

UTAH WATERSHED RESTORATION INITIATIVE VEGETATION MONITORING 2017



PUBLICATION NUMBER 18-07
REPORT FOR FEDERAL AID PROJECT W-82-R-62

STATE OF UTAH
DEPARTMENT OF NATURAL RESOURCES
DIVISION OF WILDLIFE RESOURCES

Utah Watershed Restoration Initiative Vegetation Monitoring 2017

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Western Mountain Aster (*Symphotrichum spathulatum*) Jason Cox (2014)

Performance Report for Federal Aid Project W-82-R-62

Publication No. 18-07

UTAH DEPARTMENT OF NATURAL RESOURCES
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Reports for study sites, with accompanying photographs, are available online at <http://wildlife.utah.gov/range-trend.html>.

Program Narrative

State: UTAH

Project Number: W-82-R-62

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.

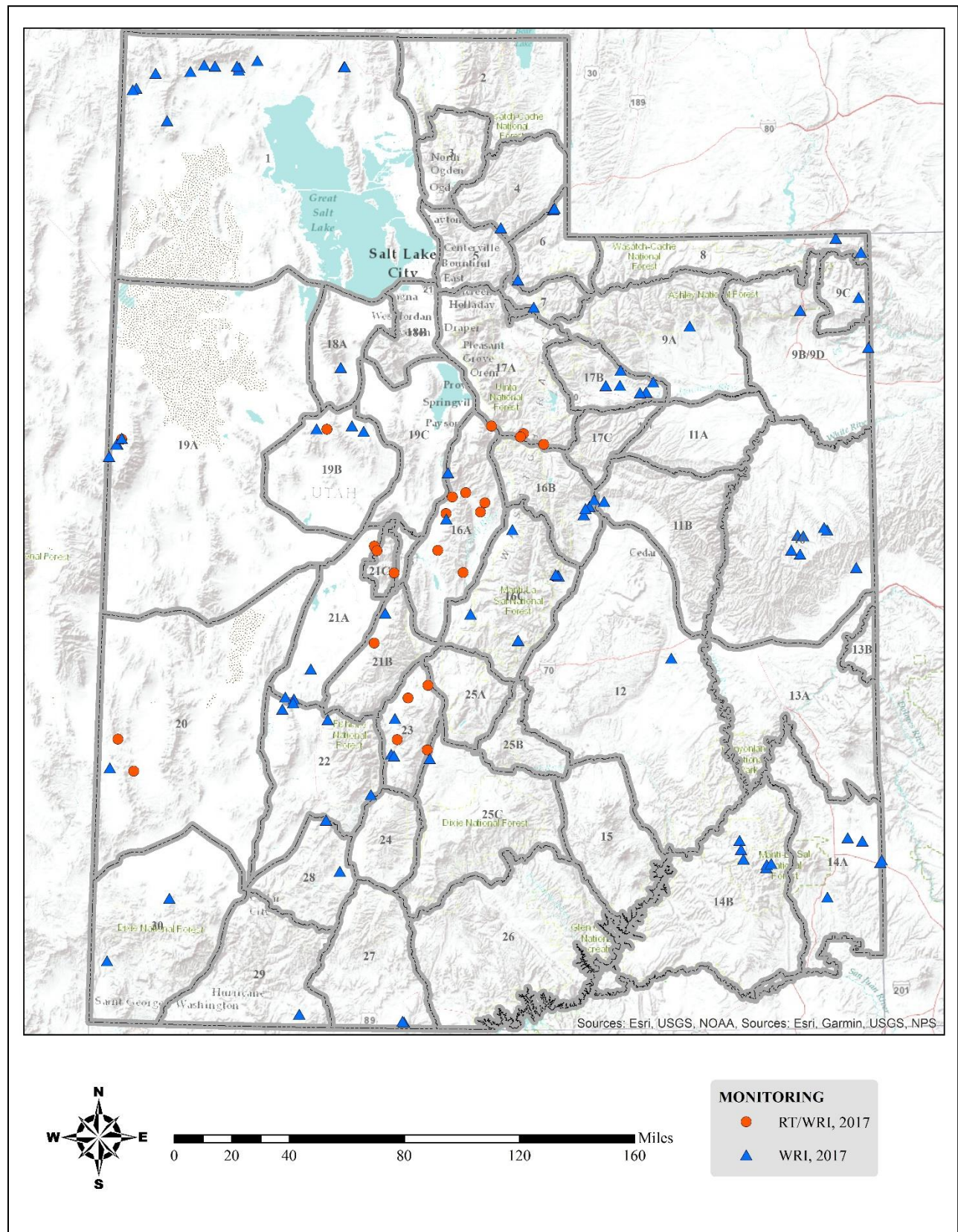
Expected Results or Benefits: Range trend studies in each region will be reread every five years, and vegetation condition and trend assessments will be made for key areas. DWR biologists, land management personnel from the USFS and BLM, and private landowners will use the range trend database to evaluate 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 2017 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 2017



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.

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).

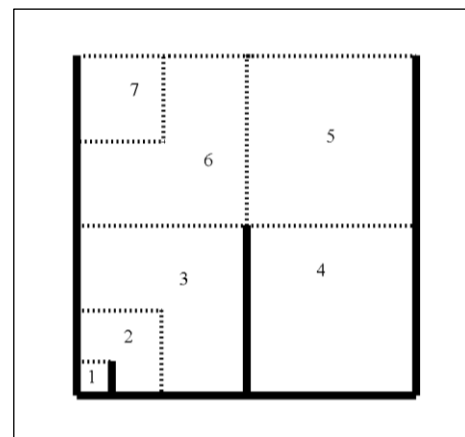


Figure 1 Cover classes of the 1/4 m² sampling quadrat

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).

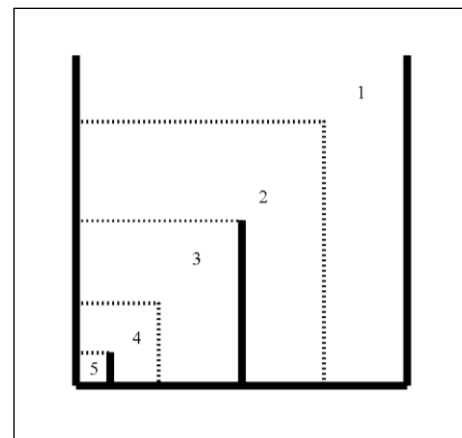


Figure 2 Nested frequency sub-quadrats of the 1/4 m² sampling quadrat.

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 <i>Seedling</i> 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 <i>Young</i> 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 <i>Mature</i> 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 <i>Decadent</i> 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 an 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

it's 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 octoflora ^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 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 (narrowleaf 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	Line Intercept Cover (%)			
	year	1995	2000	2005
Artemisia tridentata ssp. wyomingensis ^p (Wyoming big sagebrush)	-	-	-	-
Chrysothamnus viscidiflorus ssp. viscidiflorus (yellow rabbitbrush)	20.1	0.8	-	-
Linanthus pungens (granite prickly phlox)	17.6	0.4	-	0.2
Opuntia (pricklypear)	-	-	-	-

year	Quadrat Cover (%)			
	1995	2000	2005	2010
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^p -- (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

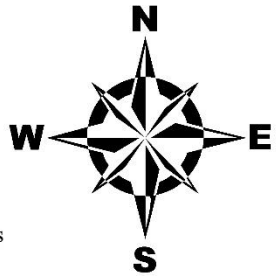
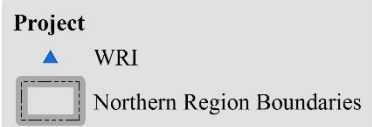
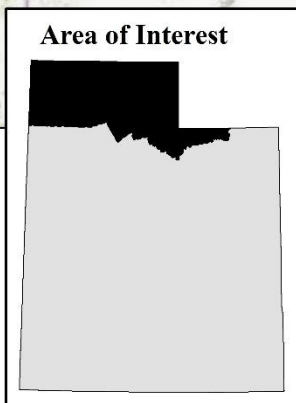
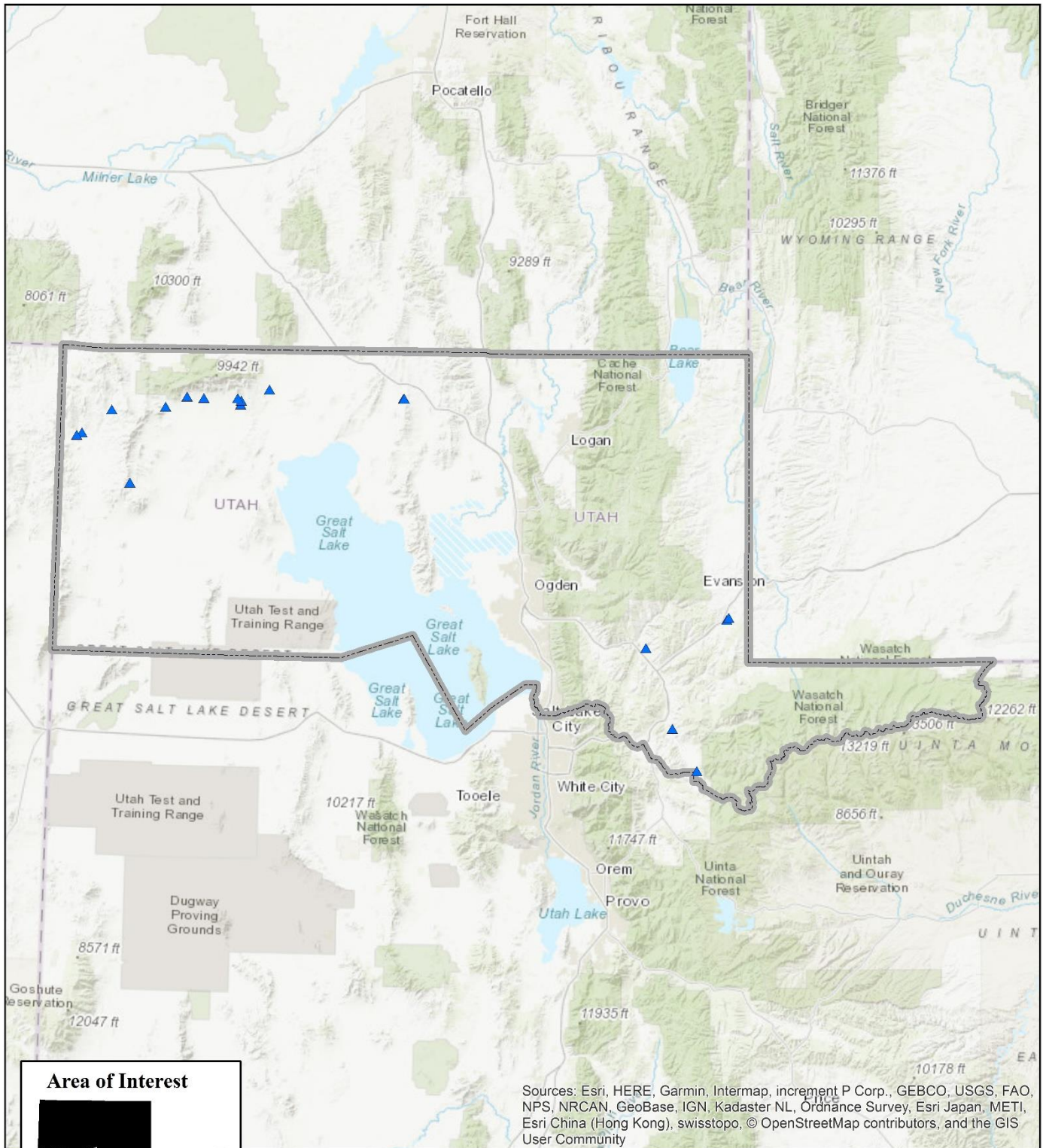
Pre-1992 Data: Data collected before July 19, 1992 has been excluded from the individual site summaries due to differences in sampling techniques and changes in sample size and area. This pre-1992 data can be found in the Utah Big Game Range Trend Studies 1982-1992 report. The following explanations 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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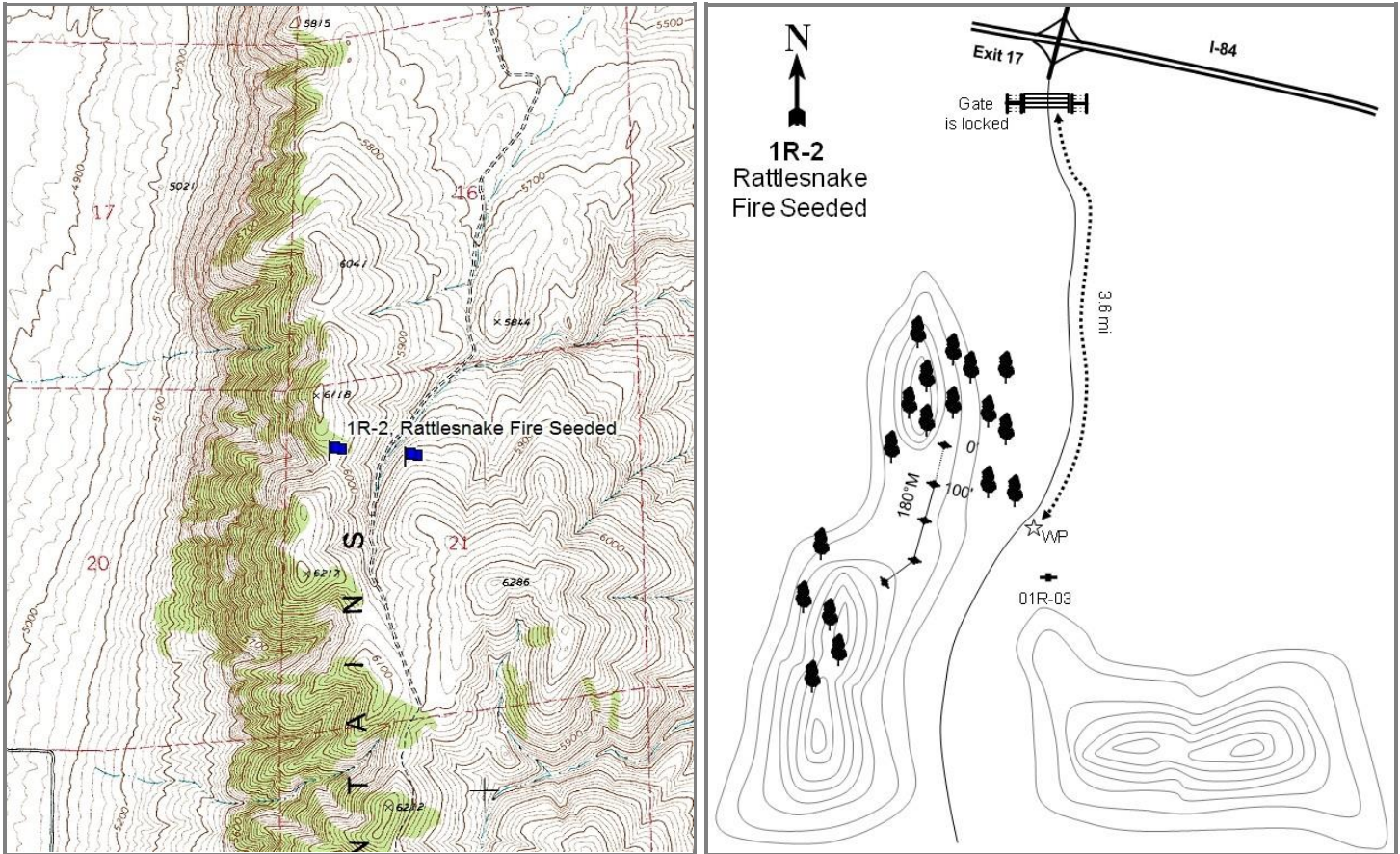
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NORTHERN REGION



RATTLESNAKE FIRE SEEDED - STUDY NO. 01R-2



Location Information

USGS 7.5 min Map Info	Bulls Pass NE; Township 13N, Range 6W, Section 21
GPS (0' Stake)	NAD 83 UTM ZONE 12, 371286 East 4633943 North

Transect Information

Browse Tag # (0' Stake)	30
Transect Bearing	180° magnetic
Length	400ft
Belt Placement	Line 1 (11ft & 95ft), Line 2 (34ft), Line 3 (59ft), Line 4 (71ft)
Belt Marker Placement	Standard

Directions to Site

Take exit 17 off of I-84 and turn south, passing through a gate. Travel south for 3.6 miles to a witness post on the right-hand (east) side of the road. The baseline is to the right (west) of the witness post and is on top of the saddle right outside of a clump of juniper trees. The 0-foot post is marked with browse tag #30.

Site Information

Land Ownership	Private
Land Administrator	Private
Allotment	No data
Elevation	6,010ft (1,832m)
Aspect	West
Slope	20-30%
Sample Dates	06/22/2004, 08/08/2007, 07/27/2012, 07/19/2017

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

Treatment/Disturbance	Name	WRI DB#	Date	Size (acres)
Fire - Wildfire	Rattle Snake Fire	PDB	2003	-
Seeding - Rangeland Drill	Rattle Snake Fire	PDB	December 2003	-

Table 01R-02.2 Seed Mix. List of known seeded plant species and rates (if available).

Mix Name			Application Type	Application Date	Acres
Rattle Snake Fire Mix 1			Drill	Dec 2003	900
Type	Species	Common Name	Cultivar/Source ID	Bulk lbs/acre	PLS lbs/acre
G	Agropyron cristatum	Crested Wheatgrass	Douglas	0.50	0.46
G	Agropyron cristatum	Crested Wheatgrass	Hycrest	1.72	1.61
G	Dactylis glomerata	Orchardgrass	Paiute	2.22	1.91
G	Elymus wawawaiensis	Snake River Wheatgrass	Secar	0.28	0.24
G	Festuca ovina	Sheep Fescue		0.58	0.55
G	Pascopyrum smithii	Western Wheatgrass	Arriba	2.22	1.96
G	Psathyrostachys juncea	Russian Wildrye	Bozoisky	0.39	0.35
G	Pseudoroegneria spicata	Bluebunch Wheatgrass	Goldar	1.94	1.80
F	Achillea millefolium	Western Yarrow		0.33	0.28
F	Medicago sativa	Alfalfa	Ladak+	2.22	2.11
F	Onobrychis viciifolia	Sainfoin		2.22	2.13
F	Sanguisorba minor	Small Burnet	Delar	2.78	2.64

Wildlife Habitat and Vegetation History**Table 01R-02.3 - Wildlife Seasonal Habitat.** UDWR wildlife habitat and seasonality.

Species	Habitat	Season
Deer	crucial	summer
Pronghorn	substantial	summer

Table 01R-02.4 - 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	Phase I
2007	Perennial Grass	Phase I
2012	Perennial Grass	Phase I
2017	Annual-Perennial Grass/Mountain Big Sagebrush/Yellow Rabbitbrush	Phase I

Site Notes

The comparison study site, Rattlesnake Fire Unseeded (1R-3), was established on an untreated ridge 1,000 feet to the east.

Soils**Table 01R-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
Loam	7.0	47.2	38.6	14.2	4.1	13.5	291.2	0.6	06/22/2004

Site Potential

1981 - 2010 Average Annual Precipitation 16 inches
 NRCS Ecological Site Upland Loam (Mountain Big Sagebrush)
 NRCS Ecological Site # 028AY310UT
 States and Transitions No state and transition model is available for this ecological site.

When established in 2004, the site was in a perennial grass state with bluebunch wheatgrass (*Pseudoroegneria spicata*) and Sandberg bluegrass (*Poa secunda*) being dominant. The annual grass cheatgrass (*Bromus tectorum*) has fluctuated over the sample years and was sampled in high abundance in 2017 (Table 01R-02.7, Table 01R-02.10). Mountain big sagebrush (*Artemisia tridentata* ssp. *vaseyana*) and yellow rabbitbrush (*Chrysothamnus viscidiflorus* ssp. *viscidiflorus* var. *viscidiflorus*) have increased in abundance over the study period and are becoming the dominant component of the site (Table 01R-02.11); with the increased abundance of shrubs, the site is transitioning to a mixed shrub and perennial grass state (Table 01R-02.6). The resistance and resilience of the community may be at risk, as is indicated by the substantial decrease in perennial grass cover and large increase of cheatgrass cover in 2017 (Table 01R-02.7). These vegetation changes may also indicate changes in management.

Trend Summary Tables

Table 01R-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
2004	0.0	2.2	-	-	2.4	-
2007	0.3	3.2	-	0.2	5.0	-
2012	1.3	3.7	-	1.4	6.8	-
2017	3.4	5.1	-	5.2	6.3	-

Table 01R-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
2004	86	323	321	253	0.8	12.8	7.9	4.2
2007	169	363	396	211	4.2	31.4	5.5	4.8
2012	93	408	349	112	0.5	33.4	2.8	2.8
2017	297	376	461	134	11.2	19.2	15.0	2.5

Table 01R-02.8 - 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	43.2	0.1	10.4	18.5	6.2	29.2
2007	22.5	0.1	25.3	10.6	6.6	43.0
2012	12.1	0.7	52.7	8.2	6.9	45.5
2017	16.5	0.9	33.6	7.8	7.2	56.3

Table 01R-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	Coyote	Mule Deer	Rabbit
	Quadrat Frequency			
2004	-	-	5	1
2007	-	-	1	8
2012	-	-	-	16
2017	2	-	-	13
Year	Days Use Per Acre (ha)			
2004	-	-	15.4 (38.1)	-
2007	-	-	0.7 (1.7)	-
2012	-	-	1.3 (3.3)	-
2017	26.2 (64.6)	8.7 (21.5)*	2.7 (6.6)	-

*Pellets per acre (ha)

Table 01R-02.10 - 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)	Dactylis glomerata ⁱ (orchardgrass)	Poa bulbosa ⁱ (bulbous bluegrass)	Poa fendleriana (muttongrass)	Poa secunda (Sandberg bluegrass)	Pseudoroegneria spicata (bluebunch wheatgrass)
year	Nested Frequency							
2004	-	-	86	5	-	21	188	254
2007	1	-	169	-	-	2	283	270
2012	4	-	93	-	-	-	348	290
2017	-	1	297	5	1	-	343	225
year	Average Cover (%)							
2004	-	-	0.8	0.0	-	0.4	4.0	8.4
2007	0.0	-	4.2	-	-	0.0	10.2	21.2
2012	0.2	-	0.5	-	-	-	13.2	20.1
2017	-	0.0	11.2	0.0	0.0	-	15.7	3.4

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

Table 01R-02.11 - 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)	Arabis (rockcress)	Astragalus (milkvetch)	Astragalus convallarius (lesser rushy milkvetch)	Astragalus utahensis (Utah milkvetch)	Balsamorhiza sagittata (arrow/leaf balsamroot)	Borago ^{ai} (borage)	Calochortus nuttallii (sego lily)	Camelina microcarpa ^{ai} (littledod false flax)	Ceratocephala testiculata ^{ai} (curvseed butterwort)	Cirsium (thistle)	Collinsia parviflora ^a (maiden blue eyed Mary)	Collomia linearis ^a (tiny trumpet)	Comandra umbellata (bastard toadflax)	
year	Nested Frequency																	
2004	5	83	115	13	-	16	11	3	0	6	26	-	-	8	3	39	-	
2007	9	111	-	204	5	1	16	-	-	-	-	2	33	7	234	70	11	
2012	1	16	4	293	-	-	8	-	1	-	-	3	1	9	125	5	1	
2017	5	1	19	442	1	-	24	-	-	-	-	-	10	4	61	90	5	
year	Average Cover (%)																	
2004	0.1	0.5	0.5	0.0	-	0.1	0.1	0.0	0.0	0.2	0.1	-	-	0.2	0.0	0.1	-	
2007	0.2	0.7	-	0.8	0.0	0.0	0.2	-	-	-	-	0.0	0.1	0.2	1.0	0.3	0.1	
2012	0.0	0.0	0.0	1.7	-	-	0.0	-	0.0	-	-	0.0	0.0	0.0	0.2	0.0	0.0	
2017	0.0	0.0	0.1	10.9	0.0	-	0.5	-	-	-	-	-	0.0	0.1	0.1	0.4	0.1	

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

FORB SPECIES	Crepis acuminata (tapertip hawkbeard)	Cryptantha ^a (annual cryptantha)	Cymopterus (springparsley)	Descurainia pinnata ^a (western tansymustard)	Epilobium brachycarpum ^a (tall annual willowherb)	Erodium cicutarium ^{ai} (redstem stork's bill)	Hackelia patens (spotted stickseed)	Hedysarum boreale (Utah sweetvetch)	Helianthus annuus ^a (common sunflower)	Lactuca serriola ^{ai} (prickly lettuce)	Lappula occidentalis ^a (flatspine stickseed)	Lithophragma tenellum (slender woodland-star)	Lomatium (desertparsley)	Lupinus (lupine)	Lupinus argenteus (silvery lupine)	Machaeranthera canescens (hoary tansyaster)	Mentzelia ^a (blazingstar)	
year	Nested Frequency																	
2004	-	-	44	9	-	-	-	3	0	8	11	-	0	10	28	-	2	
2007	2	-	34	128	-	-	-	-	-	5	35	-	-	18	38	-	-	
2012	5	-	11	-	7	-	-	-	-	-	-	4	-	-	25	3	-	
2017	-	2	3	16	25	43	1	-	-	194	3	-	-	0	31	2	-	
year	Average Cover (%)																	
2004	-	-	0.6	0.1	-	-	-	0.0	0.1	0.1	0.2	-	0.0	0.5	0.7	-	0.0	
2007	0.0	-	0.1	0.8	-	-	-	-	-	0.1	0.1	-	-	0.1	1.5	-	-	
2012	0.0	-	0.0	-	0.0	-	-	-	-	-	-	0.0	-	-	0.6	0.0	-	
2017	-	0.0	0.0	0.1	0.2	0.8	0.1	-	-	2.0	0.1	-	-	0.0	0.9	0.0	-	

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

FORB SPECIES	Microsteris gracilis ^a (slender phlox)	Phlox austromontana (mountain phlox)	Phlox longifolia (longleaf phlox)	Polygonum douglasii ^a (Douglas' knotweed)	Sanguisorba minor ⁱ (small burnet)	Silene antirrhina ^a (sleepy silene)	Sisymbrium altissimum ^{ai} (tall tumbleweed)	Stenotus acaulis (stemless mock goldenweed)	Townsendia (Townsend daisy)	Tragopogon dubius ^{ai} (yellow salsify)	Veronica biloba ^{ai} (two-lobed speedwell)	Vicia americana (American vetch)
year	Nested Frequency											
2004	8	24	19	2	3	-	26	-	-	-	277	-
2007	178	28	48	16	-	-	38	3	2	6	214	5
2012	69	36	25	13	-	-	11	-	-	5	91	-
2017	29	46	27	-	-	4	2	3	2	14	76	-
year	Average Cover (%)											
2004	0.0	0.6	0.1	0.0	0.0	-	3.2	-	-	-	3.8	-
2007	0.7	0.9	0.4	0.0	-	-	0.5	0.2	0.0	0.1	1.1	0.0
2012	0.2	1.5	0.4	0.0	-	-	0.1	-	-	0.0	0.5	-
2017	0.1	0.6	0.1	-	-	0.0	0.0	0.0	0.0	0.1	0.3	-

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

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

SHRUB SPECIES	Line Intercept Cover (%)				
	year	2004	2007	2012	2017
<i>Artemisia tridentata</i> ssp. <i>vaseyana</i> ^p (mountain big sagebrush)	-	2.4	-	-	-
<i>Chrysothamnus viscidiflorus</i> ssp. <i>viscidiflorus</i> var. <i>viscidiflorus</i> (yellow rabbitbrush)	0.2	4.4	0.2	0.2	0.2
<i>Ericameria nauseosa</i> (rubber rabbitbrush)	1.4	6.3	-	0.5	-
<i>Gutierrezia sarothrae</i> (broom snakeweed)	5.2	5.6	0.7	-	-
<i>Symphoricarpos oreophilus</i> (mountain snowberry)	-	-	-	-	-

SHRUB SPECIES	Quadrat Cover (%)				
	year	2004	2007	2012	2017
<i>Artemisia tridentata</i> ssp. <i>vaseyana</i> ^p (mountain big sagebrush)	0.0	2.2	-	-	-
<i>Chrysothamnus viscidiflorus</i> ssp. <i>viscidiflorus</i> var. <i>viscidiflorus</i> (yellow rabbitbrush)	0.3	2.2	0.0	1.0	0.0
<i>Ericameria nauseosa</i> (rubber rabbitbrush)	1.3	3.3	-	0.4	-
<i>Gutierrezia sarothrae</i> (broom snakeweed)	3.4	4.9	0.1	0.0	-
<i>Symphoricarpos oreophilus</i> (mountain snowberry)	-	-	-	-	-

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

Table 01R-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 utahensis^p -- (Utah serviceberry)									
2004	-	-	-	-	-	-	-	-	-/-
2007	-	-	-	-	-	-	-	-	-/-
2012	-	-	-	-	-	-	-	-	36/58
2017	-	-	-	-	-	-	-	-	53/84
Artemisia nova^p -- (black sagebrush)									
2004	-	-	-	-	-	-	-	-	-/-
2007	20	-	0	100	0	0	0	0	34/79
2012	20	-	0	100	0	0	100	0	37/85
2017	20	-	0	100	0	0	0	0	27/83
Artemisia tridentata ssp. vaseyana^p -- (mountain big sagebrush)									
2004	80	360	75	0	25	0	25	0	22/49
2007	240	-	75	25	0	17	0	0	48/70
2012	240	80	0	100	0	17	0	50	47/65
2017	500	460	4	96	0	0	0	0	62/93
Chrysothamnus viscidiflorus ssp. viscidiflorus var. viscidiflorus -- (yellow rabbitbrush)									
2004	3540	300	5	95	1	0	0	0	26/27
2007	2700	-	4	78	19	1	2	15	29/42
2012	2840	-	1	75	25	9	1	61	33/42
2017	2340	-	2	83	15	4	0	10	40/60
Eriogonum heracleoides -- (parsnipflower buckwheat)									
2004	-	-	-	-	-	-	-	-	-/-
2007	-	-	-	-	-	-	-	-	-/-
2012	-	-	-	-	-	-	-	-	14/66
2017	-	-	-	-	-	-	-	-	-/-
Ericameria nauseosa -- (rubber rabbitbrush)									
2004	-	-	-	-	-	-	-	-	-/-
2007	20	-	0	100	0	0	0	0	42/43
2012	20	-	100	0	0	100	0	0	50/61
2017	40	-	0	100	0	0	0	0	66/87

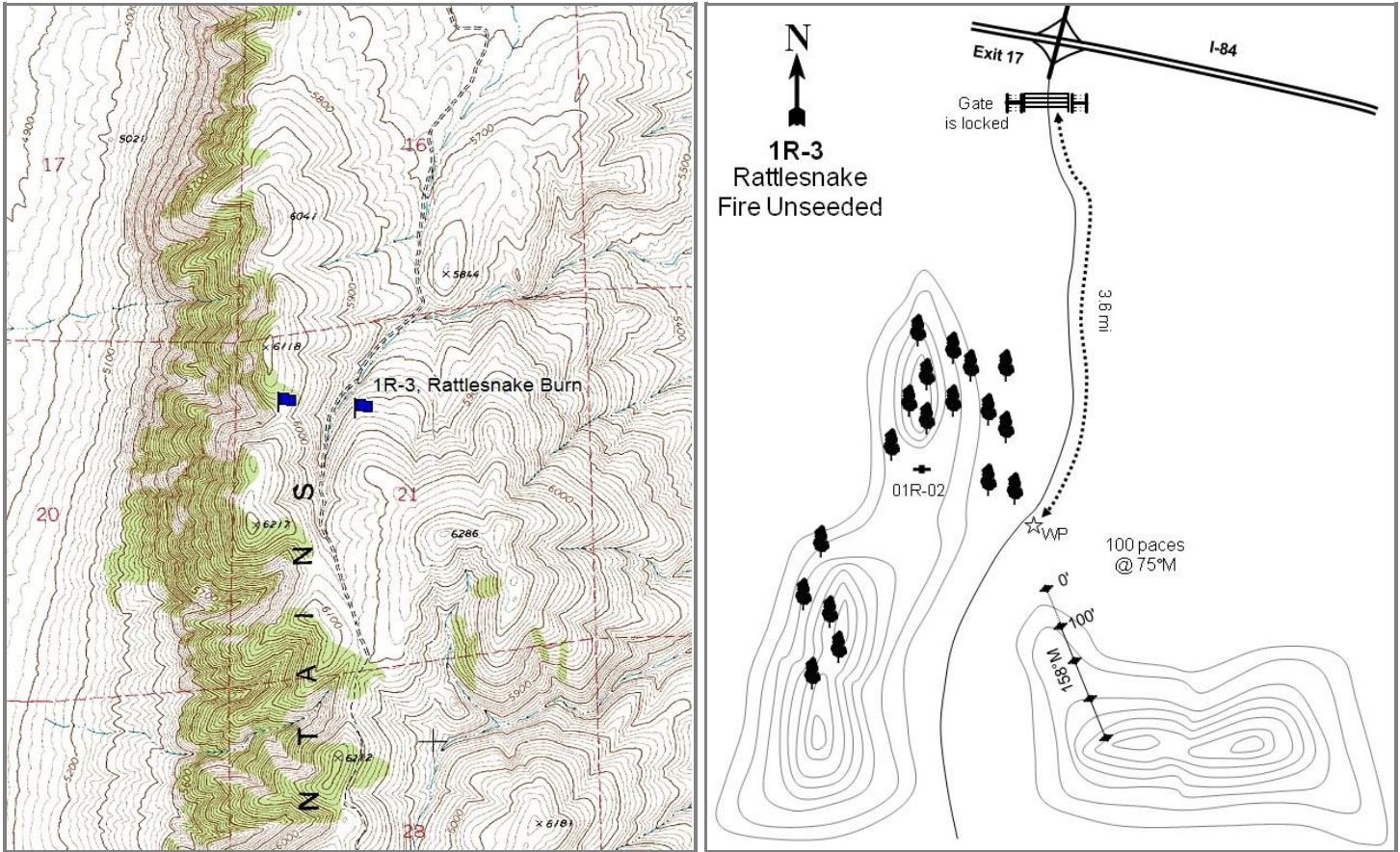
Year	Density		Age Class Distribution			Utilization		Poor Vigor (%)	Average Height Crown (cm)
	Plants Per Acre		Excluding Seedlings			Moderate (%)	Heavy (%)		
	Excluding Seedlings	Seedling	Young (%)	Mature (%)	Decadent (%)				
Gutierrezia sarothrae -- (broom snakeweed)									
2004	-	-	-	-	-	-	-	-	-/-
2007	1120	-	14	55	30	0	0	30	17/27
2012	780	20	23	64	13	0	0	13	20/26
2017	460	-	65	35	0	0	0	0	22/22
Symphoricarpos oreophilus -- (mountain snowberry)									
2004	-	-	-	-	-	-	-	-	26/53
2007	20	-	0	100	0	100	0	0	52/98
2012	-	-	-	-	-	-	-	-	35/78
2017	-	-	-	-	-	-	-	-	37/79
Tetradymia canescens -- (spineless horsebrush)									
2004	-	-	-	-	-	-	-	-	21/26
2007	-	-	-	-	-	-	-	-	24/42
2012	-	-	-	-	-	-	-	-	22/41
2017	-	-	-	-	-	-	-	-	20/56

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

Table 01R-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)							
2017	7	14	-	14	57	14	24.3

RATTLESNAKE BURN - STUDY NO. 01R-3



Location Information

USGS 7.5 min Map Info Bulls Pass NE; Township 13N, Range 6W, Section 21
 GPS (0' Stake) NAD 83 UTM ZONE 12, 371611 East 4633907 North

Transect Information

Browse Tag # (0' Stake) 31
 Transect Bearing 158° magnetic
 Length 400ft
 Belt Placement Line 1 (11ft & 95ft), Line 2 (34ft), Line 3 (59ft), Line 4 (71ft)
 Belt Marker Placement Standard

Directions to Site

Take exit 17 off of I-84 and turn south, passing through a gate. Travel south for 3.6 miles to a witness post on the right-hand (east) side of the road. The beginning of the baseline is to the left (east) of the witness post about 100 paces at 75 degrees magnetic. The 0-foot stake is marked with browse tag #31.

Site Information

Land Ownership	Private
Land Administrator	Private
Allotment	No data
Elevation	5,930ft (1,807m)
Aspect	Northernwest
Slope	20-30%
Sample Dates	06/22/2004, 08/08/2007, 07/27/2012, 07/18/2017

Table 01R-03.1 Disturbance History. Recorded history of major disturbances.

Treatment/Disturbance	Name	WRI DB#	Date	Size (acres)
Fire - Wildfire	Rattle Snake Fire	PDB	2003	-

Wildlife Habitat and Vegetation History**Table 01R-03.3 - Wildlife Seasonal Habitat.** UDWR wildlife habitat and seasonality.

Species	Habitat	Season
Deer	crucial	summer
Pronghorn	substantial	summer

Table 01R-03.4 - 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	Perennial Grass	No Encroachment
2012	Perennial Grass/Mixed Shrub	No Encroachment
2017	Perennial Grass/Mixed Shrub	No Encroachment

Site Notes

The comparison study site, Rattlesnake Fire Seeded (1R-2), was established in a seeded portion 1,000 feet to the west.

Soils**Table 01R-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
Loam	7.0	28.6	40.1	31.3	4.1	13.5	291.0	0.6	06/22/2004

Site Potential

1981 - 2010 Average Annual Precipitation	16 inches
NRCS Ecological Site	Upland Loam (Mountain Big Sagebrush)
NRCS Ecological Site #	028AY310UT
States and Transitions	No state and transition model is available for this ecological site.

When established in 2004, the site was in a perennial grass state with bluebunch wheatgrass (*Pseudoroegneria spicata*) and Sandberg bluegrass (*Poa secunda*) being dominant. The annual grass cheatgrass (*Bromus tectorum*) has fluctuated over the sample years and was sampled in high abundance in 2017 (Table 01R-03.7, Table 01R-03.10). Yellow rabbitbrush (*Chrysothamnus viscidiflorus* ssp. *viscidiflorus* var. *viscidiflorus*) has increased in abundance over the study period and is becoming the dominant vegetation component. With the increased abundance of shrubs, the site is transitioning to a mixed shrub state (Table 01R-3.6, Table 01R-03.11). The resistance and resilience of the community is at risk, as is indicated by the substantial decrease in perennial grass cover and large increase of cheatgrass cover in 2017 (Table 01R-03.7). These changes in vegetation composition may also be indicative of changes in land management practices.

Trend Summary Tables

Table 01R-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
2004	0.0	3.7	-	-	4.8	-
2007	0.5	7.5	-	1.1	10.9	-
2012	0.6	8.7	-	0.8	9.7	-
2017	1.5	15.4	-	2.2	19.3	-

Table 01R-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
2004	189	365	320	257	1.1	12.9	3.7	4.5
2007	85	421	388	222	0.4	30.8	4.4	4.6
2012	69	436	338	154	0.9	34.6	2.4	2.8
2017	396	329	485	135	19.9	13.4	19.8	3.4

Table 01R-03.8 - 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	42.7	-	18.7	12.7	4.5	28.9
2007	15.5	0.2	32.4	9.3	4.8	45.4
2012	7.3	0.3	60.0	5.0	4.7	53.0
2017	7.1	0.2	40.7	4.5	4.8	69.4

Table 01R-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	Greater Sage-Grouse	Rabbit
	Quadrat Frequency			
2004	-	-	-	1
2007	-	1	2	1
2012	-	-	-	-
2017	3	2	-	5
Year	Days Use Per Acre (ha)			
2004	-	5.3 (13.2)	-	-
2007	-	2.7 (6.6)	-	-
2012	-	0.7 (1.7)	-	-
2017	2.2 (5.4)	-	-	-

Table 01R-03.10 - Grass Species. Nested frequency and modified Daubenmire average cover by year.

GRASS SPECIES	Nested Frequency				
Bromus tectorum ^{ai} (cheatgrass)	189	-	2	233	292
Poa bulbosa ⁱ (bulbous bluegrass)	-	-	-	336	340
Poa fendleriana (muttongrass)	69	-	-	342	351
Poa secunda (Sandberg bluegrass)	396	2	-	315	131
Pseudoroegneria spicata (bluebunch wheatgrass)	Average Cover (%)				
year	1.1	-	0.0	3.8	9.1
2004	0.4	-	-	11.0	19.8
2007	0.9	-	-	10.4	24.2
2012	19.9	0.0	-	11.5	1.9
2017					

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

Table 01R-03.11 - Forb Species. Nested frequency and modified Daubenmire average cover by year.

FORB SPECIES	Nested Frequency																	
Achillea millefolium (Common yarrow)	7	38	89	95	-	47	20	1	2	6	-	-	-	-	58	19	8	
Agoseris glauca (pale agoseris)	11	17	4	363	1	23	4	-	69	-	90	2	2	0	31	12	1	
Allium (onion)	14	14	5	328	-	23	-	-	-	-	50	-	-	-	9	4	-	
Alyssum desertorum ^{ai} (desert madwort)	21	-	15	484	3	32	4	-	-	-	35	3	0	2	-	-	200	
Arabis (rockcress)	Average Cover (%)																	
Astragalus convallarius (lesser rushy milkvetch)	0.2	0.1	0.3	0.4	-	0.6	0.1	0.0	0.0	0.0	-	-	-	-	0.4	0.2	0.1	
Calochortus nuttallii (sego lily)	0.2	0.1	0.0	2.9	0.0	0.2	0.0	-	0.2	-	0.3	0.0	0.0	0.0	0.2	0.0	0.0	
Camelina microcarpa ^{ai} (littledod false flax)	0.2	0.0	0.0	2.0	-	0.3	-	-	-	-	0.1	-	-	-	0.0	0.1	-	
Ceratocephala testiculata ^{ai} (curvseed butterwort)	0.2	-	0.0	17.4	0.0	0.5	0.0	-	-	-	0.1	0.0	0.0	0.0	-	-	1.9	
Chenopodium ^a (goosefoot)																		
Collinsia parviflora ^a (maiden blue eyed Mary)																		
Collomia linearis ^a (tiny trumpet)																		
Cordylanthus ^a (bird s-beak)																		
Crepis acuminata (tapertip hawkbeard)																		
Cymopterus (springparsley)																		
Descurainia pinnata ^a (western tansymustard)																		
Lactuca serriola ^{ai} (prickly lettuce)																		

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

FORB SPECIES											
<i>Lappula occidentalis</i> ^a (flatspine stickseed)											
<i>Lupinus</i> (lupine)											
<i>Lupinus argenteus</i> (silvery lupine)											
<i>Machaeranthera canescens</i> (hoary tansyaster)											
<i>Microsteris gracilis</i> ^a (slender phlox)											
<i>Phlox austromontana</i> (mountain phlox)											
<i>Phlox longifolia</i> (longleaf phlox)											
<i>Polygonum douglasii</i> ^a (Douglas' knotweed)											
<i>Sisymbrium altissimum</i> ^{ai} (tall tumblemustard)											
<i>Tragopogon dubius</i> ^{ai} (yellow salsify)											
<i>Veronica biloba</i> ^{ai} (two-lobed speedwell)											
year	Nested Frequency										
2004	-	20	31	-	-	28	89	1	2	3	304
2007	1	25	43	-	66	41	123	3	10	5	141
2012	-	-	27	1	15	31	74	-	1	4	18
2017	1	-	50	-	10	26	21	-	6	25	18
year	Average Cover (%)										
2004	-	0.7	1.5	-	-	0.2	0.3	0.0	0.0	0.1	2.9
2007	0.0	0.2	2.1	-	0.2	0.8	0.8	0.0	0.4	0.0	0.5
2012	-	-	0.7	0.0	0.1	1.2	0.3	-	0.0	0.0	0.1
2017	0.0	-	1.7	-	0.1	0.9	0.1	-	0.1	0.2	0.1

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

Table 01R-03.12 - Shrub and Tree Species. Average modified Daubenmire quadrat and line intercept cover by year.

SHRUB SPECIES						
<i>Artemisia tridentata</i> ssp. <i>vaseyana</i> ^p (mountain big sagebrush)						
<i>Chrysothamnus viscidiflorus</i> ssp. <i>viscidiflorus</i> var. <i>viscidiflorus</i> (yellow rabbitbrush)						
<i>Ericameria nauseosa</i> (rubber rabbitbrush)						
<i>Eriogonum microthecum</i> ^p (slender buckwheat)						
<i>Gutierrezia sarothrae</i> (broom snakeweed)						
<i>Tetradymia canescens</i> (spineless horsebrush)						
year	Line Intercept Cover (%)					
2004	-	3.7	0.1	-	-	1
2007	-	5.7	-	1.1	2.7	2.5
2012	-	4.4	0.9	0.8	2.2	2.2
2017	0.2	11.2	0	2	5	3.1
year	Quadrat Cover (%)					
2004	-	2.8	0.0	0.0	0.0	0.9
2007	0.0	3.2	-	0.5	3.0	1.2
2012	0.0	4.7	0.7	0.6	2.0	1.3
2017	0.1	8.5	0.0	1.3	5.8	1.1

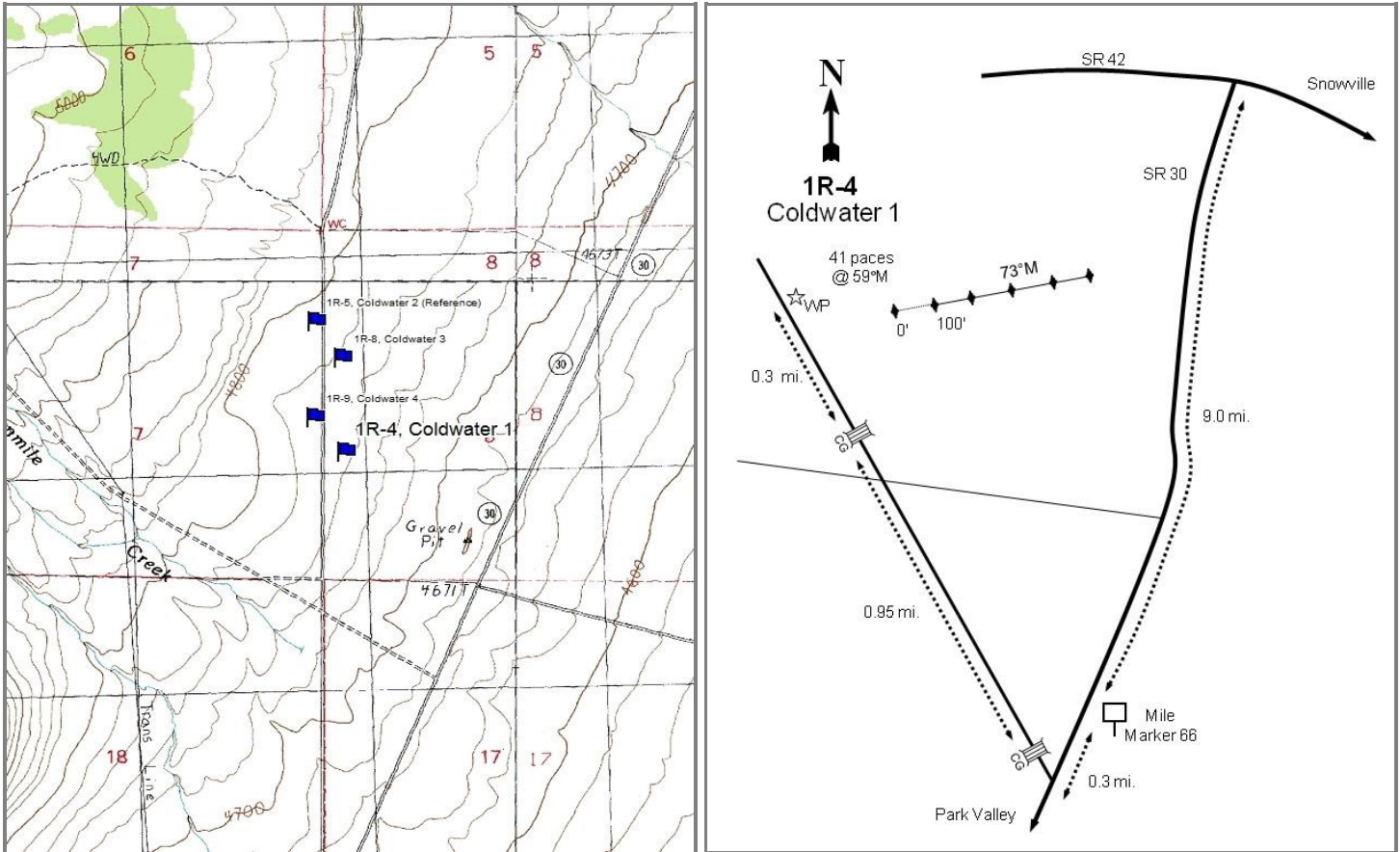
t - Tree Species; p - Preferred Browse; i - Introduced Species

Table 01R-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)									
2004	60	60	67	33	0	0	0	0	90/107
2007	20	20	100	0	0	0	0	0	53/33
2012	20	-	0	100	0	0	0	0	67/86
2017	40	-	0	100	0	0	0	0	70/100
Chrysothamnus viscidiflorus ssp. viscidiflorus var. viscidiflorus -- (yellow rabbitbrush)									
2004	4220	4160	4	95	1	0	0	0	29/33
2007	3700	-	5	44	51	0	0	45	31/47
2012	3300	-	1	90	9	5	0	50	35/47
2017	3580	-	5	87	8	0	0	11	44/67
Eriogonum microthecum^P -- (slender buckwheat)									
2004	140	-	0	100	0	0	0	0	21/25
2007	680	-	0	94	6	15	0	0	24/32
2012	580	-	0	97	3	0	0	55	24/43
2017	700	-	0	97	3	0	0	3	30/54
Ericameria nauseosa -- (rubber rabbitbrush)									
2004	20	-	0	100	0	0	0	0	43/45
2007	20	-	0	100	0	0	100	0	60/80
2012	340	-	0	71	29	0	0	100	49/63
2017	20	-	100	0	0	0	0	0	87/111
Gutierrezia sarothrae -- (broom snakeweed)									
2004	20	-	0	100	0	0	0	0	17/13
2007	7400	-	16	74	11	0	0	36	18/19
2012	2820	20	2	94	4	1	0	4	24/25
2017	12220	40	29	71	0	0	0	0	25/30
Purshia tridentata^P -- (antelope bitterbrush)									
2004	-	-	-	-	-	-	-	-	-/-
2007	-	-	-	-	-	-	-	-	20/54
2012	-	-	-	-	-	-	-	-	-/-
2017	-	-	-	-	-	-	-	-	-/-
Tetradymia canescens -- (spineless horsebrush)									
2004	1380	-	19	81	0	0	0	0	27/43
2007	1060	-	2	40	59	0	2	28	33/58
2012	580	-	0	86	14	14	0	31	37/66
2017	860	-	5	79	16	0	0	5	33/62

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

COLDWATER 1 - STUDY NO. 01R-4

**Location Information**

USGS 7.5 min Map Info
GPS (0' Stake)

Black Butte NE; Township 13N, Range 11W, Section 08
NAD 83 UTM ZONE 12, 322821 East 4637257 North

Transect Information

Browse Tag # (0' Stake)	797
Transect Bearing	72° 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 west on SR-42 from Snowville, UT to Curlew Junction and turn south (left) onto SR-30 and drive toward Park Valley, UT. Drive to mile marker 66, proceed another 0.3 miles, and turn right. Drive north on this dirt road for 0.95 miles to a cattle guard. Continue for another 0.3 miles to the witness post on the east (right) side of the road. From the witness post, walk 41 paces at 59 degrees magnetic to the 0-foot stake which is marked with browse tag #797.

Site Information

Land Ownership	Private
Land Administrator	Private
Allotment	No data
Elevation	4,760ft (1,451m)
Aspect	East
Slope	2%
Sample Dates	06/22/2005, 08/05/2009, 07/08/2013, 07/19/2017

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

Treatment/Disturbance	Name	WRI DB#	Date	Size (acres)
Fire - Prescribed	Coldwater Ranch-Dees Inc., M.O.	163	Fall 2007	1944
Herbicide - Plateau	Coldwater Ranch-Dees Inc., M.O.	163	Fall 2007	1944
Seeding - Rangeland Drill	Coldwater Ranch-Dees Inc., M.O.	163	November-December 2007	1944

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

Mix Name			Application Type	Application Date	Acres
Coldwater Ranch			Drill	Oct 2007	2000
Type	Species	Common Name	Cultivar/Source ID	Bulk lbs/acre	PLS lbs/acre
G	Agropyron cristatum	Crested Wheatgrass	Ephraim	0.50	0.45
G	Agropyron cristatum	Crested Wheatgrass	Hycrest	0.54	0.50
G	Elymus wawawaiensis	Snake River Wheatgrass	Secar	0.53	0.40
G	Elymus wawawaiensis	Snake River Wheatgrass	Secar	0.45	0.42
G	Leymus cinereus	Great Basin Wildrye	Trailhead	1.00	0.91
G	Pascopyrum smithii	Western Wheatgrass	Arriba	1.00	0.81
G	Poa secunda	Canby Bluegrass	Canbar	0.20	0.18
G	Psathyrostachys juncea	Russian Wildrye		1.00	0.83
G	Thinopyrum intermedium	Pubescent Wheatgrass		0.89	0.75
G	Thinopyrum intermedium	Pubescent Wheatgrass		0.13	0.11
F	Astragalus cicer	Cicer Milkvetch	Lutana	0.41	0.38
F	Astragalus cicer	Cicer Milkvetch	Lutana	0.07	0.06
F	Medicago sativa	Alfalfa	Ladak	0.15	0.13
F	Medicago sativa	Alfalfa	Ranger	0.30	0.27
F	Medicago sativa	Alfalfa	Spredor 4	0.35	0.34
F	Medicago sativa	Alfalfa	Ladak	0.17	0.16
F	Onobrychis viciifolia	Sainfoin	Eski	1.00	0.92
F	Sanguisorba minor	Small Burnet	Delar	1.00	0.93
S	Atriplex canescens	Fourwing Saltbush	Fourwing Saltbush-Juab/Millard UT	0.35	0.13
Mix Name			Application Type	Application Date	Acres
Coldwater Ranch Fluffy Box			Drill	Oct 2007	2000
Type	Species	Common Name	Cultivar/Source ID	Bulk lbs/acre	PLS lbs/acre
F	Achillea millefolium	Western Yarrow		0.05	0.05
S	Artemisia tridentata ssp. wyomingensis	Wyoming Big Sagebrush	Beaver UT	0.30	0.07
S	Bassia prostrata	Forage Kochia	Humbolt NV	0.40	0.33

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

Species	Habitat	Season
Greater Sage Grouse	occupied	year-long
Pronghorn	substantial	summer

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

Year	Vegetation Type	Woodland Succession
2005	Annual Grass-Forb	No Encroachment
2009	Annual Grass-Forb/Perennial Grass	No Encroachment
2013	Annual-Perennial Grass	No Encroachment
2017	Annual-Perennial Grass	No Encroachment

Site Notes

Sage grouse pellets were seen on site in 2013, but was not sampled in the pellet group transect.

Soils**Table 01R-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	7.6	34.2	42.0	23.8	1.0	6.5	492.8	0.6	06/22/2005

Site Potential

1981 - 2010 Average Annual Precipitation 10 inches
 NRCS Ecological Site Semidesert Gravelly Loam (Wyoming Big Sagebrush) North
 NRCS Ecological Site # R028AY215UT
 States and Transitions No state and transition model is available for this ecological site.

Upon establishment in 2005, this site was in an annual grass and forb state dominated by cheatgrass (*Bromus tectorum*), prickly lettuce (*Lactuca serriola*), and prickly Russian thistle (*Salsola tragus*) (Table 01R-04.7, Table 01R-04.10, Table 01R-04.11). Shrubs and perennial grasses were rare (Table 01R-04.6, Table 01R-04.7). In 2007 the site was burned, the herbicide Plateau was applied aerially, and perennial introduced and native grasses, forbs, and shrubs were drill seeded. Following the treatment, seeded perennial grasses established on the site and have been the dominant component since 2013 (Table 01R-04.7). Although cheatgrass decreased following the treatment, it has remained a prominent component of the herbaceous understory. With time, proper grazing management, and lack of disturbance (mechanical, fire, etc.), this site could become a native shrub community with an introduced perennial herbaceous understory.

