	-	84	16	-	-	6.9

PIONEER CREEK - STUDY NO. 21R-17



Location Information

USGS 7.5 min Map Info	Coffee Peak SW; Township 20S, Range 4W, Section 36
GPS (0' Stake)	NAD 83 UTM ZONE 12, 392056 East 4320853 North

Transect Information

Browse Tag # (0' Stake)	Not Available
Transect Bearing	2° 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 out of Fillmore on Main Street until just before I-15, then turn right onto Frontage Road. Follow Frontage Road for 3.1 miles and then turn right (east). Drive for 1.75 miles to a fork in the road: stay left and continue for 0.5 miles. Turn right and drive for another 1.15 miles. The study will be on the left-hand (west) side of the road.

Site Information

Land Ownership	State
Land Administrator	UDWR
Allotment	No data
Elevation	5,718ft (1,743m)
Aspect	North
Slope	3%
Sample Dates	07/22/2013, 08/10/2016

Table 21R-17.1 Disturbance History. Recorded history of major disturbances.

Treatment/Disturbance	Name	WRI DB#	Date	Size (acres)
Chaining - Two-Way Ely	Pioneer WMA Bullhog	2665	November 2013-March 2014	102
Seeding - Aerial Before	Pioneer WMA Bullhog	2665	November 2013	188

Table 21R-17.2 Seed Mix. List of known seeded plant species and rates (if available).

Mix Name		Application Type	Application Date	Acres	
Pioneer Bullhog		Aerial	Nov 2013	188	
Type	Species	Common Name	Cultivar/Source ID	Bulk lbs/acre	PLS lbs/acre
G	Achnatherum hymenoides	Indian Ricegrass	Nezpar	1.06	1.03
G	Agropyron cristatum	Crested Wheatgrass	CDII	0.80	0.73
G	Bouteloua gracilis	Blue Grama	Hachita	1.06	0.60
G	Pascopyrum smithii	Western Wheatgrass	Arriba	1.06	0.93
G	Poa secunda	Sandberg Bluegrass	Mountain Home	0.27	0.22
G	Pseudoroegneria spicata	Bluebunch Wheatgrass	Anatone	1.06	0.96
G	Thinopyrum intermedium	Intermediate Wheatgrass		0.27	0.24
G	Thinopyrum ponticum	Tall Wheatgrass		0.27	0.25
F	Medicago sativa	Alfalfa	Big Sky Ladak	1.06	1.00
F	Medicago sativa	Alfalfa	Ranger (NC)	1.06	0.98
F	Melilotus officinalis	Yellow Sweetclover		0.53	0.52
F	Sanguisorba minor	Small Burnet	Delar	1.86	1.65

Wildlife Habitat and Vegetation History

Table 21R-17.3 - Wildlife Seasonal Habitat. UDWR wildlife habitat and seasonality.

Species	Habitat	Season
Deer	crucial	winter
Elk	substantial	winter

Table 21R-17.4 - Vegetation History. The dominant vegetation type(s) and phase of woodland succession (Tausch, Miller, Roundy, & Chambers, 2009).

Year	Vegetation Type	Woodland Succession
2013	Gambel Oak/Utah Juniper	Phase II
2016	Gambel Oak/Annual Grass-Forb	Phase I

Site Notes

In 2016, it was noted that Gambel oak (*Quercus gambelii*) plants often had galls on the leaves in moderate to substantial amounts.

Site Potential

1981-2010 Average Annual Precipitation	17 inches
NRCS Ecological Site	Mountain Loam (Oak)
NRCS Ecological Site #	R047XB432UT
States and Transitions	No state and transition model is available for this ecological site.

Upon establishment in 2013, this study site was dominated by Gambel oak (*Quercus gambelii*), Utah juniper (*Juniperus osteosperma*), and mountain big sagebrush (*Artemisia tridentata* ssp. *vaseyana*) and was considered to be in Phase II of woodland succession (Table 21R-17.4, Table 21R-17.12). Following a seeding and chaining treatment, shrub and tree cover decreased and that of annual forbs and grasses increased, and the site was dominated by oak and annual forbs and grasses in 2016 (Table 21R-17.7, Table 21R-17.10, Table 21R-17.11). Although density and cover of juniper were low in the most recent sample year, the site is still considered to be in Phase I of woodland succession and has the potential for future infilling (Table 27R-17.4, Table 21R-17.12).

Trend Summary Tables

Table 21R-17.6 - Shrub/Tree Summary. Average modified Daubenmire quadrat and line intercept cover by year for shrubs/trees.

Year	Quadrat Cover (%)			Line-intercept Cover (%)		
	Preferred Shrub	Other Shrub	Tree	Preferred Shrub	Other Shrub	Tree
2013	31.9	1.3	2.5	56.1	1.6	6.6
2016	26.1	4.9	0.6	35.5	4.0	0.3

Table 21R-17.7 - Herbaceous Summary. Nested frequency and average modified Daubenmire quadrat cover by year for herbaceous functional groups.

Year	Nested Frequency				Quadrat Cover (%)			
	Annual Grass	Perennial Grass	Annual/Biennial Forb	Perennial Forb	Annual Grass	Perennial Grass	Annual/Biennial Forb	Perennial Forb
2013	105	222	306	139	0.7	4.0	2.3	1.2
2016	287	145	383	60	10.1	4.3	10.6	0.9

Table 21R-17.8 - Basic Ground Cover. Average modified Daubenmire quadrat cover by year for basic ground cover types.

Year	Cover Type (%)					
	Bare Ground	Cryptograms	Litter	Pavement	Rock	Vegetation
2013	18.5	0.0	61.3	0.3	0.9	43.1
2016	17.4	-	49.0	0.3	0.1	50.8

Table 21R-17.9 - Pellet Group Data. Quadrat frequency and pellet group transect data for animal pellets. Rabbit pellet groups are not sampled in the pellet group transect.

Year	Cattle	Mule Deer	Elk	Rabbit
	Quadrat Frequency			
2013	1	6	3	9
2016	-	1	-	18
Year	Days Use Per Acre (ha)			
2013	4.4 (10.8)	14.7 (36.4)	4.7 (11.6)	-
2016	1.5 (3.6)	2.0 (5.0)	2.0 (5.0)	-

Table 21R-17.10 - Grass Species. Nested frequency and modified Daubenmire average cover by year.

GRASS SPECIES	Agropyron cristatum ⁱ (crested wheatgrass)	Bromus arvensis ^{ai} (field brome)	Bromus tectorum ^{ai} (cheatgrass)	Elymus elymoides (squirreltail)	Elymus trachycaulus (slender wheatgrass)	Pascopyrum smithii (western wheatgrass)	Poa bulbosa ⁱ (bulbous bluegrass)	Poa fendleriana (muttongrass)	Poa pratensis ⁱ (Kentucky bluegrass)	Poa secunda (Sandberg bluegrass)	Pseudoroegneria spicata (bluebunch wheatgrass)	Thinopyrum intermedium ⁱ (intermediate wheatgrass)
year	Nested Frequency											
2013	-	-	105	6	-	-	108	2	16	74	36	65
2016	1	86	241	2	4	76	24	-	4	53	3	19
year	Average Cover (%)											
2013	-	-	0.7	0.0	-	-	2.3	0.0	0.0	1.3	0.2	0.2
2016	0.1	2.5	7.6	0.0	0.3	1.7	0.4	-	0.0	0.6	0.3	0.9

a - Annual; n - Noxious Weed; i - Introduced Species

Table 21R-17.11 - Forb Species. Nested frequency and modified Daubenmire average cover by year.

FORB SPECIES	Agoseris glauca (pale agoseris)	Allium (onion)	Alyssum desertorum ^{ai} (desert madwort)	Antennaria (pussytoes)	Arabis (rockcress)	Astragalus convallarius (lesser rusby milkvetch)	Calochortus nuttallii (sego lily)	Castilleja angustifolia (northwestern Indian paintbrush)	Ceratocephala testiculata ^{ai} (curveseed butterwort)	Cirsium (thistle)	Collinsia parviflora ^a (maiden blue eyed Mary)	Collomia linearis ^a (tiny trumpet)	Descurainia pinnata ^a (western tansymustard)	Epilobium brachycarpum ^a (tall annual willowherb)	Galium ^a (bedstraw)	Gayophytum ramosissimum ^a (pinyon groundsmoke)	Holosteum umbellatum ^{ai} (jagged chickweed)
year	Nested Frequency																
2013	6	39	178	9	2	8	20	0	24	-	62	86	-	34	26	2	4
2016	-	17	283	-	-	3	16	-	-	2	19	73	3	7	143	-	-
year	Average Cover (%)																
2013	0.0	0.2	1.0	0.0	0.0	0.1	0.4	0.0	0.0	-	0.1	0.5	-	0.1	0.0	0.0	0.0
2016	-	0.1	5.2	-	-	0.1	0.1	-	-	0.0	0.0	0.4	0.0	0.1	4.4	-	-

a - Annual/Biennial; n - Noxious Weed; i - Introduced Species

FORB SPECIES	Lactuca serriola ^{ai} (prickly lettuce)	Lappula occidentalis ^a (flatspine stickseed)	Lomatium (desertparsley)	Microsteris gracilis ^a (slender phlox)	Phlox longifolia (longleaf phlox)	Polygonum douglasii ^a (Douglas' knotweed)	Sanguisorba minor ⁱ (small burnet)	Tragopogon dubius ^{ai} (yellow salsify)	Veronica biloba ^{ai} (two-lobed speedwell)	Vicia americana (American vetch)	Zigadenus paniculatus (foothill deathcamas)
year	Nested Frequency										
2013	-	31	5	23	15	20	-	4	-	59	15
2016	61	-	4	-	3	12	11	9	2	16	4
year	Average Cover (%)										
2013	-	0.4	0.0	0.0	0.1	0.0	-	0.0	-	0.3	0.1
2016	0.3	-	0.0	-	0.0	0.0	0.2	0.1	0.0	0.3	0.1

a - Annual/Biennial; n - Noxious Weed; i - Introduced Species

Table 21R-17.12 - Shrub and Tree Species. Average modified Daubenmire quadrat and line intercept cover by year.

SHRUB SPECIES	Line Intercept Cover (%)			
	Artemisia tridentata ssp. vaseyana ^p (mountain big sagebrush)	Gutierrezia sarothrae (broom snakeweed)	Juniperus osteosperma ^t (Utah juniper)	Quercus gambelii ^p (Gambel oak)
year	Line Intercept Cover (%)			
2013	3.9	1.6	6.6	52.2
2016	1.7	4	0.3	33.8
year	Quadrat Cover (%)			
2013	1.6	1.3	2.5	30.3
2016	1.9	4.9	0.6	24.2

t - Tree Species; p - Preferred Browse; i - Introduced

Table 21R-17.13 - Shrub/Tree Characteristics. Population characteristics of shrub/tree species populations including density reproduction (seedlings), age distribution, utilization, vigor and average size (height/crown) of plants.

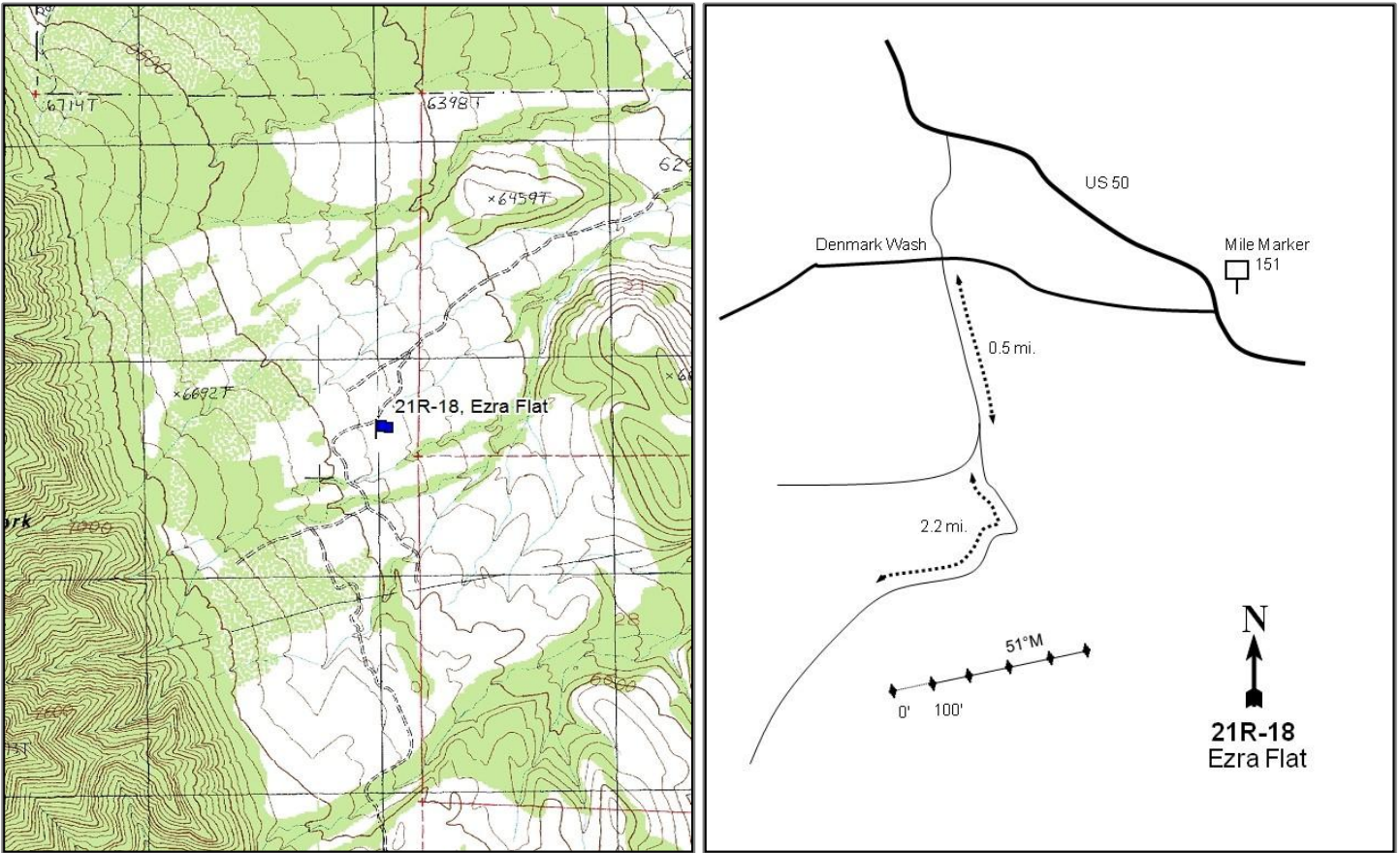
Year	Density		Age Class Distribution			Utilization		Poor Vigor (%)	Average Height Crown (cm)
	Plants Per Acre		Excluding Seedlings			Moderate (%)	Heavy (%)		
	Excluding Seedlings	Seedling	Young (%)	Mature (%)	Decadent (%)				
Artemisia frigida ^p -- (prairie sagewort)									
2013	120	-	0	100	0	0	0	0	- / -
2016	-	-	-	-	-	-	-	-	- / -
Artemisia tridentata ssp. vaseyana ^p -- (mountain big sagebrush)									
2013	860	100	28	63	9	19	0	7	64/95
2016	600	-	13	83	3	10	0	3	41/62
Gutierrezia sarothrae -- (broom snakeweed)									
2013	2620	-	5	95	0	0	0	0	25/27
2016	1800	20	4	94	1	0	0	0	34/50
Juniperus osteosperma ^t -- (Utah juniper)									
2013	100	-	0	100	0	0	0	0	- / -
2016	60	60	67	0	33	0	0	0	- / -
Quercus gambelii ^p -- (Gambel oak)									
2013	10440	1040	31	69	0	0	0	0	149/98
2016	11740	1020	73	27	0	0	0	1	81/67

t - Tree Species; p - Preferred Browse; i - Introduced Species

Table 21R-17.14 - Tree Characteristics. Point-quarter tree density, size class distribution, and average diameter.

Year	Density	Size Class Distribution				Average Diameter (cm)	
	Trees per Acre	Seedling (%)	1-4'	4-8'	8-12'		>12' (%)
Juniperus osteosperma (Utah juniper)							
2013	80	6	12	29	12	41	18.4
2016	18	20	50	30	-	-	4.2

EZRA FLAT - STUDY NO. 21R-18



Location Information

USGS 7.5 min Map Info	Beehive Peak NE; Township 21S, Range 2W, Section 20
GPS (0' Stake)	NAD 83 UTM ZONE 12, 409930 East 4312838 North

Transect Information

Browse Tag # (0' Stake)	Not Available
Transect Bearing	51° 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

Travelling west out of Salina on Highway 50, drive just past mile marker 151. Turn left and continue until the road forks. Keep left and drive 0.5 miles again until the road forks again. Stay left again and proceed for 2.2 miles. The study will be on the left (south) side of the road.

Site Information

Land Ownership	Federal
Land Administrator	USFS
Allotment	Cedar Ridge Allotment
Elevation	6,560ft (1,999m)
Aspect	Northeast
Slope	4%
Sample Dates	07/29/2013, 08/11/2016

Table 21R-18.1 Disturbance History. Recorded history of major disturbances.

Treatment/Disturbance	Name	WRI DB#	Date	Size (acres)
Chaining - Unknown	-	-	Historic	1100
Mechanical - Bullhog	Ezra Flat Winter Range Restoration	2623	Fall 2013	1048

Wildlife Habitat and Vegetation History

Table 21R-18.3 - Wildlife Seasonal Habitat. UDWR wildlife habitat and seasonality.

Species	Habitat	Season
Deer	crucial	winter

Table 21R-18.4 - Vegetation History. The dominant vegetation type(s) and phase of woodland succession (Tausch, Miller, Roundy, & Chambers, 2009).

Year	Vegetation Type	Woodland Succession
2013	Black Sagebrush/Pinyon-Juniper	Phase I transitioning to Phase II
2016	Black Sagebrush	Phase I

Site Notes

No Notes

Site Potential

1981-2010 Average Annual Precipitation	14 inches
NRCS Ecological Site	Upland Shallow Hardpan (Black Sagebrush-Bluegrass)
NRCS Ecological Site #	R047XB316UT
States and Transitions	No state and transition model is available for this ecological site.

This site was established in 2013 and was dominated by black sagebrush (*Artemisia nova*) with Utah juniper (*Juniperus osteosperma*) and two-needle pinyon (*Pinus edulis*) scattered throughout and was considered to be transitioning from Phase I to Phase II of woodland succession. The 2013 bullhog treatment removed most of the tree cover, and black sagebrush was the sole dominant site component in the 2016 sample year (Table 21R-18.12) although a variety of other browse species were observed in height crown measurements (Table 21R-18.13). The herbaceous understory was sparse in both sample years (Table 21R-18.7, Table 21R-18.10, Table 21R-18.11). Although 2016 cover and density of pinyon-juniper were low, their presence indicates that this site has the potential to be infilled in the future (Table 21R-18.12, Table 21R-18.13).

Trend Summary Tables

Table 21R-18.6 - Shrub/Tree Summary. Average modified Daubenmire quadrat and line intercept cover by year for shrubs/trees.

Year	Quadrat Cover (%)			Line-intercept Cover (%)		
	Preferred Shrub	Other Shrub	Tree	Preferred Shrub	Other Shrub	Tree
2013	16.5	0.3	7.3	21.8	0.4	16.7
2016	14.9	0.3	0.9	23.6	0.1	0.2

Table 21R-18.7 - Herbaceous Summary. Nested frequency and average modified Daubenmire quadrat cover by year for herbaceous functional groups.

Year	Nested Frequency				Quadrat Cover (%)			
	Annual Grass	Perennial Grass	Annual/Biennial Forb	Perennial Forb	Annual Grass	Perennial Grass	Annual/Biennial Forb	Perennial Forb
2013	15	92	33	111	0.1	0.7	0.1	1.7
2016	0	50	18	39	0.0	0.5	0.5	1.0

Table 21R-18.8 - Basic Ground Cover. Average modified Daubenmire quadrat cover by year for basic ground cover types.

Year	Cover Type (%)					
	Bare Ground	Cryptograms	Litter	Pavement	Rock	Vegetation
2013	28.0	7.8	43.5	4.4	9.1	23.9
2016	23.6	0.8	55.8	2.4	3.3	16.9

Table 21R-18.9 - Pellet Group Data. Quadrat frequency and pellet group transect data for animal pellets. Rabbit pellet groups are not sampled in the pellet group transect.

Year	Mule Deer	Rabbit
	Quadrat Frequency	
2013	6	19
2016	1	34
Year	Days Use Per Acre (ha)	
2013	2.0 (5.0)	-
2016	8.1 (19.9)	-

Table 21R-18.10 - Grass Species. Nested frequency and modified Daubenmire average cover by year.

GRASS SPECIES	Achnatherum hymenoides (Indian ricegrass)	Agropyron cristatum ⁱ (crested wheatgrass)	Bromus tectorum ^{ai} (cheatgrass)	Carex (sedge)	Elymus elymoides (squirreltail)	Poa fendleriana (nuttongrass)	Poa secunda (Sandberg bluegrass)
year	Nested Frequency						
2013	2	40	15	1	19	3	41
2016	4	6	0	19	11	3	8
year	Average Cover (%)						
2013	0.0	0.3	0.1	0.0	0.1	0.0	0.3
2016	0.0	0.1	0.0	0.2	0.1	0.0	0.1

a - Annual; n - Noxious Weed; i - Introduced Species

Table 21R-18.11 - Forb Species. Nested frequency and modified Daubenmire average cover by year.

FORB SPECIES	Agoseris glauca (pale agoseris)	Alyssum desertorum ^{ai} (desert madwort)	Arabis (rockcress)	Arenaria (sandwort)	Astragalus calycosus (Torrey's milkvetch)	Ceratocephala testiculata ^{ai} (curvseed butterwort)	Chaenactis douglasii (Douglas' dustymaiden)	Cymopterus (springparsley)	Descurainia pinnata ^a (western tansymustard)	Epilobium brachycarpum ^a (tall annual willowherb)	Erigeron eatonii (Eaton's fleabane)	Eriogonum racemosum (redroot buckwheat)	Eriogonum umbellatum (sulphur-flower buckwheat)	Gilia ^a (gilia)	Ipomopsis aggregata (scarlet gilia)	Ipomopsis congesta (ballhead ipomopsis)	Lactuca serriola ^{ai} (prickly lettuce)
year	Nested Frequency																
2013	1	2	15	1	2	18	5	2	6	2	3	0	10	8	7	13	-
2016	-	-	1	-	-	-	3	-	9	-	-	-	-	1	-	-	5
year	Average Cover (%)																
2013	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	-
2016	-	-	0.0	-	-	-	0.1	-	0.0	-	-	-	-	0.0	-	-	0.0

a - Annual/Biennial; n - Noxious Weed; i - Introduced Species

FORB SPECIES	Lesquerella (bladderpod)	Lithospermum incisum (narrowleaf stoneseed)	Machaeranthera canescens (hoary tansyaster)	Nicotiana attenuata ^a (coyote tobacco)	Orobanche fasciculata (clustered broomrape)	Packera multilobata (lobeleaf groundsel)	Pedicularis centranthera (dwarf lousewort)	Penstemon comarrhenus (dusty beardtongue)	Penstemon pachyphyllus (thickleaf beardtongue)	Phlox austromontana (mountain phlox)	Schoenocrambe limifolia (flaxleaf plainsmustard)	Solanum triflorum ^a (cutleaf nightshade)	Streptanthus cordatus (heartleaf twistflower)
year	Nested Frequency												
2013	1	-	3	-	1	12	2	3	3	47	1	-	20
2016	1	3	-	2	-	4	-	1	3	12	2	3	15
year	Average Cover (%)												
2013	0.0	-	0.0	-	0.0	0.1	0.0	0.0	0.0	1.2	0.0	-	0.1
2016	0.0	0.0	-	0.0	-	0.2	-	0.1	0.2	0.1	0.0	0.4	0.1

a - Annual/Biennial; n - Noxious Weed; i - Introduced Species

Table 21R-18.12 - Shrub and Tree Species. Average modified Daubenmire quadrat and line intercept cover by year.

SHRUB SPECIES	Artemisia nova ^p (black sagebrush)	Artemisia tridentata ssp. wyomingensis ^p (Wyoming big sagebrush)	Juniperus osteosperma ^t (Utah juniper)	Linanthus pungens (granite prickly phlox)	Opuntia (pricklypear)	Pinus edulis ^t (twoneedle pinyon)	Quercus gambelii ^p (Gambel oak)
year	Line Intercept Cover (%)						
2013	21	0.8	7	0.4	-	9.7	-
2016	19.6	-	-	-	0.1	0.2	4
year	Quadrat Cover (%)						
2013	16.1	0.4	2.5	0.3	0.0	4.8	-
2016	12.1	-	-	-	0.3	0.9	2.8

t - Tree Species; p - Preferred Browse; i - Introduced

Table 21R-18.13 - Shrub/Tree Characteristics. Population characteristics of shrub/tree species populations including density reproduction (seedlings), age distribution, utilization, vigor and average size (height/crown) of plants.

Year	Density		Age Class Distribution			Utilization		Poor Vigor (%)	Average Height Crown (cm)
	Plants Per Acre		Excluding Seedlings			Moderate (%)	Heavy (%)		
	Excluding Seedlings	Seedling	Young (%)	Mature (%)	Decadent (%)				
Artemisia nova ^p -- (black sagebrush)									
2013	6260	260	11	74	15	19	3	15	37/63
2016	6220	120	8	78	14	16	0	3	34/63
Artemisia tridentata ssp. wyomingensis ^p -- (Wyoming big sagebrush)									
2013	100	40	60	40	0	0	0	0	54/61
2016	20	-	0	100	0	0	0	0	64/90
Cercocarpus ledifolius var. ledifolius ^p -- (curl-leaf mountain mahogany)									
2013	-	-	-	-	-	-	-	-	89/142
2016	-	-	-	-	-	-	-	-	86/87

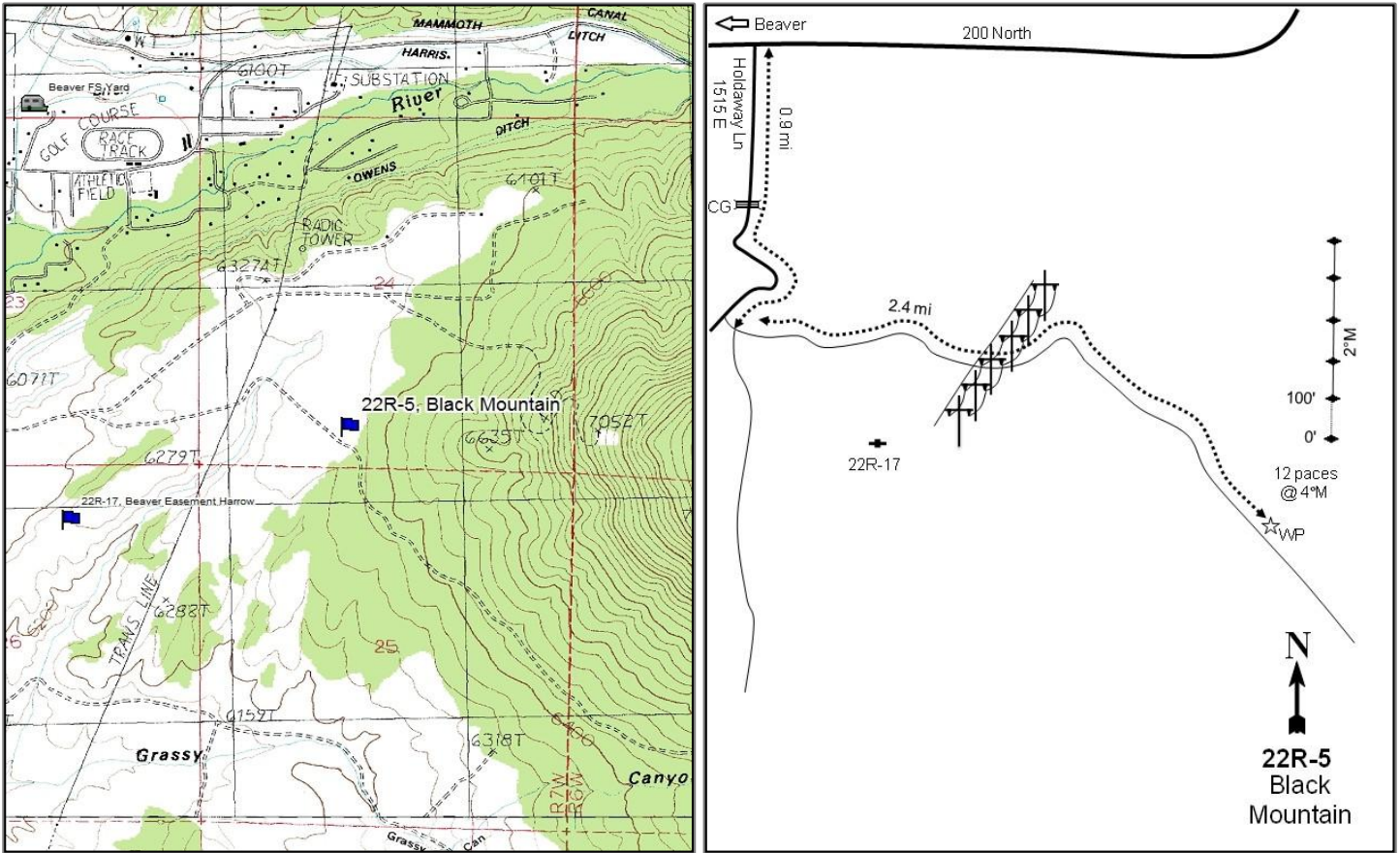
Year	Density		Age Class Distribution			Utilization		Poor Vigor (%)	Average Height Crown (cm)
	Plants Per Acre		Excluding Seedlings			Moderate (%)	Heavy (%)		
	Excluding Seedlings	Seedling	Young (%)	Mature (%)	Decadent (%)				
Cercocarpus montanus^P -- (alderleaf mountain mahogany)									
2013	-	-	-	-	-	-	-	-	-/-
2016	-	-	-	-	-	-	-	-	80/99
Ericameria nauseosa -- (rubber rabbitbrush)									
2013	-	-	-	-	-	-	-	-	-/-
2016	-	-	-	-	-	-	-	-	74/111
Juniperus osteosperma^t -- (Utah juniper)									
2013	180	-	44	56	0	0	0	0	- / -
2016	20	-	100	0	0	0	0	0	- / -
Linanthus pungens -- (granite prickly phlox)									
2013	300	-	7	93	0	0	0	7	16/26
2016	-	-	-	-	-	-	-	-	-/-
Opuntia -- (pricklypear)									
2013	100	-	20	80	0	0	0	0	12/19
2016	180	-	0	100	0	0	0	0	9/28
Pinus edulis^t -- (twoneedle pinyon)									
2013	200	60	50	50	0	0	0	0	- / -
2016	-	60	0	0	0	0	0	0	- / -
Quercus gambelii^P -- (Gambel oak)									
2013	-	-	-	-	-	-	-	-	94/85
2016	1280	240	38	63	0	31	55	0	69/63

t - Tree Species; p - Preferred Browse; i - Introduced Species

Table 21R-18.14 - Tree Characteristics. Point-quarter tree density, size class distribution, and average diameter.

Year	Density	Size Class Distribution					Average Diameter (cm)
	Trees per Acre	Seedling (%)	1-4'	4-8'	8-12'	>12' (%)	
Juniperus osteosperma (Utah juniper)							
2013	160	10	15	15	45	15	14.8
2016	14	33	50	17	-	-	4.0
Pinus edulis (twoneedle pinyon)							
2013	108	6	12	35	24	24	16.3
2016	5	60	40	-	-	-	2.6

BLACK MOUNTAIN - STUDY No. 22R-5



Location Information

USGS 7.5 min Map Info Black Ridge SW; Township 29S, Range 7W, Section 24
 GPS (0' Stake) NAD 83 UTM ZONE 12, 360424 East 4236501 North

Transect Information

Browse Tag # (0' Stake) 42
 Transect Bearing 2° 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 Beaver, drive east on 200 North. Holdaway Lane (1515 East) comes in from the south: turn onto this road, drive for 0.9 miles, and turn left. Travel 1 mile to the power lines. At the power lines, turn south and travel 0.1 miles to a fork. Go left at the fork and proceed 0.4 miles to a witness post on the left (north) side of the road. The 0-foot stake is 12 paces from the witness post at 4 degrees magnetic and is marked with browse tag #42.

Site Information

Land Ownership	Private
Land Administrator	Private
Allotment	LEE SPRINGS
Elevation	6,350ft (1,935m)
Aspect	Southwest
Slope	3%
Sample Dates	07/20/2004, 06/21/2007, 06/25/2012, 08/09/2016

Table 22R-05.1 Disturbance History. Recorded history of major disturbances.

Treatment/Disturbance	Name	WRI DB#	Date	Size (acres)
Seeding - Aerial	Black Mountain	PDB	2004	-
Hand Crew - Lop and Scatter	-	-	Between 2004 and 2007	-
Harrow - Two-Way Dixie	Beaver Easement Property Treatment	1294	Fall 2008	205
Seeding - Broadcast Before	Beaver Easement Property Treatment	1294	Fall 2008	205
Seeding - Aerial After	Beaver Easement Property Treatment	1294	Winter 2009	205

Table 22R-05.2 Seed Mix. List of known seeded plant species and rates (if available).

Mix Name			Application Type	Application Date	Acres
Beaver Easement			Broadcast	Nov 2008	210
Type	Species	Common Name	Cultivar/Source ID	Bulk lbs/acre	PLS lbs/acre
G	Achnatherum hymenoides	Indian Ricegrass	Rimrock	2.14	1.97
G	Pseudoroegneria spicata	Bluebunch Wheatgrass	Anatone	1.43	1.17
G	Thinopyrum intermedium	Intermediate Wheatgrass	Oahe	2.14	1.94
F	Cleome serrulata	Rocky Mountain Beeplant	Iron UT	0.48	0.43
F	Medicago sativa	Alfalfa	Ladak	1.43	1.30
F	Melilotus officinalis	Yellow Sweetclover		0.48	0.43
F	Onobrychis viciifolia	Sainfoin	Eski	3.10	2.72
F	Sanguisorba minor	Small Burnet	Delar	1.90	1.80
F	Sphaeralcea grossulariifolia	Gooseberryleaf Globemallow	Lincoln NV	0.12	0.09
Mix Name			Application Type	Application Date	Acres
Beaver Easement - Kochia			Aerial	Jan 2009	200
Type	Species	Common Name	Cultivar/Source ID	Bulk lbs/acre	PLS lbs/acre
F	Medicago sativa	Alfalfa	Ladak 65	1.00	0.89
S	Bassia prostrata	Forage Kochia	Lander NV	1.00	0.66

Wildlife Habitat and Vegetation History**Table 22R-05.3 - Wildlife Seasonal Habitat.** UDWR wildlife habitat and seasonality.

Species	Habitat	Season
Deer	crucial	winter

Table 22R-05.4 - Vegetation History. The dominant vegetation type(s) and phase of woodland succession (Tausch, Miller, Roundy, & Chambers, 2009).

Year	Vegetation Type	Woodland Succession
2004	Wyoming Big Sagebrush	Phase I
2007	Wyoming Big Sagebrush	Phase I
2012	Wyoming Big Sagebrush/Perennial Grass	Phase I
2016	Wyoming Big Sagebrush/Perennial Grass	Phase I

Site Notes

The study is located approximately one mile southeast of Beaver within a Wyoming big sagebrush (*Artemisia tridentata* ssp. *wyomingensis*) flat.

Soils**Table 22R-05.5 - Soil Analysis Data.** List of chemical and textural soil characteristics determined by laboratory analysis.

Texture	pH	%sand	%silt	%clay	%OM	PPM P	PPM K	ds/m	Sample Date
Clay Loam	7.4	41.0	31.5	27.5	2.2	5.6	163.2	0.7	07/20/2004

Site Potential

1981-2010 Average Annual Precipitation 13 inches
 NRCS Ecological Site Upland Loam (Wyoming Big Sagebrush)
 NRCS Ecological Site # R028AY309UT
 States and Transitions No state and transition model is available for this ecological site.

Since study establishment in 2004, the dominant browse species has been Wyoming big sagebrush (*Artemisia tridentata* ssp. *wyomingensis*) (Table 22R-05.12). The herbaceous understory was initially lacking in cover, but perennial grasses increased and became a co-dominant site component in 2012 (Table 22R-05.7, Table 22R-05.10). Although two-needle pinyon (*Pinus edulis*) and Utah juniper (*Juniperus osteosperma*) were sparsely scattered throughout the site in 2004, cover decreased after a lop and scatter treatment between 2004 and 2007 (Table 22R-05.1, Table 22R-05.12). However, density data indicates that trees have been present in all sample years, suggesting that this site could be further encroached in the future (Table 22R-05.13).

Trend Summary Tables

Table 22R-05.6 - Shrub/Tree Summary. Average modified Daubenmire quadrat and line intercept cover by year for shrubs/trees.

Year	Quadrat Cover (%)			Line-intercept Cover (%)		
	Preferred Shrub	Other Shrub	Tree	Preferred Shrub	Other Shrub	Tree
2004	14.7	-	2.2	17.7	-	4.7
2007	12.4	0.0	0.0	17.3	-	-
2012	11.4	0.4	0.0	17.5	0.3	-
2016	13.1	0.7	-	15.9	0.5	-

Table 22R-05.7 - Herbaceous Summary. Nested frequency and average modified Daubenmire quadrat cover by year for herbaceous functional groups.

Year	Nested Frequency				Quadrat Cover (%)			
	Annual Grass	Perennial Grass	Annual/Biennial Forb	Perennial Forb	Annual Grass	Perennial Grass	Annual/Biennial Forb	Perennial Forb
2004	16	208	219	142	0.0	4.0	1.1	1.2
2007	260	221	413	146	2.2	5.1	3.5	1.1
2012	210	256	310	163	4.5	12.9	1.8	3.1
2016	90	272	297	203	0.8	13.5	1.4	4.1

Table 22R-05.8 - Basic Ground Cover. Average modified Daubenmire quadrat cover by year for basic ground cover types.

Year	Cover Type (%)					
	Bare Ground	Cryptograms	Litter	Pavement	Rock	Vegetation
2004	39.0	0.4	28.6	20.4	2.9	23.0
2007	34.1	0.4	26.1	16.3	3.8	27.2
2012	22.3	0.0	51.9	5.5	4.4	38.2
2016	42.0	0.0	31.4	7.0	2.1	31.9

Table 22R-05.9 - Pellet Group Data. Quadrat frequency and pellet group transect data for animal pellets. Rabbit pellet groups are not sampled in the pellet group transect.

Year	Cattle	Mule Deer	Rabbit
	Quadrat Frequency		
2004	3	11	4
2007	1	7	58
2012	-	2	8
2016	1	6	26
Year	Days Use Per Acre (ha)		
2004	5.1 (12.6)	27.5 (67.9)	-
2007	11.6 (28.7)	22.1 (54.6)	-
2012	-	0.7 (1.7)	-
2016	7.2 (17.9)	1.3 (3.3)	-

Table 22R-05.10 - Grass Species. Nested frequency and modified Daubenmire average cover by year.

GRASS SPECIES	Achnatherum hymenoides (Indian ricegrass)	Bromus tectorum ^{ai} (cheatgrass)	Elymus elymoides (squirreltail)	Hesperostipa comata (needle and thread)	Pascopyrum smithii (western wheatgrass)	Pleuraphis jamesii (James' galleta)	Poa secunda (Sandberg bluegrass)	Pseudoroegneria spicata (bluebunch wheatgrass)
year	Nested Frequency							
2004	148	16	4	52	24	9	-	6
2007	168	260	26	35	27	-	5	15
2012	176	210	54	29	44	5	5	4
2016	147	90	69	133	41	5	1	3
year	Average Cover (%)							
2004	2.8	0.0	0.1	0.9	0.1	0.0	-	0.0
2007	3.6	2.2	0.2	1.0	0.2	-	0.0	0.1
2012	9.7	4.5	0.7	0.6	1.5	0.2	0.0	0.2
2016	6.5	0.8	1.0	5.3	0.4	0.1	0.0	0.1

a - Annual; n - Noxious Weed; i - Introduced Species

Table 22R-05.11 - Forb Species. Nested frequency and modified Daubenmire average cover by year.

FORB SPECIES	Alysum desertorum ^{ai} (desert madwort)	Astragalus calycosus (Torrey's milkvetch)	Astragalus lentiginosus (freckled milkvetch)	Ceratocephala testiculata ^{ai} (curvseed butterwort)	Chaetopappa ericoides (rose heath)	Collinsia parviflora ^a (maiden blue eyed Mary)	Cryptantha (cryptantha)	Descurainia pinnata ^a (western tansymustard)	Draba ^a (draba)	Gilia ^a (gilia)	Orobanche fasciculata (clustered broomrape)	Penstemon comarthenus (dusty beardtongue)	Phlox hoodii (spiny phlox)	Phlox longifolia (longleaf phlox)	Sanguisorba minor ^r (small burnet)	Sphaeralcea coccinea (scarlet globemallow)
year	Nested Frequency															
2004	-	-	-	193	52	0	-	10	5	56	-	-	11	23	-	75
2007	96	2	2	404	44	8	-	-	-	12	-	-	16	35	2	77
2012	173	6	5	228	70	3	5	-	-	-	5	3	10	29	-	84
2016	242	3	10	9	116	-	1	-	-	152	-	3	7	26	-	100
year	Average Cover (%)															
2004	-	-	-	0.9	0.5	0.0	-	0.0	0.0	0.2	-	-	0.1	0.1	-	0.6
2007	0.2	0.0	0.0	3.2	0.4	0.0	-	-	-	0.0	-	-	0.1	0.1	0.0	0.6
2012	0.8	0.0	0.0	1.0	1.8	0.0	0.0	-	-	-	0.0	0.0	0.2	0.1	-	0.9
2016	0.8	0.0	0.0	0.0	2.4	-	0.0	-	-	0.6	-	0.0	0.2	0.1	-	1.3

a - Annual/Biennial; n - Noxious Weed; i - Introduced Species

Table 22R-05.12 - Shrub and Tree Species. Average modified Daubenmire quadrat and line intercept cover by year.

SHRUB SPECIES	Line Intercept Cover (%)					
	year	Line Intercept Cover (%)				
Artemisia tridentata ssp. wyomingensis ^p (Wyoming big sagebrush)	2004	17.7	-	-	1.4	3.3
	2007	17.3	-	-	-	-
	2012	17.5	0.3	-	-	-
	2016	15.9	0.5	-	-	-
SHRUB SPECIES	Quadrat Cover (%)					
	year	Quadrat Cover (%)				
	2004	14.7	-	-	1.0	1.2
	2007	12.4	0.0	0.0	0.0	-
	2012	11.4	0.4	-	0.0	-
	2016	13.1	0.7	-	-	-

t - Tree Species; p - Preferred Browse; i - Introduced

Table 22R-05.13 - Shrub/Tree Characteristics. Population characteristics of shrub/tree species populations including density reproduction (seedlings), age distribution, utilization, vigor and average size (height/crown) of plants.