Trend Summary Tables**Table 01R-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
2005	0.0	0.3	-	0.2	0.8	-
2009	-	-	-	-	-	-
2013	0.2	-	-	0.4	-	-
2017	1.0	-	-	1.7	-	-

Table 01R-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
2005	488	55	458	32	47.2	1.9	27.9	0.9
2009	179	107	257	29	10.7	6.3	28.1	2.6
2013	434	247	154	62	8.0	12.8	1.9	1.3
2017	421	309	42	8	19.1	21.5	0.2	0.2

Table 01R-04.8 - 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	14.0	0.3	16.8	5.3	1.0	66.9
2009	41.0	-	12.7	19.2	0.6	43.6
2013	23.1	-	43.6	4.8	1.3	32.2
2017	26.7	0.0	36.6	6.4	1.0	46.5

Table 01R-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		
2005	4	-	1
2009	-	-	-
2013	3	1	1
2017	11	-	3
Year	Days Use Per Acre (ha)		
2005	11.6 (28.7)	-	-
2009	3.6 (9.0)	2.7 (6.6)	-
2013	14.5 (35.9)	-	-
2017	8.7 (21.5)	-	-

Table 01R-04.10 - 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)	Elymus wawawaiensis (Snake River wheatgrass)	Leymus cinereus (basin wildrye)	Pascopyrum smithii (western wheatgrass)	Poa secunda (Sandberg bluegrass)	Psathyrostachys juncea ⁱ (Russian wildrye)	Thinopyrum intermedium ⁱ (intermediate wheatgrass)	Vulpia octoflora ^a (sixweeks fescue)
year	Nested Frequency										
2005	7	3	488	5	-	-	-	42	-	-	158
2009	10	24	178	4	12	-	3	57	-	9	1
2013	3	158	432	11	10	58	3	40	7	54	79
2017	-	205	420	-	40	12	31	109	44	27	80
year	Average Cover (%)										
2005	0.3	0.1	45.3	0.3	-	-	-	1.1	-	-	1.9
2009	0.1	2.1	10.7	0.8	0.8	-	0.0	1.7	-	0.7	0.0
2013	0.1	5.7	7.7	0.4	0.5	3.3	0.1	0.4	0.2	2.1	0.2
2017	-	13.5	18.7	-	2.1	0.2	0.7	1.8	2.8	0.4	0.4

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

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

FORB SPECIES	Allium (onion)	Astragalus (milkvetch)	Cardaria draba ^{ai} (whitetop)	Ceratocephala testiculata ^{ai} (curvseed butterwort)	Descurainia pinnata ^a (western tansymustard)	Erigeron pumilus (shaggy fleabane)	Erodium cicutarium ^{ai} (redstem stork's bill)	Halogeton glomeratus ^{ai} (saltflower)	Ipomopsis congesta (ballhead ipomopsis)	Lactuca serriola ^{ai} (prickly lettuce)	Lappula occidentalis ^a (flatspine stickseed)	Lepidium ^a (pepperweed)	Machaeranthera canescens (hoary tansyaster)	Malcolmia africana ^{ai} (African mustard)	Penstemon (beardtongue)	Phlox longifolia (longleaf phlox)	Salsola tragus ^{ai} (prickly Russian thistle)
year	Nested Frequency																
2005	-	5	5	237	13	1	13	-	-	403	-	-	1	7	-	5	416
2009	3	-	6	5	3	-	-	-	1	-	-	-	-	-	13	-	244
2013	-	1	23	30	11	15	-	1	-	1	-	-	-	-	-	14	121
2017	-	3	-	16	-	2	-	-	-	-	2	24	-	-	-	-	-
year	Average Cover (%)																
2005	-	0.2	0.1	3.7	0.1	0.0	0.2	-	-	11.8	-	-	0.0	0.1	-	0.0	9.8
2009	0.0	-	0.0	0.0	0.2	-	-	-	0.0	-	-	-	-	-	0.6	-	23.4
2013	-	0.0	0.1	0.1	0.1	0.1	-	0.0	-	0.0	-	-	-	-	-	0.2	1.4
2017	-	0.1	-	0.0	-	0.0	-	-	-	-	0.0	0.1	-	-	-	-	-

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

FORB SPECIES	Senecio (ragwort)	Sisymbrium altissimum ^{ai} (tall tumblemustard)	Sphaeralcea grossularifolia (gooseberry/leaf globemallow)	Tragopogon dubius ^{ai} (yellow salsify)
year	Nested Frequency			
2005	2	52	15	27
2009	-	0	11	38
2013	-	-	9	24
2017	-	-	3	-
year	Average Cover (%)			
2005	0.0	1.1	0.5	1.1
2009	-	0.1	2.0	4.4
2013	-	-	0.9	0.4
2017	-	-	0.0	-

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

Table 01R-04.12 - 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 ^{pi} (forage kochia)	Ericameria nauseosa (rubber rabbitbrush)
year	Line Intercept Cover (%)		
2005	0.2	-	0.8
2009	-	-	-
2013	-	0.4	-
2017	-	1.7	-
year	Quadrat Cover (%)		
2005	0.0	-	0.3
2009	-	-	-
2013	-	0.2	-
2017	-	1.0	-

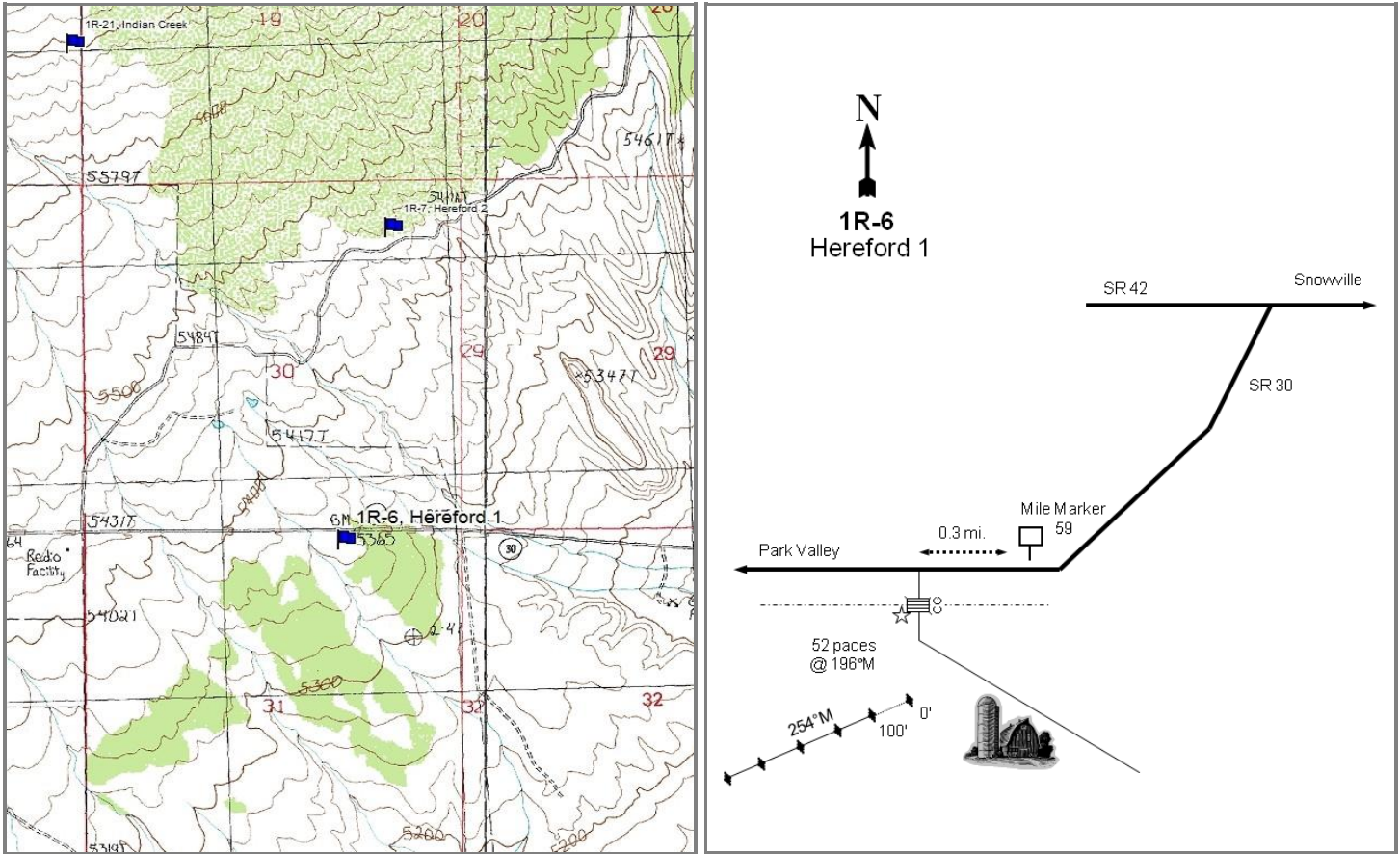
t - Tree Species; p - Preferred Browse; i - Introduced Species

Table 01R-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. wyomingensis^P -- (Wyoming big sagebrush)									
2005	60	-	0	100	0	0	0	0	53/69
2009	-	-	-	-	-	-	-	-	-/-
2013	-	-	-	-	-	-	-	-	23/24
2017	-	-	-	-	-	-	-	-	-/-
Atriplex canescens^P -- (fourwing saltbush)									
2005	-	-	-	-	-	-	-	-	-/-
2009	-	-	-	-	-	-	-	-	55/120
2013	-	-	-	-	-	-	-	-	-/-
2017	-	-	-	-	-	-	-	-	54/164
Bassia prostrata^{Pi} -- (forage kochia)									
2005	-	-	-	-	-	-	-	-	-/-
2009	-	-	-	-	-	-	-	-	-/-
2013	40	20	0	100	0	0	0	0	47/53
2017	580	-	0	100	0	0	0	0	39/46
Ericameria nauseosa -- (rubber rabbitbrush)									
2005	200	-	0	90	10	0	0	10	48/64
2009	-	-	-	-	-	-	-	-	-/-
2013	-	-	-	-	-	-	-	-	76/89
2017	40	-	0	100	0	0	0	0	30/37
Gutierrezia sarothrae -- (broom snakeweed)									
2005	-	-	-	-	-	-	-	-	-/-
2009	-	-	-	-	-	-	-	-	-/-
2013	-	-	-	-	-	-	-	-	-/-
2017	-	-	-	-	-	-	-	-	23/40
Opuntia -- (pricklypear)									
2005	-	-	-	-	-	-	-	-	-/-
2009	-	-	-	-	-	-	-	-	-/-
2013	-	-	-	-	-	-	-	-	-/-
2017	-	-	-	-	-	-	-	-	12/31

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

HEREFORD 1 - STUDY NO. 01R-6



Location Information

USGS 7.5 min Map Info	Park Valley NE; Township 13N, Range 12W, Section 31
GPS (0' Stake)	NAD 83 UTM ZONE 12, 312425 East 4631864 North

Transect Information

Browse Tag # (0' Stake)	58
Transect Bearing	254° magnetic
Length	500ft
Belt Placement	Line 1 (11ft), Line 2 (34ft), Line 3 (59ft), Line 4 (71ft), Line 5 (95ft)
Belt Marker Placement	Standard

Directions to Site

Drive west on SR-42 from Snowville, UT to Curlew Junction, turn south (left) onto SR-30, and drive toward Park Valley, UT. Drive to mile marker 59 and proceed another 0.3 miles to a gate on the south (left) side of the road with a "No Trespassing" sign. There is a small burn area just inside the gate; from the west (right) post, walk 52 paces at 196 degrees magnetic to the 0-foot stake. The 0-foot stake is marked with browse tag #58.

Site Information

Land Ownership	Private
Land Administrator	Private
Allotment	No data
Elevation	5,350ft (1,631m)
Aspect	SW
Slope	3%
Sample Dates	06/21/2005, 08/12/2008, 07/08/2013, 07/18/2017

Table 01R-06.1 Disturbance History. Recorded history of major disturbances.

Treatment/Disturbance	Name	WRI DB#	Date	Size (acres)
Fire - Wildfire	Park Valley	-	July 2005	18421
Seeding - Rangeland Drill	Park Valley Burn Rehab	348	October-December 2005	3152
Seeding - Aerial	Park Valley Burn Rehab	348	January 2006	3152

Table 01R-06.2 Seed Mix. List of known seeded plant species and rates (if available).

Mix Name			Application Type	Application Date	Acres
Hereford Grazing Association			Drill	Nov 2005	1200
Type	Species	Common Name	Cultivar/Source ID	Bulk lbs/acre	PLS lbs/acre
G	Agropyron cristatum	Crested Wheatgrass	Hycrest	2.48	2.32
G	Agropyron fragile	Siberian Wheatgrass	Vavilov	1.00	0.92
G	Leymus cinereus	Great Basin Wildrye	Trailhead	1.16	1.08
G	Psathyrostachys juncea	Russian Wildrye		1.17	1.08
F	Medicago sativa	Alfalfa	Ladak+	1.17	1.11
F	Onobrychis viciifolia	Sainfoin	Eski	2.33	2.19
F	Sanguisorba minor	Small Burnet		2.33	2.25
S	Atriplex canescens	Fourwing Saltbush	Juab/Millard UT	0.19	0.09
S	Atriplex canescens	Fourwing Saltbush	Juab UT	0.38	0.11
S	Atriplex canescens	Fourwing Saltbush	Juab/Tooete UT	0.58	0.33
S	Bassia prostrata	Forage Kochia	Millard UT	0.88	0.68
Mix Name			Application Type	Application Date	Acres
Hereford Grazing Association - Kochia			Aerial	Jan 2006	1920
Type	Species	Common Name	Cultivar/Source ID	Bulk lbs/acre	PLS lbs/acre
S	Bassia prostrata	Forage Kochia	Beaver UT	0.68	0.46
S	Bassia prostrata	Forage Kochia	Millard UT	0.32	0.28

Wildlife Habitat and Vegetation History

Table 01R-06.3 - Wildlife Seasonal Habitat. UDWR wildlife habitat and seasonality.

Species	Habitat	Season
Deer	crucial	winter
Greater Sage Grouse	occupied	year-long & Winter
Pronghorn	substantial	summer

Table 01R-06.4 - Vegetation History. The dominant vegetation type(s) and phase of woodland succession (Tausch, Miller, Roundy, & Chambers, 2009).

Year	Vegetation Type	Woodland Succession
2005	Wyoming Big Sagebrush	Phase I
2008	Perennial Grass/Forage Kochia	Phase I
2013	Perennial Grass/Forage Kochia	Phase I
2017	Perennial Grass/Forage Kochia	Phase I

Site Notes

The site was established in 2005 to monitor a Wyoming big sagebrush (*Artemisia tridentata* ssp. *wyomingensis*) dominated system which was originally prescribed to be disked and drill seeded in fall 2005, but the study burned in the Park Valley fire. There is a cell phone tower a quarter mile from the transect.

Soils

Table 01R-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	7.5	37.2	39.0	23.8	1.5	6.5	640.0	0.6	06/21/2005

Site Potential

1981 - 2010 Average Annual Precipitation 11 inches
 NRCS Ecological Site Semidesert Loam (Wyoming Big Sagebrush)
 NRCS Ecological Site # R028AY220UT
 States and Transitions No state and transition model is available for the above ecological site.

When established in 2005, the site existed as a stand of Wyoming big sagebrush (*Artemisia tridentata* ssp. *wyomingensis*) with a diverse component of other shrub species present which provided limited cover (Table 01R-06.6). Curvseed butterwort (*Ceratocephala testiculata*) and introduced perennial and annual grass species made up the majority of the herbaceous understory (Table 01R-06.7, Table 01R-06.10, Table 01R-06.11). In the summer of 2005, the site burned, removing a majority of the sagebrush. The site was seeded in the fall and winter of 2005. Following the fire and seeding treatment, the site transitioned to a forage kochia (*Bassia prostrata*) and crested wheatgrass (*Agropyron cristatum*) dominated state with minimal cover from other species (Table 01R-06.10, Table 01R-06.12, Table 01R- 06.13). Without a disturbance, it is predicted that sagebrush will increase and become dominant on the site.

Trend Summary Tables

Table 01R-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
2005	13.1	2.0	0.4	14.9	2.7	0.7
2008	10.6	0.4	-	12.0	0.5	-
2013	13.5	0.9	-	17.7	1.2	-
2017	13.7	0.2	-	18.9	0.9	-

Table 01R-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
2005	328	230	435	23	7.2	7.6	27.8	0.2
2008	55	231	62	32	1.0	8.7	1.1	1.1
2013	108	283	231	26	0.3	10.8	0.7	0.2
2017	206	301	285	13	3.2	16.5	1.5	0.1

Table 01R-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
2005	35.2	0.7	22.3	4.7	0.3	51.7
2008	60.6	-	22.6	5.9	0.2	21.1
2013	41.0	-	31.4	2.2	0.8	28.9
2017	43.0	0.1	30.2	6.4	1.0	37.5

Table 01R-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	Rocky Mountain Elk	Rabbit
	Quadrat Frequency			
2005	10	7	1	35
2008	6	2	-	32
2013	8	9	-	10
2017	10	-	-	52
Year	Days Use Per Acre (ha)			
2005	12.3 (30.5)	18.1 (44.7)	-	-
2008	22.5 (55.6)	0.7 (1.7)	-	-
2013	9.4 (23.3)	4.7 (11.6)	-	-
2017	17.4 (43.0)	-	-	-

Table 01R-06.10 - Grass Species. Nested frequency and modified Daubenmire average cover by year.

GRASS SPECIES	Achatherum hymenoides (Indian ricegrass)	Agropyron cristatum ⁱ (crested wheatgrass)	Agropyron fragile ⁱ (Siberian wheatgrass)	Bromus tectorum ^{ai} (cheatgrass)	Elymus elymoides (squirreltail)	Elymus lanceolatus (thickspike wheatgrass)	Leymus cinereus (basin wildrye)	Poa bulbosa ⁱ (bulbous bluegrass)	Poa secunda (Sandberg bluegrass)	Psathyrostachys juncea ⁱ (Russian wildrye)
year	Nested Frequency									
2005	21	193	-	328	12	0	-	1	57	-
2008	4	221	-	55	1	5	-	-	13	1
2013	-	243	21	108	-	1	14	1	17	40
2017	-	279	3	206	-	7	-	-	29	32
year	Average Cover (%)									
2005	0.0	5.9	-	7.2	0.1	0.0	-	0.0	1.5	-
2008	0.0	8.4	-	1.0	0.0	0.0	-	-	0.0	0.1
2013	-	8.9	0.3	0.3	-	0.1	0.5	0.0	0.1	0.8
2017	-	14.1	0.2	3.2	-	0.1	-	-	0.7	1.4

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

Table 01R-06.11 - Forb Species. Nested frequency and modified Daubenmire average cover by year.

FORB SPECIES	Allium (onion)	Alyssum desertorum ^{ai} (desert madwort)	Astragalus (milkvetch)	Calochortus nuttallii (sego lily)	Ceratocephala testiculata ^{ai} (curveseed butterwort)	Descurainia pinnata ^a (western tansymustard)	Gilia inconspicua ^a (shy gilia)	Halogeton glomeratus ^{ai} (saltlover)	Iva axillaris (povertyweed)	Lactuca serriola ^{ai} (prickly lettuce)	Lepidium ^a (pepperweed)	Medicago sativa ⁱ (alfalfa)	Microsteris gracilis ^a (slender phlox)	Onobrychis vicifolia ⁱ (sainfoin)	Phlox longifolia (longleaf phlox)	Salsola tragus ^{ai} (prickly Russian thistle)	Sanguisorba minor ⁱ (small burnet)
year	Nested Frequency																
2005	1	4	-	0	435	32	1	-	13	1	5	-	7	-	8	2	-
2008	-	-	-	-	32	1	-	14	14	3	-	10	-	5	-	22	5
2013	2	9	2	-	221	16	6	2	13	9	-	-	-	-	9	1	-
2017	-	62	-	-	260	6	-	-	13	2	-	-	-	-	-	-	-
year	Average Cover (%)																
2005	0.0	0.0	-	0.0	27.6	0.1	0.0	-	0.1	0.0	0.1	-	0.0	-	0.0	0.0	-
2008	-	-	-	-	0.1	0.0	-	0.4	0.8	0.0	-	0.2	-	0.1	-	0.6	0.1
2013	0.0	0.0	0.0	-	0.5	0.1	0.0	0.0	0.1	0.0	-	-	-	-	0.0	0.0	-
2017	-	0.1	-	-	1.3	0.0	-	-	0.1	0.0	-	-	-	-	-	-	-

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

FORB SPECIES		
	Tragopogon dubius ^{ai} (yellow salsify)	Zigadenus paniculatus (foothill deathcamas)
year	Nested Frequency	
2005	-	1
2008	-	-
2013	-	-
2017	1	-
year	Average Cover (%)	
2005	-	0.0
2008	-	-
2013	-	-
2017	0.0	-

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

Table 01R-06.12 - 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 ^{pi} (forage kochia)									
Chrysothamnus viscidiflorus ssp. viscidiflorus var. viscidiflorus (yellow rabbitbrush)									
Ericameria nauseosa ssp. nauseosa var. hololeuca ^p (rubber rabbitbrush)									
Gutierrezia sarothrae (broom snakeweed)									
Juniperus osteosperma ⁱ (Utah juniper)									
Sarcobatus vermiculatus (greasewood)									
year	Line Intercept Cover (%)								
2005	14.4	-	-	0.2	0.5	-	0.7	2.5	
2008	0.6	0.4	10.8	-	0.2	-	-	0.5	
2013	1.3	-	16.3	-	0.1	-	-	1.2	
2017	3.5	-	15.4	-	-	-	-	0.9	
year	Quadrat Cover (%)								
2005	12.7	-	-	0.0	0.5	-	0.4	2.0	
2008	0.3	0.0	10.3	0.0	0.0	-	-	0.4	
2013	1.1	-	12.5	-	0.0	-	-	0.9	
2017	1.1	-	12.6	-	0.0	0.0	-	0.1	

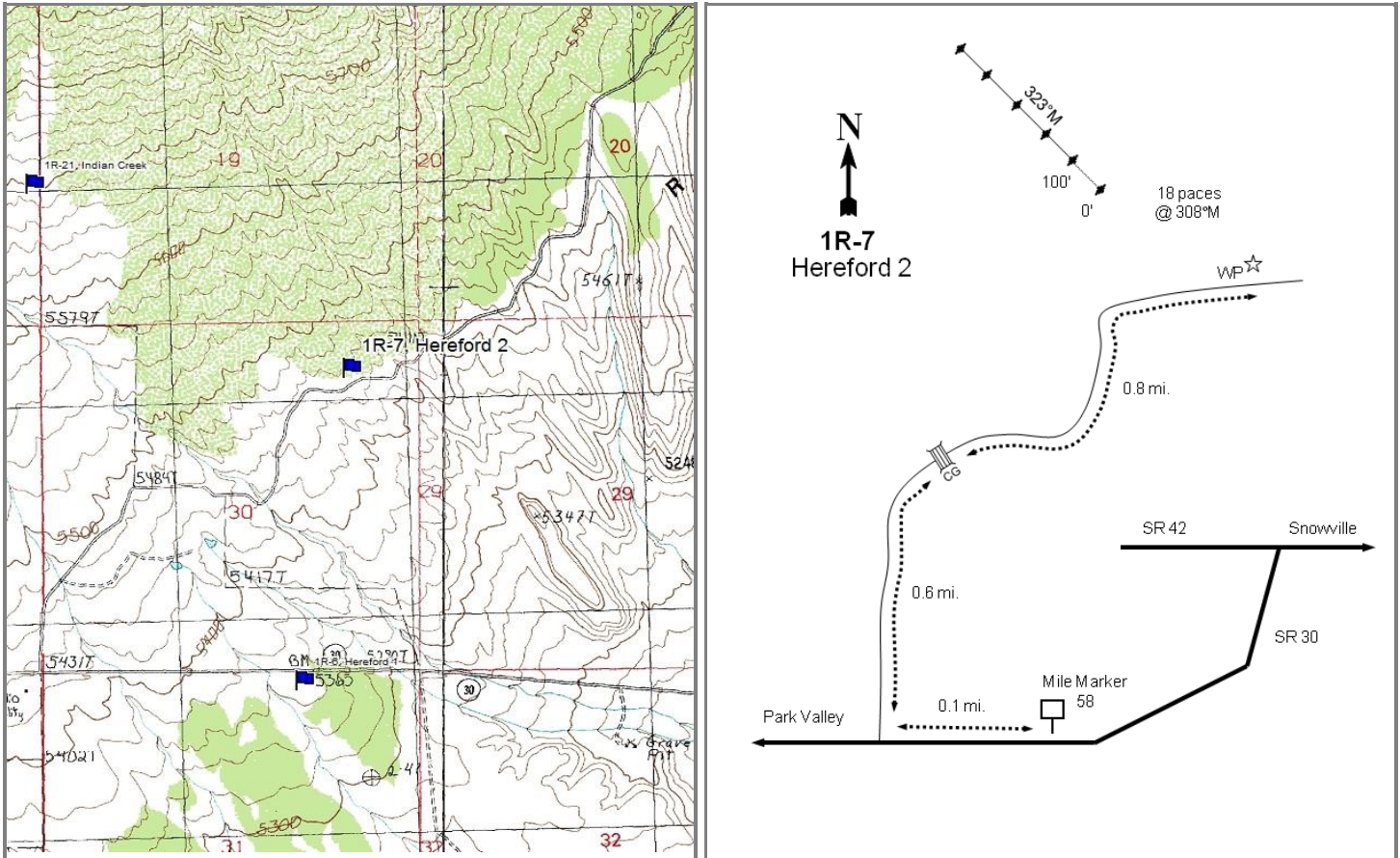
t - Tree Species; p - Preferred Browse; i - Introduced Species

Table 01R-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)									
2005	2540	20660	5	59	36	5	0	20	90/104
2008	1460	60	8	92	0	6	0	0	25/24
2013	1020	60	4	92	4	73	6	22	35/41
2017	820	-	7	81	12	0	2	10	48/60
Atriplex canescens^P -- (fourwing saltbush)									
2005	-	-	-	-	-	-	-	-	-/-
2008	100	-	0	80	20	0	0	20	49/65
2013	20	-	100	0	0	0	0	0	89/137
2017	-	-	-	-	-	-	-	-	116/176
Bassia prostrata^{Pi} -- (forage kochia)									
2005	-	-	-	-	-	-	-	-	-/-
2008	8220	39000	5	91	4	4	26	3	32/45
2013	27280	3820	51	49	0	17	4	1	22/36
2017	26160	600	12	88	0	29	13	0	14/30
Chrysothamnus viscidiflorus ssp. viscidiflorus var. viscidiflorus -- (yellow rabbitbrush)									
2005	20	-	0	100	0	0	0	0	36/51
2008	20	-	0	100	0	0	0	0	28/56
2013	-	-	-	-	-	-	-	-	28/60
2017	20	-	0	100	0	0	0	0	33/52
Ericameria nauseosa ssp. nauseosa var. hololeuca^P -- (rubber rabbitbrush)									
2005	220	40	18	82	0	18	9	0	56/80
2008	40	-	50	50	0	0	0	0	41/42
2013	60	-	33	67	0	33	0	33	50/86
2017	60	-	0	100	0	0	0	0	61/87
Gutierrezia sarothrae -- (broom snakeweed)									
2005	-	-	-	-	-	-	-	-	-/-
2008	-	-	-	-	-	-	-	-	-/-
2013	-	-	-	-	-	-	-	-	-/-
2017	-	-	-	-	-	-	-	-	-/-
Opuntia -- (pricklypear)									
2005	20	-	0	100	0	0	0	0	22/28
2008	-	-	-	-	-	-	-	-	-/-
2013	-	-	-	-	-	-	-	-	-/-
2017	-	-	-	-	-	-	-	-	-/-
Sarcobatus vermiculatus -- (greasewood)									
2005	120	620	33	67	0	0	0	0	86/121
2008	60	-	0	100	0	0	0	0	56/98
2013	20	-	0	100	0	0	100	0	70/143
2017	40	-	0	100	0	0	0	0	78/134

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

HEREFORD 2 - STUDY NO. 01R-7

**Location Information**

USGS 7.5 min Map Info
GPS (0' Stake)

Park Valley NE; Township 13N, Range 12W, Section 30
NAD 83 UTM ZONE 12, 312664 East 4633300 North

Transect Information

Browse Tag # (0' Stake)	262
Transect Bearing	323° 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 west on SR-42 from Snowville, UT to Curlew Junction, turn south (left) onto SR-30, and drive toward Park Valley, UT. Drive to mile marker 58 and proceed for another 0.1 miles to a radio tower on the south (left) side of the road. Turn north (right) and continue through a gate with a private property sign. Follow the road for 0.6 miles to a cattle guard. Continue on the road for 0.8 miles to the witness post on the left (north) side of the road. From the witness post, walk 18 paces at 308 degrees magnetic to the 0-foot stake; the site is on the ridge. The 0-foot stake is marked with browse tag #262.

Site Information

Land Ownership	Private
Land Administrator	Private
Allotment	No data
Elevation	5,475ft (1,669m)
Aspect	Southeast
Slope	5%
Sample Dates	06/22/2005, 07/20/2010, 07/10/2013, 07/18/2017

Table 01R-07.1 Disturbance History. Recorded history of major disturbances.

Treatment/Disturbance	Name	WRI DB#	Date	Size (acres)
Herbicide - Herbicide Unknown	-	-	2013-2016	-
Chaining - Two-Way Ely	Hereford Grazing Association	250	October 2005	600
Seeding - Rangeland Drill	Hereford Grazing Association	250	October-December 2005	1240
Seeding - Aerial After	Hereford Grazing Association	250	January 2006	1240

Table 01R-07.2 Seed Mix. List of known seeded plant species and rates (if available).

Mix Name			Application Type	Application Date	Acres
Hereford Grazing Association			Drill	Nov 2005	1200
Type	Species	Common Name	Cultivar/Source ID	Bulk lbs/acre	PLS lbs/acre
G	Agropyron cristatum	Crested Wheatgrass	Hycrest	2.48	2.32
G	Agropyron fragile	Siberian Wheatgrass	Vavilov	1.00	0.92
G	Leymus cinereus	Great Basin Wildrye	Trailhead	1.16	1.08
G	Psathyrostachys juncea	Russian Wildrye		1.17	1.08
F	Medicago sativa	Alfalfa	Ladak+	1.17	1.11
F	Onobrychis viciifolia	Sainfoin	Eski	2.33	2.19
F	Sanguisorba minor	Small Burnet		2.33	2.25
S	Atriplex canescens	Fourwing Saltbush	Juab/Millard UT	0.19	0.09
S	Atriplex canescens	Fourwing Saltbush	Juab UT	0.38	0.11
S	Atriplex canescens	Fourwing Saltbush	Juab/Tooole UT	0.58	0.33
S	Bassia prostrata	Forage Kochia	Millard UT	0.88	0.68
Mix Name			Application Type	Application Date	Acres
Hereford Grazing Association 2			Drill	Nov 2005	340
Type	Species	Common Name	Cultivar/Source ID	Bulk lbs/acre	PLS lbs/acre
G	Agropyron cristatum	Crested Wheatgrass	Hycrest	1.47	1.28
G	Agropyron cristatum	Crested Wheatgrass	Ephraim	0.59	0.50
G	Agropyron fragile	Siberian Wheatgrass	Vavilov	0.88	0.84
G	Elymus wawawaiensis	Snake River Wheatgrass	Secar	1.03	0.95
G	Leymus cinereus	Great Basin Wildrye	Trailhead	1.03	0.84
G	Psathyrostachys juncea	Russian Wildrye		1.03	0.87
F	Medicago sativa	Alfalfa	Ladak	0.15	0.14
F	Medicago sativa	Alfalfa	Nomad	0.44	0.41
F	Medicago sativa	Alfalfa	Spredor 4	0.44	0.41
F	Onobrychis viciifolia	Sainfoin	Eski	2.71	2.49
F	Onobrychis viciifolia	Sainfoin	Eski	0.29	0.24
F	Sanguisorba minor	Small Burnet	Delar	2.06	1.91
S	Atriplex canescens	Fourwing Saltbush	Juab/Tooole UT	0.44	0.25
Mix Name			Application Type	Application Date	Acres
Hereford Grazing Association - Kochia			Aerial	Jan 2006	1920
Type	Species	Common Name	Cultivar/Source ID	Bulk lbs/acre	PLS lbs/acre
S	Bassia prostrata	Forage Kochia	Beaver UT	0.68	0.46
S	Bassia prostrata	Forage Kochia	Millard UT	0.32	0.28

Wildlife Habitat and Vegetation History

Table 01R-07.3 - Wildlife Seasonal Habitat. UDWR wildlife habitat and seasonality.

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

Table 01R-07.4 - Vegetation History. The dominant vegetation type(s) and phase of woodland succession (Tausch, Miller, Roundy, & Chambers, 2009).

Year	Vegetation Type	Woodland Succession
2005	Juniper/Black Sagebrush	Phase II transitioning to Phase III
2010	Black Sagebrush/Annual Grass/Juniper	Phase I
2013	Black Sagebrush/Juniper	Phase I
2017	Annual - Perennial Grass	Phase I

Site Notes

The trees were pushed into rows as a result of the chaining. In 2017, the site appeared to have been treated with herbicide to remove shrubs and trees.

Soils

Table 01R-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	7.3	37.2	40.0	22.8	1.9	6.8	243.2	0.5	06/22/2005

Site Potential

1981 - 2010 Average Annual Precipitation 11 inches
 NRCS Ecological Site Semidesert Shallow Loam (Black Sagebrush)
 NRCS Ecological Site # R028AY236UT
 States and Transitions No state and transition model is available for this ecological site.

When established in 2005, the plant community on this site was a mixed stand of black sagebrush (*Artemisia nova*) and Utah juniper (*Juniperus osteosperma*) with a diverse component of other shrub species present, which provided limited cover (Table 01R-07.12). Forbs were also very diverse but provided little cover. Immediately following the chaining, the herbaceous understory remained diverse but provided sparse cover (Table 01R-07.11). Some shrubs increased in cover while others decreased, creating more of a mixed browse community consisting of black sagebrush, broom snakeweed (*Gutierrezia sarothrae*), and forage kochia (*Bassia prostrata*). In addition, juniper was not completely removed from the site. An apparent herbicide treatment occurred between the 2013 and 2017 sample readings, and caused shrub and juniper cover to decrease substantially (Table 01R-07.6, Table 01R-07.12, Table 01R-12.13). The annual grass cheatgrass (*Bromus tectorum*) has fluctuated over the sample years, but was very prevalent in 2017, the first sample year following the herbicide treatment (Table 01R-07.7, Table 01R-07.10).

Trend Summary Tables

Table 01R-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
2005	7.5	0.3	5.9	9.2	0.3	15.0
2010	4.2	0.5	3.3	6.3	0.6	3.0
2013	5.3	2.6	1.7	5.5	2.4	4.2
2017	1.6	0.2	0.2	1.5	-	-

Table 01R-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

Table 01R-07.8 - 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	33.4	2.4	23.5	32.2	2.5	19.0
2010	29.8	-	31.3	24.1	1.2	32.6
2013	32.1	-	33.7	11.2	7.2	23.7
2017	29.8	-	27.8	26.6	1.7	35.3

Table 01R-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	Rabbit
	Quadrat Frequency		
2005	1	6	64
2010	-	-	1
2013	4	1	18
2017	3	-	37
Year	Days Use Per Acre (ha)		
2005	2.9 (7.2)	-	-
2010	2.2 (5.4)	0.7 (1.7)	-
2013	11.6 (28.7)	-	-
2017	2.9 (7.2)	3.4 (8.3)	-

Table 01R-07.10 - Grass Species. Nested frequency and modified Daubenmire average cover by year.

GRASS SPECIES	Achnatherum hymenoides (Indian ricegrass)	Agropyron cristatum ⁱ (crested wheatgrass)	Agropyron fragile ⁱ (Siberian wheatgrass)	Bromus tectorum ⁱⁱ (cheatgrass)	Elymus elymoides (squirreltail)	Leymus cinereus (basin wildrye)	Poa bulbosa ⁱ (bulbous bluegrass)	Poa fendleriana (muttongrass)	Poa secunda (Sandberg bluegrass)	Psathyrostachys juncea ⁱ (Russian wildrye)	Pseudoroegneria spicata (bluebunch wheatgrass)	Thinopyrum intermedium ⁱ (intermediate wheatgrass)	Vulpia octoflora ^a (sixweeks fescue)
year	Nested Frequency												
2005	13	28	-	240	7	-	-	-	23	-	13	-	13
2010	26	59	-	304	4	-	-	11	1	6	17	-	-
2013	18	56	3	343	23	0	-	4	10	7	7	3	1
2017	45	103	17	352	4	1	5	0	7	43	21	-	1
year	Average Cover (%)												
2005	0.4	0.3	-	1.4	0.1	-	-	-	0.5	-	0.4	-	0.1
2010	0.7	0.9	-	12.1	0.1	-	-	0.2	0.1	0.0	0.2	-	-
2013	0.1	0.6	0.0	3.9	0.1	0.0	-	0.0	0.0	0.0	0.0	0.0	0.0
2017	2.3	4.3	0.7	19.5	0.0	0.2	0.0	0.0	0.1	1.7	0.8	-	0.0

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

Table 01R-07.11 - Forb Species. Nested frequency and modified Daubenmire average cover by year.

FORB SPECIES	Alyssum desertorum ^{ai} (desert madwort)	Antennaria (pussytoes)	Arabis (rockcress)	Arenaria (sandwort)	Astragalus (milkvetch)	Astragalus utahensis (Utah milkvetch)	Bassia scoparia ^{ai} (burningbush)	Calochortus nuttallii (sego lily)	Castilleja angustifolia (northwestern Indian paintbrush)	Ceratocephala testiculata ^{ai} (curvseed butterwort)	Chaenactis douglasii (Douglas' dustymaiden)	Chenopodium album ^a (lambsquarters)	Collinsia parviflora ^a (maiden blue eyed Mary)	Cordylanthus ^a (bird's-beak)	Cryptantha (cryptantha)	Descurainia pinnata ^a (western tansymustard)	Draba ^a (draba)
year	Nested Frequency																
2005	-	-	4	1	6	3	-	8	-	65	5	-	-	37	11	100	10
2010	-	6	-	3	12	1	-	3	-	-	21	-	-	4	7	14	-
2013	12	-	3	32	6	-	15	-	2	7	86	3	9	12	12	20	4
2017	14	-	-	-	-	-	-	-	-	29	3	-	-	-	-	6	2
year	Average Cover (%)																
2005	-	-	0.0	0.0	0.0	0.0	-	0.0	-	0.3	0.0	-	-	0.3	0.1	0.9	0.0
2010	-	0.1	-	0.0	0.2	0.0	-	0.0	-	-	0.1	-	-	0.2	0.1	1.0	-
2013	0.0	-	0.0	0.1	0.0	-	0.4	-	0.0	0.0	0.3	0.0	0.0	0.1	0.0	0.0	0.0
2017	0.0	-	-	-	-	-	-	-	-	0.1	0.0	-	-	-	-	0.0	0.0

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

FORB SPECIES	Erigeron pumilus (shaggy fleabane)	Eriogonum cernuum ^a (nodding buckwheat)	Eriogonum ovalifolium (cushion buckwheat)	Eriogonum umbellatum (sulphur-flower buckwheat)	Gayophytum ramosissimum ^a (pinyon groundsmoke)	Gilia inconspicua ^a (shy gilia)	Halogeton glomeratus ^{ai} (saltlover)	Lactuca serriola ^{ai} (prickly lettuce)	Lappula occidentalis ^a (flatspine stickseed)	Machaeranthera canescens (hoary tansyaster)	Medicago sativa ⁱ (alfalfa)	Packera multilobata (lobeleaf groundsel)	Penstemon (beardtongue)	Phlox austromontana (mountain phlox)	Phlox longifolia (longleaf phlox)	Salsola tragus ^{ai} (prickly Russian thistle)	Sanguisorba minor ⁱ (small burnet)
year	Nested Frequency																
2005	1	7	31	16	7	108	-	7	14	-	-	-	2	14	4	-	-
2010	-	-	7	12	-	26	66	75	-	-	36	1	7	9	6	55	67
2013	1	32	-	6	-	132	18	31	4	0	1	13	-	9	3	21	33
2017	-	-	-	-	-	3	-	7	-	-	-	-	-	3	-	-	-
year	Average Cover (%)																
2005	0.0	0.1	0.2	0.3	0.0	0.9	-	0.0	0.0	-	-	-	0.0	0.2	0.0	-	-
2010	-	-	0.2	0.1	-	0.1	0.7	0.6	-	-	0.7	0.0	0.3	0.2	0.0	0.6	3.1
2013	0.0	0.2	-	0.2	-	0.4	0.0	0.1	0.0	0.0	0.0	0.2	-	0.3	0.0	0.1	0.4
2017	-	-	-	-	-	0.0	-	0.1	-	-	-	-	-	0.0	-	-	-

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

FORB SPECIES	Nested Frequency			
Sisymbrium altissimum ^{ai} (tall tumblemustard)	-	-	26	-
Sphaeralcea coccinea (scarlet globemallow)	15	7	7	-
Streptanthus cordatus (heartleaf twistflower)	20	4	3	1
Tragopogon dubius ^{ai} (yellow salsify)	12	3	-	-
year	Average Cover (%)			
2005	-	-	0.1	-
2010	0.1	0.3	0.0	-
2013	0.1	0.2	0.0	0.0
2017	0.9	0.0	-	-

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

Table 01R-07.12 - Shrub and Tree Species. Average modified Daubenmire quadrat and line intercept cover by year.

SHRUB SPECIES	Line Intercept Cover (%)									
Artemisia nova ^p (black sagebrush)	9.2	-	0.1	-	-	0.1	15	0.1	-	-
Bassia prostrata ^{pi} (forage kochia)	2.9	3.4	0.3	-	-	0.2	3	-	0.1	-
Chrysothamnus viscidiflorus (yellow rabbitbrush)	2.8	2.7	0.2	-	-	2.2	4.2	-	-	-
Ericameria nauseosa (rubber rabbitbrush)	0.1	1.4	-	-	-	-	-	-	-	-
Eriogonum microthecum ^p (slender buckwheat)	-	-	-	-	-	-	-	-	-	-
Gutierrezia sarothrae (broom snakeweed)	-	-	-	-	-	-	-	-	-	-
Juniperus osteosperma ⁱ (Utah juniper)	-	-	-	-	-	-	-	-	-	-
Linanthus pungens (granite prickly phlox)	-	-	-	-	-	-	-	-	-	-
Opuntia (pricklypear)	-	-	-	-	-	-	-	-	-	-
year	Quadrat Cover (%)									
2005	7.5	-	0.0	-	0.0	0.0	5.9	0.2	-	-
2010	2.3	1.8	0.2	-	-	0.1	3.3	-	0.1	-
2013	3.1	2.3	0.5	0.4	0.0	1.7	1.7	0.0	0.0	-
2017	0.5	1.1	0.0	-	-	0.2	0.2	-	0.0	-

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

Table 01R-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.

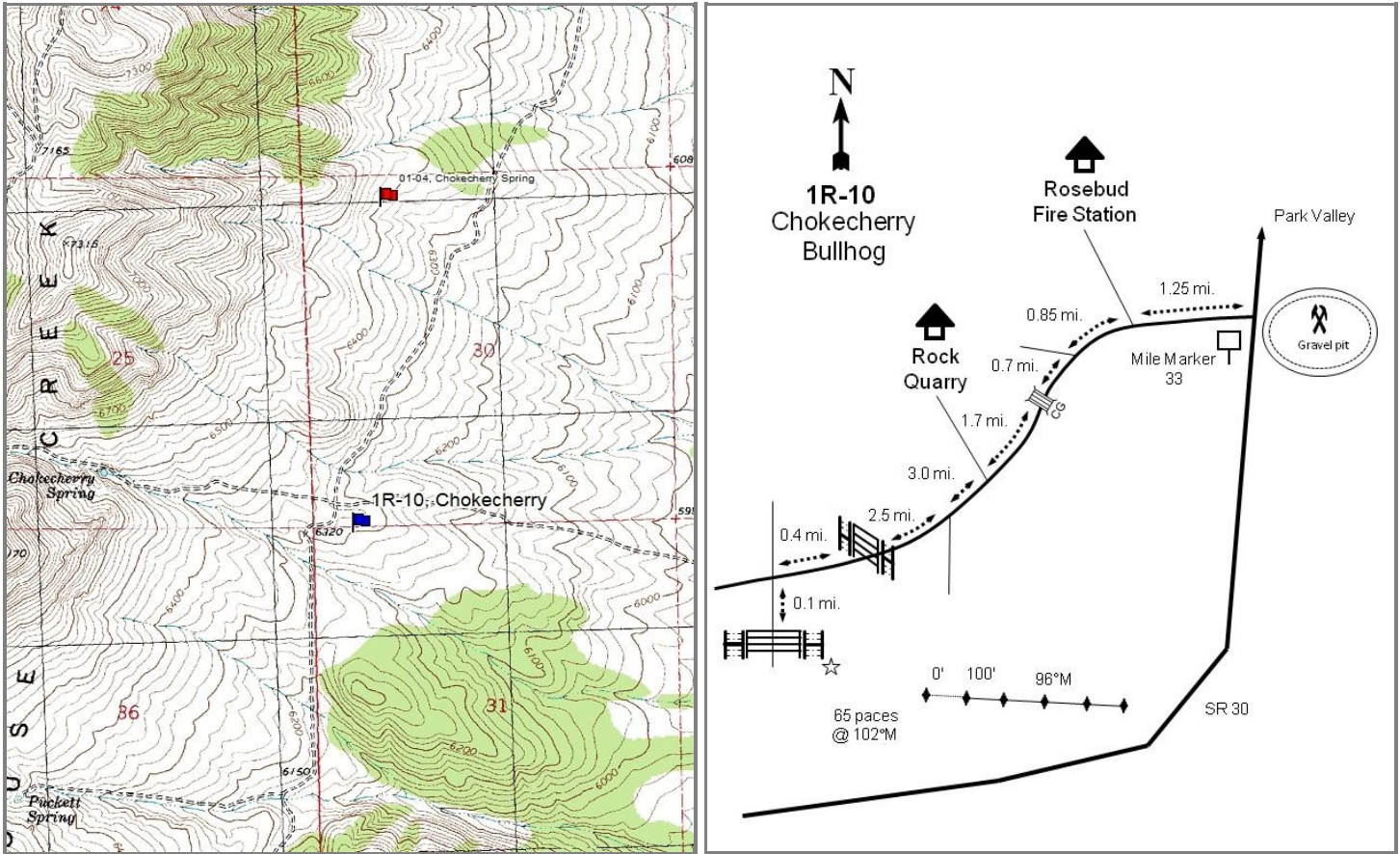
Year	Density		Age Class Distribution			Utilization		Poor Vigor (%)	Average Height Crown (cm)
	Plants Per Acre		Excluding Seedlings			Moderate (%)	Heavy (%)		
	Excluding Seedlings	Seedling	Young (%)	Mature (%)	Decadent (%)				
Artemisia nova^P -- (black sagebrush)									
2005	3220	14100	10	49	41	0	0	17	27/62
2010	640	220	6	91	3	0	0	3	37/46
2013	3000	1920	71	29	0	3	0	1	23/38
2017	560	-	57	21	21	0	14	4	21/45
Bassia prostrata^{Pi} -- (forage kochia)									
2005	-	-	-	-	-	-	-	-	-/-
2010	2040	-	14	86	0	6	3	0	31/34
2013	3600	320	32	68	0	6	0	0	24/36
2017	2020	-	12	85	3	4	0	1	27/38
Chrysothamnus viscidiflorus -- (yellow rabbitbrush)									
2005	140	-	29	71	0	29	29	0	17/27
2010	100	-	20	80	0	20	0	0	28/33
2013	220	-	55	46	0	0	27	9	25/39
2017	160	-	50	50	0	0	0	0	21/31
Eriogonum microthecum^P -- (slender buckwheat)									
2005	80	-	0	75	25	50	50	25	11/18
2010	-	-	-	-	-	-	-	-	-/-
2013	40	-	50	50	0	50	0	0	9/27
2017	-	-	-	-	-	-	-	-	-/-
Ericameria nauseosa -- (rubber rabbitbrush)									
2005	-	-	-	-	-	-	-	-	-/-
2010	-	-	-	-	-	-	-	-	36/37
2013	20	-	0	100	0	0	0	0	49/58
2017	-	-	-	-	-	-	-	-	-/-
Gutierrezia sarothrae -- (broom snakeweed)									
2005	140	200	14	86	0	0	0	0	14/19
2010	380	-	21	79	0	0	0	5	26/41
2013	3000	40	24	76	0	0	0	0	22/33
2017	120	40	0	100	0	0	0	0	18/24
Juniperus osteosperma^t -- (Utah juniper)									
2005	440	40	50	27	23	0	0	9	-/-
2010	200	40	40	60	0	0	0	0	-/-
2013	140	80	43	29	29	0	0	0	-/-
2017	40	-	100	0	0	0	0	50	-/-
Linanthus pungens -- (granite prickly phlox)									
2005	500	-	0	88	12	0	0	0	15/22
2010	20	-	0	100	0	0	0	0	15/29
2013	120	-	50	50	0	0	0	0	16/16
2017	-	-	-	-	-	-	-	-	17/19
Opuntia -- (pricklypear)									
2005	60	-	33	67	0	0	0	0	10/23
2010	80	-	0	100	0	0	0	0	11/23
2013	60	-	33	33	33	0	0	67	17/29
2017	40	-	0	100	0	0	0	0	11/29
Tetradymia canescens -- (spineless horsebrush)									
2005	-	-	-	-	-	-	-	-	-/-
2010	-	-	-	-	-	-	-	-	42/28

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

Table 01R-07.14 - 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)							
2010	311	20	70	5	5	-	7.3
2013	315	5	75	15	5	-	12.7
2017	40	50	50	-	-	-	3.8

CHOKECHERRY - STUDY NO. 01R-10



Location Information

USGS 7.5 min Map Info GPS (0' Stake)	Emigrant Pass SW; Township 10N, Range 16W, Section 31 NAD 83 UTM ZONE 12, 272286 East 4603680 North
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Transect Information

Browse Tag # (0' Stake) Transect Bearing Length Belt Placement Belt Marker Placement	Not Available 96° magnetic 500ft Line 1 (11ft), Line 2 (34ft), Line 3 (59ft), Line 4 (71ft), Line 5 (95ft) Standard
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Directions to Site

Drive west on SR-42 from Snowville, UT to Curlew Junction, turn south (left) onto SR-30, and drive past Park Valley, UT. Turn right (west) just before mile marker 33; on the road is a mailbox for the Rosebud fire station. Drive on the main road for 1.25 miles to a fork and stay left at the fork. Drive for 0.85 miles to another large fork in the road and proceed left after a manmade ditch. Drive for another 0.7 miles to a cattle guard. Continue for 1.7 miles to a fork in the road before a rock quarry. Stay left at the fork and drive southwest for 3.0 miles to another fork. Turn right (east) at the fork and proceed for 2.5 miles to a gate. Continue past the gate for 0.4 miles to a crossroad. Turn left and drive south for 0.1 miles to a gate. From the gate's eastern-most post, walk 65 paces at 102 degrees magnetic to the 0-foot stake.

Site Information

Land Ownership	Federal
Land Administrator	BLM
Allotment	MUDDY CREEK
Elevation	6,300ft (1,920m)
Aspect	East
Slope	6%
Sample Dates	06/23/2005, 08/11/2008, 07/09/2013, 07/19/2017

Table 01R-10.1 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 01R-10.2 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	Canby Bluegrass		0.55	0.46
G	Poa secunda	Sandberg Bluegrass	SID MT	0.09	0.07
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 01R-10.3 - Wildlife Seasonal Habitat.** UDWR wildlife habitat and seasonality.

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

Table 01R-10.4 - 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/Juniper	Phase I transitioning to Phase II
2008	Mountain Big Sagebrush	Phase I
2013	Mountain Big Sagebrush	Phase I
2017	Mountain Big Sagebrush/Annual Grass	Phase I

Site Notes

No Notes

Soils**Table 01R-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
Sandy Loam	7.6	58.2	24.0	17.8	1.1	11.5	297.6	0.6	06/23/2005

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 transitional model is available for this ecological site.

When established in 2005, this site was dominated by mountain big sagebrush (*Artemisia tridentata* ssp. *vaseyana*) with a diverse component of other shrub species present which provided little cover. Utah juniper (*Juniperus osteosperma*) trees were present, but also afforded limited cover (Table 01R-10.12). The herbaceous understory was comprised of native perennial grasses with a small component of cheatgrass (*Bromus tectorum*) and a number of annual forbs (Table 01R-10.10, Table 01R-10.11). Shrubs remained as the dominant vegetation component following treatment (Table 01R- 10.6). The herbaceous understory remained in good condition, though annual grass was sampled in high abundance in 2017 (Table 01R-10.7).

Trend Summary Tables

Table 01R-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
2005	20.6	3.1	5.3	21.3	4.2	8.3
2008	14.4	2.2	-	18.3	2.3	0.1
2013	19.1	2.6	0.0	21.1	2.8	-
2017	19.7	3.4	0.0	31.6	2.7	0.1

Table 01R-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
2005	303	328	289	206	4.3	12.0	7.3	2.6
2008	40	269	56	105	0.1	7.8	0.3	1.4
2013	188	333	168	78	1.1	10.7	0.8	1.6
2017	399	311	106	75	21.2	14.3	1.3	3.4

Table 01R-10.8 - 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	14.9	0.1	32.0	19.0	0.5	50.5
2008	9.4	0.2	59.4	17.9	0.2	23.7
2013	10.1	0.1	54.8	10.3	1.9	40.1
2017	12.0	0.1	46.2	8.8	0.3	51.1

Table 01R-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	Coyote	Mule Deer	Rocky Mountain Elk	Greater Sage- Grouse	Rabbit
	Quadrat Frequency					
2005	6	-	21	-	-	32
2008	4	-	13	1	1	26
2013	4	-	13	-	-	1
2017	5	-	12	-	-	38
Year	Days Use Per Acre (ha)					
2005	7.2 (17.9)	8.7 (21.5)*	27.5 (67.9)	2.0 (5.0)	-	-
2008	9.4 (23.3)	-	17.4 (43.0)	-	-	-
2013	14.5 (35.9)	-	19.4 (48.0)	-	-	-
2017	18.9 (46.6)	-	22.8 (56.3)	-	-	-

*Pellets per acre (ha)

Table 01R-10.10 - Grass Species. Nested frequency and modified Daubenmire average cover by year.

GRASS SPECIES	Achnatherum hymenoides (Indian ricegrass)	Achnatherum pinetorum (pine needlegrass)	Bromus tectorum ^{ai} (cheatgrass)	Carex (sedge)	Elymus elymoides (squirreltail)	Pascopyrum smithii (western wheatgrass)	Poa secunda (Sandberg bluegrass)	Pseudoroegneria spicata (bluebunch wheatgrass)	Vulpia octoflora ^a (sixweeks fescue)
year	Nested Frequency								
2005	10	43	296	3	28	64	241	40	25
2008	21	59	40	-	6	58	195	41	-
2013	14	62	188	4	13	86	255	54	-
2017	17	41	396	10	3	97	232	48	35
year	Average Cover (%)								
2005	0.2	1.8	4.2	0.0	0.4	0.7	7.5	1.4	0.1
2008	0.4	1.9	0.1	-	0.3	1.0	3.4	0.9	-
2013	0.6	1.3	1.1	0.0	0.2	0.6	5.9	2.0	-
2017	0.2	0.6	20.6	0.3	0.0	1.9	9.8	1.4	0.6

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

Table 01R-10.11 - 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)	Androsace septentrionalis ^a (pygmyflower rockjasmine)	Apiaceae (parsley family)	Arabis (rockcress)	Astragalus (milkvetch)	Astragalus convallarius (lesser rushy milkvetch)	Astragalus utahensis (Utah milkvetch)	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 ^a (bird s-beak)	Crepis acuminata (tapertip hawkbeard)	Cryptantha (cryptantha)
year	Nested Frequency																
2005	2	101	-	2	2	-	17	-	5	2	4	229	1	2	-	2	76
2008	1	19	-	-	-	-	7	-	-	-	-	29	2	5	-	-	10
2013	1	3	19	-	-	3	-	-	-	3	3	156	-	5	2	-	7
2017	-	9	40	-	-	-	-	0	-	-	-	60	2	14	-	-	7
year	Average Cover (%)																
2005	0.0	0.8	-	0.0	0.0	-	0.3	-	0.0	0.0	0.0	5.8	0.0	0.1	-	0.0	0.4
2008	0.0	0.1	-	-	-	-	0.0	-	-	-	-	0.1	0.0	0.0	-	-	0.1
2013	0.0	0.0	0.0	-	-	0.0	-	-	-	0.0	0.0	0.6	-	0.1	0.0	-	0.2
2017	-	0.0	0.5	-	-	-	-	0.0	-	-	-	0.7	0.0	0.1	-	-	0.1

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

FORB SPECIES	Cryptantha watsonii ^a (Watson's cryptantha)	Delphinium nuttallianum (two-lobed larkspur)	Gayophytum ramosissimum ^a (pinyon groundsmoke)	Gilia inconspicua ^a (shy gilia)	Lactuca scariola ⁱⁱ (prickly lettuce)	Lappula occidentalis ^a (flatspine stickseed)	Linum perenne ⁱ (blue flax)	Lupinus argenteus (silvery lupine)	Medicago sativa ⁱ (alfalfa)	Microsteris gracilis ^a (slender phlox)	Navarretia intertexta ^a (needleleaf navarretia)	Phlox austromontana (mountain phlox)	Phlox longifolia (longleaf phlox)	Pleiacanthus spinosus (thorn skeletonweed)	Tragopogon dubius ⁱⁱ (yellow salsify)	unknown annual forb ^a (unknown forb)
year	Nested Frequency															
2005	-	5	38	13	-	1	-	9	-	133	16	-	54	1	-	9
2008	-	-	21	1	-	3	-	11	-	11	4	-	72	2	-	-
2013	-	-	0	-	-	-	4	18	0	10	10	-	48	-	-	-
2017	6	-	-	7	4	1	-	35	0	8	1	5	7	-	3	-
year	Average Cover (%)															
2005	-	0.1	0.2	0.1	-	0.0	-	0.6	-	1.1	0.1	-	0.3	0.0	-	0.0
2008	-	-	0.1	0.0	-	0.0	-	0.9	-	0.0	0.0	-	0.3	0.0	-	-
2013	-	-	0.0	-	-	-	0.0	1.1	0.0	0.0	0.1	-	0.1	-	-	-
2017	0.0	-	-	0.0	0.0	0.0	-	3.0	0.1	0.0	0.0	0.0	0.0	-	0.0	-

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

Table 01R-10.12 - 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)	Chrysothamnus viscidiflorus ssp. viscidiflorus var. viscidiflorus (yellow rabbitbrush)	Ericameria nauseosa (rubber rabbitbrush)	Juniperus osteosperma ⁱ (Utah juniper)	Linanthus pungens (granite prickly phlox)	Opuntia (pricklypear)	Purshia tridentata ^p (antelope bitterbrush)	Symphoricarpos oreophilus (mountain snowberry)
year	Line Intercept Cover (%)								
2005	-	19.5	3.1	-	8.3	-	-	1.8	1.1
2008	-	16.7	1.9	-	0.1	0.1	0.1	1.6	0.2
2013	-	19.8	2.2	-	-	0	-	1.3	0.6
2017	-	28.5	1.9	-	0.1	-	-	3.1	0.8
year	Quadrat Cover (%)								
2005	-	19.4	2.2	-	5.3	0.2	0.0	1.2	0.6
2008	-	13.6	2.0	-	0.0	0.1	0.0	0.8	0.1
2013	-	17.9	2.1	-	0.0	0.0	0.1	1.2	0.4
2017	0.4	17.9	1.6	0.8	0.0	0.0	0.0	1.4	0.8

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

Table 01R-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.

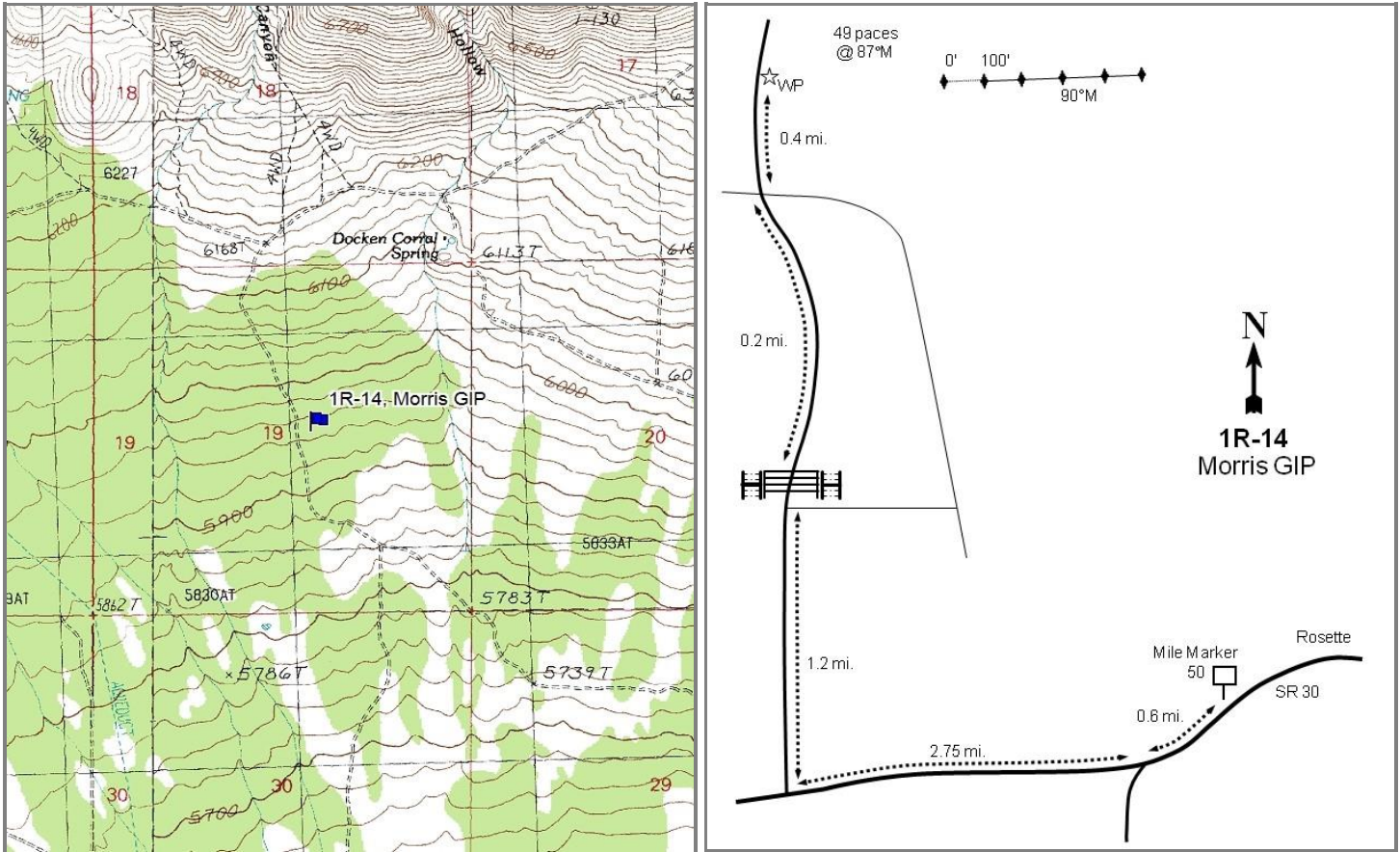
Year	Density		Age Class Distribution			Utilization		Poor Vigor (%)	Average Height Crown (cm)
	Plants Per Acre		Excluding Seedlings			Moderate (%)	Heavy (%)		
	Excluding Seedlings	Seedling	Young (%)	Mature (%)	Decadent (%)				
Amelanchier utahensis^p -- (Utah serviceberry)									
2005	-	-	-	-	-	-	-	-	-/-
2008	-	-	-	-	-	-	-	-	-/-
2013	-	-	-	-	-	-	-	-	-/-
2017	-	-	-	-	-	-	-	-	67/87
Artemisia nova^p -- (black sagebrush)									
2005	20	60	0	100	0	0	0	0	-/-
2008	-	-	-	-	-	-	-	-	-/-
2013	-	-	-	-	-	-	-	-	28/108
2017	120	-	0	100	0	0	0	0	43/55
Artemisia tridentata ssp. vaseyana^p -- (mountain big sagebrush)									
2005	3940	8640	6	66	29	12	4	14	65/93
2008	3480	40	2	36	63	24	1	32	55/83
2013	3720	20	16	68	17	16	0	27	49/79
2017	4300	-	10	80	11	14	2	5	59/87
Chrysothamnus viscidiflorus ssp. viscidiflorus var. stenophyllus -- (yellow rabbitbrush)									
2005	-	-	-	-	-	-	-	-	-/-
2008	-	-	-	-	-	-	-	-	-/-
2013	-	-	-	-	-	-	-	-	-/-
2017	20	-	0	100	0	0	0	0	24/43
Chrysothamnus viscidiflorus ssp. viscidiflorus var. viscidiflorus -- (yellow rabbitbrush)									
2005	960	-	0	94	6	2	0	4	29/52
2008	1240	80	3	74	23	0	0	23	24/37
2013	1060	20	6	94	0	15	2	47	28/46
2017	1140	-	5	95	0	2	4	0	31/45
Ericameria nauseosa -- (rubber rabbitbrush)									
2005	-	-	-	-	-	-	-	-	48/42
2008	-	-	-	-	-	-	-	-	56/59
2013	20	-	0	100	0	0	0	0	28/47
2017	20	-	0	100	0	0	0	0	65/70
Juniperus osteosperma^t -- (Utah juniper)									
2005	40	40	50	50	0	0	0	0	-/-
2008	80	-	100	0	0	0	0	0	-/-
2013	60	40	100	0	0	0	0	0	-/-
2017	280	-	57	43	0	0	0	0	-/-
Linanthus pungens -- (granite prickly phlox)									
2005	380	-	0	95	5	0	0	0	19/29
2008	140	-	0	71	29	0	0	0	15/17
2013	60	-	0	100	0	0	0	0	15/22
2017	80	-	0	100	0	0	0	0	17/19
Opuntia -- (pricklypear)									
2005	140	-	0	100	0	0	0	0	12/24
2008	180	-	0	67	33	0	0	33	11/27
2013	100	-	0	100	0	0	0	0	12/25
2017	160	-	0	100	0	0	0	0	11/19
Purshia tridentata^p -- (antelope bitterbrush)									
2005	80	-	0	100	0	50	50	0	86/138
2008	80	-	0	25	75	25	0	25	85/138
2013	140	-	14	86	0	71	0	14	90/132
2017	120	-	17	83	0	67	0	0	95/155
Symphoricarpos oreophilus -- (mountain snowberry)									
2005	60	-	33	67	0	0	0	0	74/169
2008	80	-	50	50	0	0	0	0	63/127
2013	120	-	0	100	0	0	0	0	55/126
2017	100	-	0	100	0	20	0	0	64/140

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

Table 01R-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)							
2005	74	-	-	58	21	21	18.4
2008	5	-	67	33	-	-	16.3
2013	13	11	78	11	-	-	3.6
2017	21	22	33	44	-	-	4.3

MORRIS GIP - STUDY NO. 01R-14



Location Information

USGS 7.5 min Map Info
GPS (0' Stake)

Rosette NW; Township 13N, Range 14W, Section 19
NAD 83 UTM ZONE 12, 293027 East 4634751 North

Transect Information

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

241
60° magnetic
400ft
Line 1 (11ft & 71ft), Line 2 (34ft), Line 3 (59ft), Line 4 (95ft)
No Rebar

Directions to Site

Drive west on SR-42 from Snowville, UT to Curlew Junction and turn south (left) onto SR-30 toward Park Valley, UT. Continue on SR-30 past Rosette, and turn right 0.6 miles after mile marker 50 by the sign to Lynn (onto 17600 North). Drive 2.75 miles to a gate on the right (north). From the gate, continue for 1.2 miles north to another gate. Drive for 0.2 miles to a fork, stay to the right, and proceed for 0.4 miles to the witness post on the right (east) side of the road. The 0-foot stake is 49 paces from the witness post at 87 degrees magnetic and is marked with browse tag #241.

Site Information

Land Ownership	Private
Land Administrator	Private
Allotment	No data
Elevation	5,914ft (1,803m)
Aspect	South
Slope	6%
Sample Dates	08/13/2008, 07/10/2013, 07/18/2017

Table 01R-14.1 Disturbance History. Recorded history of major disturbances.

Treatment/Disturbance	Name	WRI DB#	Date	Size (acres)
Mechanical – Push	Morris Ranch	1503	November-December 2008	797
Seeding - Rangeland Drill	Morris Ranch	1503	November-December 2008	797

Table 01R-14.2 Seed Mix. List of known seeded plant species and rates (if available).

Mix Name			Application Type	Application Date	Acres
Morris Ranch			Drill	Dec 2008	450
Type	Species	Common Name	Cultivar/Source ID	Bulk lbs/acre	PLS lbs/acre
G	Agropyron cristatum	Crested Wheatgrass	Nordan	2.00	1.78
G	Agropyron fragile	Siberian Wheatgrass	Vavilov	1.00	0.84
G	Elymus wawawaiensis	Snake River Wheatgrass	Secar	2.00	1.85
G	Pseudoroegneria spicata	Bluebunch Wheatgrass	Anatone	1.00	0.82
G	Thinopyrum intermedium	Pubescent Wheatgrass	Luna	2.00	1.80
F	Medicago sativa	Alfalfa	Ladak	0.44	0.40
F	Medicago sativa	Alfalfa	Ranger	0.56	0.51
F	Onobrychis viciifolia	Sainfoin	Eski	1.44	1.40
F	Onobrychis viciifolia	Sainfoin	Eski	0.54	0.47
F	Sanguisorba minor	Small Burnet	Delar	1.00	0.95
S	Atriplex canescens	Fourwing Saltbush	Central UT	1.00	0.43
S	Bassia prostrata	Forage Kochia	Humbolt/Lander NV	1.00	0.67

Wildlife Habitat and Vegetation History**Table 01R-14.3 - Wildlife Seasonal Habitat.** UDWR wildlife habitat and seasonality.

Species	Habitat	Season	Brood/Young Rearing
Greater Sage Grouse	occupied	year-long	brood-rearing

Table 01R-14.4 - Vegetation History. The dominant vegetation type(s) and phase of woodland succession (Tausch, Miller, Roundy, & Chambers, 2009).

Year	Vegetation Type	Woodland Succession
2008	Juniper/Black Sagebrush	Phase III
2013	Perennial Grass/Wyoming Big Sagebrush	Phase I
2017	Perennial Grass/Wyoming Big Sagebrush	Phase I

Site Notes

This site was bulldozed. In 2013, the transect was moved to fall in the treatment area without crossing windrows. The trees were pushed into windrows and then burned, although some of the trees were left for windbreaks and cover habitat. In 2013, two sage grouse were seen flying out of the windrows.

Site Potential

1981 - 2010 Average Annual Precipitation	13 inches
NRCS Ecological Site	Upland Shallow Loam (Black Sagebrush)
NRCS Ecological Site #	R028AY325UT
States and Transitions	No state and transition model is available for this ecological site.

When established in 2008, the site was a mixed stand of Utah juniper (*Juniperus osteosperma*) and black sagebrush (*Artemisia nova*) with a diverse component of other shrub species present which provided limited cover (Table 01R- 14.12). Sandberg bluegrass (*Poa secunda*) made up a majority of the herbaceous understory with limited cover being provided by perennial and annual grass and forb species (Table 01R-14.10, Table 01R-14.11). Following the treatment the site was dominated by Wyoming big sagebrush (*A. tridentata* ssp. *wyomingensis*) and forage kochia (*Bassia prostrata*) (Table 01R-14.12). The herbaceous understory has been comprised mainly of seeded perennial introduced grasses following treatment, though forb cover was still limited (Table 01R-14.7).

Trend Summary Tables

Table 01R-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
2008	2.5	0.2	7.9	3.1	0.3	38.6
2013	6.0	0.0	0.1	9.5	0.1	-
2017	9.8	0.1	-	11.4	0.4	0.1

Table 01R-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
2008	76	230	34	108	0.2	2.7	0.1	0.9
2013	339	284	65	103	1.7	11.8	0.2	1.7
2017	292	322	72	32	3.3	17.1	0.1	0.8

Table 01R-14.8 - 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
2008	13.4	0.4	53.8	26.7	3.6	14.9
2013	20.7	-	32.4	16.4	8.3	27.7
2017	27.8	0.0	24.7	28.2	5.4	33.6

Table 01R-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	Rocky Mountain Elk	Rabbit
	Quadrat Frequency			
2008	1	3	-	72
2013	2	-	-	5
2017	2	2	-	30
Days Use Per Acre (ha)				
2008	2.2 (5.4)	2.7 (6.6)	-	-
2013	20.3 (50.2)	4.0 (9.9)	-	-
2017	1.5 (3.6)	6.0 (14.9)	0.7 (1.7)	-

Table 01R-14.10 - 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 ⁿⁱ (cheatgrass)	Elymus elymoides (squirreltail)	Hordeum jubatum (foxtail barley)	Pascopyrum smithii (western wheatgrass)	Poa secunda (Sandberg bluegrass)	Pseudoroegneria spicata (bluebunch wheatgrass)	Thinopyrum intermedium ⁱ (intermediate wheatgrass)	Vulpia octoflora ^a (sixweeks fescue)
year	Nested Frequency									
2008	-	-	74	28	-	29	195	9	-	2
2013	124	72	338	35	1	5	123	51	42	13
2017	209	24	282	20	-	26	148	80	38	55
year	Average Cover (%)									
2008	-	-	0.2	0.2	-	0.1	2.4	0.1	-	0.0
2013	3.2	2.1	1.7	0.9	0.0	0.0	1.6	2.0	1.9	0.0
2017	8.7	0.6	3.1	0.3	-	0.8	2.4	3.4	0.9	0.2

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

Table 01R-14.11 - Forb Species. Nested frequency and modified Daubenmire average cover by year.

FORB SPECIES	Agoseris glauca (pale agoseris)	Alyssum desertorum ^{ai} (desert madwort)	Ceratocephala testiculata ^{ai} (curveseed butterwort)	Chaenactis douglasii (Douglas' dustymaiden)	Collinsia parviflora ^a (maiden blue eyed Mary)	Cryptantha (cryptantha)	Cymopterus (springparsley)	Descurainia pinnata ^a (western tansymustard)	Eriogonum cernuum ^a (nodding buckwheat)	Eriogonum ovalifolium (cushion buckwheat)	Eriogonum shockleyi (Shockley's buckwheat)	Eriogonum umbellatum (sulphur-flower buckwheat)	Medicago sativa ⁱ (alfalfa)	Microsteris gracilis ^a (slender phlox)	Onobrychis vicifolia ⁱ (sainfoin)	Penstemon (beardtongue)	Phlox longifolia (longleaf phlox)
year	Nested Frequency																
2008	-	-	3	5	3	3	-	-	-	-	12	34	-	24	-	1	77
2013	7	49	9	2	-	1	3	4	6	-	-	23	2	5	21	6	47
2017	-	65	-	2	-	2	7	5	-	3	3	14	-	-	-	-	4
year	Average Cover (%)																
2008	-	-	0.0	0.0	0.0	0.0	-	-	-	-	0.1	0.6	-	0.0	-	0.0	0.2
2013	0.0	0.1	0.0	0.0	-	0.0	0.0	0.0	0.0	-	-	0.8	0.1	0.0	0.3	0.2	0.3
2017	-	0.1	-	0.0	-	0.0	0.0	0.0	-	0.0	0.0	0.7	-	-	-	-	0.0

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

FORB SPECIES	Polygonum douglasii ^{ai} (Douglas' knotweed)	Sanguisorba minor ⁱ (small burnet)	Tragopogon dubius ^{ai} (yellow salsify)
year	Nested Frequency		
2008	4	-	-
2013	-	2	-
2017	-	-	2
year	Average Cover (%)		
2008	0.0	-	-
2013	-	0.0	-
2017	-	-	0.0

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

Table 01R-14.12 - 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)	2008	3.1	-	-	-	-	38.6	0.2	0.1	-
Artemisia tridentata ssp. vaseyana ^p (mountain big sagebrush)	2013	0.5	4.5	4.4	0.1	0.1	-	-	-	-
Bassia prostrata ^{pi} (forage kochia)	2017	1.9	7.8	1.5	0.4	0.2	0.1	-	-	-
Ericameria nauseosa (rubber rabbitbrush)	year	Quadrat Cover (%)								
Eriogonum microthecum ^p (slender buckwheat)	2008	2.5	-	-	-	0.0	7.9	0.2	0.0	0.0
Juniperus osteosperma ^t (Utah juniper)	2013	0.5	2.7	2.8	0.0	0.0	0.1	0.0	0.0	-
Linanthus pungens (granite prickly phlox)	2017	1.1	6.8	1.8	0.0	0.1	0.0	-	0.1	-
Opuntia (pricklypear)										
Purshia tridentata ^p (antelope bitterbrush)										

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

Table 01R-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 nova^p -- (black sagebrush)									
2008	2800	140	6	32	61	25	20	38	27/46
2013	1180	220	48	53	0	0	0	0	19/35
2017	3260	20	44	55	1	1	0	0	19/38
Artemisia tridentata ssp. vaseyana^p -- (mountain big sagebrush)									
2008	-	-	-	-	-	-	-	-	-/-
2013	4400	3840	80	21	0	1	1	3	32/45
2017	6700	-	47	53	0	12	7	0	29/50
Atriplex canescens^p -- (fourwing saltbush)									
2008	-	-	-	-	-	-	-	-	-/-
2013	-	-	-	-	-	-	-	-	31/27
2017	-	-	-	-	-	-	-	-	-/-
Bassia prostrata^{pi} -- (forage kochia)									
2008	-	-	-	-	-	-	-	-	-/-
2013	5240	1240	41	59	0	3	0	23	22/28
2017	4000	180	12	87	1	8	0	0	12/19
Chrysothamnus viscidiflorus -- (yellow rabbitbrush)									
2008	-	-	-	-	-	-	-	-	-/-
2013	20	-	100	0	0	0	0	0	-/-
2017	-	-	-	-	-	-	-	-	35/57
Eriogonum microthecum^p -- (slender buckwheat)									
2008	480	-	13	88	0	38	29	0	13/17
2013	280	-	21	79	0	43	0	36	13/27
2017	860	-	7	93	0	5	0	0	9/18
Ericameria nauseosa -- (rubber rabbitbrush)									
2008	-	-	-	-	-	-	-	-	-/-
2013	20	-	0	100	0	0	100	0	42/51
2017	20	-	0	100	0	0	0	0	55/77
Juniperus osteosperma^t -- (Utah juniper)									
2008	700	160	23	77	0	0	0	0	-/-
2013	40	20	100	0	0	0	0	0	-/-
2017	40	-	100	0	0	0	0	0	-/-

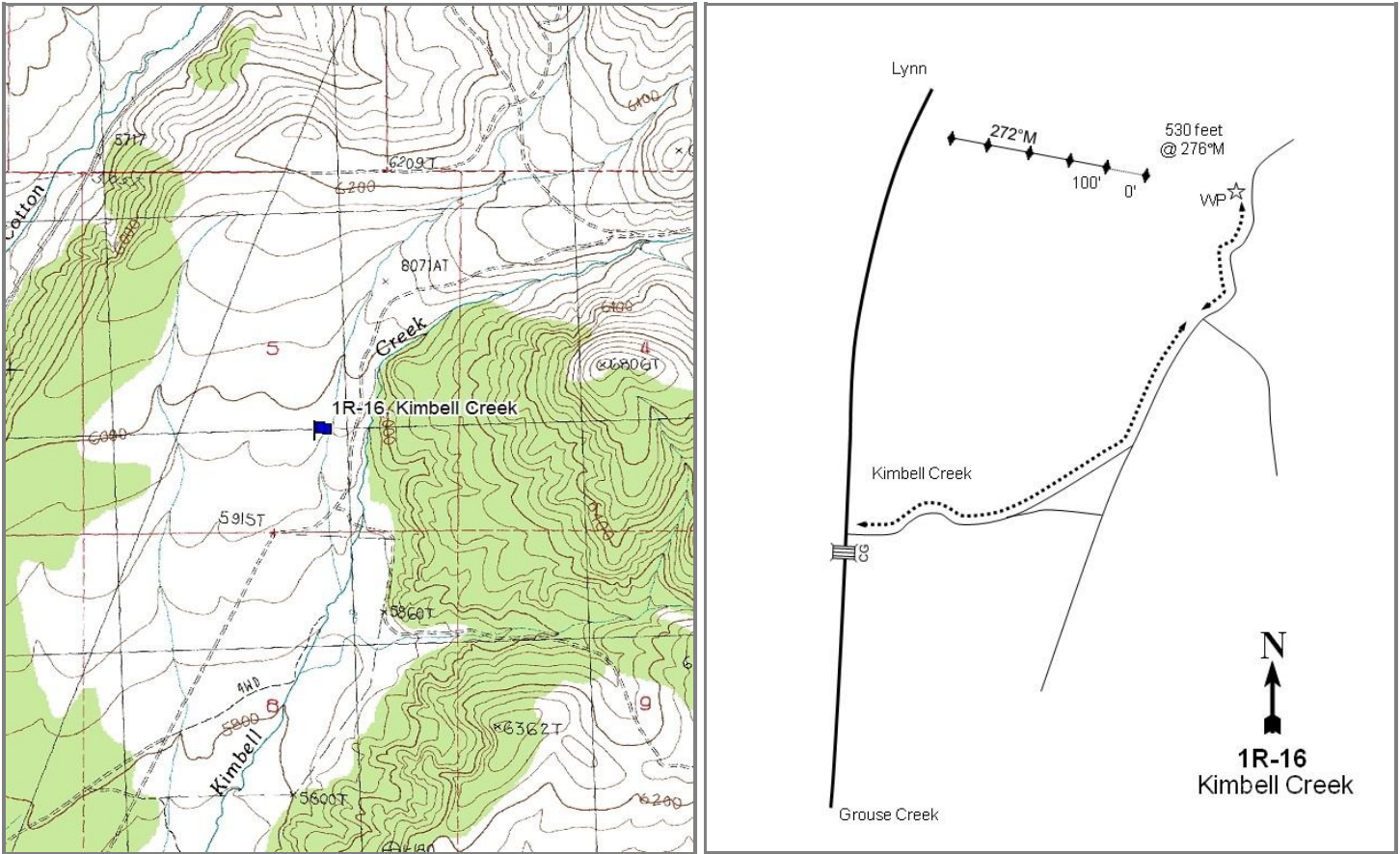
Year	Density		Age Class Distribution			Utilization		Poor Vigor (%)	Average Height Crown (cm)
	Plants Per Acre		Excluding Seedlings			Moderate (%)	Heavy (%)		
	Excluding Seedlings	Seedling	Young (%)	Mature (%)	Decadent (%)				
Linanthus pungens -- (granite prickly phlox)									
2008	280	-	14	79	7	0	0	0	10/16
2013	40	-	50	50	0	0	0	100	18/38
2017	40	-	0	100	0	0	0	0	14/26
Opuntia -- (pricklypear)									
2008	340	-	12	65	24	0	0	12	10/31
2013	260	-	39	54	8	0	0	8	12/21
2017	240	-	17	83	0	0	0	0	8/20
Purshia tridentata ^P -- (antelope bitterbrush)									
2008	-	-	-	-	-	-	-	-	37/112
2013	-	-	-	-	-	-	-	-	46/114
2017	-	-	-	-	-	-	-	-	67/158
Symphoricarpos oreophilus -- (mountain snowberry)									
2008	-	-	-	-	-	-	-	-	44/81

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

Table 01R-14.14 - 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	796	10	15	25	35	15	20.4
2013	21	44	56	-	-	-	4.2
2017	13	80	20	-	-	-	2.4

KIMBELL CREEK - STUDY NO. 01R-16



Location Information

USGS 7.5 min Map Info	Kimbell Creek SW; Township 12N, Range 17W, Section 05
GPS (0' Stake)	NAD 83 UTM ZONE 12, 265795 East 4630153 North

Transect Information

Browse Tag # (0' Stake)	Not Available
Transect Bearing	272° magnetic
Length	500ft
Belt Placement	Line 1 (11ft), Line 2 (34ft), Line 3 (59ft), Line 4 (71ft), Line 5 (95ft)
Belt Marker Placement	No Rebar

Directions to Site

Drive north from Grouse Creek to the Kimbell Creek sign and a cattleguard. Turn right and continue for 2.3 miles, then turn left. Continue for 0.1 miles to a witness post on the left (west) side of the road. From the witness post, walk 530 feet, over a ridge and up a drainage, at 96 degrees magnetic to the 0-foot stake.

Site Information

Land Ownership	Federal
Land Administrator	BLM
Allotment	KIMBALL CREEK
Elevation	5,930ft (1,807m)
Aspect	Southeast
Slope	3-7%
Sample Dates	07/19/2010, 07/09/2013, 07/17/2017

Table 01R-16.1 Disturbance History. Recorded history of major disturbances.

Treatment/Disturbance	Name	WRI DB#	Date	Size (acres)
Seeding - Broadcast Unknown	Kimball Creek Greater Sage Grouse Brood Rearing Habitat Enhancement	1739	October 2010	106
Harrow - One-Way Chain	Kimball Creek Greater Sage Grouse Brood Rearing Habitat Enhancement	1739	October 2010	106

Table 01R-16.2 Seed Mix. List of known seeded plant species and rates (if available).

Mix Name		Application Type	Application Date	Acres	
Kimball Creek Sage Grouse Habitat Enhancement		Broadcast	Oct 2010	144	
Type	Species	Common Name	Cultivar/Source ID	Bulk lbs/acre	PLS lbs/acre
G	<i>Pascopyrum smithii</i>	Western Wheatgrass	Arriba	2.08	1.72
G	<i>Pseudoroegneria spicata</i>	Bluebunch Wheatgrass	Anatone	2.08	1.89
F	<i>Achillea millefolium</i>	Western Yarrow	Eagle Mountain	0.14	0.12
F	<i>Astragalus cicer</i>	Cicer Milkvetch	Lutana	2.08	1.89
F	<i>Balsamorhiza sagittata</i>	Arrowleaf Balsamroot		0.01	0.01
F	<i>Balsamorhiza sagittata</i>	Arrowleaf Balsamroot	Sanpete/Millard UT	1.04	0.84
F	<i>Cleome serrulata</i>	Rocky Mountain Beeplant	Millard UT	1.04	0.97
F	<i>Linum perenne</i>	Blue Flax	Appar	0.52	0.46
F	<i>Medicago sativa</i>	Alfalfa	Ladak	1.04	0.97
F	<i>Onobrychis viciifolia</i>	Sainfoin	Eski	3.13	2.97
F	<i>Penstemon palmeri</i>	Palmer Penstemon	White Pine NV	0.52	0.48
F	<i>Sanguisorba minor</i>	Small Burnet	Delar	3.13	2.97

Wildlife Habitat and Vegetation History**Table 01R-16.3 - Wildlife Seasonal Habitat.** UDWR wildlife habitat and seasonality.

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

Table 01R-16.4 - Vegetation History. The dominant vegetation type(s) and phase of woodland succession (Tausch, Miller, Roundy, & Chambers, 2009).

Year	Vegetation Type	Woodland Succession
2010	Basin Big Sagebrush/Low Sagebrush/Juniper	Phase I transitioning to Phase II
2013	Low Sagebrush	Phase I
2017	Low Sagebrush/Annual Grass	Phase I

Site Notes

This study was established to monitor the Kimbell Creek Sage Grouse Brood Rearing Habitat Enhancement project.

Site Potential

1981 - 2010 Average Annual Precipitation	12 inches
NRCS Ecological Site	Upland Loam (Mountain Big Sagebrush)
NRCS Ecological Site #	028AY310UT
States and Transitions	No state and transition model is available for this ecological site.

When established in 2010, this site was a mixed stand of basin big sagebrush (*Artemisia tridentata* ssp. *tridentata*), low sagebrush (*A. arbuscula*), and Utah juniper (*Juniperus osteosperma*) with a few other shrub species present which provided limited cover (Table 01R-16.12). Sandberg bluegrass (*Poa secunda*) made up a majority of the herbaceous understory with a small component of perennial and annual forb species also present (Table 01R-16.7). Following the tree-removing treatment, low sagebrush became the dominant species, while basin big sagebrush and Utah juniper cover decreased substantially (Table 01R-16.12). Perennial grasses initially decreased as well, while perennial forbs increased in cover. As time since treatment has increased, perennial grasses have increased on the site. However, annual grass cover was high in 2017 (Table 01R-16.7, Table 01R-16.10, Table 01R-16.11).

Trend Summary Tables

Table 01R-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
2010	20.7	6.4	5.2	28.1	8.9	6.9
2013	16.1	4.2	0.0	21.5	5.4	0.2
2017	17.3	3.6	0.4	26.8	6.1	0.2

Table 01R-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
2010	69	343	153	206	0.6	13.1	1.1	2.8
2013	97	298	254	292	0.6	4.4	1.1	3.6
2017	312	322	257	203	21.4	12.8	4.4	3.4

Table 01R-16.8 - 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
2010	30.2	-	39.1	9.8	1.3	47.6
2013	21.9	-	43.7	4.7	2.8	35.2
2017	17.8	0.0	34.4	3.4	2.2	53.2

Table 01R-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	Rocky Mountain Elk	Rabbit
	Quadrat Frequency			
2010	1	-	-	-
2013	5	2	-	2
2017	7	1	-	6
Year	Days Use Per Acre (ha)			
2010	5.8 (14.3)	1.3 (3.3)	0.7 (1.7)	-
2013	12.3 (30.5)	5.3 (13.2)	-	-
2017	16.0 (39.5)	-	-	-

Table 01R-16.10 - Grass Species. Nested frequency and modified Daubenmire average cover by year.

GRASS SPECIES	Achnatherum hymenoides (Indian ricegrass)	Bromus tectorum ^{ai} (cheatgrass)	Elymus elymoides (squirreltail)	Koeleria macrantha (prairie Junegrass)	Pascopyrum smithii (western wheatgrass)	Poa bulbosa ⁱ (bulbous bluegrass)	Poa secunda (Sandberg bluegrass)	Pseudoroegneria spicata (bluebunch wheatgrass)
year	Nested Frequency							
2010	-	69	26	-	61	2	334	3
2013	1	97	13	-	142	-	242	9
2017	-	312	2	6	136	2	277	21
year	Average Cover (%)							
2010	-	0.6	0.5	-	0.4	0.0	12.2	0.0
2013	0.0	0.6	0.2	-	0.9	-	3.1	0.2
2017	-	21.4	0.0	0.1	2.4	0.0	9.9	0.4

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

Table 01R-16.11 - 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)	Arabis (rockcress)	Astragalus (milkvetch)	Balsamorhiza sagittata (arrowleaf balsamroot)	Calochortus nuttallii (sego lily)	Camelina microcarpa ^{ai} (litttlepod false flax)	Castilleja angustifolia (northwestern Indian paintbrush)	Ceratocephala testiculata ^{ai} (curveseed butterwort)	Chaenactis douglasii (Douglas' dustymaiden)	Cleome serrulata ^a (Rocky Mountain beeplant)	Collinsia parviflora ^a (maiden blue eyed Mary)	Collomia linearis ^a (tiny trumpet)	Comandra umbellata (bastard toadflax)	Cordylanthus ^a (bird's-beak)
year	Nested Frequency																
2010	-	22	52	29	11	12	8	-	-	-	-	1	-	-	-	39	6
2013	5	11	30	7	1	-	9	3	2	-	15	7	7	26	-	34	24
2017	37	1	75	41	2	7	15	-	33	7	50	-	-	151	9	44	35
year	Average Cover (%)																
2010	-	0.0	0.1	0.2	0.1	0.2	0.3	-	-	-	-	0.0	-	-	-	0.3	0.0
2013	0.0	0.0	0.1	0.0	0.0	-	0.1	0.0	0.0	-	0.1	0.0	0.0	0.1	-	0.1	0.1
2017	0.8	0.0	0.3	1.3	0.0	0.1	0.2	-	0.3	0.0	0.4	-	-	0.8	0.0	0.5	0.8

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

FORB SPECIES	Crepis acuminata (tapertip hawkbeard)	Cryptantha gracilis ^a (narrowstem cryptantha)	Cymopterus (springparsley)	Delphinium nuttallianum (twolobe larkspur)	Descurainia pinnata ^a (western tansymustard)	Epilobium brachycarpum ^a (tall annual willowherb)	Eriogonum brevicaule (shortstem buckwheat)	Fritillaria pudica (yellow fritillary)	Gilia inconspicua ^a (shy gilia)	Hackelia patens (spotted stickseed)	Hedysarum boreale (Utah sweetvetch)	Ionactis alpina (Lava aster)	Lactuca serriola ^{ai} (prickly lettuce)	Lappula occidentalis ^a (flatspine stickseed)	Lesquerella (bladderpod)	Linum perenne ⁱ (blue flax)	Lomatium (desertparsley)
year	Nested Frequency																
2010	-	8	-	-	-	-	-	-	20	-	1	-	-	4	3	-	-
2013	2	6	9	5	1	21	5	-	5	1	-	-	4	6	3	37	-
2017	-	7	-	-	6	-	-	3	-	1	-	10	10	4	1	45	3
year	Average Cover (%)																
2010	-	0.1	-	-	-	-	-	-	0.1	-	0.0	-	-	0.0	0.0	-	-
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	0.6	-
2017	-	0.0	-	-	0.0	-	-	0.0	-	0.0	-	0.1	0.0	0.0	0.0	0.5	0.0

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

FORB SPECIES														
Lupinus argenteus (silvery lupine)														
Machaeranthera canescens (hoary tansyaster)														
Medicago sativa ⁱ (alfalfa)														
Microseris nutans (nodding microseris)														
Microsteris gracilis ^a (slender phlox)														
Onobrychis vicifolia ⁱ (sainfoin)														
Penstemon (beardtongue)														
Phlox hoodii (spiny 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)														
Zigadenus paniculatus (foothill deathcamas)														
year	Nested Frequency													
2010	5	-	-	-	112	-	4	-	131	6	-	-	-	-
2013	8	1	9	-	119	13	3	-	246	49	10	-	106	0
2017	5	-	9	23	44	2	-	3	20	5	1	3	42	-
year	Average Cover (%)													
2010	0.0	-	-	-	0.7	-	0.2	-	1.6	0.0	-	-	-	-
2013	0.0	0.0	0.0	-	0.3	0.1	0.0	-	2.2	0.1	0.2	-	0.4	0.0
2017	0.4	-	0.2	0.1	0.2	0.0	-	0.0	0.1	0.0	0.0	0.0	0.5	-

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

Table 01R-16.12 - Shrub and Tree Species. Average modified Daubenmire quadrat and line intercept cover by year.

SHRUB SPECIES							
Artemisia arbuscula ^p (little sagebrush)							
Artemisia tridentata ssp. vaseyana ^p (mountain big sagebrush)							
Chrysothamnus viscidiflorus (yellow rabbitbrush)							
Ericameria nauseosa (rubber rabbitbrush)							
Juniperus osteosperma ⁱ (Utah juniper)							
Opuntia polyacantha (plains pricklypear)							
Purshia tridentata ^p (antelope bitterbrush)							
year	Line Intercept Cover (%)						
2010	14.7	13.4	8.3	-	6.9	0.6	-
2013	19.9	1.6	4.8	0.2	0.2	0.4	-
2017	24.5	2.3	5.3	0.6	0.2	0.2	-
year	Quadrat Cover (%)						
2010	2.8	17.9	5.5	0.4	5.2	0.5	-
2013	15.5	0.6	3.4	0.6	0.0	0.2	0.0
2017	14.8	2.4	2.8	0.6	0.4	0.2	-

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

Table 01R-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.

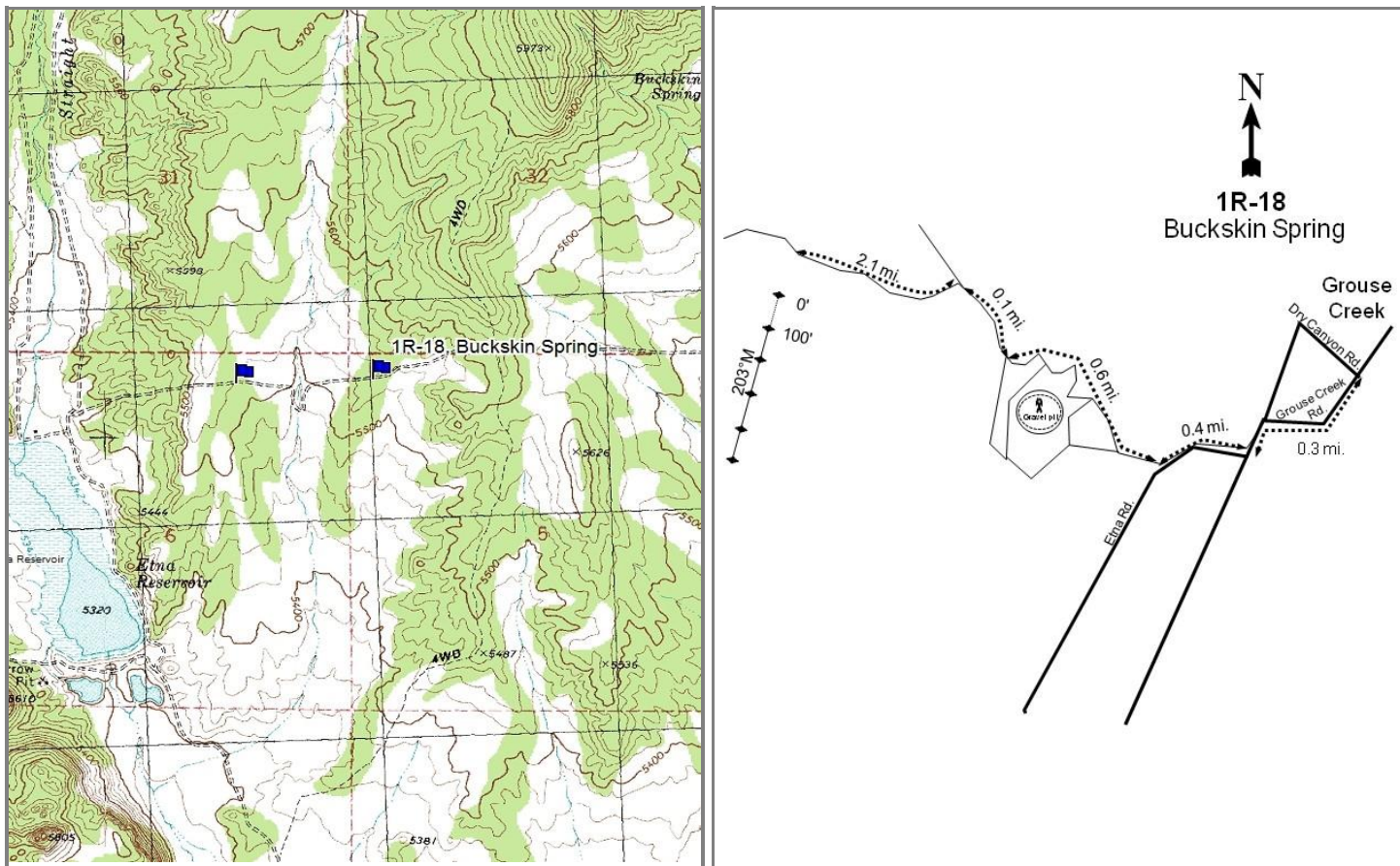
Year	Density		Age Class Distribution			Utilization		Poor Vigor (%)	Average Height Crown (cm)
	Plants Per Acre		Excluding Seedlings			Moderate (%)	Heavy (%)		
	Excluding Seedlings	Seedling	Young (%)	Mature (%)	Decadent (%)				
Amelanchier utahensis^p -- (Utah serviceberry)									
2010	-	20	0	0	0	0	0	0	94/127
2013	-	-	-	-	-	-	-	-	115/149
2017	20	-	100	0	0	0	100	0	85/120
Artemisia arbuscula^p -- (little sagebrush)									
2010	2320	300	59	41	0	4	0	9	38/58
2013	9280	200	17	77	6	9	0	6	24/49
2017	10920	-	8	88	4	4	1	3	29/51
Artemisia tridentata ssp. vaseyana^p -- (mountain big sagebrush)									
2010	6660	100	38	61	2	33	0	29	65/85
2013	560	40	18	79	4	32	0	21	65/72
2017	520	-	8	77	15	4	4	12	77/82
Chrysothamnus viscidiflorus -- (yellow rabbitbrush)									
2010	2860	20	3	94	4	0	0	18	32/48
2013	3260	-	1	90	9	19	4	26	29/42
2017	2120	-	3	94	3	1	0	0	35/47
Ericameria nauseosa -- (rubber rabbitbrush)									
2010	80	-	0	75	25	0	0	25	42/51
2013	100	-	40	60	0	0	0	60	54/64
2017	80	-	0	100	0	0	0	0	68/72
Juniperus osteosperma^t -- (Utah juniper)									
2010	100	20	40	60	0	0	0	0	- / -
2013	20	40	100	0	0	0	0	0	- / -
2017	120	-	17	83	0	0	0	0	- / -
Opuntia polyacantha -- (plains pricklypear)									
2010	360	-	0	100	0	0	0	6	12/38
2013	600	60	30	57	13	0	3	13	12/25
2017	840	-	0	100	0	0	0	17	11/25
Purshia tridentata^p -- (antelope bitterbrush)									
2010	-	-	-	-	-	-	-	-	77/150
2013	-	-	-	-	-	-	-	-	- / -
2017	20	-	0	100	0	0	100	0	59/123

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

Table 01R-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' (%)	
Juniperus osteosperma (Utah juniper)							
2010	54	-	32	53	11	5	9.8
2013	42	50	50	-	-	-	3.3
2017	53	13	75	13	-	-	5.6

BUCKSKIN SPRING - STUDY NO. 01R-18



Location Information

USGS 7.5 min Map Info
GPS (0' Stake)

Grouse Creek NW; Township 11N, Range 18W, Section 05
NAD 83 UTM ZONE 12, 254950 East 4621838 North

Transect Information

Browse Tag # (0' Stake)	Not Available
Transect Bearing	203° magnetic
Length	500ft
Belt Placement	Line 1 (11ft), Line 2 (34ft), Line 3 (59ft), Line 4 (71ft), Line 5 (95ft)
Belt Marker Placement	Standard

Directions to Site

From the intersection of Dry Canyon Road and Grouse Creek Road in the town of Grouse Creek, travel southwest on Grouse Creek Road for 0.3 miles. Turn right and continue for 0.4 miles. Turn right again and drive for 0.6 miles, going around some gravel pits. While there are many side roads, stay on the main road for 0.1 miles until there is a fork in the road. Travel left at the fork and drive for 2.1 miles. The site is south of the road.

Site Information

Land Ownership	Federal
Land Administrator	BLM
Allotment	GROUSE CREEK
Elevation	5,538ft (1,688m)
Aspect	South
Slope	4%
Sample Dates	09/03/2014, 07/18/2017

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

Treatment/Disturbance	Name	WRI DB#	Date	Size (acres)
Seeding - Aerial Before	West Grouse Creek Bullhog Phase 3	2900	January 2015	949
Mechanical - Bullhog	West Grouse Creek Bullhog Phase 3	2900	January-April 2015	949

Table 01R-18.2 Seed Mix. List of known seeded plant species and rates (if available).

Mix Name			Application Type	Application Date	Acres
West Grouse Creek Bullhog 3			Aerial	Jan 2015	959
Type	Species	Common Name	Cultivar/Source ID	Bulk lbs/acre	PLS lbs/acre
G	<i>Achnatherum hymenoides</i>	Indian Ricegrass	Rimrock	0.52	0.44
G	<i>Agropyron cristatum</i>	Crested Wheatgrass	Hycrest II	0.99	0.85
G	<i>Elymus wawawaiensis</i>	Snake River Wheatgrass	Secar	1.04	0.95
G	<i>Poa secunda</i>	Canby Bluegrass	Canbar	0.52	0.40
G	<i>Psathyrostachys juncea</i>	Russian Wildrye	Bozoisky II	0.16	0.13
G	<i>Psathyrostachys juncea</i>	Russian Wildrye	Bozoisky II	0.36	0.30
G	<i>Pseudoroegneria spicata</i>	Bluebunch Wheatgrass	Anatone	1.04	0.90
G	<i>Thinopyrum intermedium</i>	Thickspike Wheatgrass	Critana	1.98	1.72
F	<i>Linum perenne</i>	Blue Flax	Appar	0.21	0.18
F	<i>Medicago sativa</i>	Alfalfa	Ladak	0.21	0.20
F	<i>Medicago sativa</i>	Alfalfa	Ladak +	0.52	0.49
F	<i>Onobrychis viciifolia</i>	Sainfoin	Eski	2.03	1.97
F	<i>Sanguisorba minor</i>	Small Burnet		2.03	1.68

Wildlife Habitat and Vegetation History**Table 01R-18.3 - Wildlife Seasonal Habitat.** UDWR wildlife habitat and seasonality.

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

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

Year	Vegetation Type	Woodland Succession
2014	Juniper	Phase II transitioning to Phase III
2017	Annual-Perennial Grass-Forb/Black Sagebrush	Phase I

Site Notes

No Notes

Site Potential

1981 - 2010 Average Annual Precipitation	11 inches
NRCS Ecological Site	Semidesert Gravelly Sandy Loam (Black Sagebrush)
NRCS Ecological Site #	028AY227UT
States and Transitions	No state and transition model is available for this ecological site.

The site was established in 2014 and was dominated by Utah Juniper (*Juniperus osteosperma*) with a small component of black sagebrush (*Artemisia nova*) (Table 01R-18.12, Table 01R-18.13, Table 01R-18.14). Herbaceous cover was low, likely due to competition with the juniper (Table 01R-18.10, Table 01R-18.11). Following the treatment, the site transitioned to an annual-perennial grass/forb community with black sagebrush sparsely scattered across the site. The annual grass species cheatgrass (*Bromus tectorum*) increased substantially in cover following the treatment, as did perennial grasses and forbs (Table 01R-18.7).

Trend Summary Tables**Table 01R-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
2014	3.1	1.3	14.2	4.4	1.2	29.5
2017	2.5	2.4	0.3	2.6	2.6	0.2

Table 01R-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
2014	26	120	23	115	0.1	2.4	0.1	3.4
2017	244	166	213	195	7.6	6.6	4.5	7.9

Table 01R-18.8 - 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
2014	18.0	5.7	39.6	30.3	3.1	22.4
2017	15.7	1.1	57.7	11.2	0.5	26.6

Table 01R-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/Pronghorn	Rabbit
	Quadrat Frequency		
2014	2	-	2
2017	1	-	25
Days Use Per Acre (ha)			
2014	-	-	-
2017	0.7 (1.8)	2.0 (5.0)	-

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

GRASS SPECIES	Achnatherum hymenoides (Indian ricegrass)	Agropyron cristatum ⁱ (crested wheatgrass)	Agropyron fragile ⁱ (Siberian wheatgrass)	Bromus tectorum ⁱⁱ (cheatgrass)	Elymus elymoides (squirreltail)	Elymus lanceolatus (thickspike wheatgrass)	Poa secunda (Sandberg bluegrass)	Psathyrostachys juncea ⁱ (Russian wildrye)	Pseudoroegneria spicata (bluebunch wheatgrass)
year	Nested Frequency								
2014	31	-	-	26	47	-	60	-	3
2017	34	21	0	244	43	26	44	1	34
year	Average Cover (%)								
2014	0.9	-	-	0.1	0.5	-	0.9	-	0.1
2017	1.2	1.0	0.0	7.6	1.3	1.3	1.1	0.0	0.6

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

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

FORB SPECIES	Nested Frequency																
year	Average Cover (%)																
Alyssum desertorum ^{ai} (desert madwort)	-	1	6	1	-	24	-	-	15	-	23	-	26	-	-	2	-
Antennaria dimorpha (low pussytoes)	13	2	-	11	9	26	2	75	14	19	17	2	4	103	40	3	89
Arabis (rockcress)	Average Cover (%)																
Astragalus anserinus (Goose Creek milkvetch)	-	0.0	0.0	0.0	-	0.1	-	-	0.1	-	0.1	-	0.2	-	-	0.0	-
Astragalus beckwithii (Beckwith's milkvetch)	0.2	0.0	-	0.1	0.2	0.1	0.0	1.0	0.3	0.2	0.5	0.0	0.2	2.2	0.3	0.0	1.9
Astragalus calycosus (Torrey's milkvetch)	Average Cover (%)																
Chaenactis douglasii (Douglas' dusty maiden)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Collinsia parviflora ^a (maiden blue eyed Mary)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Cryptantha (cryptantha)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Cryptantha gracilis ^a (narrowstem cryptantha)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Descurainia pinnata ^a (western tansymustard)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Draba ^a (draba)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Eriogonum (buckwheat)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Gilia inconspicua ^a (shy gilia)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Lactuca serriola ^{ai} (prickly lettuce)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Lesquerella (bladderpod)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Linum perenne ⁱ (blue flax)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

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

FORB SPECIES	Nested Frequency						
year	Average Cover (%)						
Lupinus argenteus (silvery lupine)	-	-	1	75	3	-	-
Medicago sativa ⁱ (alfalfa)	23	13	3	66	1	12	4
Penstemon (beardtongue)	Average Cover (%)						
Phlox austromontana (mountain phlox)	-	-	0.0	2.9	0.0	-	-
Phlox longifolia (longleaf phlox)	1.4	0.8	0.0	2.1	0.0	0.7	0.2
Sanguisorba minor ⁱ (small burnet)	Average Cover (%)						
Sisymbrium altissimum ^{ai} (tall tumbled mustard)	-	-	-	-	-	-	-

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

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

SHRUB SPECIES	Line Intercept Cover (%)					
	Artemisia nova ^p (black sagebrush)	Artemisia tridentata ssp. wyomingensis ^p (Wyoming big sagebrush)	Chrysothamnus viscidiflorus ssp. viscidiflorus var. stenophyllus (yellow rabbitbrush)	Juniperus osteosperma ^t (Utah juniper)	Linanthus pungens (granite prickly phlox)	Opuntia polyacantha (plains pricklypear)
year	Line Intercept Cover (%)					
2014	3.4	1	0.5	29.5	0.6	0.1
2017	2.6	-	2.3	0.2	0.3	-
year	Quadrat Cover (%)					
2014	3.1	0.1	0.5	14.2	0.4	0.4
2017	2.5	-	1.0	0.3	1.3	0.1

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

Table 01R-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.

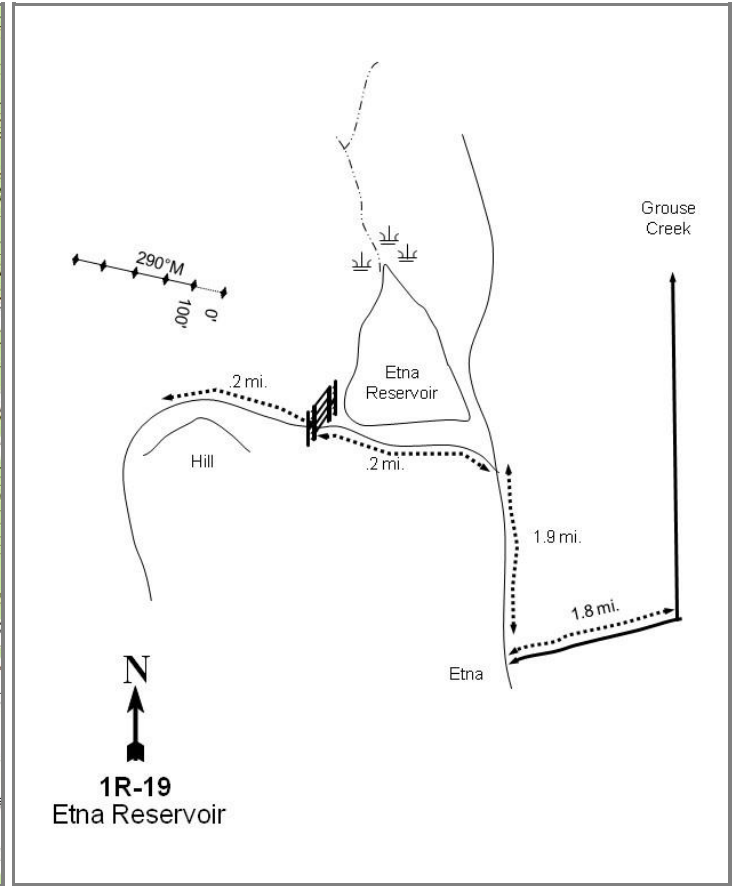
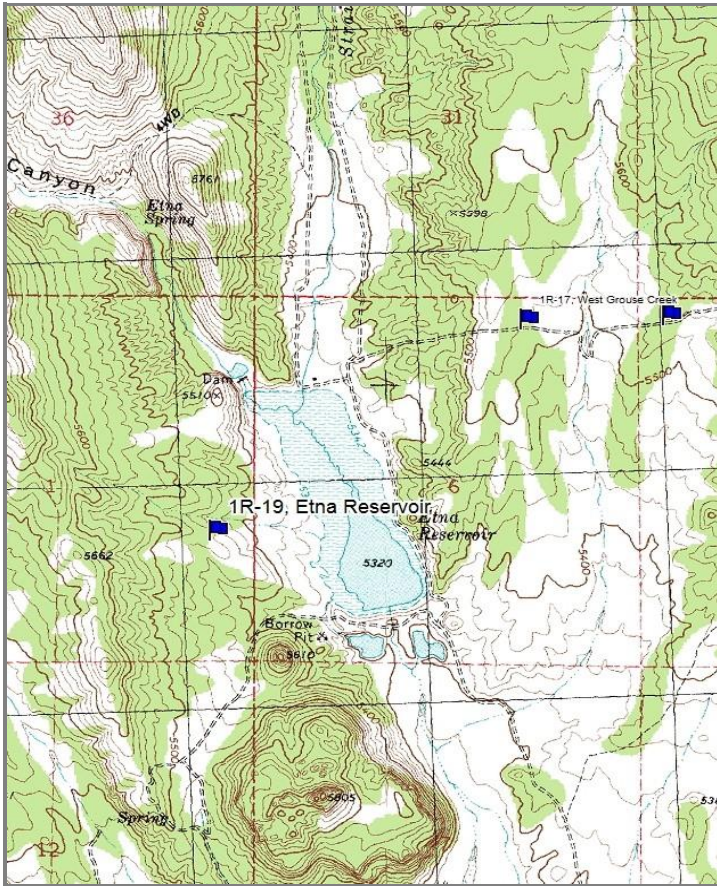
Year	Density		Age Class Distribution			Utilization		Poor Vigor (%)	Average Height Crown (cm)
	Plants Per Acre		Excluding Seedlings			Moderate (%)	Heavy (%)		
	Excluding Seedlings	Seedling	Young (%)	Mature (%)	Decadent (%)				
Artemisia nova ^p -- (black sagebrush)									
2014	1780	20	24	39	37	15	8	56	28/57
2017	1620	40	22	77	1	0	0	1	29/48
Artemisia tridentata ssp. wyomingensis ^p -- (Wyoming big sagebrush)									
2014	300	20	33	20	47	47	0	60	37/49
2017	40	-	0	100	0	0	0	0	41/78
Chrysothamnus viscidiflorus ssp. viscidiflorus var. stenophyllus -- (yellow rabbitbrush)									
2014	800	20	5	83	13	8	0	65	18/26
2017	1320	20	6	94	0	0	0	2	25/37
Juniperus osteosperma ^t -- (Utah juniper)									
2014	700	80	54	37	9	3	0	46	- / -
2017	100	60	80	20	0	0	0	0	- / -
Linanthus pungens -- (granite prickly phlox)									
2014	1080	40	2	74	24	11	2	65	19/24
2017	680	-	0	100	0	0	0	0	19/30
Opuntia polyacantha -- (plains pricklypear)									
2014	220	-	0	91	9	0	0	18	11/26
2017	80	-	0	100	0	0	0	25	8/19

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

Table 01R-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)							
2014	305	5	10	60	25	-	21.7
2017	34	43	57	-	-	-	2.9

ETNA RESERVOIR - STUDY NO. 01R-19



Location Information

USGS 7.5 min Map Info
GPS (0' Stake)

Grouse Creek NW; Township 11N, Range 19W, Section 01
NAD 83 UTM ZONE 12, 253054 East 4620946 North

Transect Information

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

Not Available
290° magnetic (Lines 4-5: 270° magnetic)
500ft
Line 1 (11ft), Line 2 (34ft), Line 3 (59ft), Line 4 (71ft), Line 5 (95ft)
Standard

Directions to Site

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

Site Information

Land Ownership	Federal
Land Administrator	BLM
Allotment	GROUSE CREEK
Elevation	5,460ft (1,664m)
Aspect	Southeast
Slope	4%
Sample Dates	09/03/2014, 07/18/2017

Table 01R-19.1 Disturbance History. Recorded history of major disturbances.

Treatment/Disturbance	Name	WRI DB#	Date	Size (acres)
Seeding - Aerial Before	West Grouse Creek Bullhog Phase 3	2900	Fall 2015	949
Mechanical - Bullhog	West Grouse Creek Bullhog Phase 3	2900	January- April 2015	949

Table 01R-19.2 Seed Mix. List of known seeded plant species and rates (if available).

Mix Name			Application Type	Application Date	Acres
West Grouse Creek Bullhog 3			Aerial	Jan 2015	959
Type	Species	Common Name	Cultivar/Source ID	Bulk lbs/acre	PLS lbs/acre
G	<i>Achnatherum hymenoides</i>	Indian Ricegrass	Rimrock	0.52	0.44
G	<i>Agropyron cristatum</i>	Crested Wheatgrass	Hycrest II	0.99	0.85
G	<i>Elymus lanceolatus</i>	Thickspike Wheatgrass	Critana	1.98	1.72
G	<i>Elymus wawawaiensis</i>	Snake River Wheatgrass	Secar	1.04	0.95
G	<i>Poa secunda</i>	Canby Bluegrass	Canbar	0.52	0.40
G	<i>Psathyrostachys juncea</i>	Russian Wildrye	Bozoisky II	0.16	0.13
G	<i>Psathyrostachys juncea</i>	Russian Wildrye	Bozoisky II	0.36	0.30
G	<i>Pseudoroegneria spicata</i>	Bluebunch Wheatgrass	Anatone	1.04	0.90
F	<i>Linum perenne</i>	Blue Flax	Appar	0.21	0.18
F	<i>Medicago sativa</i>	Alfalfa	Ladak	0.21	0.20
F	<i>Medicago sativa</i>	Alfalfa	Ladak +	0.52	0.49
F	<i>Onobrychis viciifolia</i>	Sainfoin	Eski	2.03	1.97
F	<i>Sanguisorba minor</i>	Small Burnet		2.03	1.68

Wildlife Habitat and Vegetation History**Table 01R-19.3 - Wildlife Seasonal Habitat.** UDWR wildlife habitat and seasonality.

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

Table 01R-19.4 - Vegetation History. The dominant vegetation type(s) and phase of woodland succession (Tausch, Miller, Roundy, & Chambers, 2009).

Year	Vegetation Type	Woodland Succession
2014	Juniper	Phase I transitioning to Phase II
2017	Black Sagebrush	Phase I

Site Notes

Elk and deer sign were observed on the site in 2017, but pellets were not sampled.

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 was established in 2014 and was dominated by Utah Juniper (*Juniperus osteosperma*) with a component of black sagebrush (*Artemisia nova*) (Table 01R-19.12, Table 01R-19.13, Table 01R-19.14). The herbaceous understory was not overly diverse and provided little cover (Table 01R-19.7). Following the bullhog treatment, cover of juniper decreased substantially and black sagebrush increased slightly (Table 01R-19.12). The herbaceous understory increased in diversity and cover, though cheatgrass (*Bromus tectorum*) was sampled with moderate amounts of cover (Table 01R- 19.10, Table 01R-19.11).