Year	Density		Age Class Distribution			Utilization		Poor Vigor (%)	Average Height Crown (cm)
	Plants Per Acre		Excluding Seedlings			Moderate (%)	Heavy (%)		
	Excluding Seedlings	Seedling	Young (%)	Mature (%)	Decadent (%)				
Artemisia tridentata ssp. wyomingensis^p -- (Wyoming big sagebrush)									
2004	3860	60	1	62	38	32	11	17	50/75
2007	3160	-	0	66	34	25	31	44	51/83
2012	3680	160	38	50	13	15	0	40	46/78
2016	4820	-	14	74	12	31	3	7	42/76
Atriplex canescens^p -- (fourwing saltbush)									
2004	-	-	-	-	-	-	-	-	69/95
2007	-	-	-	-	-	-	-	-	-/-
2012	-	-	-	-	-	-	-	-	-/-
2016	-	-	-	-	-	-	-	-	-/-
Bassia prostrataⁱ -- (forage kochia)									
2004	-	-	-	-	-	-	-	-	-/-
2007	-	40	0	0	0	0	0	0	-/-
2012	2120	640	40	60	0	5	59	12	9/17
2016	1200	-	7	93	0	13	28	5	14/22
Chrysothamnus viscidiflorus ssp. viscidiflorus -- (yellow rabbitbrush)									
2004	-	-	-	-	-	-	-	-	33/39
2007	-	40	0	0	0	0	0	0	-/-
2012	60	-	0	100	0	0	0	0	24/36
2016	-	-	-	-	-	-	-	-	33/59
Gutierrezia sarothrae -- (broom snakeweed)									
2004	-	-	-	-	-	-	-	-	-/-
2007	-	-	-	-	-	-	-	-	-/-
2012	20	-	100	0	0	0	0	0	16/10
2016	40	-	0	100	0	0	0	0	23/27

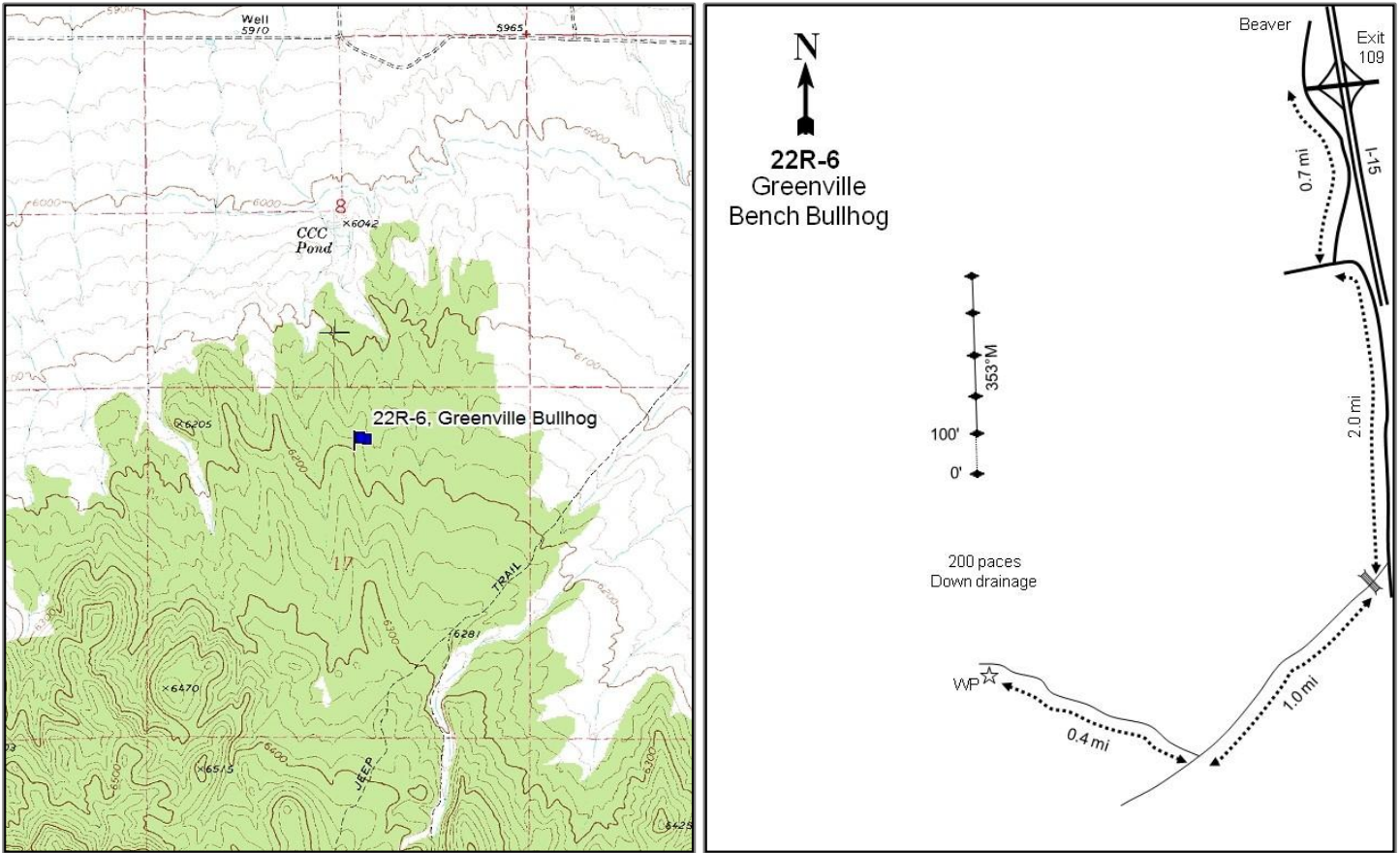
Year	Density		Age Class Distribution			Utilization		Poor Vigor (%)	Average Height Crown (cm)
	Plants Per Acre		Excluding Seedlings			Moderate (%)	Heavy (%)		
	Excluding Seedlings	Seedling	Young (%)	Mature (%)	Decadent (%)				
Juniperus osteosperma^t -- (Utah juniper)									
2004	60	-	67	33	0	0	0	0	- / -
2007	40	-	50	50	0	0	0	0	- / -
2012	20	-	0	100	0	0	0	0	- / -
2016	-	-	-	-	-	-	-	-	- / -
Linanthus pungens -- (granite prickly phlox)									
2004	-	-	-	-	-	-	-	-	- / -
2007	-	-	-	-	-	-	-	-	- / -
2012	-	-	-	-	-	-	-	-	16/43
2016	-	-	-	-	-	-	-	-	- / -
Pinus edulis^t -- (two-needle pinyon)									
2004	20	-	0	100	0	0	0	0	- / -
2007	-	-	-	-	-	-	-	-	- / -
2012	-	-	-	-	-	-	-	-	- / -
2016	-	20	0	0	0	0	0	0	- / -

t - Tree Species; p - Preferred Browse; i - Introduced Species

Table 22R-05.14 - Tree Characteristics. Point-quarter tree density, size class distribution, and average diameter.

Year	Density	Size Class Distribution					Average Diameter (cm)
	Trees per Acre	Seedling (%)	1-4'	4-8'	8-12'	>12' (%)	
Juniperus osteosperma (Utah juniper)							
2004	29	7	71	14	7	-	6.6
2007	25	7	86	7	-	-	5.0
2012	16	-	100	-	-	-	3.0
2016	11	-	100	-	-	-	3.3
Pinus edulis (two-needle pinyon)							
2004	12	-	75	25	-	-	5.6
2007	4	-	100	-	-	-	3.3
2012	4	25	75	-	-	-	3.0
2016	3	-	100	-	-	-	2.7

GREENVILLE BULLHOG - STUDY No. 22R-6



Location Information

USGS 7.5 min Map Info Greenville Bench NE; Township 30S, Range 7W, Section 17
 GPS (0' Stake) NAD 83 UTM ZONE 12, 354091 East 4229693 North

Transect Information

Browse Tag # (0' Stake) 188
 Transect Bearing 353° 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 109 off of I-15 and go west on the overpass toward a Chevron Station. From the Chevron Station, travel south on 600 West for 0.7 miles to the motocross track and turn left. Stay to the left and travel south for 2 miles. Turn right and drive 1 mile to another road that comes in from the right. Turn west here and travel 0.4 miles to a drainage. Stop here and walk 200 paces north, down the drainage to the baseline off to the left. The 0-foot stake is marked with browse tag #188.

Site Information

Land Ownership	Federal
Land Administrator	BLM
Allotment	SAND HOLLOW
Elevation	6,000ft (1,829m)
Aspect	Northeast
Slope	5-10%
Sample Dates	07/20/2004, 06/21/2007, 06/26/2012, 08/09/2016

Table 22R-06.1 Disturbance History. Recorded history of major disturbances.

Treatment/Disturbance	Name	WRI DB#	Date	Size (acres)
Mechanical - Bullhog	Greenville Bench	PDB	Fall 2004	1500
Seeding - Rangeland Drill	Greenville Bench	PDB	Fall 2004	1500
Seeding - Aerial After	Greenville Bench	PDB	Fall 2004	1500

Table 22R-06.2 Seed Mix. List of known seeded plant species and rates (if available).

Mix Name			Application Type	Application Date	Acres
Greenville Bench			Drill	Sep 2004	1500
Type	Species	Common Name	Cultivar/Source ID	Bulk lbs/acre	PLS lbs/acre
G	Achnatherum hymenoides	Indian Ricegrass	Nezpar	1.07	1.00
G	Agropyron cristatum	Crested Wheatgrass	Hycrest	1.13	1.02
G	Elymus wawawaiensis	Snake River Wheatgrass	Secar	2.00	1.77
G	Poa secunda	Sandberg Bluegrass	SID MT	0.25	0.20
G	Thinopyrum intermedium	Pubescent Wheatgrass		1.99	1.76
F	Achillea millefolium	Western Yarrow		0.10	0.09
F	Linum perenne	Blue Flax	Appar	0.80	0.67
F	Medicago sativa	Alfalfa	Ladak+	1.00	0.95
F	Melilotus officinalis	Yellow Sweetclover		0.07	0.06
F	Sanguisorba minor	Small Burnet	Delar	0.97	0.92
S	Purshia tridentata	Bitterbrush	Ada/Boise ID	0.25	0.21
Mix Name			Application Type	Application Date	Acres
Greenville Bench Sagebrush			Aerial	Oct 2004	1500
Type	Species	Common Name	Cultivar/Source ID	Bulk lbs/acre	PLS lbs/acre
S	Artemisia tridentata ssp. wyomingensis	Wyoming Big Sagebrush		0.27	0.03

Wildlife Habitat and Vegetation History

Table 22R-06.3 - Wildlife Seasonal Habitat. UDWR wildlife habitat and seasonality.

Species	Habitat	Season	Brood/Young Rearing
Greater Sage Grouse	Crucial	occupied	brood-rearing

Table 22R-06.4 - Vegetation History. The dominant vegetation type(s) and phase of woodland succession (Tausch, Miller, Roundy, & Chambers, 2009).

Year	Vegetation Type	Woodland Succession
2004	Pinyon-Juniper	Phase III
2007	Annual-Perennial Grass	Phase I
2012	Perennial Grass	Phase I
2016	Mixed Shrub/Perennial Grass	Phase I

Site Notes

This study is located approximately five miles south of Beaver within a Wyoming big sagebrush (*Artemisia tridentata* ssp. *wyomingensis*) community invaded by two-needle pinyon (*Pinus edulis*) and Utah juniper (*Juniperus osteosperma*).

Soils

Table 22R-06.5 - Soil Analysis Data. List of chemical and textural soil characteristics determined by laboratory analysis.

Texture	pH	%sand	%silt	%clay	%OM	PPM P	PPM K	ds/m	Sample Date
Sandy Loam	7.3	61.7	20.5	17.8	2.5	6.8	99.2	0.6	07/20/2004

Site Potential

1981-2010 Average Annual Precipitation 12 inches
 NRCS Ecological Site Upland Loam (Wyoming Big Sagebrush)
 NRCS Ecological Site # R028AY309UT
 States and Transitions No state and transition model is available for this ecological site.

When established in 2004, this site was dominated by two-needle pinyon (*Pinus edulis*) and Utah juniper (*Juniperus osteosperma*) and was considered to be within Phase III of woodland succession (Table 22R-06.4, Table 22R-06.12). When sampled in 2007 after the bullhog and seeding treatment, tree cover decreased significantly and the site transitioned to an annual-perennial grassland. Cover of annual grass decreased in 2012 and the understory has remained dominated by perennial grasses since then (Table 22R-06.7, Table 22R-06.10). Browse cover on this site has increased each sample year since the treatment, and in 2016 mixed shrubs such as broom snakeweed (*Gutierrezia sarothrae*), antelope bitterbrush (*Purshia tridentata*), and Wyoming big sagebrush (*Artemisia tridentata* ssp. *wyomingensis*) dominated the overstory. Cover and density of juniper has increased each year following treatment, indicating that this site may be infilled in the future (Table 22R-06.12, Table 22R-06.13).

Trend Summary Tables

Table 22R-06.6 - Shrub/Tree Summary. Average modified Daubenmire quadrat and line intercept cover by year for shrubs/trees.

Year	Quadrat Cover (%)			Line-intercept Cover (%)		
	Preferred Shrub	Other Shrub	Tree	Preferred Shrub	Other Shrub	Tree
2004	0.2	1.3	19.3	-	1.1	32.3
2007	0.4	6.5	1.7	0.5	5.7	2.9
2012	2.9	1.5	1.1	4.3	1.2	4.1
2016	4.1	6.7	1.4	8.0	7.3	4.9

Table 22R-06.7 - Herbaceous Summary. Nested frequency and average modified Daubenmire quadrat cover by year for herbaceous functional groups.

Year	Nested Frequency				Quadrat Cover (%)			
	Annual Grass	Perennial Grass	Annual/Biennial Forb	Perennial Forb	Annual Grass	Perennial Grass	Annual/Biennial Forb	Perennial Forb
2004	10	6	25	13	0.0	0.0	0.2	0.1
2007	372	173	34	60	9.5	6.8	0.3	1.5
2012	270	265	25	35	6.2	15.3	0.2	0.7
2016	234	235	16	47	3.6	8.0	0.3	0.4

Table 22R-06.8 - Basic Ground Cover. Average modified Daubenmire quadrat cover by year for basic ground cover types.

Year	Cover Type (%)					
	Bare Ground	Cryptograms	Litter	Pavement	Rock	Vegetation
2004	24.1	1.0	39.6	31.8	7.4	21.3
2007	22.9	0.3	45.9	6.4	5.4	29.4
2012	19.6	0.0	62.8	2.1	3.3	30.7
2016	23.3	0.4	45.2	15.1	5.4	22.7

Table 22R-06.9 - Pellet Group Data. Quadrat frequency and pellet group transect data for animal pellets. Rabbit pellet groups are not sampled in the pellet group transect.

Year	Cattle	Mule Deer	Elk	Rabbit
	Quadrat Frequency			
2004	-	4	-	10
2007	-	7	1	75
2012	1	4	-	9
2016	2	5	-	60
Year	Days Use Per Acre (ha)			
2004	-	8.1 (19.9)	-	-
2007	-	15.4 (38.1)	-	-
2012	1.5 (3.6)	23.4 (57.9)	-	-
2016	4.4 (10.8)	4.0 (9.9)	-	-

Table 22R-06.10 - Grass Species. Nested frequency and modified Daubenmire average cover by year.

GRASS SPECIES	Achnatherum hymenoides (Indian ricegrass)	Agropyron cristatum ⁱ (crested wheatgrass)	Aristida purpurea (purple threeawn)	Bromus tectorum ^{ai} (cheatgrass)	Elymus elymoides (squirreltail)	Elymus wawawaiensis (Snake River wheatgrass)	Hesperostipa comata (needle and thread)	Poa secunda (Sandberg bluegrass)	Psathyrostachys juncea ⁱ (Russian wildrye)	Thinopyrum intermedium ⁱ (intermediate wheatgrass)
year	Nested Frequency									
2004	-	-	-	10	6	-	-	-	-	-
2007	5	15	-	372	66	82	-	-	10	54
2012	4	76	-	270	89	126	-	-	10	49
2016	9	44	10	234	70	60	3	3	13	99
year	Average Cover (%)									
2004	-	-	-	0.0	0.0	-	-	-	-	-
2007	0.0	0.3	-	9.5	1.9	2.8	-	-	0.7	1.2
2012	0.1	4.1	-	6.2	2.2	7.5	-	-	0.5	0.9
2016	0.2	0.8	0.2	3.6	1.5	2.7	0.0	0.0	0.5	1.9

a - Annual; n - Noxious Weed; i - Introduced Species

Table 22R-06.11 - Forb Species. Nested frequency and modified Daubenmire average cover by year.

FORB SPECIES	Astragalus (milkvetch)	Astragalus lentiginosus (freckled milkvetch)	Chaenactis douglasii (Douglas' dustymaiden)	Chamaesyce (sandmat)	Chenopodium fremontii ^a (Fremont's goosefoot)	Collinsia parviflora ^a (maiden blue eyed Mary)	Cryptantha (cryptantha)	Descurainia pinnata ^a (western tansymustard)	Eriogonum cernuum ^a (nodding buckwheat)	Eriogonum ovalifolium (cushion buckwheat)	Eriogonum umbellatum (sulphur-flower buckwheat)	Gayophytum ramosissimum ^a (pinyon groundsmoke)	Gilia ^a (gilia)	Lactuca serriola ^{ai} (prickly lettuce)	Lappula occidentalis ^a (flatspine stickseed)	Linum perenne ⁱ (blue flax)	Medicago sativa ^a (alfalfa)
year	Nested Frequency																
2004	-	8	-	1	-	-	-	-	24	1	-	1	1	-	0	-	-
2007	-	6	10	4	-	-	-	8	-	-	-	-	4	12	2	19	5
2012	-	12	3	-	-	2	2	1	6	1	-	-	-	4	6	-	-
2016	4	8	-	9	2	-	17	2	4	-	7	-	1	-	8	-	-
year	Average Cover (%)																
2004	-	0.0	-	0.0	-	-	-	-	0.2	0.0	-	0.0	0.0	-	0.0	-	-
2007	-	0.0	0.2	0.0	-	-	-	0.0	-	-	-	-	0.0	0.1	0.0	0.6	0.1
2012	-	0.2	0.0	-	-	0.0	0.0	0.0	0.0	0.1	-	-	-	0.0	0.1	-	-
2016	0.0	0.0	-	0.1	0.0	-	0.1	0.0	0.0	-	0.1	-	0.0	-	0.1	-	-

a - Annual/Biennial; n - Noxious Weed; i - Introduced Species

FORB SPECIES							
Penstemon leiophyllus (smoothleaf beardtongue)							
Salsola tragus ^{ai} (prickly Russian thistle)							
Sanguisorba minor ⁱ (small burnet)							
Sisymbrium altissimum ^{ai} (tall tumbled mustard)							
Streptanthus cordatus (heartleaf twistflower)							
Symphotrichum (aster)							
Tragopogon dubius ^{ai} (yellow salsify)							
year	Nested Frequency						
2004	-	-	-	-	4	-	-
2007	2	4	22	10	0	-	4
2012	2	0	16	-	-	-	6
2016	1	6	2	-	-	2	-
year	Average Cover (%)						
2004	-	-	-	-	0.0	-	-
2007	0.2	0.0	0.5	0.1	0.0	-	0.0
2012	0.0	0.0	0.3	-	-	-	0.0
2016	0.0	0.2	0.0	-	-	0.0	-

a - Annual/Biennial; n - Noxious Weed; i - Introduced Species

Table 22R-06.12 - Shrub and Tree Species. Average modified Daubenmire quadrat and line intercept cover by year.

SHRUB SPECIES								
Artemisia tridentata ssp. wyomingensis ^t (Wyoming big sagebrush)								
Ericameria nauseosa ssp. nauseosa var. spectiosa ^p (rubber rabbitbrush)								
Eriogonum microthecum ^p (slender buckwheat)								
Gutierrezia sarothrae (broom snakeweed)								
Juniperus osteosperma ^t (Utah juniper)								
Pinus edulis ^t (twoneedle pinyon)								
Polygala subspinosa (spiny milkwort)								
Purshia tridentata ^p (antelope bitterbrush)								
year	Line Intercept Cover (%)							
2004	-	-	-	1.1	18.8	13.5	-	-
2007	0.3	-	-	5.7	2.9	-	-	0.2
2012	2	0.5	0	1.2	3.9	0.2	-	1.8
2016	2.8	0.6	-	7.2	4.9	-	0.1	4.6
year	Quadrat Cover (%)							
2004	0.2	-	0.0	1.3	11.5	7.8	0.0	-
2007	0.0	-	0.0	6.5	1.5	0.1	-	0.3
2012	0.4	0.1	0.2	1.5	0.7	0.4	0.0	2.1
2016	1.4	0.6	0.1	6.7	1.0	0.4	0.0	2.1

t - Tree Species; p - Preferred Browse; i - Introduced

Table 22R-06.13 - Shrub/Tree Characteristics. Population characteristics of shrub/tree species populations including density reproduction (seedlings), age distribution, utilization, vigor and average size (height/crown) of plants.

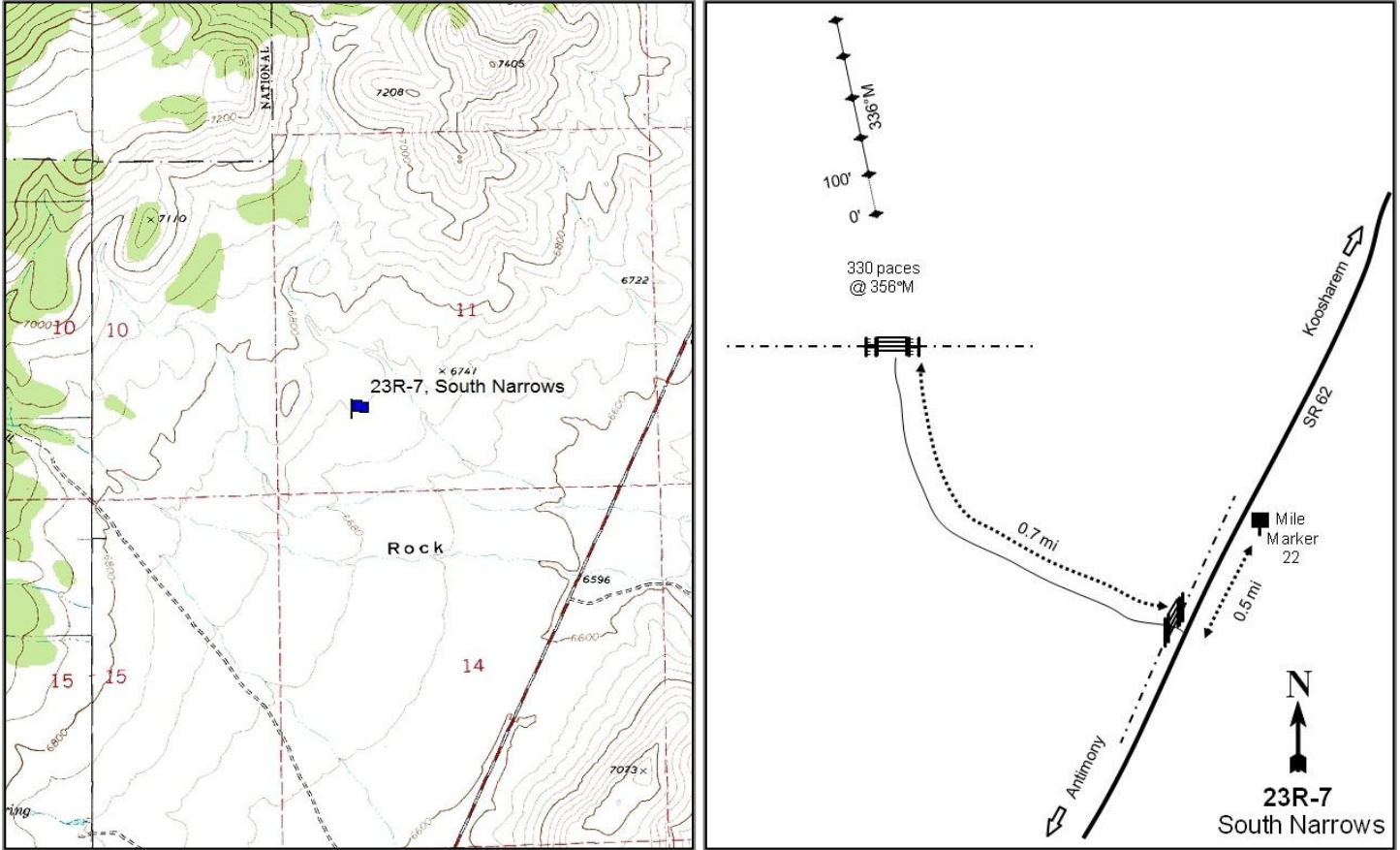
Year	Density		Age Class Distribution			Utilization		Poor Vigor (%)	Average Height Crown (cm)
	Plants Per Acre		Excluding Seedlings			Moderate (%)	Heavy (%)		
	Excluding Seedlings	Seedling	Young (%)	Mature (%)	Decadent (%)				
Artemisia tridentata ssp. wyomingensis^P -- (Wyoming big sagebrush)									
2004	180	20	0	11	89	33	22	78	51/57
2007	500	60	76	24	0	4	4	4	34/34
2012	700	40	43	57	0	23	0	37	54/66
2016	880	80	21	73	7	14	18	7	60/94
Chrysothamnus viscidiflorus ssp. viscidiflorus var. stenophyllus -- (yellow rabbitbrush)									
2004	-	-	-	-	-	-	-	-	-/-
2007	-	-	-	-	-	-	-	-	-/-
2012	-	-	-	-	-	-	-	-	23/19
2016	-	-	-	-	-	-	-	-	-/-
Eriogonum microthecum^P -- (slender buckwheat)									
2004	360	-	0	100	0	39	28	0	10/12
2007	40	-	50	50	0	50	50	0	14/15
2012	280	20	7	93	0	7	21	0	19/31
2016	200	-	0	100	0	0	0	0	21/32
Ericameria nauseosa ssp. nauseosa var. speciosa^P -- (rubber rabbitbrush)									
2004	-	-	-	-	-	-	-	-	-/-
2007	-	-	-	-	-	-	-	-	-/-
2012	20	-	0	100	0	0	0	0	55/91
2016	20	-	0	100	0	0	0	0	64/83
Gutierrezia sarothrae -- (broom snakeweed)									
2004	2600	20	25	75	0	0	0	0	17/20
2007	2840	440	4	94	1	0	0	1	29/39
2012	3720	640	24	73	4	0	0	38	17/22
2016	11960	-	0	100	0	0	0	0	24/32
Juniperus osteosperma^t -- (Utah juniper)									
2004	180	-	56	44	0	0	0	0	-/-
2007	-	40	0	0	0	0	0	0	-/-
2012	20	80	100	0	0	0	0	0	-/-
2016	60	20	100	0	0	0	0	0	-/-
Opuntia -- (pricklypear)									
2004	20	-	0	100	0	0	0	0	12/26
2007	-	-	-	-	-	-	-	-	11/34
2012	20	-	0	100	0	0	0	0	10/28
2016	20	-	0	100	0	0	0	0	11/20
Pinus edulis^t -- (twoneedle pinyon)									
2004	80	-	25	75	0	0	0	0	-/-
2007	20	-	100	0	0	0	0	0	-/-
2012	20	20	100	0	0	0	0	0	-/-
2016	-	-	-	-	-	-	-	-	-/-
Polygala subspinoso -- (spiny milkwort)									
2004	260	-	0	100	0	8	0	0	5/8
2007	-	-	-	-	-	-	-	-	-/-
2012	120	-	17	67	17	17	0	0	9/15
2016	120	-	0	100	0	17	0	0	6/11
Purshia tridentata^P -- (antelope bitterbrush)									
2004	-	-	-	-	-	-	-	-	-/-
2007	1320	100	100	0	0	42	49	0	9/13
2012	1520	-	33	67	0	63	7	0	32/40
2016	1160	20	10	83	7	41	43	9	43/59

t - Tree Species; p - Preferred Browse; i - Introduced Species

Table 22R-06.14 - Tree Characteristics. Point-quarter tree density, size class distribution, and average diameter.

Year	Density	Size Class Distribution				Average Diameter (cm)	
	Trees per Acre	Seedling (%)	1-4'	4-8'	8-12'		>12' (%)
Juniperus osteosperma (Utah juniper)							
2004	132	5	10	20	35	30	22.3
2007	44	38	38	-	-	25	20.8
2012	50	6	81	-	6	6	9.9
2016	89	53	35	-	-	12	13.6
Pinus edulis (two-needle pinyon)							
2004	102	10	15	25	45	5	13.1
2007	18	71	29	-	-	-	4.6
2012	17	-	89	11	-	-	4.2
2016	16	17	67	17	-	-	7.7

SOUTH NARROWS - STUDY NO. 23R-7



Location Information

USGS 7.5 min Map Info	Parker Knoll SW; Township 29S, Range 2W, Section 11
GPS (0' Stake)	NAD 83 UTM ZONE 12, 413604 East 4239187 North

Transect Information

Browse Tag # (0' Stake)	191
Transect Bearing	336° 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 State Route 62 south of Koosharem, there will be a road coming in from the west 0.5 miles south of mile marker 22. Turn onto this road, pass through a gate, and travel 0.7 to another fence with a gate. From here, walk about 1,000 feet at 356 degrees magnetic to the 0-foot stake that is marked with browse tag #191.

Site Information

Land Ownership	Federal
Land Administrator	BLM
Allotment	SOUTH NARROWS
Elevation	6,700ft (2,042m)
Aspect	South
Slope	4-5%
Sample Dates	08/05/2004, 06/25/2007, 08/07/2012, 08/16/2016

Table 23R-07.1 Disturbance History. Recorded history of major disturbances.

Treatment/Disturbance	Name	WRI DB#	Date	Size (acres)
Harrow - Two-Way Dixie	-	PDB	1996	-
Seeding - Unknown	-	PDB	1996	-
Harrow - Two-Way Dixie	South Narrows Dixie Harrow - West Side	210	Fall 2005	1740
Seeding - Broadcast Before	South Narrows Dixie Harrow - West Side	210	Fall 2005	1740

Wildlife Habitat and Vegetation History

Table 23R-07.3 - Wildlife Seasonal Habitat. UDWR wildlife habitat and seasonality.

Species	Habitat	Season	Brood/Young Rearing
Deer	crucial	winter	
Greater Sage Grouse	Crucial	occupied	brood-rearing

Table 23R-07.4 - Vegetation History. The dominant vegetation type(s) and phase of woodland succession (Tausch, Miller, Roundy, & Chambers, 2009).

Year	Vegetation Type	Woodland Succession
2004	Annual Forb	NA
2007	Annual Forb	NA
2012	Annual Forb	NA
2016	Annual Forb	NA

Site Notes

This study is located approximately three and a half miles north of Otter Creek Reservoir within a treated Wyoming big sagebrush (*Artemisia tridentata* ssp. *wyomingensis*) flat. In 2016, very heavily utilization by rabbits was noted.

Soils

Table 23R-07.5 - Soil Analysis Data. List of chemical and textural soil characteristics determined by laboratory analysis.

Texture	pH	% sand	% silt	% clay	%OM	PPM P	PPM K	ds/m	Sample Date
Sandy Loam	7.5	55.0	27.5	17.5	1.1	12.5	604.8	0.7	08/05/2004

Site Potential

1981-2010 Average Annual Precipitation	9 inches
NRCS Ecological Site	Semidesert Loam (Wyoming Big Sagebrush)
NRCS Ecological Site #	R028AY220UT
States and Transitions	No state and transition model is available for this ecological site.

This study site has remained in poor condition and has been dominated by annual forbs since establishment in 2004. Cover of perennial grasses and forbs has remained low and could be related to rabbit grazing, as quadrat frequency of pellets indicates high use (Table 23R-07.7, Table 23R-07.9, Table 23R-07.10, Table 23R-07.11). Browse is extremely limited and all line-intercept cover has been contributed by Wyoming big sagebrush (*Artemisia tridentata* ssp. *wyomingensis*) (Table 23R-07.12). This site is expected to remain in a degraded state if current conditions persist.

Trend Summary Tables

Table 23R-07.6 - Shrub/Tree Summary. Average modified Daubenmire quadrat and line intercept cover by year for shrubs/trees.

Year	Quadrat Cover (%)			Line-intercept Cover (%)		
	Preferred Shrub	Other Shrub	Tree	Preferred Shrub	Other Shrub	Tree
2004	0.1	-	-	-	-	-
2007	-	0.0	-	-	-	-
2012	0.2	-	-	0.2	-	-
2016	0.0	-	-	0.1	-	-

Table 23R-07.7 - Herbaceous Summary. Nested frequency and average modified Daubenmire quadrat cover by year for herbaceous functional groups.

Year	Nested Frequency				Quadrat Cover (%)			
	Annual Grass	Perennial Grass	Annual/Biennial Forb	Perennial Forb	Annual Grass	Perennial Grass	Annual/Biennial Forb	Perennial Forb
2004	-	16	53	38	-	0.1	8.2	4.7
2007	-	8	335	19	-	0.0	14.6	0.0
2012	3	25	431	98	0.0	0.5	15.8	0.8
2016	-	9	206	37	-	0.0	6.4	1.5

Table 23R-07.8 - Basic Ground Cover. Average modified Daubenmire quadrat cover by year for basic ground cover types.

Year	Cover Type (%)					
	Bare Ground	Cryptograms	Litter	Pavement	Rock	Vegetation
2004	43.7	0.3	22.4	21.4	7.8	14.0
2007	34.8	0.2	45.3	8.0	5.4	14.3
2012	15.2	0.0	55.3	11.4	4.6	18.1
2016	47.0	0.0	33.6	16.9	7.4	7.9

Table 23R-07.9 - Pellet Group Data. Quadrat frequency and pellet group transect data for animal pellets. Rabbit pellet groups are not sampled in the pellet group transect.

Year	Cattle	Mule Deer	Elk	Rabbit
	Quadrat Frequency			
2004	1	1	1	70
2007	2	-	-	97
2012	-	4	-	29
2016	-	-	-	93
Year	Days Use Per Acre (ha)			
2004	1.5 (3.6)	4.7 (11.6)	3.4 (8.3)	-
2007	-	-	-	-
2012	-	2.0 (5.0)	-	-
2016	-	-	-	-

Table 23R-07.10 - Grass Species. Nested frequency and modified Daubenmire average cover by year.

GRASS SPECIES	Achnatherum hymenoides (Indian ricegrass)	Agropyron cristatum ⁱ (crested wheatgrass)	Bromus tectorum ^{ai} (cheatgrass)	Elymus elymoides (squirreltail)	Psathyrostachys juncea ⁱ (Russian wildrye)
year	Nested Frequency				
2004	-	-	-	16	-
2007	-	-	-	8	-
2012	3	10	3	13	3
2016	1	1	-	5	2
year	Average Cover (%)				
2004	-	-	-	0.1	-
2007	-	-	-	0.0	-
2012	0.0	0.4	0.0	0.1	0.0
2016	0.0	0.0	-	0.0	0.0

a - Annual; n - Noxious Weed; i - Introduced Species

Table 23R-07.11 - Forb Species. Nested frequency and modified Daubenmire average cover by year.

FORB SPECIES	Achillea millefolium (Common yarrow)	Astragalus lentiginosus (freckled milkvetch)	Chamaesyce (sandmat)	Chenopodium leptophyllum ^a (narrowleaf goosefoot)	Descurainia pinnata ^a (western tansymustard)	Eriogonum cernuum ^a (nodding buckwheat)	Helianthus annuus ^a (common sunflower)	Lactuca serriola ^{ai} (prickly lettuce)	Lappula occidentalis ^a (flatspine stickseed)	Linum perenne ⁱ (blue flax)	Nicotiana attenuata ^a (coyote tobacco)	Salsola tragus ^{ai} (prickly Russian thistle)	Sisymbrium altissimum ^{ai} (tall tumbledmustard)	Solanum triflorum ^a (cutleaf nightshade)	Sphaeralcea grossularifolia (gooseberry/leaf globemallow)	Tragopogon dubius ^{ai} (yellow salsify)
year	Nested Frequency															
2004	-	38	-	11	4	3	-	-	5	-	0	22	-	14	0	-
2007	-	13	-	-	115	45	-	3	230	6	-	262	3	4	-	-
2012	0	1	2	2	72	-	12	146	367	-	-	276	95	-	97	3
2016	-	17	-	-	10	5	-	10	-	-	27	96	130	-	20	-
year	Average Cover (%)															
2004	-	4.0	-	2.5	0.1	0.1	-	-	0.5	-	0.2	3.6	-	1.3	0.8	-
2007	-	0.0	-	-	4.2	0.2	-	0.0	9.0	0.0	-	0.9	0.1	0.0	-	-
2012	0.0	0.1	0.0	0.0	1.5	-	0.1	1.1	8.2	-	-	3.0	2.0	-	0.7	0.0
2016	-	0.8	-	-	0.1	0.1	-	0.1	-	-	1.1	3.0	2.1	-	0.6	-

a - Annual/Biennial; n - Noxious Weed; i - Introduced Species

Table 23R-07.12 - Shrub and Tree Species. Average modified Daubenmire quadrat and line intercept cover by year.

SHRUB SPECIES	Artemisia tridentata ssp. wyomingensis ^p (Wyoming big sagebrush)		Bassia prostrata ⁱ (forage kochia)			
	year	Line Intercept Cover (%)		year	Quadrat Cover (%)	
	2004	-	-	2004	0.1	-
	2007	-	-	2007	-	0.0
	2012	0.2	-	2012	0.2	-
	2016	0.1	-	2016	0.0	-

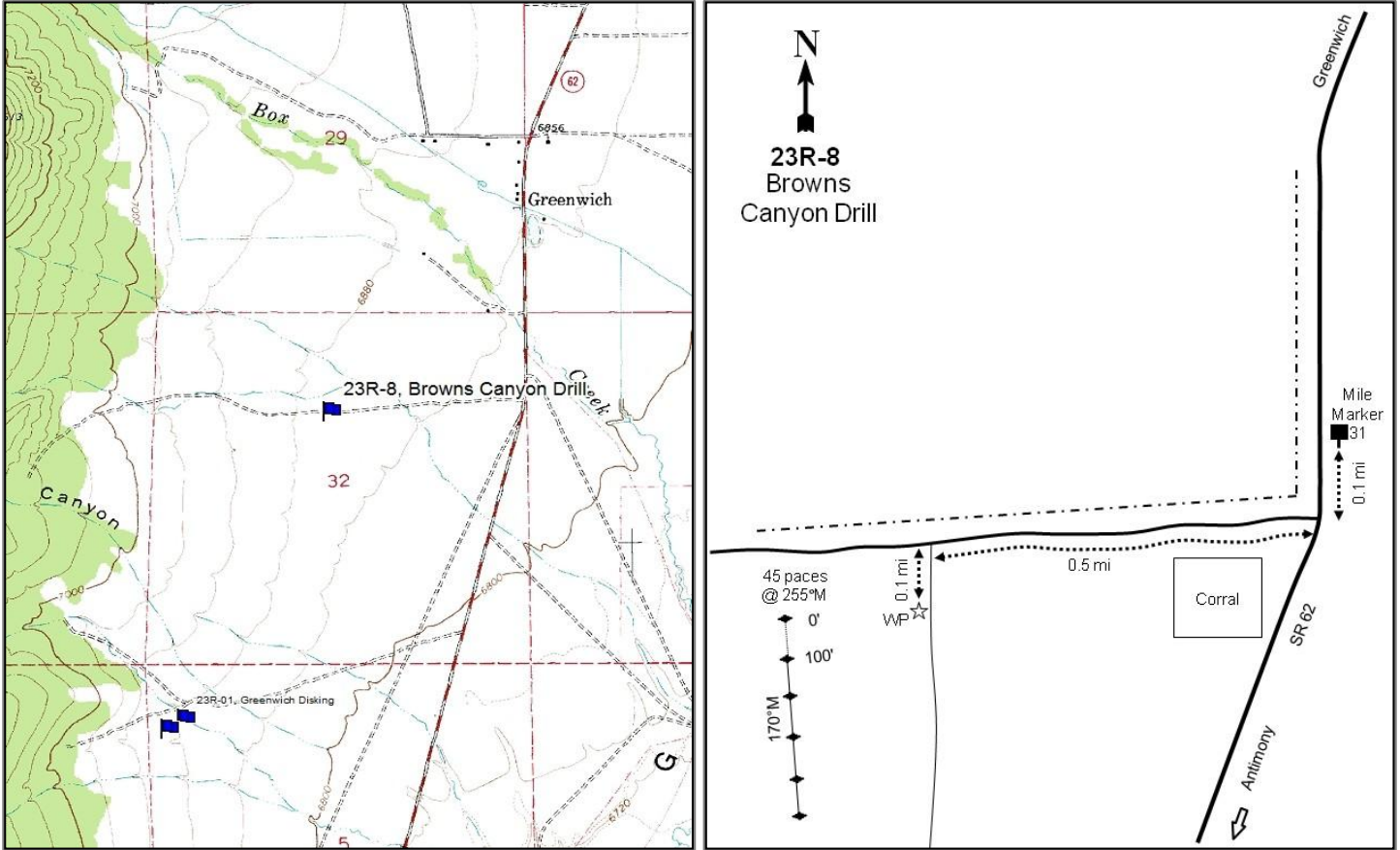
t - Tree Species; p - Preferred Browse; i - Introduced

Table 23R-07.13 - Shrub/Tree Characteristics. Population characteristics of shrub/tree species populations including density reproduction (seedlings), age distribution, utilization, vigor and average size (height/crown) of plants.

Year	Density		Age Class Distribution			Utilization		Poor Vigor (%)	Average Height Crown (cm)
	Plants Per Acre		Excluding Seedlings			Moderate (%)	Heavy (%)		
	Excluding Seedlings	Seedling	Young (%)	Mature (%)	Decadent (%)				
Artemisia tridentata ssp. wyomingensis^p -- (Wyoming big sagebrush)									
2004	40	-	0	50	50	0	0	50	45/66
2007	20	-	0	0	100	0	0	100	- / -
2012	80	-	75	25	0	25	0	0	24/32
2016	20	-	0	100	0	0	100	0	32/49
Bassia prostrataⁱ -- (forage kochia)									
2004	-	-	-	-	-	-	-	-	-/-
2007	20	200	0	100	0	0	0	0	- / -
2012	-	-	-	-	-	-	-	-	-/-
2016	-	-	-	-	-	-	-	-	-/-
Ericameria nauseosa -- (rubber rabbitbrush)									
2004	-	-	-	-	-	-	-	-	-/-
2007	-	-	-	-	-	-	-	-	-/-
2012	-	-	-	-	-	-	-	-	60/76
2016	-	-	-	-	-	-	-	-	89/127
Opuntia -- (pricklypear)									
2004	-	-	-	-	-	-	-	-	-/-
2007	-	-	-	-	-	-	-	-	-/-
2012	-	-	-	-	-	-	-	-	15/38
2016	-	-	-	-	-	-	-	-	15/50

t - Tree Species; p - Preferred Browse; i - Introduced Species

BROWNS CANYON DRILL - STUDY NO. 23R-8



Location Information

USGS 7.5 min Map Info	Greenwich SE; Township 27S, Range 1W, Section 32
GPS (0' Stake)	NAD 83 UTM ZONE 12, 418604 East 4253004 North

Transect Information

Browse Tag # (0' Stake)	54
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	Standard

Directions to Site

Travel south of Greenwich on State Route 62. From mile marker 31, travel 0.1 miles north to a road that comes in from the west. Turn onto this road and travel 0.5 miles to a road that comes in from the left (south). Turn left onto this road and drive 100 feet to a witness post on the right-hand (west) side of the road. From the witness post, walk 45 paces at 255 degrees magnetic to the 0-foot stake that is marked with browse tag #54.

Site Information

Land Ownership	State
Land Administrator	SITLA
Allotment	No data
Elevation	6,870ft (2,094m)
Aspect	East
Slope	2%
Sample Dates	08/05/2004, 06/27/2007, 08/07/2012, 08/18/2016

Table 23R-08.1 Disturbance History. Recorded history of major disturbances.

Treatment/Disturbance	Name	WRI DB#	Date	Size (acres)
Seeding - Aerial After	Greenwich Disking	PDB	December 2003	275
Disc - Unknown	-	PDB	Fall 1996	-
Seeding - Unknown	-	PDB	Fall 1996	-
Seeding - Truax Drill	Greenwich Disking	PDB	October 2003	275
Seeding - Rangeland Drill	Grass Valley/Rocky Knoll Phase II	2256	November 2013	172

Table 23R-08.2 Seed Mix. List of known seeded plant species and rates (if available).

Mix Name			Application Type	Application Date	Acres
Greenwich Discing			Drill	Oct 2003	275
Type	Species	Common Name	Cultivar/Source ID	Bulk lbs/acre	PLS lbs/acre
G	Agropyron cristatum	Crested Wheatgrass	Douglas	2.00	1.81
G	Dactylis glomerata	Orchardgrass	Paiute	0.55	0.47
G	Elymus wawawaiensis	Snake River Wheatgrass	Secar	1.09	0.92
G	Leymus cinereus	Great Basin Wildrye	Trailhead	1.09	0.94
G	Pascopyrum smithii	Western Wheatgrass	Arriba	1.45	1.28
G	Psathyrostachys juncea	Russian Wildrye	Bozoisky	2.00	1.80
G	Thinopyrum intermedium	Pubescent Wheatgrass		2.00	1.81
F	Linum perenne	Blue Flax	Appar	0.36	0.33
F	Medicago sativa	Alfalfa	Ladak+	1.09	1.03
F	Melilotus officinalis	Yellow Sweetclover		0.36	0.32
Mix Name			Application Type	Application Date	Acres
Greenwich Discing Shrubs			Aerial	Dec 2003	275
Type	Species	Common Name	Cultivar/Source ID	Bulk lbs/acre	PLS lbs/acre
S	Artemisia tridentata ssp. wyomingensis	Wyoming Big Sagebrush		1.16	0.12
S	Bassia prostrata	Forage Kochia		1.82	0.55
T		Rice Hulls		1.00	0.00
Mix Name			Application Type	Application Date	Acres
Grass Valley Rocky Knoll 2			Drill	Nov 2013	170
Type	Species	Common Name	Cultivar/Source ID	Bulk lbs/acre	PLS lbs/acre
G	Achnatherum hymenoides	Indian Ricegrass	Rimrock	1.03	0.98
G	Achnatherum hymenoides	Indian Ricegrass	Rimrock	0.15	0.14
G	Agropyron cristatum	Crested Wheatgrass	Hycrest	1.47	1.28
G	Elymus elymoides	Bottlebrush Squirreltail	Juab UT	0.50	0.46
G	Elymus lanceolatus	Thickspike Wheatgrass	Critana	1.76	1.60
G	Leymus cinereus	Great Basin Wildrye	Magnar	0.59	0.51
G	Thinopyrum intermedium	Intermediate Wheatgrass		0.88	0.79
F	Linum perenne	Blue Flax	Appar	0.29	0.26
F	Medicago sativa	Alfalfa	Ranger (NC)	1.47	1.36
F	Onobrychis viciifolia	Sainfoin	Eski	2.06	1.77
F	Sanguisorba minor	Small Burnet	Delar	2.06	1.81

Wildlife Habitat and Vegetation History

Table 23R-08.3 - Wildlife Seasonal Habitat. UDWR wildlife habitat and seasonality.