Trend Summary Tables**Table 01R-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
2014	4.8	0.6	7.5	6.1	0.8	16.9
2017	8.1	0.5	0.3	7.2	0.8	0.3

Table 01R-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
2014	3	180	16	179	0.0	3.6	0.1	4.6
2017	154	223	262	211	5.5	6.8	3.6	7.0

Table 01R-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
2014	20.9	1.2	30.1	37.8	4.6	20.1
2017	16.9	0.0	45.9	18.9	1.1	26.6

Table 01R-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	Rabbit
	Quadrat Frequency	
2014	3	10
2017	2	6
Year	Days Use Per Acre (ha)	
2014	-	-
2017	5.1 (12.6)	-

Table 01R-19.10 - 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)	Elymus lanceolatus (thickspike wheatgrass)	Leymus cinereus (basin wildrye)	Poa secunda (Sandberg bluegrass)	Pseudoroegneria spicata (bluebunch wheatgrass)
year	Nested Frequency							
2014	12	-	3	54	-	-	122	27
2017	10	7	154	76	15	3	134	24
year	Average Cover (%)							
2014	0.4	-	0.0	0.8	-	-	1.9	0.6
2017	0.1	0.2	5.5	1.1	0.2	0.1	4.1	0.9

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

Table 01R-19.11 - Forb Species. Nested frequency and modified Daubenmire average cover by year.

FORB SPECIES	Allium acuminatum (tapertip onion)	Alyssum desertorum ^{ai} (desert madwort)	Antennaria dimorpha (low pussytoes)	Arabis (rockcress)	Astragalus anserinus (Goose Creek milkvetch)	Astragalus calycosus (Torrey's milkvetch)	Astragalus filipes (basalt milkvetch)	Camelina microcarpa ^{ai} (littlepod false flax)	Castilleja angustifolia (northwestern Indian paintbrush)	Ceratocephala testiculata ^{ai} (curvseed butterwort)	Chaenactis douglasii (Douglas' dustymaiden)	Chaetopappa ericooides (rose heath)	Collinsia parviflora ^a (maiden blue eyed Mary)	Collomia linearis ^a (tiny trumpet)	Cordylanthus ^a (bird's-beak)	Crepis acuminata (tapertip hawksbeard)	Cryptantha (cryptantha)
year	Nested Frequency																
2014	-	-	56	-	4	8	-	-	-	-	-	4	-	-	-	4	10
2017	3	78	25	7	-	18	39	4	3	32	1	3	20	2	20	2	6
year	Average Cover (%)																
2014	-	-	1.3	-	0.0	0.1	-	-	-	-	-	0.0	-	-	-	0.0	0.1
2017	0.0	0.8	1.0	0.2	-	0.1	1.9	0.0	0.0	0.6	0.0	0.0	0.3	0.0	0.1	0.0	0.1

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

FORB SPECIES	Cryptantha gracilis ^a (narrowstem cryptantha)	Descurainia pinnata ^a (western tansymustard)	Draba ^a (draba)	Erigeron (fleabane)	Eriogonum (buckwheat)	Eriogonum ovalifolium (cushion buckwheat)	Gayophytum ramosissimum ^a (pinyon groundsmoke)	Gilia inconspicua ^a (shy gilia)	Heterotheca villosa (hairy false goldenaster)	Lactuca serriola ^{ai} (prickly lettuce)	Lappula occidentalis ^a (flatspine stickseed)	Lepidium ^a (pepperweed)	Lesquerella (bladderpod)	Linum perenne ⁱ (blue flax)	Lupinus argenteus (silvery lupine)	Medicago sativa ⁱ (alfalfa)	Microsteris gracilis ^a (slender phlox)
year	Nested Frequency																
2014	-	15	-	29	3	-	-	-	-	-	1	-	12	-	-	-	-
2017	6	19	4	25	3	4	6	91	12	70	-	4	-	59	7	12	5
year	Average Cover (%)																
2014	-	0.1	-	0.2	0.0	-	-	-	-	-	0.0	-	0.0	-	-	-	-
2017	0.1	0.1	0.0	0.4	0.0	0.0	0.0	0.9	0.6	0.3	-	0.1	-	0.9	0.2	0.3	0.0

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

FORB SPECIES											
Onobrychis vicifolia ⁱ (sainfoin)											
Petroragia pumila (rock goldenrod)											
Phlox austromontana (mountain phlox)											
Phlox longifolia (longleaf phlox)											
Sanguisorba minor ⁱ (small burnet)											
Silene antirrhina ^a (sleepy silene)											
Sisymbrium altissimum ^{ai} (tall tumblemustard)											
Stenotus acaulis (stemless mock goldenweed)											
Symphotrichum (aster)											
Tragopogon dubius ^{ai} (yellow salsify)											
Veronica biloba ^{ai} (twolobe speedwell)											
year	Nested Frequency										
2014	-	13	107	12	-	-	-	5	8	1	-
2017	4	-	68	1	9	0	8	8	-	1	2
year	Average Cover (%)										
2014	-	0.2	2.2	0.1	-	-	-	0.3	0.2	0.0	-
2017	0.1	-	1.1	0.0	0.1	0.0	0.2	0.1	-	0.0	0.0

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

Table 01R-19.12 - 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)								
Eriogonum microthecum ^p (slender buckwheat)								
Juniperus osteosperma ⁱ (Utah juniper)								
Linanthus pungens (granite prickly phlox)								
Opuntia polyacantha (plains pricklypear)								
Pinus edulis ⁱ (twoneedle pinyon)								
year	Line Intercept Cover (%)							
2014	5.7	0.4	0.8	-	16.9	-	0	-
2017	6.1	1.1	0.7	-	0.3	0.1	-	-
year	Quadrat Cover (%)							
2014	4.5	0.2	0.3	0.0	7.4	0.0	0.2	0.0
2017	7.3	0.8	0.3	-	0.3	0.2	0.0	-

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

Table 01R-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.

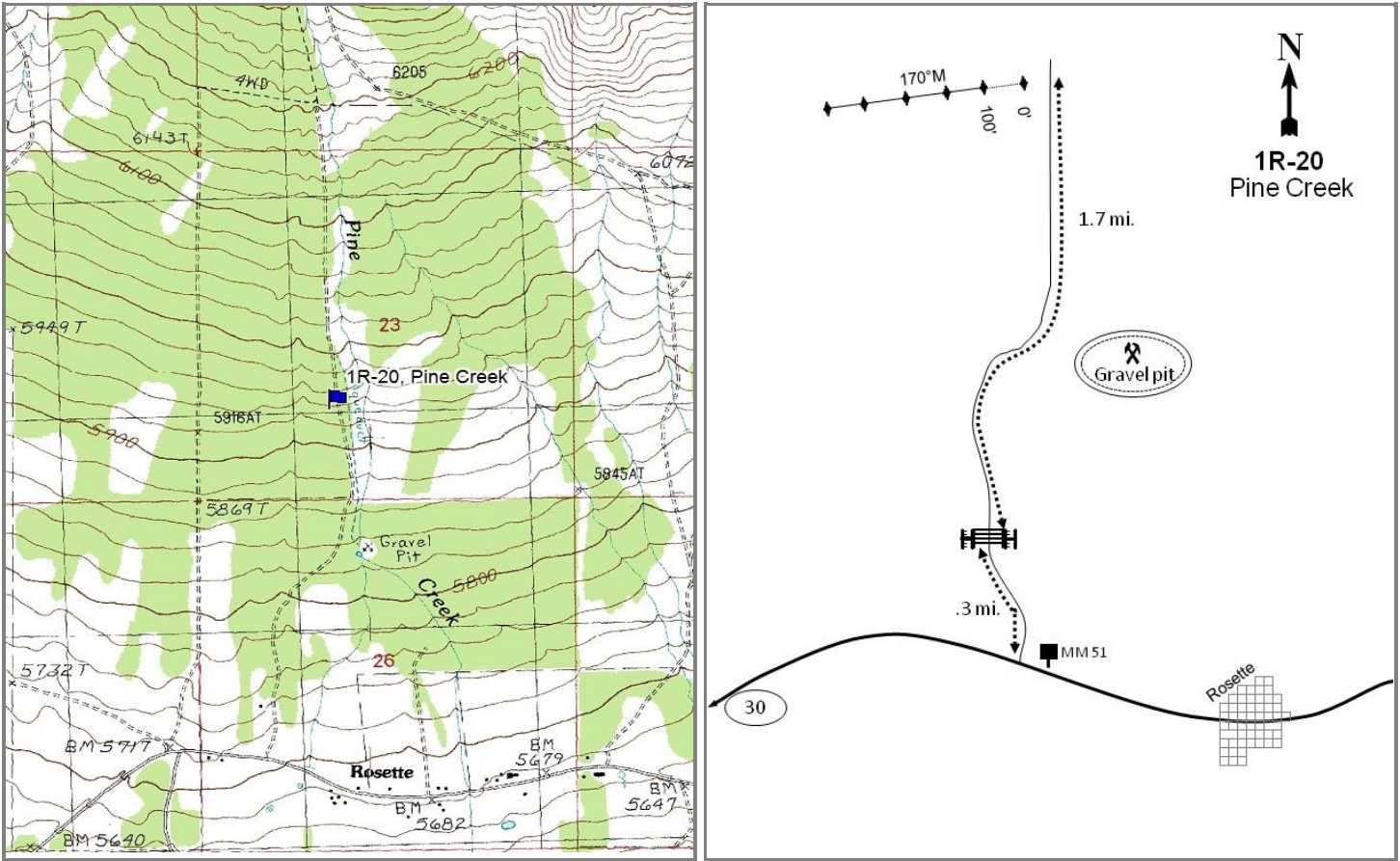
Year	Density		Age Class Distribution			Utilization		Poor Vigor (%)	Average Height Crown (cm)
	Plants Per Acre		Excluding Seedlings			Moderate (%)	Heavy (%)		
	Excluding Seedlings	Seedling	Young (%)	Mature (%)	Decadent (%)				
Artemisia nova^p -- (black sagebrush)									
2014	5460	80	54	33	14	23	10	18	32/53
2017	5180	40	7	89	4	1	0	3	26/42
Artemisia tridentata ssp. wyomingensis^p -- (Wyoming big sagebrush)									
2014	440	-	18	46	36	5	5	77	36/53
2017	2780	2240	89	12	0	0	0	0	45/58
Chrysothamnus viscidiflorus ssp. viscidiflorus var. stenophyllus -- (yellow rabbitbrush)									
2014	780	-	31	39	31	8	8	67	18/20
2017	340	-	18	82	0	0	0	0	27/35
Eriogonum microthecum^p -- (slender buckwheat)									
2014	20	-	0	100	0	0	100	100	- / -
2017	-	-	-	-	-	-	-	-	- / -
Juniperus osteosperma^t -- (Utah juniper)									
2014	340	20	18	82	0	0	0	94	- / -
2017	100	60	80	20	0	0	0	0	- / -
Linanthus pungens -- (granite prickly phlox)									
2014	80	-	0	100	0	0	0	0	11/21
2017	80	-	0	100	0	0	0	0	16/27
Opuntia polyacantha -- (plains pricklypear)									
2014	260	40	8	92	0	0	0	15	12/27
2017	80	-	0	100	0	0	0	50	8/19
Pinus edulis^t -- (twoneedle pinyon)									
2014	-	-	-	-	-	-	-	-	- / -
2017	20	-	100	0	0	0	0	0	- / -

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

Table 01R-19.14 - 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)							
2014	342	-	15	75	10	-	17.0
2017	55	69	31	-	-	-	4.2

PINE CREEK - STUDY NO. 01R-20



Location Information

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

Transect Information

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

Directions to Site

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

Site Information

Land Ownership	Private
Land Administrator	Private
Allotment	No data
Elevation	5,931ft (1,808m)
Aspect	South
Slope	5%
Sample Dates	09/03/2014, 07/19/2017

Table 01R-20.1 Disturbance History. Recorded history of major disturbances.

Treatment/Disturbance	Name	WRI DB#	Date	Size (acres)
Seeding - Aerial Before	Park Valley PJ Treatment Project Phase 1	2874	October 2014	1408
Mechanical - Bullhog	Park Valley PJ Treatment Project Phase 1	2874	October 2014-June 2015	1408

Table 01R-20.2 Seed Mix. List of known seeded plant species and rates (if available).

Mix Name		Application Type	Application Date	Acres	
Park Valley		Aerial	Oct 2014	707	
Type	Species	Common Name	Cultivar/Source ID	Bulk lbs/acre	PLS lbs/acre
G	<i>Achnatherum hymenoides</i>	Indian Ricegrass	Rimrock	0.99	0.84
G	<i>Agropyron cristatum</i>	Crested Wheatgrass	Hycrest II	0.99	0.85
G	<i>Elymus wawawaiensis</i>	Snake River Wheatgrass	Secar	1.06	0.97
G	<i>Pascopyrum smithii</i>	Western Wheatgrass	Arriba	0.99	0.93
G	<i>Poa secunda</i>	Canby Bluegrass	Canbar	0.50	0.38
G	<i>Psathyrostachys juncea</i>	Russian Wildrye	Bozoisky II	0.99	0.81
G	<i>Pseudoroegneria spicata</i>	Bluebunch Wheatgrass	Anatone	1.06	0.91
F	<i>Achillea millefolium</i>	Western Yarrow	Lincoln WA	0.10	0.09
F	<i>Linum perenne</i>	Blue Flax	Appar	0.28	0.24
F	<i>Lomatium dissectum</i>	Fernleaf Biscuitroot	Owyhee ID, Malheur/Harney OR	0.04	0.03
F	<i>Lomatium dissectum</i>	Fernleaf Biscuitroot	Owyhee ID, Malheur/Harney OR	0.11	0.10
F	<i>Medicago sativa</i>	Alfalfa	Ladak +	0.99	0.94
F	<i>Onobrychis viciifolia</i>	Sainfoin	Eski	1.98	1.92
F	<i>Sanguisorba minor</i>	Small Burnet		1.98	1.63

Wildlife Habitat and Vegetation History**Table 01R-20.3 - Wildlife Seasonal Habitat.** UDWR wildlife habitat and seasonality.

Species	Habitat	Season	Brood/Young Rearing
Greater Sage Grouse	occupied	year-long & Winter	brood-rearing

Table 01R-20.4 - Vegetation History. The dominant vegetation type(s) and phase of woodland succession (Tausch, Miller, Roundy, & Chambers, 2009).

Year	Vegetation Type	Woodland Succession
2014	Juniper	Phase III
2017	Annual-Perennial Grass	Phase I

Site Notes

In 2017 sample year it appeared that mountain brome (*Bromus marginatus*) was seeded on the site, but was not listed in available seed mix. The site may have been reseeded, possibly by a rangeland drill, in 2015-2016.

Site Potential

1981 - 2010 Average Annual Precipitation	12 inches
NRCS Ecological Site	Upland Gravelly Loam (Mountain Big Sagebrush)
NRCS Ecological Site #	R028AY306UT
States and Transitions	No state and transition model is available for this ecological site.

The site was established in 2014 and was in Phase III of woodland succession, being encroached by Utah juniper (*Juniperus osteosperma*) (Table 01R-20.4, Table 01R-20.12, Table 01R-20.14). The understory was comprised mainly of native perennial grass species (Table 01R-20.7), though diversity of shrubs and the overall herbaceous understory was low (Table 01R-20.6, Table 01R-20.7). Following the bullhog treatment, the site transitioned to an annual-perennial grass plant community (Table 01R-20.7, Table 01R-20.10). Juniper trees were effectively removed by the treatment, but shrubs remained rare (Table 01R-20.6).

Trend Summary Tables

Table 01R-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
2014	-	2.5	15.9	-	1.7	38.9
2017	-	0.5	-	-	0.1	-

Table 01R-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
2014	233	238	28	40	2.4	8.3	0.1	0.1
2017	427	227	1	186	36.1	11.9	0.0	10.3

Table 01R-20.8 - 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
2014	9.9	3.5	45.8	29.5	1.9	28.3
2017	4.4	0.1	57.4	6.5	1.6	52.0

Table 01R-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	Cattle	Mule Deer	Rabbit
	Quadrat Frequency		
2014	-	1	8
2017	2	3	10
Year	Days Use Per Acre (ha)		
2014	-	1.3 (3.3)	-
2017	2.9 (7.2)	4.0 (9.9)	-

Table 01R-20.10 - Grass Species. Nested frequency and modified Daubenmire average cover by year.

GRASS SPECIES	Achnatherum hymenoides (Indian ricegrass)	Agropyron cristatum ⁱ (crested wheatgrass)	Bromus marginatus (mountain brome)	Bromus tectorum ⁱⁱ (cheatgrass)	Elymus elymoides (squirreltail)	Poa fendleriana (muttongrass)	Poa secunda (Sandberg bluegrass)	Vulpia octoflora ^a (sixweeks fescue)
year	Nested Frequency							
2014	2	-	-	227	55	4	198	10
2017	5	131	63	427	31	-	95	8
year	Average Cover (%)							
2014	0.0	-	-	2.4	2.0	0.2	6.1	0.0
2017	0.0	5.0	1.8	36.0	0.8	-	4.3	0.1

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

Table 01R-20.11 - Forb Species. Nested frequency and modified Daubenmire average cover by year.

FORB SPECIES	Astragalus filipes (basalt milkvetch)	Cryptantha (cryptantha)	Descurainia pinnata ^a (western tansymustard)	Lactuca serriola ^{ai} (prickly lettuce)	Lappula occidentalis ^a (flatspine stickseed)	Lomatium (desertparsley)	Onobrychis vicifolia ⁱ (sainfoin)	Penstemon (beardtongue)	Phlox longifolia (longleaf phlox)	Sanguisorba minor ⁱ (small burnet)
year	Nested Frequency									
2014	-	3	18	-	13	-	-	1	37	-
2017	7	-	-	1	-	3	17	-	21	162
year	Average Cover (%)									
2014	-	0.0	0.1	-	0.0	-	-	0.0	0.1	-
2017	0.1	-	-	0.0	-	0.0	0.3	-	0.3	9.6

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

Table 01R-20.12 - Shrub and Tree Species. Average modified Daubenmire quadrat and line intercept cover by year.

SHRUB SPECIES	Juniperus osteosperma ^t (Utah juniper)	Opuntia (pricklypear)
year	Line Intercept Cover (%)	
2014	38.9	1.7
2017	-	0.1
year	Quadrat Cover (%)	
2014	15.9	2.5
2017	-	0.5

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

Table 01R-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.

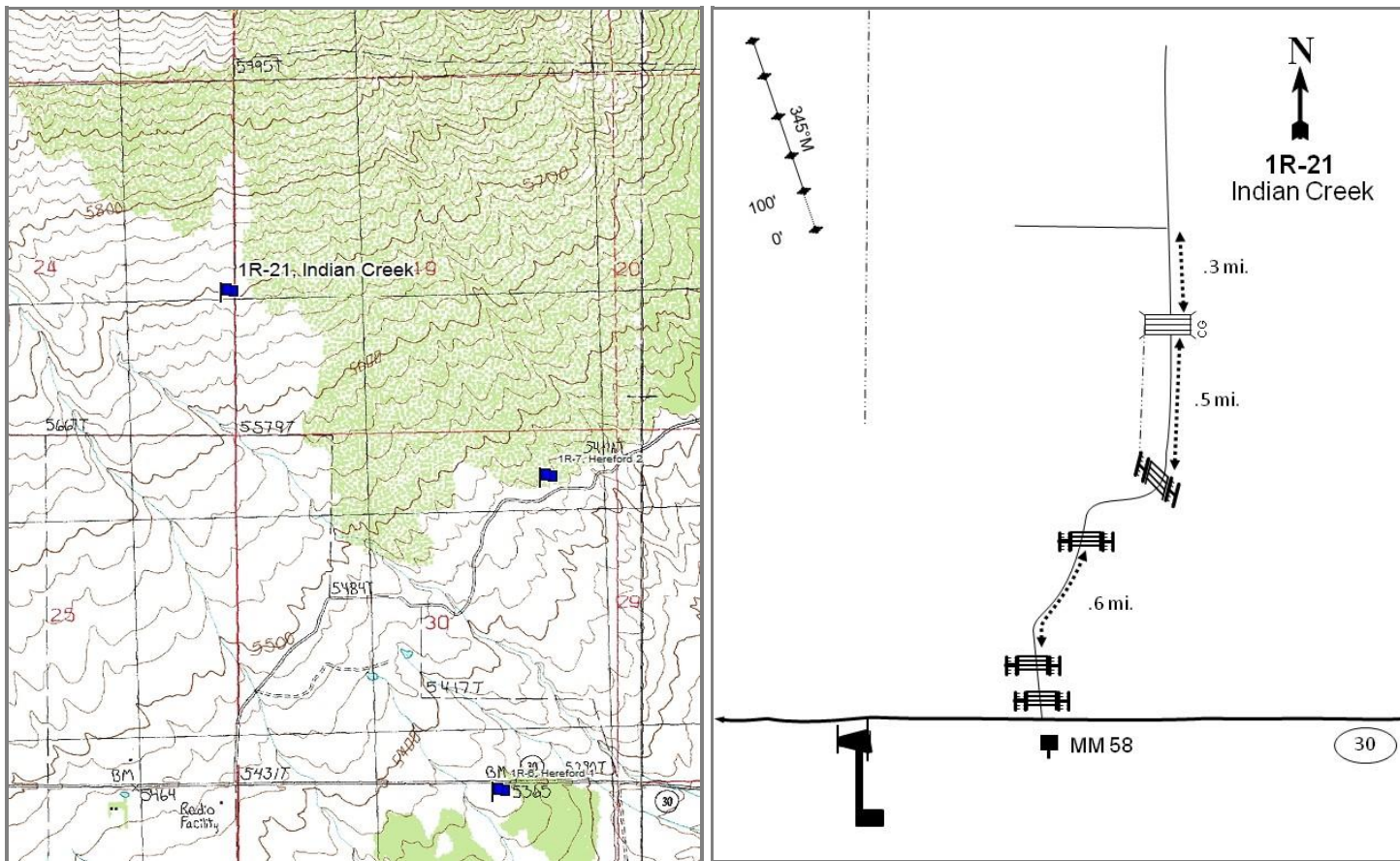
Year	Density		Age Class Distribution			Utilization		Poor Vigor (%)	Average Height Crown (cm)
	Plants Per Acre		Excluding Seedlings			Moderate (%)	Heavy (%)		
	Excluding Seedlings	Seedling	Young (%)	Mature (%)	Decadent (%)				
Artemisia tridentata ssp. vaseyana ^p -- (mountain big sagebrush)									
2014	-	-	-	-	-	-	-	-	-/-
2017	-	-	-	-	-	-	-	-	83/55
Juniperus osteosperma ^t -- (Utah juniper)									
2014	540	-	11	85	4	0	4	30	-/-
2017	60	-	33	67	0	0	0	33	-/-
Opuntia -- (pricklypear)									
2014	2780	-	2	98	0	0	0	1	10/34
2017	940	-	0	100	0	0	0	9	10/20

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

Table 01R-20.14 - 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)							
2014	488	-	10	45	35	10	24.7
2017	6	40	60	-	-	-	1.9

INDIAN CREEK - STUDY NO. 01R-21



Location Information

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

Transect Information

Browse Tag # (0' Stake)	Not Available
Transect Bearing	345° magnetic
Length	500ft
Belt Placement	Line 1 (11ft), Line 2 (34ft), Line 3 (59ft), Line 4 (71ft), Line 5 (95ft)
Belt Marker Placement	Standard

Directions to Site

Drive east on hwy 30 from the town of Park Valley for a little over 3.5 miles. Turn north at mile marker 58 onto a dirt road with two gates. Head through both gates and drive for .6 miles where there will be another gate. Pass through this gate, turn the corner and then go through yet another gate. Drive .5 miles from this gate and cross over a cattle guard. Drive .3 miles and turn left (west) and cut across the field. The site is on the other side of the fence.

Site Information

Land Ownership	Federal
Land Administrator	BLM
Allotment	FISHER CREEK
Elevation	5,696ft (1,736m)
Aspect	WEST
Slope	4%
Sample Dates	09/04/2014, 07/19/2017

Table 01R-21.1 Disturbance History. Recorded history of major disturbances.

Treatment/Disturbance	Name	WRI DB#	Date	Size (acres)
Seeding - Aerial Before	Park Valley PJ Treatment Project Phase 1	2874	October 2014	707
Bullhog - Bullhog	Park Valley PJ Treatment Project Phase 1	2874	October 2014-June 2015	1408

Table 01R-21.2 Seed Mix. List of known seeded plant species and rates (if available).

Mix Name		Application Type	Application Date	Acres	
Park Valley		Aerial	Oct 2014	707	
Type	Species	Common Name	Cultivar/Source ID	Bulk lbs/acre	PLS lbs/acre
G	Achnatherum hymenoides	Indian Ricegrass	Rimrock	0.99	0.84
G	Agropyron cristatum	Crested Wheatgrass	Hycrest II	0.99	0.85
G	Elymus wawawaiensis	Snake River Wheatgrass	Secar	1.06	0.97
G	Pascopyrum smithii	Western Wheatgrass	Arriba	0.99	0.93
G	Poa secunda	Canby Bluegrass	Canbar	0.50	0.38
G	Psathyrostachys juncea	Russian Wildrye	Bozoisky II	0.99	0.81
G	Pseudoroegneria spicata	Bluebunch Wheatgrass	Anatone	1.06	0.91
F	Achillea millefolium	Western Yarrow	Lincoln WA	0.10	0.09
F	Linum perenne	Blue Flax	Appar	0.28	0.24
F	Lomatium dissectum	Fernleaf Biscuitroot	Owyhee ID, Malheur/Harney OR	0.04	0.03
F	Lomatium dissectum	Fernleaf Biscuitroot	Owyhee ID, Malheur/Harney OR	0.11	0.10
F	Medicago sativa	Alfalfa	Ladak +	0.99	0.94
F	Onobrychis viciifolia	Sainfoin	Eski	1.98	1.92
F	Sanguisorba minor	Small Burnet		1.98	1.63

Wildlife Habitat and Vegetation History

Table 01R-21.3 - Wildlife Seasonal Habitat. UDWR wildlife habitat and seasonality.

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

Table 01R-21.4 - Vegetation History. The dominant vegetation type(s) and phase of woodland succession (Tausch, Miller, Roundy, & Chambers, 2009).

Year	Vegetation Type	Woodland Succession
2014	Juniper	Phase II transitioning to Phase III
2017	Black Sagebrush/Annual-Perennial Grass/Perennial Forb	Phase I

Site Notes

In 2014, a dead deer fawn was found on the site.

Site Potential

1981 - 2010 Average Annual Precipitation	12 inches
NRCS Ecological Site	Upland Stony Loam (Black Sagebrush)
NRCS Ecological Site #	R025XY318UT
States and Transitions	No state and transition model is available for this ecological site.

The site was established in 2014 and was dominated by Utah Juniper (*Juniperus osteosperma*) with a small component of black sagebrush (*Artemisia nova*) (Table 01R-21.6). The herbaceous understory consisted mostly of perennial grass and forb species, though cover was relatively low (Table 01R-21.7). Cheatgrass was sampled in low abundance. Following the treatment, the site transitioned to a black sagebrush and perennial grass-forb community (Table 01R- 21.6, Table 01R-21.7). Cheatgrass was also abundant on the site (Table 01R-21.10). Juniper was effectively removed by the treatment (Table 01R-21.12).

Trend Summary Tables

Table 01R-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
2014	5.5	1.1	17.8	5.3	0.7	27.2
2017	2.1	3.4	0.7	5.0	5.6	-

Table 01R-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
2014	98	119	21	107	0.2	3.0	0.1	1.6
2017	315	152	67	220	13.8	4.9	0.7	11.4

Table 01R-21.8 - 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
2014	17.4	1.3	33.3	36.1	6.6	27.9
2017	11.1	0.0	52.8	17.3	1.1	30.1

Table 01R-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	Rabbit
	Quadrat Frequency		
2014	-	1	20
2017	1	1	27
Year	Days Use Per Acre (ha)		
2014	11.6 (28.7)	1.3 (3.3)	-
2017	3.6 (9.0)	-	-

Table 01R-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 ⁱⁱ (cheatgrass)	Elymus elymoides (squirreltail)	Elymus lanceolatus (thickspike wheatgrass)	Pascopyrum smithii (western wheatgrass)	Poa secunda (Sandberg bluegrass)	Pseudoroegneria spicata (bluebunch wheatgrass)
year	Nested Frequency							
2014	2	-	98	1	-	3	85	54
2017	12	24	315	11	0	19	53	69
year	Average Cover (%)							
2014	0.0	-	0.2	0.0	-	0.0	2.1	0.8
2017	0.3	0.3	13.8	0.1	0.0	0.4	1.0	2.8

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

Table 01R-21.11 - Forb Species. Nested frequency and modified Daubenmire average cover by year.

FORB SPECIES	Achillea millefolium (Common yarrow)	Allium acuminatum (tapertip onion)	Alyssum desertorum ^{ai} (desert madwort)	Antennaria dimorpha (low pussytoes)	Arenaria (sandwort)	Astragalus beckwithii (Beckwith's milkvetch)	Astragalus calycosus (Torrey's milkvetch)	Astragalus purshii (woollypod milkvetch)	Calochortus nuttallii (sego lily)	Ceratocephala testiculata ^{ai} (curvseed butterwort)	Chaenactis douglasii (Douglas' dustymaiden)	Cordylanthus ^a (bird's-beak)	Cryptantha (cryptantha)	Descurainia pinnata ^a (western tansymustard)	Eriogonum (buckwheat)	Eriogonum caespitosum (matted buckwheat)	Eriogonum ovalifolium (cushion buckwheat)	
year	Nested Frequency																	
2014	-	-	-	17	2	4	1	-	-	7	1	9	12	8	8	4	-	
2017	1	1	2	3	2	55	2	1	2	35	6	-	18	7	-	3	4	
year	Average Cover (%)																	
2014	-	-	-	0.1	0.0	0.0	0.0	-	-	0.0	0.0	0.1	0.1	0.0	0.0	0.2	-	
2017	0.0	0.0	0.0	0.0	0.0	1.4	0.0	0.0	0.0	0.5	0.0	-	0.1	0.0	-	0.3	0.1	

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

FORB SPECIES	Eriogonum racemosum (redroot buckwheat)	Eriogonum umbellatum (sulphur-flower buckwheat)	Lactuca serriola ^{ai} (prickly lettuce)	Lesquerella (bladderpod)	Linum perenne ⁱ (blue flax)	Medicago sativa ⁱ (alfalfa)	Onobrychis viciifolia ⁱ (sainfoin)	Phlox austromontana (mountain phlox)	Phlox longifolia (longleaf phlox)	Polygonum douglasii ^a (Douglas' knotweed)	Sanguisorba minor ⁱ (small burnet)	Senecio integerrimus ^a (lambstongue ragwort)	Streptanthus cordatus (heartleaf twistflower)	Zigadenus paniculatus (foothill deathcamas)
year	Nested Frequency													
2014	3	4	-	6	-	-	-	62	7	-	-	-	3	-
2017	2	7	17	-	89	14	4	38	16	5	61	1	9	2
year	Average Cover (%)													
2014	0.0	0.1	-	0.0	-	-	-	1.0	0.0	-	-	-	0.0	-
2017	0.1	0.1	0.1	-	4.1	0.4	0.2	1.1	0.0	0.0	3.1	0.0	0.1	0.1

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

Table 01R-21.12 - 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)	2014	5.3	0.2	-	0.2	27.2	0.3	-
Chrysothamnus viscidiflorus ssp. viscidiflorus var. stenophyllus (yellow rabbitbrush)	2017	4.9	0.9	0.1	3.7	-	1	-
Eriogonum microthecum ^p (slender buckwheat)	year	Quadrat Cover (%)						
Gutierrezia sarothrae (broom snakeweed)	2014	5.5	0.5	0.0	0.3	17.8	0.3	-
Juniperus osteosperma ^t (Utah juniper)	2017	2.0	0.4	0.1	2.2	0.7	0.8	0.1
Linanthus pungens (granite prickly phlox)								
Opuntia polyacantha (plains pricklypear)								

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

Table 01R-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.

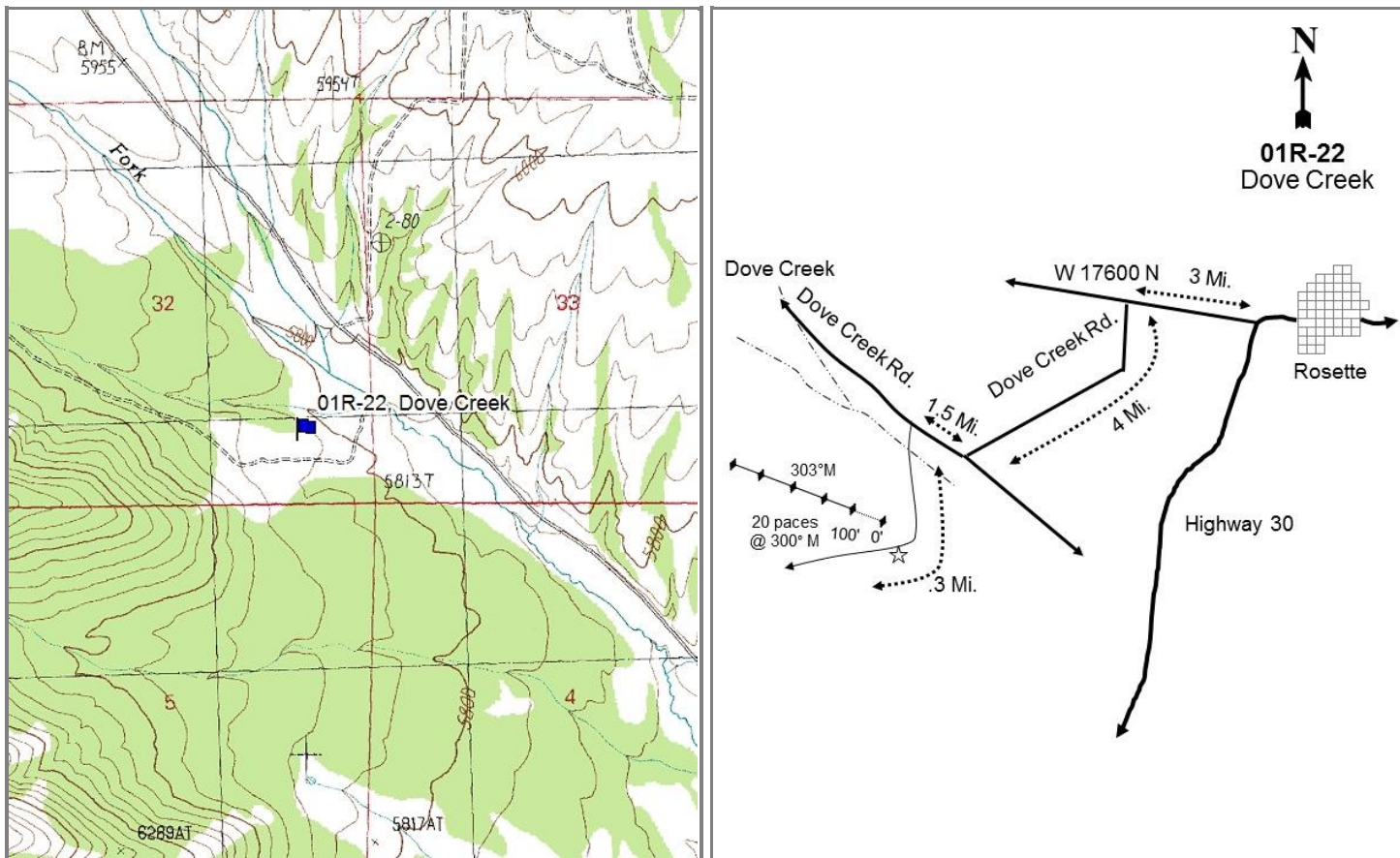
Year	Density		Age Class Distribution			Utilization		Poor Vigor (%)	Average Height Crown (cm)
	Plants Per Acre		Excluding Seedlings			Moderate (%)	Heavy (%)		
	Excluding Seedlings	Seedling	Young (%)	Mature (%)	Decadent (%)				
Artemisia nova ^p -- (black sagebrush)									
2014	3200	320	18	66	17	26	13	27	24/45
2017	2320	-	9	91	1	0	0	0	22/41
Chrysothamnus viscidiflorus ssp. viscidiflorus var. stenophyllus -- (yellow rabbitbrush)									
2014	740	60	46	54	0	3	0	3	18/25
2017	820	-	17	83	0	34	0	2	20/30
Eriogonum microthecum ^p -- (slender buckwheat)									
2014	40	-	0	50	50	0	0	50	10/28
2017	60	-	0	100	0	0	0	0	11/14
Gutierrezia sarothrae -- (broom snakeweed)									
2014	580	40	14	83	3	0	0	7	17/20
2017	1520	80	0	100	0	0	0	0	24/35
Juniperus osteosperma ^t -- (Utah juniper)									
2014	420	80	71	29	0	0	0	43	- / -
2017	240	-	50	50	0	0	0	0	- / -
Linanthus pungens -- (granite prickly phlox)									
2014	1000	-	10	78	12	6	0	42	13/18
2017	720	-	3	97	0	0	0	0	18/24
Opuntia polyacantha -- (plains pricklypear)									
2014	120	-	0	100	0	0	0	0	11/26
2017	60	-	0	100	0	0	0	0	10/22

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

Table 01R-21.14 - 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)							
2014	429	-	40	25	30	5	10.9
2017	122	22	78	-	-	-	1.8

DOVE CREEK - STUDY NO. 01R-22

**Location Information**

USGS 7.5 min Map Info
GPS (0' Stake)

Dennis Hill SW; Township 13N, Range 15W, Section 32
NAD 83 UTM ZONE 12, 285259 East 4631136 North

Transect Information

Browse Tag # (0' Stake)	Not Available
Transect Bearing	303° magnetic
Length	500ft
Belt Placement	Line 1 (11ft), Line 2 (34ft), Line 3 (59ft), Line 4 (71ft), Line 5 (95ft)
Belt Marker Placement	Standard

Directions to Site

From the intersection of W 17600 N and Highway 30, drive 3 miles west. Turn left (south) and continue for 5.5 miles. Turn left onto a lightly used two-track road. Drive for approximately 200 yards to a creek crossing; the creek bottom is soft and may be impassable (get out and check for stability). From the creek, drive or walk along the two-track road for 0.3 miles to the study site. The site is approximately 200 feet away from the road on the north side.

Site Information

Land Ownership	State
Land Administrator	SITLA
Allotment	No data
Elevation	5,839ft (1,780m)
Aspect	Southeast
Slope	3%
Sample Dates	07/17/2017

Table 01R-22.1 Disturbance History. Recorded history of major disturbances.

Treatment/Disturbance	Name	WRI DB#	Date	Size (acres)
Mechanical - Bullhog	Park Valley Winter Range Bullhog	3441	January-June 2016	1369
Seeding - Aerial	Park Valley Winter Range Bullhog	3441	Spring 2016	1369
Seeding - Aerial Before	Park Valley Winter Range Bullhog	3441	Winter 2015-2016	1369
Seeding - ATV Drill	Park Valley Winter Range Bullhog	3441	Spring 2016	1369

Table 01R-22.2 Seed Mix. List of known seeded plant species and rates (if available).

Mix Name			Application Type	Application Date	Acres
Park Valley Winter Range			Aerial	Nov 2015	1385
Type	Species	Common Name	Cultivar/Source ID	Bulk lbs/acre	PLS lbs/acre
G	Achnatherum hymenoides	Indian Ricegrass	Rimrock	0.40	0.35
G	Agropyron fragile	Siberian Wheatgrass	Vavilov II	2.09	1.97
G	Elymus lanceolatus	Thickspike Wheatgrass	Bannock	1.99	1.77
G	Elymus wawawaiensis	Snake River Wheatgrass	Secar	2.02	1.84
G	Poa secunda	Canby Bluegrass	Canbar	0.51	0.41
G	Psathyrostachys juncea	Russian Wildrye	Bozoisky II	0.90	0.85
F	Achillea millefolium	Western Yarrow	Lincoln WA	0.01	0.01
F	Achillea millefolium	Western Yarrow	Lincoln WA	0.06	0.05
F	Linum perenne	Blue Flax	Appar	1.01	0.86
F	Medicago sativa	Alfalfa	Ranger	0.72	0.68
F	Onobrychis viciifolia	Sainfoin	Eski	1.01	0.98
F	Sanguisorba minor	Small Burnet		1.52	1.30
Mix Name			Application Type	Application Date	Acres
Park Valley Winter Range Kochia			Aerial	Feb 2016	1385
Type	Species	Common Name	Cultivar/Source ID	Bulk lbs/acre	PLS lbs/acre
		Rice Hulls		0.29	0.00
F	Medicago sativa	Alfalfa	Ladak	0.51	0.47
S	Bassia prostrata	Forage Kochia	Millard/Beaver UT	0.51	0.38
Mix Name			Application Type	Application Date	Acres
Park Valley Winter Range Bitterbrush			Drill	Feb 2016	1370
Type	Species	Common Name	Cultivar/Source ID	Bulk lbs/acre	PLS lbs/acre
S	Purshia tridentata	Bitterbrush	Oneida, ID	0.15	0.13

Wildlife Habitat and Vegetation History**Table 01R-22.3 - Wildlife Seasonal Habitat.** UDWR wildlife habitat and seasonality.

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

Table 01R-22.4 - Vegetation History. The dominant vegetation type(s) and phase of woodland succession (Tausch, Miller, Roundy, & Chambers, 2009).

Year	Vegetation Type	Woodland Succession
2017	Mountain Big Sagbrush	Phase I

Site Notes

No Notes

Site Potential

1981 - 2010 Average Annual Precipitation 11 inches
 NRCS Ecological Site Upland Loam (Mountain Big Sagebrush)
 NRCS Ecological Site # 028AY310UT
 States and Transitions No state and transition model is available for this ecological site.

When established in 2017, the site was a stand of mountain big sagebrush (*Artemisia tridentata* ssp. *vaseyana*) (Table 01R-22.12). In 2016 -- prior to study establishment -- Utah juniper (*Juniperus osteosperma*) trees were bullhogged. Few trees were sampled on the site following the treatment and nearly all of those that were present were seedlings and young trees that were missed or partially treated (Table 01R-22.14). The herbaceous understory was in fairly good condition, but cheatgrass (*Bromus tectorum*) was sampled in moderate abundance (Table 01R-22.10, Table 01R-22.11).

Trend Summary Tables**Table 01R-22.6 - 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
2017	9.6	0.3	0.8	11.3	0.6	0.9

Table 01R-22.7 - 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
2017	150	298	199	259	9.4	14.6	2.3	8.0

Table 01R-22.8 - 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
2017	12.9	2.8	55.7	4.4	0.3	39.1

Table 01R-22.9 - 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/Domestic Sheep	Rabbit
	2017	7	1
Year	Days Use Per Acre (ha)		
2017	6.5 (16.1)	-	-

Table 01R-22.10 - Grass Species. Nested frequency and modified Daubenmire average cover by year.

GRASS SPECIES	Achnatherum hymenoides (Indian ricegrass)	Agropyron fragile ⁱ (Siberian wheatgrass)	Bromus tectorum ⁿ (cheatgrass)	Elymus elymoides (squirreltail)	Elymus lanceolatus (thickspike wheatgrass)	Poa secunda (Sandberg bluegrass)	Psathyrostachys juncea ⁱ (Russian wildrye)	Pseudoroegneria spicata (bluebunch wheatgrass)
year	Nested Frequency							
2017	15	13	150	63	77	221	5	45
year	Average Cover (%)							
2017	0.4	0.4	9.4	1.5	2.8	8.1	0.0	1.4

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

Table 01R-22.11 - 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)	Astragalus beckwithii (Beckwith's milkvetch)	Astragalus cibaricus (browse milkvetch)	Balsamorhiza hookeri (Hooker's balsamroot)	Castilleja angustifolia (northwestern Indian paintbrush)	Chaenactis douglasii (Douglas' dustymaiden)	Collinsia parviflora ^a (maiden blue eyed Mary)	Cordylanthus ^a (bird's-beak)	Crepis acuminata (tapertip hawksbeard)	Cryptantha gracilis ^a (narrowstem cryptantha)	Descurainia pinnata ^a (western tansymustard)	Epilobium brachycarpum ^a (tall annual willowherb)	Fritillaria atropurpurea (spotted fritillary)	Ionactis alpina (Lava aster)
year	Nested Frequency																
2017	17	22	51	4	34	5	3	2	13	132	7	5	4	24	9	4	2
year	Average Cover (%)																
2017	0.4	0.1	0.3	0.0	1.2	0.2	0.0	0.0	0.2	0.5	0.2	0.1	0.1	0.1	0.3	0.0	0.0

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

FORB SPECIES	Lactuca serriola ^{ai} (prickly lettuce)	Linum perenne ⁱ (blue flax)	Lomatium (desertparsley)	Medicago sativa ⁱ (alfalfa)	Microsteris gracilis ^a (slender phlox)	Onobrychis viciifolia ⁱ (sainfoin)	Penstemon (beardtongue)	Phlox hoodii (spiny phlox)	Phlox longifolia (longleaf phlox)	Polygonum douglasii ^a (Douglas' knotweed)	Sanguisorba minor ⁱ (small burnet)	Tragopogon dubius ^{ai} (yellow salsify)	Veronica biloba ^{ai} (twolobe speedwell)
year	Nested Frequency												
2017	13	89	4	29	93	2	5	11	142	1	25	10	24
year	Average Cover (%)												
2017	0.1	2.9	0.0	0.1	0.8	0.0	0.2	0.2	1.6	0.0	0.2	0.0	0.1

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

Table 01R-22.12 - 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 ^{ph} (forage kochia)	Ericameria nauseosa (rubber rabbitbrush)	Juniperus osteosperma ⁱ (Utah juniper)	Opuntia polyacantha (plains pricklypear)	Purshia tridentata ^p (antelope bitterbrush)	Tetradymia canescens (spineless horsebrush)
year	Line Intercept Cover (%)						
2017	11.3	-	0.2	0.9	-	0	0.4
year	Quadrat Cover (%)						
2017	9.6	0.0	0.2	0.8	0.1	0.0	0.0

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

Table 01R-22.13 - 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.

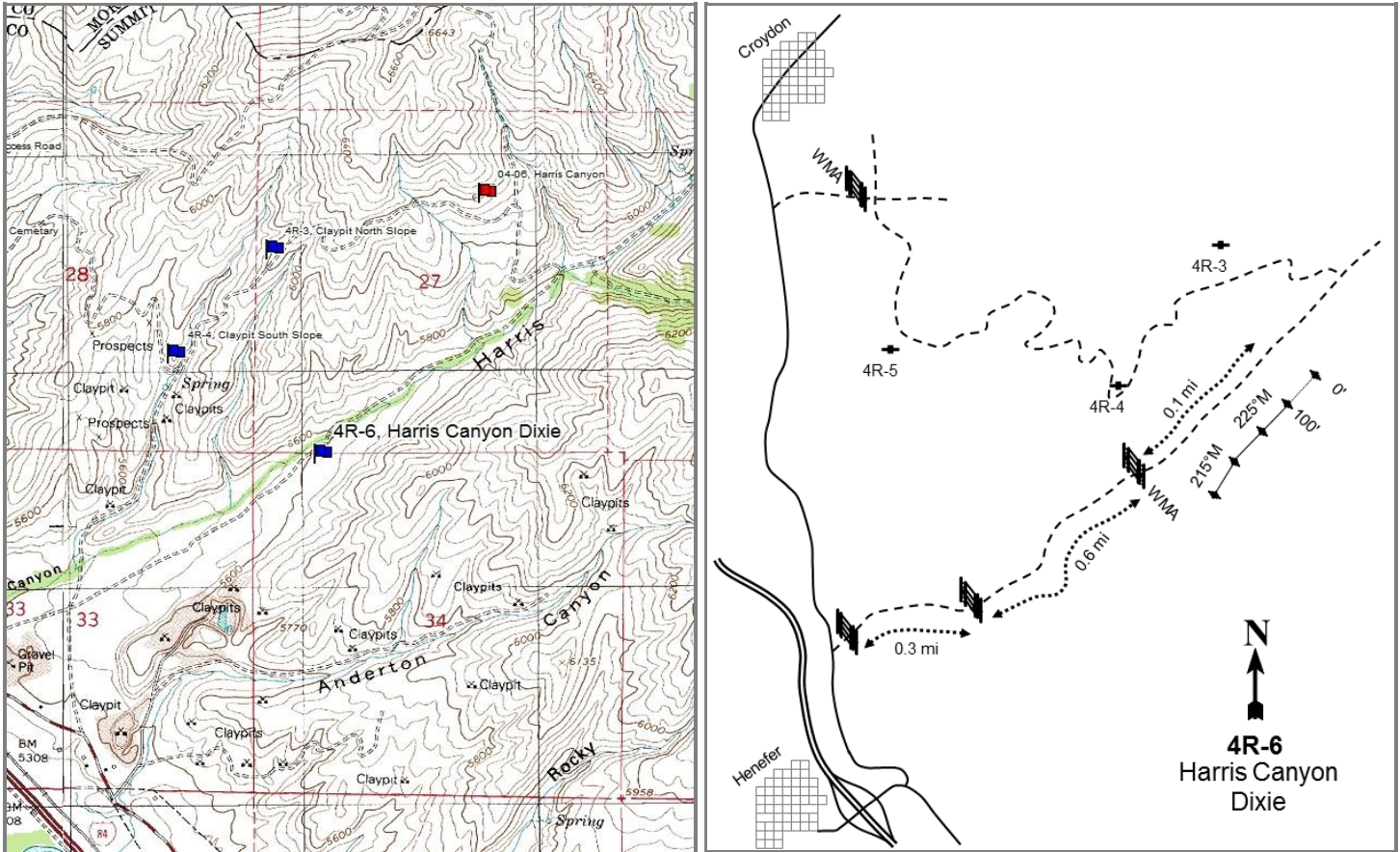
Year	Density		Age Class Distribution			Utilization		Poor Vigor (%)	Average Height Crown (cm)
	Plants Per Acre		Excluding Seedlings			Moderate (%)	Heavy (%)		
	Excluding Seedlings	Seedling	Young (%)	Mature (%)	Decadent (%)				
Artemisia tridentata ssp. vaseyana ^P -- (mountain big sagebrush)									
2017	4460	720	14	72	15	5	0	4	46/65
Bassia prostrata ^{Pi} -- (forage kochia)									
2017	60	40	100	0	0	0	0	0	3/4
Chrysothamnus viscidiflorus ssp. viscidiflorus var. stenophyllus -- (yellow rabbitbrush)									
2017	-	-	-	-	-	-	-	-	26/40
Chrysothamnus viscidiflorus ssp. viscidiflorus var. viscidiflorus -- (yellow rabbitbrush)									
2017	-	-	-	-	-	-	-	-	49/78
Ericameria nauseosa -- (rubber rabbitbrush)									
2017	100	-	40	60	0	0	0	0	55/57
Juniperus osteosperma ^t -- (Utah juniper)									
2017	180	40	56	44	0	0	0	11	- / -
Opuntia polyacantha -- (plains pricklypear)									
2017	180	-	11	89	0	11	0	11	9/20
Purshia tridentata ^P -- (antelope bitterbrush)									
2017	60	-	100	0	0	0	0	0	- / -
Symphoricarpos oreophilus -- (mountain snowberry)									
2017	140	-	14	86	0	0	0	0	31/61
Tetradymia canescens -- (spineless horsebrush)									
2017	20	-	0	100	0	0	0	0	39/64

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

Table 01R-22.14 - 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)							
2017	122	53	47	-	-	-	4.7

HARRIS CANYON DIXIE - STUDY No. 04R-6



Location Information

USGS 7.5 min Map Info
GPS (0' Stake)

Henefer SW; Township 4N, Range 4E, Section 34
NAD 83 UTM ZONE 12, 458988 East 4543777 North

Transect Information

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

236
225° magnetic (Line 4: 215° magnetic)
400ft
Line 1 (11ft & 95ft), Line 2 (34ft), Line 3 (59ft), Line 4 (71ft)
No Rebar

Directions to Site

Drive west on I-84 toward Ogden. Take Exit 111 onto Lost Creek Road, then take a slight right at N Lost Creek Road, and another right onto E 1900 N to Croydon. From Croydon, turn right onto 6800 E and drive for 2.4 miles, passing a ruined old house, to a gate. From the gate, proceed for 0.3 miles to another gate with a group of trees on the left. From this gate, continue for 0.6 miles to a gate to a Wildlife Management Area. Pass through the gate and drive for 0.1 miles to a witness post on the right (east) side of the road. The 0-foot stake is 33 paces from the witness post at 150 degrees magnetic and is marked with browse tag #236.

Site Information

Land Ownership	State
Land Administrator	UDWR
Allotment	No data
Elevation	5,599ft (1,707m)
Aspect	Northwest
Slope	5%
Sample Dates	08/14/2008, 07/26/2017

Table 04R-06.1 Disturbance History. Recorded history of major disturbances.

Treatment/Disturbance	Name	WRI DB#	Date	Size (acres)
Insect - Aroga Moth	Aroga Moth	-	Approximately 2006	-
Disk - One-Way	Henefer-Echo WMA	1471	September-October 2010	28
Seeding - Rangeland Drill	Henefer-Echo WMA	1471	September-October 2010	28
Seeding - Broadcast	Henefer-Echo WMA	1471	September-October 2010	28

Wildlife Habitat and Vegetation History**Table 04R-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	occupied	year-long & Winter	brood-rearing
Moose	crucial	summer	

Table 04R-06.4 - Vegetation History. The dominant vegetation type(s) and phase of woodland succession (Tausch, Miller, Roundy, & Chambers, 2009).

Year	Vegetation Type	Woodland Succession
2008	Mountain Big Sagebrush/Bulbous Bluegrass	NA
2017	Bulbous Bluegrass/Rubber Rabbitbrush	NA

Site Notes

No Notes

Site Potential

1981 - 2010 Average Annual Precipitation	17 inches
NRCS Ecological Site	Mountain Gravelly Loam (Mountain Big Sagebrush)
NRCS Ecological Site #	R047XA406UT
States and Transitions	No state and transition model is available for this ecological site.

Upon establishment in 2008, this study site was dominated by mountain big sagebrush (*Artemisia tridentata* ssp. *vaseyana*); many of the plants were in poor health due to Aroga moth defoliation that took place in approximately 2006. Much of the sagebrush was removed by a disking and seeding treatment in 2010 (Table 04R-06.1), and in 2017 rubber rabbitbrush (*Ericameria nauseosa* ssp. *nauseosa* var. *hololeuca*) was the dominant browse species on the site (photos, Table 04R-06.12, Table 04R-06.13). The herbaceous understory has remained abundant, but most of the cover has been contributed by the introduced perennial grass species bulbous bluegrass (*Poa bulbosa*), which has been considered to be a co-dominant vegetation component in both sample years. Forb diversity has increased following treatment, but they have remained rare in comparison to grasses; alfalfa (*Medicago sativa*) provided the most cover of any single species in both sample years (Table 04R-06.7, Table 04R-06.10, Table 04R-06.11).

Trend Summary Tables

Table 04R-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
2008	6.6	-	-	7.6	-	-
2017	3.6	0.0	-	4.2	-	-

Table 04R-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
2008	-	483	-	78	-	51.0	-	3.7
2017	99	463	99	130	2.8	51.0	1.1	5.1

Table 04R-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
2008	11.1	0.2	31.2	2.0	3.1	64.4
2017	4.5	0.8	38.9	3.2	5.2	64.2

Table 04R-06.10 - 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 ⁿⁱ (cheatgrass)	Elymus wawawaiensis (Snake River wheatgrass)	Pascopyrum smithii (western wheatgrass)	Poa bulbosa ⁱ (bulbous bluegrass)	Thinopyrum intermedium ⁱ (intermediate wheatgrass)
year	Nested Frequency						
2008	22	-	-	-	-	467	365
2017	3	2	99	19	7	446	265
year	Average Cover (%)						
2008	0.3	-	-	-	-	38.2	12.6
2017	0.0	0.0	2.8	1.0	0.3	37.8	11.7

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

Table 04R-06.11 - Forb Species. Nested frequency and modified Daubenmire average cover by year.