Species	Habitat	Season	Brood/Young Rearing
Deer	crucial	winter	
Greater Sage Grouse	Crucial	occupied	brood-rearing

Table 23R-08.4 - Vegetation History. The dominant vegetation type(s) and phase of woodland succession (Tausch, Miller, Roundy, & Chambers, 2009).

Year	Vegetation Type	Woodland Succession
2004	Forage Kochia/Annual Forb	NA
2007	Forage Kochia	NA
2012	Forage Kochia	NA
2016	Forage Kochia	NA

Site Notes

This study is located approximately one-half mile southwest of Greenwich within a treated Wyoming big sagebrush (*Artemisia tridentata* ssp. *wyomingensis*) flat.

Soils

Table 23R-08.5 - Soil Analysis Data. List of chemical and textural soil characteristics determined by laboratory analysis.

Texture	pH	%sand	%silt	%clay	%OM	PPM P	PPM K	ds/m	Sample Date
Sandy Clay Loam	7.4	51.0	26.8	22.2	1.1	15.7	249.6	0.7	08/05/2004

Site Potential

1981-2010 Average Annual Precipitation 9 inches
 NRCS Ecological Site Semidesert Loam (Wyoming Big Sagebrush)
 NRCS Ecological Site # R028AY220UT
 States and Transitions No state and transition model is available for this ecological site.

Since establishment in 2004, this study site has remained dominated by forage kochia (*Bassia prostrata*) with few other shrub species present (Table 23R-08.12, Table 23R-08.13). Annual forbs, mainly prickly Russian thistle (*Salsola tragus*) were a co-dominant component in 2004, but cover has since decreased. Perennial grasses and forbs have remained rare (Table 23R-08.7, Table 23R-08.10, Table 23R-08.11). Without a major disturbance, this site is expected to remain in this state in future sample years.

Trend Summary Tables

Table 23R-08.6 - Shrub/Tree Summary. Average modified Daubenmire quadrat and line intercept cover by year for shrubs/trees.

Year	Quadrat Cover (%)			Line-intercept Cover (%)		
	Preferred Shrub	Other Shrub	Tree	Preferred Shrub	Other Shrub	Tree
2004	0.1	20.9	-	-	30.9	-
2007	-	18.7	-	-	16.5	-
2012	-	22.1	-	-	26.2	-
2016	-	17.2	-	-	27.0	-

Table 23R-08.7 - Herbaceous Summary. Nested frequency and average modified Daubenmire quadrat cover by year for herbaceous functional groups.

Year	Nested Frequency				Quadrat Cover (%)			
	Annual Grass	Perennial Grass	Annual/Biennial Forb	Perennial Forb	Annual Grass	Perennial Grass	Annual/Biennial Forb	Perennial Forb
2004	-	3	213	80	-	0.0	13.9	1.3
2007	-	7	283	7	-	0.0	2.0	0.2
2012	-	20	58	-	-	0.9	0.6	-
2016	-	16	116	40	-	0.9	1.7	0.6

Table 23R-08.8 - Basic Ground Cover. Average modified Daubenmire quadrat cover by year for basic ground cover types.

Year	Cover Type (%)					
	Bare Ground	Cryptograms	Litter	Pavement	Rock	Vegetation
2004	44.9	0.1	21.5	3.9	4.7	38.0
2007	50.9	0.0	28.7	5.4	5.8	19.3
2012	51.5	0.1	27.2	3.3	4.8	23.4
2016	48.7	0.0	32.2	4.6	7.1	18.8

Table 23R-08.9 - Pellet Group Data. Quadrat frequency and pellet group transect data for animal pellets. Rabbit pellet groups are not sampled in the pellet group transect.

Year	Cattle	Mule Deer	Elk	Rabbit
	Quadrat Frequency			
2004	-	-	3	55
2007	3	-	-	98
2012	6	2	-	68
2016	5	-	-	98
Year	Days Use Per Acre (ha)			
2004	-	3.4 (8.3)	6.7 (16.6)	-
2007	15.3 (37.7)	-	-	-
2012	12.3 (30.5)	19.4 (48.0)	-	-
2016	7.2 (17.9)	-	0.7 (1.7)	-

Table 23R-08.10 - Grass Species. Nested frequency and modified Daubenmire average cover by year.

GRASS SPECIES	<i>Dactylis glomerata</i> ⁱ (orchardgrass)	<i>Elymus elymoides</i> (squirreltail)	<i>Koeleria macrantha</i> (prairie Junegrass)	<i>Psathyrostachys juncea</i> ⁱ (Russian wildrye)
year	Nested Frequency			
2004	2	1	-	-
2007	-	7	-	-
2012	3	1	-	16
2016	-	-	3	13
year	Average Cover (%)			
2004	0.0	0.0	-	-
2007	-	0.0	-	-
2012	0.3	0.0	-	0.6
2016	-	-	0.0	0.8

a - Annual; n - Noxious Weed; i - Introduced Species

Table 23R-08.11 - Forb Species. Nested frequency and modified Daubenmire average cover by year.

FORB SPECIES	Agastache urticifolia (nettleleaf giant hyssop)	Astragalus lentiginosus (freckled milkvetch)	Cirsium (thistle)	Cleome serrulata ^a (Rocky Mountain beeplant)	Descurainia pinnata ^a (western tansymustard)	Lactuca serriola ^{ai} (prickly lettuce)	Lappula occidentalis ^a (flatspine stickseed)	Marrubium vulgare ⁱ (horehound)	Nicotiana attenuata ^a (coyote tobacco)	Salsola tragus ^{ai} (prickly Russian thistle)	Sisymbrium altissimum ^{ai} (tall tumblemustard)	Solanum triflorum ^a (cutleaf nightshade)	Sphaeralcea grossularifolia (gooseberryleaf globemallow)	unknown perennial forb (unknown forb)
year	Nested Frequency													
2004	15	57	-	4	0	-	5	-	16	90	-	157	-	21
2007	-	2	1	-	74	4	270	1	-	11	21	-	3	-
2012	-	-	-	-	3	-	28	-	-	-	29	-	-	-
2016	-	40	-	-	79	-	49	-	-	-	12	-	-	-
year	Average Cover (%)													
2004	0.3	0.9	-	0.8	0.0	-	0.1	-	0.1	9.0	-	3.9	-	0.2
2007	-	0.0	0.0	-	0.2	0.0	1.5	0.1	-	0.0	0.2	-	0.0	-
2012	-	-	-	-	0.0	-	0.1	-	-	-	0.5	-	-	-
2016	-	0.6	-	-	1.1	-	0.2	-	-	-	0.4	-	-	-

a - Annual/Biennial; n - Noxious Weed; i - Introduced Species

Table 23R-08.12 - Shrub and Tree Species. Average modified Daubenmire quadrat and line intercept cover by year.

SHRUB SPECIES	Attriplex canescens ^p (fourwing saltbush)	Bassia prostrata ⁱ (forage kochia)	Opuntia (pricklypear)
year	Line Intercept Cover (%)		
2004	-	30.9	0
2007	-	16.5	-
2012	-	26.2	-
2016	-	27	-
year	Quadrat Cover (%)		
2004	0.1	20.9	0.0
2007	-	18.7	-
2012	-	22.1	0.0
2016	-	17.2	-

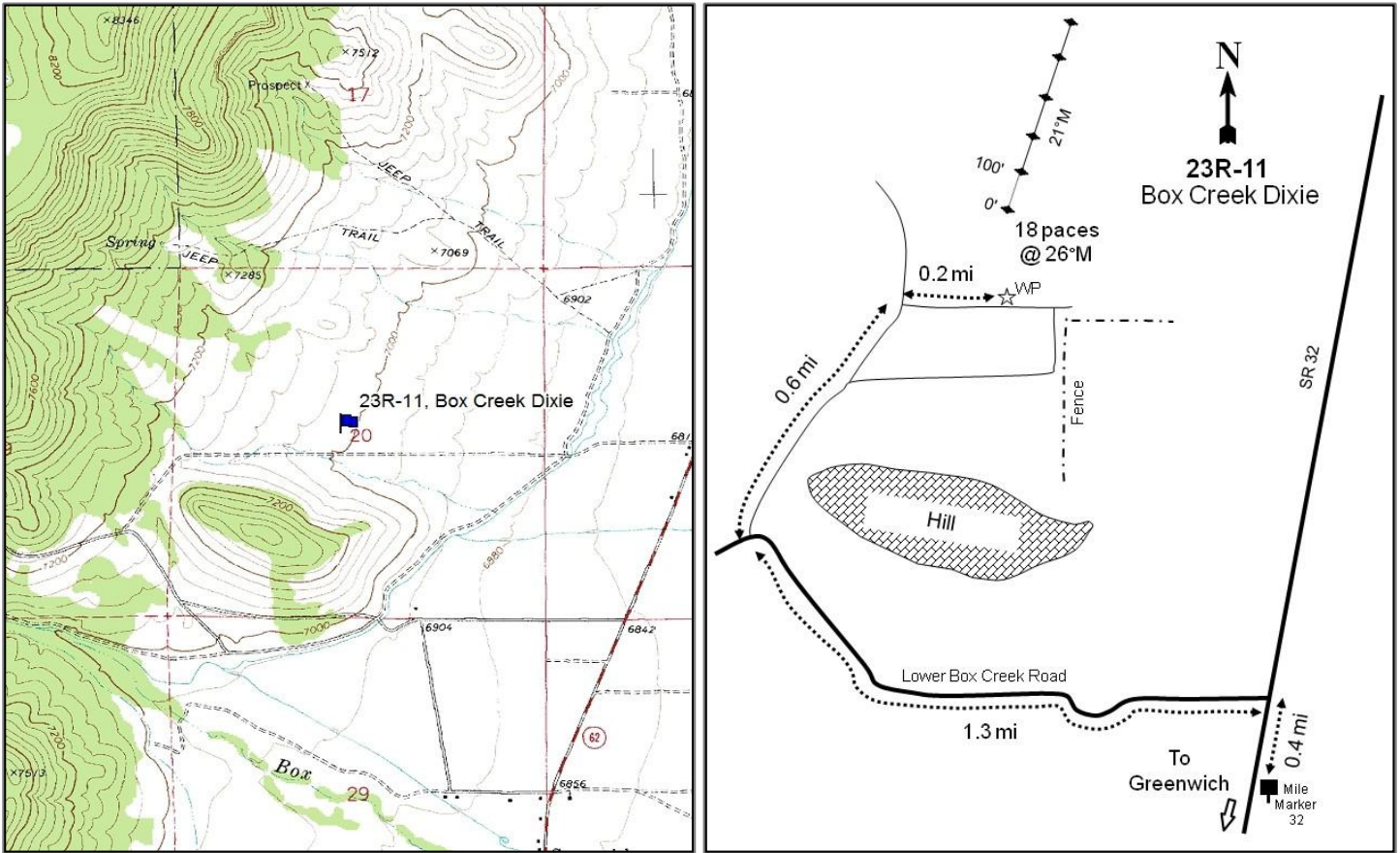
t - Tree Species; p - Preferred Browse; i - Introduced

Table 23R-08.13 - Shrub/Tree Characteristics. Population characteristics of shrub/tree species populations including density reproduction (seedlings), age distribution, utilization, vigor and average size (height/crown) of plants.

Year	Density		Age Class Distribution			Utilization		Poor Vigor (%)	Average Height Crown (cm)
	Plants Per Acre		Excluding Seedlings			Moderate (%)	Heavy (%)		
	Excluding Seedlings	Seedling	Young (%)	Mature (%)	Decadent (%)				
Artemisia tridentata ssp. wyomingensis^p -- (Wyoming big sagebrush)									
2004	-	-	-	-	-	-	-	-	-/-
2007	-	-	-	-	-	-	-	-	-/-
2012	-	-	-	-	-	-	-	-	63/56
2016	-	-	-	-	-	-	-	-	38/37
Atriplex canescens^p -- (fourwing saltbush)									
2004	20	-	100	0	0	0	0	0	-/-
2007	-	-	-	-	-	-	-	-	-/-
2012	-	-	-	-	-	-	-	-	-/-
2016	-	-	-	-	-	-	-	-	-/-
Bassia prostrataⁱ -- (forage kochia)									
2004	5360	-	1	99	0	9	0	0	34/39
2007	53720	-	31	69	0	1	98	0	10/22
2012	35700	94940	43	57	0	30	37	0	14/32
2016	18960	-	1	99	0	19	63	4	21/35
Opuntia -- (pricklypear)									
2004	80	-	0	75	25	0	0	0	11/35
2007	20	-	0	0	100	0	0	100	12/46
2012	40	-	0	100	0	0	0	0	13/47
2016	-	-	-	-	-	-	-	-	7/23

t - Tree Species; p - Preferred Browse; i - Introduced Species

BOX CREEK DIXIE - STUDY No. 23R-11



Location Information

USGS 7.5 min Map Info Greenwich NE; Township 27S, Range 1W, Section 20
 GPS (0' Stake) NAD 83 UTM ZONE 12, 418610 East 4255979 North

Transect Information

Browse Tag # (0' Stake) 169
 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 mile marker 32 on SR 62, drive north for 0.4 miles to a turnoff on the left with a sign that reads "To Box Creek." Turn left here and drive 0.6 miles to a crossroads: continue straight for 0.5 miles to a fork. Turn right, travel 0.2 miles to another fork, and turn right. Drive 0.2 miles to a witness post on the left-hand (north) side of the road. From the witness post, walk 18 paces at 26 degrees magnetic to the 0-foot stake marked with browse tag #169.

Site Information

Land Ownership	Federal
Land Administrator	BLM
Allotment	BOX CREEK
Elevation	6,940ft (2,115m)
Aspect	East
Slope	6%
Sample Dates	07/26/2006, 06/23/2011, 08/18/2016

Table 23R-11.1 Disturbance History. Recorded history of major disturbances.

Treatment/Disturbance	Name	WRI DB#	Date	Size (acres)
Harrow - Two-Way Dixie	BLM Project	BLM	Fall 2006	-
Seeding - Broadcast Before	BLM Project	BLM	Fall 2006	-
Seeding - Aerial After	BLM Project	BLM	Fall 2006	-

Table 23R-11.2 Seed Mix. List of known seeded plant species and rates (if available).

Mix Name			Application Type	Application Date	Acres
			Broadcast	Oct 2006	
Type	Species	Common Name	Cultivar/Source ID	Bulk lbs/acre	PLS lbs/acre
G	Agropyron cristatum	Crested Wheatgrass	Hycrest	NaN	NaN
G	Elymus wawawaiensis	Snake River Wheatgrass	Secar	NaN	NaN
G	Festuca ovina	Sheep Fescue	Covar	NaN	NaN
G	Leymus cinereus	Great Basin Wildrye	Magnar	NaN	NaN
G	Poa secunda	Sandberg Bluegrass		NaN	NaN
G	Poa secunda	Big Bluegrass	Sherman	NaN	NaN
G	Psathyrostachys juncea	Russian Wildrye	Bozoisky	NaN	NaN
G	Pseudoroegneria spicata	Bluebunch Wheatgrass	Anatone	NaN	NaN
G	Thinopyrum intermedium	Pubescent Wheatgrass	Luna	NaN	NaN
F	Linum perenne	Blue Flax	Appar	NaN	NaN
F	Medicago sativa	Alfalfa	Ladak	NaN	NaN
F	Melilotus officinalis	Yellow Sweetclover	Madrid	NaN	NaN
F	Onobrychis viciifolia	Sainfoin	Eski	NaN	NaN
F	Sanguisorba minor	Small Burnet	Delar	NaN	NaN
S	Atriplex canescens	Fourwing Saltbush		NaN	NaN
Mix Name			Application Type	Application Date	Acres
			Aerial	Nov 2006	
Type	Species	Common Name	Cultivar/Source ID	Bulk lbs/acre	PLS lbs/acre
S	Bassia prostrata	Forage Kochia		NaN	NaN

Wildlife Habitat and Vegetation History

Table 23R-11.3 - Wildlife Seasonal Habitat. UDWR wildlife habitat and seasonality.

Species	Habitat	Season	Brood/Young Rearing
Deer	crucial	winter	
Greater Sage Grouse	Crucial	occupied	brood-rearing

Table 23R-11.4 - Vegetation History. The dominant vegetation type(s) and phase of woodland succession (Tausch, Miller, Roundy, & Chambers, 2009).

Year	Vegetation Type	Woodland Succession
2006	Wyoming Big Sagebrush	No Encroachment
2011	Annual Forb/Wyoming Big Sagebrush	No Encroachment
2016	Wyoming Big Sagebrush	No Encroachment

Site Notes

This study is located approximately one mile northwest of Greenwich within a Wyoming big sagebrush (*Artemisia tridentata* ssp. *wyomingensis*) flat that is north of Box Creek.

Soils

Table 23R-11.5 - Soil Analysis Data. List of chemical and textural soil characteristics determined by laboratory analysis.

Texture	pH	% sand	% silt	% clay	% OM	PPM P	PPM K	ds/m	Sample Date
Loam	7.4	46.0	29.1	24.9	1.6	15.7	163.2	0.6	07/26/2006

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 this ecological site.

This site has existed as a Wyoming big sagebrush (*Artemisia tridentata* ssp. *wyomingensis*) dominated community type since its establishment in 2006; other shrubs are present in much lower amounts (Table 23R-11.12, Table 23R- 11.13). In 2011, annual forbs such as tall tumbled mustard (*Sisymbrium altissimum*) and prickly Russian thistle (*Salsola tragus*) had nearly 20% cover and were a co-dominant site component, but have not been abundant in other sample years. Perennial forbs and grasses, while somewhat diverse, have remained rare (Table 23R-11.7, Table 23R-11.10, Table 23R-11.11).

Trend Summary Tables

Table 23R-11.6 - Shrub/Tree Summary. Average modified Daubenmire quadrat and line intercept cover by year for shrubs/trees.

Year	Quadrat Cover (%)			Line-intercept Cover (%)		
	Preferred Shrub	Other Shrub	Tree	Preferred Shrub	Other Shrub	Tree
2006	19.1	0.0	-	21.7	0.2	-
2011	8.3	-	-	11.2	-	-
2016	12.8	0.2	-	17.2	0.2	-

Table 23R-11.7 - Herbaceous Summary. Nested frequency and average modified Daubenmire quadrat cover by year for herbaceous functional groups.

Year	Nested Frequency				Quadrat Cover (%)			
	Annual Grass	Perennial Grass	Annual/Biennial Forb	Perennial Forb	Annual Grass	Perennial Grass	Annual/Biennial Forb	Perennial Forb
2006	-	29	38	6	-	0.4	0.5	0.1
2011	3	39	434	54	0.0	1.1	19.9	1.1
2016	1	49	67	42	0.0	1.5	0.7	1.5

Table 23R-11.8 - Basic Ground Cover. Average modified Daubenmire quadrat cover by year for basic ground cover types.

Year	Cover Type (%)					
	Bare Ground	Cryptograms	Litter	Pavement	Rock	Vegetation
2006	34.2	1.2	23.6	26.8	6.0	19.5
2011	33.9	0.2	26.8	7.1	6.5	28.9
2016	30.7	0.0	35.9	26.2	6.4	15.0

Table 23R-11.9 - Pellet Group Data. Quadrat frequency and pellet group transect data for animal pellets. Rabbit pellet groups are not sampled in the pellet group transect.

Year	Cattle	Coyote	Mule Deer	Elk	Rabbit
	Quadrat Frequency				
2006	-	-	12	-	65
2011	-	-	5	-	2
2016	-	-	4	-	81
Year	Days Use Per Acre (ha)				
2006	-	-	12.1 (29.8)	-	-
2011	-	-	8.7 (21.5)	0.7 (1.7)	-
2016	0.7 (1.8)	8.7 (21.5)*	1.3 (3.3)	-	-

*Pellets per acre (ha)

Table 23R-11.10 - Grass Species. Nested frequency and modified Daubenmire average cover by year.

GRASS SPECIES	Achnatherum hymenoides (Indian ricegrass)	Agropyron cristatum ⁱ (crested wheatgrass)	Bromus tectorum ^{ai} (cheatgrass)	Elymus elymoides (squirreltail)	Festuca ovina ⁱ (sheep fescue)	Hesperostipa comata (needle and thread)	Pleuraphis jamesii (James' galleta)	Psathyrostachys juncea ⁱ (Russian wildrye)	Thinopyrum intermedium ⁱ (intermediate wheatgrass)
year	Nested Frequency								
2006	7	-	-	22	-	-	-	-	-
2011	4	2	3	17	5	0	3	12	1
2016	18	1	1	15	7	-	-	15	1
year	Average Cover (%)								
2006	0.0	-	-	0.3	-	-	-	-	-
2011	0.1	0.0	0.0	0.4	0.0	0.0	0.0	0.5	0.0
2016	0.7	0.0	0.0	0.4	0.1	-	-	0.3	0.0

a - Annual; n - Noxious Weed; i - Introduced Species

Table 23R-11.11 - Forb Species. Nested frequency and modified Daubenmire average cover by year.

FORB SPECIES	Astragalus calycosus (Torrey's milkvetch)	Astragalus lentiginosus (freckled milkvetch)	Caulanthus crassicaulis ^a (thickstem wild cabbage)	Ceratocephala testiculata ^{ai} (curvseed butterwort)	Chamaesyce (sandmat)	Collinsia parviflora ^a (maiden blue eyed Mary)	Cryptantha (cryptantha)	Descurainia pinnata ^a (western tansymustard)	Eriogonum cernuum ^a (nodding buckwheat)	Erodium cicutarium ^{ai} (redstem stork's bill)	Gayophytum ramosissimum ^a (pinyon groundsmoke)	Helianthus annuus ^a (common sunflower)	Ipomopsis aggregata (scarlet gilia)	Lactuca serriola ^{ai} (prickly lettuce)	Lappula occidentalis ^a (flatspine stickseed)	Lupinus brevicaulis ^a (shortstem lupine)	Marrubium vulgare ⁱ (horehound)
year	Nested Frequency																
2006	-	3	2	-	-	-	-	36	-	-	-	-	3	-	-	-	-
2011	13	6	0	3	-	10	2	119	21	5	25	2	4	69	142	1	28
2016	2	4	0	-	4	-	-	14	1	-	-	-	-	-	8	-	29
year	Average Cover (%)																
2006	-	0.0	0.0	-	-	-	-	0.5	-	-	-	-	0.0	-	-	-	-
2011	0.1	0.0	0.0	0.0	-	0.0	0.0	1.2	0.1	0.0	0.1	0.0	0.3	0.5	2.6	0.0	0.4
2016	0.0	0.0	0.0	-	0.0	-	-	0.1	0.0	-	-	-	-	-	0.0	-	1.4

a - Annual/Biennial; n - Noxious Weed; i - Introduced Species

FORB SPECIES	Mentzelia albicaulis ^a (whitestem blazingstar)	Phlox longifolia (longleaf phlox)	Salsola tragus ⁿⁱ (prickly Russian thistle)	Sisymbrium altissimum ⁿⁱ (tall tumbled mustard)	Sphaeralcea coccinea (scarlet globemallow)	Tragopogon dubius ⁿⁱ (yellow salsify)
year	Nested Frequency					
2006	-	-	-	-	-	-
2011	10	2	341	331	4	3
2016	-	-	21	39	3	-
year	Average Cover (%)					
2006	-	-	-	-	-	-
2011	0.0	0.0	4.3	11.0	0.2	0.0
2016	-	-	0.1	0.6	0.0	-

a - Annual/Biennial; n - Noxious Weed; i - Introduced Species

Table 23R-11.12 - Shrub and Tree Species. Average modified Daubenmire quadrat and line intercept cover by year.

SHRUB SPECIES	Artemisia tridentata ssp. wyomingensis ^p (Wyoming big sagebrush)	Bassia prostrata ⁱ (forage kochia)	Gutierrezia sarothrae (broom snakeweed)	Opuntia (pricklypear)
year	Line Intercept Cover (%)			
2006	21.7	-	-	0.2
2011	11.2	-	-	-
2016	17.2	0.1	-	0.1
year	Quadrat Cover (%)			
2006	19.1	-	-	0.0
2011	8.3	-	-	-
2016	12.8	0.0	0.2	0.0

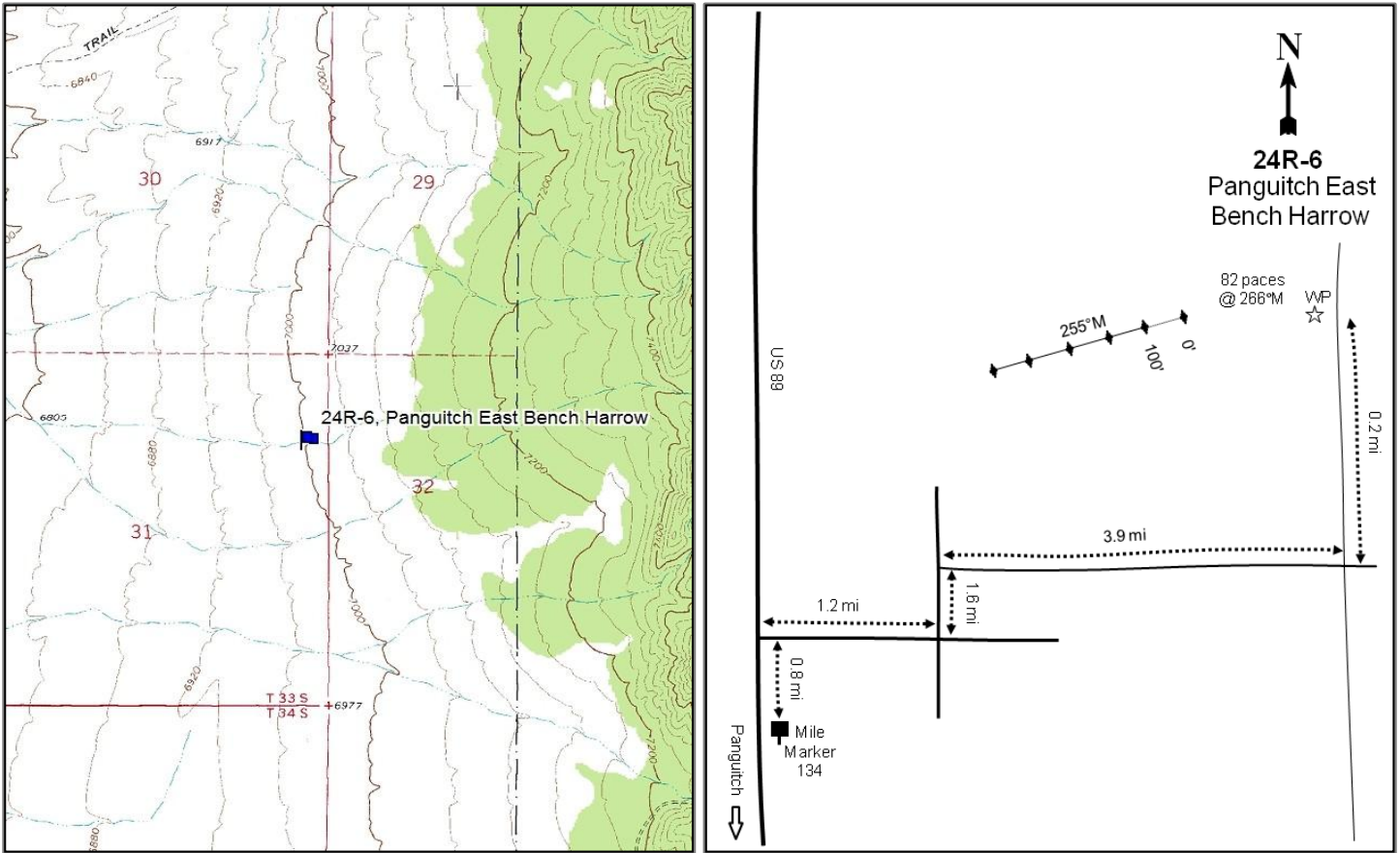
t - Tree Species; p - Preferred Browse; i - Introduced

Table 23R-11.13 - Shrub/Tree Characteristics. Population characteristics of shrub/tree species populations including density reproduction (seedlings), age distribution, utilization, vigor and average size (height/crown) of plants.

Year	Density		Age Class Distribution			Utilization		Poor Vigor (%)	Average Height Crown (cm)
	Plants Per Acre		Excluding Seedlings			Moderate (%)	Heavy (%)		
	Excluding Seedlings	Seedling	Young (%)	Mature (%)	Decadent (%)				
<i>Artemisia tridentata</i> ssp. <i>wyomingensis</i> ^P -- (Wyoming big sagebrush)									
2006	3440	800	24	43	33	4	2	19	64/97
2011	6900	23380	75	25	0	2	0	1	53/72
2016	8520	400	48	51	1	37	24	1	37/57
<i>Bassia prostrata</i> ⁱ -- (forage kochia)									
2006	-	-	-	-	-	-	-	-	-/-
2011	-	-	-	-	-	-	-	-	-/-
2016	20	-	0	100	0	0	0	0	23/32
<i>Ericameria nauseosa</i> -- (rubber rabbitbrush)									
2006	-	-	-	-	-	-	-	-	-/-
2011	-	-	-	-	-	-	-	-	-/-
2016	-	-	-	-	-	-	-	-	66/65
<i>Gutierrezia sarothrae</i> -- (broom snakeweed)									
2006	-	-	-	-	-	-	-	-	12/22
2011	-	-	-	-	-	-	-	-	-/-
2016	160	-	0	100	0	0	0	0	24/28
<i>Opuntia</i> -- (pricklypear)									
2006	-	20	0	0	0	0	0	0	9/24
2011	-	-	-	-	-	-	-	-	-/-
2016	80	-	25	75	0	0	0	0	9/29

t - Tree Species; p - Preferred Browse; i - Introduced Species

PANGUITCH EAST BENCH HARROW - STUDY NO. 24R-6



Location Information

USGS 7.5 min Map Info	Blind Spring Mountain; Township 33S, Range 4W, Section 31
GPS (0' Stake)	NAD 83 UTM ZONE 12, 382044 East 4195732 North

Transect Information

Browse Tag # (0' Stake)	41
Transect Bearing	255° 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 of Panguitch on US 89 to mile marker 134. Continue 0.8 miles north of the mile marker to a road that comes in from the right (east). Turn onto this road and travel 1.2 miles to an intersection. Turn left and drive 1.6 miles to a 90 degree turn. Continue 3.9 miles to a road that comes in from the left (north). Turn left here and travel 0.2 miles to two witness posts that are right next to each other. From the witness posts, walk 82 paces at 266 degrees magnetic to the 0-foot stake that is marked with browse tag #41.

Site Information

Land Ownership	Federal
Land Administrator	BLM
Allotment	SANFORD BENCH
Elevation	7,000ft (2,134m)
Aspect	West
Slope	3-7%
Sample Dates	07/19/2004, 06/19/2007, 08/22/2012, 08/17/2016

Table 24R-06.1 Disturbance History. Recorded history of major disturbances.

Treatment/Disturbance	Name	WRI DB#	Date	Size (acres)
Harrow - One-Way Dixie	Panguitch East Bench	PDB	October 2004	300
Seeding - Broadcast Before	Panguitch East Bench	PDB	October 2004	300
Seeding - Aerial After	Panguitch East Bench	PDB	December 2004	300

Table 24R-06.2 Seed Mix. List of known seeded plant species and rates (if available).

Mix Name			Application Type	Application Date	Acres
Panguitch East Bench			Broadcast	Oct 2004	300
Type	Species	Common Name	Cultivar/Source ID	Bulk lbs/acre	PLS lbs/acre
G	Achnatherum hymenoides	Indian Ricegrass	Rimrock	0.50	0.48
G	Agropyron cristatum	Crested Wheatgrass	Douglas	0.50	0.47
G	Agropyron cristatum	Crested Wheatgrass	Hycrest	0.50	0.45
G	Elymus elymoides	Bottlebrush Squirreltail		0.13	0.10
G	Elymus hoffmannii	Newhy Wheatgrass		0.50	0.44
G	Elymus wawawaiensis	Snake River Wheatgrass	Secar	1.17	1.03
G	Festuca brevipila	Hard Fescue		0.50	0.45
G	Hesperostipa comata	Needle and Threadgrass		0.12	0.10
G	Psathyrostachys juncea	Russian Wildrye	Bozoisky	0.50	0.47
G	Thinopyrum intermedium	Intermediate Wheatgrass		0.50	0.45
F		Rocky Mountain Beeplant	Sanpete UT	0.50	0.49
F	Achillea millefolium	Western Yarrow		0.07	0.06
F	Linum perenne	Blue Flax	Appar	0.17	0.14
F	Medicago sativa	Alfalfa	Ladak+	1.00	0.95
F	Melilotus officinalis	Yellow Sweetclover		0.04	0.04
F	Onobrychis viciifolia	Sainfoin		2.67	2.55
F	Sanguisorba minor	Small Burnet	Delar	1.67	1.60
Mix Name			Application Type	Application Date	Acres
Panguitch East Bench Forage Kochia			Aerial	Dec 2004	300
Type	Species	Common Name	Cultivar/Source ID	Bulk lbs/acre	PLS lbs/acre
S	Bassia prostrata	Forage Kochia	Immigrant	1.00	0.67

Wildlife Habitat and Vegetation History**Table 24R-06.3 - Wildlife Seasonal Habitat.** UDWR wildlife habitat and seasonality.

Species	Habitat	Season	Brood/Young Rearing
Deer	substantial	winter	
Greater Sage Grouse	Crucial	occupied & Winter	brood-rearing
Pronghorn	crucial	year-long	

Table 24R-06.4 - Vegetation History. The dominant vegetation type(s) and phase of woodland succession (Tausch, Miller, Roundy, & Chambers, 2009).

Year	Vegetation Type	Woodland Succession
2004	Wyoming Big Sagebrush	Phase I
2007	Wyoming Big Sagebrush	Phase I
2012	Wyoming Big Sagebrush/Perennial Grass	Phase I
2016	Wyoming Big Sagebrush/Perennial Grass	Phase I

Site Notes

This study is located approximately eight miles northwest of Panguitch within a Wyoming big sagebrush (*Artemisia tridentata* ssp. *wyomingensis*) flat.

Soils

Table 24R-06.5 - Soil Analysis Data. List of chemical and textural soil characteristics determined by laboratory analysis.

Texture	pH	%sand	%silt	%clay	%OM	PPM P	PPM K	ds/m	Sample Date
Sandy Clay Loam	7.6	55.0	23.4	21.6	1.4	7.8	611.2	0.7	07/19/2004

Site Potential

1981-2010 Average Annual Precipitation 11 inches
 NRCS Ecological Site Semidesert Loam (Wyoming Big Sagebrush)
 NRCS Ecological Site # R047XB222UT
 States and Transitions No state and transition model is available for this ecological site.

This study site has existed as a Wyoming big sagebrush (*Artemisia tridentata* ssp. *wyomingensis*) dominated plant community since establishment in 2004. Decadence was high in the 2004 sample year and the site was dixie harrowed and seeded that fall (Table 24R-06.1). Sagebrush cover exhibited an initial decrease, but has since surpassed pre- treatment levels. Decadence has remained low following treatment (Table 24R-06.12, Table 24R-06.13). Perennial grasses -- mainly blue grama (*Bouteloua gracilis*) -- increased in cover and became a co-dominant component in 2012 (Table 24R-06.7, Table 24R-06.10). Although no trees have been recorded in the data, photos reveal that there is at least one on the site and a woodland on one side, indicating that this site has the potential for future encroachment (Table 24R-06.12, Table 24R-06.13, Photos).

Trend Summary Tables

Table 24R-06.6 - Shrub/Tree Summary. Average modified Daubenmire quadrat and line intercept cover by year for shrubs/trees.

Year	Quadrat Cover (%)			Line-intercept Cover (%)		
	Preferred Shrub	Other Shrub	Tree	Preferred Shrub	Other Shrub	Tree
2004	18.1	0.1	-	19.5	-	-
2007	7.7	0.2	-	4.7	-	-
2012	18.3	-	-	15.9	-	-
2016	19.8	0.3	-	22.8	0.2	-

Table 24R-06.7 - Herbaceous Summary. Nested frequency and average modified Daubenmire quadrat cover by year for herbaceous functional groups.

Year	Nested Frequency				Quadrat Cover (%)			
	Annual Grass	Perennial Grass	Annual/Biennial Forb	Perennial Forb	Annual Grass	Perennial Grass	Annual/Biennial Forb	Perennial Forb
2004	-	185	16	3	-	5.3	0.1	0.0
2007	-	162	89	12	-	6.4	1.1	0.0
2012	-	208	94	22	-	10.7	0.6	0.1
2016	-	296	3	4	-	20.5	0.0	0.0

Table 24R-06.8 - Basic Ground Cover. Average modified Daubenmire quadrat cover by year for basic ground cover types.

Year	Cover Type (%)					
	Bare Ground	Cryptogams	Litter	Pavement	Rock	Vegetation
2004	36.6	3.4	23.8	22.8	4.1	23.1
2007	49.7	0.1	28.2	9.1	5.0	15.9
2012	38.0	0.6	25.9	11.1	3.3	30.2
2016	32.7	0.6	26.4	13.1	4.2	39.1

Table 24R-06.9 - Pellet Group Data. Quadrat frequency and pellet group transect data for animal pellets. Rabbit pellet groups are not sampled in the pellet group transect.

Year	Cattle	Mule Deer/Pronghorn	Rabbit
	Quadrat Frequency		
2004	-	1	26
2007	-	1	91
2012	2	-	32
2016	-	2	41
Year	Days Use Per Acre (ha)		
2004	-	1.3 (3.3)	-
2007	-	4.0 (9.9)	-
2012	8.0 (19.7)	2.0 (5.0)	-
2016	2.9 (7.2)	7.4 (18.2)	-

Table 24R-06.10 - Grass Species. Nested frequency and modified Daubenmire average cover by year.

GRASS SPECIES	Achnatherum hymenoides (Indian ricegrass)	Agropyron cristatum ⁱ (crested wheatgrass)	Bouteloua gracilis (blue grama)	Elymus elymoides (squirreltail)	Elymus wawawaiensis (Snake River wheatgrass)	Festuca brevipila ⁱ (hard fescue)	Hesperostipa comata (needle and thread)	Poa secunda (Sandberg bluegrass)	Psathyrostachys juncea ⁱ (Russian wildrye)	Thinopyrum intermedium ⁱ (intermediate wheatgrass)
year	Nested Frequency									
2004	-	-	148	38	-	-	-	5	-	-
2007	3	7	148	8	-	-	2	3	2	1
2012	15	8	154	14	1	18	4	3	17	-
2016	20	-	254	62	-	-	-	-	4	-
year	Average Cover (%)									
2004	-	-	4.3	1.0	-	-	-	0.0	-	-
2007	0.0	0.0	6.2	0.1	-	-	0.0	0.0	0.0	0.0
2012	0.5	0.4	8.6	0.2	0.0	0.5	0.0	0.0	0.4	-
2016	0.6	-	18.4	1.1	-	-	-	-	0.4	-

a - Annual; n - Noxious Weed; i - Introduced Species

Table 24R-06.11 - Forb Species. Nested frequency and modified Daubenmire average cover by year.

FORB SPECIES	Arabis (rockcross)	Astragalus lentiginosus (freckled milkvetch)	Chamaesyce (sandmat)	Chenopodium fremontii ^a (Fremont's goosefoot)	Cleome serrulata ^a (Rocky Mountain beeplant)	Cryptantha (cryptantha)	Descurainia pinnata ^a (western tansymustard)	Eriogonum cernuum ^a (nodding buckwheat)	Gilia ^a (gilia)	Lactuca serriola ⁱⁱ (prickly lettuce)	Lappula occidentalis ^a (flatspine stickseed)	Salsola tragus ⁱⁱ (prickly Russian thistle)	Sanguisorba minor ⁱ (small burnet)	Sphaeralcea coccinea (scarlet globemallow)	Sphaeralcea grossularifolia (gooseberry/leaf globemallow)	
year	Nested Frequency															
2004	-	3	-	-	-	-	16	-	-	-	-	-	-	-	-	-
2007	4	7	-	4	9	-	60	22	1	4	2	-	1	-	-	-
2012	11	-	8	-	-	-	33	44	-	1	4	29	1	-	-	2
2016	-	-	-	-	-	3	3	-	-	-	-	-	-	1	-	-
year	Average Cover (%)															
2004	-	0.0	-	-	-	-	0.1	-	-	-	-	-	-	-	-	-
2007	0.0	0.0	-	0.0	0.2	-	0.9	0.0	0.0	0.0	0.0	-	0.0	-	-	-
2012	0.0	-	0.0	-	-	-	0.1	0.2	-	0.0	0.0	0.3	0.0	-	-	0.0
2016	-	-	-	-	-	0.0	0.0	-	-	-	-	-	-	0.0	-	-

a - Annual/Biennial; n - Noxious Weed; i - Introduced Species

Table 24R-06.12 - Shrub and Tree Species. Average modified Daubenmire quadrat and line intercept cover by year.

SHRUB SPECIES	Line Intercept Cover (%)			
	Artemisia tridentata ssp. wyomingensis ^p (Wyoming big sagebrush)	Chrysothamnus viscidiflorus (yellow rabbitbrush)	Gutierrezia sarothrae (broom snakeweed)	Opuntia (pricklypear)
year	Line Intercept Cover (%)			
2004	19.5	-	-	-
2007	4.7	-	-	-
2012	15.9	-	-	-
2016	22.8	-	0.1	0.1
year	Quadrat Cover (%)			
2004	18.1	-	0.1	-
2007	7.7	0.1	-	0.0
2012	18.3	-	-	-
2016	19.8	-	0.3	0.0

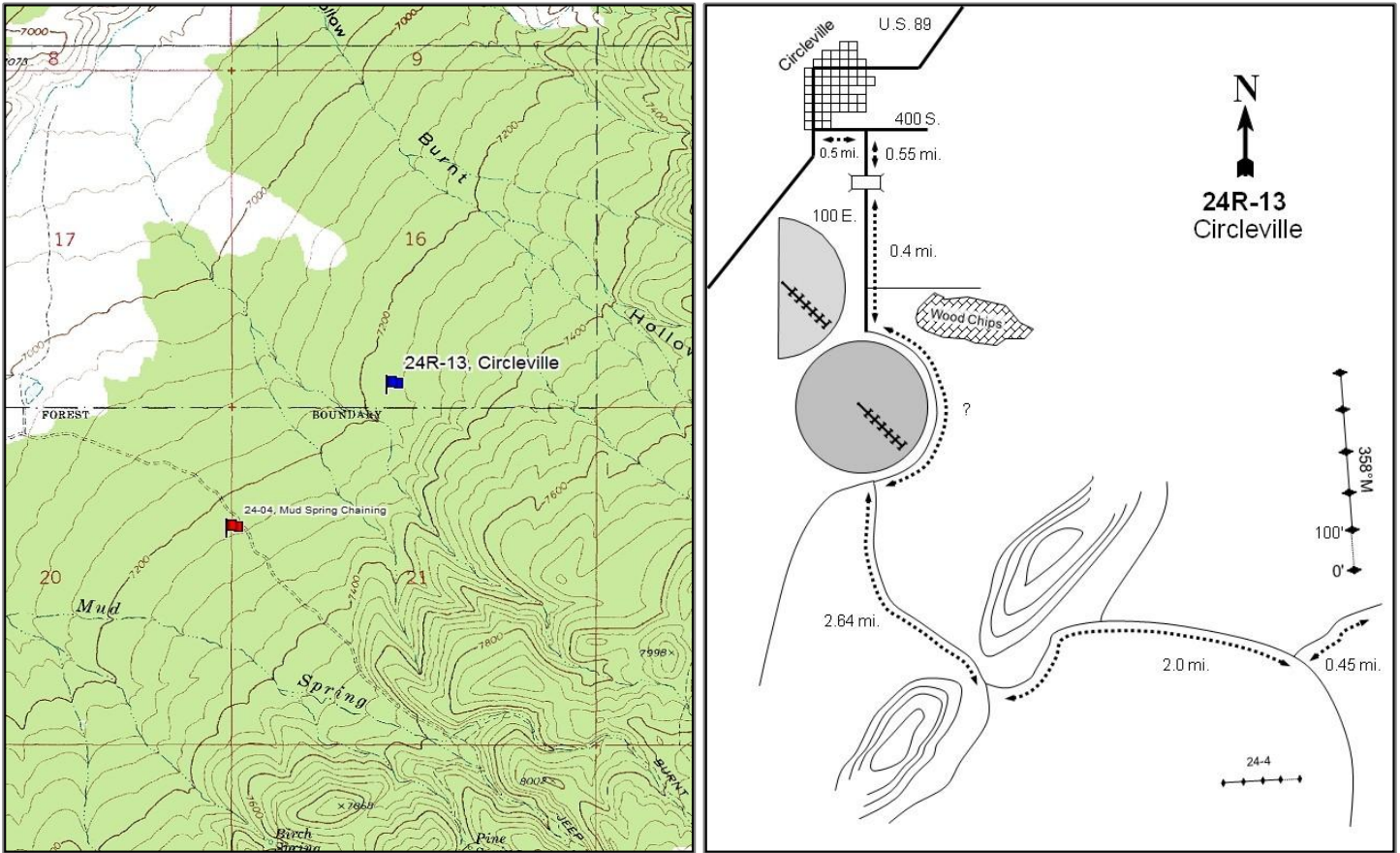
t - Tree Species; p - Preferred Browse; i - Introduced

Table 24R-06.13 - Shrub/Tree Characteristics. Population characteristics of shrub/tree species populations including density reproduction (seedlings), age distribution, utilization, vigor and average size (height/crown) of plants.