FORB SPECIES	Alyssum desertorum ^{ai} (desert madwort)	Carduus nutans ⁿⁱ (nodding plumelless thistle)	Collomia linearis ^a (tiny trumpet)	Comandra umbellata (bastard toadflax)	Erigeron pumilus (shaggy fleabane)	Erodium cicutarium ^{ai} (redstem stork's bill)	Lactuca serriola ^{ai} (prickly lettuce)	Lupinus argenteus (silvery lupine)	Medicago sativa ^a (alfalfa)	Onobrychis vicifolia ^a (sainfoin)	Sanguisorba minor ^a (small burnet)	Sisymbrium altissimum ^{ai} (tall tumbled mustard)	Sphaeralcea grossularifolia (gooseberry/leaf globemallow)	Tragopogon dubius ^{ai} (yellow salsify)
year	Nested Frequency													
2008	-	-	-	1	-	-	-	4	73	-	-	-	-	-
2017	4	1	5	-	34	44	36	-	64	28	3	12	14	5
year	Average Cover (%)													
2008	-	-	-	0.1	-	-	-	0.5	3.0	-	-	-	-	-
2017	0.0	0.0	0.0	-	0.2	0.7	0.1	-	3.9	0.7	0.0	0.2	0.3	0.1

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

Table 04R-06.12 - 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)	Chrysothamnus viscidiflorus ssp. viscidiflorus var. viscidiflorus (yellow rabbitbrush)	Ericameria nauseosa ssp. nauseosa var. hololeuca ^p (rubber rabbitbrush)
year	Line Intercept Cover (%)			
2008	-	6.4	0	1.2
2017	-	1.7	-	2.5
year	Quadrat Cover (%)			
2008	0.1	6.1	0.0	0.4
2017	-	1.4	0.0	2.2

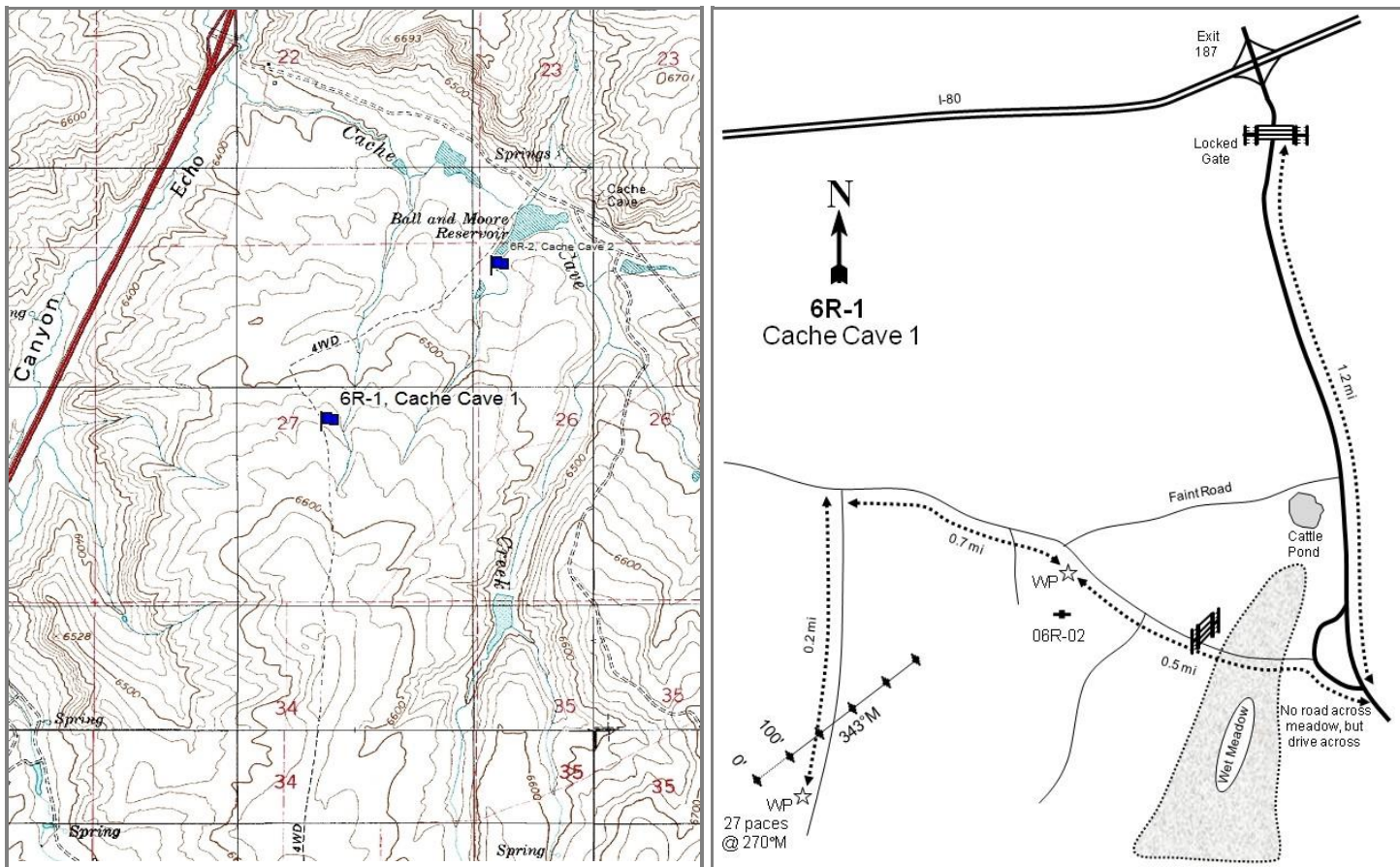
t - Tree Species; p - Preferred Browse; i - Introduced Species

Table 04R-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 (%)				
Amelanchier utahensis^p -- (Utah serviceberry)									
2008	20	-	0	100	0	0	100	0	131/19
2017	-	-	-	-	-	-	-	-	-/-
Artemisia tridentata ssp. vaseyana^p -- (mountain big sagebrush)									
2008	1000	20	2	4	94	14	52	60	65/108
2017	480	-	8	71	21	21	0	21	57/78
Chrysothamnus viscidiflorus ssp. viscidiflorus var. viscidiflorus -- (yellow rabbitbrush)									
2008	20	-	0	100	0	100	0	0	25/34
2017	-	-	-	-	-	-	-	-	42/72
Ericameria nauseosa ssp. nauseosa var. hololeuca^p -- (rubber rabbitbrush)									
2008	100	-	0	100	0	0	20	0	76/107
2017	200	-	10	90	0	0	0	0	78/114
Gutierrezia sarothrae -- (broom snakeweed)									
2008	-	-	-	-	-	-	-	-	-/-
2017	20	-	0	100	0	0	0	0	25/26

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

CACHE CAVE 1 - STUDY NO. 06R-1



Location Information

USGS 7.5 min Map Info Shearing Corral SE; Township 5N, Range 7E, Section 27
 GPS (0' Stake) NAD 83 UTM ZONE 12, 488294 East 4553993 North

Transect Information

Browse Tag # (0' Stake) 32
 Transect Bearing 343° 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 I-80, use exit 187 and turn southeast onto the access road (you will need to contact the landowner). Travel 1.2 miles southeast to a road that comes in from the right. Turn here and travel 0.5 miles northwest through a meadow to a road. There is a witness post for study 6R-2 on the left (southeast) side of the road. Continue 0.7 miles to a road on the left (south). Take this road and travel 0.2 miles to a witness post on the right (west) side of the road. The 0-foot stake is 27 paces from the witness post at 270 degrees magnetic and is marked with browse tag #32.

Site Information

Land Ownership	Private
Land Administrator	Private
Allotment	No data
Elevation	6,570ft (2,003m)
Aspect	North
Slope	5%
Sample Dates	09/13/2004, 08/09/2007, 07/25/2012, 07/25/2017

Table 06R-01.1 Disturbance History. Recorded history of major disturbances.

Treatment/Disturbance	Name	WRI DB#	Date	Size (acres)
Seeding - Broadcast Before	Cache Cave	PDB	Fall 2004	500
Aerator - Double Drum	Cache Cave	PDB	Fall 2004	500

Table 06R-01.2 Seed Mix. List of known seeded plant species and rates (if available).

Mix Name		Application Type	Application Date	Acres	
Cache Cave		Broadcast	Sep 2004	500	
Type	Species	Common Name	Cultivar/Source ID	Bulk lbs/acre	PLS lbs/acre
G	Dactylis glomerata	Orchardgrass	Paiute	1.00	0.86
G	Leymus cinereus	Great Basin Wildrye	Trailhead	1.00	0.90
G	Psathyrostachys juncea	Russian Wildrye	Bozoisky	1.00	0.93
G	Pseudoroegneria spicata	Bluebunch Wheatgrass	Goldar	1.50	1.46
F	Astragalus cicer	Cicer Milkvetch	Lutana	1.30	1.16
F	Medicago sativa	Alfalfa	Ladak+	1.30	1.23
F	Onobrychis viciifolia	Sainfoin		2.00	1.91
F	Sanguisorba minor	Small Burnet	Delar	2.00	1.92
S	Atriplex canescens	Fourwing Saltbush	Juab UT	0.50	0.26

Wildlife Habitat and Vegetation History

Table 06R-01.3 - Wildlife Seasonal Habitat. UDWR wildlife habitat and seasonality.

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

Table 06R-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	Mountain Big Sagebrush	NA
2007	Perennial Grass/Mountain Big Sagebrush	NA
2012	Mountain Big Sagebrush	NA
2017	Mountain Big Sagebrush	NA

Site Notes

Sheep ranching is the primary use of this land.

Soils

Table 06R-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	6.5	47.3	29.4	23.3	2.8	27.0	166.4	0.7	06/23/2004

Site Potential

1981 - 2010 Average Annual Precipitation 14 inches
 NRCS Ecological Site Upland Loam (Basin Big Sagebrush)
 NRCS Ecological Site # R047XA308UT
 States and Transitions No state and transition model is available for this ecological site.

The dominant browse species on this site has been mountain big sagebrush (*Artemisia tridentata* ssp. *vaseyana*) since study establishment in 2004. Although cover and density of sagebrush exhibited an initial decrease in the first post-treatment sampling, both values exceeded pre-treatment levels in 2017. Furthermore, decadence and poor vigor of sagebrush have decreased while recruitment of young has increased (Table 06R-01.12, Table 06R-01.13). The herbaceous understory has been diverse and abundant in all post-treatment sample years. Perennial grasses, particularly the native species western wheatgrass (*Pascopyrum smithii*) and Sandberg bluegrass (*Poa secunda*), have contributed the most herbaceous cover in all sample years, and were a co-dominant site component in 2007 (Table 06R-01.10). Forbs have generally remained rare in most sample years. However, annual forbs contributed 41% cover in 2017: this cover can almost entirely be attributed to the native species bird's-beak (*Cordylanthus* sp.) and introduced species desert madwort (*Alyssum desertorum*) (Table 06R-01.7, Table 06R-01.11). Barring a major disturbance, this study site is expected to remain in a similar state in the future.

Trend Summary Tables

Table 06R-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	20.9	6.3	-	23.3	7.2	-
2007	7.0	6.4	-	6.4	7.4	-
2012	12.3	2.7	-	12.6	2.3	-
2017	17.4	1.9	-	22.7	3.3	-

Table 06R-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	58	340	333	152	0.4	4.9	3.9	1.0
2007	89	397	418	163	3.0	19.7	8.1	2.4
2012	62	396	156	57	1.2	12.1	0.5	0.4
2017	85	338	469	72	2.5	13.7	41.0	1.2

Table 06R-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
2004	22.3	15.7	38.7	0.5	0.4	42.1
2007	17.6	4.8	42.7	1.6	0.4	43.3
2012	18.7	0.9	65.5	0.5	0.5	29.0
2017	11.7	1.8	46.2	1.5	0.6	62.6

Table 06R-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/Domestic Sheep	Rocky Mountain Elk	Greater Sage-Grouse	Rabbit
	Quadrat Frequency				
2004	-	7	1	-	20
2007	-	38	-	-	41
2012	1	30	-	1	9
2017	2	20	1	1	12
Year	Days Use Per Acre (ha)				
2004	0.7 (1.8)	33.5 (82.8)	2.7 (6.6)	-	-
2007	-	41.5 (102.6)	0.7 (1.7)	-	-
2012	-	35.5 (87.7)	2.0 (5.0)	8.7 (21.5)*	-
2017	-	43.6 (107.6)	21.5 (53.0)	-	-

*Pellets per acre (ha)

Table 06R-01.10 - Grass Species. Nested frequency and modified Daubenmire average cover by year.

GRASS SPECIES	Achnatherum lettermanii (Letterman's needlegrass)	Bromus tectorum ^{ai} (cheatgrass)	Carex (sedge)	Dactylis glomerata ⁱ (orchardgrass)	Elymus elymoides (squirreltail)	Hesperostipa comata (needle and thread)	Juncus arcticus (arctic rush)	Pascopyrum smithii (western wheatgrass)	Poa fendleriana (muttongrass)	Poa pratensis ⁱ (Kentucky bluegrass)	Poa secunda (Sandberg bluegrass)	Pseudoroegneria spicata (bluebunch wheatgrass)
year	Nested Frequency											
2004	52	58	34	-	29	12	5	248	69	-	8	-
2007	33	89	16	77	32	25	-	304	33	8	184	0
2012	20	62	62	-	4	12	-	306	28	-	135	27
2017	26	85	11	-	7	17	-	231	42	-	178	3
year	Average Cover (%)											
2004	0.3	0.4	0.3	-	0.7	0.3	0.0	2.6	0.6	-	0.1	-
2007	1.2	3.0	0.3	1.2	0.5	0.9	-	10.3	0.7	0.2	4.4	0.0
2012	0.6	1.2	1.0	-	0.0	0.5	-	6.8	0.8	-	1.4	0.8
2017	0.7	2.5	0.6	-	0.0	0.4	-	6.6	0.7	-	4.7	0.0

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

Table 06R-01.11 - 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)	Arabis (rockcress)	Astragalus beckwithii (Beckwith's milkvetch)	Astragalus convallarius (lesser rushy milkvetch)	Calochortus nuttallii (sego lily)	Carduus nutans ^{ani} (nodding plumeless thistle)	Ceratocephala testiculata ^{ai} (curvseed butterwort)	Chenopodium leptophyllum ^a (narrowleaf goosefoot)	Cirsium (thistle)	Collinsia parviflora ^a (maiden blue eyed Mary)	Cordylanthus ^a (bird's-beak)	Descurainia pinnata ^a (western tansymustard)	Draba ^a (draba)	
year	Nested Frequency																	
2004	-	3	3	229	43	-	2	-	4	-	40	11	-	22	157	4	-	
2007	1	2	1	408	30	7	-	-	-	1	91	1	1	26	29	11	-	
2012	-	3	-	141	7	-	-	4	-	-	28	-	-	2	26	2	-	
2017	10	3	-	454	21	-	9	-	-	-	9	-	5	30	334	1	7	
year	Average Cover (%)																	
2004	-	0.0	0.0	0.9	0.2	-	0.0	-	0.0	-	0.1	0.0	-	0.1	2.5	0.0	-	
2007	0.0	0.0	0.0	7.0	0.4	0.0	-	-	-	0.0	0.4	0.0	0.0	0.1	0.2	0.0	-	
2012	-	0.0	-	0.3	0.2	-	-	0.0	-	-	0.1	-	-	0.0	0.1	0.0	-	
2017	0.2	0.0	-	17.2	0.5	-	0.0	-	-	-	0.0	-	0.0	0.1	23.6	0.0	0.0	

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

FORB SPECIES	Erigeron pumilus (shaggy fleabane)	Lappula occidentalis ^a (flatspine stickseed)	Medicago sativa ⁱ (alfalfa)	Microsteris gracilis ^a (slender phlox)	Navarretia intertexta ^a (needleleaf navarretia)	Onobrychis vicifolia ⁱ (sainfoin)	Phlox austromontana (mountain phlox)	Phlox longifolia (longleaf phlox)	Polygonum douglasii ^a (Douglas' knotweed)	Sanguisorba minor ⁱ (small burnet)	Schoenocrambe linifolia (flaxleaf plainsmustard)	Sphaeralcea munroana (Munro's globemallow)	Taraxacum officinale (common dandelion)	Tragopogon dubius ^{ai} (yellow salsify)	Trifolium (clover)	Verbascum thapsus ^{ai} (common mullein)	Viola (violet)
year	Nested Frequency																
2004	1	4	-	104	3	-	17	86	19	-	-	-	14	4	5	-	7
2007	13	0	20	35	-	21	25	65	51	27	3	3	10	-	-	4	-
2012	-	-	-	-	1	-	9	34	-	2	-	1	-	-	-	-	-
2017	-	-	-	-	-	-	10	20	19	3	-	2	4	1	-	-	-
year	Average Cover (%)																
2004	0.0	0.0	-	0.2	0.0	-	0.2	0.2	0.1	-	-	-	0.2	0.0	0.0	-	0.0
2007	0.0	0.0	0.1	0.1	-	0.3	0.6	0.4	0.1	0.5	0.0	0.0	0.1	-	-	0.2	-
2012	-	-	-	-	0.0	-	0.1	0.1	-	0.0	-	0.0	-	-	-	-	-
2017	-	-	-	-	-	-	0.3	0.1	0.1	0.0	-	0.0	0.0	0.0	-	-	-

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

Table 06R-01.12 - 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. viscidiflorus (yellow rabbitbrush)	Gutierrezia sarothrae (broom snakeweed)	Tetradymia canescens (spineless horsebrush)
year	Line Intercept Cover (%)			
2004	23.3	7.2	-	-
2007	6.4	7.3	0.1	-
2012	12.6	2.1	0.2	-
2017	22.7	3.3	-	-
year	Quadrat Cover (%)			
2004	20.9	6.3	0.0	0.0
2007	7.0	6.3	0.1	-
2012	12.3	2.5	0.2	-
2017	17.4	1.9	-	-

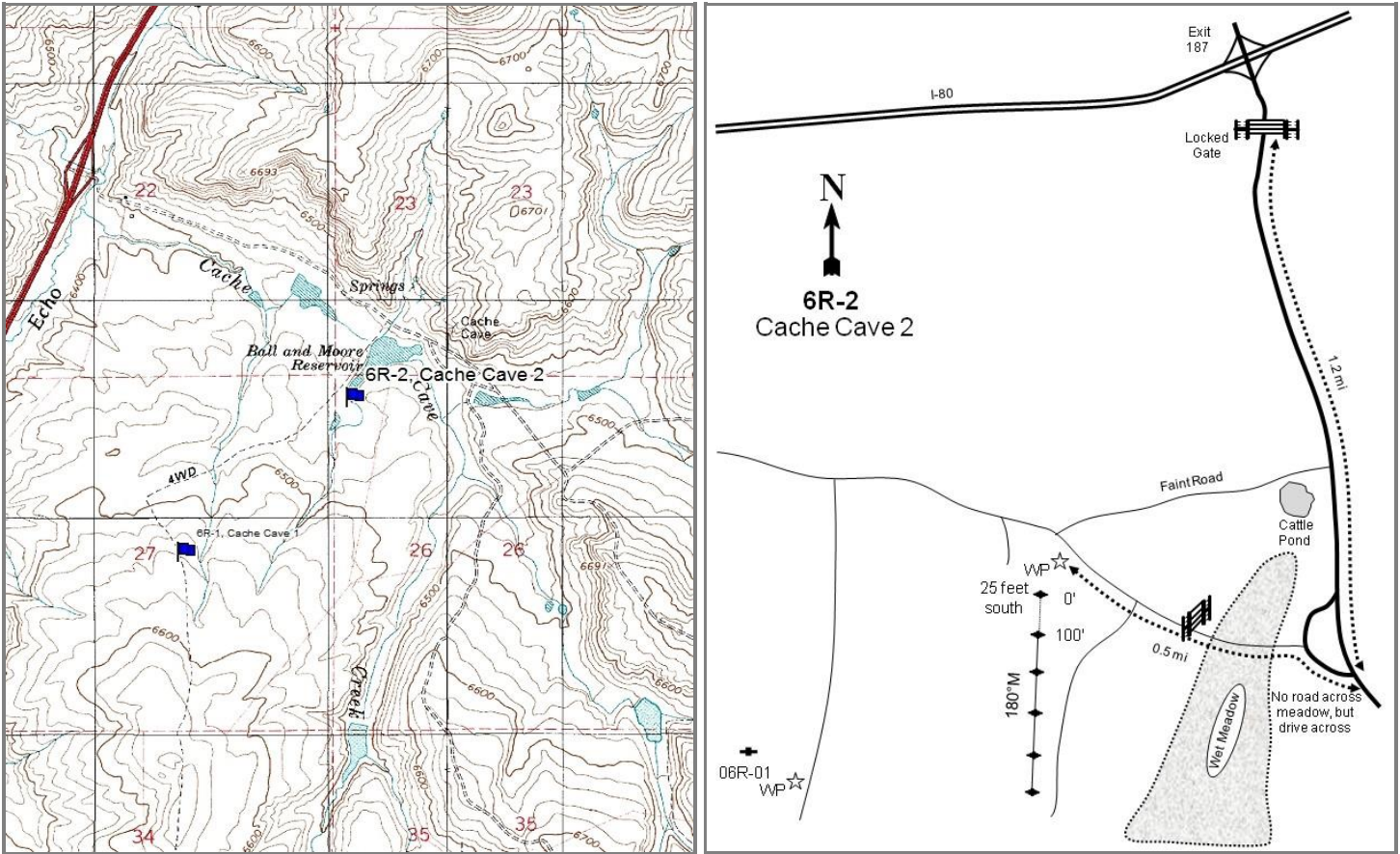
t - Tree Species; p - Preferred Browse; i - Introduced Species

Table 06R-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 nova^P -- (black sagebrush)									
2004	-	-	-	-	-	-	-	-	-/-
2007	-	-	-	-	-	-	-	-	-/-
2012	-	-	-	-	-	-	-	-	23/57
2017	40	-	0	0	100	0	0	100	22/56
Artemisia tridentata ssp. vaseyana^P -- (mountain big sagebrush)									
2004	4600	840	3	59	38	0	0	18	112/94
2007	4360	2900	56	18	26	13	1	19	74/72
2012	7620	2980	27	68	5	51	8	22	66/64
2017	9080	20	28	67	5	2	0	5	71/71
Chrysothamnus viscidiflorus ssp. viscidiflorus var. viscidiflorus -- (yellow rabbitbrush)									
2004	5420	380	3	97	1	0	0	0	23/30
2007	8660	180	2	88	10	30	13	2	16/30
2012	5860	460	4	50	47	27	53	70	12/23
2017	5680	40	44	56	0	0	0	0	14/22
Gutierrezia sarothrae -- (broom snakeweed)									
2004	-	-	-	-	-	-	-	-	-/-
2007	120	-	0	100	0	0	0	0	10/14
2012	540	-	0	100	0	0	0	0	7/18
2017	-	-	-	-	-	-	-	-	-/-
Tetradymia canescens -- (spineless horsebrush)									
2004	20	-	100	0	0	0	0	0	- / -
2007	-	-	-	-	-	-	-	-	-/-
2012	40	-	0	0	100	0	0	100	6/11

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

CACHE CAVE 2 - STUDY NO. 06R-2



Location Information

USGS 7.5 min Map Info Shearing Corral SE; Township 5N, Range 7E, Section 26
 GPS (0' Stake) NAD 83 UTM ZONE 12, 489017 East 4554708 North

Transect Information

Browse Tag # (0' Stake) N/A
 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 I-80, use exit 187 and turn southeast onto the access road (you will need to contact the landowner). Travel 1.2 miles southeast to a road that comes in from the right. Turn here and travel 0.5 miles northwest through a meadow to a road. There is a witness post on the left (southeast) side of the road; the 0-foot stake is 25 feet southeast of the witness post. Full-high fenceposts mark the stakes.

Site Information

Land Ownership	Private
Land Administrator	Private
Allotment	No data
Elevation	6,450ft (1,966m)
Aspect	North
Slope	3%
Sample Dates	06/23/2004, 08/09/2007, 07/25/2012, 07/25/2017

Table 06R-02.1 Disturbance History. Recorded history of major disturbances.

Treatment/Disturbance	Name	WRI DB#	Date	Size (acres)
Seed - Broadcast Before	Cache Cave	PDB	Fall 2004	500
Aerator - Double Drum	Cache Cave	PDB	Fall 2004	500

Table 06R-02.2 Seed Mix. List of known seeded plant species and rates (if available).

Mix Name		Application Type	Application Date	Acres	
Cache Cave		Broadcast	Sep 2004	500	
Type	Species	Common Name	Cultivar/Source ID	Bulk lbs/acre	PLS lbs/acre
G	Dactylis glomerata	Orchardgrass	Paiute	1.00	0.86
G	Leymus cinereus	Great Basin Wildrye	Trailhead	1.00	0.90
G	Psathyrostachys juncea	Russian Wildrye	Bozoisky	1.00	0.93
G	Pseudoroegneria spicata	Bluebunch Wheatgrass	Goldar	1.50	1.46
F	Astragalus cicer	Cicer Milkvetch	Lutana	1.30	1.16
F	Medicago sativa	Alfalfa	Ladak+	1.30	1.23
F	Onobrychis viciifolia	Sainfoin		2.00	1.91
F	Sanguisorba minor	Small Burnet	Delar	2.00	1.92
S	Atriplex canescens	Fourwing Saltbush	Juab UT	0.50	0.26

Wildlife Habitat and Vegetation History

Table 06R-02.3 - Wildlife Seasonal Habitat. UDWR wildlife habitat and seasonality.

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

Table 06R-02.4 - Vegetation History. The dominant vegetation type(s) and phase of woodland succession (Tausch, Miller, Roundy, & Chambers, 2009).

Year	Vegetation Type	Woodland Succession
2004	Sagebrush	NA
2007	Yellow Rabbitbrush	NA
2012	Yellow Rabbitbrush/Sagebrush	NA
2017	Yellow Rabbitbrush/Sagebrush	NA

Site Notes

No Notes

Soils

Table 06R-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
Clay Loam	7.3	33.3	36.2	30.6	2.3	34.9	268.8	0.8	06/23/2004

Site Potential

1981 - 2010 Average Annual Precipitation 14 inches
 NRCS Ecological Site Upland Loam (Mountain Big Sagebrush)
 NRCS Ecological Site # 047XC310UT
 States and Transitions No state and transition model is available for this ecological site.

This site was dominated by black sagebrush (*Artemisia nova*) and mountain big sagebrush (*A. tridentata* ssp. *vaseyana*) when it was established in 2004. An aerator and seeding treatment later that year (Table 06R-02.1) removed much of the sagebrush, and yellow rabbitbrush (*Chrysothamnus viscidiflorus* ssp. *viscidiflorus* var. *viscidiflorus*) has been a dominant or co-dominant shrub species in all post-treatment sample years. Sagebrush began to recover as time since treatment increased, and it was considered to be co-dominant with yellow rabbitbrush in 2012 and 2017 (photos, Table 06R-02.12, Table 06R-02.13). The herbaceous understory has remained diverse, but abundance has fluctuated. Perennial grasses, particularly western wheatgrass (*Pascopyrum smithii*) and Sandberg bluegrass (*Poa secunda*), have provided the most herbaceous cover in all sample years. Forbs and annual grasses have remained relatively rare (Table 06R-02.7, Table 06R-02.10, Table 06R-02.11).

Trend Summary Tables

Table 06R-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
2004	19.9	11.3	-	24.6	16.2	-
2007	4.8	13.5	-	4.0	15.8	-
2012	5.4	12.9	-	9.4	18.0	-
2017	12.7	16.9	-	16.5	27.6	-

Table 06R-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
2004	31	323	236	147	0.1	4.0	1.5	1.6
2007	-	416	320	146	-	22.1	3.0	2.0
2012	5	402	47	76	0.0	6.0	0.1	0.7
2017	3	411	299	105	0.0	16.9	6.2	2.4

Table 06R-02.8 - 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	34.2	5.0	35.2	0.1	0.0	40.2
2007	29.3	0.7	38.9	0.4	0.1	42.5
2012	24.1	0.0	61.4	0.1	0.0	25.5
2017	22.9	0.4	41.3	0.2	0.2	50.1

Table 06R-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/Domestic Sheep	Rocky Mountain Elk	Greater Sage- Grouse	Horse	Rabbit
	Quadrat Frequency					
2004	1	9	5	-	-	22
2007	-	45	1	-	1	31
2012	-	35	-	3	-	7
2017	3	40	1	11	2	15
Year	Days Use Per Acre (ha)					
2004	1.5 (3.6)	28.1 (69.5)	6.0 (14.9)	-	0.6 (1.4)	-
2007	3.6 (9.0)	71.1 (175.5)	1.3 (3.3)	-	0.6 (1.4)	-
2012	-	31.5 (77.8)	0.7 (1.7)	-	-	-
2017	-	22.8 (56.3)	-	-	-	-

Table 06R-02.10 - Grass Species. Nested frequency and modified Daubenmire average cover by year.

GRASS SPECIES	Achnatherum lettermanii (Letterman's needlegrass)	Bromus tectorum ^{ai} (cheatgrass)	Carex obtusata (obtuse sedge)	Dactylis glomerata ⁱ (orchardgrass)	Elymus elymoides (squirreltail)	Hesperostipa comata (needle and thread)	Juncus arcticus (arctic rush)	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)	unknown annual grass ^a (unknown grass)
year	Nested Frequency													
2004	153	-	30	-	8	-	-	200	83	-	-	-	-	31
2007	159	-	54	105	27	-	6	294	67	9	88	11	3	-
2012	45	5	113	-	5	8	27	251	38	-	162	-	32	-
2017	99	3	82	-	10	-	22	317	40	-	127	-	24	-
year	Average Cover (%)													
2004	1.5	-	0.1	-	0.0	-	-	1.6	0.7	-	-	-	-	0.1
2007	5.4	-	0.4	1.2	0.3	-	0.1	9.0	2.8	0.4	2.5	0.1	0.0	-
2012	0.6	0.0	0.6	-	0.0	0.1	0.1	3.0	0.2	-	1.1	-	0.2	-
2017	2.7	0.0	0.7	-	0.1	-	0.6	7.3	1.5	-	3.5	-	0.7	-

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

Table 06R-02.11 - 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)	Arabis (rockcress)	Ceratocephala testiculata ^{ai} (curviseed butterwort)	Chenopodium leptophyllum ^a (narrowleaf goosefoot)	Collinsia parviflora ^a (maiden blue eyed Mary)	Cordylanthus ^a (bird s-beak)	Cryptantha (cryptantha)	Descurainia pinnata ^a (western tansymustard)	Draba ^a (draba)	Gayophytum ramosissimum ^a (pinyon groundsmoke)	Lappula occidentalis ^a (flatspine stickseed)	Microsteris gracilis ^a (slender phlox)	Navaretia intertexta ^a (needleleaf navaretia)
year	Nested Frequency																
2004	34	2	-	55	59	3	33	4	55	92	1	5	-	4	2	57	-
2007	33	2	2	134	48	6	161	4	30	12	-	77	5	-	8	29	-
2012	32	-	-	8	32	-	12	2	-	-	-	-	-	-	-	-	1
2017	51	-	-	131	62	-	149	-	3	136	-	40	10	-	26	-	1
year	Average Cover (%)																
2004	0.1	0.0	-	0.1	1.2	0.0	0.1	0.0	0.1	0.9	0.0	0.0	-	0.0	0.0	0.1	-
2007	0.3	0.0	0.0	0.6	0.9	0.0	1.0	0.0	0.1	0.1	-	0.3	0.0	-	0.0	0.1	-
2012	0.1	-	-	0.0	0.5	-	0.0	0.0	-	-	-	-	-	-	-	-	0.0
2017	0.9	-	-	0.4	1.5	-	0.9	-	0.0	4.4	-	0.2	0.0	-	0.1	-	0.0

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

FORB SPECIES	Onobrychis vicifolia ⁱ (sainfoin)	Orthocarpus luteus ^a (yellow owl's-clover)	Phlox austromontana (mountain phlox)	Phlox longifolia (longleaf phlox)	Polygonum douglasii ^a (Douglas' knotweed)	Sanguisorba minor ⁱ (small burnet)	Sphaeralcea munroana (Munro's globemallow)	Taraxacum officinale (common dandelion)	Tragopogon dubius ^{ai} (yellow salsify)	Trifolium (clover)	unknown annual forb ^a (unknown forb)	Viola (violet)
year	Nested Frequency											
2004	-	-	5	45	70	-	-	4	-	11	-	17
2007	5	3	6	47	147	21	2	3	1	-	3	-
2012	8	-	3	1	26	-	-	-	-	1	-	-
2017	-	-	-	3	54	-	-	-	-	4	-	-
year	Average Cover (%)											
2004	-	-	0.1	0.1	0.2	-	-	0.0	-	0.0	-	0.1
2007	0.0	0.0	0.1	0.2	0.7	0.4	0.0	0.0	0.0	-	0.0	-
2012	0.0	-	0.0	0.0	0.1	-	-	-	-	0.0	-	-
2017	-	-	-	0.0	0.2	-	-	-	-	0.0	-	-

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

Table 06R-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. vaseyana ^p (mountain big sagebrush)	Chrysothamnus viscidiflorus ssp. viscidiflorus var. viscidiflorus (yellow rabbitbrush)
year	Line Intercept Cover (%)		
2004	9.7	14.9	16.2
2007	2.7	1.3	15.8
2012	5.6	3.8	18
2017	5.4	11.1	27.6
year	Quadrat Cover (%)		
2004	8.8	11.1	11.3
2007	3.5	1.3	13.5
2012	2.9	2.6	12.9
2017	4.3	8.4	16.9

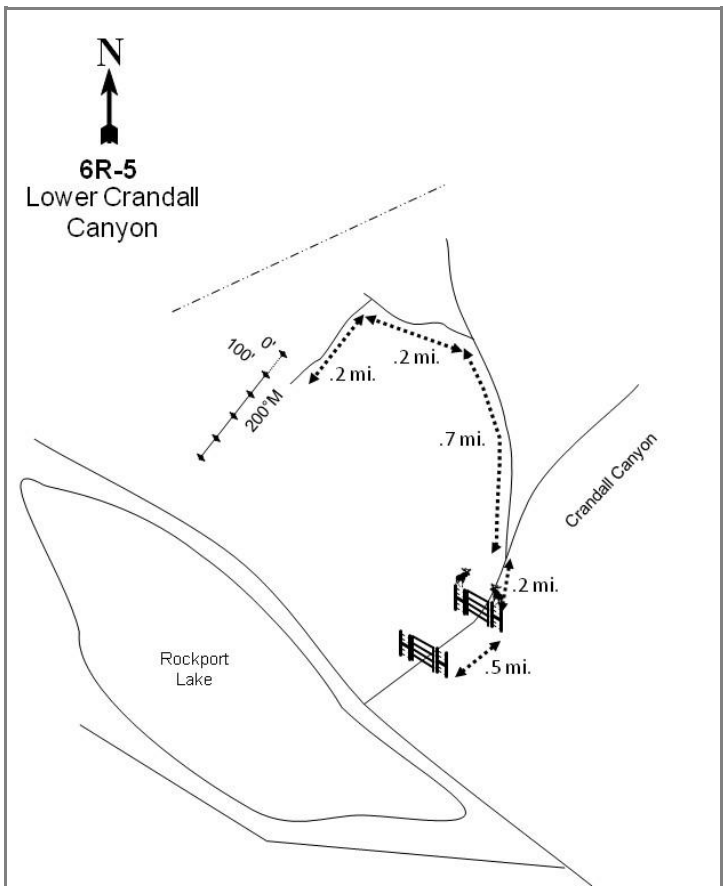
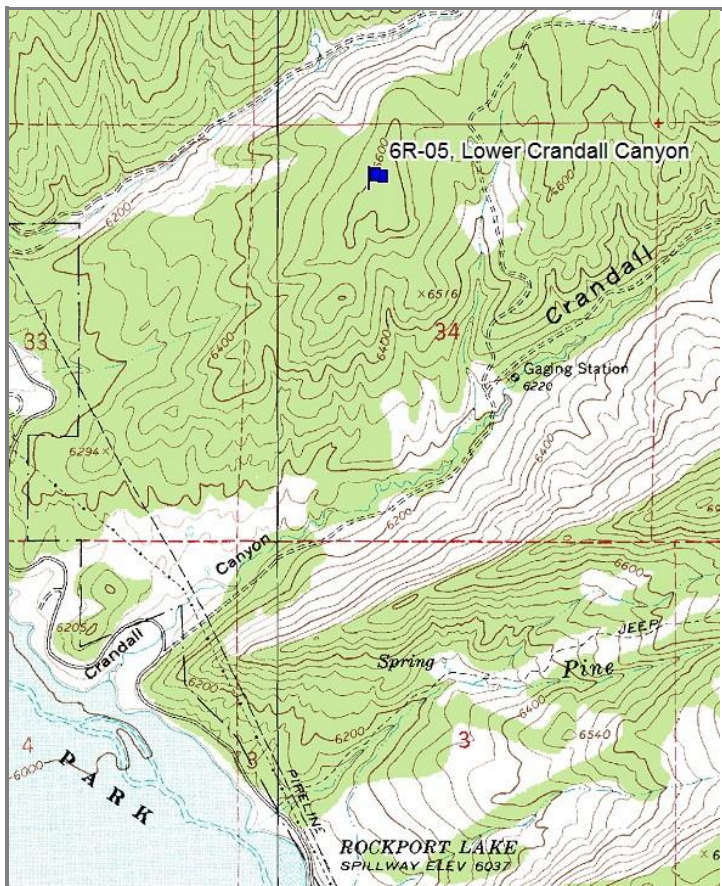
t - Tree Species; p - Preferred Browse; i - Introduced Species

Table 06R-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 (%)				
Artemisia nova^P -- (black sagebrush)									
2004	2960	40	1	78	20	7	5	5	20/40
2007	2800	360	0	79	21	8	0	26	16/36
2012	3740	20	0	91	9	20	78	24	15/37
2017	3680	-	2	95	4	9	0	4	19/41
Artemisia tridentata ssp. vaseyana^P -- (mountain big sagebrush)									
2004	3800	860	9	59	32	2	1	20	93/93
2007	2400	1000	57	16	28	6	1	26	49/43
2012	3180	60	20	77	3	59	16	16	37/40
2017	2780	-	2	97	1	32	7	0	43/55
Chrysothamnus viscidiflorus ssp. viscidiflorus var. viscidiflorus -- (yellow rabbitbrush)									
2004	7400	260	5	95	1	0	0	0	20/30
2007	18420	480	13	79	8	19	5	4	21/37
2012	17120	920	7	91	2	24	1	26	18/31
2017	17400	80	13	86	1	0	0	1	23/38

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

LOWER CRANDALL CANYON - STUDY NO. 06R-5



Location Information

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

Transect Information

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

Directions to Site

Drive northwest on UT-32 toward River Valley Drive. Turn right onto UT-302 and take the first left to stay on 302. Continue to follow this road for approximately 1.07 miles and turn right onto Crandall Canyon Road. Pass through the first gate and drive for 0.5 miles to a larger gate on private property (contact the landowner for entry). After 0.2 miles the road will fork: continue on the left side of the fork for 0.7 miles. At this point the road will fork again, and again, stay left. Drive for 0.2 miles at which point there will be a road off to the left. Proceed on this road for another 0.2 miles. The site is on the right (northwest) side of the road. The road to the site in the chained area is very faint and may not be visible in future sample years.

Site Information

Land Ownership	Private
Land Administrator	Private
Allotment	No data
Elevation	6,603ft (2,013m)
Aspect	Southwest
Slope	5-6%
Sample Dates	09/02/2014, 07/26/2017

Table 06R-05.1 Disturbance History. Recorded history of major disturbances.

Treatment/Disturbance	Name	WRI DB#	Date	Size (acres)
Chaining - Two-Way Ely	Crandall Canyon Juniper Thinning	2360	October-November 2013	354
Seeding - Aerial After	Crandall Canyon Juniper Thinning	2360	December 2013	354
Seeding - Drill	Crandall Canyon Juniper Thinning	2360	November-December 2013	-

Table 06R-05.2 Seed Mix. List of known seeded plant species and rates (if available).

Mix Name		Application Type	Application Date	Acres	
Crandall Canyon		Aerial	Dec 2013	400	
Type	Species	Common Name	Cultivar/Source ID	Bulk lbs/acre	PLS lbs/acre
G	Dactylis glomerata	Orchardgrass	Paiute	0.49	0.43
G	Elymus wawawaiensis	Snake River Wheatgrass	Secar	1.00	0.82
G	Poa secunda	Big Bluegrass	Sherman	0.50	0.41
G	Poa secunda	Canby Bluegrass	Canbar	0.75	0.58
F	Achillea millefolium	Western Yarrow	Hanford WA	0.10	0.09
F	Linum perenne	Blue Flax	Appar	0.50	0.45
F	Medicago sativa	Alfalfa	Ranger NC	1.18	1.11
F	Onobrychis viciifolia	Sainfoin	Eski	1.05	0.90
F	Onobrychis viciifolia	Sainfoin	Eski	0.88	0.80
F	Sanguisorba minor	Small Burnet		2.00	1.82
S	Artemisia tridentata ssp. vaseyana	Mountain Big Sagebrush	Summit UT	0.55	0.12
S	Artemisia tridentata ssp. wyomingensis	Wyoming Big Sagebrush	Sanpete UT	0.13	0.03
S	Artemisia tridentata ssp. wyomingensis	Wyoming Big Sagebrush	Sanpete UT	0.88	0.15
S	Bassia prostrata	Forage Kochia	Sanpete UT	1.00	0.65
Mix Name		Application Type	Application Date	Acres	
Crandall Canyon		Drill	Nov 2014		
Type	Species	Common Name	Cultivar/Source ID	Bulk lbs/acre	PLS lbs/acre
	Purshia tridentata	Bitterbrush		NaN	NaN

Wildlife Habitat and Vegetation History

Table 06R-05.3 - Wildlife Seasonal Habitat. UDWR wildlife habitat and seasonality.

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

Table 06R-05.4 - Vegetation History. The dominant vegetation type(s) and phase of woodland succession (Tausch, Miller, Roundy, & Chambers, 2009).

Year	Vegetation Type	Woodland Succession
2014	Perennial Grass	Phase I
2017	Perennial-Annual Grass	Phase I

Site Notes

A partial deer shed was found in 2017.

Site Potential

1981 - 2010 Average Annual Precipitation 17 inches
 NRCS Ecological Site Mountain Loam (Mountain Big Sagebrush)
 NRCS Ecological Site # R047XA430UT
 States and Transitions No state and transition model is available for this ecological site.

This site was established in 2014 and has been dominated by native perennial grasses including bluebunch wheatgrass (*Pseudoroegneria spicata*), squirreltail (*Elymus elymoides*), and Sandberg bluegrass (*Poa secunda*). In addition, cover and frequency of the annual grass cheatgrass (*Bromus tectorum*) increased and it became co-dominant with perennial grasses in 2017. Forbs are diverse and cover has increased between 2014 and 2017, but a majority of said increase can be attributed to annual species such as desert madwort (*Alyssum desertorum*), western tansymustard (*Descurainia pinnata*), and pepperweed (*Lepidium sp.*) (Table 06R-05.7, Table 06R-05.10, Table 06R-05.11). The most abundant shrub species in both sample years has been yellow rabbitbrush (*Chrysothamnus viscidiflorus* ssp. *viscidiflorus* var. *viscidiflorus*). Cover and density of preferred browse species has remained similar throughout the duration of the study. Utah juniper (*Juniperus osteosperma*) is still present post-treatment, but in low amounts; the study site is considered to be within Phase I of woodland succession (Table 06R-05.4, Table 06R-05.12, Table 06R-05.13, Table 06R-05.14).

Trend Summary Tables

Table 06R-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
2014	0.5	1.6	0.3	0.9	2.1	1.8
2017	0.9	5.9	1.2	2.2	6.8	1.6

Table 06R-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
2014	11	252	25	159	0.0	7.2	0.3	1.6
2017	244	323	354	173	13.1	17.7	11.2	5.2

Table 06R-05.8 - 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
2014	38.5	0.0	53.1	0.6	1.0	12.3
2017	17.1	0.1	47.4	0.4	0.7	53.6

Table 06R-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	Rocky Mountain Elk	Moose	Rabbit
	Quadrat Frequency				
2014	-	20	1	-	41
2017	1	15	26	-	22
Year	Days Use Per Acre (ha)				
2014	-	12.1 (29.8)	2.7 (6.6)	-	-
2017	5.8 (14.3)	7.4 (18.2)	20.8 (51.3)	0.5 (1.2)	-

Table 06R-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 tectorum ^{ai} (cheatgrass)	Dactylis glomerata ⁱ (orchardgrass)	Elymus elymoides (squirreltail)	Elymus lanceolatus (thickspike wheatgrass)	Poa fendleriana (muttongrass)	Poa pratensis ⁱ (Kentucky bluegrass)	Poa secunda (Sandberg bluegrass)	Pseudoroegneria spicata (bluebunch wheatgrass)
year	Nested Frequency									
2014	18	68	11	5	19	2	47	21	106	89
2017	41	-	244	8	69	37	57	-	75	181
year	Average Cover (%)									
2014	0.4	1.5	0.0	0.0	0.3	0.0	0.9	0.3	1.2	2.5
2017	1.1	-	13.1	0.1	3.2	1.1	2.0	-	1.6	8.6

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

Table 06R-05.11 - 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 dimorpha (low pussytoes)	Arenaria (sandwort)	Astragalus 2 (Milkvetch)	Astragalus convallarius (lesser rusby milkvetch)	Astragalus tenellus (looseflower milkvetch)	Balsamorhiza sagittata (arrowleaf balsamroot)	Calochortus nuttallii (sego lily)	Camelina microcarpa ^{ai} (littlepod false flax)	Carduus nutans ^{ai} (nodding plumeless thistle)	Ceratocephala testiculata ^{ai} (curvseed butterwort)	Chenopodium leptophyllum ^a (narrowleaf goosefoot)	Cirsium (thistle)	Collinsia parviflora ^a (maiden blue eyed Mary)	
year	Nested Frequency																	
2014	16	4	-	-	30	50	6	8	5	0	-	-	-	-	5	4	1	
2017	26	-	12	243	9	63	3	28	7	3	10	9	13	20	-	33	3	
year	Average Cover (%)																	
2014	0.4	0.0	-	-	0.2	0.2	0.0	0.0	0.0	0.0	-	-	-	-	0.0	0.0	0.0	
2017	0.6	-	0.1	6.5	0.2	1.4	0.0	0.4	0.2	0.4	0.0	0.0	0.8	0.1	-	0.4	0.1	

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

FORB SPECIES	Collomia linearis ^a (tiny trumpet)	Comandra umbellata (bastard toadflax)	Cordylanthus ^a (bird's-beak)	Crepis acuminata (tapertip hawkbeard)	Descurainia pinnata ^a (western tansymustard)	Draba ^a (draba)	Erigeron engelmannii (Engelmann's fleabane)	Eriogonum umbellatum (sulphur-flower buckwheat)	Hackelia patens (spotted stickseed)	Lactuca serriola ^{ai} (prickly lettuce)	Lepidium ^a (pepperweed)	Linum perenne ⁱ (blue flax)	Lithospermum incisum (narrowleaf stone seed)	Packera multilobata (lobeleaf groundsel)	Penstemon humilis (low beardtongue)	Phlox hoodii (spiny phlox)	Phlox longifolia (longleaf phlox)
year	Nested Frequency																
2014	-	8	-	-	6	-	13	39	-	-	4	-	4	-	-	27	11
2017	13	16	2	1	6	2	3	8	5	92	77	13	5	1	6	13	-
year	Average Cover (%)																
2014	-	0.1	-	-	0.0	-	0.0	0.2	-	-	0.2	-	0.0	-	-	0.3	0.0
2017	0.1	0.5	0.0	0.0	1.1	0.0	0.0	0.2	0.0	0.9	1.2	0.1	0.0	0.0	0.2	0.3	-

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

FORB SPECIES	Polygonum douglasii ^a (Douglas' knotweed)	Sanguisorba minor ⁱ (small burnet)	Schoenocrambe limifolia (flaxleaf plainsmustard)	Sisymbrium altissimum ^{ai} (tall tumblemustard)	Solanum triflorum ^a (cutleaf nightshade)	Symphyotrichum (aster)	Trifolium (clover)
year	Nested Frequency						
2014	9	7	-	-	0	4	16
2017	-	1	1	5	5	9	6
year	Average Cover (%)						
2014	0.0	0.0	-	-	0.0	0.0	0.1
2017	-	0.0	0.0	0.2	0.0	0.1	0.0

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

Table 06R-05.12 - 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)	Bassia prostrata ^{pi} (forage kochia)	Chrysothamnus viscidiflorus ssp. viscidiflorus var. viscidiflorus (yellow rabbitbrush)	Gutierrezia sarothrae (broom snakeweed)	Juniperus osteosperma ^t (Utah juniper)	Opuntia (pricklypear)	Purshia tridentata ^p (antelope bitterbrush)	Symphoricarpos oreophilus (mountain snowberry)	Tetradymia canescens (spineless horsebrush)
year	Line Intercept Cover (%)									
2014	-	0.8	0.1	1.8	-	1.8	0.1	-	-	0.2
2017	-	1.8	0.4	6.2	-	1.6	-	-	0.1	0.5
year	Quadrat Cover (%)									
2014	0.0	0.4	0.0	1.4	-	0.3	0.1	0.0	0.0	0.0
2017	-	0.8	0.1	5.3	0.0	1.2	0.0	0.0	0.1	0.5

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

Table 06R-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.

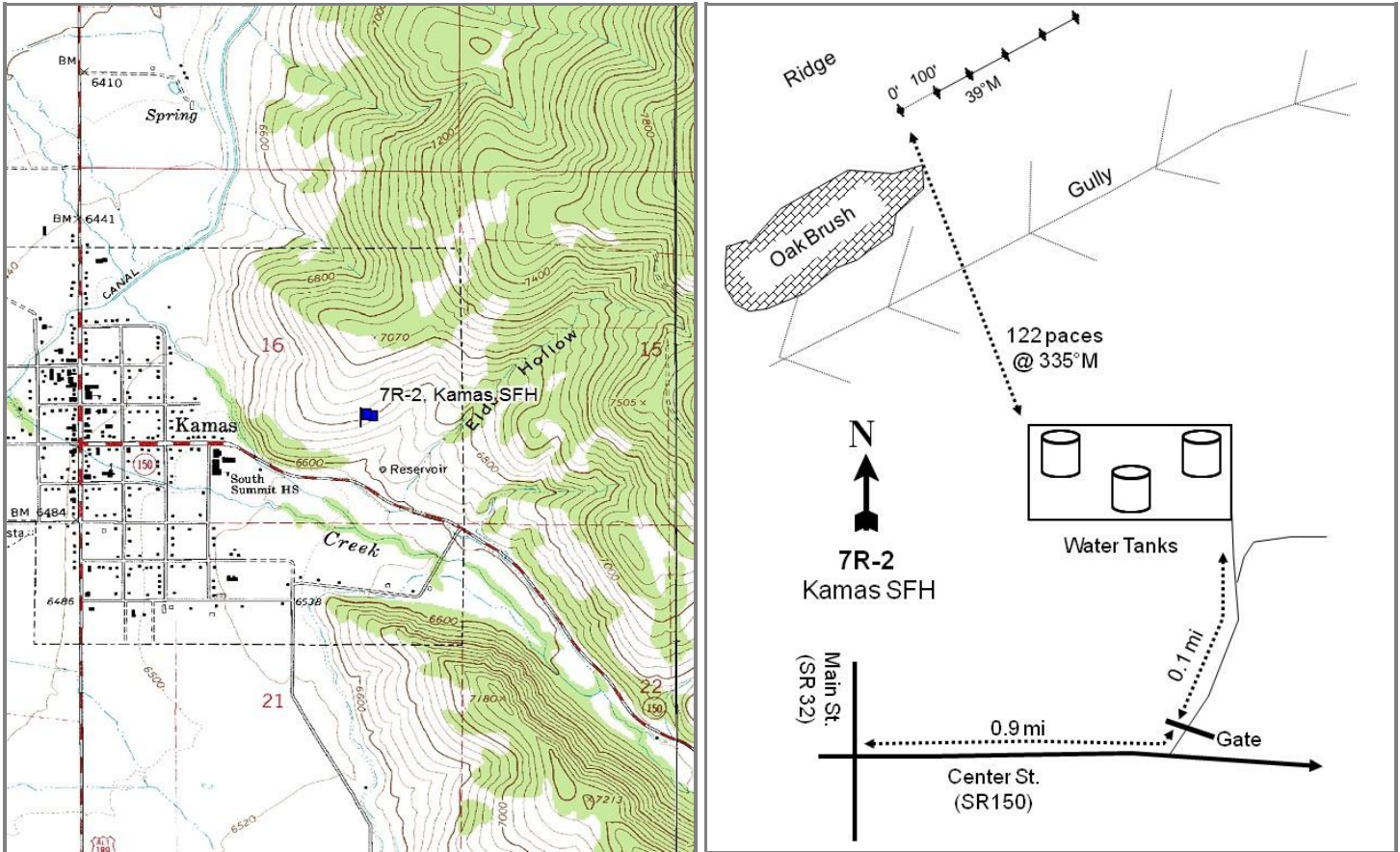
Year	Density		Age Class Distribution			Utilization		Poor Vigor (%)	Average Height Crown (cm)
	Plants Per Acre		Excluding Seedlings			Moderate (%)	Heavy (%)		
	Excluding Seedlings	Seedling	Young (%)	Mature (%)	Decadent (%)				
Amelanchier utahensis ^p -- (Utah serviceberry)									
2014	100	20	100	0	0	40	0	0	28/28
2017	100	-	80	20	0	0	0	0	25/31
Artemisia tridentata ssp. vaseyana ^p -- (mountain big sagebrush)									
2014	320	80	13	19	69	13	19	25	32/41
2017	320	20	6	94	0	31	6	0	39/47
Bassia prostrata ^{pi} -- (forage kochia)									
2014	380	200	26	74	0	0	0	0	7/18
2017	460	-	4	96	0	4	0	0	19/33
Chrysothamnus viscidiflorus ssp. viscidiflorus var. viscidiflorus -- (yellow rabbitbrush)									
2014	3980	540	40	60	0	4	1	1	19/20
2017	3580	-	7	92	1	0	0	1	24/37
Gutierrezia sarothrae -- (broom snakeweed)									
2014	-	-	-	-	-	-	-	-	23/31
2017	140	-	0	100	0	0	0	0	20/28
Juniperus osteosperma ^t -- (Utah juniper)									
2014	100	60	80	0	20	0	0	40	- / -
2017	100	-	40	60	0	20	0	20	- / -
Opuntia -- (pricklypear)									
2014	860	-	42	58	0	0	0	5	12/17
2017	260	-	15	69	15	0	0	23	11/20
Purshia tridentata ^p -- (antelope bitterbrush)									
2014	60	660	100	0	0	0	0	0	5/5
2017	80	-	75	25	0	0	0	0	14/26
Symphoricarpos oreophilus -- (mountain snowberry)									
2014	540	100	78	15	7	7	0	19	18/26
2017	280	-	36	64	0	0	0	0	23/36
Tetradymia canescens -- (spineless horsebrush)									
2014	480	-	58	42	0	29	8	0	18/20
2017	420	-	24	76	0	0	0	0	24/36

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

Table 06R-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)							
2014	79	10	70	15	5	-	4.7
2017	69	-	70	30	-	-	8.6

KAMAS SFH - STUDY NO. 07R-2

**Location Information**

USGS 7.5 min Map Info
GPS (0' Stake)

Kamas SE; Township 2S, Range 6E, Section 16
NAD 83 UTM ZONE 12, 477454 East 4499249 North

Transect Information

Browse Tag # (0' Stake)	177
Transect Bearing	39° 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 intersection of Main Street (SR-32) and Center Street (SR-150) in Kamas, turn east onto Center Street and drive for 0.9 miles. Turn left (north) where there will be a gate. After passing through the gate (you may have to walk), drive for 0.1 miles to the southeast corner of some fenced-off water tanks. From there, walk to the northwest corner and then walk for 122 paces at a bearing of 335 degrees magnetic to the 0-foot stake, marked with browse tag #177.

Site Information

Land Ownership	Private
Land Administrator	Private
Allotment	No data
Elevation	6,650ft (2,027m)
Aspect	Southeast
Slope	30%
Sample Dates	08/24/2006, 06/28/2011, 07/27/2017

Table 07R-02.1 Disturbance History. Recorded history of major disturbances.

Treatment/Disturbance	Name	WRI DB#	Date	Size (acres)
Herbicide – Plateau	Kamas SFH Property	1195	September 2008	55
Seeding – Aerial	Kamas SFH Property	1195	February 2009	55

Table 07R-02.2 Seed Mix. List of known seeded plant species and rates (if available).

Mix Name			Application Type	Application Date	Acres
Kamas SFH Property			Aerial	Feb 2009	55
Type	Species	Common Name	Cultivar/Source ID	Bulk lbs/acre	PLS lbs/acre
G	<i>Elymus wawawaiensis</i>	Snake River Wheatgrass	Secar	0.91	0.84
G	<i>Pseudoroegneria spicata</i>	Bluebunch Wheatgrass	Goldar	0.95	0.72
F	<i>Medicago sativa</i>	Alfalfa	Ranger	1.82	1.67
F	<i>Sanguisorba minor</i>	Small Burnet	Delar	0.91	0.83
S	<i>Artemisia tridentata</i> ssp. <i>vaseyana</i>	Mountain Big Sagebrush	Sanpete UT	0.91	0.16
S	<i>Bassia prostrata</i>	Forage Kochia	Beaver UT	2.73	1.90

Wildlife Habitat and Vegetation History**Table 07R-02.3 - Wildlife Seasonal Habitat.** UDWR wildlife habitat and seasonality.

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

Table 07R-02.4 - Vegetation History. The dominant vegetation type(s) and phase of woodland succession (Tausch, Miller, Roundy, & Chambers, 2009).

Year	Vegetation Type	Woodland Succession
2006	Bulbous Bluegrass/Annual Grass	NA
2011	Bulbous Bluegrass/Annual Grass	NA
2017	Bulbous Bluegrass	NA

Site Notes

Two deer carcasses were seen on the walk to the site in 2017.

Soils**Table 07R-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
Loam	6.8	43.0	32.7	24.3	3.8	46.5	560.0	0.7	08/23/2006

Site Potential

1981 - 2010 Average Annual Precipitation	18 inches
NRCS Ecological Site	Mountain Stony Loam (Mountain Big Sagebrush)
NRCS Ecological Site #	047XC462UT
States and Transitions	No state and transition model is available for this ecological site.

This study site has remained dominated by herbaceous species since establishment in 2006. The introduced perennial grass species bulbous bluegrass (*Poa bulbosa*) has contributed the most cover of any grass species and dominated the site throughout the duration of the study; other perennial grasses have remained rare. In addition, the introduced annual grass cheatgrass (*Bromus tectorum*) was a co-dominant site component in 2006 and 2011, but cover decreased in 2017 (Table 07R-02.10). Forbs have been diverse and abundant, with native perennial forbs such as hairy false goldenaster (*Heterotheca villosa*), silvery lupine (*Lupinus argenteus*), and white sagebrush (*Artemisia ludoviciana*) contributing more cover than annual forbs (Table 07R-02.7, Table 07R-02.11). Broom snakeweed (*Gutierrezia sarothrae*) was the most abundant shrub in 2017, while preferred browse such as Utah serviceberry (*Amelanchier utahensis*) and mountain big sagebrush (*Artemisia tridentata* ssp. *vaseyana*) has remained rare (Table 07R-02.12, Table 07R-02.13).

Trend Summary Tables**Table 07R-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
2006	0.6	2.7	-	0.7	2.7	-
2011	0.8	1.0	-	0.6	1.1	-
2017	0.8	4.4	-	0.9	7.1	-

Table 07R-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
2006	349	300	326	252	10.2	16.6	7.0	17.8
2011	398	361	389	278	10.0	19.8	9.8	12.8
2017	344	406	400	294	5.0	19.4	11.7	18.8

Table 07R-02.8 - 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
2006	8.7	0.4	16.4	3.2	28.8	55.0
2011	5.7	0.1	16.8	3.9	30.3	53.9
2017	9.1	0.2	15.2	11.5	26.6	52.6

Table 07R-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	Rocky Mountain Elk	Rabbit
	Quadrat Frequency			
2006	1	42	18	26
2011	5	22	3	8
2017	2	30	1	11
Year	Days Use Per Acre (ha)			
2006	8.7 (21.5)	101.9 (251.6)	31.5 (77.8)	-
2011	18.1 (44.8)	59.6 (147.3)	8.1 (19.9)	-
2017	10.9 (26.9)	107.9 (266.5)	-	-

Table 07R-02.10 - Grass Species. Nested frequency and modified Daubenmire average cover by year.

GRASS SPECIES	Agropyron cristatum ⁱ (crested wheatgrass)	Bromus tectorum ⁿⁱ (cheatgrass)	Poa bulbosa ⁱ (bulbous bluegrass)	Poa pratensis ⁱ (Kentucky bluegrass)	Poa secunda (Sandberg bluegrass)
year	Nested Frequency				
2006	44	349	287	5	-
2011	38	398	325	15	28
2017	34	344	401	17	9
year	Average Cover (%)				
2006	1.3	10.2	14.9	0.3	-
2011	0.6	10.0	18.3	0.6	0.3
2017	0.3	5.0	18.8	0.1	0.1

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

Table 07R-02.11 - Forb Species. Nested frequency and modified Daubenmire average cover by year.