Year	Density		Age Class Distribution			Utilization		Poor Vigor (%)	Average Height Crown (cm)
	Plants Per Acre		Excluding Seedlings			Moderate (%)	Heavy (%)		
	Excluding Seedlings	Seedling	Young (%)	Mature (%)	Decadent (%)				
Artemisia tridentata ssp. wyomingensis^p -- (Wyoming big sagebrush)									
2004	6960	60	7	48	45	3	0	26	42/65
2007	2460	80	10	68	23	22	7	59	37/55
2012	15400	9160	82	18	1	8	0	1	47/71
2016	15680	80	57	42	1	23	2	1	40/62
Gutierrezia sarothrae -- (broom snakeweed)									
2004	140	-	71	29	0	0	0	0	12/18
2007	-	-	-	-	-	-	-	-	-/-
2012	-	-	-	-	-	-	-	-	10/12
2016	180	-	11	89	0	0	0	0	18/24
Opuntia -- (pricklypear)									
2004	40	-	0	100	0	0	0	0	11/24
2007	20	-	0	100	0	0	0	0	3/4
2012	20	-	0	100	0	0	0	0	10/16
2016	20	-	0	100	0	0	0	0	10/18
Pediocactus simpsonii -- (mountain ball cactus)									
2004	-	-	-	-	-	-	-	-	-/-
2007	-	-	-	-	-	-	-	-	-/-
2012	20	-	100	0	0	0	0	0	2/3

t - Tree Species; p - Preferred Browse; i - Introduced Species

CIRCLEVILLE - STUDY NO. 24R-13



Location Information

USGS 7.5 min Map Info Mount Dutton NW; Township 31S, Range 3W, Section 16
 GPS (0' Stake) NAD 83 UTM ZONE 12, 394485 East 4218701 North

Transect Information

Browse Tag # (0' Stake) 583
 Transect Bearing 0° magnetic
 Length 500ft
 Belt Placement Line 1 (11ft), Line 2 (34ft), Line 3 (71ft), Line 4 (59ft), Line 5 (95ft)
 Belt Marker Placement Standard, Belt 3: 1ft

Directions to Site

Heading south on U.S. 89 in Circleville, turn left (east) onto 400 South. Drive for 0.5 miles and turn right (south) onto 100 East. After 0.55 miles there will be a bridge: continue for another 0.4 miles. At this point the road will curve around a center pivot field; about halfway around the field there will be a road that heads south. Take this road and drive for 2.64 miles at which point the road will fork. Take the left fork and drive for 2 miles. Then take the road to the left and drive for 0.45 miles. The transect will be to the left (north) of the road.

Site Information

Land Ownership	State
Land Administrator	SITLA
Allotment	No data
Elevation	7,273ft (2,217m)
Aspect	West
Slope	5%
Sample Dates	07/29/2013, 08/17/2016

Table 24R-13.1 Disturbance History. Recorded history of major disturbances.

Treatment/Disturbance	Name	WRI DB#	Date	Size (acres)
Seeding - Dribbler Before	Circleville Vegetation Enhancement	2706	October 2013	459
Seeding - Aerial After	Circleville Vegetation Enhancement	2706	February 2014	459
Chaining - Two-Way Ely	Circleville Vegetation Enhancement	2706	October 2013	459
Seeding - Aerial Before	Circleville Vegetation Enhancement	2706	October 2013	459

Table 24R-13.2 Seed Mix. List of known seeded plant species and rates (if available).

Mix Name			Application Type	Application Date	Acres
Circleville Chaining			Aerial	Oct 2013	460
Type	Species	Common Name	Cultivar/Source ID	Bulk lbs/acre	PLS lbs/acre
G	Achnatherum hymenoides	Indian Ricegrass	Rimrock	2.07	1.92
G	Agropyron fragile	Siberian Wheatgrass	Vavilov	1.96	1.62
G	Elymus wawawaiensis	Snake River Wheatgrass	Secar	0.98	0.91
G	Elymus wawawaiensis	Snake River Wheatgrass	Secar	0.54	0.47
G	Leymus cinereus	Great Basin Wildrye	UDWR IntMtn Tetra	0.87	0.74
G	Thinopyrum intermedium	Intermediate Wheatgrass	Clarke	1.30	0.81
F	Astragalus cicer	Cicer Milkvetch	Lutana	0.98	0.94
F	Linum perenne	Blue Flax	Appar	0.54	0.47
F	Medicago sativa	Alfalfa	Ranger	2.07	1.86
F	Sanguisorba minor	Small Burnet	Delar	2.07	1.87
Mix Name			Application Type	Application Date	Acres
Circleville Chaining Secondary			Aerial	Feb 2014	460
Type	Species	Common Name	Cultivar/Source ID	Bulk lbs/acre	PLS lbs/acre
F	Medicago sativa	Alfalfa	Ranger (NC)	0.33	0.31
S	Artemisia tridentata ssp. wyomingensis	Wyoming Big Sagebrush	Piute UT	0.35	0.10
S	Bassia prostrata	Forage Kochia	Beaver UT	0.49	0.30
S	Bassia prostrata	Forage Kochia	Snowstorm	0.22	0.12

Wildlife Habitat and Vegetation History

Table 24R-13.3 - Wildlife Seasonal Habitat. UDWR wildlife habitat and seasonality.

Species	Habitat	Season
Deer	crucial	winter
Elk	substantial	year-long

Table 24R-13.4 - Vegetation History. The dominant vegetation type(s) and phase of woodland succession (Tausch, Miller, Roundy, & Chambers, 2009).

Year	Vegetation Type	Woodland Succession
2013	Pinyon-Juniper	Phase III
2016	Perennial Grass	Phase I

Site Notes

There are a lot of flow patterns and soil movement. Additionally, there are a lot of large rocks holding the surface relatively stable. A few other active gullies are in the area. In 2016, a 3 point deer antler shed was found near the site.

Site Potential

1981-2010 Average Annual Precipitation 13 inches
 NRCS Ecological Site Upland Loam (Mountain Big Sagebrush-Indian Ricegrass)
 NRCS Ecological Site # R047XB308UT
 States and Transitions No state and transition model is available for this ecological site.

When this study site was established in 2013, it was a two-needle pinyon (*Pinus edulis*) and Utah juniper (*Juniperus osteosperma*) woodland that was considered to be in Phase III of woodland succession. Other browse cover was minimal and was mainly contributed by mountain big sagebrush (*Artemisia tridentata* ssp. *vaseyana*) (Table 24R- 13.12). A chaining and seeding treatment later that year (Table 24R-13.1) removed most of the pinyon and juniper, causing the site to transition to one dominated by a mix of perennial grasses in 2016 (Table 24R-13.7, Table 24R- 13.10). Although sagebrush cover decreased from 2013 to 2016, it is predicted that it will increase in subsequent sample years. Juniper seedlings and a few remaining trees are present, indicating that this site has the potential to be infilled in the future (Table 24R-13.12, Table 24R-13.13).

Trend Summary Tables

Table 24R-13.6 - Shrub/Tree Summary. Average modified Daubenmire quadrat and line intercept cover by year for shrubs/trees.

Year	Quadrat Cover (%)			Line-intercept Cover (%)		
	Preferred Shrub	Other Shrub	Tree	Preferred Shrub	Other Shrub	Tree
2013	0.3	0.3	11.8	1.1	0.2	34.9
2016	1.0	0.9	0.2	0.2	1.4	0.4

Table 24R-13.7 - Herbaceous Summary. Nested frequency and average modified Daubenmire quadrat cover by year for herbaceous functional groups.

Year	Nested Frequency				Quadrat Cover (%)			
	Annual Grass	Perennial Grass	Annual/Biennial Forb	Perennial Forb	Annual Grass	Perennial Grass	Annual/Biennial Forb	Perennial Forb
2013	-	114	5	63	-	1.7	0.0	0.2
2016	8	313	34	110	0.0	12.5	0.5	2.0

Table 24R-13.8 - Basic Ground Cover. Average modified Daubenmire quadrat cover by year for basic ground cover types.

Year	Cover Type (%)					
	Bare Ground	Cryptograms	Litter	Pavement	Rock	Vegetation
2013	9.7	1.5	51.2	13.6	17.0	14.4
2016	27.7	0.0	46.0	5.9	16.2	17.5

Table 24R-13.9 - Pellet Group Data. Quadrat frequency and pellet group transect data for animal pellets. Rabbit pellet groups are not sampled in the pellet group transect.

Year	Cattle	Mule Deer	Elk	Rabbit
	Quadrat Frequency			
2013	-	-	2	2
2016	7	5	3	37
Year	Days Use Per Acre (ha)			
2013	-	0.7 (1.7)	2.0 (5.0)	-
2016	18.1 (44.8)	-	8.7 (21.5)	-

Table 24R-13.10 - Grass Species. Nested frequency and modified Daubenmire average cover by year.

GRASS SPECIES	Achnatherum hymenoides (Indian ricegrass)	Achnatherum lettermanii (Letterman's needlegrass)	Agropyron cristatum ⁱ (crested wheatgrass)	Bouteloua gracilis (blue grama)	Bromus tectorum ^{ai} (cheatgrass)	Elymus elymoides (squirreltail)	Koeleria macrantha (prairie Junegrass)	Psathyrostachys juncea ⁱ (Russian wildrye)	Pseudoroegneria spicata (bluebunch wheatgrass)	Thinopyrum intermedium ⁱ (intermediate wheatgrass)
year	Nested Frequency									
2013	4	26	-	38	-	56	1	-	-	-
2016	119	5	110	41	8	121	27	21	3	11
year	Average Cover (%)									
2013	0.2	0.4	-	0.8	-	0.4	0.0	-	-	-
2016	2.9	0.0	4.1	1.5	0.0	2.4	0.7	0.3	0.0	0.5

a - Annual; n - Noxious Weed; i - Introduced Species

Table 24R-13.11 - Forb Species. Nested frequency and modified Daubenmire average cover by year.

FORB SPECIES	Antennaria microphylla (littleleaf pussytoes)	Arabis (rockcross)	Astragalus lentiginosus (freckled milkvetch)	Chaenactis douglasii (Douglas' dustymaiden)	Cryptantha (cryptantha)	Descurainia pinnata ^a (western tansymustard)	Erigeron pumilus (shaggy fleabane)	Hymenopappus filifolius (fineleaf hymenopappus)	Ipomopsis aggregata (scarlet gilia)	Lactuca serriola ^{ai} (prickly lettuce)	Lappula occidentalis ^a (flatspine stickseed)	Linum perenne ⁱ (blue flax)	Medicago sativa ⁱ (alfalfa)	Nicotiana attenuata ^a (coyote tobacco)	Penstemon (beardtongue)	Salsola tragus ^{ai} (prickly Russian thistle)	Sanguisorba minor ⁱ (small burnet)
year	Nested Frequency																
2013	-	53	-	2	1	5	-	-	8	-	-	-	-	-	1	-	-
2016	1	-	4	-	3	6	3	9	-	12	1	94	7	6	-	5	3
year	Average Cover (%)																
2013	-	0.1	-	0.0	0.0	0.0	-	-	0.0	-	-	-	-	-	0.0	-	-
2016	0.0	-	0.0	-	0.0	0.1	0.0	0.4	-	0.0	0.0	1.4	0.0	0.3	-	0.0	0.0

a - Annual/Biennial; n - Noxious Weed; i - Introduced Species

FORB SPECIES	Sisymbrium altissimum ^{ai} (tall tumbled mustard)	Solanum triflorum ^a (cutleaf nightshade)	Tragopogon dubius ^{ai} (yellow salsify)
year	Nested Frequency		
2013	-	-	-
2016	1	1	3
year	Average Cover (%)		
2013	-	-	-
2016	0.0	0.0	0.1

a - Annual/Biennial; n - Noxious Weed; i - Introduced Species

Table 24R-13.12 - Shrub and Tree Species. Average modified Daubenmire quadrat and line intercept cover by year.

SHRUB SPECIES	Artemisia tridentata ssp. vaseyana ^p (mountain big sagebrush)	Bassia prostrata ⁱ (forage kochia)	Ericameria nauseosa (rubber rabbitbrush)	Gutierrezia sarothrae (broom snakeweed)	Juniperus osteosperma ⁱ (Utah juniper)	Opuntia (pricklypear)	Pediocactus simpsonii (mountain ball cactus)	Pinus edulis ⁱ (twonneedle pinyon)
year	Line Intercept Cover (%)							
2013	1.1	-	-	0.2	10.4	-	-	24.5
2016	0.2	0	-	1.4	0.4	-	-	-
year	Quadrat Cover (%)							
2013	0.3	-	-	0.3	1.1	-	0.0	10.7
2016	1.0	0.3	0.2	0.4	0.2	0.0	-	-

t - Tree Species; p - Preferred Browse; i - Introduced

Table 24R-13.13 - Shrub/Tree Characteristics. Population characteristics of shrub/tree species populations including density reproduction (seedlings), age distribution, utilization, vigor and average size (height/crown) of plants.

Year	Density		Age Class Distribution			Utilization		Poor Vigor (%)	Average Height Crown (cm)
	Plants Per Acre		Excluding Seedlings			Moderate (%)	Heavy (%)		
	Excluding Seedlings	Seedling	Young (%)	Mature (%)	Decadent (%)				
Artemisia tridentata ssp. vaseyana ^p -- (mountain big sagebrush)									
2013	380	240	11	90	0	11	0	0	53/70
2016	340	100	29	71	0	0	0	0	44/69
Bassia prostrata ⁱ -- (forage kochia)									
2013	-	-	-	-	-	-	-	-	-/-
2016	640	20	28	72	0	16	31	0	10/17
Cercocarpus ledifolius var. ledifolius ^p -- (curl-leaf mountain mahogany)									
2013	-	-	-	-	-	-	-	-	-/-
2016	-	-	-	-	-	-	-	-	84/93

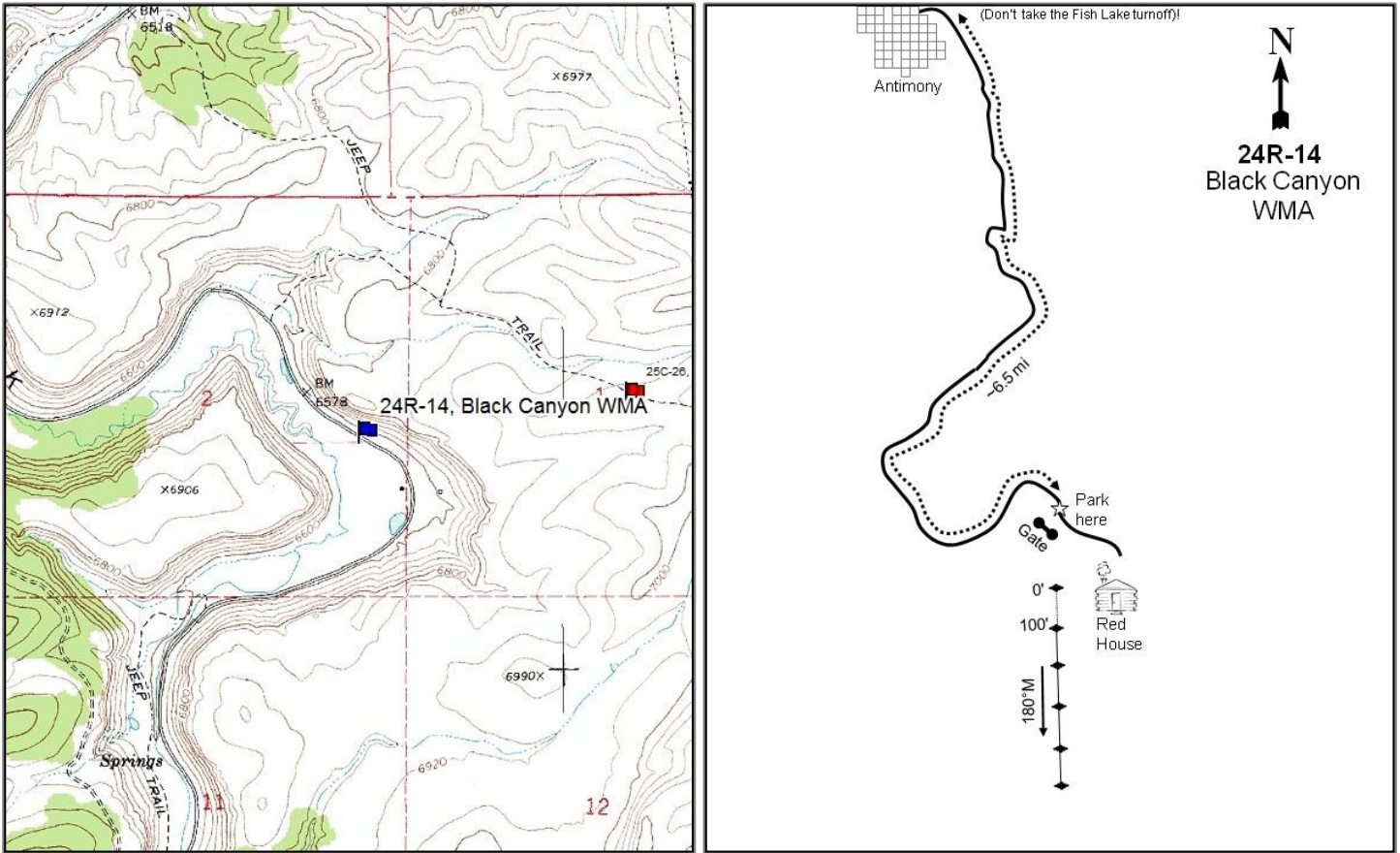
Year	Density		Age Class Distribution			Utilization		Poor Vigor (%)	Average Height Crown (cm)
	Plants Per Acre		Excluding Seedlings			Moderate (%)	Heavy (%)		
	Excluding Seedlings	Seedling	Young (%)	Mature (%)	Decadent (%)				
Chrysothamnus viscidiflorus ssp. viscidiflorus -- (yellow rabbitbrush)									
2013	-	-	-	-	-	-	-	-	-/-
2016	-	-	-	-	-	-	-	-	28/40
Ericameria nauseosa -- (rubber rabbitbrush)									
2013	-	-	-	-	-	-	-	-	-/-
2016	20	20	0	100	0	0	0	0	54/71
Gutierrezia sarothrae -- (broom snakeweed)									
2013	340	-	35	65	0	0	0	0	19/19
2016	400	-	10	90	0	0	0	0	28/43
Juniperus osteosperma^t -- (Utah juniper)									
2013	80	-	25	75	0	0	0	0	-/-
2016	80	120	75	0	25	0	0	25	-/-
Opuntia -- (pricklypear)									
2013	20	-	0	100	0	0	0	0	10/22
2016	20	-	0	100	0	0	0	0	15/31
Pediocactus simpsonii -- (mountain ball cactus)									
2013	40	-	0	100	0	0	0	0	3/5
2016	-	-	-	-	-	-	-	-	-/-
Pinus edulis^t -- (twoneedle pinyon)									
2013	460	60	30	65	4	0	0	4	-/-
2016	-	-	-	-	-	-	-	-	-/-
Purshia tridentata^p -- (antelope bitterbrush)									
2013	-	-	-	-	-	-	-	-	-/-
2016	-	-	-	-	-	-	-	-	46/62
Yucca -- (yucca)									
2013	-	-	-	-	-	-	-	-	22/28

t - Tree Species; p - Preferred Browse; i - Introduced Species

Table 24R-13.14 - Tree Characteristics. Point-quarter tree density, size class distribution, and average diameter.

Year	Density	Size Class Distribution					Average Diameter (cm)
	Trees per Acre	Seedling (%)	1-4'	4-8'	8-12'	>12' (%)	
Juniperus osteosperma (Utah juniper)							
2013	56	17	17	6	11	50	28.4
2016	119	70	15	15	-	-	2.5
Pinus edulis (two-needle pinyon)							
2013	182	5	5	5	20	65	24.9
2016	13	50	50	-	-	-	2.3

BLACK CANYON WMA - STUDY No. 24R-14



Location Information

USGS 7.5 min Map Info	Antimony SW; Township 32S, Range 2W, Section 02
GPS (0' Stake)	NAD 83 UTM ZONE 12, 415041 East 4211773 North

Transect Information

Browse Tag # (0' Stake)	Not Available
Transect Bearing	180° 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 Antimony, travel south on South Black Canyon Road for about 6.5 miles. There will be a gate and a red house on the right (west) side of the road. Park here; the transect is near the gate.

Site Information

Land Ownership	State
Land Administrator	UDWR
Allotment	PINE CREEK ANTIMONY
Elevation	6,588ft (2,008m)
Aspect	South
Slope	1%
Sample Dates	08/31/2016

Table 24R-14.1 Disturbance History. Recorded history of major disturbances.

Treatment/Disturbance	Name	WRI DB#	Date	Size (acres)
Seeding - Rangeland Drill	Black Canyon WMA Rabbitbrush Removal Phase 2	3069	2016?	24
Seeding - Unknown	-	-	Historic	-
Herbicide - Tordon	Black Canyon WMA Rabbitbrush Removal Phase 2	3069	2016?	24
Mechanical - Mower	Black Canyon WMA Rabbitbrush Removal Phase 2	3069	2016?	24

Wildlife Habitat and Vegetation History

Table 24R-14.3 - Wildlife Seasonal Habitat. UDWR wildlife habitat and seasonality.

Species	Habitat	Season	Brood/Young Rearing
Deer	crucial	winter	
Greater Sage Grouse	Crucial	occupied & Winter	brood-rearing

Table 24R-14.4 - Vegetation History. The dominant vegetation type(s) and phase of woodland succession (Tausch, Miller, Roundy, & Chambers, 2009).

Year	Vegetation Type	Woodland Succession
2016	Rubber Rabbitbrush/Perennial Grass	NA

Site Notes

No Notes

Site Potential

1981-2010 Average Annual Precipitation	9 inches
NRCS Ecological Site	Upland - Interzonal Loamy Bottom (Basin Wildrye)
NRCS Ecological Site #	R047XB016UT
States and Transitions	No state and transition model is available for this ecological site.

As of study establishment in 2016, this site is dominated by rubber rabbitbrush (*Ericameria nauseosa*) and a diverse mixture of perennial grasses; the invasive annual grass species cheatgrass (*Bromus tectorum*) also contributes a significant amount of cover (Table 23R-13.7, Table 23R-13.10, Table 23R-13.11). A mower, herbicide, and seeding treatment scheduled for 2016 will likely reduce the amount of rubber rabbitbrush present, encouraging the establishment of more desirable herbaceous and shrub species (Table 23R-13.1).

Trend Summary Tables

Table 24R-14.6 - Shrub/Tree Summary. Average modified Daubenmire quadrat and line intercept cover by year for shrubs/trees.

Year	Quadrat Cover (%)			Line-intercept Cover (%)		
	Preferred Shrub	Other Shrub	Tree	Preferred Shrub	Other Shrub	Tree
2016	-	7.8	-	-	9.7	-

Table 24R-14.7 - Herbaceous Summary. Nested frequency and average modified Daubenmire quadrat cover by year for herbaceous functional groups.

Year	Nested Frequency				Quadrat Cover (%)			
	Annual Grass	Perennial Grass	Annual/Biennial Forb	Perennial Forb	Annual Grass	Perennial Grass	Annual/Biennial Forb	Perennial Forb
2016	262	271	91	202	11.8	21.6	5.9	9.5

Table 24R-14.8 - Basic Ground Cover. Average modified Daubenmire quadrat cover by year for basic ground cover types.

Year	Cover Type (%)					
	Bare Ground	Cryptograms	Litter	Pavement	Rock	Vegetation
2016	13.1	0.0	43.1	1.3	1.4	54.5

Table 24R-14.9 - Pellet Group Data. Quadrat frequency and pellet group transect data for animal pellets. Rabbit pellet groups are not sampled in the pellet group transect.

Year	Cattle	Mule Deer	Elk	Horse	Rabbit
	Quadrat Frequency				
2016	1	16	1	1	13
Year	Days Use Per Acre (ha)				
	2016	2.9 (7.2)	23.4 (57.9)	-	-

Table 24R-14.10 - Grass Species. Nested frequency and modified Daubenmire average cover by year.

GRASS SPECIES	Agrostis stolonifera ⁱ (creeping bentgrass)	Bouteloua gracilis (blue grama)	Bromus inermis ⁱ (smooth brome)	Bromus tectorum ^{ai} (cheatgrass)	Juncus ensifolius (swordleaf rush)	Pascopyrum smithii (western wheatgrass)	Phalaris arundinacea (reed canarygrass)	Phleum pratense ⁱ (timothy)	Poa pratensis ⁱ (Kentucky bluegrass)	Psathyrostachys juncea ⁱ (Russian wildrye)	Sporobolus cryptandrus (sand dropseed)	Thinopyrum intermedium ⁱ (intermediate wheatgrass)	Thinopyrum ponticum ⁱ (tall wheatgrass)
year	Nested Frequency												
2016	13	2	6	262	13	110	36	1	78	49	2	4	68
year	Average Cover (%)												
2016	0.4	0.0	0.2	11.8	0.3	5.0	3.9	0.0	3.3	3.8	0.2	0.0	4.5

a - Annual; n - Noxious Weed; i - Introduced Species

Table 24R-14.11 - Forb Species. Nested frequency and modified Daubenmire average cover by year.

FORB SPECIES	Ambrosia artemisiifolia ^a (annual ragweed)	Bassia scoparia ^{ai} (bumingbush)	Chenopodium fremontii ^{ai} (Fremont's goosefoot)	Cirsium (thistle)	Clematis (leather flower)	Cleome serrulata ^a (Rocky Mountain beoplant)	Comandra umbellata (bastard toadflax)	Convolvulus arvensis ⁿⁱ (field bindweed)	Descurainia pinnata ^a (western tansymustard)	Equisetum laevigatum (smooth horsetail)	Iva axillaris (povertyweed)	Lactuca serriola ^{ai} (prickly lettuce)	Melilotus officinalis ⁱ (sweetclover)	Potentilla (cinquefoil)	Salsola tragus ^{ai} (prickly Russian thistle)	Sisymbrium altissimum ^{ai} (tall tumbledustard)	Symphyotrichum ascendens (western aster)
year	Nested Frequency																
2016	2	68	8	3	18	0	1	4	5	116	63	4	5	2	3	7	3
year	Average Cover (%)																
2016	0.0	4.9	0.5	0.0	0.4	0.0	0.0	0.1	0.0	4.7	3.7	0.0	0.0	0.1	0.3	0.1	0.1

a - Annual/Biennial; n - Noxious Weed; i - Introduced Species

FORB SPECIES	
Tragopogon dubius ^{ai} (yellow salsify)	
Viola (violet)	
year	Nested Frequency
2016	3 8
year	Average Cover (%)
2016	0.1 0.2

a - Annual/Biennial; n - Noxious Weed; i - Introduced Species

Table 24R-14.12 - Shrub and Tree Species. Average modified Daubenmire quadrat and line intercept cover by year.

SHRUB SPECIES	
Ericameria nauseosa (rubber rabbitbrush)	
year	Line Intercept Cover (%)
2016	9.7
year	Quadrat Cover (%)
2016	7.8

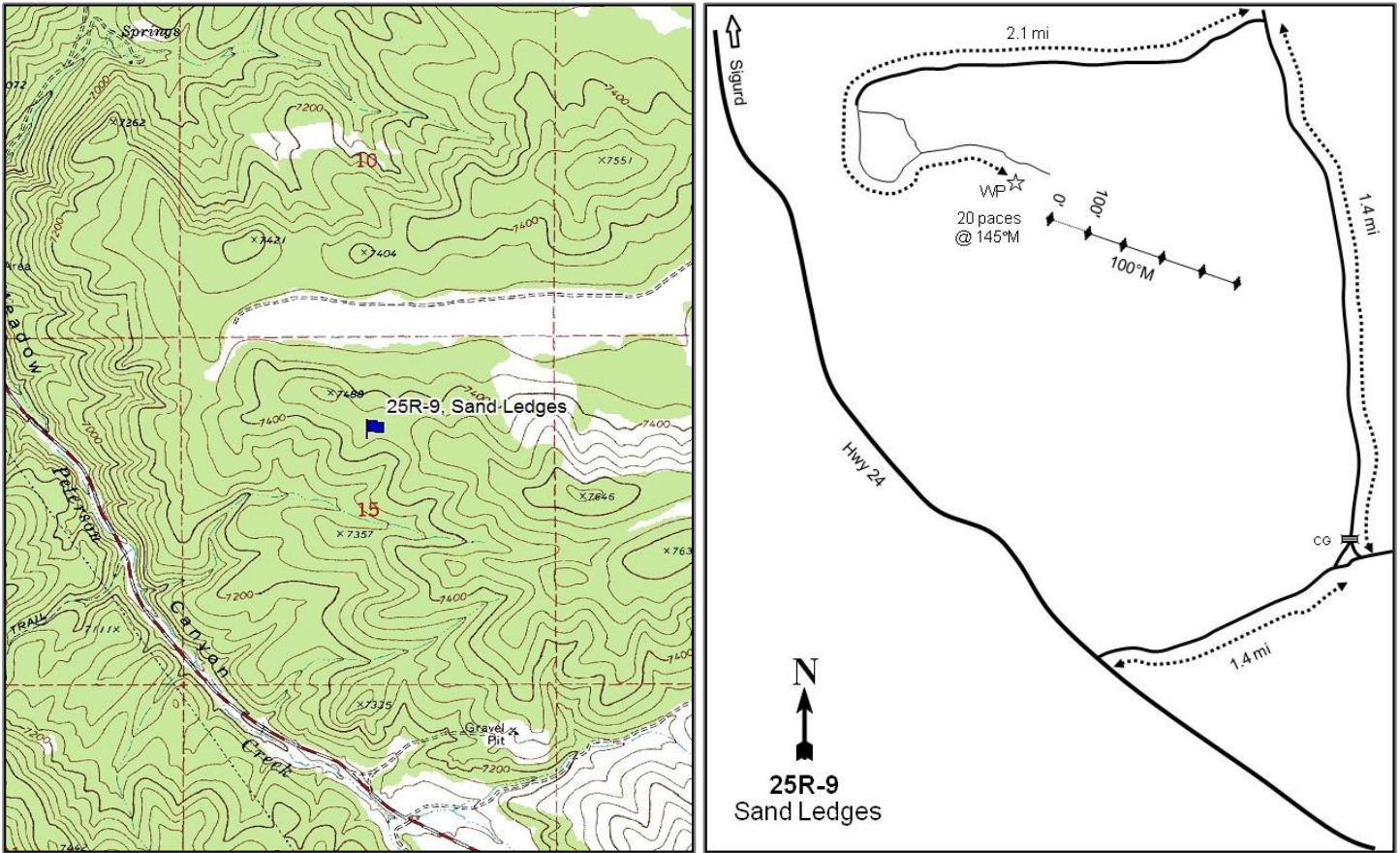
t - Tree Species; p - Preferred Browse; i - Introduced

Table 24R-14.13 - Shrub/Tree Characteristics. Population characteristics of shrub/tree species populations including density reproduction (seedlings), age distribution, utilization, vigor and average size (height/crown) of plants.

Year	Density		Age Class Distribution			Utilization		Poor Vigor (%)	Average Height Crown (cm)
	Plants Per Acre		Excluding Seedlings			Moderate (%)	Heavy (%)		
	Excluding Seedlings	Seedling	Young (%)	Mature (%)	Decadent (%)				
Artemisia tridentata ssp. tridentata ^P -- (basin big sagebrush)									
2016	-	-	-	-	-	-	-	-	86/85
Atriplex canescens ^P -- (fourwing saltbush)									
2016	60	-	0	100	0	0	0	0	110/184
Ericameria nauseosa -- (rubber rabbitbrush)									
2016	820	-	2	90	7	0	0	10	113/138
Salix lucida -- (shining willow)									
2016	60	-	100	0	0	0	100	0	-/-

t - Tree Species; p - Preferred Browse; i - Introduced Species

SAND LEDGES - STUDY NO. 25R-9



Location Information

USGS 7.5 min Map Info Water Creek Canyon N; Township 24S, Range 1W, Section 15
 GPS (0' Stake) NAD 83 UTM ZONE 12, 422207 East 4286724 North

Transect Information

Browse Tag # (0' Stake) 9155
 Transect Bearing 100° 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 24, drive 1.4 miles to a junction. Turn left, travel 1.4 miles, then turn right. Drive for 2.1 miles to a witness post on the right-hand (south) side of the road (there are two roads that climb to the top of the hill and both roads reach the site). From the witness post, walk 20 paces at 145 degrees magnetic to the 0-foot stake which is marked with browse tag #9155.

Site Information

Land Ownership	State
Land Administrator	SITLA
Allotment	GYPSUM
Elevation	7,458ft (2,273m)
Aspect	Southeast
Slope	16%
Sample Dates	08/09/2012, 08/15/2016

Table 25R-09.1 Disturbance History. Recorded history of major disturbances.

Treatment/Disturbance	Name	WRI DB#	Date	Size (acres)
Chaining - Unknown	-	-	Historic	-
Seeding - Unknown	-	-	Historic	-
Hand Crew - Lop and Scatter	Sand ledges Lop and Scatter Project Phase II	2334	June 2013	2275

Wildlife Habitat and Vegetation History**Table 25R-09.3 - Wildlife Seasonal Habitat.** UDWR wildlife habitat and seasonality.

Species	Habitat	Season
Deer	crucial	winter
Elk	substantial	winter

Table 25R-09.4 - Vegetation History. The dominant vegetation type(s) and phase of woodland succession (Tausch, Miller, Roundy, & Chambers, 2009).

Year	Vegetation Type	Woodland Succession
2012	Pinyon-Juniper/Mountain Big Sagebrush-Bitterbrush	Phase II
2016	Mountain Big Sagebrush-Bitterbrush/Annual Grass	Phase I

Site Notes

This study is located approximately five miles east of Glenwood within an old two-needle pinyon (*Pinus edulis*) and Utah juniper (*Juniperus osteosperma*) chaining. In 2016, a small deer shed was found on the site.

Site Potential

1981-2010 Average Annual Precipitation	16 inches
NRCS Ecological Site	Mountain Loam (Mountain Big Sagebrush)
NRCS Ecological Site #	R047XB430UT
States and Transitions	No state and transition model is available for this ecological site.

The states and transitions for this site are likely similar to those of the Mountain Loam (Mountain Big Sagebrush), R047XA430UT ecological site. This study site was dominated by two-needle pinyon (*Pinus edulis*) and Utah juniper (*Juniperus osteosperma*) with mountain big sagebrush (*Artemisia tridentata* ssp. *vaseyana*) and antelope bitterbrush (*Purshia tridentata*) in the shrub understory. A lop and scatter project later that year removed a majority of the tree cover, and cover of sagebrush and bitterbrush had increased in the 2016 sample year (Table 25R-09.12, Table 25R- 09.13). Although initially sparse, the herbaceous understory was abundant in 2016; much of the herbaceous cover, however, was contributed by the invasive annual grass cheatgrass (*Bromus tectorum*) (Table 25R-09.7, Table 25R- 09.10). A number of juniper trees have remained on the site, indicating that it has the potential to be infilled in the future (Table 25R-09.12, Table 25R-09.13).

Trend Summary Tables

Table 25R-09.6 - Shrub/Tree Summary. Average modified Daubenmire quadrat and line intercept cover by year for shrubs/trees.

Year	Quadrat Cover (%)			Line-intercept Cover (%)		
	Preferred Shrub	Other Shrub	Tree	Preferred Shrub	Other Shrub	Tree
2012	6.4	0.2	20.1	10.5	0.5	20.5
2016	11.9	0.1	1.6	16.1	0.2	2.9

Table 25R-09.7 - Herbaceous Summary. Nested frequency and average modified Daubenmire quadrat cover by year for herbaceous functional groups.

Year	Nested Frequency				Quadrat Cover (%)			
	Annual Grass	Perennial Grass	Annual/Biennial Forb	Perennial Forb	Annual Grass	Perennial Grass	Annual/Biennial Forb	Perennial Forb
2012	195	216	18	38	0.9	5.6	0.0	0.1
2016	405	250	37	19	22.2	10.6	0.3	0.1

Table 25R-09.8 - Basic Ground Cover. Average modified Daubenmire quadrat cover by year for basic ground cover types.

Year	Cover Type (%)					
	Bare Ground	Cryptograms	Litter	Pavement	Rock	Vegetation
2012	5.2	0.6	34.6	37.9	16.1	31.3
2016	6.3	-	54.3	9.7	8.7	45.3

Table 25R-09.9 - Pellet Group Data. Quadrat frequency and pellet group transect data for animal pellets. Rabbit pellet groups are not sampled in the pellet group transect.

Year	Cattle	Coyote	Mule Deer	Elk	Rabbit
	Quadrat Frequency				
2012	-	-	2	1	5
2016	-	-	8	2	51
Year	Days Use Per Acre (ha)				
2012	1.5 (3.6)	8.7 (21.5)*	5.3 (13.2)	7.4 (18.2)	-
2016	2.9 (7.2)	-	24.1 (59.6)	14.7 (36.4)	-

*Pellets per acre (ha)

Table 25R-09.10 - Grass Species. Nested frequency and modified Daubenmire average cover by year.

GRASS SPECIES	Achnatherum hymenoides (Indian ricegrass)	Agropyron cristatum ⁱ (crested wheatgrass)	Bromus inermis ⁱ (smooth brome)	Bromus tectorum ^{ai} (cheatgrass)	Carex (sedge)	Elymus elymoides (squirreltail)	Poa secunda (Sandberg bluegrass)	Psathyrostachys juncea ⁱ (Russian wildrye)	Pseudoroegneria spicata (bluebunch wheatgrass)	Thinopyrum intermedium ⁱ (intermediate wheatgrass)
year	Nested Frequency									
2012	5	28	6	195	-	-	40	6	92	96
2016	12	34	3	405	6	1	4	11	77	150
year	Average Cover (%)									
2012	0.0	0.5	0.0	0.9	-	-	0.2	0.0	2.9	1.8
2016	0.1	1.1	0.0	22.2	0.0	0.0	0.0	0.3	2.8	6.1

a - Annual; n - Noxious Weed; i - Introduced Species

Table 25R-09.11 - Forb Species. Nested frequency and modified Daubenmire average cover by year.

FORB SPECIES	Alyssum desertorum ^{ai} (desert madwort)	Arabis (rockcross)	Astragalus lentiginosus (freckled milkvetch)	Calochortus nuttallii (sego lily)	Chaenactis douglasii (Douglas' dustymaiden)	Chamaesyce (sandmat)	Descurainia pinnata ^a (western tansymustard)	Lactuca serriola ^{ai} (prickly lettuce)	Microsteris gracilis ^a (slender phlox)	Packera multilobata (lobeleaf groundsel)	Penstemon (beardtongue)	Phlox longifolia (longleaf phlox)	Polygonum douglasii ^a (Douglas' knotweed)	Streptanthus cordatus (heartleaf twistflower)	Symphyotrichum (aster)	Tragopogon dubius ^{ai} (yellow salsify)
year	Nested Frequency															
2012	-	11	11	-	4	1	1	2	-	1	4	-	15	1	8	-
2016	10	-	3	7	-	1	-	1	25	1	-	3	5	6	-	1
year	Average Cover (%)															
2012	-	0.0	0.0	-	0.0	0.0	0.0	0.0	-	0.0	0.0	-	0.0	0.0	0.0	-
2016	0.1	-	0.0	0.0	-	0.0	-	0.0	0.1	0.0	-	0.0	0.0	0.0	-	0.1

a - Annual/Biennial; n - Noxious Weed; i - Introduced Species

Table 25R-09.12 - Shrub and Tree Species. Average modified Daubenmire quadrat and line intercept cover by year.

SHRUB SPECIES	Artemisia tridentata ssp. vaseyana ^p (mountain big sagebrush)	Ericameria nauseosa (rubber rabbitbrush)	Juniperus osteosperma ^t (Utah juniper)	Pinus edulis ^t (twoneedle piñon)	Purshia tridentata ^p (antelope bitterbrush)
year	Line Intercept Cover (%)				
2012	6.4	0.5	14.2	6.3	4.1
2016	9.6	0.2	2.6	0.3	6.5
year	Quadrat Cover (%)				
2012	4.0	0.2	14.4	5.7	2.4
2016	6.8	0.1	1.6	0.0	5.1

t - Tree Species; p - Preferred Browse; i - Introduced

Table 25R-09.13 - Shrub/Tree Characteristics. Population characteristics of shrub/tree species populations including density reproduction (seedlings), age distribution, utilization, vigor and average size (height/crown) of plants.

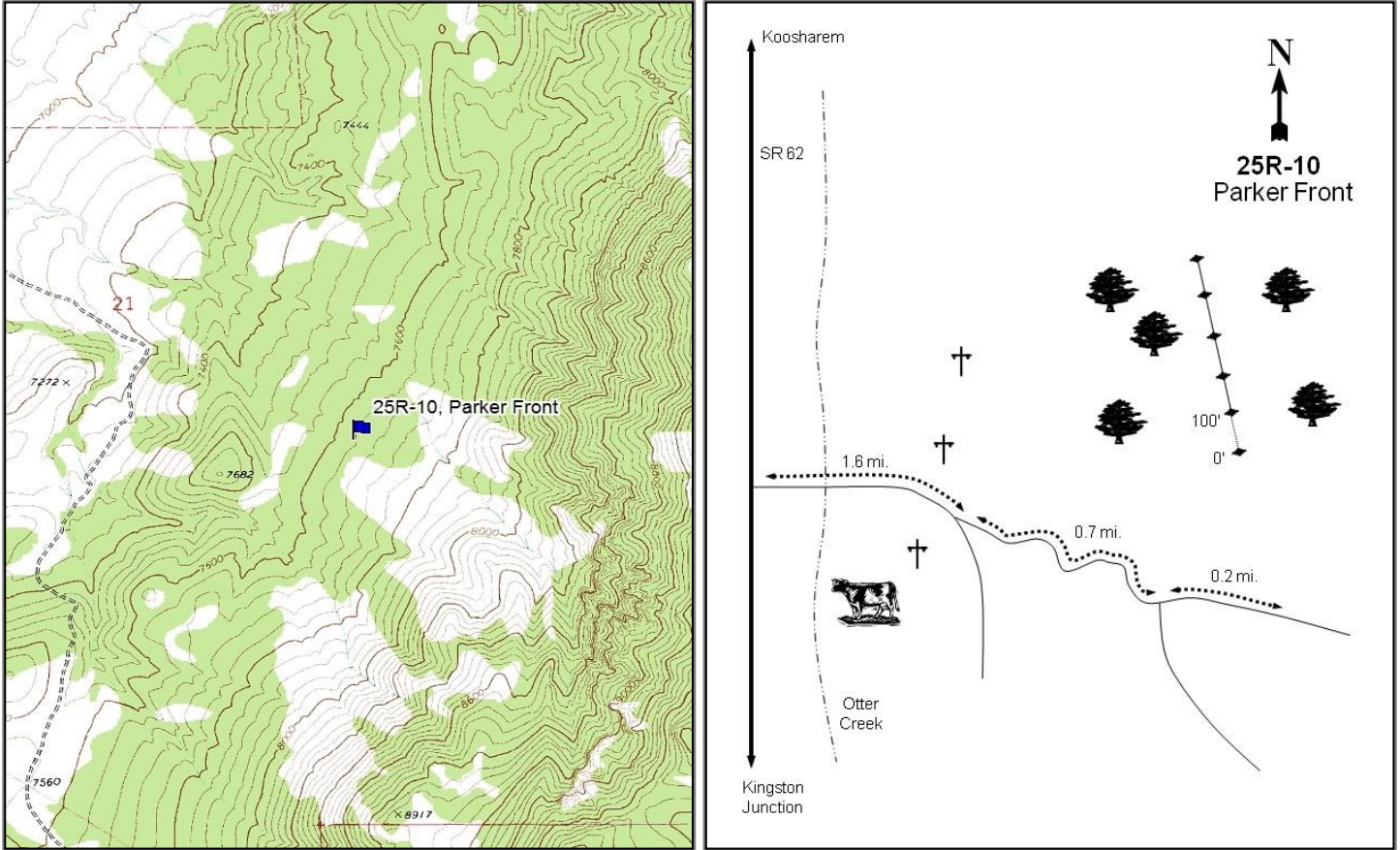
Year	Density		Age Class Distribution			Utilization		Poor Vigor (%)	Average Height Crown (cm)
	Plants Per Acre		Excluding Seedlings			Moderate (%)	Heavy (%)		
	Excluding Seedlings	Seedling	Young (%)	Mature (%)	Decadent (%)				
Artemisia tridentata ssp. vaseyana^P -- (mountain big sagebrush)									
2012	840	40	33	57	10	26	0	5	53/84
2016	1180	-	24	76	0	17	12	0	54/89
Ericameria nauseosa -- (rubber rabbitbrush)									
2012	40	-	0	100	0	0	0	50	96/123
2016	20	-	0	100	0	0	0	0	82/100
Gutierrezia sarothrae -- (broom snakeweed)									
2012	-	-	-	-	-	-	-	-	-/-
2016	-	-	-	-	-	-	-	-	38/56
Juniperus osteosperma^I -- (Utah juniper)									
2012	380	-	21	79	0	5	0	0	-/-
2016	220	-	55	36	9	0	0	0	-/-
Krascheninnikovia lanata^P -- (winterfat)									
2012	20	-	0	100	0	100	0	0	-/-
2016	-	-	-	-	-	-	-	-	-/-
Opuntia -- (pricklypear)									
2012	-	-	-	-	-	-	-	-	17/37
2016	-	-	-	-	-	-	-	-	-/-
Pediocactus simpsonii -- (mountain ball cactus)									
2012	-	-	-	-	-	-	-	-	15/27
2016	-	-	-	-	-	-	-	-	-/-
Pinus edulis^I -- (two-needle pinyon)									
2012	120	-	50	50	0	0	0	0	-/-
2016	80	-	100	0	0	0	0	0	-/-
Purshia tridentata^P -- (antelope bitterbrush)									
2012	140	-	0	71	29	0	43	14	72/165
2016	380	40	11	90	0	58	0	0	77/176

t - Tree Species; p - Preferred Browse; i - Introduced Species

Table 25R-09.14 - Tree Characteristics. Point-quarter tree density, size class distribution, and average diameter.