FORB SPECIES																		
Alyssum desertorum ^{ai} (desert madwort)																		
Arabis (rockcress)																		
Artemisia ludoviciana (white sagebrush)																		
Camelina microcarpa ^{ai} (littlerpod false flax)																		
Ceratocephala testiculata ^{ai} (curveseed butterwort)																		
Cirsium (thistle)																		
Cirsium undulatum ^a (wavy/leaf thistle)																		
Collinsia parviflora ^a (maiden blue eyed Mary)																		
Draba ^a (draba)																		
Epilobium brachycarpum ^a (tall annual willowherb)																		
Eriogonum cernuum ^a (nodding buckwheat)																		
Eriogonum racemosum (redroot buckwheat)																		
Erodium cicutarium ^{ai} (redstem stork's bill)																		
Helianthella uniflora (oneflower helianthella)																		
Heliomeris multiflora var. multiflora (showy goldeneye)																		
Heterotheca villosa (hairy false goldenaster)																		
Lactuca serriola ^{ai} (prickly lettuce)																		
year	Nested Frequency																	
2006	220	3	72	3	5	-	3	57	37	71	5	9	187	6	6	181	1	
2011	124	-	93	7	25	2	23	39	60	110	-	8	339	1	20	179	28	
2017	214	-	88	-	5	7	3	-	-	-	25	12	353	-	-	232	-	
year	Average Cover (%)																	
2006	1.0	0.0	3.8	0.0	0.0	-	0.1	0.1	0.1	1.3	0.0	0.3	4.0	0.0	0.5	9.3	0.0	
2011	0.5	-	3.9	0.1	0.1	0.1	0.8	0.2	0.1	1.0	-	0.0	6.9	0.1	0.8	5.2	0.1	
2017	1.0	-	1.9	-	0.0	0.0	0.0	-	-	-	1.0	0.3	9.7	-	-	11.1	-	

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

FORB SPECIES										
Lithospermum ruderale (western stone seed)										
Lupinus argenteus (silvery lupine)										
Phlox longifolia (longleaf phlox)										
Salsola tragus ^{ai} (prickly Russian thistle)										
Silene antirrhina ^a (sleepy silene)										
Sisymbrium altissimum ^{ai} (tall tumbleweed)										
Solidago (goldenrod)										
Tragopogon dubius ^{ai} (yellow salsify)										
Verbascum thapsus ^{ai} (common mullein)										
Veronica biloba ^{ai} (two-lobed speedwell)										
year	Nested Frequency									
2006	0	21	1	7	106	1	15	6	-	-
2011	6	56	-	-	50	-	-	2	-	2
2017	2	43	2	-	-	-	22	2	6	-
year	Average Cover (%)									
2006	0.0	2.6	0.0	0.1	0.4	0.0	1.4	0.1	-	-
2011	0.0	2.6	-	-	0.1	-	-	0.0	-	0.0
2017	0.0	4.4	0.0	-	-	-	1.1	0.0	0.0	-

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

Table 07R-02.12 - Shrub and Tree Species. Average modified Daubenmire quadrat and line intercept cover by year.

SHRUB SPECIES	Line Intercept Cover (%)							
	year	2006	2011	2017	2006	2011	2017	
Artemisia tridentata ssp. vaseyana ^p (mountain big sagebrush)	0.7	-	0.1	1.7	0.3	0.6	0	
Chrysothamnus viscidiflorus ssp. viscidiflorus var. viscidiflorus (yellow rabbitbrush)	0.6	-	0	0.3	0.4	0.4	-	
Crataegus (hawthorn)	0.9	-	0.4	5.1	0.5	0.7	0.4	
Gutierrezia sarothrae (broom snakeweed)	Quadrat Cover (%)							
Mahonia repens (creeping barberry)	2006	0.6	-	0.0	2.0	0.5	0.2	0.0
Opuntia (pricklypear)	2011	0.8	0.0	0.0	0.1	0.5	0.4	0.0
Symphoricarpos oreophilus (mountain snowberry)	2017	0.8	0.1	0.0	3.4	0.3	0.4	0.1

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

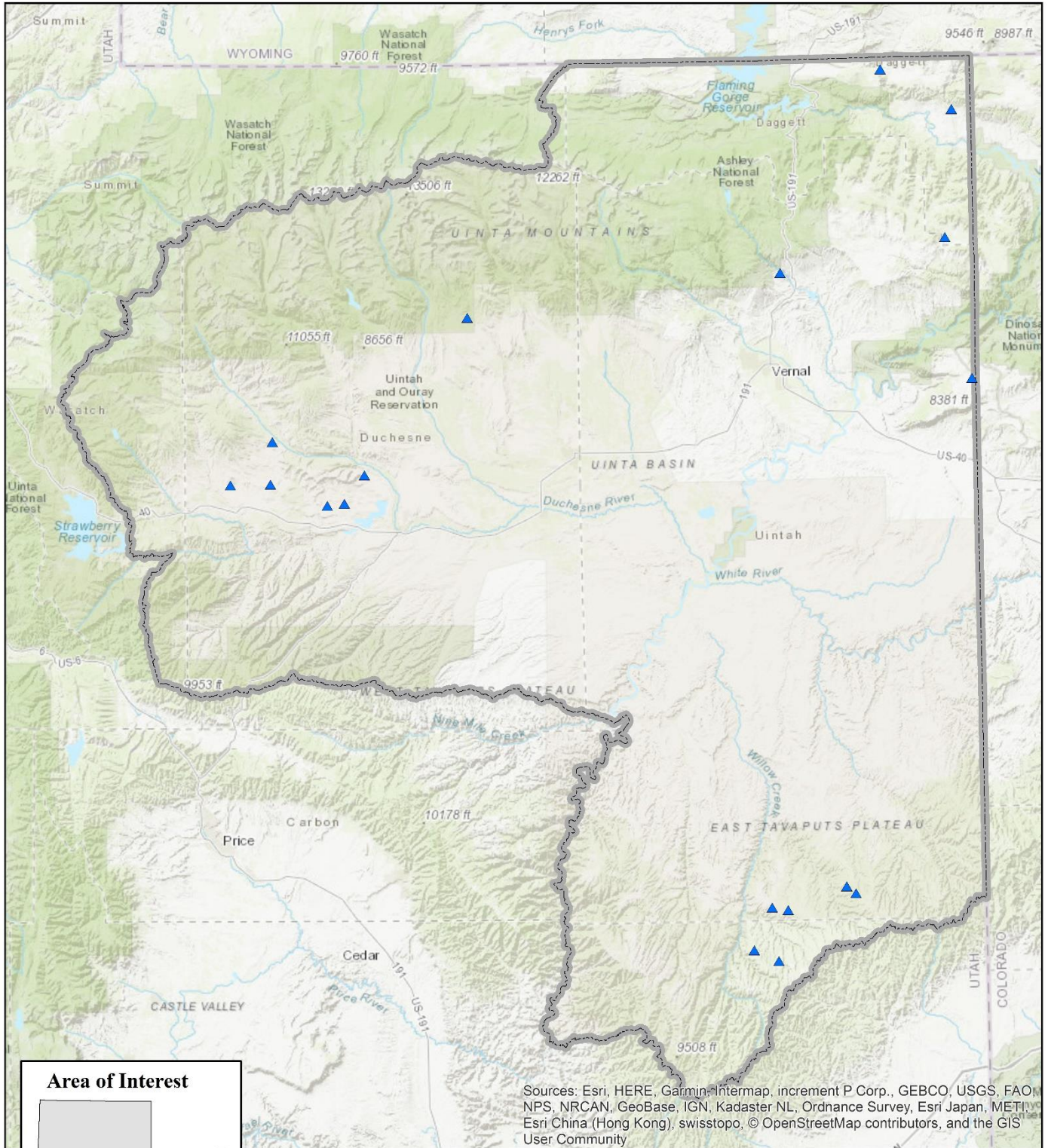
Table 07R-02.13 - Shrub/Tree Characteristics. Population characteristics of shrub/tree species populations including density reproduction (seedlings), age distribution, utilization, vigor and average size (height/crown) of plants.

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 utahensis ^p -- (Utah serviceberry)									
2006	-	-	-	-	-	-	-	-	125/130
2011	-	-	-	-	-	-	-	-	140/147
2017	-	-	-	-	-	-	-	-	92/122
Artemisia tridentata ssp. vaseyana ^p -- (mountain big sagebrush)									
2006	20	-	0	100	0	100	0	0	57/95
2011	20	-	0	100	0	100	0	0	70/119
2017	20	-	0	100	0	0	100	0	74/138
Chrysothamnus viscidiflorus ssp. viscidiflorus var. viscidiflorus -- (yellow rabbitbrush)									
2006	-	-	-	-	-	-	-	-	28/72
2011	20	-	100	0	0	0	0	0	20/32
2017	-	-	-	-	-	-	-	-	15/50
Crataegus -- (hawthorn)									
2006	20	-	100	0	0	0	0	0	105/53
2011	20	-	0	100	0	0	0	0	177/123
2017	20	-	0	100	0	100	0	0	218/182
Ericameria nauseosa -- (rubber rabbitbrush)									
2006	-	-	-	-	-	-	-	-	76/114
2011	-	-	-	-	-	-	-	-	87/129
2017	60	-	100	0	0	0	0	0	51/59
Gutierrezia sarothrae -- (broom snakeweed)									
2006	1980	20	22	76	2	0	0	1	20/29
2011	860	20	30	70	0	0	0	0	17/18
2017	8620	80	11	87	3	0	0	3	21/23
Mahonia repens -- (creeping barberry)									
2006	2600	-	11	89	0	0	0	0	6/10
2011	3640	-	6	95	0	0	0	0	5/10
2017	3900	-	0	100	0	0	0	0	5/7
Opuntia -- (pricklypear)									
2006	200	-	30	60	10	0	0	10	13/40
2011	360	-	0	100	0	0	0	6	14/45
2017	540	-	7	82	11	0	0	26	13/36

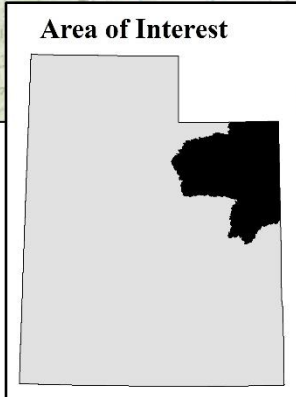
Year	Density		Age Class Distribution			Utilization		Poor Vigor (%)	Average Height Crown (cm)
	Plants Per Acre		Excluding Seedlings			Moderate (%)	Heavy (%)		
	Excluding Seedlings	Seedling	Young (%)	Mature (%)	Decadent (%)				
Purshia tridentata ^P -- (antelope bitterbrush)									
2006	-	-	-	-	-	-	-	-	-/-
2011	-	-	-	-	-	-	-	-	-/-
2017	-	-	-	-	-	-	-	-	43/146
Symphoricarpos oreophilus -- (mountain snowberry)									
2006	20	-	0	100	0	0	0	0	64/134
2011	40	-	0	100	0	0	50	0	68/129
2017	40	-	0	100	0	0	0	0	64/124
Tetradymia canescens -- (spineless horsebrush)									
2006	-	-	-	-	-	-	-	-	37/111
2011	-	-	-	-	-	-	-	-	-/-
2017	-	-	-	-	-	-	-	-	40/151

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

NORTHEASTERN REGION

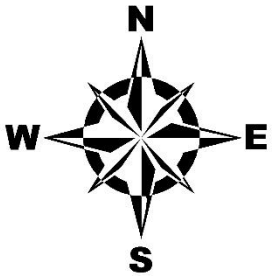
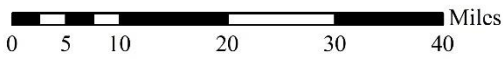


Sources: Esri, HERE, Garmin, Intermap, increment P Corp., GEBCO, USGS, FAO, NPS, NRCAN, GeoBase, IGN, Kadaster NL, Ordnance Survey, Esri Japan, METI, Esri China (Hong Kong), swisstopo, © OpenStreetMap contributors, and the GIS User Community

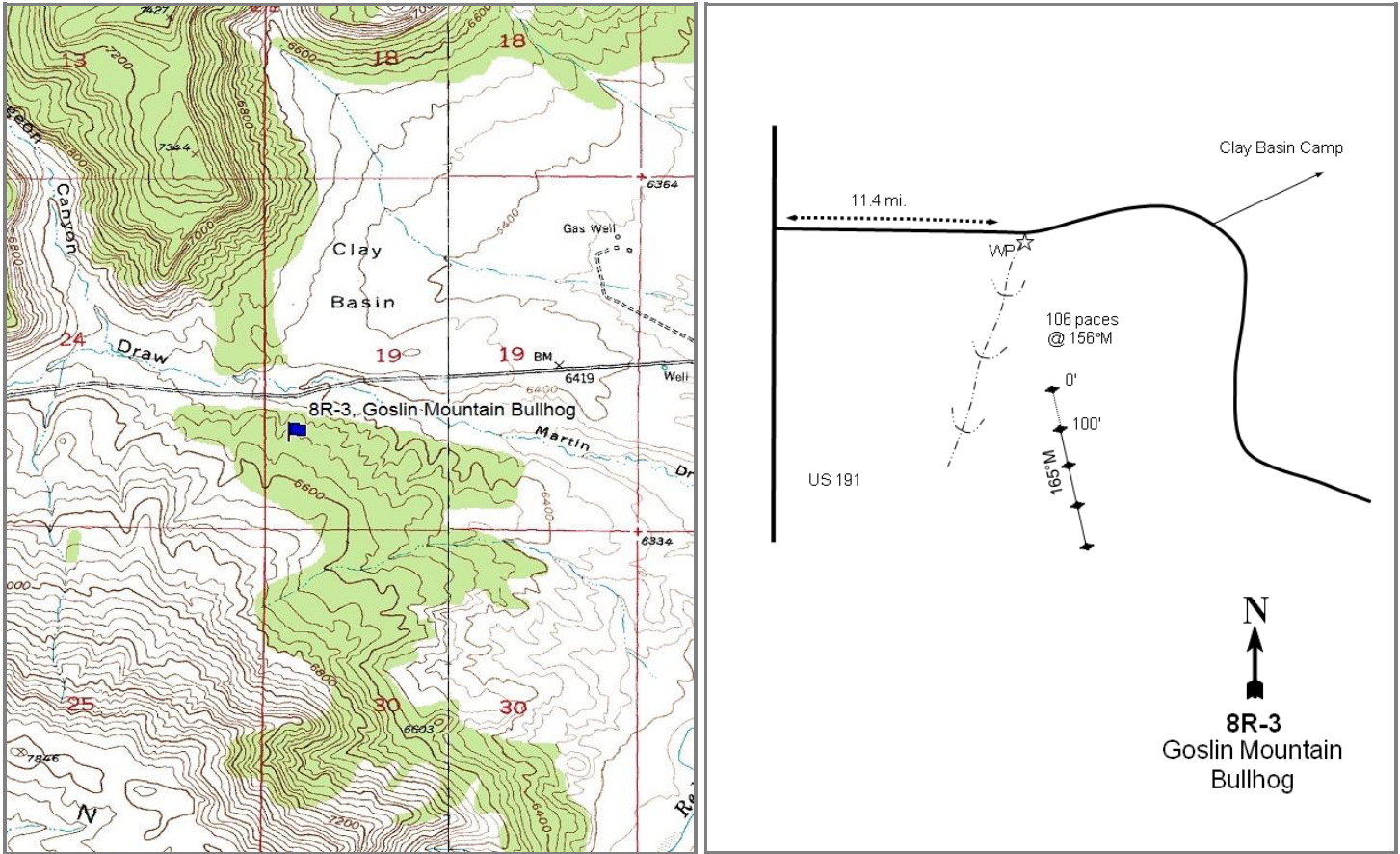


Project

- ▲ WRI
- Northeastern Region Boundaries



GOSLIN MOUNTAIN BULLHOG - STUDY NO. 08R-3



Location Information

USGS 7.5 min Map Info	Goslin Mountain NE; Township 3N, Range 24E, Section 19
GPS (0' Stake)	NAD 83 UTM ZONE 12, 646494 East 4537900 North

Transect Information

Browse Tag # (0' Stake)	274
Transect Bearing	165° 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 Dutch John, proceed north towards Antelope Flat on Highway U.S. 191 for approximately 8 miles. Before the Wyoming border, turn east onto Antelope Flat Road and drive on this road for 11.4 miles. There is a half-high witness post on the right (south) side of the road. The 0-foot stake is 106 paces away from the half-high witness post at 156 degrees magnetic and is marked with browse tag #274.

Site Information

Land Ownership	Federal
Land Administrator	BLM
Allotment	CLAY BASIN
Elevation	6,500ft (1,981m)
Aspect	North
Slope	8-10%
Sample Dates	07/28/2008, 07/27/2010, 07/09/2013, 08/08/2017

Table 08R-03.1 Disturbance History. Recorded history of major disturbances.

Treatment/Disturbance	Name	WRI DB#	Date	Size (acres)
Mechanical – Bullhog	Goslin Bullhog Phase II	1090	March-May 2009	2595
Seeding - Aerial Before	Goslin Bullhog Phase II	1090	October	2595

Table 08R-03.2 Seed Mix. List of known seeded plant species and rates (if available).

Mix Name			Application Type	Application Date	Acres
Goslin Bullhog phase 2			Aerial	Oct 2008	300
Type	Species	Common Name	Cultivar/Source ID	Bulk lbs/acre	PLS lbs/acre
G	<i>Achnatherum hymenoides</i>	Indian Ricegrass	Rimrock	1.00	0.92
G	<i>Dactylis glomerata</i>	Orchardgrass	Paiute	0.50	0.40
G	<i>Elymus elymoides</i>	Bottlebrush Squirreltail	Toe Jam	0.50	0.42
G	<i>Elymus lanceolatus</i>	Thickspike Wheatgrass	Critana	0.50	0.42
G	<i>Elymus wawawaiensis</i>	Snake River Wheatgrass	Secar	1.00	0.76
G	<i>Poa secunda</i>	Sandberg Bluegrass	Toole MT	0.25	0.21
G	<i>Poa secunda</i>	Big Bluegrass	Sherman	0.25	0.17
G	<i>Pseudoroegneria spicata</i>	Bluebunch Wheatgrass	Anatone	0.50	0.36
F	<i>Medicago sativa</i>	Alfalfa	Ladak	1.00	0.95
F	<i>Medicago sativa</i>	Alfalfa	Ranger	1.00	0.92
F	<i>Onobrychis viciifolia</i>	Sainfoin	Eski	2.00	1.76
F	<i>Onobrychis viciifolia</i>	Sainfoin	Eski	1.97	1.72
F	<i>Sanguisorba minor</i>	Small Burnet	Delar	4.00	3.70
S	<i>Artemisia tridentata</i> ssp. <i>wyomingensis</i>	Wyoming Big Sagebrush	Sanpete UT	0.50	0.09

Wildlife Habitat and Vegetation History

Table 08R-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	occupied	year-long & Winter	brood-rearing

Table 08R-03.4 - Vegetation History. The dominant vegetation type(s) and phase of woodland succession (Tausch, Miller, Roundy, & Chambers, 2009).

Year	Vegetation Type	Woodland Succession
2008	Pinyon-Juniper/Black Sagebrush	Phase III
2010	Perennial Grass/Sagebrush/Bitterbrush	Phase I
2013	Perennial Grass/Sagebrush/Bitterbrush	Phase I
2017	Perennial Grass/Sagebrush/Bitterbrush	Phase I

Site Notes

An unknown skull plate was found near the transect in 2017. Trees west of the site could provide good thermal cover.

Site Potential

1981 - 2010 Average Annual Precipitation	11 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.

When the site was established in 2008, Utah juniper (*Juniperus osteosperma*) contributed most of the cover in the overstory, and the site was considered to be within Phase III of woodland succession (Table 08R-03.4, Table 08R- 03.14). The shrub layer consisted of black sagebrush (*Artemisia nova*) and antelope bitterbrush (*Purshia tridentata*) with only a few other shrub species present which provided limited cover. Following the treatment, the site transitioned from a tree-dominated state to one dominated by mountain big sagebrush (*A. tridentata* ssp. *vaseyana*), black sagebrush, and bitterbrush (Table 08R-03.12, Table 08R-03.13). A diverse mixture of native perennial grasses, including (but not limited to) Indian ricegrass (*Achnatherum hymenoides*), western wheatgrass (*Pascopyrum smithii*), and bluebunch wheatgrass (*Pseudoroegneria spicata*) has contributed most of the herbaceous cover throughout the duration of the study; perennial grasses have been a co-dominant site component in all post-treatment sample years. Although diverse, forbs have provided limited cover in all sample years (Table 08R-03.7, Table 08R-03.10, Table 08R- 03.11).

Trend Summary Tables**Table 08R-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
2008	4.4	0.5	6.3	4.4	0.1	18.2
2010	6.6	0.6	0.3	8.1	0.3	0.4
2013	8.8	0.6	-	10.9	0.3	0.1
2017	15.3	1.1	0.2	20.3	0.5	0.6

Table 08R-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
2008	-	259	15	134	-	10.0	0.2	2.7
2010	-	246	12	148	-	16.5	0.1	4.6
2013	-	279	17	130	-	16.3	0.1	2.6
2017	23	348	25	132	0.2	27.0	0.1	3.7

Table 08R-03.8 - 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
2008	26.7	7.0	49.7	8.1	0.8	22.9
2010	16.1	0.2	67.8	1.1	0.0	29.7
2013	12.4	0.2	72.1	0.8	0.3	31.6
2017	9.6	1.5	66.7	0.9	0.1	47.4

Table 08R-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	Coyote	Mule Deer	Rocky Mountain Elk	Rabbit
	Quadrat Frequency				
2008	-	-	18	4	56
2010	-	-	3	3	1
2013	-	-	8	2	4
2017	-	-	19	-	12
Year	Days Use Per Acre (ha)				
2008	7.2 (17.9)	17.4 (43.0)*	22.8 (56.3)	6.0 (14.9)	-
2010	2.2 (5.4)	-	14.1 (34.8)	-	-
2013	-	-	20.8 (51.3)	8.7 (21.5)	-
2017	-	-	35.5 (87.7)	2.0 (5.0)	-

*Pellets per acre (ha)

Table 08R-03.10 - 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 ^{ai} (cheatgrass)	Carex (sedge)	Dactylis glomerata ⁱ (orchardgrass)	Elymus elymoides (squirreltail)	Elymus wawawaiensis (Snake River wheatgrass)	Hesperostipa comata (needle and thread)	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	33	23	-	-	43	-	26	-	3	32	22	74	98	20	-
2010	29	11	-	-	30	5	52	-	15	107	48	21	14	17	3
2013	52	12	2	-	40	9	71	-	10	26	68	55	49	56	16
2017	43	-	0	23	12	7	57	5	25	48	145	37	112	80	10
year	Average Cover (%)														
2008	1.0	0.5	-	-	0.9	-	0.4	-	0.2	0.9	0.1	2.6	2.8	0.7	-
2010	2.7	0.3	-	-	1.0	0.2	2.1	-	0.8	5.2	2.0	0.8	0.5	0.6	0.2
2013	3.1	0.2	0.0	-	0.5	0.1	2.6	-	0.7	0.8	1.6	2.4	1.1	2.8	0.2
2017	2.9	-	0.0	0.2	0.3	0.5	1.7	0.4	1.3	1.3	8.3	1.4	3.5	5.4	0.1

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

Table 08R-03.11 - 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)	Astragalus (milkvetch)	Astragalus convallarius (lesser rushy milkvetch)	Astragalus utahensis (Utah milkvetch)	Chaenactis douglasii (Douglas' dustymaiden)	Chenopodium fremontii ^a (Fremont's goosefoot)	Chorispora tenella ^{ai} (crossflower)	Collinsia parviflora ^a (maiden blue eyed Mary)	Cryptantha (cryptantha)	Cymopterus (springparsley)	Descurainia pinnata ^a (western tansymustard)	Epilobium brachycarpum ^a (tall annual willowherb)	Erigeron (fleabane)	Erigeron pumilus (shaggy fleabane)
year	Nested Frequency																
2008	5	-	12	5	2	16	4	-	-	-	2	26	7	8	3	8	-
2010	-	-	22	-	2	6	3	-	5	-	-	28	-	1	-	10	-
2013	6	3	21	2	-	1	2	-	3	-	-	34	1	6	3	3	5
2017	5	5	13	5	-	-	-	3	-	1	-	15	1	16	-	8	4
year	Average Cover (%)																
2008	0.0	-	0.1	0.0	0.0	0.1	0.0	-	-	-	0.0	0.2	0.0	0.2	0.0	0.0	-
2010	-	-	0.5	-	0.0	0.0	0.1	-	0.0	-	-	0.7	-	0.0	-	0.3	-
2013	0.0	0.0	0.3	0.0	-	0.0	0.0	-	0.0	-	-	0.3	0.0	0.1	0.0	0.0	0.0
2017	0.0	0.0	0.4	0.0	-	-	-	0.0	-	0.0	-	0.3	0.0	0.1	-	0.0	0.0

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

FORB SPECIES	Gayophytum ramosissimum ^a (pinyon groundsmoke)	Heterotheca villosa (hairy false goldenaster)	Ipomopsis aggregata (scarlet gilia)	Machaeranthera canescens (hoary tansyaster)	Onobrychis vicifolia ^a (sainfoin)	Orthocarpus ^a (owl's-clover)	Packera multilobata (lobeleaf groundsel)	Penstemon (beardtongue)	Petradoria pumila (rock goldenrod)	Phlox hoodii (spiny phlox)	Phlox longifolia (longleaf phlox)	Polygonum douglasii ^a (Douglas' knotweed)	Sanguisorba minor ^a (small burnet)	Trifolium (clover)
year	Nested Frequency													
2008	-	-	19	2	-	-	6	6	43	13	2	4	-	7
2010	2	1	31	19	-	-	12	2	38	5	10	4	13	1
2013	-	11	2	24	5	2	7	1	37	18	7	-	6	2
2017	-	3	47	2	-	-	4	3	48	1	2	3	4	3
year	Average Cover (%)													
2008	-	-	0.1	0.2	-	-	0.2	0.3	1.4	0.1	0.0	0.0	-	0.0
2010	0.0	0.0	1.1	0.2	-	-	0.1	0.1	0.9	0.0	0.0	0.0	0.5	0.0
2013	-	0.0	0.0	0.2	0.0	0.0	0.0	0.0	1.0	0.1	0.0	-	0.4	0.0
2017	-	0.1	0.5	0.0	-	-	0.0	0.0	2.2	0.0	0.0	0.0	0.0	0.0

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

Table 08R-03.12 - 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)	Chrysothamnus viscidiflorus ssp. viscidiflorus var. viscidiflorus (yellow rabbitbrush)	Eriogonum microthecum ^p (slender buckwheat)	Juniperus osteosperma ¹ (Utah juniper)	Linanthus pungens (granite prickly phlox)	Opuntia (pricklypear)	Purshia tridentata ^p (antelope bitterbrush)	Symphoricarpos oreophilus (mountain snowberry)
year	Line Intercept Cover (%)								
2008	2.5	0.5	-	0.3	18.2	-	0.1	1.1	-
2010	2.9	2.1	0.3	0.3	0.4	-	0	2.8	-
2013	3.4	5.1	0.2	0.1	0.1	0.1	0	2.3	-
2017	5.3	8.5	-	0.2	0.6	0.4	0.1	6.3	-
year	Quadrat Cover (%)								
2008	2.9	0.3	-	0.4	6.3	-	0.5	0.7	-
2010	2.1	2.1	0.0	0.4	0.3	0.1	0.3	2.0	0.1
2013	3.1	2.9	0.0	0.5	0.0	0.2	0.2	2.2	0.1
2017	4.6	5.9	0.1	0.6	0.2	0.3	0.3	4.3	0.4

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

Table 08R-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 utahensis^P -- (Utah serviceberry)									
2008	20	-	100	0	0	0	100	0	- / -
2010	-	-	-	-	-	-	-	-	- / -
2013	-	-	-	-	-	-	-	-	- / -
2017	20	-	100	0	0	0	0	0	8/10
Artemisia nova^P -- (black sagebrush)									
2008	1880	160	12	46	43	12	1	32	29/47
2010	1600	2320	35	57	8	1	0	4	26/47
2013	3800	600	45	51	4	6	4	6	21/44
2017	4180	-	19	77	4	9	0	2	19/38
Artemisia tridentata ssp. vaseyana^P -- (mountain big sagebrush)									
2008	300	20	0	20	80	13	67	60	48/66
2010	880	1180	48	50	2	0	0	2	54/74
2013	2120	220	66	33	1	7	1	12	44/70
2017	2260	-	12	88	1	6	3	0	37/56
Cercocarpus montanus^P -- (alderleaf mountain mahogany)									
2008	-	-	-	-	-	-	-	-	- / -
2010	-	-	-	-	-	-	-	-	67/98
2013	-	-	-	-	-	-	-	-	- / -
2017	-	-	-	-	-	-	-	-	- / -
Chrysothamnus viscidiflorus ssp. viscidiflorus var. viscidiflorus -- (yellow rabbitbrush)									
2008	20	-	0	100	0	0	0	0	20/17
2010	40	-	100	0	0	0	0	0	27/38
2013	100	-	60	40	0	20	0	20	33/38
2017	120	-	0	100	0	0	0	0	42/58
Eriogonum microthecum^P -- (slender buckwheat)									
2008	660	20	6	91	3	21	18	3	18/24
2010	180	-	11	89	0	0	0	11	19/33
2013	460	-	4	96	0	0	0	0	18/25
2017	160	-	0	100	0	0	0	0	18/27
Ericameria nauseosa -- (rubber rabbitbrush)									
2008	-	-	-	-	-	-	-	-	- / -
2010	-	-	-	-	-	-	-	-	- / -
2013	-	-	-	-	-	-	-	-	- / -
2017	-	-	-	-	-	-	-	-	70/84
Juniperus osteosperma^t -- (Utah juniper)									
2008	540	20	30	56	15	0	0	7	- / -
2010	120	80	100	0	0	0	0	33	- / -
2013	200	20	100	0	0	0	0	0	- / -
2017	220	-	46	55	0	0	0	0	- / -
Linanthus pungens -- (granite prickly phlox)									
2008	60	-	0	0	100	0	0	33	10/17
2010	40	-	0	100	0	0	0	0	20/35
2013	120	-	0	100	0	0	0	50	23/34
2017	220	-	0	100	0	27	0	46	11/21
Opuntia -- (pricklypear)									
2008	340	-	6	47	47	0	0	41	11/34
2010	320	-	0	100	0	0	0	6	11/28
2013	380	-	16	84	0	0	0	0	11/23
2017	380	-	0	100	0	0	0	11	11/25
Pediocactus simpsonii -- (mountain ball cactus)									
2008	-	-	-	-	-	-	-	-	4/7
2010	-	-	-	-	-	-	-	-	4/5
2013	-	-	-	-	-	-	-	-	- / -
2017	-	-	-	-	-	-	-	-	4/10
Pinus edulis^t -- (twoneedle pinyon)									
2008	-	-	-	-	-	-	-	-	- / -
2010	-	-	-	-	-	-	-	-	- / -
2013	-	20	0	0	0	0	0	0	- / -
2017	-	-	-	-	-	-	-	-	- / -

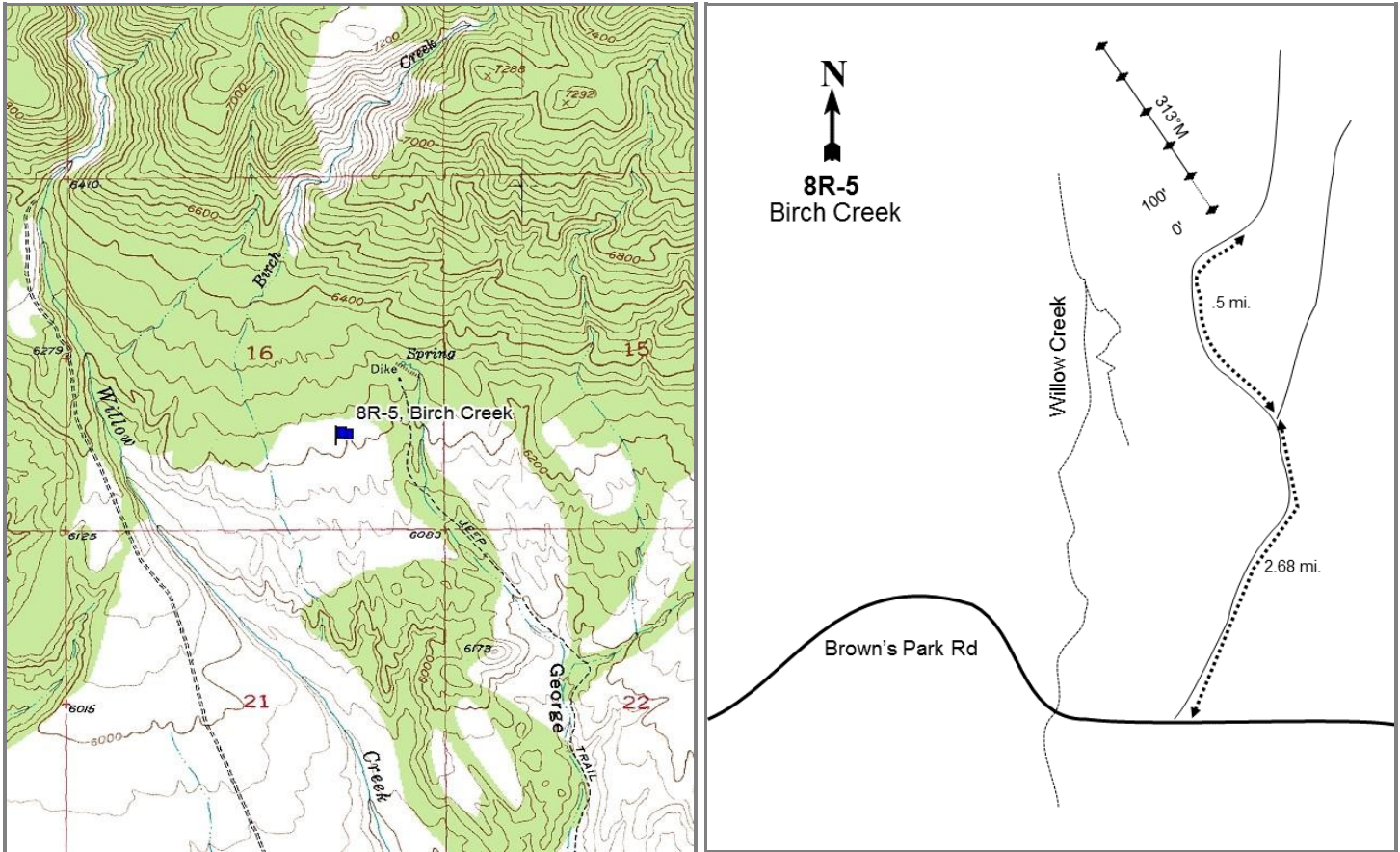
Year	Density		Age Class Distribution			Utilization		Poor Vigor (%)	Average Height Crown (cm)
	Plants Per Acre		Excluding Seedlings			Moderate (%)	Heavy (%)		
	Excluding Seedlings	Seedling	Young (%)	Mature (%)	Decadent (%)				
Purshia tridentata ^P -- (antelope bitterbrush)									
2008	380	-	5	58	37	47	11	16	31/85
2010	440	20	18	77	5	36	0	5	46/102
2013	380	-	5	95	0	68	0	21	45/120
2017	420	-	0	95	5	24	29	5	55/144
Symphoricarpos oreophilus -- (mountain snowberry)									
2008	40	-	0	100	0	50	0	0	28/43
2010	20	-	0	100	0	0	0	0	37/101
2013	20	-	0	100	0	0	0	0	46/92
2017	40	-	0	100	0	0	0	0	37/78

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

Table 08R-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)							
2008	431	-	10	10	35	45	44.4
2010	91	15	85	-	-	-	5.4
2013	52	13	88	-	-	-	4.1
2017	69	11	84	5	-	-	19.9
Pinus edulis (twoneedle pinyon)							
2008	22	100	-	-	-	-	1.0
2010	3	50	50	-	-	-	2.0
2017	6	-	100	-	-	-	8.0

BIRCH CREEK - STUDY NO. 08R-5

**Location Information**

USGS 7.5 min Map Info
GPS (0' Stake)

Willow Creek Butte S; Township 2N, Range 25E, Section 16
NAD 83 UTM ZONE 12, 660583 East 4530053 North

Transect Information

Browse Tag # (0' Stake)	714
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

Directions to Site

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

Site Information

Land Ownership	State
Land Administrator	SITLA
Allotment	No data
Elevation	6,220ft (1,896m)
Aspect	South
Slope	3-5%
Sample Dates	08/20/2014, 08/07/2017

Table 08R-05.1 Disturbance History. Recorded history of major disturbances.

Treatment/Disturbance	Name	WRI DB#	Date	Size (acres)
Seeding - Aerial Before	Birch Creek Pinyon and Juniper Removal	2913	November 2014	276
Mechanical - Bullhog	Birch Creek Pinyon and Juniper Removal	2913	December 2014	276
Seeding - Aerial After	Birch Creek Pinyon and Juniper Removal	2913	January 2015	276

Wildlife Habitat and Vegetation History**Table 08R-05.3 - Wildlife Seasonal Habitat.** UDWR wildlife habitat and seasonality.

Species	Habitat	Season	Brood/Young Rearing
Deer	Crucial	winter	
Elk	Substantial	winter	
Greater Sage Grouse	Occupied	year-long	brood-rearing

Table 08R-05.4 - Vegetation History. The dominant vegetation type(s) and phase of woodland succession (Tausch, Miller, Roundy, & Chambers, 2009).

Year	Vegetation Type	Woodland Succession
2014	Juniper/Mountain Big Sagebrush	Phase II transitioning to Phase III
2017	Broom Snakeweed/Mountain Big Sagebrush	Phase I

Site Notes

Elk were seen in the area in 2017.

Site Potential

1981 - 2010 Average Annual Precipitation	10 inches
NRCS Ecological Site	Upland Loam (Mountain Big Sagebrush)
NRCS Ecological Site #	047XC310UT
States and Transitions	No state and transition model is available for this ecological site.

When this study was established in 2014 it was considered to be within Phase II transitioning to Phase III of woodland succession, with Utah juniper (*Juniperus osteosperma*) as a dominant component (photos, Table 08R-05.14). Mountain big sagebrush (*Artemisia tridentata* ssp. *vaseyana*) comprised a majority of the shrub layer, though most plants were decadent. A bullhog and seeding treatment later that year (Table 08R-05.1) removed most of the trees, and the site transitioned into one dominated by broom snakeweed (*Gutierrezia sarothrae*) and mountain big sagebrush (Table 08R-05.12, Table 08R-05.13). The herbaceous understory was depauperate in both species diversity and quantity prior to treatment, but increased on both counts in 2017. Perennial forbs, mainly blue flax (*Linum perenne*), provided the most cover after treatment (Table 08R-05.7, Table 08R-05.10, Table 08R-05.11).

Trend Summary Tables

Table 08R-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
2014	1.6	2.8	13.9	3.4	2.4	27.7
2017	1.9	7.9	1.8	2.8	7.4	1.8

Table 08R-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
2014	-	28	33	8	-	0.3	0.1	0.0
2017	112	213	128	215	1.6	5.1	1.0	8.0

Table 08R-05.8 - 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
2014	41.4	2.7	33.3	16.1	3.0	19.3
2017	21.6	0.5	52.3	7.0	2.4	28.1

Table 08R-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	Mule Deer	Rocky Mountain Elk	Rabbit
	Quadrat Frequency		
2014	5	-	7
2017	11	3	26
Days Use Per Acre (ha)			
2014	1.3 (3.3)	-	-
2017	13.4 (33.1)	0.7 (1.7)	-

Table 08R-05.10 - Grass Species. Nested frequency and modified Daubenmire average cover by year.

GRASS SPECIES	Agropyron cristatum ⁱ (crested wheatgrass)	Bouteloua gracilis (blue grama)	Bromus tectorum ⁱⁱ (cheatgrass)	Elymus elymoides (squirreltail)	Elymus wawawaiensis (Snake River wheatgrass)	Hesperostipa comata (needle and thread)	Pascopyrum smithii (western wheatgrass)	Poa secunda (Sandberg bluegrass)	Psathyrostachys juncea ⁱ (Russian wildrye)	Pseudoroegneria spicata (bluebunch wheatgrass)	Vulpia octoflora ^a (sixweeks fescue)
year	Nested Frequency										
2014	-	-	-	27	-	-	-	1	-	-	-
2017	30	3	101	79	32	11	19	24	13	68	20
year	Average Cover (%)										
2014	-	-	-	0.3	-	-	-	0.0	-	-	-
2017	0.2	0.0	1.3	1.4	1.0	0.3	0.1	0.4	0.2	1.6	0.3

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

Table 08R-05.11 - Forb Species. Nested frequency and modified Daubenmire average cover by year.

FORB SPECIES	Achillea millefolium (Common yarrow)	Arabis (rockcress)	Caulanthus crassicaulis ^a (thickstem wild cabbage)	Cryptantha (cryptantha)	Descurainia pinnata ^a (western tansymustard)	Gilia inconspicua ^a (shy gilia)	Ipomopsis aggregata (scarlet gilia)	Lactuca serriola ^{ai} (prickly lettuce)	Linum perenne ⁱ (blue flax)	Machaeranthera canescens (hoary tansyaster)	Medicago sativa ⁱ (alfalfa)	Penstemon (beardtongue)	Phlox hoodii (spiny phlox)
year	Nested Frequency												
2014	-	2	-	-	33	-	-	-	-	-	-	3	3
2017	5	2	4	6	1	118	11	8	198	2	25	8	3
year	Average Cover (%)												
2014	-	0.0	-	-	0.1	-	-	-	-	-	-	0.0	0.0
2017	0.2	0.0	0.0	0.0	0.0	0.8	0.2	0.2	7.3	0.0	0.1	0.1	0.0

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

Table 08R-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)	Gutierrezia sarothrae (broom snakeweed)	Juniperus osteosperma ⁱ (Utah juniper)	Opuntia (pricklypear)	Pinus edulis ⁱ (twoneedle pinyon)
year	Line Intercept Cover (%)				
2014	3.4	-	26.6	2.4	1.1
2017	2.8	6.3	1.8	1.1	-
year	Quadrat Cover (%)				
2014	1.6	0.0	13.0	2.7	0.8
2017	1.9	6.2	1.8	1.8	-

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

Table 08R-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.

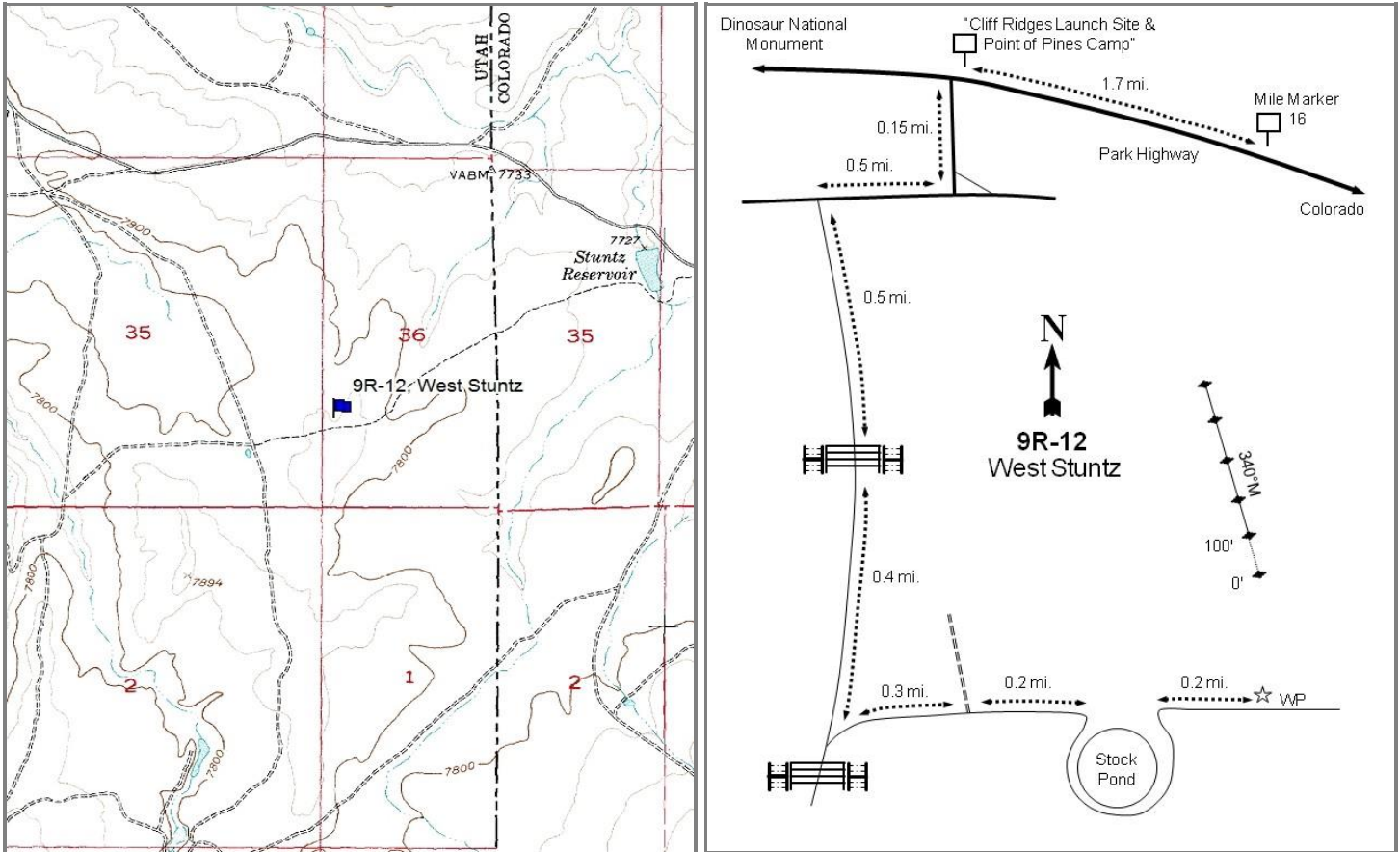
Year	Density		Age Class Distribution			Utilization		Poor Vigor (%)	Average Height Crown (cm)
	Plants Per Acre		Excluding Seedlings			Moderate (%)	Heavy (%)		
	Excluding Seedlings	Seedling	Young (%)	Mature (%)	Decadent (%)				
Artemisia nova^p -- (black sagebrush)									
2014	-	-	-	-	-	-	-	-	-/-
2017	-	-	-	-	-	-	-	-	8/17
Artemisia tridentata ssp. vaseyana^p -- (mountain big sagebrush)									
2014	1140	20	2	11	88	9	47	95	31/56
2017	3640	1880	62	29	9	6	3	5	28/41
Echinocereus -- (hedgehog cactus)									
2014	-	-	-	-	-	-	-	-	12/30
2017	-	-	-	-	-	-	-	-	-/-
Gutierrezia sarothrae -- (broom snakeweed)									
2014	120	420	33	67	0	0	0	67	18/23
2017	4340	40	14	86	0	0	0	0	27/40
Juniperus osteosperma^t -- (Utah juniper)									
2014	460	-	44	52	4	0	4	4	-/-
2017	300	-	20	80	0	0	0	0	-/-
Opuntia -- (pricklypear)									
2014	1340	-	2	66	33	18	0	46	10/44
2017	1700	-	1	99	0	0	0	0	10/37
Pinus edulis^t -- (twoneedle pinyon)									
2014	80	40	75	25	0	0	0	0	-/-
2017	80	-	50	50	0	0	0	0	-/-
Symphoricarpos oreophilus -- (mountain snowberry)									
2014	-	-	-	-	-	-	-	-	8/32

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

Table 08R-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)							
2014	291	-	40	40	20	-	11.1
2017	199	15	75	10	-	-	13.7
Pinus edulis (twoneedle pinyon)							
2014	70	36	29	14	21	-	5.9
2017	39	15	85	-	-	-	2.8

WEST STUNTZ - STUDY NO. 09R-12

**Location Information**

USGS 7.5 min Map Info
GPS (0' Stake)

Stuntz Reservoir SE; Township 4S, Range 25E, Section 36
NAD 83 UTM ZONE 12, 664664 East 4476766 North

Transect Information

Browse Tag # (0' Stake)	152
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	No Rebar

Directions to Site

On Park Highway in Dinosaur National Monument, drive to mile marker 16. From mile marker 16, drive 1.7 miles west to a turn off to the left (south). From there, continue for 0.15 miles to a fork and turn right. Proceed for 0.5 miles to another fork and turn left, then drive 0.5 miles to a gate. Go through the gate and drive for 0.4 miles to another gate and a two-track road to the left (east). Take the two-track for 0.3 miles to a fork, then stay straight for another 0.2 miles to a livestock pond where the road disappears: drive around the pond to the two-track on the east side. From where the two-track starts again, drive another 0.2 miles to a witness post on the left (north) side of the road and park. Walk 25 paces at 337 degrees magnetic to the 0-foot stake, marked with browse tag #152.

Site Information

Land Ownership	State
Land Administrator	SITLA
Allotment	STUNTZ VALLEY
Elevation	7,850ft (2,393m)
Aspect	Northwest
Slope	3-4%
Sample Dates	06/29/2006, 07/28/2010, 07/11/2013, 08/09/2017

Table 09R-12.1 Disturbance History. Recorded history of major disturbances.

Treatment/Disturbance	Name	WRI DB#	Date	Size (acres)
Harrow - Two-Way Dixie	West Stuntz	357	Fall 2006	199
Seeding - Broadcast Before	West Stuntz	357	Fall 2006	199

Table 09R-12.2 Seed Mix. List of known seeded plant species and rates (if available).

Mix Name			Application Type	Application Date	Acres
West Stuntz Blue Mountain			Broadcast	Sep 2006	210
Type	Species	Common Name	Cultivar/Source ID	Bulk lbs/acre	PLS lbs/acre
G	Dactylis glomerata	Orchardgrass	Paiute	0.24	0.22
G	Elymus lanceolatus	Thickspike Wheatgrass	Bannock	0.95	0.88
G	Nassella viridula	Green Needlegrass	Lodorm	0.95	0.76
G	Poa secunda	Big Bluegrass	Sherman	0.48	0.39
G	Poa secunda	Canby Bluegrass	Canbar	0.48	0.44
G	Poa secunda	Sandberg Bluegrass	Toole MT	0.48	0.43
G	Pseudoroegneria spicata	Bluebunch Wheatgrass	Goldar	1.19	1.12
F	Achillea millefolium	Western Yarrow	SID Columbia	0.05	0.04
F	Linum perenne	Blue Flax		0.24	0.21
F	Medicago sativa	Alfalfa	Ladak	1.43	1.34
F	Onobrychis viciifolia	Sainfoin	Eski	3.81	3.38
F	Sanguisorba minor	Small Burnet	Delar	1.90	1.77
S	Purshia tridentata	Bitterbrush	Millard UT	0.10	0.07

Wildlife Habitat and Vegetation History**Table 09R-12.3 - Wildlife Seasonal Habitat.** UDWR wildlife habitat and seasonality.

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

Table 09R-12.4 - 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	Phase I
2010	Mountain Big Sagebrush	Phase I
2013	Mountain Big Sagebrush	Phase I

Site Notes

No Notes

Soils**Table 09R-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	6.5	30.3	40.4	29.3	1.9	36.8	444.8	0.8	06/29/2006

Site Potential

1981 - 2010 Average Annual Precipitation	16 inches
NRCS Ecological Site	Mountain Loam (Mountain Big Sagebrush)
NRCS Ecological Site #	R047XC430UT
States and Transitions	No state and transition model is available for this ecological site.

Since establishment in 2006, this site has remained in a stable state as a mountain big sagebrush (*Artemisia tridentata* ssp. *vaseyana*) dominated plant community. Following the 2006 harrow treatment, the sagebrush community has been primarily composed of mature plants with little diversity in age class (Table 09R-12.12, Table 09R-12.13). The herbaceous understory is mainly comprised of perennial grasses, particularly the native species Sandberg bluegrass (*Poa secunda*) and Letterman's needlegrass (*Achnatherum lettermanii*). Perennial forbs have also provided notable cover throughout the study period, with much of that contributed by parsnipflower buckwheat (*Eriogonum heracleoides*) and silvery lupine (*Lupinus argenteus*). Annual forbs and grasses have remained rare. (Table 09R-12.7, Table 09R-12.10, Table 09R-12.11).

Trend Summary Tables**Table 09R-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
2006	28.4	0.3	-	33.3	5.7	-
2010	13.0	0.1	-	16.2	7.2	-
2013	11.6	0.1	-	17.6	7.2	-
2017	15.6	0.3	-	25.1	0.4	-

Table 09R-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
2006	-	380	112	373	-	16.7	0.8	28.4
2010	11	388	134	331	0.1	17.7	1.6	16.2
2013	61	373	304	366	1.1	16.8	3.4	18.7
2017	136	432	172	296	3.2	23.9	1.0	9.9

Table 09R-12.8 - 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
2006	15.0	0.2	43.9	0.5	0.3	58.0
2010	17.5	-	47.9	0.2	0.2	50.0
2013	15.0	0.1	54.8	0.1	0.1	55.8
2017	10.6	0.3	53.5	0.1	0.3	57.0

Table 09R-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	Rocky Mountain Elk	Greater Sage- Grouse	Rabbit
	Quadrat Frequency					
2006	11	-	19	-	5	30
2010	8	-	3	-	-	-
2013	14	-	4	2	1	1
2017	15	-	8	4	1	7
Year	Days Use Per Acre (ha)					
2006	18.9 (46.6)	-	15.4 (38.1)	9.4 (23.2)	26.2 (64.6)*	-
2010	10.9 (26.9)	-	11.4 (28.1)	4.7 (11.6)	-	-
2013	21.8 (53.8)	-	10.7 (26.5)	1.3 (3.3)	69.7 (172.1)*	-
2017	25.4 (62.8)	8.7 (21.5)*	2.0 (5.0)	4.0 (9.9)	26.2 (64.6)*	-

*Pellets per acre (ha)

Table 09R-12.10 - Grass Species. Nested frequency and modified Daubenmire average cover by year.