Year	Density	Size Class Distribution					Average Diameter (cm)
	Trees per Acre	Seedling (%)	1-4'	4-8'	8-12'	>12' (%)	
Juniperus osteosperma (Utah juniper)							
2012	240	-	-	20	80	-	19.1
2016	73	-	78	22	-	-	4.1
Pinus edulis (two-needle pinyon)							
2012	65	-	18	35	29	18	12.6
2016	29	-	100	-	-	-	2.6

PARKER FRONT - STUDY NO. 25R-10



Location Information

USGS 7.5 min Map Info	Parker Knoll NE; Township 28S, Range 1W, Section 22
GPS (0' Stake)	NAD 83 UTM ZONE 12, 421398 East 4245609 North

Transect Information

Browse Tag # (0' Stake)	597
Transect Bearing	356° magnetic
Length	500ft
Belt Placement	Line 1 (11ft), Line 2 (34ft), Line 3 (59ft), Line 4 (95ft), Line 5 (71ft)
Belt Marker Placement	Standard, Belt 3: 5ft

Directions to Site

Travel south on SR 62 from Greenwich for 4.24 miles. Turn east and drive for 1.6 miles, crossing Otter Creek. The road will fork: stay to the left and drive for another 0.7 miles. The road will fork again: keep left and continue for 0.2 miles. The transect will be on the north side of the road.

Site Information

Land Ownership	Federal
Land Administrator	BLM
Allotment	NORTH NARROWS
Elevation	7,618ft (2,322m)
Aspect	Northwest
Slope	12%
Sample Dates	08/01/2013, 08/16/2016

Table 25R-10.1 Disturbance History. Recorded history of major disturbances.

Treatment/Disturbance	Name	WRI DB#	Date	Size (acres)
Chaining - Two-Way Smooth	Parker Front PJ Removal	2547	October-November 2013	496
Seeding - Aerial Before	Parker Front PJ Removal	2547	November 2013	1230
Seeding - Aerial After	Parker Front PJ Removal	2547	January 2014	1230

Table 25R-10.2 Seed Mix. List of known seeded plant species and rates (if available).

Mix Name			Application Type	Application Date	Acres
Parker Front PJ Removal			Aerial	Nov 2013	1230
Type	Species	Common Name	Cultivar/Source ID	Bulk lbs/acre	PLS lbs/acre
G	Festuca ovina	Sheep Fescue	Covar	0.08	0.07
G	Festuca ovina	Sheep Fescue	Covar	0.28	0.26
G	Festuca ovina	Sheep Fescue	Covar	0.16	0.15
G	Poa fendleriana	Muttongrass		0.05	0.05
G	Poa fendleriana	Muttongrass	Montezuma CO	0.12	0.09
G	Pseudoroegneria spicata	Bluebunch Wheatgrass	Anatone	1.50	1.36
F	Helianthus annuus	Annual Sunflower	Box Elder UT	0.57	0.54
F	Linum perenne	Blue Flax	Appar	0.73	0.64
F	Medicago sativa	Alfalfa	Big Sky Ladak	0.77	0.72
F	Melilotus officinalis	Yellow Sweetclover		0.49	0.43
F	Penstemon palmeri	Palmer Penstemon	Sevier UT	0.08	0.07
F	Penstemon palmeri	Palmer Penstemon	White Pine NV	0.16	0.13
F	Sanguisorba minor	Small Burnet		2.44	2.24

Wildlife Habitat and Vegetation History

Table 25R-10.3 - Wildlife Seasonal Habitat. UDWR wildlife habitat and seasonality.

Species	Habitat	Season	Brood/Young Rearing
Deer	crucial	winter	
Elk	substantial	winter	
Greater Sage Grouse	Crucial	occupied	brood-rearing

Table 25R-10.4 - Vegetation History. The dominant vegetation type(s) and phase of woodland succession (Tausch, Miller, Roundy, & Chambers, 2009).

Year	Vegetation Type	Woodland Succession
2013	Pinyon-Juniper	Phase II
2016	Mountain Big Sagebrush/Perennial Grass	Phase I

Site Notes

A few old deer shed antlers were found near the site in 2013.

Site Potential

1981-2010 Average Annual Precipitation 14 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 this ecological site.

This site was dominated by two-needle pinyon (*Pinus edulis*) and Utah juniper (*Juniperus osteosperma*) with a moderately robust mountain big sagebrush (*Artemisia tridentata* ssp. *vaseyana*) and antelope bitterbrush (*Purshia tridentata*) shrub understory when it was established in 2013. Tree and bitterbrush cover decreased following a chaining and seeding treatment later that year, and the dominant browse species was mountain big sagebrush in 2016 (Table 25R-10.12). Herbaceous cover increased following the treatment, and perennial grasses were a co-dominant site component in 2016 (Table 25R-10.7, Table 25R-10.10). Although a majority of the trees were removed during the chaining treatment, they have remained on the site in lower amounts, indicating that this site has the potential for future infilling (Table 25R-10.12, Table 25R-10.13).

Trend Summary Tables

Table 25R-10.6 - Shrub/Tree Summary. Average modified Daubenmire quadrat and line intercept cover by year for shrubs/trees.

Year	Quadrat Cover (%)			Line-intercept Cover (%)		
	Preferred Shrub	Other Shrub	Tree	Preferred Shrub	Other Shrub	Tree
2013	5.4	0.0	6.3	11.1	-	33.9
2016	13.4	0.6	1.9	18.3	0.2	2.1

Table 25R-10.7 - Herbaceous Summary. Nested frequency and average modified Daubenmire quadrat cover by year for herbaceous functional groups.

Year	Nested Frequency				Quadrat Cover (%)			
	Annual Grass	Perennial Grass	Annual/Biennial Forb	Perennial Forb	Annual Grass	Perennial Grass	Annual/Biennial Forb	Perennial Forb
2013	-	151	-	40	-	5.0	-	0.3
2016	7	238	38	52	0.1	11.6	1.4	0.8

Table 25R-10.8 - Basic Ground Cover. Average modified Daubenmire quadrat cover by year for basic ground cover types.

Year	Cover Type (%)					
	Bare Ground	Cryptograms	Litter	Pavement	Rock	Vegetation
2013	5.7	0.8	48.2	3.0	33.0	17.1
2016	2.5	0.0	56.4	1.6	26.3	29.8

Table 25R-10.9 - Pellet Group Data. Quadrat frequency and pellet group transect data for animal pellets. Rabbit pellet groups are not sampled in the pellet group transect.

Year	Mule Deer	Elk	Rabbit
	Quadrat Frequency		
2013	7	2	9
2016	6	2	27
Year	Days Use Per Acre (ha)		
2013	3.4 (8.3)	2.7 (6.6)	-
2016	19.4 (48.0)	2.0 (5.0)	-

Table 25R-10.10 - Grass Species. Nested frequency and modified Daubenmire average cover by year.

GRASS SPECIES	Achnatherum hymenoides (Indian ricegrass)	Achnatherum lettermanii (Letterman's needlegrass)	Bouteloua gracilis (blue grama)	Bromus tectorum ^{ai} (cheatgrass)	Carex (sedge)	Elymus elymoides (squirriltail)	Hesperostipa comata (needle and thread)	Poa fendleriana (muttongrass)	Poa secunda (Sandberg bluegrass)	Pseudoroegneria spicata (bluebunch wheatgrass)
year	Nested Frequency									
2013	21	-	49	-	33	12	29	45	-	-
2016	27	0	14	7	86	88	59	49	4	2
year	Average Cover (%)									
2013	0.3	-	1.4	-	1.1	0.1	0.8	1.2	-	-
2016	1.5	0.0	0.7	0.1	2.6	2.6	2.5	1.7	0.0	0.0

a - Annual; n - Noxious Weed; i - Introduced Species

Table 25R-10.11 - Forb Species. Nested frequency and modified Daubenmire average cover by year.

FORB SPECIES	Arabis (rockcross)	Astragalus utahensis (Utah milkvetch)	Chaenactis douglasii (Douglas' dustymaiden)	Corydalis aurea ^a (scrambled eggs)	Cryptantha (cryptantha)	Erigeron eatonii (Eaton's fleabane)	Erigeron pumilus (shaggy fleabane)	Eriogonum cernuum ^a (nodding buckwheat)	Eriogonum racemosum (redroot buckwheat)	Gayophytum ramosissimum ^a (pinyon groundsmoke)	Lactuca scariola ^{ai} (prickly lettuce)	Lappula occidentalis ^a (flatspine stickseed)	Machaeranthera canescens (hoary tansyaster)	Medicago sativa ⁱ (alfalfa)	Melilotus officinalis ⁱ (sweetclover)	Packera multilobata (lobeleaf groundsel)	Salsola tragus ^{ai} (prickly Russian thistle)
year	Nested Frequency																
2013	3	1	2	-	3	2	8	-	-	-	-	-	2	-	-	27	-
2016	7	-	3	4	8	6	9	3	17	11	16	9	2	1	2	12	1
year	Average Cover (%)																
2013	0.0	0.0	0.0	-	0.0	0.0	0.1	-	-	-	-	-	0.0	-	-	0.2	-
2016	0.1	-	0.0	0.1	0.1	0.0	0.2	0.0	0.2	0.1	0.5	0.8	0.0	0.0	0.0	0.1	0.0

a - Annual/Biennial; n - Noxious Weed; i - Introduced Species

FORB SPECIES	Streptanthus cordatus (heartleaf twistflower)
year	Nested Frequency
2013	-
2016	2
year	Average Cover (%)
2013	-
2016	0.0

a - Annual/Biennial; n - Noxious Weed; i - Introduced Species

Table 25R-10.12 - Shrub and Tree Species. Average modified Daubenmire quadrat and line intercept cover by year.

SHRUB SPECIES	Artemisia tridentata ssp. vaseyana ^p (mountain big sagebrush)	Chrysothamnus viscidiflorus ssp. viscidiflorus (yellow rabbitbrush)	Gutierrezia sarothrae (broom snakeweed)	Juniperus osteosperma ^t (Utah juniper)	Opuntia (pricklypear)	Pinus edulis ^t (twonneedle pinyon)	Purshia tridentata ^p (antelope bitterbrush)
year	Line Intercept Cover (%)						
2013	7.6	-	0	7	-	26.9	3.5
2016	16.5	0.2	-	0.4	-	1.7	1.8
year	Quadrat Cover (%)						
2013	4.3	0.0	0.0	1.1	-	5.3	1.1
2016	11.8	0.3	-	1.0	0.3	1.0	1.6

t - Tree Species; p - Preferred Browse; i - Introduced

Table 25R-10.13 - Shrub/Tree Characteristics. Population characteristics of shrub/tree species populations including density reproduction (seedlings), age distribution, utilization, vigor and average size (height/crown) of plants.

Year	Density		Age Class Distribution			Utilization		Poor Vigor (%)	Average Height Crown (cm)
	Plants Per Acre		Excluding Seedlings			Moderate (%)	Heavy (%)		
	Excluding Seedlings	Seedling	Young (%)	Mature (%)	Decadent (%)				
Artemisia tridentata ssp. vaseyana ^p -- (mountain big sagebrush)									
2013	2540	40	30	37	33	21	13	36	49/74
2016	2860	60	26	73	1	1	0	1	48/78
Chrysothamnus viscidiflorus ssp. viscidiflorus -- (yellow rabbitbrush)									
2013	60	-	0	100	0	0	100	0	5/28
2016	300	-	13	87	0	0	13	13	35/44
Gutierrezia sarothrae -- (broom snakeweed)									
2013	40	-	0	100	0	0	0	0	24/33
2016	-	-	-	-	-	-	-	-	40/71

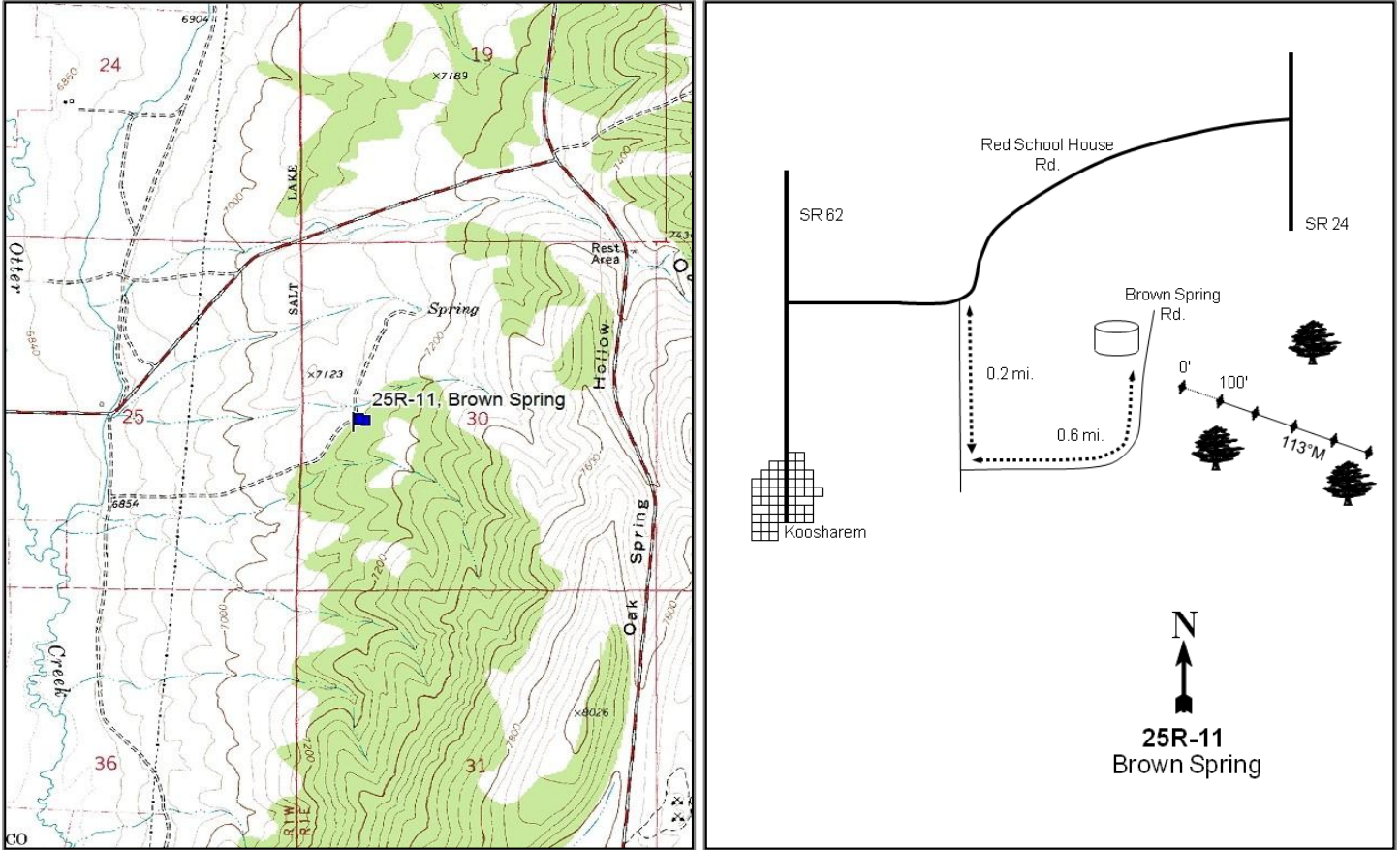
Year	Density		Age Class Distribution			Utilization		Poor Vigor (%)	Average Height Crown (cm)
	Plants Per Acre		Excluding Seedlings			Moderate (%)	Heavy (%)		
	Excluding Seedlings	Seedling	Young (%)	Mature (%)	Decadent (%)				
Juniperus osteosperma^t -- (Utah juniper)									
2013	120	40	17	83	0	0	0	0	- / -
2016	120	20	83	0	17	0	0	0	- / -
Linanthus pungens -- (granite prickly phlox)									
2013	40	-	0	100	0	0	0	0	10/15
2016	20	-	0	100	0	0	0	0	22/32
Opuntia -- (pricklypear)									
2013	60	-	0	100	0	0	0	0	14/27
2016	60	-	0	100	0	0	0	0	15/35
Pinus edulis^t -- (two-needle pinyon)									
2013	320	20	38	63	0	0	0	0	- / -
2016	140	-	71	14	14	0	0	29	- / -
Purshia tridentata^p -- (antelope bitterbrush)									
2013	380	-	5	79	16	42	42	32	67/106
2016	300	-	0	100	0	33	13	0	51/80
Rubus -- (blackberry)									
2013	-	-	-	-	-	-	-	-	- / -
2016	-	-	-	-	-	-	-	-	71/53
Sambucus racemosa^p -- (red elderberry)									
2013	-	-	-	-	-	-	-	-	- / -
2016	-	-	-	-	-	-	-	-	94/104

t - Tree Species; p - Preferred Browse; i - Introduced Species

Table 25R-10.14 - Tree Characteristics. Point-quarter tree density, size class distribution, and average diameter.

Year	Density	Size Class Distribution				Average Diameter (cm)	
	Trees per Acre	Seedling (%)	1-4'	4-8'	8-12'		>12' (%)
Juniperus osteosperma (Utah juniper)							
2013	85	5	26	11	26	32	17.1
2016	45	17	50	33	-	-	6.2
Pinus edulis (two-needle pinyon)							
2013	261	5	15	30	30	20	15.1
2016	74	21	68	5	5	-	4.5

BROWN SPRING - STUDY NO. 25R-11



Location Information

USGS 7.5 min Map Info Burrville SW; Township 26S, Range 1E, Section 30
 GPS (0' Stake) NAD 83 UTM ZONE 12, 426233 East 4263793 North

Transect Information

Browse Tag # (0' Stake) 118
 Transect Bearing 113° 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 north out of Koosharem on SR 62 for 0.7 miles and turn right (east) on Red School House Road. Drive about 1.3 miles, turn right (south), and go for 0.2 miles. Turn left (east) and continue for 0.6 miles; the study will be on the right (east) side of the road.

Site Information

Land Ownership	Federal
Land Administrator	BLM
Allotment	OAK SPRINGS
Elevation	7,139ft (2,176m)
Aspect	Northwest
Slope	9%
Sample Dates	08/01/2013, 08/16/2016

Table 25R-11.1 Disturbance History. Recorded history of major disturbances.

Treatment/Disturbance	Name	WRI DB#	Date	Size (acres)
Mechanical - Bull-hog	Parker Front PJ Removal	2547	November-January 2013-2014	404
Seeding - Aerial Before	Parker Front PJ Removal	2547	November 2013	1230

Table 25R-11.2 Seed Mix. List of known seeded plant species and rates (if available).

Mix Name			Application Type	Application Date	Acres
Parker Front PJ Removal			Aerial	Nov 2013	1230
Type	Species	Common Name	Cultivar/Source ID	Bulk lbs/acre	PLS lbs/acre
G	<i>Festuca ovina</i>	Sheep Fescue	Covar	0.08	0.07
G	<i>Festuca ovina</i>	Sheep Fescue	Covar	0.28	0.26
G	<i>Festuca ovina</i>	Sheep Fescue	Covar	0.16	0.15
G	<i>Poa fendleriana</i>	Muttongrass		0.05	0.05
G	<i>Poa fendleriana</i>	Muttongrass	Montezuma CO	0.12	0.09
G	<i>Pseudoroegneria spicata</i>	Bluebunch Wheatgrass	Anatone	1.50	1.36
F	<i>Helianthus annuus</i>	Annual Sunflower	Box Elder UT	0.57	0.54
F	<i>Linum perenne</i>	Blue Flax	Appar	0.73	0.64
F	<i>Medicago sativa</i>	Alfalfa	Big Sky Ladak	0.77	0.72
F	<i>Melilotus officinalis</i>	Yellow Sweetclover		0.49	0.43
F	<i>Penstemon palmeri</i>	Palmer Penstemon	Sevier UT	0.08	0.07
F	<i>Penstemon palmeri</i>	Palmer Penstemon	White Pine NV	0.16	0.13
F	<i>Sanguisorba minor</i>	Small Burnet		2.44	2.24

Wildlife Habitat and Vegetation History**Table 25R-11.3 - Wildlife Seasonal Habitat.** UDWR wildlife habitat and seasonality.

Species	Habitat	Season	Brood/Young Rearing
Deer	crucial	winter	
Elk	substantial	winter	
Greater Sage Grouse	Crucial	occupied	brood-rearing

Table 25R-11.4 - Vegetation History. The dominant vegetation type(s) and phase of woodland succession (Tausch, Miller, Roundy, & Chambers, 2009).

Year	Vegetation Type	Woodland Succession
2013	Pinyon-Juniper	Phase III
2016	Wyoming Big Sagebrush/Annual-Perennial Forb	Phase I

Site Notes

No Notes

Site Potential

1981-2010 Average Annual Precipitation	11 inches
NRCS Ecological Site	Upland Loam (Wyoming Big Sagebrush)
NRCS Ecological Site #	R047XA312UT
States and Transitions	No state and transition model is available for this ecological site.

When established in 2013, this site was a Phase III two-needle pinyon (*Pinus edulis*) and Utah juniper (*Juniperus osteosperma*) woodland with a mostly depauperate understory. Most of the tree cover was removed by a bull-hog and seeding treatment the following winter (Table 25R-11.1), and in 2016 the main browse component was Wyoming big sagebrush (*Artemisia tridentata* ssp. *wyomingensis*) (Table 25R-11.12). Grass cover has remained low in both sample years, but in 2016 annual and perennial forbs filled the interspaces and were co-dominant site components (Table 25R-11.7, Table 25R-11.11). Pinyon and juniper were observed in 2016 in low amounts, suggesting that this site may be infilled in the future (Table 25R-11.12, Table 25R-11.13).

Trend Summary Tables

Table 25R-11.6 - Shrub/Tree Summary. Average modified Daubenmire quadrat and line intercept cover by year for shrubs/trees.

Year	Quadrat Cover (%)			Line-intercept Cover (%)		
	Preferred Shrub	Other Shrub	Tree	Preferred Shrub	Other Shrub	Tree
2013	1.1	-	6.2	2.4	-	41.7
2016	4.7	-	0.1	3.0	-	-

Table 25R-11.7 - Herbaceous Summary. Nested frequency and average modified Daubenmire quadrat cover by year for herbaceous functional groups.

Year	Nested Frequency				Quadrat Cover (%)			
	Annual Grass	Perennial Grass	Annual/Biennial Forb	Perennial Forb	Annual Grass	Perennial Grass	Annual/Biennial Forb	Perennial Forb
2013	-	4	-	1	-	0.0	-	0.0
2016	-	51	148	177	-	0.4	6.4	5.7

Table 25R-11.8 - Basic Ground Cover. Average modified Daubenmire quadrat cover by year for basic ground cover types.

Year	Cover Type (%)					
	Bare Ground	Cryptograms	Litter	Pavement	Rock	Vegetation
2013	11.7	1.7	39.0	31.7	11.2	7.6
2016	11.4	0.0	63.6	13.0	3.8	17.0

Table 25R-11.9 - Pellet Group Data. Quadrat frequency and pellet group transect data for animal pellets. Rabbit pellet groups are not sampled in the pellet group transect.

Year	Mule Deer/Pronghorn	Rabbit
	Quadrat Frequency	
2013	17	29
2016	21	44
Days Use Per Acre (ha)		
2013	45.6 (112.6)	-
2016	36.2 (89.4)	-

Table 25R-11.10 - Grass Species. Nested frequency and modified Daubenmire average cover by year.

GRASS SPECIES	Achnatherum hymenoides (Indian ricegrass)	Bouteloua gracilis (blue grama)	Elymus elymoides (squirreltail)	Festuca ovina ⁱ (sheep fescue)	Poa fendleriana (nuttongrass)	Poa secunda (Sandberg bluegrass)	Pseudoroegneria spicata (bluebunch wheatgrass)
year	Nested Frequency						
2013	-	-	4	-	-	-	-
2016	0	1	28	14	3	3	4
year	Average Cover (%)						
2013	-	-	0.0	-	-	-	-
2016	0.0	0.0	0.1	0.1	0.1	0.0	0.0

a - Annual; n - Noxious Weed; i - Introduced Species

Table 25R-11.11 - Forb Species. Nested frequency and modified Daubenmire average cover by year.

FORB SPECIES	Arabis (rockcross)	Astragalus lentiginosus (freckled milkvetch)	Cirsium (thistle)	Descurainia pinnata ^a (western tansymustard)	Eriogonum cernuum ^a (nodding buckwheat)	Gayophytum ramosissimum ^a (pinyon groundsmoke)	Ipomopsis aggregata (scarlet gilia)	Lactuca serriola ^{ai} (prickly lettuce)	Lappula occidentalis ^a (flatspine stickseed)	Linum perenne ⁱ (blue flax)	Medicago sativa ⁱ (alfalfa)	Melilotus officinalis ⁱ (sweetclover)	Nicotiana attenuata ^a (coyote tobacco)	Salsola tragus ^{ai} (prickly Russian thistle)	Sisymbrium altissimum ^{ai} (tall tumblemustard)	Solanum triflorum ^a (cutleaf nightshade)
year	Nested Frequency															
2013	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
2016	-	5	7	8	3	8	1	2	2	174	2	1	73	77	6	14
year	Average Cover (%)															
2013	0.0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
2016	-	0.0	0.2	0.1	0.0	0.1	0.0	0.0	0.0	5.5	0.0	0.0	1.5	3.8	0.3	0.5

a - Annual/Biennial; n - Noxious Weed; i - Introduced Species

Table 25R-11.12 - Shrub and Tree Species. Average modified Daubenmire quadrat and line intercept cover by year.

SHRUB SPECIES	Artemisia tridentata ssp. wyomingensis ^p (Wyoming big sagebrush)	Juniperus osteosperma ^t (Utah juniper)	Pinus edulis ^t (twoneedle pinyon)	Sambucus racemosa ^p (red elderberry)
year	Line Intercept Cover (%)			
2013	2.4	4.7	37	-
2016	3	-	0	0
year	Quadrat Cover (%)			
2013	1.1	0.5	5.7	-
2016	4.7	0.1	0.0	0.0

t - Tree Species; p - Preferred Browse; i - Introduced

Table 25R-11.13 - Shrub/Tree Characteristics. Population characteristics of shrub/tree species populations including density reproduction (seedlings), age distribution, utilization, vigor and average size (height/crown) of plants.

Year	Density		Age Class Distribution			Utilization		Poor Vigor (%)	Average Height Crown (cm)
	Plants Per Acre		Excluding Seedlings			Moderate (%)	Heavy (%)		
	Excluding Seedlings	Seedling	Young (%)	Mature (%)	Decadent (%)				
Artemisia tridentata ssp. wyomingensis ^p -- (Wyoming big sagebrush)									
2013	1140	500	5	30	65	49	28	61	49/58
2016	1180	200	20	75	5	2	3	0	48/71
Ericameria nauseosa -- (rubber rabbitbrush)									
2013	-	-	-	-	-	-	-	-	-/-
2016	-	-	-	-	-	-	-	-	27/10
Juniperus osteosperma ^t -- (Utah juniper)									
2013	100	20	20	80	0	0	0	20	-/-
2016	-	120	0	0	0	0	0	0	-/-

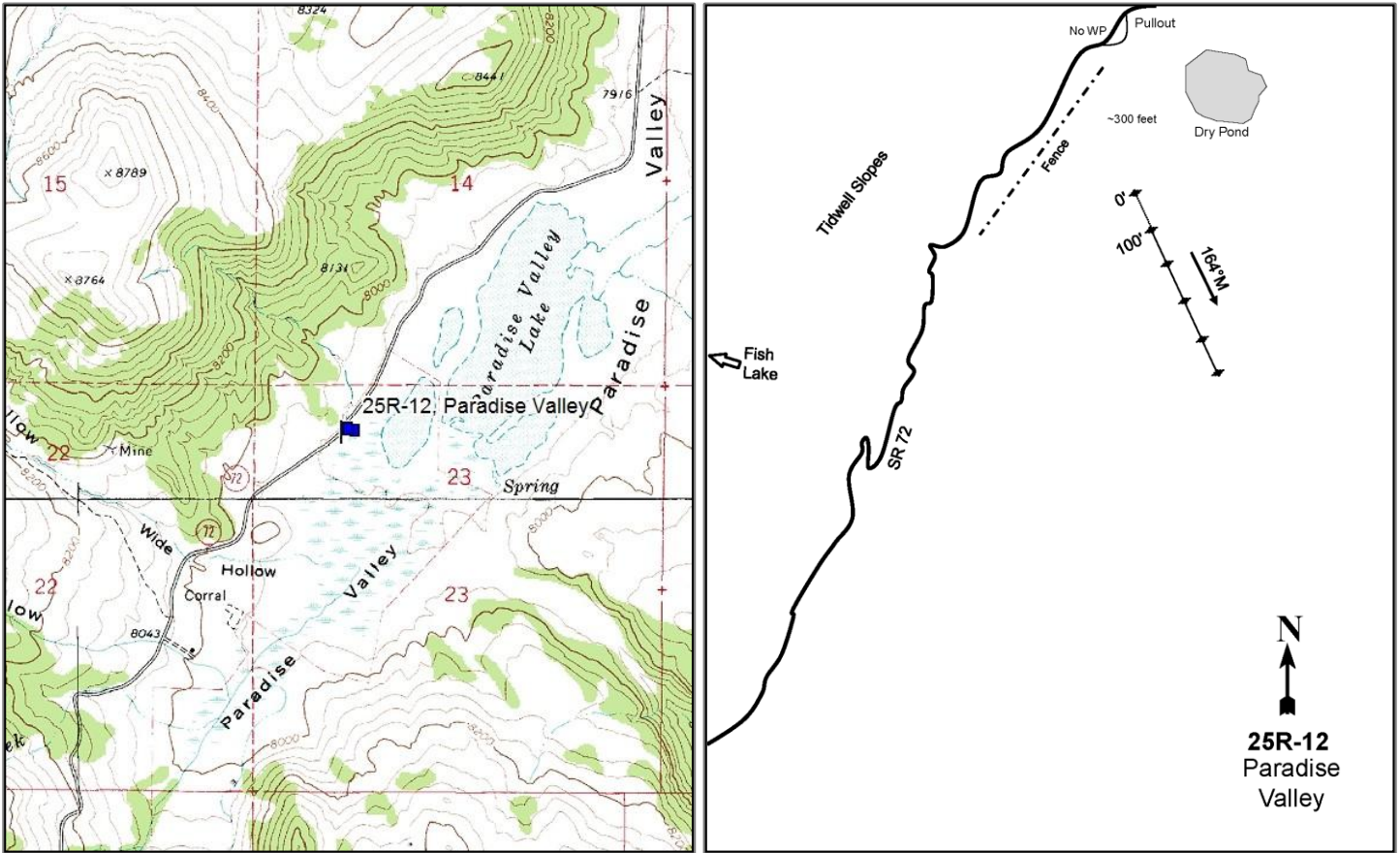
Year	Density		Age Class Distribution			Utilization		Poor Vigor (%)	Average Height Crown (cm)
	Plants Per Acre		Excluding Seedlings			Moderate (%)	Heavy (%)		
	Excluding Seedlings	Seedling	Young (%)	Mature (%)	Decadent (%)				
Opuntia -- (pricklypear)									
2013	-	-	-	-	-	-	-	-	-/-
2016	80	-	25	75	0	0	0	0	12/29
Pinus edulis^t -- (two-needle pinyon)									
2013	300	100	47	53	0	0	0	0	-/-
2016	80	60	100	0	0	0	0	0	-/-
Sambucus racemosa^p -- (red elderberry)									
2013	-	-	-	-	-	-	-	-	-/-
2016	20	-	0	100	0	0	0	0	56/80

t - Tree Species; p - Preferred Browse; i - Introduced Species

Table 25R-11.14 - Tree Characteristics. Point-quarter tree density, size class distribution, and average diameter.

Year	Density	Size Class Distribution					Average Diameter (cm)
	Trees per Acre	Seedling (%)	1-4'	4-8'	8-12'	>12' (%)	
Juniperus osteosperma (Utah juniper)							
2013	56	5	-	5	32	58	17.4
2016	142	100	-	-	-	-	1.0
Pinus edulis (two-needle pinyon)							
2013	358	20	15	10	15	40	11.1
2016	37	50	50	-	-	-	2.1

PARADISE VALLEY - STUDY NO. 25R-12



Location Information

USGS 7.5 min Map Info	Johns Peak SW; Township 25S, Range 4E, Section 23
GPS (0' Stake)	NAD 83 UTM ZONE 12, 461092 East 4275472 North

Transect Information

Browse Tag # (0' Stake)	Not Available
Transect Bearing	164° 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

Go east from Salina on I-70 for approximately 37.5 miles to the rest area. From the exit, go 2.4 miles east on the frontage road to the junction with SR 72. Travel south on SR 72 approximately 12.8 miles to a pullout on the east side of the highway. The study site is approximately 300 feet east of the highway. No stakes or rebar were used prior to treatment, but will be placed following the treatment. Use GPS coordinates and photos to setup site.

Site Information

Land Ownership	Federal
Land Administrator	USFS
Allotment	Last Chance Allotment
Elevation	7,927ft (2,416m)
Aspect	Northeast
Slope	3%
Sample Dates	08/31/2016

Table 25R-12.1 Disturbance History. Recorded history of major disturbances.

Treatment/Disturbance	Name	WRI DB#	Date	Size (acres)
Herbicide - Tordon	Paradise Valley Restoration Project (Proposed)	3794	2016?	130
Mechanical - Mower	Paradise Valley Restoration Project (Proposed)	3794	2016?	130

Wildlife Habitat and Vegetation History

Table 25R-12.3 - Wildlife Seasonal Habitat. UDWR wildlife habitat and seasonality.

Species	Habitat	Season	Brood/Young Rearing
Deer	crucial	winter	
Elk	substantial	winter	
Greater Sage Grouse	Crucial	occupied	brood-rearing

Table 25R-12.4 - Vegetation History. The dominant vegetation type(s) and phase of woodland succession (Tausch, Miller, Roundy, & Chambers, 2009).

Year	Vegetation Type	Woodland Succession
2016	Rubber Rabbitbrush	No Encroachment

Site Notes

It was noted that the herbaceous understory was heavily grazed in 2016.

Site Potential

1981-2010 Average Annual Precipitation	15 inches
NRCS Ecological Site	Semi-wet Fresh Meadow
NRCS Ecological Site #	R047XB004UT
States and Transitions	No state and transition model is available for this ecological site.

When established in 2016, this study site was dominated by rubber rabbitbrush (*Ericameria nauseosa*) with no other browse species present (Table 25R-12.12, Table 25R-12.13). The understory was plentiful, but not diverse; a majority of the cover was contributed by the perennial grass Kentucky bluegrass (*Poa pratensis*), sedges (*Carex* sp.), and rushes (*Juncus* sp.) (Table 25R-12.7, Table 25R-12.10). It is predicted that the decrease in rubber rabbitbrush following a mower and herbicide treatment (Table 25R-12.1) will enable other, more desirable browse species to establish and allow for a more diverse understory.

Trend Summary Tables

Table 25R-12.6 - Shrub/Tree Summary. Average modified Daubenmire quadrat and line intercept cover by year for shrubs/trees.

Year	Quadrat Cover (%)			Line-intercept Cover (%)		
	Preferred Shrub	Other Shrub	Tree	Preferred Shrub	Other Shrub	Tree
2016	-	39.3	-	-	63.0	-

Table 25R-12.7 - Herbaceous Summary. Nested frequency and average modified Daubenmire quadrat cover by year for herbaceous functional groups.

Year	Nested Frequency				Quadrat Cover (%)			
	Annual Grass	Perennial Grass	Annual/Biennial Forb	Perennial Forb	Annual Grass	Perennial Grass	Annual/Biennial Forb	Perennial Forb
2016	-	395	27	200	-	26.5	0.2	2.2

Table 25R-12.8 - Basic Ground Cover. Average modified Daubenmire quadrat cover by year for basic ground cover types.

Year	Cover Type (%)					
	Bare Ground	Cryptograms	Litter	Pavement	Rock	Vegetation
2016	10.5	0.1	41.6	-	0.0	67.0

Table 25R-12.9 - Pellet Group Data. Quadrat frequency and pellet group transect data for animal pellets. Rabbit pellet groups are not sampled in the pellet group transect.

Year	Cattle	Elk	Rabbit
	Quadrat Frequency		
2016	12	2	60
Year	Days Use Per Acre (ha)		
2016	26.2 (64.6)	-	-

Table 25R-12.10 - Grass Species. Nested frequency and modified Daubenmire average cover by year.

GRASS SPECIES	Carex (sedge)	Distichlis spicata (saltgrass)	Elymus elymoides (squirreltail)	Juncus (rush)	Koeleria macrantha (prairie Junegrass)	Pascopyrum smithii (western wheatgrass)	Poa pratensis ⁱ (Kentucky bluegrass)	Poa secunda (Sandberg bluegrass)
year	Nested Frequency							
2016	277	9	9	189	3	4	202	5
year	Average Cover (%)							
2016	13.8	0.0	0.2	4.5	0.0	0.0	7.9	0.1

a - Annual; n - Noxious Weed; i - Introduced Species

Table 25R-12.11 - Forb Species. Nested frequency and modified Daubenmire average cover by year.

FORB SPECIES	Achillea millefolium (Common yarrow)	Chenopodium fremontii ^a (Fremont's goosefoot)	Comandra umbellata (bastard toadflax)	Crepis acuminata (tapertip hawksbeard)	Descurainia pinnata ^a (western tansymustard)	Symphyotrichum ascendens (western aster)	Taraxacum officinale (common dandelion)
year	Nested Frequency						
2016	3	5	3	19	23	70	136
year	Average Cover (%)						
2016	0.0	0.1	0.0	0.1	0.1	0.9	1.2

a - Annual/Biennial; n - Noxious Weed; i - Introduced Species

Table 25R-12.12 - Shrub and Tree Species. Average modified Daubenmire quadrat and line intercept cover by year.

SHRUB SPECIES	Ericameria nauseosa (rubber rabbitbrush)
	year Line Intercept Cover (%)
	2016 63
	year Quadrat Cover (%)
	2016 39.3

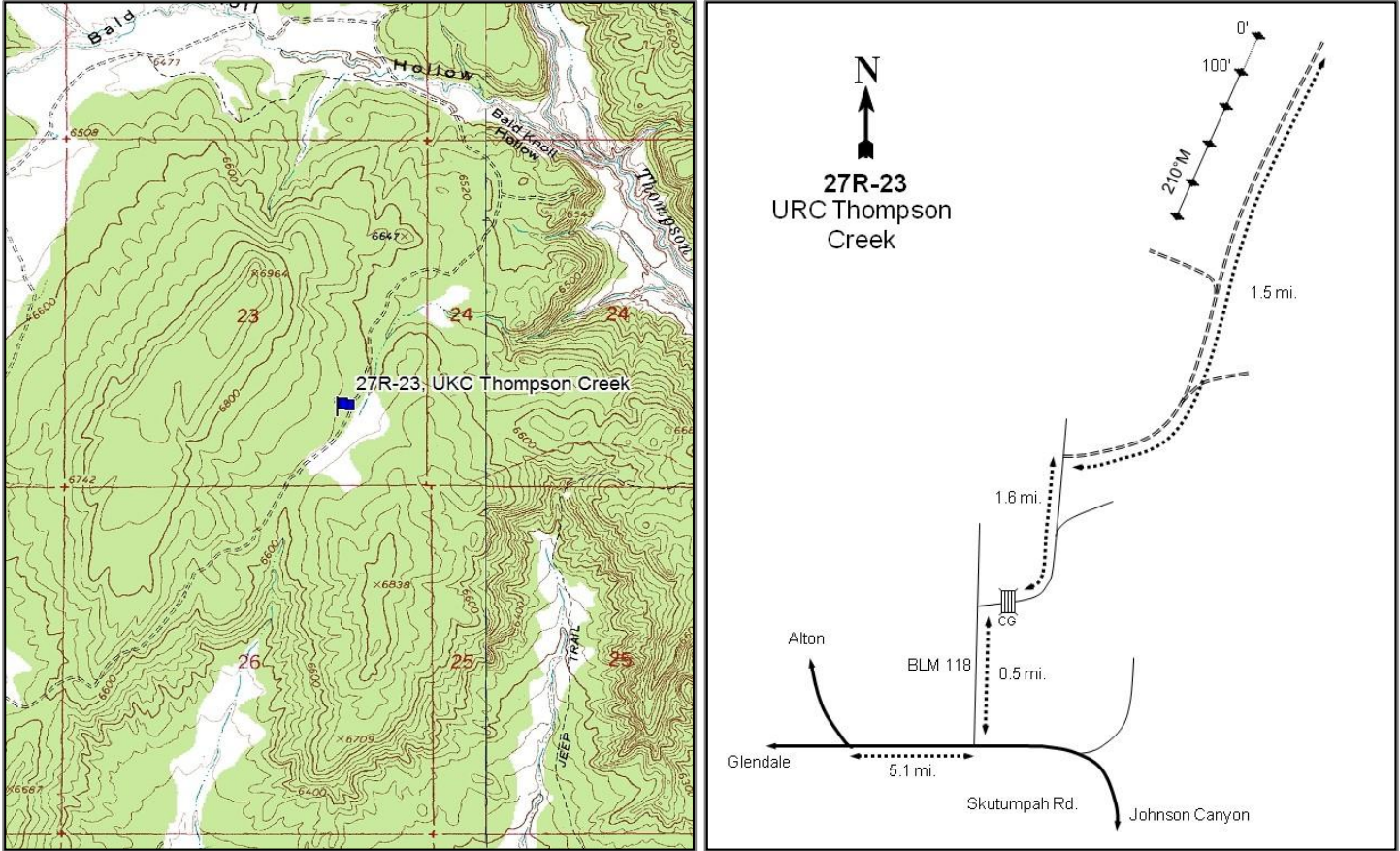
t - Tree Species; p - Preferred Browse; i - Introduced

Table 25R-12.13 - Shrub/Tree Characteristics. Population characteristics of shrub/tree species populations including density reproduction (seedlings), age distribution, utilization, vigor and average size (height/crown) of plants.