GRASS SPECIES	Achnatherum lettermanii (Letterman's needlegrass)	Agropyron cristatum ⁱ (crested wheatgrass)	Bromus tectorum ^{ai} (cheatgrass)	Carex (sedge)	Elymus elymoides (squirreltail)	Elymus lanceolatus (thickspike wheatgrass)	Hesperostipa comata (needle and thread)	Koeleria macrantha (prairie Junegrass)	Nassella viridula (green needlegrass)	Pascopyrum smithii (western wheatgrass)	Poa fendleriana (muttongrass)	Poa secunda (Sandberg bluegrass)	Pseudoroegneria spicata (bluebunch wheatgrass)
year	Nested Frequency												
2006	315	-	-	2	4	-	3	38	-	13	7	155	-
2010	268	-	11	46	14	-	-	6	24	87	10	126	-
2013	251	1	61	14	39	1	104	-	6	41	3	188	5
2017	258	-	136	23	16	-	57	-	-	34	11	287	51
year	Average Cover (%)												
2006	11.5	-	-	0.0	0.0	-	0.0	0.3	-	0.0	0.2	4.6	-
2010	10.5	-	0.1	1.7	0.3	-	-	0.0	0.5	1.8	0.2	2.7	-
2013	7.9	0.0	1.1	0.1	0.2	0.1	2.5	-	0.1	0.4	0.0	5.5	0.1
2017	7.0	-	3.2	0.1	0.3	-	0.7	-	-	0.1	0.0	14.4	1.3

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

Table 09R-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)	Arabis (rockcress)	Arenaria congesta (ballhead sandwort)	Ceratocephala testiculata ^{ai} (curvseed butterwort)	Chenopodium leptophyllum ^a (narrow/leaf goosefoot)	Collinsia parviflora ^a (maiden blue eyed Mary)	Collomia linearis ^a (tiny trumpet)	Crepis acuminata (tapertip hawksbeard)	Cryptantha (cryptantha)	Delphinium nuttallianum (two-lobed larkspur)	Descurainia pinnata ^a (western tansymustard)	Draba ^a (draba)	Erigeron eatonii (Eaton's fleabane)
year	Nested Frequency																
2006	12	132	-	4	53	2	101	3	-	59	19	-	-	3	-	3	44
2010	47	-	-	-	38	-	75	-	3	3	-	-	-	-	-	-	32
2013	62	77	15	2	24	7	125	-	-	178	99	7	3	19	26	14	38
2017	61	12	-	84	25	-	38	-	-	59	53	-	-	-	4	1	24
year	Average Cover (%)																
2006	0.3	1.4	-	0.0	1.4	0.0	0.9	0.0	-	0.1	0.1	-	-	0.0	-	0.0	0.4
2010	0.7	-	-	-	0.8	-	0.4	-	0.0	0.0	-	-	-	-	-	-	0.1
2013	1.6	0.7	0.1	0.0	0.4	0.0	1.0	-	-	0.5	0.6	0.0	0.0	0.1	0.2	0.1	0.3
2017	0.4	0.1	-	0.5	0.9	-	0.2	-	-	0.2	0.2	-	-	-	0.0	0.0	0.1

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

FORB SPECIES	Eriogonum heracleoides (parsnipflower buckwheat)	Linum lewisii (Lewis flax)	Lomatium (desertparsley)	Lupinus argenteus (silvery lupine)	Melilotus officinalis ⁱ (sweetclover)	Microsteris gracilis ^a (slender phlox)	Onobrychis vicifolia ⁱ (sainfoin)	Orthocarpus luteus ^a (yellow owl's-clover)	Penstemon comarthenus (dusty beardtongue)	Penstemon humilis (low beardtongue)	Phlox austromontana (mountain phlox)	Phlox longifolia (longleaf phlox)	Physaria (twinpod)	Polygonum douglasii ^a (Douglas' knotweed)	Sanguisorba minor ⁱ (small burnet)	Senecio integerrimus ^a (lambstongue ragwort)	Silene drummondii var. drummondii (Drummond's campion)	
year	Nested Frequency																	
2006	172	3	2	217	-	32	-	4	5	3	1	190	-	5	-	33	-	
2010	185	25	-	196	4	9	11	-	-	-	-	21	-	126	7	-	-	
2013	158	7	10	180	4	56	4	-	-	2	5	193	3	180	-	20	-	
2017	152	24	-	106	-	17	-	-	-	5	-	61	-	28	-	13	4	
year	Average Cover (%)																	
2006	5.6	0.0	0.0	16.2	-	0.1	-	0.0	0.0	0.0	0.0	1.8	-	0.0	-	0.5	-	
2010	7.7	0.3	-	5.8	0.0	0.0	0.1	-	-	-	-	0.1	-	1.5	0.2	-	-	
2013	6.3	0.0	0.1	5.6	0.0	0.5	0.0	-	-	0.0	0.0	1.9	0.0	1.3	-	0.2	-	
2017	5.1	0.1	-	2.6	-	0.0	-	-	-	0.0	-	0.4	-	0.0	-	0.1	0.0	

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

FORB SPECIES	Symphyotrichum (aster)	Taraxacum officinale (common dandelion)	Trifolium (clover)	Zigadenus paniculatus (foothill deathcamas)
year	Nested Frequency			
2006	15	-	11	4
2010	-	10	2	-
2013	10	17	5	26
2017	-	18	-	0
year	Average Cover (%)			
2006	0.1	-	0.2	0.1
2010	-	0.0	0.0	-
2013	0.1	0.1	0.0	0.2
2017	-	0.0	-	0.0

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

Table 09R-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)	2006	33.3	-	-	4.9	0.8
	2010	16.2	-	-	6.8	0.4
	2013	17.6	-	-	6.9	0.3
	2017	25.1	-	-	-	0.4
SHRUB SPECIES	Quadrat Cover (%)					
	year	Quadrat Cover (%)				
Artemisia tridentata ssp. vaseyana ^p (mountain big sagebrush)	2006	28.3	0.1	-	0.0	0.3
	2010	12.1	0.8	-	0.0	0.1
	2013	11.6	-	-	0.0	0.1
	2017	15.6	-	0.0	-	0.3

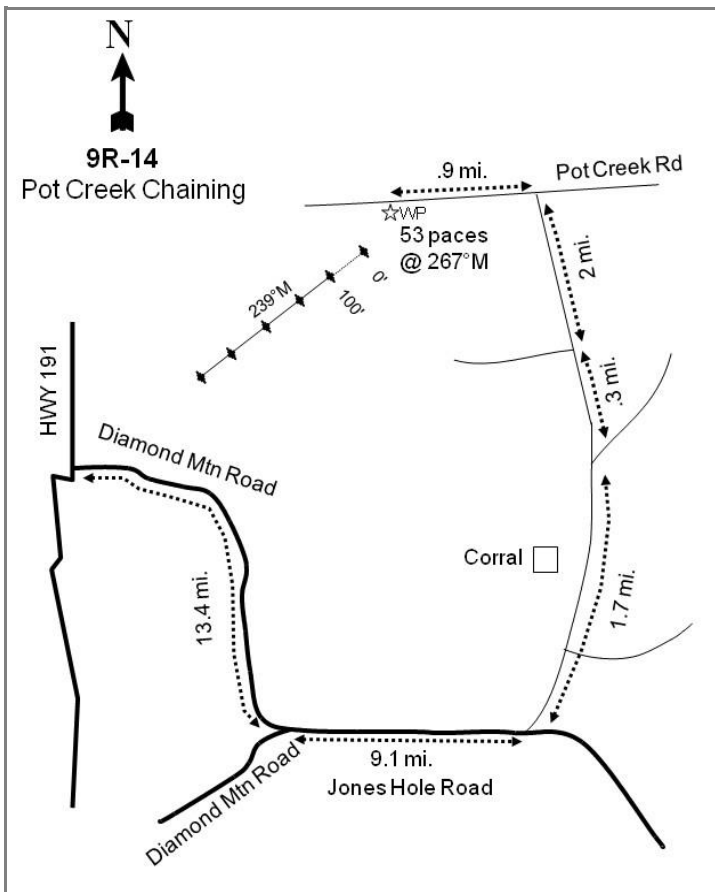
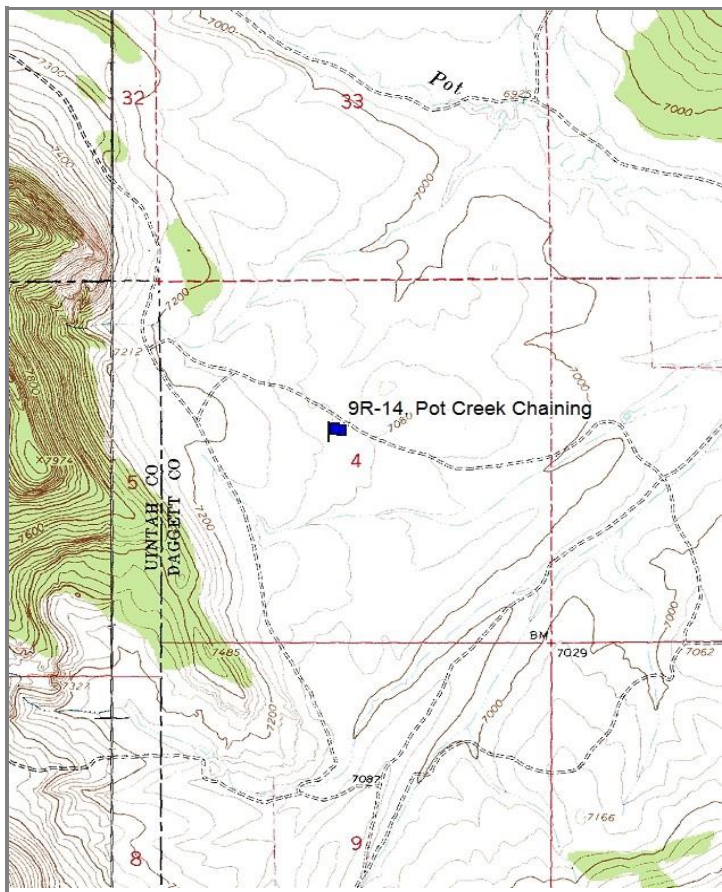
t - Tree Species; p - Preferred Browse; i - Introduced Species

Table 09R-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)									
2006	8840	-	19	59	22	1	0	3	67/79
2010	4120	700	7	75	18	8	25	25	54/73
2013	3640	20	8	86	7	34	7	34	61/84
2017	4600	40	7	81	13	12	3	7	57/79
Chrysothamnus viscidiflorus -- (yellow rabbitbrush)									
2006	-	-	-	-	-	-	-	-	-/-
2010	-	-	-	-	-	-	-	-	-/-
2013	20	-	0	100	0	0	0	0	49/51
2017	-	-	-	-	-	-	-	-	32/56
Eriogonum heracleoides -- (parsnipflower buckwheat)									
2006	9400	380	19	79	1	7	0	0	8/22
2010	9180	20	6	94	0	0	0	0	11/32
2013	10520	-	5	95	0	0	0	1	12/24
2017	-	-	-	-	-	-	-	-	-/-
Gutierrezia sarothrae -- (broom snakeweed)									
2006	340	160	6	94	0	0	0	0	15/27
2010	200	-	0	100	0	0	0	0	18/31
2013	280	-	7	93	0	0	0	0	17/26
2017	560	-	0	100	0	0	0	0	16/30
Purshia tridentata^p -- (antelope bitterbrush)									
2006	20	-	0	100	0	0	100	0	18/43
2010	-	-	-	-	-	-	-	-	-/-
2013	-	-	-	-	-	-	-	-	-/-
2017	-	-	-	-	-	-	-	-	-/-
Symphoricarpos oreophilus -- (mountain snowberry)									
2006	-	-	-	-	-	-	-	-	-/-
2010	-	-	-	-	-	-	-	-	-/-
2013	-	-	-	-	-	-	-	-	-/-
2017	-	-	-	-	-	-	-	-	48/86

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

POT CREEK CHAINING - STUDY NO. 09R-14



Location Information

USGS 7.5 min Map Info
GPS (0' Stake)

Hoy Mountain SW; Township 2S, Range 25E, Section 04
NAD 83 UTM ZONE 12, 659297 East 4504682 North

Transect Information

Browse Tag # (0' Stake)	132
Transect Bearing	239° magnetic
Length	500ft
Belt Placement	Line 1 (11ft), Line 2 (34ft), Line 3 (59ft), Line 4 (71ft), Line 5 (95ft)
Belt Marker Placement	No Rebar

Directions to Site

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

Site Information

Land Ownership	Federal
Land Administrator	BLM
Allotment	RUPLE CABIN
Elevation	7,100ft (2,164m)
Aspect	Northeast
Slope	2-5%
Sample Dates	08/02/2007, 08/09/2011, 08/19/2014, 08/07/2017

Table 09R-14.1 Disturbance History. Recorded history of major disturbances.

Treatment/Disturbance	Name	WRI DB#	Date	Size (acres)
Fire - Wildfire	Pot Hole	-	June-July2006	1396
Chaining - One-Way Ely	Ruple Cabin Wildfire Rehabilitation	608	September 2006	1208
Seeding - Aerial Before	Ruple Cabin Wildfire Rehabilitation	608	September 2006	1208
Seeding - Dribbler	Ruple Cabin Wildfire Rehabilitation	608	September 2006	1208
Seeding - Aerial After	Ruple Cabin Wildfire Rehabilitation	608	December 2006	1208

Table 09R-14.2 Seed Mix. List of known seeded plant species and rates (if available).

Mix Name			Application Type	Application Date	Acres
Ruple Cabin Wildfire Rehabilitation			Aerial	Sep 2006	1200
Type	Species	Common Name	Cultivar/Source ID	Bulk lbs/acre	PLS lbs/acre
G	Dactylis glomerata	Orchardgrass	Paiute	0.25	0.23
G	Elymus wawawaiensis	Snake River Wheatgrass	Secar	0.50	0.46
G	Festuca brevipila	Hard Fescue	Durar	0.03	0.02
G	Festuca brevipila	Hard Fescue		0.25	0.22
G	Poa secunda	Big Bluegrass	Sherman	0.21	0.17
G	Poa secunda	Canby Bluegrass	Canbar	0.21	0.19
G	Pseudoroegneria spicata	Bluebunch Wheatgrass	Goldar	0.04	0.04
G	Pseudoroegneria spicata	Bluebunch Wheatgrass	Goldar	0.46	0.43
F	Achillea millefolium	Western Yarrow	SID Columbia	0.04	0.04
F	Astragalus cicer	Cicer Milkvetch	Lutana	0.75	0.72
F	Medicago sativa	Alfalfa	Ladak	0.75	0.70
F	Medicago sativa	Alfalfa	Nomad	0.75	0.68
F	Onobrychis viciifolia	Sainfoin	Eski	0.60	0.49
F	Onobrychis viciifolia	Sainfoin	Eski	2.50	2.22
F	Onobrychis viciifolia	Sainfoin	Eski	2.08	1.91
F	Sanguisorba minor	Small Burnet	Delar	2.50	2.32
Mix Name			Application Type	Application Date	Acres
Ruple Cabin Wildfire Rehabilitation Dribbler			Dribbler	Sep 2006	1200
Type	Species	Common Name	Cultivar/Source ID	Bulk lbs/acre	PLS lbs/acre
F	Sanguisorba minor	Small Burnet	Delar	0.25	0.23
S	Purshia tridentata	Bitterbrush	Millard UT	0.03	0.02
S	Purshia tridentata	Bitterbrush	Millard UT	0.13	0.10
Mix Name			Application Type	Application Date	Acres
Ruple Cabin Sagebrush			Aerial	Dec 2006	1150
Type	Species	Common Name	Cultivar/Source ID	Bulk lbs/acre	PLS lbs/acre
S	Artemisia tridentata ssp. wyomingensis	Wyoming Big Sagebrush	Sanpete UT	0.33	0.07
S	Artemisia tridentata ssp. wyomingensis	Wyoming Big Sagebrush	Sanpete UT	0.40	0.09
S	Artemisia tridentata ssp. wyomingensis	Wyoming Big Sagebrush	Piute UT	0.27	0.07

Wildlife Habitat and Vegetation History

Table 09R-14.3 - Wildlife Seasonal Habitat. UDWR wildlife habitat and seasonality.

Species	Habitat	Season	Brood/Young Rearing
Deer	Crucial	summer	
Elk	Crucial	winter	
Greater Sage Grouse	Occupied	year-long	brood-rearing
Moose	Crucial	year-long	

Table 09R-14.4 - Vegetation History. The dominant vegetation type(s) and phase of woodland succession (Tausch, Miller, Roundy, & Chambers, 2009).

Year	Vegetation Type	Woodland Succession
2007	Perennial Grass	No Encroachment
2011	Perennial Grass	No Encroachment
2014	Perennial Grass	No Encroachment
2017	Perennial Grass/Mountain Big Sagebrush	No Encroachment

Site Notes

Livestock were seen in the area in 2017, and sage grouse were seen and heard adjacent to the site in the same year.

Soils

Table 09R-14.5 - 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	6.6	50.2	25.4	24.5	2.6	17.4	195.2	0.6	08/09/2011

Site Potential

1981 - 2010 Average Annual Precipitation 12 inches
 NRCS Ecological Site Mountain Loam (Mountain Big Sagebrush)
 NRCS Ecological Site # R047XC430UT
 States and Transitions No state and transition model is available for this ecological site.

Since establishment in 2007, this site has been dominated by perennial grasses; in 2017 the most abundant species were hard fescue (*Festuca brevipila*) and Sandberg bluegrass (*Poa secunda*). Perennial forbs have been more common than annual forbs in all study years, with lesser rushy milkvetch (*Astragalus convallarius*) and alfalfa (*Medicago sativa*) providing the most cover (Table 09R-14.7, Table 09R-14.10, Table 09R-14.11). Much of the mountain big sagebrush (*Artemisia tridentata* ssp. *vaseyana*) cover was removed by the Pot Hole Wildfire (Table 09R-14.1) and it was very low during the initial sampling. However, there has been an overall increase in cover and density over the study years and sagebrush was a co-dominant site component in 2017 (photos, Table 09R-14.12, Table 09R-12.13). Barring a major disturbance, this site will likely continue to increase in sagebrush cover.

Trend Summary Tables

Table 09R-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
2007	0.4	0.0	-	0.1	-	-
2011	0.8	0.0	-	1.2	-	-
2014	1.4	0.0	-	2.1	-	-
2017	2.2	-	-	4.4	-	-

Table 09R-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
2007	4	330	241	319	0.0	16.9	4.3	11.0
2011	20	424	264	328	0.1	25.6	4.1	24.7
2014	128	456	144	194	2.2	29.7	0.8	3.4
2017	135	462	100	226	3.3	46.0	1.3	11.0

Table 09R-14.8 - 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
2007	65.2	0.1	11.8	0.7	0.1	33.3
2011	22.6	2.1	36.7	0.1	0.0	50.1
2014	16.7	0.0	59.4	0.4	0.0	45.1
2017	8.8	0.2	43.0	0.1	0.4	65.5

Table 09R-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	Pronghorn	Cattle	Mule Deer	Rocky Mountain Elk	Greater Sage- Grouse	Rabbit
	Quadrat Frequency					
2007	-	2	1	6	-	8
2011	-	14	6	3	-	1
2014	1	19	9	11	-	1
2017	-	18	10	5	1	9
Year	Days Use Per Acre (ha)					
2007	-	1.5 (3.6)	3.4 (8.3)	3.4 (8.3)	-	-
2011	-	7.2 (17.9)	6.0 (14.9)	12.1 (29.8)	-	-
2014	-	1.5 (3.6)	12.8 (31.5)	8.1 (19.9)	-	-
2017	-	69.0 (170.4)	6.7 (16.6)	10.0 (24.8)	34.9 (86.1)*	-

*Pellets per acre (ha)

Table 09R-14.10 - Grass Species. Nested frequency and modified Daubenmire average cover by year.

GRASS SPECIES										
Bromus tectorum ^{ai} (cheatgrass)										
Carex (sedge)										
Dactylis glomerata ⁱ (orchardgrass)										
Elymus elymoides (squirreltail)										
Elymus lanceolatus (thickspike wheatgrass)										
Festuca brevipila ⁱ (hard fescue)										
Koeleria macrantha (prairie Junegrass)										
Poa fendleriana (muttongrass)										
Poa secunda (Sandberg bluegrass)										
Pseudoroegneria spicata (bluebunch wheatgrass)										
year	Nested Frequency									
2007	4	28	-	-	278	-	-	30	216	11
2011	20	13	3	1	364	34	1	3	251	19
2014	128	2	-	1	218	84	-	21	398	49
2017	135	-	-	10	177	289	10	10	298	2
year	Average Cover (%)									
2007	0.0	0.1	-	-	7.3	-	-	0.4	9.0	0.1
2011	0.1	0.1	0.0	0.0	15.4	1.7	0.0	0.0	7.6	0.7
2014	2.2	0.0	-	0.0	4.0	2.5	-	0.2	22.5	0.5
2017	3.3	-	-	0.4	4.2	25.4	0.7	1.0	14.2	0.2

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

Table 09R-14.11 - 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)																	
Arabis (rockcress)																	
Astragalus convallarius (lesser rushy milkvetch)																	
Astragalus tenellus (looseflower milkvetch)																	
Calochortus nuttallii (sego lily)																	
Castilleja linariifolia (Wyoming Indian paintbrush)																	
Chaenactis douglasii (Douglas' dustymaiden)																	
Chorispora tenella ^{ai} (crossflower)																	
Collinsia parviflora ^a (maiden blue eyed Mary)																	
Collomia linearis ^a (tiny trumpet)																	
Crepis acuminata (tapertip hawkbeard)																	
Cymopterus (springparsley)																	
Delphinium nuttallianum (two-lobed larkspur)																	
Descurainia pinnata ^a (western tansymustard)																	
Erigeron eatonii (Eaton's fleabane)																	
year	Nested Frequency																
2007	14	70	-	3	140	-	31	7	-	18	223	7	13	7	41	1	-
2011	81	94	-	-	147	3	2	-	1	1	179	28	39	4	-	2	5
2014	52	19	-	-	50	9	-	-	-	25	82	1	23	-	4	-	13
2017	67	39	2	-	104	5	2	-	-	-	4	1	9	-	-	-	3
year	Average Cover (%)																
2007	0.1	0.9	-	0.0	4.1	-	0.1	0.0	-	0.7	2.8	0.1	0.5	0.1	0.2	0.0	-
2011	2.1	2.2	-	-	9.2	0.1	0.0	-	0.0	0.0	0.9	0.3	1.1	0.1	-	0.0	0.1
2014	0.8	0.1	-	-	0.4	0.1	-	-	-	0.1	0.2	0.0	0.2	-	0.0	-	0.1
2017	0.8	0.3	0.0	-	5.2	0.0	0.0	-	-	-	0.0	0.0	0.1	-	-	-	0.0

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

FORB SPECIES	Eriogonum (buckwheat)	Gayophytum ramosissimum ^a (pinyon groundsmoke)	Lactuca serriola ^{ai} (prickly lettuce)	Lepidium ^a (pepperweed)	Lupinus argenteus (silvery lupine)	Machaeranthera grindelioides (rayless tansyaster)	Medicago sativa ⁱ (alfalfa)	Microsteris gracilis ^{ai} (slender phlox)	Onobrychis vicifolia ⁱ (sainfoin)	Phlox austromontana (mountain phlox)	Phlox longifolia (longleaf phlox)	Polygonum douglasii ^a (Douglas' knotweed)	Sanguisorba minor ⁱ (small burnet)	Sisymbrium altissimum ^{ai} (tall tumblemustard)	Sphaeralcea coccinea (scarlet globemallow)	Symphytotrichum (aster)	Tragopogon dubius ^{ai} (yellow salsify)
year	Nested Frequency																
2007	-	7	-	3	-	-	49	21	122	5	149	41	82	-	14	5	-
2011	3	4	2	-	1	4	14	62	54	11	150	101	62	7	34	-	64
2014	-	-	3	-	-	-	32	3	26	8	6	-	-	-	45	-	79
2017	7	-	-	-	-	3	27	-	-	6	6	5	-	-	31	-	92
year	Average Cover (%)																
2007	-	0.2	-	0.0	-	-	0.4	0.2	1.8	0.0	1.1	0.2	0.7	-	0.4	0.0	-
2011	0.0	0.0	0.0	-	0.2	0.0	1.2	0.7	2.9	0.3	2.7	0.4	1.7	0.2	0.7	-	1.6
2014	-	-	0.0	-	-	-	0.9	0.0	0.3	0.2	0.0	-	-	-	0.3	-	0.5
2017	0.1	-	-	-	-	0.4	2.7	-	-	0.2	0.0	0.0	-	-	0.5	-	1.2

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

FORB SPECIES	Trifolium (clover)	Zigadenus paniculatus (foothill deathcamas)
year	Nested Frequency	
2007	101	1
2011	4	7
2014	-	3
2017	7	4
year	Average Cover (%)	
2007	0.5	0.1
2011	0.0	0.0
2014	-	0.0
2017	0.4	0.2

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

Table 09R-14.12 - Shrub and Tree Species. Average modified Daubenmire quadrat and line intercept cover by year.

SHRUB SPECIES	Artemisia tridentata ssp. vaseyana ^p (mountain big sagebrush)	Opuntia (pricklypear)	Purshia tridentata ^p (antelope bitterbrush)	Tetradymia canescens (spineless horsebrush)
year	Line Intercept Cover (%)			
2007	-	-	0.1	-
2011	1.1	-	0.1	-
2014	2.1	-	-	-
2017	4	-	0.4	-
year	Quadrat Cover (%)			
2007	0.0	0.0	0.4	-
2011	0.4	-	0.4	0.0
2014	1.2	-	0.1	0.0
2017	2.1	-	0.1	-

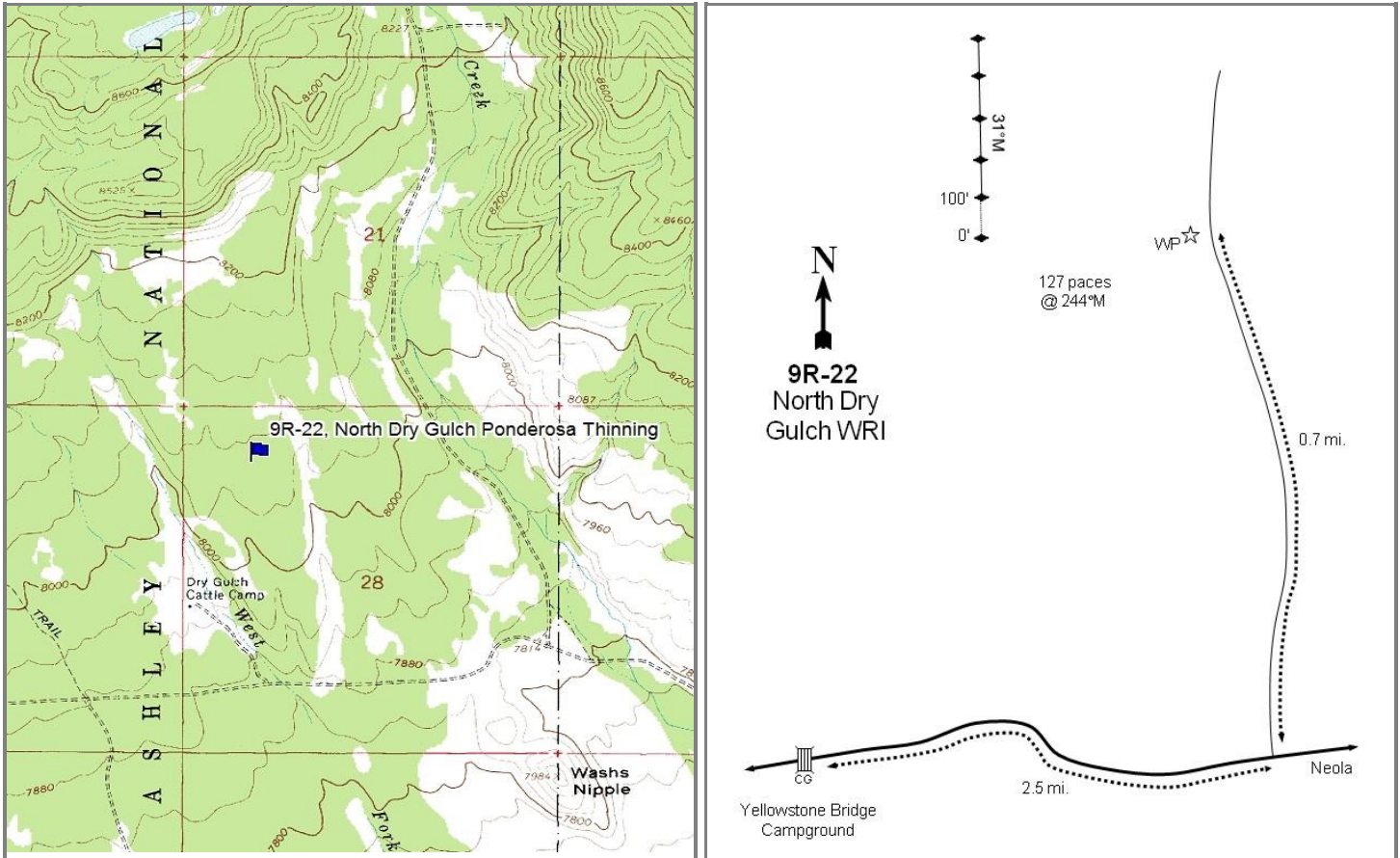
t - Tree Species; p - Preferred Browse; i - Introduced Species

Table 09R-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. vaseyana^p -- (mountain big sagebrush)									
2007	20	340	100	0	0	0	0	0	- / -
2011	620	-	45	55	0	0	0	0	33/36
2014	800	-	10	90	0	40	35	8	41/59
2017	780	-	5	95	0	10	44	5	51/72
Eriogonum microthecum^p -- (slender buckwheat)									
2007	20	-	0	100	0	0	0	0	17/22
2011	20	-	0	100	0	0	0	0	18/25
2014	-	-	-	-	-	-	-	-	13/22
2017	20	-	0	100	0	100	0	0	17/26
Opuntia -- (pricklypear)									
2007	40	20	0	100	0	0	0	0	7/19
2011	-	-	-	-	-	-	-	-	7/20
2014	20	-	0	100	0	0	0	0	9/30
2017	20	-	0	100	0	0	0	0	9/25
Purshia tridentata^p -- (antelope bitterbrush)									
2007	20	-	0	100	0	0	100	0	15/71
2011	20	-	0	100	0	0	100	0	43/102
2014	20	-	0	100	0	0	100	0	19/76
2017	20	-	0	100	0	0	100	0	24/76
Symphoricarpos oreophilus -- (mountain snowberry)									
2007	-	-	-	-	-	-	-	-	48/89
2011	-	-	-	-	-	-	-	-	49/98
2014	-	-	-	-	-	-	-	-	41/74
2017	-	-	-	-	-	-	-	-	33/86
Tetradymia canescens -- (spineless horsebrush)									
2007	-	-	-	-	-	-	-	-	23/31
2011	40	-	0	100	0	0	0	0	30/64
2014	20	-	0	100	0	100	0	0	28/49
2017	20	-	0	100	0	0	0	0	27/57

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

NORTH DRY GULCH PONDEROSA THINNING - STUDY NO. 09R-22



Location Information

USGS 7.5 min Map Info
GPS (0' Stake)

Heller Lake SW; Township 2N, Range 3W, Section 28
NAD 83 UTM ZONE 12, 564696 East 4488666 North

Transect Information

Browse Tag # (0' Stake)	Not Available
Transect Bearing	325° magnetic
Length	500ft
Belt Placement	Read Baseline, No Belts
Belt Marker Placement	No Belts

Directions to Site

From the Yellowstone Bridge Campground, drive for 0.9 miles, turn right, and continue for 4.7 miles to a cattle guard in 77 Flat (there should be signs denoting it as 77 Flat). From the cattle guard, continue east for 2.5 miles to a two-track to the left (north) and travel 0.7 miles to a witness post on the left-hand (west) side of the road. The 0-foot stake is 127 paces away at 244 degrees magnetic.

Site Information

Land Ownership	Federal
Land Administrator	USFS
Allotment	DRY GULCH
Elevation	8,008ft (2,441m)
Aspect	South
Slope	4%
Sample Dates	07/30/2009, 07/08/2013, 08/01/2017

Table 09R-22.1 Disturbance History. Recorded history of major disturbances.

Treatment/Disturbance	Name	WRI DB#	Date	Size (acres)
Hand Crew - Lop (No Scatter)	North Dry Gulch Ponderosa Pine Thinning Project	1495	September 2010	448

Wildlife Habitat and Vegetation History**Table 09R-22.3 - Wildlife Seasonal Habitat.** UDWR wildlife habitat and seasonality.

Species	Habitat	Season
Deer	crucial	summer
Elk	crucial	summer
Moose	crucial	year-long

Table 09R-22.4 - Vegetation History. The dominant vegetation type(s) and phase of woodland succession (Tausch, Miller, Roundy, & Chambers, 2009).

Year	Vegetation Type	Woodland Succession
2009	Ponderosa Pine	NA
2013	Ponderosa Pine	NA
2017	Ponderosa Pine	NA

Site Notes

There is a salt lick 300 yards away from the site.

Site Potential

1981 - 2010 Average Annual Precipitation	16 inches
NRCS Ecological Site	Mountain Gravelly Loam (Ponderosa Pine)
NRCS Ecological Site #	047XB412UT
States and Transitions	No state and transition model is available for this ecological site.

Since establishment in 2009 this site has remained in a stable state as a ponderosa pine (*Pinus ponderosa*) dominated plant community. A variety of mountain shrubs, including (but not limited to) Utah serviceberry (*Amelanchier utahensis*), mountain big sagebrush (*Artemisia tridentata* ssp. *vaseyana*), and mountain snowberry (*Symphoricarpos oreophilus*) make up the browse component (Table 09R-22.12, Table 09R-22.13, Table 09R-22.14). The herbaceous understory is abundant and diverse, with the perennial grass species Kentucky bluegrass (*Poa pratensis*) and perennial forb species trailing fleabane (*Erigeron flagellaris*) and aster (*Symphyotrichum* sp.) contributing a majority of the herbaceous cover (Table 09R-22.7, Table 09R-22.10, Table 09R-22.11).

Trend Summary Tables

Table 09R-22.6 - 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	4.5	2.2	4.3	4.7	1.7	12.9
2013	4.0	2.6	1.8	4.1	2.3	16.2
2017	3.6	1.6	1.5	4.3	2.9	12.2

Table 09R-22.7 - 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	5	357	69	368	0.0	14.5	0.5	21.8
2013	5	392	93	323	0.0	9.9	0.3	8.7
2017	7	423	138	370	0.2	14.2	0.9	19.7

Table 09R-22.8 - 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
2009	13.1	0.1	48.7	0.3	7.6	49.5
2013	16.6	-	59.5	0.0	5.8	27.5
2017	16.8	0.2	49.9	0.5	7.4	40.5

Table 09R-22.9 - 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	Rocky Mountain Elk
	Quadrat Frequency		
2009	4	1	3
2013	3	2	3
2017	5	-	-
Year	Days Use Per Acre (ha)		
2009	21.1 (52.0)	2.7 (6.6)	5.3 (13.2)
2013	10.9 (26.9)	4.0 (9.9)	16.8 (41.4)
2017	19.6 (48.4)	2.0 (5.0)	14.1 (34.8)

Table 09R-22.10 - Grass Species. Nested frequency and modified Daubenmire average cover by year.

GRASS SPECIES	Achnatherum lettermanii (Letterman's needlegrass)	Bromus tectorum ⁿⁱ (cheatgrass)	Carex (sedge)	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)
year	Nested Frequency									
2009	-	5	5	127	-	9	70	37	275	7
2013	21	5	59	75	-	24	98	28	279	37
2017	43	7	3	97	2	51	111	14	335	58
year	Average Cover (%)									
2009	-	0.0	0.0	1.5	-	0.1	1.2	0.5	10.9	0.2
2013	0.3	0.0	1.1	1.6	-	0.3	0.6	0.5	5.1	0.4
2017	0.7	0.2	0.0	1.8	0.0	0.4	0.8	0.4	9.1	0.8

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

Table 09R-22.11 - Forb Species. Nested frequency and modified Daubenmire average cover by year.

FORB SPECIES	Achillea millefolium (Common yarrow)	Agoseris glauca (pale agoseris)	Allium (onion)	Androsace septentrionalis ^a (pygmyflower rockjasmine)	Antennaria (pussytoes)	Arenaria (sandwort)	Astragalus (milkvetch)	Astragalus miser (timber milkvetch)	Balsamorhiza hookeri (Hooker's balsamroot)	Cirsium (thistle)	Collinsia parviflora ^a (maiden blue eyed Mary)	Collomia linearis ^a (tiny trumpet)	Cordylanthus ^a (bird's-beak)	Cryptantha (cryptantha)	Draba ^a (draba)	Erigeron (fleabane)	Erigeron flagellaris (trailing fleabane)
year	Nested Frequency																
2009	122	3	4	-	44	20	4	-	-	6	3	-	4	26	-	-	146
2013	106	6	-	-	40	62	16	-	41	2	74	2	7	3	-	1	91
2017	92	3	-	11	72	76	2	3	29	-	50	27	5	-	11	7	165
year	Average Cover (%)																
2009	3.2	0.0	0.0	-	1.0	0.2	0.0	-	-	0.3	0.0	-	0.0	0.1	-	-	6.0
2013	0.7	0.1	-	-	1.1	0.5	0.1	-	0.9	0.0	0.1	0.0	0.0	0.0	-	0.0	1.1
2017	0.9	0.0	-	0.0	2.0	0.6	0.0	0.0	0.4	-	0.3	0.1	0.0	-	0.0	0.0	7.1

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

FORB SPECIES	Eriogonum (buckwheat)	Eriogonum racemosum (redroot buckwheat)	Heterotheca villosa (hairy false goldenaster)	Lepidium ^a (pepperweed)	Lupinus (lupine)	Microsteris gracilis ^a (slender phlox)	Onobrychis vicifolia ⁱ (sainfoin)	Penstemon (beardtongue)	Phlox austromontana (mountain phlox)	Polygonum douglasii ^a (Douglas' knotweed)	Potentilla (cinquefoil)	Potentilla gracilis (slender cinquefoil)	Potentilla hippiana (woolly cinquefoil)	Sedum lanceolatum (spearleaf stonecrop)	Senecio integerrimus ^a (lambstongue ragwort)	Silene drummondii (Drummond's campion)	Symphoricarum (aster)
year	Nested Frequency																
2009	22	19	46	-	5	6	8	3	17	32	17	-	-	14	-	-	255
2013	-	-	13	-	16	8	1	-	4	7	-	12	28	22	-	-	237
2017	-	8	1	3	5	5	1	25	-	28	-	37	20	3	21	6	263
year	Average Cover (%)																
2009	0.5	0.3	1.1	-	0.1	0.0	0.1	0.0	0.2	0.1	0.6	-	-	0.2	-	-	7.7
2013	-	-	0.0	-	0.3	0.0	0.0	-	0.0	0.0	-	0.3	0.2	0.2	-	-	3.3
2017	-	0.1	0.0	0.0	0.2	0.0	0.0	0.4	-	0.1	-	0.4	0.7	0.0	0.4	0.0	6.9

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

FORB SPECIES				
Taraxacum officinale (common dandelion)				
Tragopogon dubius ⁱⁱ (yellow salsify)				
unknown annual forb ^a (unknown forb)				
unknown perennial forb 2 (unknown forb)				
year	Nested Frequency			
2009	13	-	26	26
2013	-	5	-	-
2017	21	11	-	-
year	Average Cover (%)			
2009	0.1	-	0.3	0.3
2013	-	0.0	-	-
2017	0.1	0.1	-	-

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

Table 09R-22.12 - 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)						
Pinus ponderosa ^t (ponderosa pine)						
Purshia tridentata ^p (antelope bitterbrush)						
Rosa woodsii ^p (Woods' rose)						
Symphoricarpos oreophilus (mountain snowberry)						
year	Line Intercept Cover (%)					
2009	3.1	0.6	12.9	0.9	0.1	1.7
2013	3.1	0.6	16.2	0.4	0	2.3
2017	2.1	0.6	12.2	1.3	0.3	2.9
year	Quadrat Cover (%)					
2009	3.0	0.6	4.3	0.5	0.4	2.2
2013	2.2	0.8	1.8	0.9	0.2	2.6
2017	1.4	0.8	1.5	1.2	0.2	1.6

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

Table 09R-22.13 - 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.

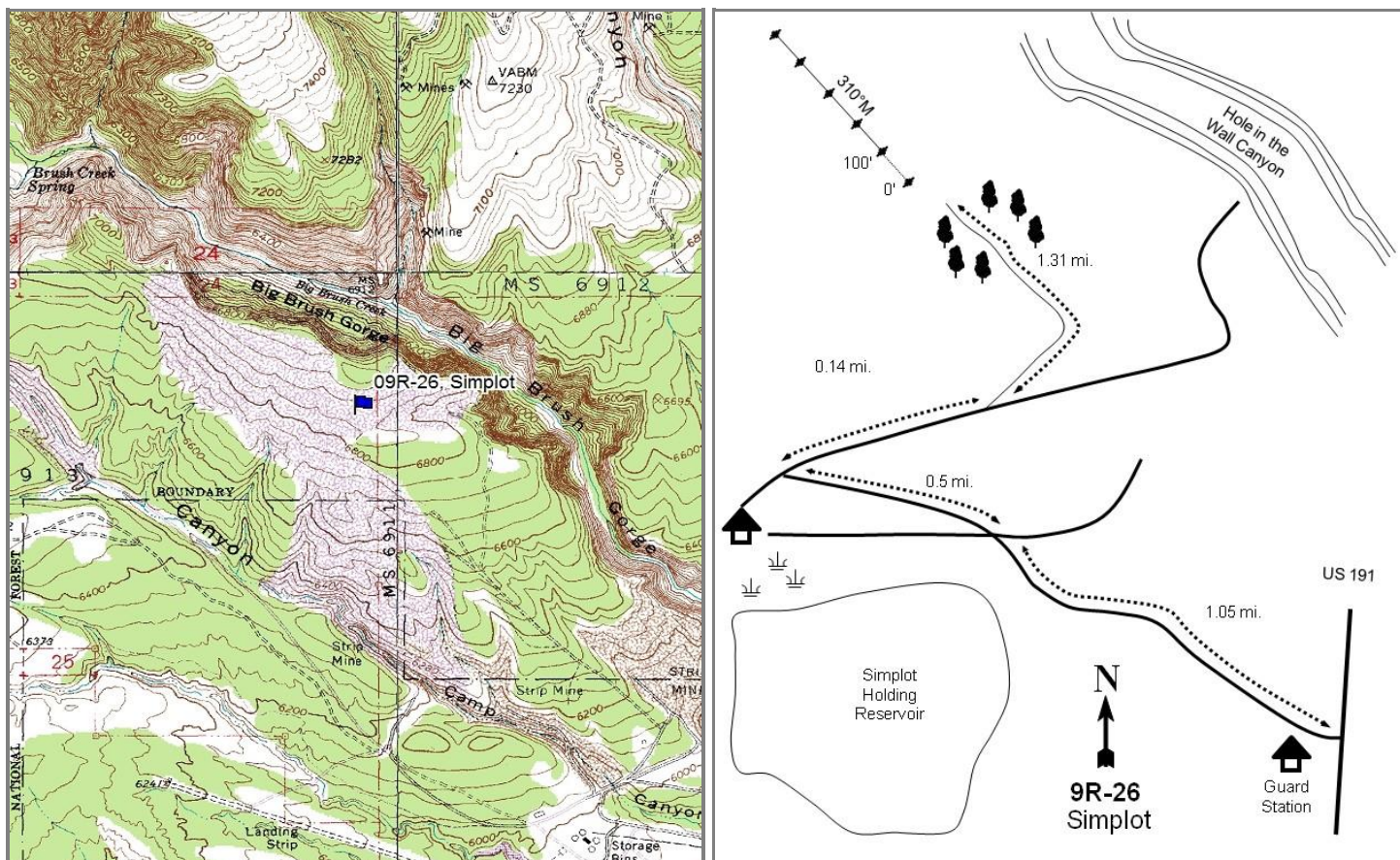
Year	Density		Age Class Distribution			Utilization		Poor Vigor (%)	Average Height Crown (cm)
	Plants Per Acre		Excluding Seedlings			Moderate (%)	Heavy (%)		
	Excluding Seedlings	Seedling	Young (%)	Mature (%)	Decadent (%)				
Amelanchier utahensis^p -- (Utah serviceberry)									
2009	-	-	-	-	-	-	-	-	56/96
2013	620	-	10	84	7	42	16	7	57/97
2017	660	-	3	82	15	3	52	18	45/82
Artemisia tridentata ssp. vaseyana^p -- (mountain big sagebrush)									
2009	-	-	-	-	-	-	-	-	43/59
2013	140	-	29	71	0	0	0	0	33/56
2017	140	20	0	100	0	14	0	29	33/62
Cercocarpus montanus^p -- (alderleaf mountain mahogany)									
2009	-	-	-	-	-	-	-	-	26/41
2013	-	-	-	-	-	-	-	-	-/-
2017	-	-	-	-	-	-	-	-	32/39
Juniperus communis -- (common juniper)									
2009	-	-	-	-	-	-	-	-	-/-
2013	-	-	-	-	-	-	-	-	-/-
2017	-	-	-	-	-	-	-	-	69/293
Mahonia repens -- (creeping barberry)									
2009	-	-	-	-	-	-	-	-	6/25
2013	-	-	-	-	-	-	-	-	-/-
2017	-	-	-	-	-	-	-	-	5/11
Pinus ponderosa^t -- (ponderosa pine)									
2009	-	-	-	-	-	-	-	-	-/-
2013	120	20	67	33	0	0	0	0	-/-
2017	140	-	14	86	0	0	0	0	-/-
Purshia tridentata^p -- (antelope bitterbrush)									
2009	-	-	-	-	-	-	-	-	29/84
2013	160	-	0	100	0	25	38	0	26/79
2017	280	-	0	100	0	79	21	0	27/82
Rosa woodsii^p -- (Woods' rose)									
2009	-	-	-	-	-	-	-	-	22/31
2013	1160	40	71	28	2	0	0	0	20/19
2017	1040	-	17	83	0	2	10	0	17/20
Symphoricarpos oreophilus -- (mountain snowberry)									
2009	-	-	-	-	-	-	-	-	31/67
2013	1720	60	14	86	0	29	0	0	29/56
2017	2860	-	4	96	0	11	1	0	22/55

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

Table 09R-22.14 - 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' (%)	
Pinus ponderosa (ponderosa pine)							
2009	216	5	25	15	15	40	17.6
2013	148	-	10	5	20	65	30.5
2017	153	-	20	15	20	45	18.9

SIMPLOT - STUDY NO. 09R-26

**Location Information**

USGS 7.5 min Map Info
GPS (0' Stake)

Steinaker Reservoir ; Township 2S, Range 21E, Section 00
NAD 83 UTM ZONE 12, 626640 East 4497545 North

Transect Information

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

Not Available
312° magnetic
500ft
Line 1 (11ft), Line 2 (34ft), Line 3 (59ft), Line 4 (71ft), Line 5 (95ft)
No Rebar

Directions to Site

Drive north out of Vernal on US-191; turn left and drive for 1.05 miles where there will be an intersection. Continue straight for 0.5 miles. The road will then "T": turn right and drive for another 0.14 miles. There will be a road on the left (north). Follow this road around a turn for 1.31 miles. Park in the trees and the study site will be directly ahead.

Site Information

Land Ownership	Private
Land Administrator	Private
Allotment	No data
Elevation	6,863ft (2,092m)
Aspect	Northwest
Slope	3-5%
Sample Dates	07/10/2013, 08/09/2017

Table 09R-26.1 Disturbance History. Recorded history of major disturbances.

Treatment/Disturbance	Name	WRI DB#	Date	Size (acres)
Mining - Strip Mine	-	-	Historic	-

Wildlife Habitat and Vegetation History**Table 09R-26.3 - Wildlife Seasonal Habitat.** UDWR wildlife habitat and seasonality.

Species	Habitat	Season	Brood/Young Rearing
Deer	Crucial	winter	
Elk	Crucial	winter	
Greater Sage Grouse	Occupied	year-long	brood-rearing
Rocky Mountain Bighorn	Crucial	year-long	

Table 09R-26.4 - Vegetation History. The dominant vegetation type(s) and phase of woodland succession (Tausch, Miller, Roundy, & Chambers, 2009).

Year	Vegetation Type	Woodland Succession
2013	Forage Kochia	No Encroachment
2017	Forage Kochia/Perennial Forb	No Encroachment

Site Notes

Much of the alfalfa (*Medicago sativa*) and forage kochia (*Bassia prostrata*) had been defoliated by grasshoppers in 2017. An elk carcass was observed on site in the same year.

Site Potential

1981 - 2010 Average Annual Precipitation	12 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.

The dominant browse species on this study site has been forage kochia (*Bassia prostrata*) since study establishment in 2013, though both cover and density had decreased as of the 2017 sample year (Table 09R-26.12, Table 09R-26.13). Perennial forb cover -- much of which was contributed by alfalfa (*Medicago sativa*) -- increased between sample years and it was the dominant herbaceous component in 2017. Perennial grasses, particularly Sandberg bluegrass (*Poa secunda*), have also been present in both sample years. The introduced annual grass species cheatgrass (*Bromus tectorum*) has been observed on site since study establishment, but with low cover values. Annual forbs have remained rare (Table 09R-26.7, Table 09R-26.10, Table 09R-26.11).

Trend Summary Tables

Table 09R-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
2013	18.4	-	-	23.1	0.2	-
2017	10.9	0.2	-	12.8	-	-

Table 09R-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
2013	292	257	114	51	2.2	7.1	0.3	2.6
2017	284	254	28	135	4.0	6.1	0.1	15.1

Table 09R-26.8 - 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
2013	22.6	0.2	18.2	21.0	12.3	33.3
2017	14.1	0.1	28.2	16.5	13.8	38.1

Table 09R-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	Rocky Mountain Elk	Rabbit
	Quadrat Frequency			
2013	1	7	30	5
2017	-	9	28	9
Year	Days Use Per Acre (ha)			
2013	-	17.4 (43.0)	56.3 (139.0)	-
2017	-	2.7 (6.6)	70.4 (173.8)	-

Table 09R-26.10 - Grass Species. Nested frequency and modified Daubenmire average cover by year.

GRASS SPECIES	Achnatherum hymenoides (Indian ricegrass)	Agropyron cristatum ⁱ (crested wheatgrass)	Bromus tectorum ⁱⁱ (cheatgrass)	Elymus elymoides (squirreltail)	Koeleria macrantha (prairie Junegrass)	Pascopyrum smithii (western wheatgrass)	Poa secunda (Sandberg bluegrass)	Psathyrostachys juncea ⁱ (Russian wildrye)	Pseudoroegneria spicata (bluebunch wheatgrass)	Thinopyrum intermedium ⁱ (intermediate wheatgrass)
year	Nested Frequency									
2013	1	6	292	17	21	36	188	29	7	34
2017	1	7	284	15	-	-	219	52	-	3
year	Average Cover (%)									
2013	0.2	0.2	2.2	0.1	0.7	0.5	3.6	0.8	0.3	0.6
2017	0.1	0.1	4.0	0.1	-	-	4.7	1.1	-	0.0

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

Table 09R-26.11 - Forb Species. Nested frequency and modified Daubenmire average cover by year.

FORB SPECIES										
<i>Alyssum desertorum</i> ^{ai} (desert madwort)										
<i>Arabis</i> (rockcress)										
<i>Ceratocephala testiculata</i> ^{ai} (curveseed butterwort)										
<i>Descurainia pinnata</i> ^a (western tansymustard)										
<i>Lappula occidentalis</i> ^a (flatspine stickseed)										
<i>Linum perenne</i> ⁱ (blue flax)										
<i>Machaeranthera canescens</i> (hoary tansyaster)										
<i>Medicago sativa</i> ⁱ (alfalfa)										
<i>Phlox austromontana</i> (mountain phlox)										
<i>Tragopogon dubius</i> ^{ai} (yellow salsify)										
year	Nested Frequency									
2013	-	2	87	49	2	-	7	43	-	5
2017	18	3	8	-	-	4	-	127	3	2
year	Average Cover (%)									
2013	-	0.0	0.2	0.1	0.0	-	0.1	2.5	-	0.0
2017	0.0	0.0	0.0	-	-	0.0	-	15.1	0.0	0.0

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

Table 09R-26.12 - Shrub and Tree Species. Average modified Daubenmire quadrat and line intercept cover by year.

SHRUB SPECIES		
<i>Bassia prostrata</i> ^{ai} (forage kochia)		
<i>Gutierrezia sarothrae</i> (broom snakeweed)		
year	Line Intercept Cover (%)	
2013	23.1	0.2
2017	12.8	-
year	Quadrat Cover (%)	
2013	18.4	0.0
2017	10.9	0.2

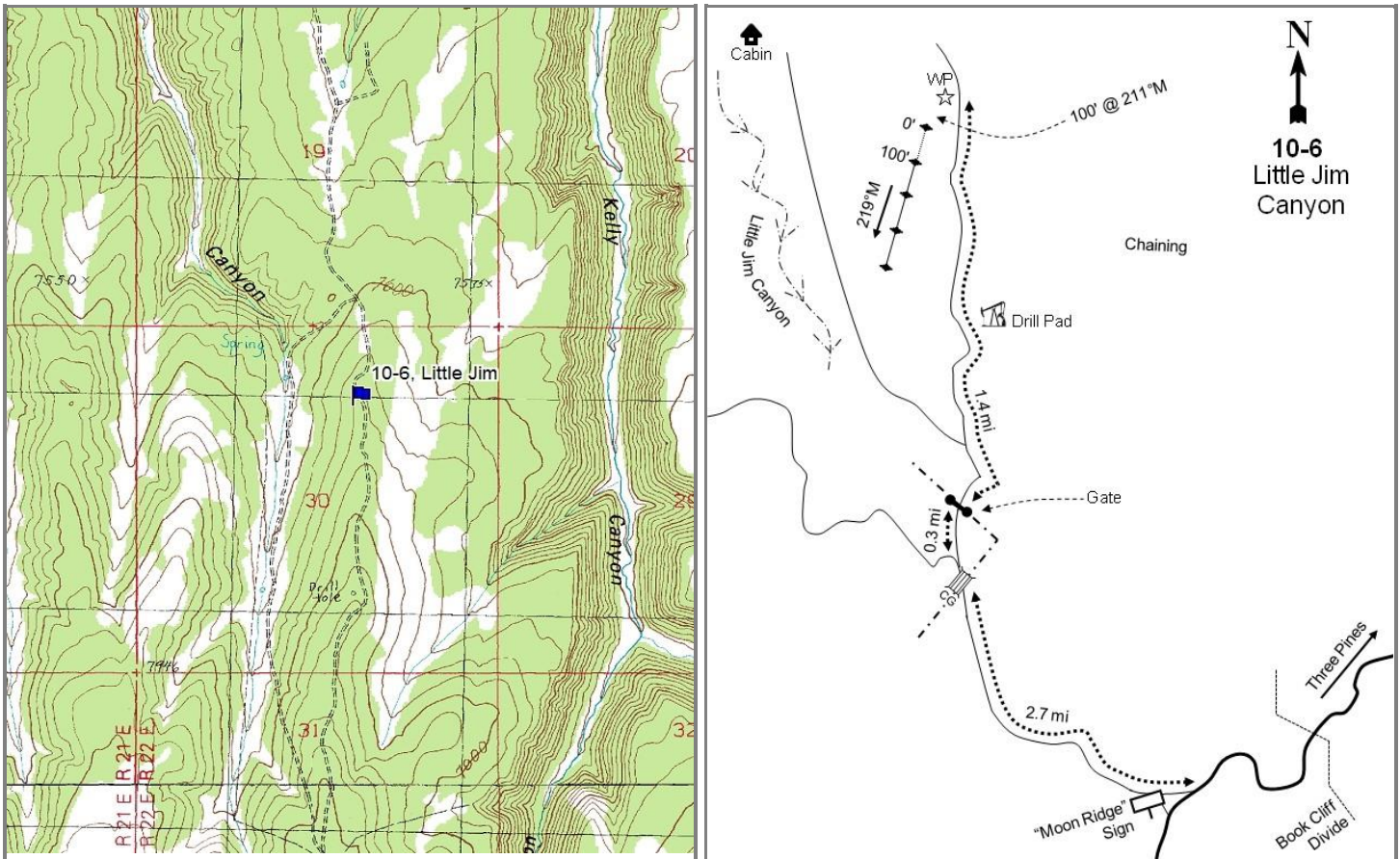
t - Tree Species; p - Preferred Browse; i - Introduced Species

Table 09R-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		Age Class Distribution			Utilization		Poor Vigor (%)	Average Height Crown (cm)
	Plants Per Acre		Excluding Seedlings			Moderate (%)	Heavy (%)		
	Excluding Seedlings	Seedling	Young (%)	Mature (%)	Decadent (%)				
<i>Bassia prostrata</i> ^{pi} -- (forage kochia)									
2013	41800	1540	48	52	0	6	3	19	22/36
2017	32240	-	11	89	1	25	24	70	16/21
<i>Gutierrezia sarothrae</i> -- (broom snakeweed)									
2013	20	-	0	100	0	0	0	0	22/33
2017	100	-	0	80	20	0	0	80	13/16

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

LITTLE JIM CANYON - STUDY NO. 10-6

**Location Information**

USGS 7.5 min Map Info
GPS (0' Stake)

Tennile Canyon North; Township 16S, Range 22E, Section 30
NAD 83 UTM ZONE 12, 626445 East 4361161 North

Transect Information

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

9099
204° magnetic
400ft
Line 1 (11ft & 95ft), Line 2 (34ft), Line 3 (59ft), Line 4 (71ft)
Standard

Directions to Site

From Three Pines, proceed southwest along the divide road for about 10.5 miles to a major junction at Moon Ridge. Turn right and drive for 2.7 miles to a cattle guard. Just before the cattle guard and fence, turn right and travel along the fence for 0.3 miles to a gate. Stay to the right and continue down the ridges for 1.4 miles to the witness post on the left (west) side of the road. From the witness post, the 0-foot baseline stake is 100 feet into the chaining at a bearing 211 degrees magnetic. The 0-foot stake is marked by browse tag #9099.

Site Information

Land Ownership	State
Land Administrator	SITLA
Allotment	MCCLELLAND
Elevation	7,700ft (2,347m)
Aspect	Southwest
Slope	15%
Sample Dates	06/20/1995, 06/22/2000, 08/21/2012, 07/14/2015, 08/15/2017

Table 10-06.1 Disturbance History. Recorded history of major disturbances.

Treatment/Disturbance	Name	WRI DB#	Date	Size (acres)
Bullhog - Mechanical	Little Jim Bullhog	2219	April-July 2013	669

Wildlife Habitat and Vegetation History**Table 10-06.3 - Wildlife Seasonal Habitat.** UDWR wildlife habitat and seasonality.

Species	Habitat	Season	Brood/Young Rearing
Bison	Crucial	year-long	
Deer	substantial	summer	
Elk	Crucial	summer	
Greater Sage Grouse	occupied	year-long	brood-rearing
Rocky Mountain Bighorn	Crucial	year-long	

Table 10-06.4 - Vegetation History. The dominant vegetation type(s) and phase of woodland succession (Tausch, Miller, Roundy, & Chambers, 2009).

Year	Vegetation Type	Woodland Succession
1988	Mixed Mountain Brush	Phase I
1995	Mixed Mountain Brush	Phase I
2000	Mixed Mountain Brush	Phase I
2012	Mixed Mountain Brush	Phase I
2015	Mixed Mountain Brush	Phase I
2017	Mixed Mountain Brush	Phase I

Site Notes

No Notes

Soils**Table 10-06.5 - 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	7.3	38.0	37.4	24.6	6.7	8.3	96.0	0.8	06/22/2000

Site Potential

1981 - 2010 Average Annual Precipitation	17 inches
NRCS Ecological Site	Mountain Stony Loam (Browse)
NRCS Ecological Site #	R047XC460UT
States and Transitions	No state and transition model is available for this ecological site

The browse component on this study site has been dominated by mixed mountain brush species such as mountain big sagebrush (*Artemisia tridentata* ssp. *vaseyana*), alderleaf mountain mahogany (*Cercocarpus montanus*), and mountain snowberry (*Symphoricarpos oreophilus*) since study establishment in 1988 (photos, Table 10-06.12, Table 10-06.13). The herbaceous understory has remained somewhat diverse and has consisted mostly of native perennial grass species. The annual grass cheatgrass (*Bromus tectorum*) is present, but has provided limited cover (Table 10-06.10). Forb species have remained rare (Table 10-06.7, Table 10-06.11). Twoneedle pinyon (*Pinus edulis*) and Utah juniper (*Juniperus osteosperma*) increased in abundance over the sample period and were becoming co-dominant with the browse component. In 2013, however, the site was treated with a bullhog that removed nearly all of the pinyon and juniper trees (Table 10-06.14).

Trend Summary Tables**Table 10-06.6 - 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
1995	11.9	8.3	4.0	-	-	-
2000	16.2	8.6	3.9	-	-	-
2012	11.8	6.0	8.8	14.3	11.7	12.0
2015	7.4	12.3	0.0	10.9	18.2	-
2017	10.7	11.1	0.0	11.1	17.9	0.1

Table 10-06.7 - 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
1995	81	139	113	91	1.6	3.2	1.9	0.9
2000	39	129	3	67	0.1	2.6	0.0	1.2
2012	6	118	4	38	0.0	2.7	0.0	0.3
2015	103	175	17	72	3.1	9.2	0.3	2.1
2017	142	217	1	55	2.1	9.6	0.1	1.8

Table 10-06.8 - 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
1995	3.3	0.6	49.0	19.2	3.2	33.2
2000	7.8	1.0	54.2	25.2	3.1	31.7
2012	3.6	-	50.7	30.3	1.4	29.7
2015	6.4	-	61.1	18.3	2.1	30.4
2017	15.6	0.0	63.6	13.6	2.5	29.4

Table 10-06.9 - 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	Rocky Mountain Elk	Horse	Rabbit
	Quadrat Frequency				
1995	-	3	4	-	9
2000	-	3	11	-	33
2012	-	12	9	2	5
2015	1	5	7	-	4
2017	1	10	17	2	-
Year	Days Use Per Acre (ha)				
1995	-	-	-	-	-
2000	-	7.4 (18.2)	6.0 (14.9)	-	-
2012	-	24.8 (61.2)	19.4 (48.0)	2.3 (5.7)	-
2015	-	16.8 (41.4)	24.8 (61.2)	1.2 (2.9)	-
2017	1.5 (3.6)	22.1 (54.6)	36.2 (89.4)	0.6 (1.4)	-

Table 10-06.10 - Grass Species. Nested frequency and modified Daubenmire average cover by year.