Year	Density		Age Class Distribution			Utilization		Poor Vigor (%)	Average Height Crown (cm)
	Plants Per Acre		Excluding Seedlings			Moderate (%)	Heavy (%)		
	Excluding Seedlings	Seedling	Young (%)	Mature (%)	Decadent (%)				
Ericameria nauseosa -- (rubber rabbitbrush)									
2016	6680	60	6	90	4	0	1	3	102/115

t - Tree Species; p - Preferred Browse; i - Introduced Species

UKC THOMPSON CREEK - STUDY NO. 27R-23



Location Information

USGS 7.5 min Map Info	Bald Knoll NE; Township 40S, Range 5W, Section 23
GPS (0' Stake)	NAD 83 UTM ZONE 12, 377461 East 4130640 North

Transect Information

Browse Tag # (0' Stake)	Not Available
Transect Bearing	261° 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 east from the Glendale/Alton junction for 5.1 miles on Skutumpah road. Turn left (north) onto BLM road 118 and drive for 0.5 miles. Turn left, crossing a cattleguard, and proceed for 1.6 miles. Turn right and continue for another 1.5 miles. The study will be on the left (west) side of the road.

Site Information

Land Ownership	Federal
Land Administrator	BLM
Allotment	BALD KNOLL
Elevation	6,672ft (2,034m)
Aspect	East
Slope	6-8%
Sample Dates	08/08/2013, 08/23/2016

Table 27R-23.1 Disturbance History. Recorded history of major disturbances.

Treatment/Disturbance	Name	WRI DB#	Date	Size (acres)
Seeding - Aerial After	UKC Thompson Creek	2701	January 2015	959
Chaining - Two-Way Ely	UKC Thompson Creek	2701	Fall 2014	959
Seeding - Aerial Before	UKC Thompson Creek	2701	Fall 2014	959

Table 27R-23.2 Seed Mix. List of known seeded plant species and rates (if available).

Mix Name			Application Type	Application Date	Acres
Thompson Creek			Aerial	Sep 2014	1000
Type	Species	Common Name	Cultivar/Source ID	Bulk lbs/acre	PLS lbs/acre
G	<i>Achnatherum hymenoides</i>	Indian Ricegrass	Paloma	0.30	0.26
G	<i>Achnatherum hymenoides</i>	Indian Ricegrass	Rimrock	1.70	1.63
G	<i>Agropyron cristatum</i>	Crested Wheatgrass	Hycrest II	1.50	1.29
G	<i>Elymus wawawaiensis</i>	Snake River Wheatgrass	Secar	1.50	1.23
G	<i>Poa secunda</i>	Sandberg Bluegrass	UP Colorado Plateau	0.50	0.41
G	<i>Psathyrostachys juncea</i>	Russian Wildrye	Bozoisky	0.50	0.42
G	<i>Thinopyrum intermedium</i>	Pubescent Wheatgrass		1.50	0.87
F	<i>Astragalus cicer</i>	Cicer Milkvetch	Lutana	1.00	0.97
F	<i>Linum perenne</i>	Blue Flax	Appar	0.17	0.16
F	<i>Linum perenne</i>	Blue Flax	Appar	0.82	0.76
F	<i>Onobrychis viciifolia</i>	Sainfoin	Eski	1.00	0.92
F	<i>Penstemon palmeri</i>	Palmer Penstemon	Carbon UT	0.22	0.17
F	<i>Penstemon palmeri</i>	Palmer Penstemon	White Pine NV	0.03	0.02
F	<i>Sanguisorba minor</i>	Small Burnet		1.50	1.36
F	<i>Trifolium hybridum</i>	Alsike Clover		0.04	0.04
F	<i>Trifolium hybridum</i>	Alsike Clover		0.05	0.04
F	<i>Trifolium hybridum</i>	Alsike Clover		0.25	0.23
F	<i>Trifolium hybridum</i>	Alsike Clover		0.66	0.64
Mix Name			Application Type	Application Date	Acres
Thompson Creek Kochia			Aerial	Jan 2015	1000
Type	Species	Common Name	Cultivar/Source ID	Bulk lbs/acre	PLS lbs/acre
F	<i>Medicago sativa</i>	Alfalfa	Ladak+	2.00	1.86
S	<i>Bassia prostrata</i>	Forage Kochia	Beaver UT	0.50	0.37

Wildlife Habitat and Vegetation History**Table 27R-23.3 - Wildlife Seasonal Habitat.** UDWR wildlife habitat and seasonality.

Species	Habitat	Season
Deer	substantial	summer
Elk	substantial	year-long

Table 27R-23.4 - Vegetation History. The dominant vegetation type(s) and phase of woodland succession (Tausch, Miller, Roundy, & Chambers, 2009).

Year	Vegetation Type	Woodland Succession
2013	Pinyon-Juniper	Phase III
2016	Gambel Oak/Perennial Grass	Phase I

Site Notes

The transect bearing was rotated in 2016 so that the site falls within and samples the treatment area. There were several rubbed junipers noted near site in the 2016 survey.

Site Potential

1981-2010 Average Annual Precipitation 15 inches
 NRCS Ecological Site Mountain Loam (Oak)
 NRCS Ecological Site # R047XB432UT
 States and Transitions No state and transition model is available for this ecological site.

When established in 2013, the site was dominated by two-needle pinyon (*Pinus edulis*) and Utah juniper (*Juniperus osteosperma*) with Gambel oak (*Quercus gambelii*) present to a lesser extent. Most of the tree cover was removed in a chaining and seeding treatment, and in 2016 Gambel oak was dominant with forage kochia (*Bassia prostrata*) as a subordinate species (Table 27R-23.12). The herbaceous understory was initially sparse, but cover had increased as of 2016 and perennial forbs were a co-dominant site component (Table 27R-23.7, Table 27R-23.11). Although most trees were removed during treatment, juniper and pinyon remain on the site in low amounts, indicating that infilling could occur in the future (Table 27R-23.12, Table 27R-23.13).

Trend Summary Tables

Table 27R-23.6 - Shrub/Tree Summary. Average modified Daubenmire quadrat and line intercept cover by year for shrubs/trees.

Year	Quadrat Cover (%)			Line-intercept Cover (%)		
	Preferred Shrub	Other Shrub	Tree	Preferred Shrub	Other Shrub	Tree
2013	1.9	-	4.8	3.0	-	27.6
2016	6.3	1.2	0.6	10.6	2.1	2.7

Table 27R-23.7 - Herbaceous Summary. Nested frequency and average modified Daubenmire quadrat cover by year for herbaceous functional groups.

Year	Nested Frequency				Quadrat Cover (%)			
	Annual Grass	Perennial Grass	Annual/Biennial Forb	Perennial Forb	Annual Grass	Perennial Grass	Annual/Biennial Forb	Perennial Forb
2013	-	1	-	45	-	0.0	-	0.2
2016	-	192	50	186	-	10.1	1.1	12.1

Table 27R-23.8 - Basic Ground Cover. Average modified Daubenmire quadrat cover by year for basic ground cover types.

Year	Cover Type (%)					
	Bare Ground	Cryptograms	Litter	Pavement	Rock	Vegetation
2013	46.7	0.3	46.7	1.4	1.5	7.1
2016	26.6	0.1	42.7	6.5	5.2	29.5

Table 27R-23.9 - Pellet Group Data. Quadrat frequency and pellet group transect data for animal pellets. Rabbit pellet groups are not sampled in the pellet group transect.

Year	Mule Deer	Elk	Rabbit
	Quadrat Frequency		
2013	1	1	11
2016	10	8	6
Year	Days Use Per Acre (ha)		
2013	-	2.0 (5.0)	-
2016	20.8 (51.3)	10.7 (26.5)	-

Table 27R-23.10 - Grass Species. Nested frequency and modified Daubenmire average cover by year.

GRASS SPECIES	Achnatherum hymenoides (Indian ricegrass)	Agropyron cristatum ⁱ (crested wheatgrass)	Bouteloua gracilis (blue grama)	Carex (sedge)	Elymus elymoides (squirriltail)	Psathyrostachys juncea ⁱ (Russian wildrye)	Pseudoroegneria spicata (bluebunch wheatgrass)	Thinopyrum intermedium ⁱ (intermediate wheatgrass)	unknown perennial grass (unknown grass)
year	Nested Frequency								
2013	-	-	-	-	1	-	-	-	-
2016	66	71	4	0	2	4	8	104	2
year	Average Cover (%)								
2013	-	-	-	-	0.0	-	-	-	-
2016	2.2	2.7	0.0	0.0	0.0	0.3	0.5	4.3	0.1

a - Annual; n - Noxious Weed; i - Introduced Species

Table 27R-23.11 - Forb Species. Nested frequency and modified Daubenmire average cover by year.

FORB SPECIES	Arabis (rockcross)	Astragalus cibaricus (browse milkvetch)	Astragalus cicer ⁱ (chickpea milkvetch)	Astragalus convallarius (lesser rushy milkvetch)	Chaenactis douglasii (Douglas' dustymaiden)	Chamaesyce (sandmat)	Comandra umbellata (bastard toadflax)	Cordylanthus kingii ^a (King's bird's-beak)	Dalea searisiiae (Searls' prairie clover)	Descurainia pinnata ^a (western tansymustard)	Eriogonum alatum (winged buckwheat)	Eriogonum umbellatum (sulphur-flower buckwheat)	Hymenopappus filifolius (fineleaf hymenopappus)	Ipomopsis aggregata (scarlet gilia)	Lactuca serriola ^{ai} (prickly lettuce)	Linum lewisii (Lewis flax)	Lotus utahensis (Utah bird's-foot trefoil)
year	Nested Frequency																
2013	12	-	-	-	-	-	-	-	1	-	10	7	-	5	-	-	6
2016	4	22	21	3	1	5	2	16	8	7	10	-	2	8	28	30	-
year	Average Cover (%)																
2013	0.0	-	-	-	-	-	-	-	0.0	-	0.1	0.0	-	0.0	-	-	0.0
2016	0.0	1.5	0.7	0.1	0.0	0.1	0.0	0.6	0.4	0.0	0.7	-	0.0	0.1	0.5	1.3	-

a - Annual/Biennial; n - Noxious Weed; i - Introduced Species

FORB SPECIES	Medicago sativa ⁱ (alfalfa)	Packera multilobata (lobeleaf groundsel)	Penstemon caespitosus (mat penstemon)	Penstemon leonardii (Leonard's beardtongue)	Phlox longifolia (longleaf phlox)	Polygonum douglasii ^a (Douglas' knotweed)	Sanguisorba minor ⁱ (small burnet)	Sphaeralcea parvifolia (smallflower globemallow)
year	Nested Frequency							
2013	-	-	4	2	-	-	-	-
2016	112	2	-	11	3	3	17	2
year	Average Cover (%)							
2013	-	-	0.0	0.0	-	-	-	-
2016	5.8	0.0	-	0.7	0.0	0.0	0.6	0.0

a - Annual/Biennial; n - Noxious Weed; i - Introduced Species

Table 27R-23.12 - Shrub and Tree Species. Average modified Daubenmire quadrat and line intercept cover by year.

SHRUB SPECIES	Artemisia tridentata ssp. vaseyana ^p (mountain big sagebrush)	Bassia prostrata ⁱ (forage kochia)	Juniperus osteosperma ^t (Utah juniper)	Pinus edulis ⁱ (twoneedle pinyon)	Quercus gambelii ^p (Gambel oak)
year	Line Intercept Cover (%)				
2013	-	-	12.3	15.3	3
2016	-	2.1	2.6	0.1	10.6
year	Quadrat Cover (%)				
2013	0.0	-	1.2	3.6	1.9
2016	-	1.2	0.6	0.0	6.3

t - Tree Species; p - Preferred Browse; i - Introduced

Table 27R-23.13 - Shrub/Tree Characteristics. Population characteristics of shrub/tree species populations including density reproduction (seedlings), age distribution, utilization, vigor and average size (height/crown) of plants.

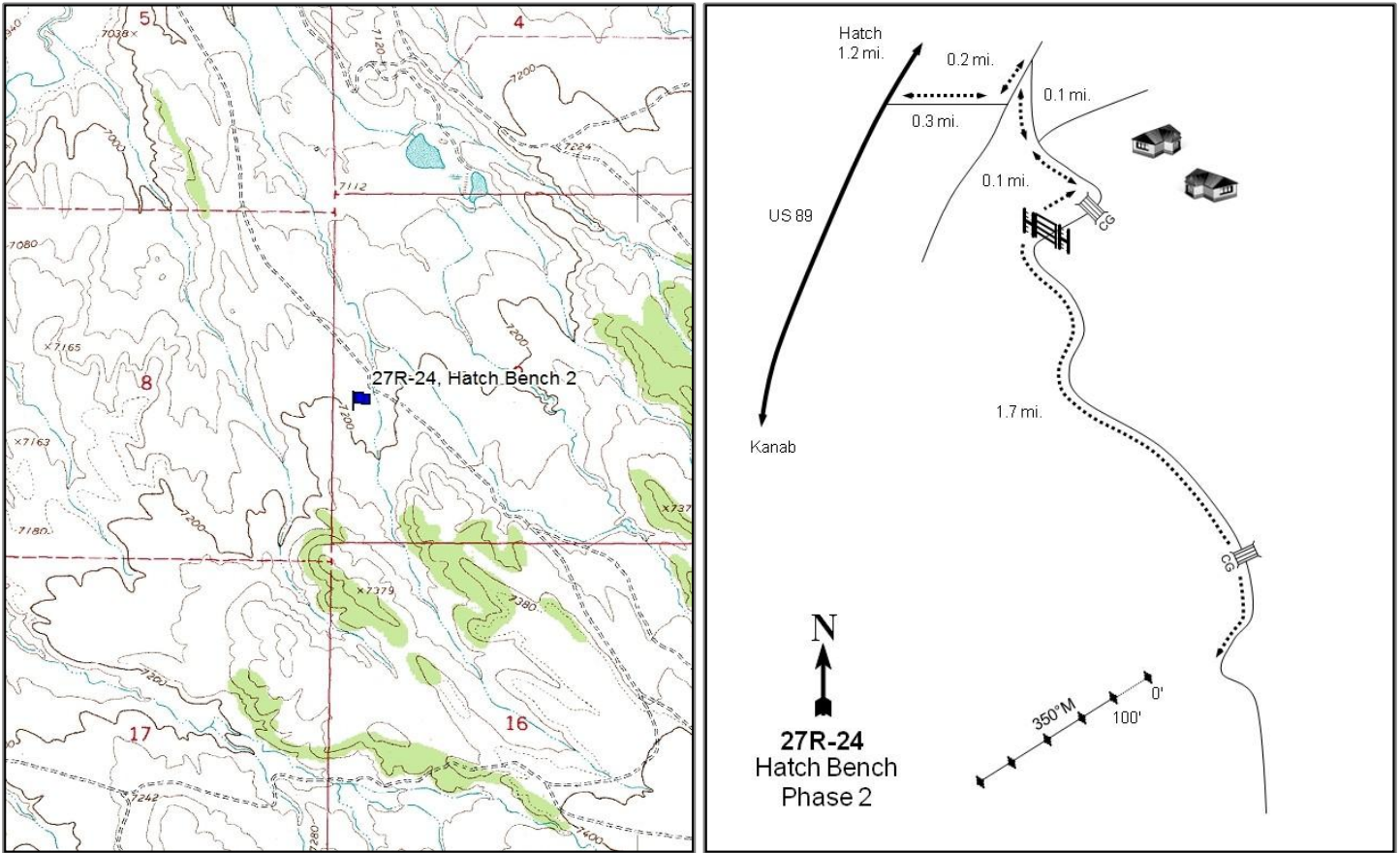
Year	Density		Age Class Distribution			Utilization		Poor Vigor (%)	Average Height Crown (cm)
	Plants Per Acre		Excluding Seedlings			Moderate (%)	Heavy (%)		
	Excluding Seedlings	Seedling	Young (%)	Mature (%)	Decadent (%)				
Artemisia tridentata ssp. vaseyana^P -- (mountain big sagebrush)									
2013	40	-	100	0	0	0	0	0	37/46
2016	-	-	-	-	-	-	-	-	-/-
Bassia prostrataⁱ -- (forage kochia)									
2013	-	-	-	-	-	-	-	-	-/-
2016	4160	620	46	54	0	21	3	0	16/29
Ericameria nauseosa -- (rubber rabbitbrush)									
2013	-	-	-	-	-	-	-	-	-/-
2016	-	-	-	-	-	-	-	-	66/65
Juniperus osteosperma^t -- (Utah juniper)									
2013	240	-	8	92	0	0	0	33	-/-
2016	-	160	0	0	0	0	0	0	-/-
Opuntia -- (pricklypear)									
2013	20	20	0	100	0	0	0	0	9/40
2016	-	-	-	-	-	-	-	-	9/39
Pinus edulis^t -- (two-needle pinyon)									
2013	240	220	50	50	0	0	0	8	-/-
2016	40	20	100	0	0	0	0	50	-/-
Purshia tridentata^P -- (antelope bitterbrush)									
2013	-	-	-	-	-	-	-	-	76/161
2016	20	-	0	100	0	0	0	0	47/91
Quercus gambelii^P -- (Gambel oak)									
2013	1080	20	70	26	4	0	0	0	111/37
2016	2720	-	41	59	0	19	2	2	71/71

t - Tree Species; p - Preferred Browse; i - Introduced Species

Table 27R-23.14 - Tree Characteristics. Point-quarter tree density, size class distribution, and average diameter.

Year	Density	Size Class Distribution					Average Diameter (cm)
	Trees per Acre	Seedling (%)	1-4'	4-8'	8-12'	>12' (%)	
Juniperus osteosperma (Utah juniper)							
2013	504	5	20	25	15	35	20.8
2016	68	13	69	19	-	-	14.8
Pinus edulis (two-needle pinyon)							
2013	688	65	-	10	-	25	8.9
2016	22	13	75	-	13	-	3.4

HATCH BENCH 2 - STUDY NO. 27R-24



Location Information

USGS 7.5 min Map Info
GPS (0' Stake)

George Mountain NE; Township 37S, Range 5W, Section 09
NAD 83 UTM ZONE 12, 373680 East 4163111 North

Transect Information

Browse Tag # (0' Stake)	Not Available
Transect Bearing	180° 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 Hatch, drive south for 1.2 miles on US 89. Turn left (east) and drive for 0.3 miles at which point there will be a T in the road. Take the road to the left and proceed for 0.2 miles; there will be a road that cuts back to the right. Take this road and drive for 0.1 miles to where the road forks. Stay right and continue for another 0.1 miles, arriving at a cattleguard. Cross the cattleguard, pass through the gate, and drive for 1.7 miles (there will be another cattleguard toward the end). The study will be on the right side of the road and to the southwest.

Site Information

Land Ownership	State
Land Administrator	SITLA
Allotment	No data
Elevation	7,181ft (2,189m)
Aspect	Northeast
Slope	6%
Sample Dates	07/31/2013, 08/23/2016

Table 27R-24.1 Disturbance History. Recorded history of major disturbances.

Treatment/Disturbance	Name	WRI DB#	Date	Size (acres)
Hand Crew - Lop and Scatter	Hatch Bench Vegetation Enhancement Phase II	2690	Fall 2014	2989

Wildlife Habitat and Vegetation History

Table 27R-24.3 - Wildlife Seasonal Habitat. UDWR wildlife habitat and seasonality.

Species	Habitat	Season	Brood/Young Rearing
Deer	crucial	summer	
Greater Sage Grouse	Crucial	occupied	brood-rearing

Table 27R-24.4 - Vegetation History. The dominant vegetation type(s) and phase of woodland succession (Tausch, Miller, Roundy, & Chambers, 2009).

Year	Vegetation Type	Woodland Succession
2013	Pinyon-Juniper/Black Sagebrush	Phase II
2016	Black Sagebrush	Phase I

Site Notes

There is a fence that runs along the 100' side of the belts parallel to the lines.

Site Potential

1981-2010 Average Annual Precipitation	14 inches
NRCS Ecological Site	Upland Shallow Hardpan (Black Sagebrush-Bluegrass)
NRCS Ecological Site #	R047XB316UT
States and Transitions	No state and transition model is available for this ecological site.

When established in 2013, this site was a mixed stand of two-needle pinyon (*Pinus edulis*), Rocky Mountain juniper (*Juniperus scopulorum*), and black sagebrush (*Artemisia nova*). Tree cover was reduced by a lop and scatter treatment in 2014 (Table 27R-24.1), and the main browse species in 2016 was black sagebrush (Table 27R-24.12). Although cover has increased between 2013 and 2016, the herbaceous understory has remained relatively limited with most cover being contributed by perennial grasses and forbs in both sample years (Table 27R-24.7, Table 27R-24.10, Table 27R-24.11). Both pinyon and juniper were observed in small amounts in 2016 and could infill the site in future sample years (Table 27R-24.12, Table 27R-24.13).

Trend Summary Tables

Table 27R-24.6 - Shrub/Tree Summary. Average modified Daubenmire quadrat and line intercept cover by year for shrubs/trees.

Year	Quadrat Cover (%)			Line-intercept Cover (%)		
	Preferred Shrub	Other Shrub	Tree	Preferred Shrub	Other Shrub	Tree
2013	10.0	0.6	16.1	12.5	1.1	36.8
2016	13.8	3.4	0.8	12.1	5.2	1.7

Table 27R-24.7 - Herbaceous Summary. Nested frequency and average modified Daubenmire quadrat cover by year for herbaceous functional groups.

Year	Nested Frequency				Quadrat Cover (%)			
	Annual Grass	Perennial Grass	Annual/Biennial Forb	Perennial Forb	Annual Grass	Perennial Grass	Annual/Biennial Forb	Perennial Forb
2013	-	69	7	130	-	1.5	0.0	1.0
2016	-	107	10	162	-	3.0	0.3	5.5

Table 27R-24.8 - Basic Ground Cover. Average modified Daubenmire quadrat cover by year for basic ground cover types.

Year	Cover Type (%)					
	Bare Ground	Cryptograms	Litter	Pavement	Rock	Vegetation
2013	14.9	8.3	46.5	16.7	2.4	30.5
2016	15.7	2.6	55.9	7.4	0.1	24.3

Table 27R-24.9 - Pellet Group Data. Quadrat frequency and pellet group transect data for animal pellets. Rabbit pellet groups are not sampled in the pellet group transect.

Year	Cattle	Mule Deer	Elk	Rabbit
	Quadrat Frequency			
2013	-	1	-	3
2016	-	2	-	3
Year	Days Use Per Acre (ha)			
2013	0.7 (1.8)	1.3 (3.3)	-	-
2016	0.7 (1.8)	6.7 (16.6)	0.7 (1.7)	-

Table 27R-24.10 - Grass Species. Nested frequency and modified Daubenmire average cover by year.

GRASS SPECIES	Achnatherum hymenoides (Indian ricegrass)	Bouteloua gracilis (blue grama)	Elymus elymoides (squirreltail)	Hesperostipa comata (needle and thread)	Koeleria macrantha (prairie Junegrass)	Pascopyrum smithii (western wheatgrass)	Piptatheropsis micrantha (littelseed ricegrass)	Poa fendleriana (nuttongrass)	Thinopyrum intermedium ⁱ (intermediate wheatgrass)
year	Nested Frequency								
2013	16	17	14	1	0	8	-	19	-
2016	17	26	40	16	8	-	3	1	5
year	Average Cover (%)								
2013	0.2	0.6	0.3	0.1	0.0	0.1	-	0.2	-
2016	0.9	0.3	0.8	0.4	0.2	-	0.2	0.0	0.1

a - Annual; n - Noxious Weed; i - Introduced Species

Table 27R-24.11 - Forb Species. Nested frequency and modified Daubenmire average cover by year.

FORB SPECIES	Arabis (rockcress)	Astragalus (milkvetch)	Astragalus calycosus (Torrey's milkvetch)	Astragalus convallarius (lesser rusby milkvetch)	Astragalus humistratus (groundcover milkvetch)	Calylophus lavandulifolius (lavenderleaf sundrops)	Chaenactis douglasii (Douglas' dustymaiden)	Chamaesyce (sandmat)	Comandra umbellata (bastard toadflax)	Cryptantha (cryptantha)	Descurainia pinnata ^a (western tansymustard)	Erigeron (fleabane)	Eriogonum (buckwheat)	Eriogonum alatum (winged buckwheat)	Eriogonum racemosum (redroot buckwheat)	Eriogonum umbellatum (sulphur-flower buckwheat)	Hedeoma drummondii (Drummond's false pennyroyal)
year	Nested Frequency																
2013	5	2	-	1	-	-	-	71	1	7	7	2	2	-	7	-	-
2016	1	-	1	1	10	6	6	71	-	8	10	4	-	9	0	3	2
year	Average Cover (%)																
2013	0.0	0.0	-	0.0	-	-	-	0.4	0.0	0.0	0.0	0.0	0.0	-	0.0	-	-
2016	0.0	-	0.0	0.0	0.1	0.1	0.2	1.5	-	0.5	0.3	0.1	-	0.2	0.0	0.0	0.2

a - Annual/Biennial; n - Noxious Weed; i - Introduced Species

FORB SPECIES	Hymenoxys richardsonii (pingue rubberweed)	Lesquerella wardii (Ward's bladderpod)	Linum kingii (King's flax)	Lithospermum incisum (narrowleaf stoneseed)	Lotus utahensis (Utah bird's-foot trefoil)	Packera multilobata (lobeleaf groundsel)	Penstemon (beardtongue)	Penstemon strictus (Rocky Mountain penstemon)	Phlox longifolia (longleaf phlox)	Pleiocanthus spinosus (thorn skeletonweed)	Senecio spartioides (broom-like ragwort)	Sphaeralcea coccinea (scarlet globemallow)	Zigadenus paniculatus (foothill deathcamas)
year	Nested Frequency												
2013	6	38	-	-	7	19	1	-	2	-	-	-	-
2016	-	44	2	1	6	26	-	1	-	8	10	2	0
year	Average Cover (%)												
2013	0.0	0.4	-	-	0.0	0.1	0.0	-	0.0	-	-	-	-
2016	-	0.4	0.2	0.0	0.5	0.5	-	0.0	-	0.2	1.0	0.0	0.0

a - Annual/Biennial; n - Noxious Weed; i - Introduced Species

Table 27R-24.12 - Shrub and Tree Species. Average modified Daubenmire quadrat and line intercept cover by year.

SHRUB SPECIES	Artemisia nova ^a (black sagebrush)	Chrysothamnus viscidiflorus ssp. viscidiflorus (yellow rabbitbrush)	Ericameria nauseosa (rubber rabbitbrush)	Gutierrezia sarothrae (broom snakeweed)	Juniperus scopulorum ^t (Rocky Mountain juniper)	Opuntia (pricklypear)	Pinus edulis ^t (twoneedle pinyon)
year	Line Intercept Cover (%)						
2013	12.5	0.1	0.5	0.5	19.2	-	17.6
2016	12.1	0.4	0.1	4.7	1.6	-	0.1
year	Quadrat Cover (%)						
2013	10.0	0.0	0.0	0.6	8.9	-	7.2
2016	13.8	0.3	0.1	2.9	0.8	0.0	0.0

t - Tree Species; p - Preferred Browse; i - Introduced

Table 27R-24.13 - Shrub/Tree Characteristics. Population characteristics of shrub/tree species populations including density reproduction (seedlings), age distribution, utilization, vigor and average size (height/crown) of plants.

Year	Density		Age Class Distribution			Utilization		Poor Vigor (%)	Average Height Crown (cm)
	Plants Per Acre		Excluding Seedlings			Moderate (%)	Heavy (%)		
	Excluding Seedlings	Seedling	Young (%)	Mature (%)	Decadent (%)				
Artemisia nova ^p -- (black sagebrush)									
2013	2180	20	2	61	38	30	23	51	35/71
2016	2400	-	1	90	9	18	0	6	36/67
Chrysothamnus depressus ^p -- (longflower rabbitbrush)									
2013	-	-	-	-	-	-	-	-	-/-
2016	40	-	0	100	0	0	0	0	19/30
Chrysothamnus viscidiflorus ssp. viscidiflorus -- (yellow rabbitbrush)									
2013	260	-	0	100	0	0	0	0	14/24
2016	200	-	0	100	0	0	0	0	27/43

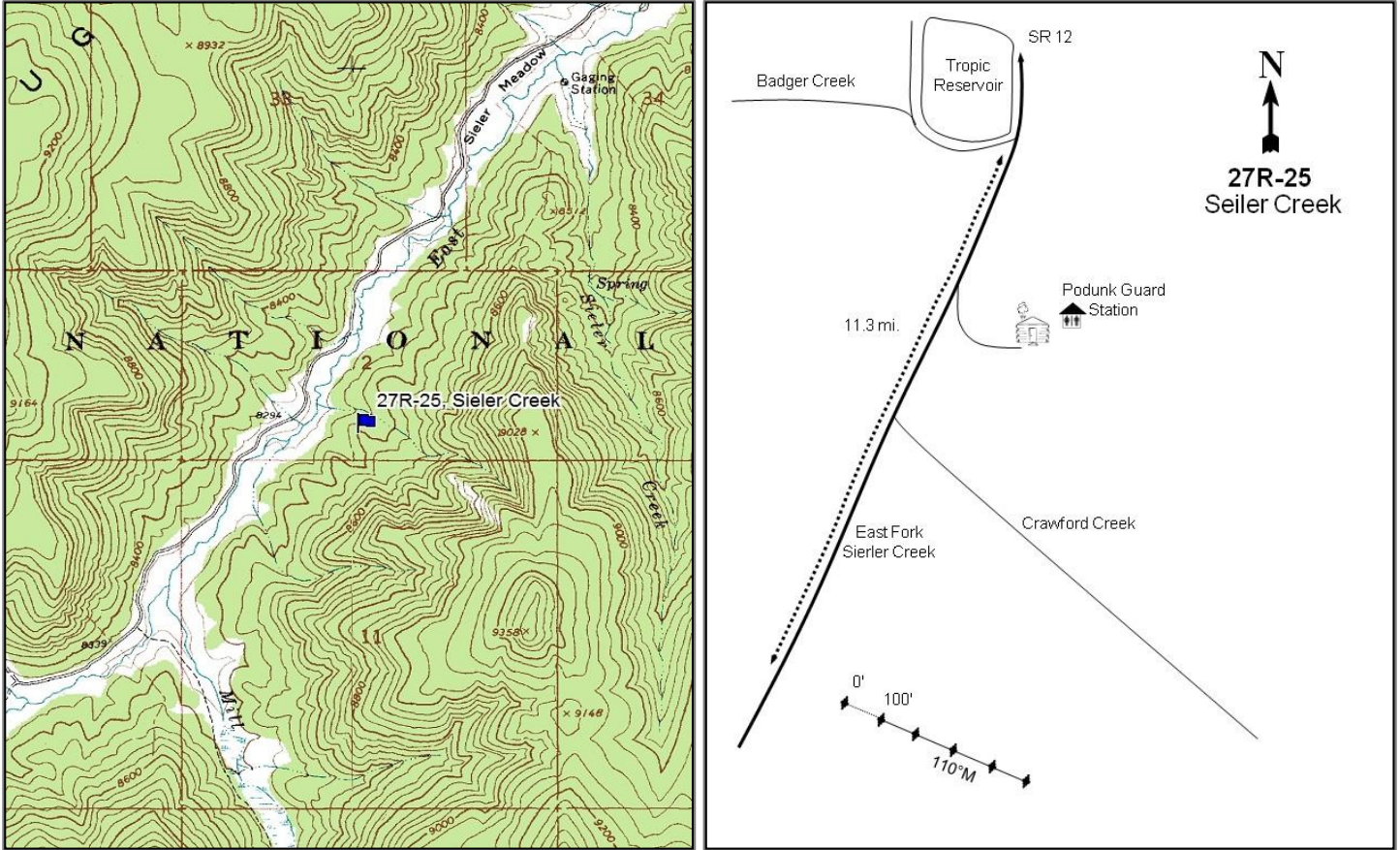
Year	Density		Age Class Distribution			Utilization		Poor Vigor (%)	Average Height Crown (cm)
	Plants Per Acre		Excluding Seedlings			Moderate (%)	Heavy (%)		
	Excluding Seedlings	Seedling	Young (%)	Mature (%)	Decadent (%)				
Eriogonum microthecum^P -- (slender buckwheat)									
2013	40	-	0	100	0	0	0	50	7/6
2016	-	-	-	-	-	-	-	-	-/-
Ericameria nauseosa -- (rubber rabbitbrush)									
2013	20	-	0	100	0	0	0	100	-/-
2016	40	-	0	100	0	0	0	0	65/72
Gutierrezia sarothrae -- (broom snakeweed)									
2013	1200	220	20	80	0	0	0	0	18/18
2016	2260	-	4	96	0	0	0	1	31/42
Juniperus scopulorum^t -- (Rocky Mountain juniper)									
2013	200	40	50	50	0	0	0	0	-/-
2016	120	40	67	33	0	0	0	0	-/-
Opuntia -- (pricklypear)									
2013	20	-	0	100	0	0	0	100	7/38
2016	60	-	0	100	0	0	0	0	9/43
Pediocactus simpsonii -- (mountain ball cactus)									
2013	20	-	0	100	0	0	0	0	3/4
2016	20	-	0	100	0	0	0	0	2/7
Pinus edulis^t -- (two-needle pinyon)									
2013	200	40	40	60	0	10	0	0	-/-
2016	20	40	100	0	0	0	0	0	-/-
Purshia tridentata^P -- (antelope bitterbrush)									
2013	-	-	-	-	-	-	-	-	25/92
2016	-	-	-	-	-	-	-	-	45/143

t - Tree Species; p - Preferred Browse; i - Introduced Species

Table 27R-24.14 - Tree Characteristics. Point-quarter tree density, size class distribution, and average diameter.

Year	Density	Size Class Distribution					Average Diameter (cm)
	Trees per Acre	Seedling (%)	1-4'	4-8'	8-12'	>12' (%)	
Juniperus scopulorum (Rocky Mountain juniper)							
2013	106	37	21	11	21	11	8.7
2016	123	18	76	6	-	-	2.5
Pinus edulis (two-needle pinyon)							
2013	237	25	15	5	15	40	16.4
2016	51	53	40	7	-	-	2.4

SIELER CREEK - STUDY NO. 27R-25



Location Information

USGS 7.5 min Map Info	Podunk Creek NW; Township 39S, Range 4W, Section 02
GPS (0' Stake)	NAD 83 UTM ZONE 12, 382017 East 4144864 North

Transect Information

Browse Tag # (0' Stake)	Not Available
Transect Bearing	110° 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

On SR 12 at the southern end of Tropic Reservoir, drive south for 11.3 miles. The study site will be on the left (east) side of the road.

Site Information

Land Ownership	Federal
Land Administrator	USFS
Allotment	East Fork/Crawford
Elevation	8,367ft (2,550m)
Aspect	West
Slope	6-8%
Sample Dates	07/31/2013, 08/24/2016

Table 27R-25.1 Disturbance History. Recorded history of major disturbances.

Treatment/Disturbance	Name	WRIDB#	Date	Size (acres)
Hand Crew - Lop-Pile-Burn	Sieler Stewardship	2716	August-September 2014	70
Logging - Logging/Clear-Cut	Sieler Stewardship	2716	October-June 2014-2015	70

Wildlife Habitat and Vegetation History

Table 27R-25.3 - Wildlife Seasonal Habitat. UDWR wildlife habitat and seasonality.

Species	Habitat	Season
Deer	crucial	summer
Elk	crucial	summer

Table 27R-25.4 - Vegetation History. The dominant vegetation type(s) and phase of woodland succession (Tausch, Miller, Roundy, & Chambers, 2009).

Year	Vegetation Type
2013	Quaking Aspen-Conifer Encroached
2016	Perennial Grass

Site Notes

There is evidence of a historic logging treatment toward the end of the transect. There was a doe noted on the site in 2016 when the site was surveyed.

Site Potential

1981-2010 Average Annual Precipitation	25 inches
NRCS Ecological Site	High Mountain Loam (Aspen)
NRCS Ecological Site #	R047XB508UT
States and Transitions	No state and transition model is available for this ecological site.

When established in 2013, the site was dominated by a mixture of conifers and of quaking aspen (*Populus tremuloides*); most of the shrub and tree cover was removed by a 2014 logging/clear-cut treatment (Table 27R-25.1, Table 27R-25.12). The herbaceous understory was initially lacking, but perennial grasses -- mainly Kentucky bluegrass (*Poa pratensis*) and Ross' sedge (*Carex rossii*) -- increased in cover and dominated the site in 2016 (Table 27R-25.7, Table 27R-25.10). Aspen may be slow to re-establish on this site: a majority of the plants showed moderate to heavy use in 2016. White fir (*Abies concolor*) was recorded in cover and density data in low amounts in 2016, indicating that this site could again be encroached by conifers in the future (Table 27R-25.12, Table 27R-25.13).

Trend Summary Tables

Table 27R-25.6 - Shrub/Tree Summary. Average modified Daubenmire quadrat and line intercept cover by year for shrubs/trees.

Year	Quadrat Cover (%)			Line-intercept Cover (%)		
	Preferred Shrub	Other Shrub	Tree	Preferred Shrub	Other Shrub	Tree
2013	-	2.2	18.1	-	1.5	57.8
2016	-	1.1	0.3	-	0.7	0.5

Table 27R-25.7 - Herbaceous Summary. Nested frequency and average modified Daubenmire quadrat cover by year for herbaceous functional groups.

Year	Nested Frequency				Quadrat Cover (%)			
	Annual Grass	Perennial Grass	Annual/Biennial Forb	Perennial Forb	Annual Grass	Perennial Grass	Annual/Biennial Forb	Perennial Forb
2013	-	44	1	61	-	1.8	0.0	4.0
2016	-	208	125	149	-	13.1	6.3	3.9

Table 27R-25.8 - Basic Ground Cover. Average modified Daubenmire quadrat cover by year for basic ground cover types.

Year	Cover Type (%)					
	Bare Ground	Cryptograms	Litter	Pavement	Rock	Vegetation
2013	0.4	0.2	90.5	-	-	24.3
2016	15.7	0.1	64.7	0.3	0.1	24.0

Table 27R-25.9 - Pellet Group Data. Quadrat frequency and pellet group transect data for animal pellets. Rabbit pellet groups are not sampled in the pellet group transect.

Year	Cattle	Mule Deer	Elk
	Quadrat Frequency		
2013	-	-	-
2016	-	3	1

Year	Days Use Per Acre (ha)		
	2013	-	3.4 (8.3)
2016	2.9 (7.2)	2.0 (5.0)	6.7 (16.6)

Table 27R-25.10 - Grass Species. Nested frequency and modified Daubenmire average cover by year.

GRASS SPECIES	Achnatherum nelsonii (Columbia needlegrass)	Bromus marginatus (mountain brome)	Bromus porteri (Porter brome)	Carex microptera (smallwing sedge)	Carex rossii (Ross' sedge)	Carex vallicola (valley sedge)	Deschampsia (hairgrass)	Elymus trachycaulus (slender wheatgrass)	Koeleria macrantha (prairie Junegrass)	Poa (bluegrass)	Poa pratensis ⁱ (Kentucky bluegrass)
year	Nested Frequency										
2013	11	6	3	-	-	-	-	2	1	-	31
2016	-	12	2	17	112	15	1	23	2	2	74
year	Average Cover (%)										
2013	0.6	0.0	0.0	-	-	-	-	0.0	0.0	-	1.1
2016	-	0.8	0.0	1.1	4.4	0.7	0.1	0.7	0.0	0.1	5.0

a - Annual; n - Noxious Weed; i - Introduced Species

Table 27R-25.11 - Forb Species. Nested frequency and modified Daubenmire average cover by year.

FORB SPECIES	Achillea millefolium (Common yarrow)	Agoseris glauca (pale agoseris)	Androsace septentrionalis ^a (pygmy/flower rockjasmine)	Antennaria (pussytoes)	Arabis drummondii (Drummond's rockcress)	Chenopodium ^a (goosefoot)	Cirsium vulgare ^{ai} (bull thistle)	Coryza ^a (horseweed)	Descurainia pinnata ^a (western tansymustard)	Dracocephalum parviflorum (American dragonhead)	Epilobium (willowherb)	Erigeron divergens ^a (spreading fleabane)	Erigeron flagellaris (trailing fleabane)	Fragaria virginiana (Virginia strawberry)	Lathyrus lanszwertii (Nevada pea)	Ligusticum porteri (Porter's licorice-root)	Mertensia arizonica (aspen bluebells)
year	Nested Frequency																
2013	24	1	1	2	1	-	-	-	-	-	-	-	19	1	7	2	4
2016	9	-	14	-	-	119	0	1	0	4	3	1	12	0	3	1	2
year	Average Cover (%)																
2013	0.6	0.0	0.0	0.1	0.0	-	-	-	-	-	-	-	0.8	0.0	0.6	0.1	0.1
2016	0.2	-	0.3	-	-	5.5	0.4	0.0	0.0	0.3	0.0	0.1	0.1	0.0	0.0	0.0	0.0

a - Annual/Biennial; n - Noxious Weed; i - Introduced Species

FORB SPECIES	Osmorhiza depauperata (bluntseed sweetroot)	Physaria (twinpod)	Polygonum aviculare ⁱ (prostrate knotweed)	Ranunculus inamoenus (graceful buttercup)	Symphotrichum ascendens (western aster)	Taraxacum officinale (common dandelion)	Thalictrum fendleri (Fendler's meadow-rue)	Tragopogon dubius ⁱⁱ (yellow salsify)	Trifolium (clover)	Vicia americana (American vetch)	Viola (violet)
year	Nested Frequency										
2013	11	2	-	1	11	15	4	-	11	10	5
2016	-	-	5	21	3	78	3	0	16	49	-
year	Average Cover (%)										
2013	0.4	0.0	-	0.0	0.3	0.5	0.0	-	0.2	0.0	0.0
2016	-	-	0.1	0.3	0.0	2.2	0.0	0.0	0.1	0.4	-

a - Annual/Biennial; n - Noxious Weed; i - Introduced Species

Table 27R-25.12 - Shrub and Tree Species. Average modified Daubenmire quadrat and line intercept cover by year.

SHRUB SPECIES	Abies concolor ^t (white fir)	Ericameria nauseosa (rubber rabbitbrush)	Ericameria parryi var. parryi (Parry's rabbitbrush)	Juniperus communis (common juniper)	Mahonia repens (creeping barberry)	Picea engelmannii ^t (Engelmann spruce)	Pinus flexilis ^t (limber pine)	Populus tremuloides ^t (quaking aspen)	Ribes cereum (wax currant)	Ribes montigenum (gooseberry currant)	Symphoricarpos oreophilus (mountain snowberry)
year	Line Intercept Cover (%)										
2013	34.5	0.1	-	1.3	-	10.4	1	11.9	-	-	0.1
2016	0.2	-	0.2	-	-	-	-	0.3	0.3	-	0.2
year	Quadrat Cover (%)										
2013	12.4	0.3	-	0.4	0.0	1.4	0.6	3.6	1.2	-	0.2
2016	0.0	-	0.6	-	-	-	-	0.3	0.3	0.0	0.1

t - Tree Species; p - Preferred Browse; i - Introduced

Table 27R-25.13 - Shrub/Tree Characteristics. Population characteristics of shrub/tree species populations including density reproduction (seedlings), age distribution, utilization, vigor and average size (height/crown) of plants.

Year	Density		Age Class Distribution			Utilization		Poor Vigor (%)	Average Height Crown (cm)
	Plants Per Acre		Excluding Seedlings			Moderate (%)	Heavy (%)		
	Excluding Seedlings	Seedling	Young (%)	Mature (%)	Decadent (%)				
Abies concolor ^t -- (white fir)									
2013	3080	1360	94	5	1	0	0	3	- / -
2016	140	20	100	0	0	0	0	0	- / -
Ericameria nauseosa -- (rubber rabbitbrush)									
2013	80	-	0	100	0	0	0	25	58/73
2016	-	-	-	-	-	-	-	-	- / -
Ericameria parryi var. parryi -- (Parry's rabbitbrush)									
2013	-	-	-	-	-	-	-	-	- / -
2016	200	-	0	100	0	0	0	10	35/43

Year	Density		Age Class Distribution			Utilization		Poor Vigor (%)	Average Height Crown (cm)
	Plants Per Acre		Excluding Seedlings			Moderate (%)	Heavy (%)		
	Excluding Seedlings	Seedling	Young (%)	Mature (%)	Decadent (%)				
Juniperus communis -- (common juniper)									
2013	260	-	8	92	0	0	0	0	73/120
2016	-	-	-	-	-	-	-	-	-/-
Mahonia repens -- (creeping barberry)									
2013	160	-	0	100	0	0	0	0	12/22
2016	-	-	-	-	-	-	-	-	-/-
Picea engelmannii^t -- (Engelmann spruce)									
2013	220	20	36	36	27	0	0	9	- / -
2016	-	-	-	-	-	-	-	-	-/-
Ribes cereum -- (wax currant)									
2013	40	-	50	50	0	0	50	0	37/59
2016	460	220	74	26	0	13	30	4	20/27
Ribes montigenum -- (gooseberry currant)									
2013	-	-	-	-	-	-	-	-	-/-
2016	40	-	100	0	0	0	0	0	23/28
Rosa woodsii^p -- (Woods' rose)									
2013	-	-	-	-	-	-	-	-	-/-
2016	-	-	-	-	-	-	-	-	27/31
Symphoricarpos oreophilus -- (mountain snowberry)									
2013	240	-	42	58	0	0	0	0	27/43
2016	80	-	0	100	0	0	100	0	39/66

t - Tree Species; p - Preferred Browse; i - Introduced Species

Table 27R-25.13a - Aspen Characteristics. Characteristics of aspen populations including density, size class distribution, and vigor of plants.

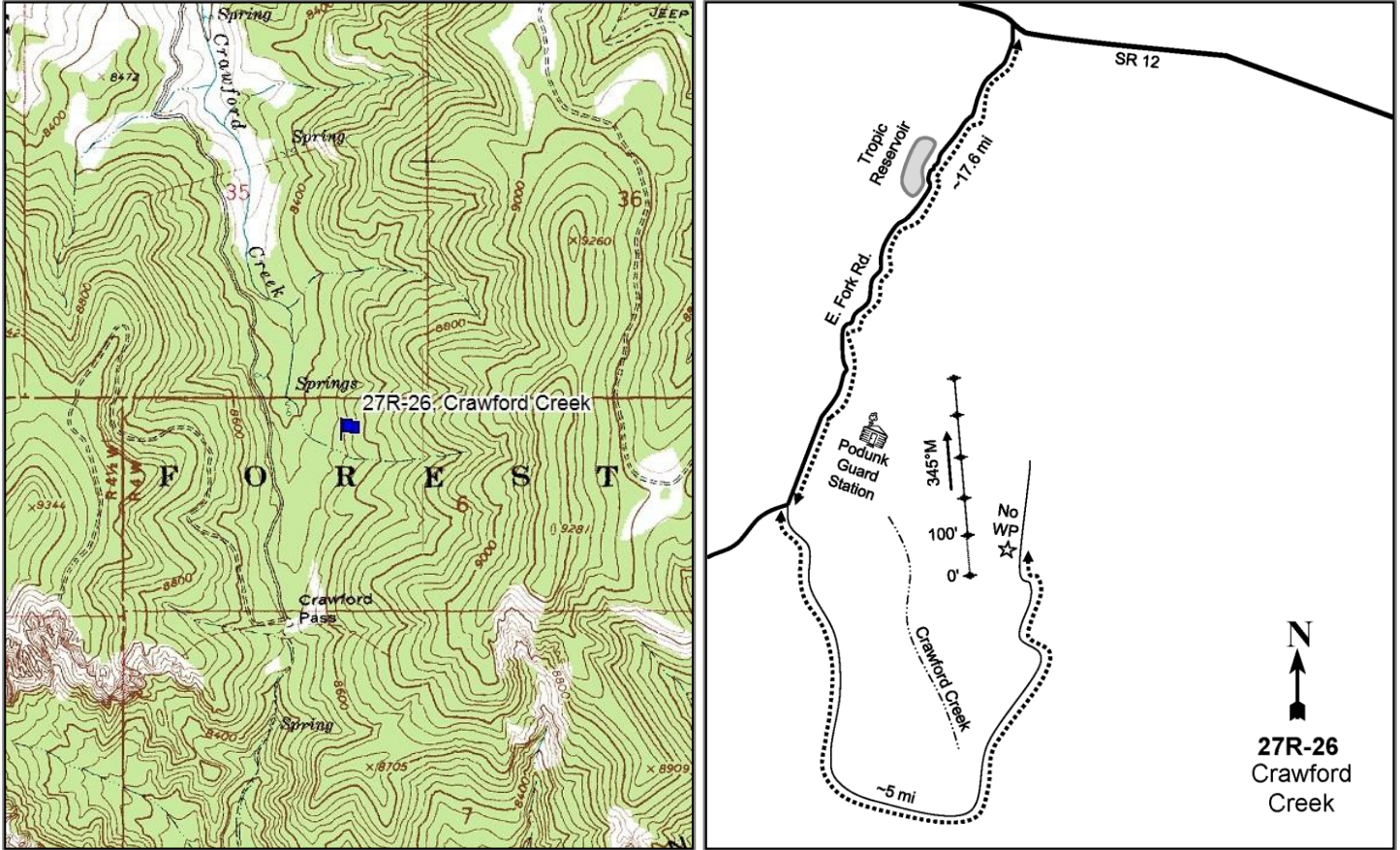
Year	Density	Size Class Distribution				Utilization		Poor Vigor (%)
	Plants per Acre	Class I (%)	Class II (%)	Class III (%)	Class IV (%)	Moderate (%)	Heavy (%)	
Populus tremuloides (quaking aspen)								
2013	1680	51	46	-	2	5	0	0
2016	880	70	30	-	-	15	85	8

Class I - Less than or equal to 1.5 feet
 Class II - Greater than 1.5 feet to 5 feet
 Class III - Greater than 5 feet and up to 1 inch diameter at breast height (dbh)
 Class IV - Greater than 1 in diameter at breast height (dbh)

Table 27R-25.14 - Tree Characteristics. Point-quarter tree density, size class distribution, and average diameter.

Year	Density	Size Class Distribution					Average Diameter (cm)
	Trees per Acre	Seedling (%)	1-4'	4-8'	8-12'	>12' (%)	
Abies concolor (white fir)							
2013	346	11	42	-	5	42	17.5
2016	24	20	80	-	-	-	2.4
Picea engelmannii (Engelmann spruce)							
2013	136	-	-	16	11	74	24.2
2016	3	100	-	-	-	-	1.0
Populus tremuloides (quaking aspen)							
2013	264	30	35	10	-	25	11.6
2016	55	72	28	-	-	-	1.2

CRAWFORD CREEK - STUDY NO. 27R-26



Location Information

USGS 7.5 min Map Info Podunk Creek NE; Township 39S, Range 4W, Section 06
 GPS (0' Stake) NAD 83 UTM ZONE 12, 385359 East 4145391 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

From SR 12, turn right onto East Fork Road and drive about 17.6 miles, passing Tropic Reservoir and the Podunk Guard Station, to a fork in the road. Turn left and proceed for about 5 miles. Park on the shoulder of the road and walk down the small slope into the flat near Crawford Creek. There is no witness post and there are no stakes or rebar.

Site Information

Land Ownership	Federal
Land Administrator	USFS
Allotment	East Fork/Crawford
Elevation	8,503ft (2,592m)
Aspect	West
Slope	9%
Sample Dates	08/24/2016

Table 27R-26.1 Disturbance History. Recorded history of major disturbances.

Treatment/Disturbance	Name	WRI DB#	Date	Size (acres)
Logging - Coppice Cut	Paunsaugunt Boreal Toad Habitat Improvement Project (Proposed)	3631	2016?	28

Wildlife Habitat and Vegetation History

Table 27R-26.3 - Wildlife Seasonal Habitat. UDWR wildlife habitat and seasonality.

Species	Habitat	Season
Deer	crucial	summer
Elk	crucial	summer

Table 27R-26.4 - Vegetation History. The dominant vegetation type(s) and phase of woodland succession (Tausch, Miller, Roundy, & Chambers, 2009).

Year	Vegetation Type
2016	Quaking Aspen-Conifer Encroached

Site Notes

No Notes

Site Potential

1981-2010 Average Annual Precipitation	25 inches
NRCS Ecological Site	High Mountain Loam (Aspen)
NRCS Ecological Site #	R047XB508UT
States and Transitions	No state and transition model is available for this ecological site.

This site was dominated by quaking aspen (*Populus tremuloides*) and conifers when it was established in 2016, with a few shrub species providing much less browse cover (Table 27R-26.12). The understory was depauperate in both species diversity and abundance, and most herbaceous cover was provided by perennial forbs (Table 27R-26.7, Table 27R-26.11). The browse and herbaceous components of this study site are expected to increase following a scheduled logging treatment (Table 27R-26.1).

Trend Summary Tables

Table 27R-26.6 - Shrub/Tree Summary. Average modified Daubenmire quadrat and line intercept cover by year for shrubs/trees.

Year	Quadrat Cover (%)			Line-intercept Cover (%)		
	Preferred Shrub	Other Shrub	Tree	Preferred Shrub	Other Shrub	Tree
2016	0.2	8.5	16.4	-	12.5	70.9

Table 27R-26.7 - Herbaceous Summary. Nested frequency and average modified Daubenmire quadrat cover by year for herbaceous functional groups.

Year	Nested Frequency				Quadrat Cover (%)			
	Annual Grass	Perennial Grass	Annual/Biennial Forb	Perennial Forb	Annual Grass	Perennial Grass	Annual/Biennial Forb	Perennial Forb
2016	-	83	-	88	-	1.3	-	3.3

Table 27R-26.8 - Basic Ground Cover. Average modified Daubenmire quadrat cover by year for basic ground cover types.

Year	Cover Type (%)					
	Bare Ground	Cryptograms	Litter	Pavement	Rock	Vegetation
2016	3.0	0.2	84.5	1.1	0.2	29.5

Table 27R-26.9 - Pellet Group Data. Quadrat frequency and pellet group transect data for animal pellets. Rabbit pellet groups are not sampled in the pellet group transect.

Year	Cattle	Mule Deer
	Quadrat Frequency	
2016	-	2
Year	Days Use Per Acre (ha)	
2016	1.5 (3.6)	
	4.0 (9.9)	

Table 27R-26.10 - Grass Species. Nested frequency and modified Daubenmire average cover by year.

GRASS SPECIES	Achnatherum lettermanii (Letterman's needlegrass)	Achnatherum nelsonii (Columbia needlegrass)	Bromus inermis ⁱ (smooth brome)	Bromus porteri (Porter brome)	Carex rossi (Ross' sedge)	Elymus elymoides (squirreltail)	Poa fendleriana (muttongrass)	Poa pratensis ⁱ (Kentucky bluegrass)	Thinopyrum intermedium ⁱ (intermediate wheatgrass)
year	Nested Frequency								
2016	6	2	10	16	49	6	0	18	3
year	Average Cover (%)								
2016	0.0	0.0	0.4	0.1	0.6	0.1	0.0	0.1	0.0

a - Annual; n - Noxious Weed; i - Introduced Species

Table 27R-26.11 - Forb Species. Nested frequency and modified Daubenmire average cover by year.

FORB SPECIES	Antennaria parvifolia (small-leaf pussytoes)	Astragalus miser var. oblongifolius (timber milkvetch)	Cirsium wheeleri (Wheeler's thistle)	Erigeron flagellaris (trailing fleabane)	Ligusticum porteri (Porter's licorice-root)	Lotus utahensis (Utah bird's-foot trefoil)	Maianthemum (mayflower)	Packera multilobata (lobeleaf groundsel)	Phlox austromontana (mountain phlox)	Silene drummondii (Drummond's campion)	Taraxacum officinale (common dandelion)	Vicia americana (American vetch)
year	Nested Frequency											
2016	18	5	4	43	0	5	8	17	1	2	3	15
year	Average Cover (%)											
2016	0.6	0.1	0.2	1.6	0.0	0.0	0.3	0.1	0.0	0.0	0.0	0.3

a - Annual/Biennial; n - Noxious Weed; i - Introduced Species

Table 27R-26.12 - Shrub and Tree Species. Average modified Daubenmire quadrat and line intercept cover by year.

SHRUB SPECIES	Abies concolor ^t (white fir)	Amelanchier utahensis ^p (Utah serviceberry)	Arctostaphylos (manzanita)	Juniperus communis (common juniper)	Mahonia repens (creeping barberry)	Paxistima myrsinites (Oregon boxleaf)	Picea engelmannii ^t (Engelmann spruce)	Pinus ponderosa ^t (ponderosa pine)	Populus tremuloides ^t (quaking aspen)	Pseudotsuga menziesii ^t (Douglas-fir)	Rosa woodsii ^p (Woods' rose)	Symphoricarpos oreophilus (mountain snowberry)
year	Line Intercept Cover (%)											
2016	35.5	-	1.3	6	2.1	1.6	1.4	0.4	18.6	15	0	1.5
year	Quadrat Cover (%)											
2016	10.5	0.0	0.1	3.4	3.1	0.7	0.6	0.0	1.4	3.9	0.2	1.1

t - Tree Species; p - Preferred Browse; i - Introduced

Table 27R-26.13 - Shrub/Tree Characteristics. Population characteristics of shrub/tree species populations including density reproduction (seedlings), age distribution, utilization, vigor and average size (height/crown) of plants.

Year	Density Plants Per Acre		Age Class Distribution Excluding Seedlings			Utilization		Poor Vigor (%)	Average Height Crown (cm)
	Excluding Seedlings	Seedling	Young (%)	Mature (%)	Decadent (%)	Moderate (%)	Heavy (%)		
Abies concolor ^t -- (white fir)									
2016	1400	340	47	53	0	3	0	1	- / -
Amelanchier utahensis ^p -- (Utah serviceberry)									
2016	100	-	80	20	0	20	0	0	29/49
Arctostaphylos -- (manzanita)									
2016	120	-	17	83	0	0	0	0	74/144
Ceanothus fendleri -- (Fendler's ceanothus)									
2016	-	-	-	-	-	-	-	-	27/80
Juniperus communis -- (common juniper)									
2016	680	-	0	97	3	0	0	3	63/143
Mahonia repens -- (creeping barberry)									
2016	8000	60	4	96	0	0	0	0	14/18
Paxistima myrsinites -- (Oregon boxleaf)									
2016	1400	20	9	91	0	0	0	0	16/19
Pinus ponderosa ^t -- (ponderosa pine)									
2016	20	-	0	100	0	0	0	0	- / -
Pseudotsuga menziesii ^t -- (Douglas-fir)									
2016	100	-	20	80	0	0	0	40	- / -
Ribes ^p -- (currant)									
2016	20	-	0	100	0	100	0	0	87/47
Rosa woodsii ^p -- (Woods' rose)									
2016	420	-	48	52	0	5	29	0	29/23
Symphoricarpos oreophilus -- (mountain snowberry)									
2016	1140	-	23	77	0	4	7	4	27/41

t - Tree Species; p - Preferred Browse; i - Introduced Species

Table 27R-26.13a - Aspen Characteristics. Characteristics of aspen populations including density, size class distribution, and vigor of plants.

Year	Density	Size Class Distribution				Utilization		Poor Vigor (%)
	Plants per Acre	Class I (%)	Class II (%)	Class III (%)	Class IV (%)	Moderate (%)	Heavy (%)	
Populus tremuloides (quaking aspen)								
2016	1300	32	43	15	9	9	11	18

Class I - Less than or equal to 1.5 feet

Class II - Greater than 1.5 feet to 5 feet

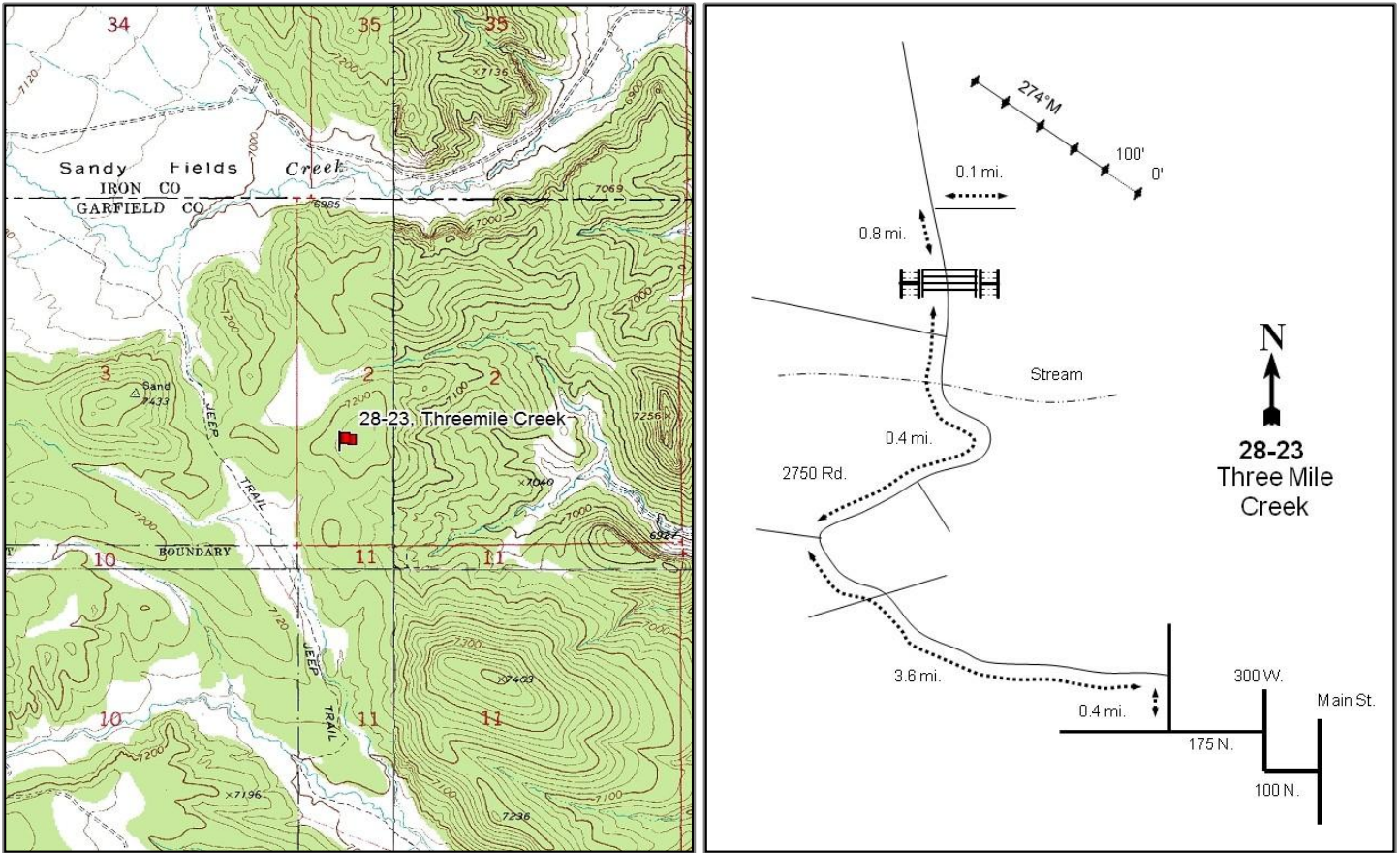
Class III - Greater than 5 feet and up to 1 inch diameter at breast height (dbh)

Class IV - Greater than 1 in diameter at breast height (dbh)

Table 27R-26.14 - Tree Characteristics. Point-quarter tree density, size class distribution, and average diameter.

Year	Density	Size Class Distribution					Average Diameter (cm)
	Trees per Acre	Seedling (%)	1-4'	4-8'	8-12'	>12' (%)	
Abies concolor (white fir)							
2016	498	20	20	-	10	50	5.6
Pinus flexilis (limber pine)							
2016	4	-	100	-	-	-	3.0
Pinus ponderosa (ponderosa pine)							
2016	17	-	11	11	11	67	28.3
Populus tremuloides (quaking aspen)							
2016	502	75	15	-	-	10	3.0
Pseudotsuga menziesii (Douglas-fir)							
2016	67	-	-	6	-	94	26.6

THREEMILE CREEK - STUDY NO. 28-23



Location Information

USGS 7.5 min Map Info Little Creek Peak SE; Township 34S, Range 6W, Section 02
 GPS (0' Stake) NAD 83 UTM ZONE 12, 367790 East 4193548 North

Transect Information

Browse Tag # (0' Stake) 149
 Transect Bearing 274° 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: 2ft

Directions to Site

Travel 0.4 miles from the town of Panguitch, and at the intersection of 175 North (Pigweed Lane) and 700 West, turn left onto Mud Spring Road. Travel 3.6 miles to an intersection and stay to the right. Drive 0.4 miles to a gate. Continue through the gate, travel 0.8 miles, and turn right. Proceed for another 0.1 miles and park. Navigate to the 0-foot stake using a GPS. The 0-foot stake will be identified by browse tag #149.

Site Information

Land Ownership	State
Land Administrator	SITLA
Allotment	SANDY CREEK
Elevation	7,244ft (2,208m)
Aspect	West
Slope	10-15%
Sample Dates	07/24/2013, 08/25/2016

Table 28-23.1 Disturbance History. Recorded history of major disturbances.

Treatment/Disturbance	Name	WRI DB#	Date	Size (acres)
Chaining - Two-Way Ely	Panguitch West Bench Habitat Improvement	2373	September-November 2012	276
Seeding - Aerial Before	Panguitch West Bench Habitat Improvement	2373	September 2012	276
Seeding - Dribbler	Panguitch West Bench Habitat Improvement	2373	September-November 2012	276
Seeding - Aerial After	Panguitch West Bench Habitat Improvement	2373	February 2012	276

Table 28-23.2 Seed Mix. List of known seeded plant species and rates (if available).

Mix Name		Application Type	Application Date	Acres	
Panguitch West Bench		Aerial	Sep 2012	276	
Type	Species	Common Name	Cultivar/Source ID	Bulk lbs/acre	PLS lbs/acre
G	<i>Achnatherum hymenoides</i>	Indian Ricegrass	Rimrock	0.72	0.68
G	<i>Agropyron cristatum</i>	Crested Wheatgrass	Douglas	0.54	0.52
G	<i>Agropyron cristatum</i>	Crested Wheatgrass	Hycrest II	0.54	0.48
G	<i>Poa secunda</i>	Canby Bluegrass	Canbar	0.49	0.26
G	<i>Pseudoroegneria spicata</i>	Bluebunch Wheatgrass	Anatone	0.54	0.53
G	<i>Thinopyrum ponticum</i>	Tall Wheatgrass	Alkar	1.00	0.94
F	<i>Achillea millefolium</i>	Western Yarrow	Eagle Mountain	0.09	0.08
F	<i>Astragalus cicer</i>	Cicer Milkvetch	Lutana	1.45	1.05
F	<i>Medicago sativa</i>	Alfalfa	Ladak DL	1.99	1.85
F	<i>Melilotus officinalis</i>	Yellow Sweetclover		0.54	0.51
F	<i>Penstemon palmeri</i>	Palmer Penstemon	Carbon/Emery UT	0.25	0.20
F	<i>Sanguisorba minor</i>	Small Burnet	Delar	1.63	1.46
Mix Name		Application Type	Application Date	Acres	
Panguitch West Bench - Dribbler Mix		Dribbler	Sep 2012	276	
Type	Species	Common Name	Cultivar/Source ID	Bulk lbs/acre	PLS lbs/acre
F	<i>Balsamorhiza sagittata</i>	Arrowleaf Balsamroot	Piute UT	0.04	0.03
F	<i>Sanguisorba minor</i>	Small Burnet	Delar	0.36	0.32
S	<i>Ephedra viridis</i>	Green Ephedra	Emery UT	0.11	0.10
S	<i>Purshia tridentata</i>	Bitterbrush	Garfield UT	0.18	0.15
Mix Name		Application Type	Application Date	Acres	
Panguitch West Bench - Browse Mix		Aerial	Sep 2012	276	
Type	Species	Common Name	Cultivar/Source ID	Bulk lbs/acre	PLS lbs/acre
		Rice Hulls		0.25	0.00
S	<i>Artemisia tridentata</i> ssp. <i>vaseyana</i>	Mountain Big Sagebrush	Sevier UT	0.22	0.06
S	<i>Artemisia tridentata</i> ssp. <i>wyomingensis</i>	Wyoming Big Sagebrush	Piute UT	0.43	0.13
S	<i>Bassia prostrata</i>	Forage Kochia	Beaver UT	0.22	0.15

Wildlife Habitat and Vegetation History

Table 28-23.3 - Wildlife Seasonal Habitat. UDWR wildlife habitat and seasonality.

Species	Habitat	Season
Deer	crucial	winter
Elk	substantial	winter

Table 28-23.4 - Vegetation History. The dominant vegetation type(s) and phase of woodland succession (Tausch, Miller, Roundy, & Chambers, 2009).

Year	Vegetation Type	Woodland Succession
2013	Perennial Grass	Phase I
2016	Perennial Grass	Phase I

Site Notes

The site was treated the year prior to establishment of the study.

Site Potential

1981-2010 Average Annual Precipitation 13 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 this ecological site.

When established in 2013, pinyon pine (*Pinus edulis*) and Utah juniper (*Juniperus osteosperma*) trees were recently treated and provided low cover, though many of the young trees were not affected by the treatment (Table 28-23.14). Shrub species were sparse and provide little cover (Table 28-23.6). The herbaceous understory vegetation was very sparse. Since establishment, shrubs and perennial grass have increased substantially (Table 28-23.6, 28-23.7). Trees have remained in low cover (Table 28-23.12). With the density of young pinyon and juniper trees which were not affected or survived the treatment, this site has the potential to become tree dominated (Table 28-23.14).

Trend Summary Tables

Table 28-23.6 - Shrub/Tree Summary. Average modified Daubenmire quadrat and line intercept cover by year for shrubs/trees.

Year	Quadrat Cover (%)			Line-intercept Cover (%)		
	Preferred Shrub	Other Shrub	Tree	Preferred Shrub	Other Shrub	Tree
2013	0.1	0.3	0.5	0.2	0.1	1.4
2016	1.1	3.0	0.6	0.3	5.3	0.9

Table 28-23.7 - Herbaceous Summary. Nested frequency and average modified Daubenmire quadrat cover by year for herbaceous functional groups.

Year	Nested Frequency				Quadrat Cover (%)			
	Annual Grass	Perennial Grass	Annual/Biennial Forb	Perennial Forb	Annual Grass	Perennial Grass	Annual/Biennial Forb	Perennial Forb
2013	-	72	35	20	-	1.5	0.3	0.2
2016	13	294	139	12	0.3	13.0	2.9	0.1

Table 28-23.8 - Basic Ground Cover. Average modified Daubenmire quadrat cover by year for basic ground cover types.

Year	Cover Type (%)					
	Bare Ground	Cryptograms	Litter	Pavement	Rock	Vegetation
2013	20.6	0.2	52.7	5.3	21.0	2.7
2016	18.8	0.0	42.6	6.5	15.0	20.1

Table 28-23.9 - Pellet Group Data. Quadrat frequency and pellet group transect data for animal pellets. Rabbit pellet groups are not sampled in the pellet group transect.

Year	Cattle	Mule Deer	Elk	Rabbit
	Quadrat Frequency			
2013	-	1	-	3
2016	-	18	2	54
Year	Days Use Per Acre (ha)			
2013	-	-	-	-
2016	1.5 (3.6)	21.5 (53.0)	7.4 (18.2)	-

Table 28-23.10 - Grass Species. Nested frequency and modified Daubenmire average cover by year.

GRASS SPECIES	Achnatherum hymenoides (Indian ricegrass)	Agropyron cristatum ⁱ (crested wheatgrass)	Bouteloua gracilis (blue grama)	Bromus tectorum ^{ai} (cheatgrass)	Carex (sedge)	Carex obtusata (obtuse sedge)	Elymus elymoides (squirreltail)	Pascopyrum smithii (western wheatgrass)	Poa fendleriana (muttongrass)	Poa secunda (Sandberg bluegrass)	Pseudoroegneria spicata (bluebunch wheatgrass)	Thinopyrum intermedium ⁱ (intermediate wheatgrass)
year	Nested Frequency											
2013	2	-	51	-	2	-	6	-	16	-	-	-
2016	16	10	85	13	-	15	212	1	15	8	21	3
year	Average Cover (%)											
2013	0.0	-	1.2	-	0.0	-	0.0	-	0.3	-	-	-
2016	0.3	0.4	3.6	0.3	-	0.2	6.8	0.0	0.5	0.0	0.9	0.2

a - Annual; n - Noxious Weed; i - Introduced Species

Table 28-23.11 - Forb Species. Nested frequency and modified Daubenmire average cover by year.

FORB SPECIES	Ambrosia ^{ai} (ragweed)	Astragalus (milkvetch)	Chenopodium fremontii ^{ai} (Fremont's goosefoot)	Cryptantha (cryptantha)	Descurainia pinnata ^a (western tansymustard)	Erigeron pumilus (shaggy fleabane)	Gayophytum ramosissimum ^a (pinyon groundsmoke)	Hedysarum boreale (Utah sweetvetch)	Lactuca serriola ^{ai} (prickly lettuce)	Lappula occidentalis ^a (flatspine stickseed)	Penstemon caespitosus (mat penstemon)	Penstemon palmeri (Palmer's penstemon)	Polygonum douglasii ^{ai} (Douglas' knotweed)	Portulaca oleracea ^{ai} (little hogweed)	Salsola tragus ^{ai} (prickly Russian thistle)	Sanguisorba minor ⁱ (small burnet)	Taraxacum officinale (common dandelion)
year	Nested Frequency																
2013	-	-	-	1	3	-	1	-	-	-	7	4	3	30	-	8	-
2016	29	1	52	-	2	2	-	2	5	11	-	-	3	67	7	4	3
year	Average Cover (%)																
2013	-	-	-	0.0	0.2	-	0.0	-	-	-	0.0	0.1	0.0	0.1	-	0.0	-
2016	0.2	0.0	1.1	-	0.0	0.0	-	0.0	0.0	0.1	-	-	0.0	0.6	0.9	0.1	0.0

a - Annual/Biennial; n - Noxious Weed; i - Introduced Species

Table 28-23.12 - Shrub and Tree Species. Average modified Daubenmire quadrat and line intercept cover by year.

SHRUB SPECIES	Line Intercept Cover (%)								
	year	Line Intercept Cover (%)							
Artemisia nova ^p (black sagebrush)	2013	0.2	-	-	0.1	0.4	-	1	-
Artemisia tridentata ssp. vaseyana ^p (mountain big sagebrush)	2016	0.2	0.1	0.5	4.8	0.5	0	0.4	0
Chrysothamnus viscidiflorus (yellow rabbitbrush)	year	Quadrat Cover (%)							
Gutierrezia sarothrae (broom snakeweed)	2013	0.1	-	-	0.1	0.3	0.2	0.2	-
Juniperus osteosperma ^t (Utah juniper)	2016	1.1	0.0	0.3	2.7	0.1	0.0	0.4	0.0
Opuntia (pricklypear)									
Pinus edulis ^t (two-needle pinyon)									
Purshia tridentata ^p (antelope bitterbrush)									

t - Tree Species; p - Preferred Browse; i - Introduced

Table 28-23.13 - Shrub/Tree Characteristics. Population characteristics of shrub/tree species populations including density reproduction (seedlings), age distribution, utilization, vigor and average size (height/crown) of plants.

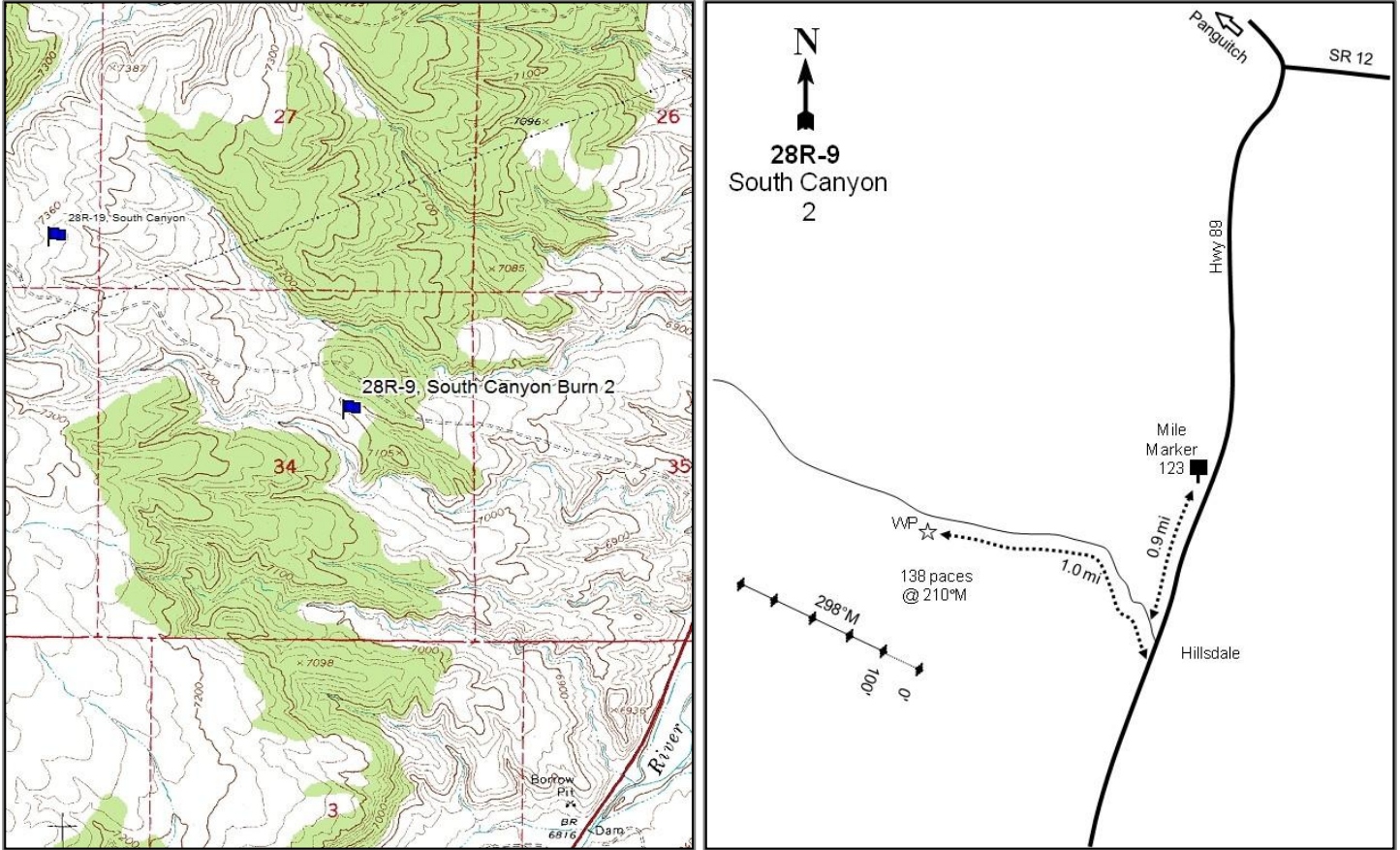
Year	Density		Age Class Distribution			Utilization		Poor Vigor (%)	Average Height Crown (cm)
	Plants Per Acre		Excluding Seedlings			Moderate (%)	Heavy (%)		
	Excluding Seedlings	Seedling	Young (%)	Mature (%)	Decadent (%)				
Artemisia nova ^p -- (black sagebrush)									
2013	180	-	0	44	56	11	0	22	27/47
2016	200	-	10	70	20	30	30	20	27/49
Artemisia tridentata ssp. vaseyana ^p -- (mountain big sagebrush)									
2013	20	-	0	100	0	0	0	0	28/44
2016	20	-	0	100	0	0	0	0	37/74
Cercocarpus ledifolius var. ledifolius ^p -- (curl-leaf mountain mahogany)									
2013	-	-	-	-	-	-	-	-	79/84
2016	-	-	-	-	-	-	-	-	86/150
Chrysothamnus viscidiflorus -- (yellow rabbitbrush)									
2013	-	-	-	-	-	-	-	-	-/-
2016	180	-	0	100	0	0	0	0	35/58
Gutierrezia sarothrae -- (broom snakeweed)									
2013	200	-	50	50	0	0	0	0	24/26
2016	4240	20	6	93	1	0	0	1	28/36
Juniperus osteosperma ^t -- (Utah juniper)									
2013	60	-	0	33	67	0	0	67	-/-
2016	40	-	0	50	50	0	0	0	-/-
Opuntia -- (pricklypear)									
2013	120	20	0	83	17	0	0	17	12/29
2016	140	-	0	100	0	0	0	14	10/22
Pinus edulis ^t -- (two-needle pinyon)									
2013	180	40	67	33	0	0	0	44	-/-
2016	140	160	43	57	0	0	0	29	-/-
Purshia tridentata ^p -- (antelope bitterbrush)									
2013	20	-	100	0	0	0	0	0	-/-
2016	20	-	0	100	0	0	100	0	31/26

t - Tree Species; p - Preferred Browse; i - Introduced Species

Table 28-23.14 - Tree Characteristics. Point-quarter tree density, size class distribution, and average diameter.

Year	Density	Size Class Distribution				Average Diameter (cm)	
	Trees per Acre	Seedling (%)	1-4'	4-8'	8-12'		>12' (%)
Juniperus osteosperma (Utah juniper)							
2016	51	13	56	31	-	-	6.4
Pinus edulis (two-needle pinyon)							
2016	71	15	45	40	-	-	4.3

SOUTH CANYON 2 - STUDY NO. 28R-9



Location Information

USGS 7.5 min Map Info Hatch NE; Township 35S, Range 5W, Section 34
 GPS (0' Stake) NAD 83 UTM ZONE 12, 376288 East 4176250 North

Transect Information

Browse Tag # (0' Stake) 70
 Transect Bearing 298° 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 Panguitch, drive west on US 89 to mile marker 123. Continue 0.9 miles to a dirt road on the left (west) with a cattle guard. Turn left and drive 1 mile to the witness post on the left (south) side of the road. From the witness post, walk 138 paces at 210 degrees magnetic to the 0-foot stake which is marked with browse tag #70. The site is across a drainage and on top of a ridge located south of the road.

Site Information

Land Ownership	Federal
Land Administrator	BLM
Allotment	SOUTH CANYON
Elevation	7,143ft (2,177m)
Aspect	Northeast
Slope	3%
Sample Dates	07/07/2005, 08/13/2012, 08/23/2016

Table 28R-09.1 Disturbance History. Recorded history of major disturbances.

Treatment/Disturbance	Name	WRI DB#	Date	Size (acres)
Mechanical - Bull-hog	South Canyon (Hillsdale)	2311	October 2012-February 2013	2279
Seeding - Aerial Before	South Canyon (Hillsdale)	2311	September 2012	2279

Table 28R-09.2 Seed Mix. List of known seeded plant species and rates (if available).

Mix Name		Application Type	Application Date	Acres	
South Canyon - Hillsdale		Aerial	Sep 2012	2000	
Type	Species	Common Name	Cultivar/Source ID	Bulk lbs/acre	PLS lbs/acre
G	Achnatherum hymenoides	Indian Ricegrass	Nezpar	0.35	0.33
G	Achnatherum hymenoides	Indian Ricegrass	Rimrock	1.55	1.47
G	Achnatherum hymenoides	Indian Ricegrass	Rimrock	0.10	0.09
G	Agropyron cristatum	Crested Wheatgrass	Nordan	0.50	0.44
G	Agropyron cristatum	Crested Wheatgrass	CDII	1.00	0.95
G	Elymus wawawaiensis	Snake River Wheatgrass	Secar	1.50	1.38
G	Poa secunda	Sandberg Bluegrass	Mountain Home	0.50	0.37
G	Psathyrostachys juncea	Russian Wildrye		1.00	0.75
G	Thinopyrum intermedium	Pubescent Wheatgrass	Luna	1.50	1.22
F	Linum perenne	Blue Flax	Appar	1.00	0.89
F	Medicago sativa	Alfalfa	Nomad	0.50	0.45
F	Medicago sativa	Alfalfa	Ladak DL	0.50	0.46
F	Onobrychis viciifolia	Sainfoin	Eski	0.56	0.49
F	Onobrychis viciifolia	Sainfoin	Eski	0.45	0.35
F	Penstemon palmeri	Palmer Penstemon	Lincoln NV	0.05	0.05
F	Penstemon palmeri	Palmer Penstemon	Iron UT	0.00	0.00
F	Penstemon palmeri	Palmer Penstemon	Carbon/Emery UT	0.23	0.18
F	Sanguisorba minor	Small Burnet	Delar	1.00	0.89

Wildlife Habitat and Vegetation History

Table 28R-09.3 - Wildlife Seasonal Habitat. UDWR wildlife habitat and seasonality.

Species	Habitat	Season	Brood/Young Rearing
Deer	substantial	winter	
Greater Sage Grouse	Crucial	occupied	brood-rearing

Table 28R-09.4 - Vegetation History. The dominant vegetation type(s) and phase of woodland succession (Tausch, Miller, Roundy, & Chambers, 2009).

Year	Vegetation Type	Woodland Succession
2005	Pinyon	Phase III
2012	Pinyon	Phase III
2016	Perennial Grass	Phase I

Site Notes

This study is located approximately one mile west of Hillsdale within a treated two-needle pinyon (*Pinus edulis*) and Utah juniper (*Juniperus osteosperma*) woodland.

Soils

Table 28R-09.5 - Soil Analysis Data. List of chemical and textural soil characteristics determined by laboratory analysis.

Texture	pH	% sand	% silt	% clay	% OM	PPM P	PPM K	ds/m	Sample Date
Loam	6.5	45.1	33.1	21.8	2.4	15.2	150.4	0.5	07/07/2005

Site Potential

1981-2010 Average Annual Precipitation 13 inches
 NRCS Ecological Site Upland Gravelly Loam (Black Sagebrush)
 NRCS Ecological Site # R047XB306UT
 States and Transitions No state and transition model is available for this ecological site.

When the study was established in 2005, the plant community was dominated by two-needle pinyon (*Pinus edulis*) and was considered to be in phase III of woodland succession (Table 28R-09.4, Table 28R-09.12) ; Shrubs were rare (Table 28R-09.6). The herbaceous understory was sparse and dominated by the perennial grass species blue grama (*Bouteloua gracilis*) (Table 28R-09.10). Following the bull-hog project in 2013 (Table 28R-09.1), the plant community transitioned to a perennial grass community type (Table 28R-09.7). Two-needle pinyon decreased substantially and became rare within the treatment area. Shrubs have remained rare, with black sagebrush (*Artemisia nova*) being the dominant species (Table 28R-09.12). It is predicted that shrubs will increase as treatment matures.

Trend Summary Tables

Table 28R-09.6 - Shrub/Tree Summary. Average modified Daubenmire quadrat and line intercept cover by year for shrubs/trees.

Year	Quadrat Cover (%)			Line-intercept Cover (%)		
	Preferred Shrub	Other Shrub	Tree	Preferred Shrub	Other Shrub	Tree
2005	3.3	0.2	27.7	2.5	-	49.0
2012	2.6	0.2	25.5	2.2	-	42.0
2016	3.4	1.0	-	3.1	0.3	-

Table 28R-09.7 - Herbaceous Summary. Nested frequency and average modified Daubenmire quadrat cover by year for herbaceous functional groups.

Year	Nested Frequency				Quadrat Cover (%)			
	Annual Grass	Perennial Grass	Annual/Biennial Forb	Perennial Forb	Annual Grass	Perennial Grass	Annual/Biennial Forb	Perennial Forb
2005	-	147	66	12	-	2.7	0.3	0.1
2012	-	136	11	44	-	3.4	0.0	0.2
2016	-	351	30	143	-	22.1	0.2	1.7

Table 28R-09.8 - Basic Ground Cover. Average modified Daubenmire quadrat cover by year for basic ground cover types.

Year	Cover Type (%)					
	Bare Ground	Cryptograms	Litter	Pavement	Rock	Vegetation
2005	15.1	1.6	54.5	17.0	9.0	35.2
2012	14.1	3.6	53.1	22.0	5.7	33.3
2016	10.7	0.0	57.4	6.0	4.9	27.5

Table 28R-09.9 - Pellet Group Data. Quadrat frequency and pellet group transect data for animal pellets. Rabbit pellet groups are not sampled in the pellet group transect.

Year	Cattle	Mule Deer	Elk	Rabbit
	Quadrat Frequency			
2005	1	2	-	36
2012	-	-	-	4
2016	-	7	-	43
Year	Days Use Per Acre (ha)			
2005	1.5 (3.6)	3.4 (8.3)	0.7 (1.7)	-
2012	0.7 (1.8)	2.7 (6.6)	0.7 (1.7)	-
2016	13.1 (32.3)	3.4 (8.3)	0.7 (1.7)	-

Table 28R-09.10 - Grass Species. Nested frequency and modified Daubenmire average cover by year.

GRASS SPECIES	Achnatherum hymenoides (Indian ricegrass)	Agropyron cristatum ⁱ (crested wheatgrass)	Bouteloua gracilis (blue grama)	Carex (sedge)	Elymus elymoides (squirreltail)	Hesperostipa comata (needle and thread)	Poa secunda (Sandberg bluegrass)	Psathyrostachys juncea ⁱ (Russian wildrye)	Thinopyrum intermedium ⁱ (intermediate wheatgrass)
year	Nested Frequency								
2005	20	-	104	3	32	1	3	-	-
2012	3	-	122	-	21	-	-	-	-
2016	13	43	163	2	203	8	13	14	56
year	Average Cover (%)								
2005	0.2	-	2.2	0.0	0.2	0.0	0.0	-	-
2012	0.0	-	3.2	-	0.2	-	-	-	-
2016	0.8	1.7	8.9	0.0	8.9	0.2	0.1	0.1	1.3

a - Annual; n - Noxious Weed; i - Introduced Species

Table 28R-09.11 - Forb Species. Nested frequency and modified Daubenmire average cover by year.

FORB SPECIES	Antennaria (pussytoes)	Arabis holboellii ^a (Holboell's rockcress)	Astragalus (milkvetch)	Astragalus lentiginosus (freckled milkvetch)	Chamaesyce albomarginata (whitemargin sandmat)	Chenopodium leptophyllum ^a (narrowleaf goosefoot)	Cryptantha ^a (annual cryptantha)	Cryptantha (cryptantha)	Descurainia pinnata ^a (western tansymustard)	Erigeron pumilus (shaggy fleabane)	Gayophytum ramosissimum ^a (pinyon groundsmoke)	Lappula occidentalis ^a (flatspine stickseed)	Linum perenne ⁱ (blue flax)	Lithospermum incisum (narrowleaf stoneseed)	Lotus utahensis (Utah bird's-foot trefoil)	Phlox longifolia (long/leaf phlox)	Sanguisorba minor ⁱ (small burnet)
year	Nested Frequency																
2005	-	2	-	-	-	1	-	9	7	-	61	-	-	-	1	2	-
2012	-	5	3	-	37	-	-	3	6	-	-	-	-	-	-	3	-
2016	8	-	1	4	24	-	5	6	11	1	-	14	114	1	0	-	1
year	Average Cover (%)																
2005	-	0.0	-	-	-	0.0	-	0.1	0.0	-	0.3	-	-	-	0.0	0.0	-
2012	-	0.0	0.0	-	0.1	-	-	0.1	0.0	-	-	-	-	-	-	0.0	-
2016	0.2	-	0.0	0.0	0.0	-	0.1	0.2	0.1	0.0	-	0.1	1.1	0.0	0.0	-	0.0

a - Annual/Biennial; n - Noxious Weed; i - Introduced Species

FORB SPECIES		
	Sphaeralcea grossularifolia (gooseberryleaf globemallow)	
	Trifolium gymnocarpon (hollyleaf clover)	
year	Nested Frequency	
2005	-	-
2012	-	2
2016	2	-
year	Average Cover (%)	
2005	-	-
2012	-	0.0
2016	0.0	-

a - Annual/Biennial; n - Noxious Weed; i - Introduced Species

Table 28R-09.12 - Shrub and Tree Species. Average modified Daubenmire quadrat and line intercept cover by year.

SHRUB SPECIES						
	Artemisia nova ^a (black sagebrush)	Chrysothamnus viscidiflorus ssp. viscidiflorus var. stenophyllus (yellow rabbitbrush)	Gutierrezia sarothrae (broom snakeweed)	Opuntia (pricklypear)	Pediocactus simpsonii (mountain ball cactus)	Pinus edulis ⁱ (twoneedle pinyon)
year	Line Intercept Cover (%)					
2005	2.5	-	-	-	-	49
2012	2.2	-	-	-	-	42
2016	3.1	-	0.3	-	-	-
year	Quadrat Cover (%)					
2005	3.3	-	0.0	0.2	-	27.7
2012	2.6	0.1	0.0	-	0.0	25.5
2016	3.4	-	1.0	-	-	-

t - Tree Species; p - Preferred Browse; i - Introduced

Table 28R-09.13 - Shrub/Tree Characteristics. Population characteristics of shrub/tree species populations including density reproduction (seedlings), age distribution, utilization, vigor and average size (height/crown) of plants.

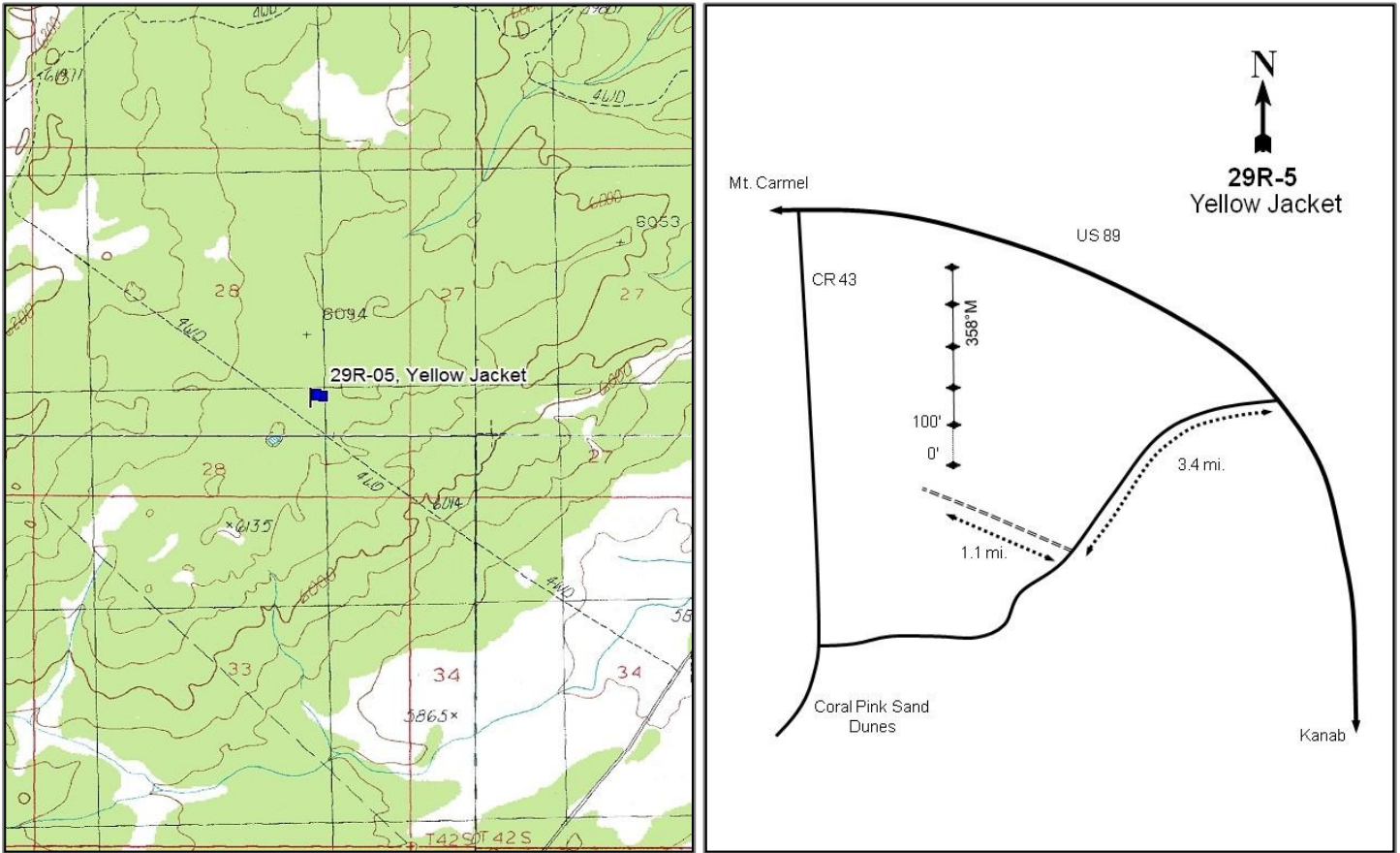
Year	Density		Age Class Distribution			Utilization		Poor Vigor (%)	Average Height Crown (cm)
	Plants Per Acre		Excluding Seedlings			Moderate (%)	Heavy (%)		
	Excluding Seedlings	Seedling	Young (%)	Mature (%)	Decadent (%)				
Artemisia nova^P -- (black sagebrush)									
2005	1940	40	4	54	42	2	0	29	34/52
2012	1860	120	17	65	18	14	0	34	28/44
2016	1340	-	21	79	0	12	5	5	25/50
Chrysothamnus viscidiflorus ssp. viscidiflorus var. stenophyllus -- (yellow rabbitbrush)									
2005	-	-	-	-	-	-	-	-	-/-
2012	60	-	0	100	0	0	0	0	26/25
2016	-	-	-	-	-	-	-	-	-/-
Ericameria nauseosa -- (rubber rabbitbrush)									
2005	-	-	-	-	-	-	-	-	44/53
2012	-	-	-	-	-	-	-	-	-/-
2016	-	-	-	-	-	-	-	-	59/107
Gutierrezia sarothrae -- (broom snakeweed)									
2005	60	60	67	33	0	0	0	0	27/23
2012	60	-	33	67	0	0	0	0	30/16
2016	620	-	10	90	0	0	0	0	30/41
Juniperus scopulorum^t -- (Rocky Mountain juniper)									
2005	-	20	0	0	0	0	0	0	- / -
2012	-	-	-	-	-	-	-	-	-/-
2016	-	-	-	-	-	-	-	-	-/-
Krascheninnikovia lanata^P -- (winterfat)									
2005	-	-	-	-	-	-	-	-	18/25
2012	-	-	-	-	-	-	-	-	-/-
2016	-	-	-	-	-	-	-	-	-/-
Opuntia -- (pricklypear)									
2005	80	-	0	100	0	25	0	0	15/32
2012	40	-	0	100	0	0	0	0	14/28
2016	20	-	0	100	0	0	0	0	13/34
Pediocactus simpsonii -- (mountain ball cactus)									
2005	20	-	0	100	0	0	0	0	3/5
2012	40	-	0	100	0	0	0	0	5/7
2016	-	-	-	-	-	-	-	-	-/-
Pinus edulis^t -- (two-needle pinyon)									
2005	960	40	21	77	2	0	2	0	- / -
2012	580	40	31	69	0	0	0	0	- / -
2016	-	20	0	0	0	0	0	0	- / -
Purshia tridentata^P -- (antelope bitterbrush)									
2005	-	-	-	-	-	-	-	-	130/274
2012	-	-	-	-	-	-	-	-	139/193

t - Tree Species; p - Preferred Browse; i - Introduced Species

Table 28R-09.14 - Tree Characteristics. Point-quarter tree density, size class distribution, and average diameter.

Year	Density	Size Class Distribution					Average Diameter (cm)
	Trees per Acre	Seedling (%)	1-4'	4-8'	8-12'	>12' (%)	
Juniperus scopulorum (Rocky Mountain juniper)							
2012	8	33	-	33	33	-	7.0
Pinus edulis (two-needle pinyon)							
2012	315	-	10	20	35	35	14.9
2016	6	25	75	-	-	-	3.0

YELLOW JACKET - STUDY No. 29R-5



Location Information

USGS 7.5 min Map Info	Mount Carmel SE; Township 42S, Range 7W, Section 28
GPS (0' Stake)	NAD 83 UTM ZONE 12, 354878 East 4110107 North

Transect Information

Browse Tag # (0' Stake)	Not Available
Transect Bearing	358° 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

On US 89 between Kanab and Mt. Carmel, turn west on the road to the Coral Pink Sand Dunes. Continue on this road for 3.4 miles and turn right onto a sandy two-track road. Drive for 1.1 miles and the study will be to the north on the right side of the road.

Site Information

Land Ownership	Federal
Land Administrator	BLM
Allotment	KINNIKINNIC SPRING
Elevation	6,089ft (1,856m)
Aspect	South
Slope	2%
Sample Dates	07/30/2013, 08/22/2016

Table 29R-05.1 Disturbance History. Recorded history of major disturbances.

Treatment/Disturbance	Name	WRI DB#	Date	Size (acres)
Mechanical - Bull-hog	Yellowjacket (Kinnickinnic)	2687	2014	2147
Seeding - Aerial Before	Yellowjacket (Kinnickinnic)	2687	January 2014	2147

Table 29R-05.2 Seed Mix. List of known seeded plant species and rates (if available).

Mix Name		Application Type	Application Date	Acres	
Yellowjacket		Aerial	Jan 2014	2146	
Type	Species	Common Name	Cultivar/Source ID	Bulk lbs/acre	PLS lbs/acre
G	Achnatherum hymenoides	Indian Ricegrass	Nezpar	0.26	0.25
G	Achnatherum hymenoides	Indian Ricegrass	Rimrock	0.12	0.11
G	Achnatherum hymenoides	Indian Ricegrass	Rimrock	0.93	0.84
G	Achnatherum hymenoides	Indian Ricegrass	Rio Grande CO	1.06	1.00
G	Achnatherum hymenoides	Indian Ricegrass	Emery UT	0.02	0.02
G	Achnatherum hymenoides	Indian Ricegrass	Nezpar	0.58	0.55
G	Agropyron fragile	Siberian Wheatgrass	Vavilov	1.30	1.09
G	Agropyron fragile	Siberian Wheatgrass	Vavilov	0.75	0.68
G	Pascopyrum smithii	Western Wheatgrass	Arriba	1.49	1.30
G	Sporobolus cryptandrus	Sand Dropseed	Washington CO	0.12	0.11
G	Thinopyrum intermedium	Pubescent Wheatgrass	Luna	0.91	0.77
F	Linum perenne	Blue Flax	Appar	1.03	0.92
F	Onobrychis viciifolia	Sainfoin	Eski	0.04	0.03
F	Onobrychis viciifolia	Sainfoin	Eski	1.00	0.92
F	Penstemon palmeri	Palmer Penstemon	White Pine NV	0.05	0.04
F	Penstemon palmeri	Palmer Penstemon	Washington UT	0.09	0.06
F	Penstemon palmeri	Palmer Penstemon	White Pine NV	0.14	0.12
F	Sanguisorba minor	Small Burnet		1.03	0.93

Wildlife Habitat and Vegetation History**Table 29R-05.3 - Wildlife Seasonal Habitat.** UDWR wildlife habitat and seasonality.

Species	Habitat	Season
Deer	crucial	winter

Table 29R-05.4 - Vegetation History. The dominant vegetation type(s) and phase of woodland succession (Tausch, Miller, Roundy, & Chambers, 2009).

Year	Vegetation Type	Woodland Succession
2013	Juniper/Mountain Big Sagebrush	Phase II
2016	Perennial Grass/Mountain Big Sagebrush	No Encroachment

Site Notes

In 2016, there was a small deer shed found on the site.

Site Potential

1981-2010 Average Annual Precipitation 15 inches
 NRCS Ecological Site Upland Sand (Mountain Big Sagebrush)
 NRCS Ecological Site # R035XY307UT
 States and Transitions No state and transition model is available for this ecological site.

This site was established in 2013 and was a mixed community of Utah juniper (*Juniperus osteosperma*) and mountain big sagebrush (*Artemisia tridentata* ssp. *vaseyana*) with a fairly sparse herbaceous understory. All trees were removed by the bull-hog treatment in 2014 (Table 29R-05.1), and in 2016, perennial grasses -- mainly native -- were dominant with sagebrush scattered throughout the site (Table 29R-05.7, Table 29R-05.10, Table 29R-05.12, Photos). Sagebrush and herbaceous cover are expected to increase as time since treatment increases.

Trend Summary Tables

Table 29R-05.6 - Shrub/Tree Summary. Average modified Daubenmire quadrat and line intercept cover by year for shrubs/trees.

Year	Quadrat Cover (%)			Line-intercept Cover (%)		
	Preferred Shrub	Other Shrub	Tree	Preferred Shrub	Other Shrub	Tree
2013	3.6	0.8	5.2	4.6	0.9	19.9
2016	1.4	1.7	-	2.1	0.9	-

Table 29R-05.7 - Herbaceous Summary. Nested frequency and average modified Daubenmire quadrat cover by year for herbaceous functional groups.

Year	Nested Frequency				Quadrat Cover (%)			
	Annual Grass	Perennial Grass	Annual/Biennial Forb	Perennial Forb	Annual Grass	Perennial Grass	Annual/Biennial Forb	Perennial Forb
2013	30	200	116	93	0.1	5.8	0.6	1.2
2016	18	257	240	119	0.1	12.9	4.0	2.6

Table 29R-05.8 - Basic Ground Cover. Average modified Daubenmire quadrat cover by year for basic ground cover types.

Year	Cover Type (%)					
	Bare Ground	Cryptograms	Litter	Pavement	Rock	Vegetation
2013	56.2	2.2	29.5	-	-	17.0
2016	46.5	0.3	38.6	0.0	-	19.9

Table 29R-05.9 - Pellet Group Data. Quadrat frequency and pellet group transect data for animal pellets. Rabbit pellet groups are not sampled in the pellet group transect.

Year	Cattle	Mule Deer	Elk	Rabbit
	Quadrat Frequency			
2013	2	9	-	14
2016	-	11	1	25
Days Use Per Acre (ha)				
2013	-	-	-	-
2016	2.2 (5.4)	6.0 (14.9)	0.7 (1.7)	-

Table 29R-05.10 - Grass Species. Nested frequency and modified Daubenmire average cover by year.

GRASS SPECIES	Achnatherum hymenoides (Indian ricegrass)	Agropyron cristatum ⁱ (crested wheatgrass)	Aristida purpurea (purple threeawn)	Bouteloua gracilis (blue grama)	Bromus tectorum ⁱⁱ (cheatgrass)	Elymus elymoides (squirreltail)	Hesperostipa comata (needle and thread)	Muhlenbergia pungens (sandhill muhly)	Pascopyrum smithii (western wheatgrass)	Phleum alpinum (alpine timothy)	Poa secunda (Sandberg bluegrass)	Sporobolus cryptandrus (sand dropseed)	Thinopyrum intermedium ⁱ (intermediate wheatgrass)	Vulpia octiflora ^a (sixweeks fescue)
year	Nested Frequency													
2013	33	-	14	67	8	9	11	54	27	6	5	27	-	22
2016	14	4	32	81	15	20	33	63	54	1	-	36	25	12
year	Average Cover (%)													
2013	0.4	-	0.3	1.7	0.0	0.3	0.2	2.4	0.1	0.0	0.0	0.3	-	0.1
2016	0.5	0.2	1.1	2.6	0.1	0.4	1.5	2.6	2.1	0.0	-	0.9	1.0	0.0

a - Annual; n - Noxious Weed; i - Introduced Species

Table 29R-05.11 - Forb Species. Nested frequency and modified Daubenmire average cover by year.

FORB SPECIES	Abronia fragrans (snowball sand verbena)	Arabis (rockcross)	Artemisia dracunculus (tarragon)	Chamaesyce (sandmat)	Comandra umbellata (bastard toadflax)	Cryptantha (cryptantha)	Descurainia pinnata ^a (western tansymustard)	Erigeron (fleabane)	Erigeron divergens ^a (spreading fleabane)	Eriogonum cernuum ^a (nodding buckwheat)	Erysimum capitatum ^a (sanddune wallflower)	Hymenopappus filifolius (fineleaf hymenopappus)	Linum kingii (King's flax)	Linum perenne ⁱ (blue flax)	Lygodesmia (skeletonplant)	Oenothera pallida ^a (pale evening primrose)	PheMERANTHUS confertiflorus (New Mexico fameflower)
year	Nested Frequency																
2013	6	5	5	12	1	-	-	4	-	-	7	33	32	-	-	4	6
2016	6	1	-	8	-	1	0	5	3	10	-	69	8	8	1	44	1
year	Average Cover (%)																
2013	0.5	0.0	0.0	0.0	0.0	-	-	0.0	-	-	0.0	0.2	0.1	-	-	0.0	0.0
2016	0.0	0.0	-	0.0	-	0.0	0.0	0.3	0.1	0.2	-	1.5	0.1	0.0	0.0	2.0	0.0

a - Annual/Biennial; n - Noxious Weed; i - Introduced Species

FORB SPECIES	Plantago patagonica ^a (woolly plantain)	Polygonum douglasii ^a (Douglas' knotweed)	Sanguisorba minor ⁱ (small burnet)	Senecio spartioides (broom-like ragwort)	Sphaeralcea parvifolia (smallflower globemallow)	Townsendia annua ^a (annual Townsend daisy)	Tradescantia occidentalis (prairie spiderwort)
year	Nested Frequency						
2013	111	4	-	-	1	-	20
2016	202	4	0	1	7	3	25
year	Average Cover (%)						
2013	0.5	0.0	-	-	0.0	-	0.2
2016	1.6	0.1	0.1	0.1	0.1	0.0	0.3

a - Annual/Biennial; n - Noxious Weed; i - Introduced Species

Table 29R-05.12 - Shrub and Tree Species. Average modified Daubenmire quadrat and line intercept cover by year.

SHRUB SPECIES	Artemisia tridentata ssp. vaseyana ^p (mountain big sagebrush)	Ephedra viridis ^p (mormon tea)	Ericameria nauseosa (rubber rabbitbrush)	Gutierrezia sarothrae (broom snakeweed)	Juniperus osteosperma ^t (Utah juniper)	Linanthus pungens (granite prickly phlox)	Opuntia (pricklypear)	Purshia tridentata ^p (antelope bitterbrush)
year	Line Intercept Cover (%)							
2013	4	0.4	-	0.8	19.9	-	0.1	0.2
2016	1.3	-	0.1	0.4	-	0.4	-	0.8
year	Quadrat Cover (%)							
2013	2.9	0.6	-	0.8	5.2	0.0	0.0	0.0
2016	0.8	0.2	0.4	1.1	-	0.2	0.0	0.4

t - Tree Species; p - Preferred Browse; i - Introduced

Table 29R-05.13 - Shrub/Tree Characteristics. Population characteristics of shrub/tree species populations including density reproduction (seedlings), age distribution, utilization, vigor and average size (height/crown) of plants.

Year	Density		Age Class Distribution			Utilization		Poor Vigor (%)	Average Height Crown (cm)
	Plants Per Acre		Excluding Seedlings			Moderate (%)	Heavy (%)		
	Excluding Seedlings	Seedling	Young (%)	Mature (%)	Decadent (%)				
Artemisia tridentata ssp. vaseyana ^p -- (mountain big sagebrush)									
2013	780	240	13	64	23	28	3	23	76/100
2016	320	-	13	81	6	13	0	6	52/88
Ephedra viridis ^p -- (mormon tea)									
2013	40	-	0	100	0	0	100	0	88/146
2016	120	-	0	83	17	0	0	17	66/105
Ericameria nauseosa -- (rubber rabbitbrush)									
2013	-	-	-	-	-	-	-	-	53/86
2016	60	-	0	100	0	0	0	0	63/101

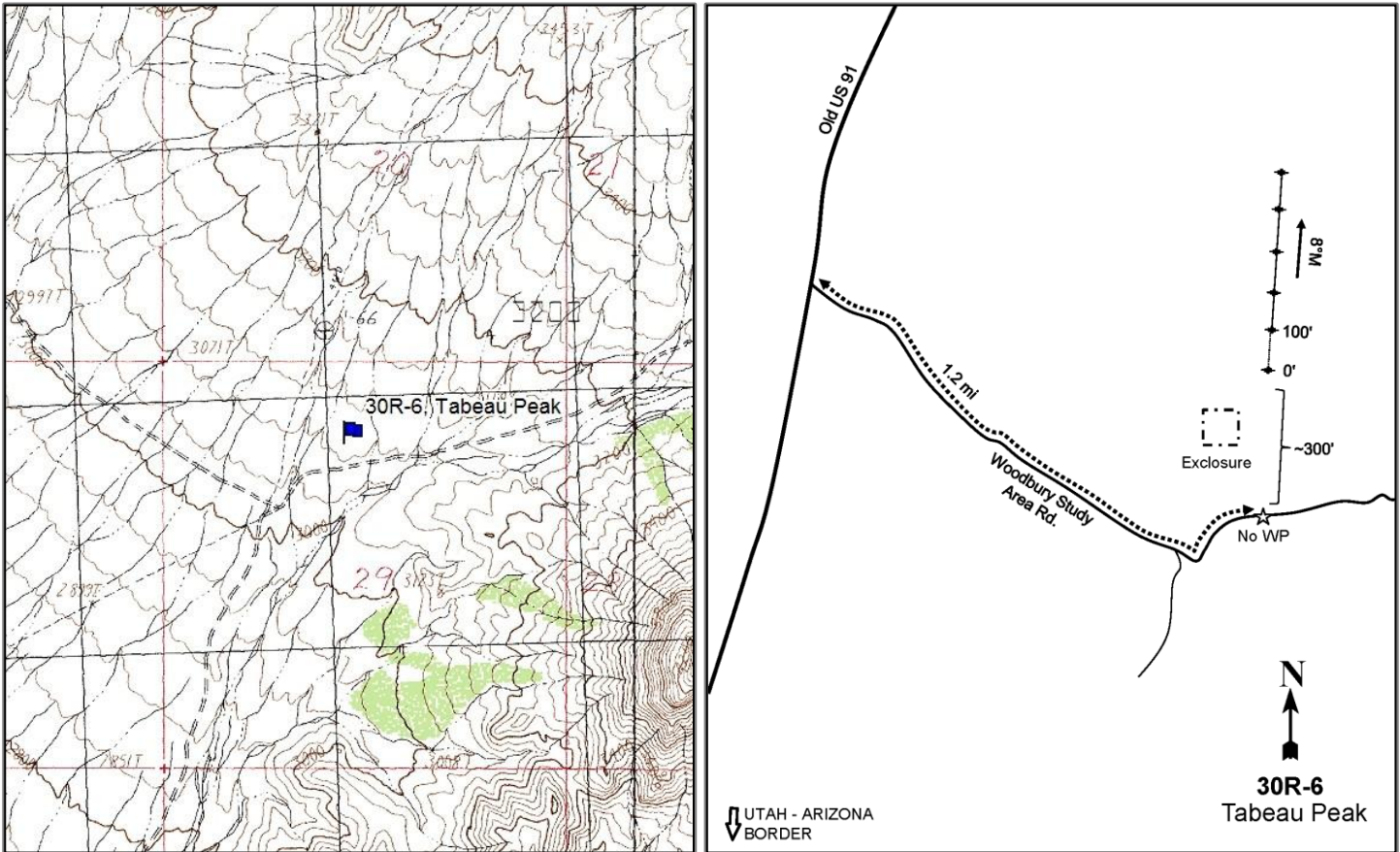
Year	Density		Age Class Distribution			Utilization		Poor Vigor (%)	Average Height Crown (cm)
	Plants Per Acre		Excluding Seedlings			Moderate (%)	Heavy (%)		
	Excluding Seedlings	Seedling	Young (%)	Mature (%)	Decadent (%)				
Gutierrezia sarothrae -- (broom snakeweed)									
2013	800	340	38	60	3	0	0	3	22/26
2016	860	40	12	88	0	0	0	0	28/44
Juniperus osteosperma^t -- (Utah juniper)									
2013	180	-	22	78	0	0	0	11	- / -
2016	-	-	-	-	-	-	-	-	- / -
Linanthus pungens -- (granite prickly phlox)									
2013	40	-	0	100	0	0	0	0	19/12
2016	380	-	0	100	0	0	0	0	20/31
Opuntia -- (pricklypear)									
2013	60	20	0	100	0	0	0	0	8/23
2016	-	-	-	-	-	-	-	-	7/19
Purshia tridentata^P -- (antelope bitterbrush)									
2013	20	-	0	100	0	100	0	0	40/133
2016	80	-	0	100	0	0	25	0	84/148
Yucca -- (yucca)									
2013	-	-	-	-	-	-	-	-	25/47
2016	-	-	-	-	-	-	-	-	62/94

t - Tree Species; p - Preferred Browse; i - Introduced Species

Table 29R-05.14 - Tree Characteristics. Point-quarter tree density, size class distribution, and average diameter.

Year	Density	Seedling (%)	Size Class Distribution				Average Diameter (cm)
	Trees per Acre		1-4'	4-8'	8-12'	>12' (%)	
Juniperus osteosperma (Utah juniper)							
2013	84	-	21	5	21	53	38.2
2016	4	50	50	-	-	-	2.0
Pinus edulis (two-needle pinyon)							
2016	5	-	100	-	-	-	2.0

TABEAU PEAK - STUDY NO. 30R-6



Location Information

USGS 7.5 min Map Info Castle Cliff SE; Township 43S, Range 18W, Section 29
 GPS (0' Stake) NAD 83 UTM ZONE 12, 243004 East 4101015 North

Transect Information

Browse Tag # (0' Stake) Not Available
 Transect Bearing 8° 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 south on Old US 91, turn left (east) onto Woodbury Study Area Road. Continue for 1.2 miles, passing a fork in the road (stay left). There will be an exclosure on the left (north) side of the road: park on the shoulder of the road near this exclosure. The transect is about 300 feet north of the road; there are no stakes or rebar.

Site Information

Land Ownership	Federal
Land Administrator	BLM
Allotment	No data
Elevation	3,084ft (940m)
Aspect	Southwest
Slope	7%
Sample Dates	08/30/2016

Table 30R-06.1 Disturbance History. Recorded history of major disturbances.

Treatment/Disturbance	Name	WRI DB#	Date	Size (acres)
Seeding - Transplant	Desert Tortoise Habitat Restoration in Burned Areas within two National Conservation Areas in SW Utah (Proposed)	3284	January- February 2017	200
Fire - Wildfire	Jarvis	-	June 2006	50702

Wildlife Habitat and Vegetation History

Table 30R-06.3 - Wildlife Seasonal Habitat. UDWR wildlife habitat and seasonality.

Species	Habitat	Season	Brood/Young Rearing
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Table 30R-06.4 - Vegetation History. The dominant vegetation type(s) and phase of woodland succession (Tausch, Miller, Roundy, & Chambers, 2009).

Year	Vegetation Type
2016	Annual Forb

Site Notes

No Notes

Site Potential

1981-2010 Average Annual Precipitation	9 inches
NRCS Ecological Site	Desert Loam (Creosotebush)
NRCS Ecological Site #	R030XY110UT
States and Transitions	No state and transition model is available for this ecological site.

This site was dominated by annual forbs when it was established in 2016, with most of the cover being contributed by woolly plantain (*Plantago patagonica*); the herbaceous understory was otherwise rare and not diverse (Table 30R- 06.7, Table 30R-06.10, Table 30R-06.11). Browse cover was very limited, with the only preferred species being Nevada jointfir (*Ephedra nevadensis*) and winterfat (*Krascheninnikovia lanata*) (Table 30R-06.12, Table 30R-06.13). Herbaceous and shrub diversity and cover are expected to increase following a proposed seeding treatment (Table 30R-06.1).

Trend Summary Tables

Table 30R-06.6 - Shrub/Tree Summary. Average modified Daubenmire quadrat and line intercept cover by year for shrubs/trees.

Year	Quadrat Cover (%)			Line-intercept Cover (%)		
	Preferred Shrub	Other Shrub	Tree	Preferred Shrub	Other Shrub	Tree
2016	0.3	0.8	-	0.7	0.5	-

Table 30R-06.7 - Herbaceous Summary. Nested frequency and average modified Daubenmire quadrat cover by year for herbaceous functional groups.

Year	Nested Frequency				Quadrat Cover (%)			
	Annual Grass	Perennial Grass	Annual/Biennial Forb	Perennial Forb	Annual Grass	Perennial Grass	Annual/Biennial Forb	Perennial Forb
2016	148	5	459	64	2.9	0.0	13.5	0.8

Table 30R-06.8 - Basic Ground Cover. Average modified Daubenmire quadrat cover by year for basic ground cover types.

Year	Cover Type (%)					
	Bare Ground	Cryptograms	Litter	Pavement	Rock	Vegetation
2016	24.4	-	7.8	48.4	8.4	18.3

Table 30R-06.9 - Pellet Group Data. Quadrat frequency and pellet group transect data for animal pellets. Rabbit pellet groups are not sampled in the pellet group transect.

Year	Rabbit
	Quadrat Frequency
2016	4
Year	Days Use Per Acre (ha)
2016	-

Table 30R-06.10 - Grass Species. Nested frequency and modified Daubenmire average cover by year.

GRASS SPECIES	Bromus arvensis ^{ai} (field brome)	Bromus rubens ^{ai} (red brome)	Dasychloa pulchella (low woollygrass)	Schismus barbatus ^{ai} (common Mediterranean grass)
year	Nested Frequency			
2016	1	2	5	147
year	Average Cover (%)			
2016	0.0	0.0	0.0	2.9

a - Annual; n - Noxious Weed; i - Introduced Species

Table 30R-06.11 - Forb Species. Nested frequency and modified Daubenmire average cover by year.

FORB SPECIES	Baileya multiradiata (desert marigold)	Chamaesyce (sandmat)	Lygodesmia (skeletonplant)	Penstemon pachyphyllus (thickleaf beardtongue)	Plantago patagonica ^a (woolly plantain)
year	Nested Frequency				
2016	49	13	1	5	459
year	Average Cover (%)				
2016	0.6	0.1	0.0	0.1	13.5

a - Annual/Biennial; n - Noxious Weed; i - Introduced Species

Table 30R-06.12 - Shrub and Tree Species. Average modified Daubenmire quadrat and line intercept cover by year.

SHRUB SPECIES	Ambrosia dumosa (burrobush)	Ephedra nevadensis ^P (Nevada jointfir)	Larrea tridentata (creosote bush)	Tetradymia canescens (spineless horsebrush)
year	Line Intercept Cover (%)			
2016	0.2	0.7	0.3	-
year	Quadrat Cover (%)			
2016	0.7	0.3	0.0	0.1

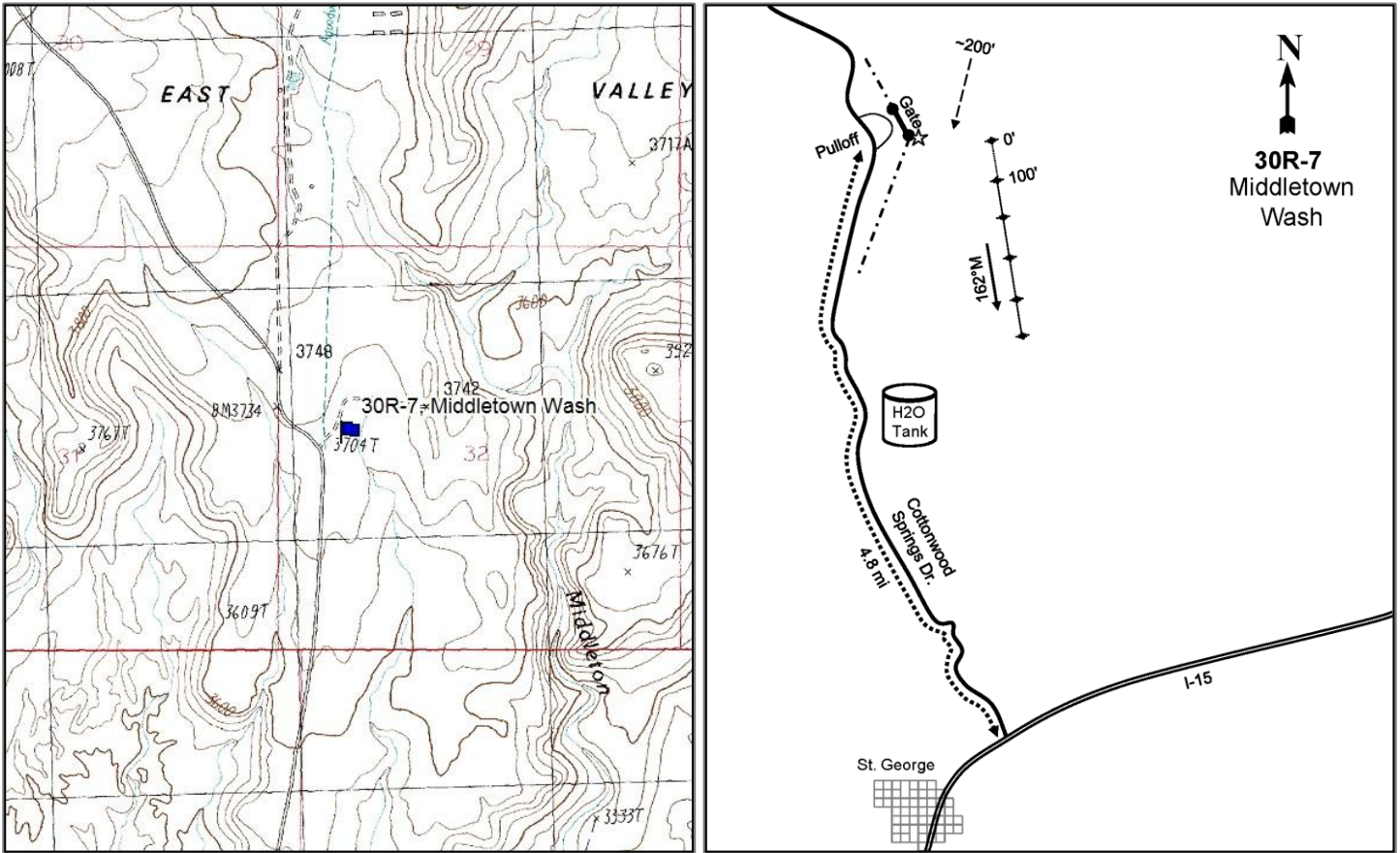
t - Tree Species; p - Preferred Browse; i - Introduced

Table 30R-06.13 - Shrub/Tree Characteristics. Population characteristics of shrub/tree species populations including density reproduction (seedlings), age distribution, utilization, vigor and average size (height/crown) of plants.

Year	Density		Age Class Distribution			Utilization		Poor Vigor (%)	Average Height Crown (cm)
	Plants Per Acre		Excluding Seedlings			Moderate (%)	Heavy (%)		
	Excluding Seedlings	Seedling	Young (%)	Mature (%)	Decadent (%)				
Ambrosia dumosa -- (burrobush)									
2016	180	-	44	22	33	0	0	11	38/93
Cylindropuntia -- (cholla)									
2016	-	-	-	-	-	-	-	-	41/43
Ephedra nevadensis ^P -- (Nevada jointfir)									
2016	80	-	25	75	0	25	0	0	48/94
Gutierrezia microcephala -- (threadleaf snakeweed)									
2016	-	-	-	-	-	-	-	-	32/48
Krameria -- (ratany)									
2016	20	-	0	100	0	0	0	100	39/71
Krascheninnikovia lanata ^P -- (winterfat)									
2016	-	-	-	-	-	-	-	-	46/94
Larrea tridentata -- (creosote bush)									
2016	-	-	-	-	-	-	-	-	101/167
Opuntia -- (pricklypear)									
2016	-	-	-	-	-	-	-	-	21/69
Thamnosma montana -- (turpentine broom)									
2016	-	-	-	-	-	-	-	-	36/83

t - Tree Species; p - Preferred Browse; i - Introduced Species

MIDDLETOWN WASH - STUDY No. 30R-7



Location Information

USGS 7.5 min Map Info Washington SW; Township 41S, Range 15W, Section 32
 GPS (0' Stake) NAD 83 UTM ZONE 12, 272128 East 4117576 North

Transect Information

Browse Tag # (0' Stake) 582
 Transect Bearing 162° 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

Heading southwest on East Red Hills Parkway (parallel to I-15) in Middletown, turn right (north) onto Cottonwood Springs Drive. Continue for 4.8 miles (passing a water tank on the east side of the road) to a pulloff next to a gate. Park in the pulloff and go through the gate (you may need to go over it). The 0-foot stake is about 200 feet southeast of the gate and is marked with browse tag #582.

Site Information

Land Ownership	Federal
Land Administrator	BLM
Allotment	No data
Elevation	3,701ft (1,128m)
Aspect	Northwest
Slope	2%
Sample Dates	08/30/2016

Table 30R-07.1 Disturbance History. Recorded history of major disturbances.

Treatment/Disturbance	Name	WRI DB#	Date	Size (acres)
Seeding - Transplant	Desert Tortoise Habitat Restoration in Burned Areas within two National Conservation Areas in SW Utah (Proposed)	3284	November 2016	200
Fire - Wildfire	Plateau	-	June 2005	2986
Fire - Wildfire	Mill Creek	-	July 2005	7888

Wildlife Habitat and Vegetation History

Table 30R-07.3 - Wildlife Seasonal Habitat. UDWR wildlife habitat and seasonality.

Species	Habitat	Season	Brood/Young Rearing
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Table 30R-07.4 - Vegetation History. The dominant vegetation type(s) and phase of woodland succession (Tausch, Miller, Roundy, & Chambers, 2009).

Year	Vegetation Type
2016	Annual Grass-Forb

Site Notes

No Notes

Site Potential

1981-2010 Average Annual Precipitation	10 inches
NRCS Ecological Site	Semidesert Shallow Hardpan (Blackbrush)
NRCS Ecological Site #	R029XY220UT
States and Transitions	No state and transition model is available for this ecological site.

This study site was established in 2016 and was dominated by annual grasses -- mainly the introduced species cheatgrass (*Bromus tectorum*) -- and forbs, namely prickly Russian thistle (*Salsola tragus*) (Table 30R-07.7, Table 30R-07.10, Table 30R-07.11). Browse was extremely limited, with only Nevada jointfir (*Ephedra nevadensis*) and greasewood (*Sarcobatus vermiculatus*) contributing any cover (Table 30R-07.6, Table 30R-07.12). A seeding (transplant) treatment (Table 30R-07.1) is proposed for this site, and it is expected that the browse and herbaceous components will increase and diversify as a result.

Trend Summary Tables

Table 30R-07.6 - Shrub/Tree Summary. Average modified Daubenmire quadrat and line intercept cover by year for shrubs/trees.

Year	Quadrat Cover (%)			Line-intercept Cover (%)		
	Preferred Shrub	Other Shrub	Tree	Preferred Shrub	Other Shrub	Tree
2016	0.0	0.0	-	0.3	-	-

Table 30R-07.7 - Herbaceous Summary. Nested frequency and average modified Daubenmire quadrat cover by year for herbaceous functional groups.

Year	Nested Frequency				Quadrat Cover (%)			
	Annual Grass	Perennial Grass	Annual/Biennial Forb	Perennial Forb	Annual Grass	Perennial Grass	Annual/Biennial Forb	Perennial Forb
2016	408	-	384	2	19.3	-	16.9	0.0

Table 30R-07.8 - Basic Ground Cover. Average modified Daubenmire quadrat cover by year for basic ground cover types.

Year	Cover Type (%)					
	Bare Ground	Cryptograms	Litter	Pavement	Rock	Vegetation
2016	11.1	-	46.5	20.4	1.8	33.5

Table 30R-07.9 - Pellet Group Data. Quadrat frequency and pellet group transect data for animal pellets. Rabbit pellet groups are not sampled in the pellet group transect.

Year	Mule Deer	Rabbit
	Quadrat Frequency	
2016	11	1
Year	Days Use Per Acre (ha)	
2016	12.1 (29.8)	

Table 30R-07.10 - Grass Species. Nested frequency and modified Daubenmire average cover by year.

GRASS SPECIES				
Bromus arvensis ^{ai} (field brome)				
Bromus rubens ^{ai} (red brome)				
Bromus tectorum ^{ai} (cheatgrass)				
Schismus barbatus ^{ai} (common Mediterranean grass)				
year	Nested Frequency			
2016	144	28	371	15
year	Average Cover (%)			
2016	2.2	0.2	16.9	0.1

a - Annual; n - Noxious Weed; i - Introduced Species

Table 30R-07.11 - Forb Species. Nested frequency and modified Daubenmire average cover by year.

FORB SPECIES					
Chamaesyce (sandmat)					
Descurainia sophia ^{ai} (herb sophia)					
Erodium cicutarium ^{ai} (redstem stork's bill)					
Salsola tragus ^{ai} (prickly Russian thistle)					
Sisymbrium altissimum ^{ai} (tall tumbledmustard)					
year	Nested Frequency				
2016	2	32	121	368	1
year	Average Cover (%)				
2016	0.0	0.7	2.6	13.4	0.2

a - Annual/Biennial; n - Noxious Weed; i - Introduced Species

Table 30R-07.12 - Shrub and Tree Species. Average modified Daubenmire quadrat and line intercept cover by year.

SHRUB SPECIES	Line Intercept Cover (%)	
	<i>Ephedra nevadensis</i> ^p (Nevada jointfir)	0.3
<i>Sarcobatus vermiculatus</i> (greasewood)	0.0	0.0

t - Tree Species; p - Preferred Browse; i - Introduced

Table 30R-07.13 - Shrub/Tree Characteristics. Population characteristics of shrub/tree species populations including density reproduction (seedlings), age distribution, utilization, vigor and average size (height/crown) of plants.

Year	Density		Age Class Distribution			Utilization		Poor Vigor (%)	Average Height Crown (cm)
	Plants Per Acre		Excluding Seedlings			Moderate (%)	Heavy (%)		
	Excluding Seedlings	Seedling	Young (%)	Mature (%)	Decadent (%)				
<i>Ambrosia dumosa</i> -- (burrobush)									
2016	-	-	-	-	-	-	-	-	42/61
<i>Ephedra nevadensis</i> ^p -- (Nevada jointfir)									
2016	100	-	60	40	0	0	0	0	73/79
<i>Gutierrezia microcephala</i> -- (threadleaf snakeweed)									
2016	-	-	-	-	-	-	-	-	37/47
<i>Opuntia</i> -- (pricklypear)									
2016	-	-	-	-	-	-	-	-	29/101
<i>Sarcobatus vermiculatus</i> -- (greasewood)									
2016	40	-	50	50	0	50	0	0	80/142
<i>Yucca</i> -- (yucca)									
2016	-	-	-	-	-	-	-	-	68/103

t - Tree Species; p - Preferred Browse; i - Introduced Species

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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.
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).

Vegetation Type Code	Vegetation Community Type Name*	Description
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.

¹Phase of woodland succession