GRASS SPECIES	Achnatherum hymenoides (Indian ricegrass)	Bromus tectorum ^{ai} (cheatgrass)	Carex (sedge)	Elymus elymoides (squirreltail)	Elymus lanceolatus (thickspike wheatgrass)	Koeleria macrantha (prairie Junegrass)	Piptatheropsis micrantha (littelseed ricegrass)	Poa fendleriana (muttongrass)	Poa pratensis ⁱ (Kentucky bluegrass)	Psathyrostachys juncea ⁱ (Russian wildrye)
year	Nested Frequency									
1995	40	81	21	58	-	-	28	3	4	6
2000	70	39	9	35	2	-	3	2	16	-
2012	82	6	14	23	-	5	-	-	-	3
2015	90	103	18	65	2	-	20	4	6	-
2017	84	142	1	122	8	3	36	0	5	-
year	Average Cover (%)									
1995	1.3	1.6	0.4	0.7	-	-	0.2	0.0	0.0	0.5
2000	1.6	0.1	0.4	0.4	0.0	-	0.0	0.0	0.1	-
2012	2.2	0.0	0.2	0.3	-	0.0	-	-	-	0.0
2015	4.6	3.1	0.9	1.9	0.0	-	1.3	0.1	0.4	-
2017	4.5	2.1	0.0	2.2	0.1	0.6	2.2	0.0	0.0	-

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

Table 10-06.11 - Forb Species. Nested frequency and modified Daubenmire average cover by year.

FORB SPECIES	Alicia latifolia ssp. latifolia ^a (broadleaf gilia)	Androsace septentrionalis ^a (pygmyflower rockjasmine)	Antennaria (pussytoes)	Arabis (rockcress)	Chaenactis douglasii (Douglas' dustymaiden)	Chenopodium fremontii ^a (Fremont's goosefoot)	Chenopodium leptophyllum ^a (narrowleaf goosefoot)	Cryptantha (cryptantha)	Delphinium nuttallianum (two-lobed larkspur)	Descurainia ^a (tansymustard)	Draba ^a (draba)	Erigeron pumilus (shaggy fleabane)	Eriogonum alatum (winged buckwheat)	Lappula occidentalis ^a (flatspine stickseed)	Lesquerella (bladderpod)	Lupinus argenteus (silvery lupine)	Machaeranthera grindelioides (rayless tansyaster)
year	Nested Frequency																
1995	9	-	-	16	1	-	-	3	1	74	23	1	-	28	-	20	16
2000	-	-	4	9	-	-	-	-	-	-	-	-	-	3	6	-	22
2012	-	4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	6
2015	-	-	-	1	-	3	6	6	-	4	4	3	-	-	-	-	7
2017	-	-	3	-	-	-	-	-	-	1	-	-	3	-	10	-	11
year	Average Cover (%)																
1995	0.2	-	-	0.0	0.0	-	-	0.0	0.0	1.5	0.1	0.0	-	0.1	-	0.1	0.6
2000	-	-	0.0	0.0	-	-	-	-	-	-	-	-	-	0.0	0.1	-	0.2
2012	-	0.0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.0
2015	-	-	-	0.1	-	0.0	0.0	0.1	-	0.2	0.0	0.0	-	-	-	-	0.2
2017	-	-	0.0	-	-	-	-	-	-	0.1	-	-	0.0	-	0.0	-	0.3

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

FORB SPECIES	Nested Frequency				
Packera multilobata (lobeleaf groundsel)	23	-	31	5	-
Penstemon pachyphyllus (thickleaf beardtongue)	1	27	9	-	-
Physaria newberryi (Newberry's twinpod)	-	16	23	-	-
Polygonum douglasii ^a (Douglas' knotweed)	5	37	23	-	1
Tragopogon dubius ^{ai} (yellow salsify)	-	32	-	-	-

year	Average Cover (%)				
1995	0.1	-	0.1	0.0	-
2000	0.0	0.8	0.1	-	-
2012	-	0.2	0.1	-	-
2015	0.0	1.5	0.1	-	0.0
2017	-	1.4	-	-	-

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

Table 10-06.12 - Shrub and Tree Species. Average modified Daubenmire quadrat and line intercept cover by year.

SHRUB SPECIES	Line Intercept Cover (%)																	
Artemisia frigida ^t (prairie sagewort)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Artemisia tridentata ssp. vaseyana ^p (mountain big sagebrush)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Cercocarpus montanus ^p (alderleaf mountain mahogany)	0.7	4.3	3.3	-	0.1	1.1	-	0.2	3.3	0.9	0.1	0.2	7.8	-	-	4.2	0.7	
Chrysothamnus viscidiflorus (yellow rabbitbrush)	1.2	4.2	0.8	-	-	3.1	-	0.3	-	-	1.8	-	-	-	-	1.5	0.1	
Ericameria nauseosa (rubber rabbitbrush)	0.8	3.8	0.5	0.1	0.4	3.6	0.2	0.9	0.1	-	1	0.1	-	-	-	2.4	-	
Ericameria nauseosa ssp. nauseosa var. hololeuca ^p (rubber rabbitbrush)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
Ericameria parryi var. parryi (Parry's rabbitbrush)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
Gutierrezia sarothrae (broom snakeweed)	0.7	4.3	3.3	-	0.1	1.1	-	0.2	3.3	0.9	0.1	0.2	7.8	-	-	4.2	0.7	
Juniperus osteosperma ^t (Utah juniper)	1.2	4.2	0.8	-	-	3.1	-	0.3	-	-	1.8	-	-	-	-	1.5	0.1	
Juniperus scopulorum ^t (Rocky Mountain juniper)	0.8	3.8	0.5	0.1	0.4	3.6	0.2	0.9	0.1	-	1	0.1	-	-	-	2.4	-	
Mahonia repens (creeping barberry)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
Opuntia (pricklypear)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
Pinus edulis ^t (twoneedle pinyon)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
Pseudotsuga menziesii ^t (Douglas-fir)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
Purshia tridentata ^p (antelope bitterbrush)	0.8	3.8	0.5	0.1	0.4	3.6	0.2	0.9	0.1	-	1	0.1	-	-	-	2.4	-	
Quercus gambelii ^p (Gambel oak)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
Ribes cereum var. cereum ^p (wax currant)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	

year	Quadrat Cover (%)																	
1995	-	3.5	3.3	-	-	2.0	-	0.0	2.3	-	1.4	0.6	1.7	-	0.1	1.2	1.7	
2000	0.0	6.8	4.2	-	0.0	1.1	-	-	1.8	0.1	0.3	0.2	1.8	0.1	-	2.8	1.3	
2012	0.8	4.6	1.8	-	0.4	0.6	-	0.2	1.8	0.0	0.2	0.7	7.0	-	-	2.7	1.3	
2015	0.8	3.5	0.4	-	0.1	1.0	-	1.2	-	-	1.3	0.0	0.0	0.0	-	1.4	0.3	
2017	0.8	4.7	0.1	0.1	0.0	1.9	0.0	0.4	0.0	-	0.9	0.0	0.0	-	-	3.1	0.1	

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

SHRUB SPECIES	
	<i>Symphoricarpos oreophilus</i> (mountain snowberry)
year	Line Intercept Cover (%)
1995	-
2000	-
2012	11.1
2015	16.1
2017	15.2
year	Quadrat Cover (%)
1995	6.4
2000	8.0
2012	4.6
2015	9.6
2017	9.6

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

Table 10-06.13 - 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 frigida</i> ^P -- (prairie sagewort)									
1995	20	-	0	100	0	0	0	0	28/29
2000	320	80	25	75	0	0	0	0	12/22
2012	1440	-	0	100	0	10	0	0	13/29
2015	660	-	15	85	0	0	0	0	39/46
2017	740	-	30	70	0	0	0	0	24/34
<i>Artemisia tridentata</i> ssp. <i>vaseyana</i> ^P -- (mountain big sagebrush)									
1995	420	-	10	86	5	0	0	0	64/78
2000	520	-	12	89	0	4	0	0	82/91
2012	620	-	7	81	13	26	29	23	60/86
2015	360	-	11	83	6	44	28	11	57/94
2017	420	20	29	67	5	5	10	5	68/99
<i>Cercocarpus montanus</i> ^P -- (alderleaf mountain mahogany)									
1995	440	-	9	86	5	14	0	0	119/115
2000	460	-	26	74	0	30	9	0	124/117
2012	300	-	20	47	33	33	33	27	113/115
2015	320	40	50	50	0	0	56	0	81/89
2017	180	-	33	67	0	33	67	0	65/72
<i>Chrysothamnus viscidiflorus</i> -- (yellow rabbitbrush)									
1995	60	-	67	33	0	67	0	0	56/62
2000	-	-	-	-	-	-	-	-	60/39
2012	-	-	-	-	-	-	-	-	22/23
2015	20	-	0	100	0	0	0	0	36/35
2017	260	-	0	100	0	0	0	0	26/35
<i>Ericameria nauseosa</i> -- (rubber rabbitbrush)									
1995	-	-	-	-	-	-	-	-	-/-
2000	140	-	14	86	0	0	0	0	73/80
2012	20	20	0	100	0	0	0	100	69/99
2015	60	-	0	100	0	0	0	0	73/98
2017	60	-	0	100	0	0	0	0	61/90

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^P -- (rubber rabbitbrush)									
1995	340	-	18	71	12	0	0	6	63/83
2000	200	-	10	80	10	0	10	10	82/82
2012	220	-	0	73	27	18	9	73	73/91
2015	280	20	0	100	0	43	14	0	66/79
2017	200	20	20	80	0	0	0	0	76/94
Ericameria parryi var. parryi -- (Parry's rabbitbrush)									
1995	-	-	-	-	-	-	-	-	-/-
2000	-	-	-	-	-	-	-	-	-/-
2012	-	-	-	-	-	-	-	-	-/-
2015	-	-	-	-	-	-	-	-	74/96
2017	-	-	-	-	-	-	-	-	78/87
Gutierrezia sarothrae -- (broom snakeweed)									
1995	-	-	-	-	-	-	-	-	-/-
2000	40	-	0	100	0	0	0	0	19/22
2012	300	-	7	93	0	0	0	0	16/26
2015	860	60	7	93	0	0	0	0	23/30
2017	820	-	7	93	0	0	0	0	19/26
Juniperus osteosperma^t -- (Utah juniper)									
1995	-	-	-	-	-	-	-	-	-/-
2000	60	-	67	33	0	0	0	0	-/-
2012	80	20	0	100	0	0	0	25	-/-
2015	20	20	100	0	0	0	0	0	-/-
2017	20	-	0	100	0	0	0	0	-/-
Juniperus scopulorum^t -- (Rocky Mountain juniper)									
1995	-	-	-	-	-	-	-	-	-/-
2000	40	-	0	100	0	0	0	0	-/-
2012	-	-	-	-	-	-	-	-	-/-
2015	-	-	-	-	-	-	-	-	-/-
2017	-	-	-	-	-	-	-	-	-/-
Mahonia repens -- (creeping barberry)									
1995	1840	-	24	76	0	0	0	0	7/18
2000	720	-	0	100	0	0	0	0	5/11
2012	1600	-	29	71	0	0	0	0	7/9
2015	1560	-	0	100	0	0	0	0	12/22
2017	2420	-	0	100	0	0	0	0	5/11
Opuntia -- (pricklypear)									
1995	120	-	0	67	33	0	0	33	19/29
2000	240	-	0	100	0	0	0	0	9/31
2012	80	-	0	100	0	0	0	100	10/51
2015	300	-	13	87	0	0	0	0	9/32
2017	200	-	0	100	0	0	0	0	9/26
Pinus edulis^t -- (twoneedle pinyon)									
1995	40	-	100	0	0	0	0	0	-/-
2000	320	-	56	44	0	0	0	0	-/-
2012	300	-	13	87	0	0	0	0	-/-
2015	20	40	100	0	0	0	0	0	-/-
2017	20	40	100	0	0	0	0	0	-/-
Pseudotsuga menziesii^t -- (Douglas-fir)									
1995	-	-	-	-	-	-	-	-	-/-
2000	20	-	100	0	0	0	0	0	-/-
2012	-	-	-	-	-	-	-	-	-/-
2015	-	20	0	0	0	0	0	0	-/-
2017	-	-	-	-	-	-	-	-	-/-
Purshia tridentata^P -- (antelope bitterbrush)									
1995	20	-	0	100	0	0	0	0	68/111
2000	20	-	0	100	0	0	100	0	97/119
2012	-	-	-	-	-	-	-	-	54/93
2015	-	-	-	-	-	-	-	-	1/27
2017	-	-	-	-	-	-	-	-	-/-

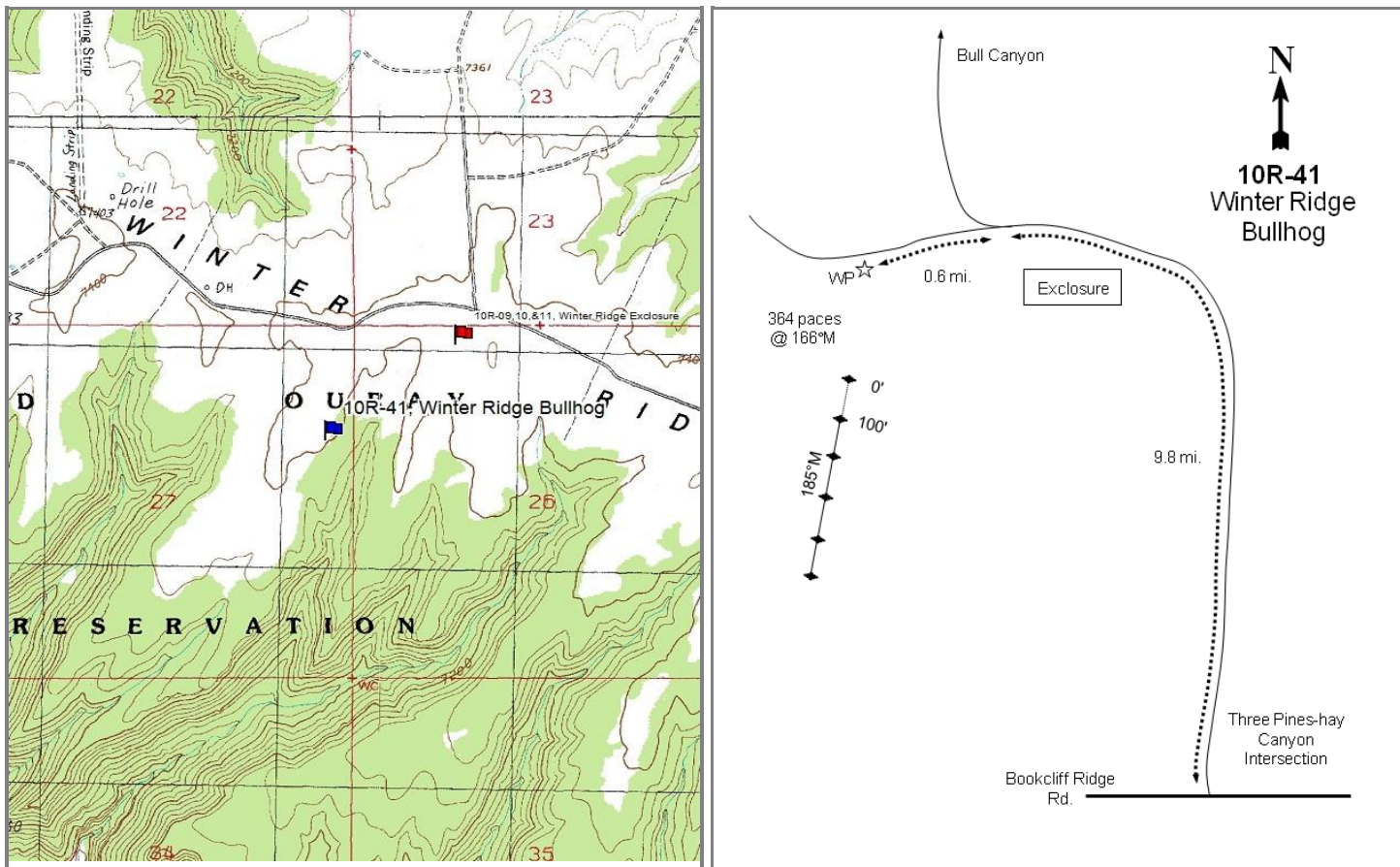
Year	Density		Age Class Distribution			Utilization		Poor Vigor (%)	Average Height Crown (cm)
	Plants Per Acre		Excluding Seedlings			Moderate (%)	Heavy (%)		
	Excluding Seedlings	Seedling	Young (%)	Mature (%)	Decadent (%)				
Quercus gambelii^P -- (Gambel oak)									
1995	60	-	0	100	0	0	0	0	37/79
2000	1400	-	16	84	0	0	0	0	162/72
2012	820	-	24	76	0	0	0	0	94/51
2015	880	-	27	73	0	0	25	0	69/58
2017	1120	-	18	82	0	18	18	0	42/43
Ribes cereum var. cereum^P -- (wax currant)									
1995	80	60	0	100	0	0	0	0	91/121
2000	100	-	0	100	0	20	0	0	85/100
2012	100	-	40	40	20	40	0	20	78/89
2015	140	20	14	86	0	14	57	0	52/67
2017	100	-	0	100	0	60	0	0	60/72
Sambucus^P -- (elderberry)									
1995	-	-	-	-	-	-	-	-	-/-
2000	-	-	-	-	-	-	-	-	-/-
2012	-	-	-	-	-	-	-	-	170/130
2015	-	-	-	-	-	-	-	-	147/108
2017	-	-	-	-	-	-	-	-	-/-
Symphoricarpos oreophilus -- (mountain snowberry)									
1995	1340	-	21	79	0	3	0	0	56/108
2000	2080	40	30	68	2	14	2	1	54/93
2012	1620	-	20	72	9	26	5	17	53/109
2015	3280	-	6	95	0	21	13	2	46/98
2017	3520	-	7	92	1	7	7	2	54/92

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

Table 10-06.14 - 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)							
1995	61	-	-	-	-	-	14.8
2000	76	-	-	-	-	-	15.4
2012	79	6	31	25	31	6	6.7
2015	20	33	67	-	-	-	3.0
2017	23	50	50	-	-	-	2.7
Pinus edulis (twoneedle pinyon)							
1995	174	-	-	-	-	-	4.4
2000	231	-	-	-	-	-	5.7
2012	241	-	30	25	35	10	6.1
2015	3	33	67	-	-	-	2.3
2017	30	30	70	-	-	-	2.3
Pseudotsuga menziesii (Douglas-fir)							
1995	3	-	-	-	-	-	10.0
Quercus gambelii (Gambel oak)							
1995	8	-	-	-	-	-	3.0

WINTER RIDGE BULLHOG - STUDY NO. 10R-41



Location Information

USGS 7.5 min Map Info	Tenmile Canyon North; Township 15S, Range 21E, Section 27
GPS (0' Stake)	NAD 83 UTM ZONE 12, 625125 East 4371785 North

Transect Information

Browse Tag # (0' Stake)	141
Transect Bearing	185° 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 the intersection of the Seep Ridge and Book Cliff Divide roads, proceed west along the divide for 9.4 miles to the major Three Pines-Hay Canyon intersection. Drive west along Winter Ridge Road for 9.8 miles to a fork. Stay left, continuing to the west for 0.6 miles to a witness post on the left (south) side of the road. The 0-foot stake is 364 paces from the witness post at 166 degrees magnetic. The 0-foot stake is marked by browse tag #141.

Site Information

Land Ownership	State
Land Administrator	SITLA
Allotment	HORSE POINT
Elevation	7,400ft (2,256m)
Aspect	Southeast
Slope	4%
Sample Dates	07/18/2007, 06/23/2010, 08/28/2013, 08/16/2017

Table 10R-41.1 Disturbance History. Recorded history of major disturbances.

Treatment/Disturbance	Name	WRI DB#	Date	Size (acres)
Mechanical - Bullhog	Winter Ridge Bullhog	685	January-February 2009	474

Wildlife Habitat and Vegetation History**Table 10R-41.3 - Wildlife Seasonal Habitat.** UDWR wildlife habitat and seasonality.

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

Table 10R-41.4 - Vegetation History. The dominant vegetation type(s) and phase of woodland succession (Tausch, Miller, Roundy, & Chambers, 2009).

Year	Vegetation Type	Woodland Succession
2007	Pinyon-Juniper	Phase II transitioning to Phase III
2010	Mountain Big Sagebrush	Phase I
2013	Mountain Big Sagebrush	Phase I
2017	Mountain Big Sagebrush	Phase I

Site Notes

In 2010, the study transect belt five was moved to line one and line five was eliminated because it fell outside of the treatment area. Even with moving line five, the transect is located along the edge of the treatment so parts of the transect were not treated. In 2017, it was noted that trees just west of the transect appeared to have been lopped and scattered.

Soils**Table 10R-41.5 - 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	7.3	28.2	40.4	31.5	3.8	9.2	51.2	0.6	07/18/2007

Site Potential

1981 - 2010 Average Annual Precipitation	16 inches
NRCS Ecological Site	Mountain Loam (Mountain Big Sagebrush)
NRCS Ecological Site #	R048AY405UT
States and Transitions	No state and transition model is available for the above ecological site.

When established in 2007, the site was a mixed stand of pinyon pine (*Pinus edulis*) and Utah juniper (*Juniperus osteosperma*) with a shrub component of mountain big sagebrush (*Artemisia tridentata* ssp. *vaseyana*) (Table 10R- 41.12). The herbaceous understory was sparse but mainly consisted of native perennial grass and forb species (Table 10R-41.10, Table 10R-41.11). After the bullhog treatment, mountain big sagebrush became the dominant species with increased cover and recruitment of young plants to the population (Table 10R-41.10, Table 10R-41.13). Following the treatment, the herbaceous understory increased in both forb and grass cover (Table 10R-41.10, Table 10R-41.11). The treatment decreased the cover of conifer trees on the site. This site is at high risk to be infilled in the future, considering the significant presence of remaining trees (Table 10R-41.14).

Trend Summary Tables**Table 10R-41.6 - 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	3.2	0.9	6.6	3.2	1.0	30.3
2010	1.9	0.7	2.9	2.3	0.4	3.6
2013	4.0	1.9	2.7	4.2	2.0	4.1
2017	4.6	4.2	6.0	4.5	4.2	6.6

Table 10R-41.7 - 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	-	195	4	190	-	2.4	0.0	2.6
2010	-	205	13	195	-	2.8	0.2	5.0
2013	-	277	1	226	-	7.3	0.0	7.5
2017	-	331	2	254	-	10.0	0.1	10.9

Table 10R-41.8 - 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
2007	40.1	4.1	44.9	2.3	5.0	16.6
2010	25.5	1.1	59.7	0.0	1.3	15.1
2013	31.8	0.3	49.6	0.4	1.0	22.6
2017	32.4	0.2	55.1	0.4	1.6	30.9

Table 10R-41.9 - 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	Rocky Mountain Elk	Horse	Rabbit
	Quadrat Frequency				
2007	-	1	10	3	51
2010	-	-	-	1	3
2013	-	14	4	4	5
2017	5	7	1	7	4
Year	Days Use Per Acre (ha)				
2007	2.9 (7.2)	2.7 (6.6)	6.0 (14.9)	5.2 (12.9)	-
2010	0.7 (1.8)	-	-	5.2 (12.9)	-
2013	3.6 (9.0)	6.7 (16.6)	4.0 (9.9)	1.2 (2.9)	-
2017	16.7 (41.2)	8.7 (21.5)	2.0 (5.0)	7.5 (18.6)	-

Table 10R-41.10 - 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)	Carex (sedge)	Elymus elymoides (squirreltail)	Elymus lanceolatus (thickspike wheatgrass)	Hesperostipa comata (needle and thread)	Koeleria macrantha (prairie Junegrass)	Poa fendleriana (muttongrass)	Poa secunda (Sandberg bluegrass)	Pseudoroegneria spicata (bluebunch wheatgrass)
year	Nested Frequency										
2007	34	-	6	25	12	5	51	51	-	46	26
2010	-	-	14	31	13	17	95	40	13	42	19
2013	17	3	49	75	35	104	93	29	18	3	9
2017	9	-	34	48	19	253	63	16	14	13	15
year	Average Cover (%)										
2007	0.4	-	0.1	0.1	0.0	0.0	0.5	0.3	-	0.4	0.5
2010	-	-	0.1	0.3	0.2	0.1	1.0	0.4	0.1	0.3	0.2
2013	0.5	0.0	1.1	0.5	0.3	1.1	2.7	0.5	0.3	0.0	0.2
2017	0.4	-	1.2	0.3	0.4	4.9	1.6	0.5	0.2	0.1	0.4

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

Table 10R-41.11 - Forb Species. Nested frequency and modified Daubenmire average cover by year.

FORB SPECIES	Antennaria microphylla (littleleaf pussytoes)	Arabis (rockcress)	Arenaria (sandwort)	Astragalus (milkvetch)	Astragalus convallarius (lesser rushy milkvetch)	Astragalus spatulatus (tufted milkvetch)	Castilleja linariifolia (Wyoming Indian paintbrush)	Cirsium (thistle)	Cryptantha (cryptantha)	Erigeron (fleabane)	Erigeron pumilus (shaggy fleabane)	Eriogonum alatum (winged buckwheat)	Hymenopappus filifolius (fineleaf hymenopappus)	Lactuca serriola ^{ai} (prickly lettuce)	Lappula occidentalis ^a (flatspine stickseed)	Lesquerella (bladderpod)	Machaeranthera canescens (hoary tansyaster)
year	Nested Frequency																
2007	-	9	24	4	2	12	-	-	-	22	-	1	-	-	-	68	-
2010	7	6	22	-	1	30	4	-	5	3	9	4	-	3	2	81	-
2013	81	21	23	-	1	-	-	4	22	-	30	21	-	-	1	20	1
2017	36	14	-	-	-	81	10	3	19	-	9	14	1	-	-	32	11
year	Average Cover (%)																
2007	-	0.1	0.1	0.0	0.0	0.0	-	-	-	0.2	-	0.0	-	-	-	0.3	-
2010	0.0	0.0	0.0	-	0.0	0.9	0.0	-	0.0	0.1	0.1	0.0	-	0.0	0.1	1.2	-
2013	2.4	0.1	0.4	-	0.0	-	-	0.0	0.1	-	0.3	0.1	-	-	0.0	0.1	0.0
2017	0.9	0.1	-	-	-	3.2	0.0	0.0	0.1	-	0.0	0.1	0.0	-	-	0.1	0.1

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

FORB SPECIES											
Machaeranthera grindelioides (rayless tansyaster)											
Packera multilobata (lobeleaf groundsel)											
Penstemon (beardtongue)											
Penstemon caespitosus (mat penstemon)											
Phlox griseola (grayleaf phlox)											
Phlox longifolia (longleaf phlox)											
Stenotus acaulis (stemless mock goldenweed)											
Streptanthus cordatus (heartleaf twistflower)											
Taraxacum officinale (common dandelion)											
Tetraneuris acaulis (stemless four-nerve daisy)											
Tragopogon dubius ^{ai} (yellow salsify)											
year	Nested Frequency										
2007	15	-	5	31	74	-	-	-	-	46	4
2010	22	3	-	46	61	1	-	-	-	37	8
2013	30	23	1	65	57	9	-	-	-	60	-
2017	50	7	-	86	81	-	9	2	4	29	2
year	Average Cover (%)										
2007	0.1	-	0.0	0.5	0.6	-	-	-	-	0.6	0.0
2010	0.4	0.0	-	0.6	1.0	0.0	-	-	-	0.5	0.0
2013	0.7	0.1	0.0	1.0	0.8	0.1	-	-	-	1.2	-
2017	0.6	0.0	-	2.8	1.9	-	0.4	0.0	0.0	0.4	0.1

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

Table 10R-41.12 - 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 depressus ^p (longflower rabbitbrush)								
Gutierrezia sarothrae (broom snakeweed)								
Juniperus osteosperma ^t (Utah juniper)								
Krascheninnikovia lanata ^p (winterfat)								
Opuntia fragilis (brittle pricklypear)								
Pinus edulis ^t (twoneedle pinyon)								
Purshia tridentata ^p (antelope bitterbrush)								
year	Line Intercept Cover (%)							
2007	3.1	0.1	1	11.9	-	0	18.4	-
2010	2.2	0.1	0.4	2.7	-	-	0.9	-
2013	3.7	0.5	2	2.9	-	-	1.2	-
2017	3.9	0.6	4.2	3.3	-	-	3.3	-
year	Quadrat Cover (%)							
2007	3.2	0.0	0.9	1.8	-	0.0	4.8	-
2010	1.6	0.3	0.7	1.2	-	0.0	1.7	0.0
2013	3.6	0.3	1.9	1.1	-	0.0	1.6	0.0
2017	4.4	0.2	4.2	2.0	0.0	-	3.9	-

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

Table 10R-41.13 - 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.

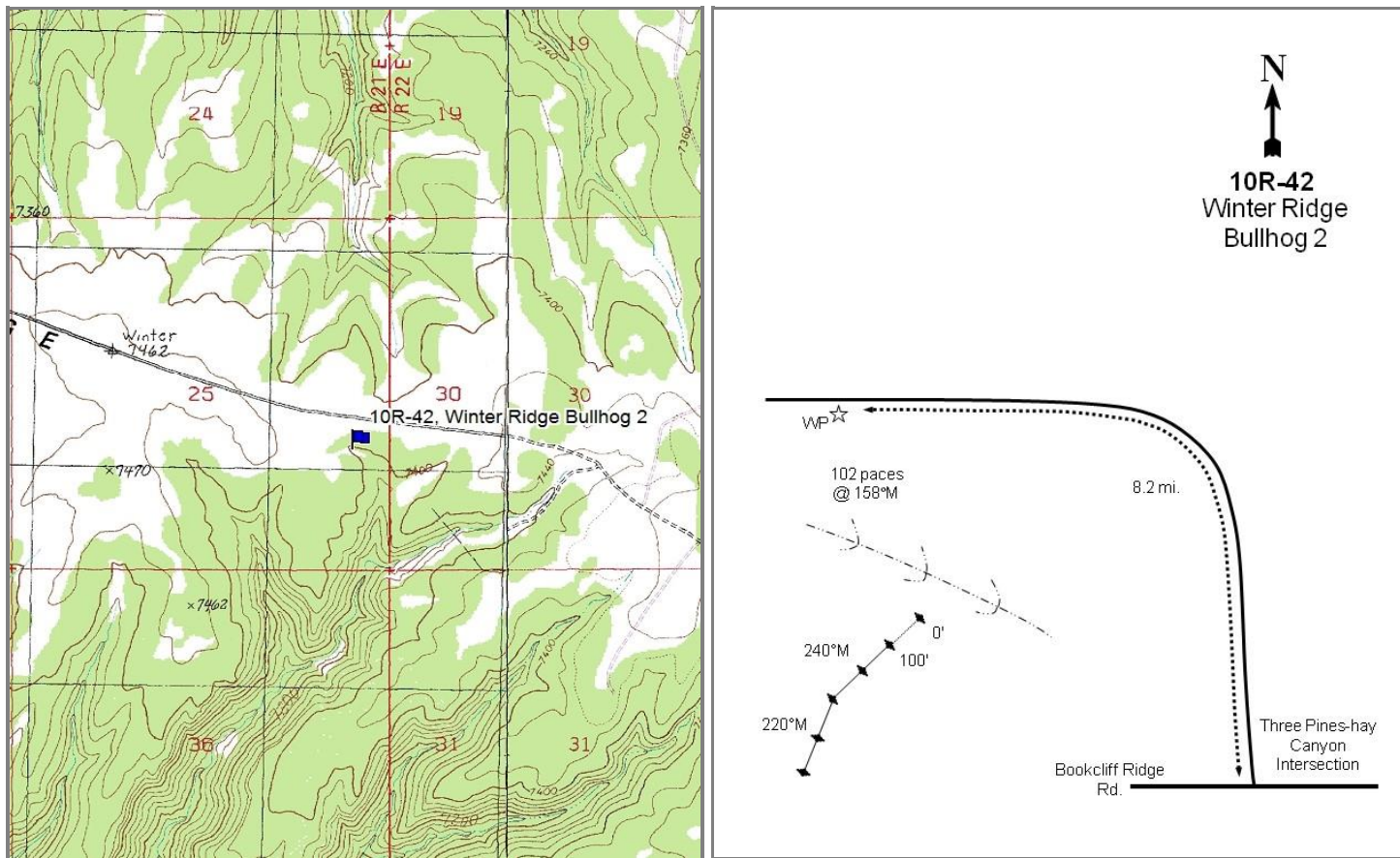
Year	Density		Age Class Distribution			Utilization		Poor Vigor (%)	Average Height Crown (cm)
	Plants Per Acre		Excluding Seedlings			Moderate (%)	Heavy (%)		
	Excluding Seedlings	Seedling	Young (%)	Mature (%)	Decadent (%)				
Artemisia tridentata ssp. vaseyana^P -- (mountain big sagebrush)									
2007	1560	20	5	30	65	19	5	46	48/58
2010	1080	20	7	59	33	19	2	20	46/50
2013	1180	300	12	73	15	17	3	12	52/68
2017	1520	300	32	55	13	12	9	4	64/77
Chrysothamnus depressus^P -- (longflower rabbitbrush)									
2007	500	-	0	72	28	4	12	12	10/14
2010	760	-	8	87	5	26	0	0	13/19
2013	620	-	7	94	0	3	0	0	14/30
2017	1120	-	7	93	0	46	38	0	11/22
Gutierrezia sarothrae -- (broom snakeweed)									
2007	3600	360	5	94	1	0	0	1	20/15
2010	2260	140	48	52	0	0	0	0	15/15
2013	3820	160	7	90	3	1	0	9	20/25
2017	11620	420	11	89	0	0	0	0	15/18
Juniperus osteosperma^t -- (Utah juniper)									
2007	120	-	50	50	0	0	0	0	- / -
2010	20	60	100	0	0	0	0	0	- / -
2013	100	20	100	0	0	0	0	0	- / -
2017	180	-	44	56	0	0	0	0	- / -
Krascheninnikovia lanata^P -- (winterfat)									
2007	-	-	-	-	-	-	-	-	- / -
2010	20	-	0	100	0	0	0	0	23/16
2013	-	-	-	-	-	-	-	-	24/20
2017	20	-	0	100	0	100	0	0	23/17
Opuntia fragilis -- (brittle pricklypear)									
2007	60	20	0	100	0	0	0	0	6/16
2010	40	-	0	100	0	0	0	50	7/23
2013	100	20	0	100	0	0	0	40	6/17
2017	20	-	0	100	0	0	0	0	6/10
Pinus edulis^t -- (twoneedle pinyon)									
2007	660	240	67	33	0	3	0	0	- / -
2010	280	220	100	0	0	0	0	0	- / -
2013	440	120	100	0	0	0	5	5	- / -
2017	500	140	76	24	0	0	0	0	- / -
Purshia tridentata^P -- (antelope bitterbrush)									
2007	-	-	-	-	-	-	-	-	- / -
2010	-	-	-	-	-	-	-	-	- / -
2013	20	-	100	0	0	0	0	100	21/33
2017	-	-	-	-	-	-	-	-	26/63

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

Table 10R-41.14 - 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)							
2007	103	5	40	20	20	15	14.1
2010	56	-	71	6	-	24	12.1
2013	66	5	68	-	5	21	15.7
2017	54	13	50	19	-	19	8.6
Pinus edulis (twoneedle pinyon)							
2007	836	45	20	20	15	-	6.2
2010	155	10	70	10	5	5	3.4
2013	218	10	60	20	5	5	5.9
2017	135	-	60	30	5	5	5.7
Pseudotsuga menziesii (Douglas-fir)							
2017	1	-	100	-	-	-	1.2

WINTER RIDGE BULLHOG 2 - STUDY NO. 10R-42



Location Information

USGS 7.5 min Map Info	Tenmile Canyon North; Township 15S, Range 21E, Section 25
GPS (0' Stake)	NAD 83 UTM ZONE 12, 628293 East 4371299 North

Transect Information

Browse Tag # (0' Stake)	140
Transect Bearing	240° magnetic (Lines 4-5: 220° magnetic)
Length	500ft
Belt Placement	Line 1 (59ft), Line 2 (71ft), Line 3 (95ft), Line 4 (34ft), Line 5 (11ft)
Belt Marker Placement	Standard

Directions to Site

From the intersection of the Seep Ridge and Book Cliff Divide Roads, proceed west along the divide for 9.4 miles to the major Three Pines-Hay Canyon intersection. Drive west along Winter Ridge Road for 8.2 miles to a witness post on the left (south) side of the road. From the witness post, the 0-foot stake is 100 paces away at 170 degrees magnetic, near the bottom of a small gully. The 0-foot stake is marked with browse tag #140.

Site Information

Land Ownership	State
Land Administrator	SITLA
Allotment	WINTER RIDGE AMP
Elevation	7,400ft (2,256m)
Aspect	Southeast
Slope	7%
Sample Dates	07/18/2007, 06/23/2010, 08/28/2013, 08/15/2017

Table 10R-42.1 Disturbance History. Recorded history of major disturbances.

Treatment/Disturbance	Name	WRI DB#	Date	Size (acres)
Mechanical - Bullhog	Winter Ridge Bullhog	685	January-February 2009	474

Wildlife Habitat and Vegetation History**Table 10R-42.3 - Wildlife Seasonal Habitat.** UDWR wildlife habitat and seasonality.

Species	Habitat	Season
Bison	crucial	year-long
Deer	substantial	winter
Elk	crucial	winter

Table 10R-42.4 - Vegetation History. The dominant vegetation type(s) and phase of woodland succession (Tausch, Miller, Roundy, & Chambers, 2009).

Year	Vegetation Type	Woodland Succession
2007	Pinyon-Juniper	Phase II transitioning to Phase III
2010	Perennial Grass/Mountain Big Sagebrush	Phase I
2013	Perennial Grass/Mountain Big Sagebrush	Phase I
2017	Perennial Grass/Mountain Big Sagebrush	Phase I

Site Notes

In 2010, the study transect lines one and two were moved and placed at the end of line five because line one and line two fell outside of the treatment area.

Soils**Table 10R-42.5 - 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	30.2	42.4	27.5	1.9	10.9	83.2	0.5	07/18/2007

Site Potential

1981 - 2010 Average Annual Precipitation	16 inches
NRCS Ecological Site	Mountain Loam (Mountain Big Sagebrush)
NRCS Ecological Site #	R048AY405UT
States and Transitions	No state and transition model is available for this ecological site.

When established in 2007, the site was a mountain big sagebrush (*Artemisia tridentata* ssp. *vaseyana*) stand encroached by pinyon pine (*Pinus edulis*), Utah juniper (*Juniperus osteosperma*), and Rocky Mountain juniper (*J. scopulorum*). In addition, there was a mixture of mountain shrub species that added to the total browse cover (Table 10R-42.12). The herbaceous understory was diverse and consisted primarily of native perennial grasses and forbs (Table 10R-42.10, Table 10R-42.11). Following the bullhog treatment, mountain big sagebrush increased in cover (Table 10R-42.12) and density with increased recruitment of young sagebrush plants to the population (Table 10R-42.13). The herbaceous understory increased in both forb and grass cover (Table 10R-42.10, Table 10R-42.11). This site is at high risk for infilling by conifers considering the presence of trees remaining on the site (Table 10R-42.14).

Trend Summary Tables

Table 10R-42.6 - 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	5.8	1.6	8.3	8.4	1.7	27.7
2010	3.1	1.9	1.8	4.3	2.3	2.2
2013	6.2	4.1	1.1	8.3	5.6	1.4
2017	6.9	3.6	2.3	6.9	2.5	2.1

Table 10R-42.7 - 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	-	322	92	256	-	9.8	1.2	5.5
2010	-	299	21	228	-	10.2	0.1	6.0
2013	-	351	27	237	-	12.9	0.6	6.6
2017	-	401	25	251	-	21.9	0.1	11.2

Table 10R-42.8 - 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
2007	33.1	6.4	37.4	2.6	0.9	32.9
2010	19.5	1.3	55.2	2.2	1.8	28.7
2013	28.8	0.0	41.9	1.2	3.0	29.1
2017	29.5	0.9	46.7	4.4	0.8	41.5

Table 10R-42.9 - 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/Bison	Mule Deer	Rocky Mountain Elk	Horse	Rabbit
	Quadrat Frequency				
2007	-	4	3	-	32
2010	3	3	2	1	7
2013	5	11	32	1	2
2017	7	9	6	1	2
Year	Days Use Per Acre (ha)				
2007	2.9 (7.2)	6.7 (16.6)	6.7 (16.6)	5.8 (14.3)	-
2010	2.9 (7.2)	17.4 (43.0)	-	4.7 (11.5)	-
2013	8.7 (21.5)	10.0 (24.8)	31.5 (77.8)	1.7 (4.3)	-
2017	20.3 (50.2)	8.1 (19.9)	14.1 (34.8)	7.5 (18.6)	-

Table 10R-42.10 - Grass Species. Nested frequency and modified Daubenmire average cover by year.

GRASS SPECIES	Achnatherum hymenoides (Indian ricegrass)	Bouteloua gracilis (blue grama)	Carex (sedge)	Elymus lanceolatus (thickspike wheatgrass)	Hesperostipa comata (needle and thread)	Koeleria macrantha (prairie Junegrass)	Poa fendleriana (muttongrass)	Poa secunda (Sandberg bluegrass)	Psathyrostachys juncea ⁱ (Russian wildrye)	Pseudoroegneria spicata (bluebunch wheatgrass)
year	Nested Frequency									
2007	11	92	38	46	76	120	50	133	3	30
2010	7	152	4	84	76	72	35	88	12	3
2013	13	216	10	164	84	45	2	79	-	6
2017	-	211	37	319	31	15	14	48	-	1
year	Average Cover (%)									
2007	0.4	3.2	0.2	0.4	1.1	2.6	0.6	1.0	0.0	0.3
2010	0.1	5.6	0.0	0.9	1.2	1.1	0.5	0.8	0.1	0.0
2013	0.2	7.8	0.1	1.9	2.1	0.3	0.0	0.4	-	0.1
2017	-	15.1	0.4	4.9	0.7	0.4	0.1	0.3	-	0.0

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

Table 10R-42.11 - Forb Species. Nested frequency and modified Daubenmire average cover by year.

FORB SPECIES	Agoseris glauca (pale agoseris)	Androsace septentrionalis ^a (pygmyflower rockjasmine)	Antennaria microphylla (littleleaf pussytoes)	Antennaria parvifolia (small-leaf pussytoes)	Arabis (rockcress)	Arenaria (sandwort)	Astragalus (milkvetch)	Astragalus convallarius (lesser rushy milkvetch)	Astragalus spatulatus (tufted milkvetch)	Calochortus nuttallii (sego lily)	Castilleja flava (yellow Indian paintbrush)	Crepis acuminata (tapertip hawkbeard)	Cryptantha (cryptantha)	Cymopterus (springparsley)	Draba ^a (draba)	Erigeron (fleabane)	Erigeron pumilus (shaggy fleabane)
year	Nested Frequency																
2007	-	-	-	146	4	-	-	8	5	-	-	8	5	-	0	51	5
2010	2	3	-	107	0	4	-	8	14	31	40	6	12	16	10	14	13
2013	-	4	-	102	23	18	8	1	1	-	-	2	11	-	-	5	27
2017	-	13	70	80	14	4	9	-	8	-	-	2	16	7	8	2	13
year	Average Cover (%)																
2007	-	-	-	2.8	0.0	-	-	0.0	0.0	-	-	0.0	0.0	-	0.0	0.3	0.0
2010	0.0	0.0	-	2.1	0.0	0.0	-	0.1	0.2	0.1	0.2	0.1	0.1	0.0	0.0	0.1	0.1
2013	-	0.4	-	2.8	0.1	0.3	0.0	0.0	0.0	-	-	0.0	0.1	-	-	0.1	0.2
2017	-	0.0	3.1	3.0	0.1	0.0	0.1	-	0.2	-	-	0.0	0.0	0.0	0.0	0.0	0.2

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

FORB SPECIES	Eriogonum alatum (winged buckwheat)	Euphorbia brachycera (horned spurge)	Gayophytum ramosissimum ^a (pinyon groundsmoke)	Hymenopappus filifolius (fineleaf hymenopappus)	Hymenoxys richardsonii (pingue rubberweed)	Ipomopsis aggregata (scarlet gilia)	Lesquerella (bladderpod)	Lupinus argenteus (silvery lupine)	Machaeranthera grindelioides (rayless tansyaster)	Orthocarpus ^a (owl's-clover)	Packera multilobata (lobeleaf groundsel)	Penstemon (beardtongue)	Penstemon caespitosus (mat penstemon)	Phlox griseola (grayleaf phlox)	Phlox longifolia (longleaf phlox)	Polygonum douglasii ^a (Douglas' knotweed)	Sphaeralcea grossularifolia (gooseberry/leaf globemallow)
year	Nested Frequency																
2007	12	1	-	-	-	0	28	4	16	91	0	2	54	44	38	-	11
2010	2	2	4	-	2	-	34	-	3	7	1	4	60	12	53	-	6
2013	9	-	-	-	5	-	8	-	7	17	-	13	87	14	48	6	8
2017	8	-	-	14	3	-	2	-	12	-	-	7	87	16	6	4	6
year	Average Cover (%)																
2007	0.1	0.0	-	-	-	0.0	0.2	0.0	0.1	1.2	0.0	0.1	0.5	0.9	0.2	-	0.1
2010	0.1	0.0	0.0	-	0.0	-	0.6	-	0.1	0.0	0.0	0.1	1.2	0.1	0.2	-	0.2
2013	0.1	-	-	-	0.2	-	0.0	-	0.0	0.2	-	0.2	1.7	0.5	0.2	0.0	0.0
2017	0.0	-	-	0.4	0.0	-	0.0	-	0.1	-	-	0.1	2.9	0.4	0.1	0.0	0.0

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

FORB SPECIES	Stenotus acaulis (stemless mock goldenweed)	Taraxacum officinale (common dandelion)	Tetraneuris acaulis (stemless four-nerve daisy)	unknown annual forb ^a (unknown forb)
year	Nested Frequency			
2007	-	-	13	1
2010	-	-	11	-
2013	-	-	10	-
2017	3	6	31	-
year	Average Cover (%)			
2007	-	-	0.1	0.0
2010	-	-	0.2	-
2013	-	-	0.1	-
2017	0.0	0.0	0.4	-

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

Table 10R-42.12 - Shrub and Tree Species. Average modified Daubenmire quadrat and line intercept cover by year.

SHRUB SPECIES	Line Intercept Cover (%)													
	year	Line Intercept Cover (%)												
Abies ^t (fir)	0	4	0.3	3	-	1.7	7.8	4.4	-	14.5	1	1.1	-	
Artemisia tridentata ssp. vaseyana ^p (mountain big sagebrush)	-	2.2	-	1.8	0.1	2.2	1.1	-	-	1.1	-	0.3	-	
Cercocarpus montanus ^p (alderleaf mountain mahogany)	-	4.6	-	3.3	0.5	5.1	1.2	-	-	0.2	-	0.4	-	
Chrysothamnus depressus ^p (longflower rabbitbrush)	-	6.1	-	0.2	0	2.5	1	-	-	1.1	-	0.6	-	
Chrysothamnus viscidiflorus ssp. viscidiflorus var. viscidiflorus (yellow rabbitbrush)	0.4	2.6	0.0	2.4	0.0	1.6	2.0	1.4	-	3.6	0.9	0.9	-	
Gutierrezia sarothrae (broom snakeweed)	-	1.0	-	2.1	0.0	1.8	0.4	-	-	1.4	-	0.0	-	
Juniperus osteosperma ^t (Utah juniper)	-	3.3	-	2.9	0.1	4.0	0.5	-	0.0	0.5	-	0.0	0.0	
Juniperus scopulorum ^t (Rocky Mountain juniper)	-	6.1	-	0.7	0.5	3.0	0.8	-	-	1.5	-	0.1	-	
Pediocactus simpsonii (mountain ball cactus)	-	-	-	-	-	-	-	-	-	-	-	-	-	
Pinus edulis ^t (twoneedle pinyon)	-	-	-	-	-	-	-	-	-	-	-	-	-	
Pinus ponderosa ^t (ponderosa pine)	-	-	-	-	-	-	-	-	-	-	-	-	-	
Purshia tridentata ^p (antelope bitterbrush)	-	-	-	-	-	-	-	-	-	-	-	-	-	
Tetradymia canescens (spineless horsebrush)	-	-	-	-	-	-	-	-	-	-	-	-	-	

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

Table 10R-42.13 - 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^t -- (fir)									
2007	20	40	100	0	0	0	0	0	- / -
2010	-	-	-	-	-	-	-	-	- / -
2013	-	-	-	-	-	-	-	-	- / -
2017	-	-	-	-	-	-	-	-	- / -
Artemisia tridentata ssp. vaseyana^p -- (mountain big sagebrush)									
2007	1800	20	3	27	70	36	6	39	64/67
2010	1520	200	29	32	40	28	13	17	48/46
2013	2300	960	32	51	17	18	5	7	60/76
2017	3180	1660	48	41	11	14	8	5	61/74
Cercocarpus montanus^p -- (alderleaf mountain mahogany)									
2007	60	-	67	33	0	33	33	0	71/58
2010	-	-	-	-	-	-	-	-	- / -
2013	-	-	-	-	-	-	-	-	- / -
2017	-	-	-	-	-	-	-	-	- / -
Chrysothamnus depressus^p -- (longflower rabbitbrush)									
2007	9300	20	6	92	3	7	13	0	12/20
2010	4640	-	10	88	2	12	40	1	12/22
2013	3420	60	1	98	1	26	26	9	14/30
2017	800	40	5	85	10	0	57	3	11/25
Chrysothamnus viscidiflorus ssp. viscidiflorus var. viscidiflorus -- (yellow rabbitbrush)									
2007	100	-	0	100	0	0	0	0	21/18
2010	200	40	10	90	0	0	0	10	21/23
2013	200	-	0	90	10	0	0	20	33/43
2017	1100	-	9	91	0	0	4	0	19/29
Gutierrezia sarothrae -- (broom snakeweed)									
2007	5020	280	3	94	2	0	0	2	18/17
2010	5160	320	50	50	0	0	0	1	17/17
2013	6980	260	11	89	1	1	0	1	19/25
2017	9020	-	14	86	0	0	0	0	15/19

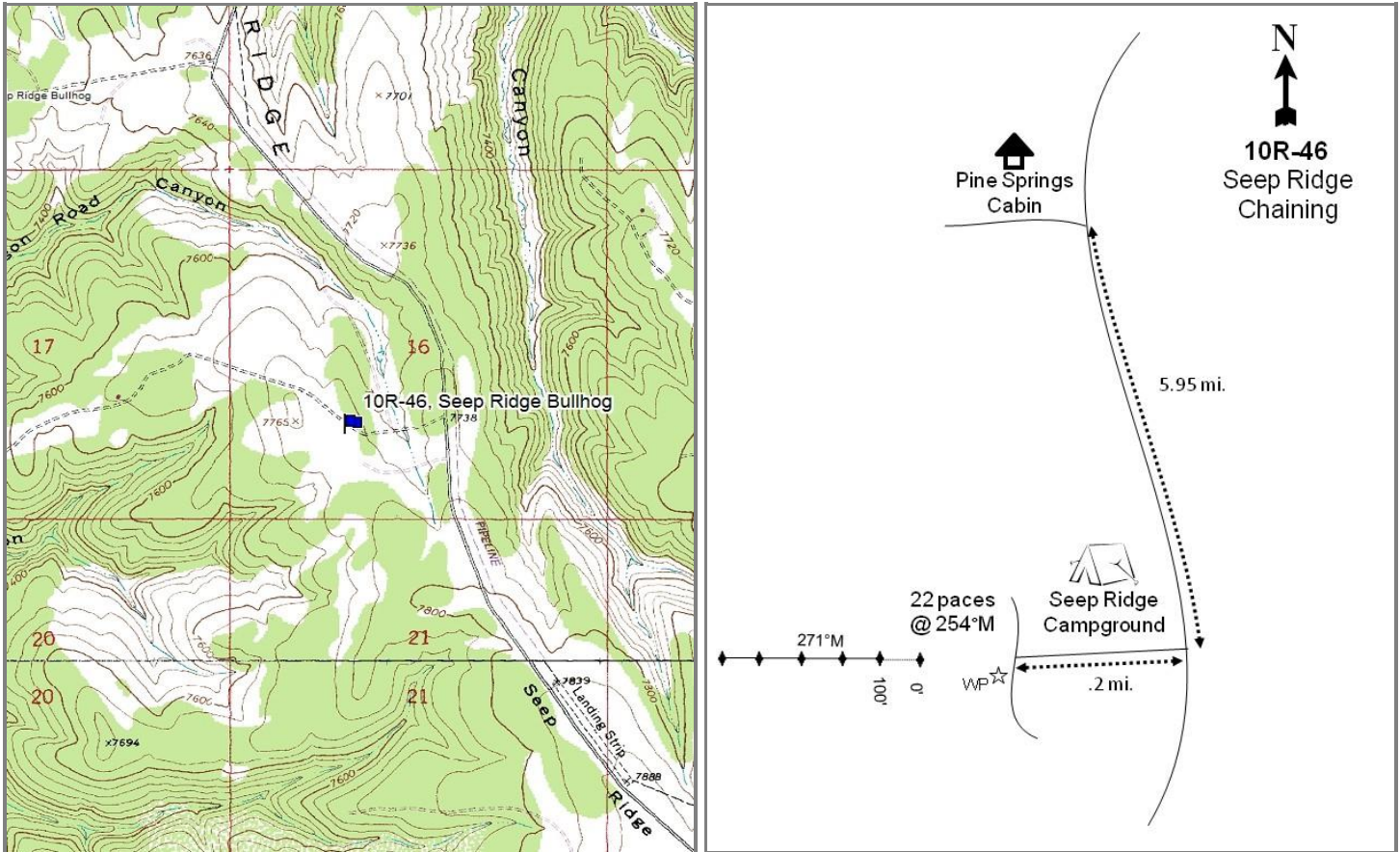
Year	Density		Age Class Distribution			Utilization		Poor Vigor (%)	Average Height Crown (cm)
	Plants Per Acre		Excluding Seedlings			Moderate (%)	Heavy (%)		
	Excluding Seedlings	Seedling	Young (%)	Mature (%)	Decadent (%)				
Juniperus osteosperma^t -- (Utah juniper)									
2007	140	40	43	43	14	0	0	0	- / -
2010	60	-	67	0	33	0	0	33	- / -
2013	120	20	100	0	0	0	0	0	- / -
2017	60	-	33	67	0	0	0	0	- / -
Juniperus scopulorum^t -- (Rocky Mountain juniper)									
2007	100	-	60	40	0	0	0	0	- / -
2010	-	-	-	-	-	-	-	-	- / -
2013	-	-	-	-	-	-	-	-	- / -
2017	-	-	-	-	-	-	-	-	- / -
Pediocactus simpsonii -- (mountain ball cactus)									
2007	-	-	-	-	-	-	-	-	- / -
2010	-	-	-	-	-	-	-	-	- / -
2013	20	20	100	0	0	0	0	0	- / -
2017	-	-	-	-	-	-	-	-	- / -
Pinus edulis^t -- (twoneedle pinyon)									
2007	340	580	53	41	6	0	0	0	- / -
2010	120	180	83	17	0	0	0	17	- / -
2013	140	60	100	0	0	0	29	14	- / -
2017	180	20	78	22	0	0	0	0	- / -
Pinus ponderosa^t -- (ponderosa pine)									
2007	80	-	75	25	0	0	0	50	- / -
2010	-	-	-	-	-	-	-	-	- / -
2013	-	-	-	-	-	-	-	-	- / -
2017	-	-	-	-	-	-	-	-	- / -
Purshia tridentata^p -- (antelope bitterbrush)									
2007	280	-	7	79	14	14	14	7	51/86
2010	20	20	0	100	0	0	0	0	29/56
2013	40	-	0	100	0	0	100	0	36/113
2017	60	-	33	67	0	0	67	0	37/129
Tetradymia canescens -- (spineless horsebrush)									
2007	-	-	-	-	-	-	-	-	18/18
2010	40	-	100	0	0	50	0	0	16/22
2013	20	-	0	100	0	0	0	0	13/24

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

Table 10R-42.14 - 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)							
2007	68	-	11	42	26	21	21.8
2010	22	33	50	17	-	-	2.5
2013	18	36	64	-	-	-	2.5
2017	26	29	64	7	-	-	4.0
Juniperus scopulorum (Rocky Mountain juniper)							
2017	1	-	100	-	-	-	5.0
Pinus edulis (twoneedle pinyon)							
2007	301	15	35	25	10	15	9.2
2010	131	15	75	10	-	-	2.1
2013	184	50	45	5	-	-	2.5
2017	166	25	75	-	-	-	3.8

SEEP RIDGE CHAINING - STUDY NO. 10R-46

**Location Information**

USGS 7.5 min Map Info
GPS (0' Stake)

Seep Canyon SW; Township 15S, Range 23E, Section 16
NAD 83 UTM ZONE 12, 641736 East 4374599 North

Transect Information

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

Directions to Site

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

Site Information

Land Ownership	State
Land Administrator	SITLA
Allotment	SWEET WATER
Elevation	7,711ft (2,350m)
Aspect	Northeast
Slope	2-4%
Sample Dates	07/10/2008, 08/20/2014, 08/15/2017

Table 10R-46.1 Disturbance History. Recorded history of major disturbances.

Treatment/Disturbance	Name	WRI DB#	Date	Size (acres)
Hand Crew - Lop (No Scatter)	Seep Ridge Chaining Maintenance	3567	September-November 2016	332
Chaining - Two-Way Ely/Smooth	Seep Ridge Chaining	1951	September-October 2011	322
Seeding - Aerial Before	Seep Ridge Chaining	1951	September-October 2011	322
Seeding - Dribbler	Seep Ridge Chaining	1951	September-October 2011	322
Seeding - Aerial After	Seep Ridge Chaining	1951	December 2011	322

Wildlife Habitat and Vegetation History**Table 10R-46.3 - Wildlife Seasonal Habitat.** UDWR wildlife habitat and seasonality.

Species	Habitat	Season
Bison	crucial	year-long
Deer	substantial	summer
Elk	crucial	summer

Table 10R-46.4 - Vegetation History. The dominant vegetation type(s) and phase of woodland succession (Tausch, Miller, Roundy, & Chambers, 2009).

Year	Vegetation Type	Woodland Succession
2008	Pinyon-Juniper	Phase III
2014	Mountain Big Sagebrush	Phase I
2017	Mountain Big Sagebrush	Phase I

Site Notes

No Notes

Site Potential

1981 - 2010 Average Annual Precipitation	18 inches
NRCS Ecological Site	Mountain Loam (Mountain Big Sagebrush)
NRCS Ecological Site #	R048AY405UT
States and Transitions	No state and transition model is available for this ecological site.

When established in 2008, this site was in Phase III of pinyon-juniper encroachment (Table 10R-46.4). Although twoneedle pinyon (*Pinus edulis*) and Utah juniper (*Juniperus osteosperma*) were the dominant species, mountain big sagebrush (*Artemisia tridentata* ssp. *vaseyana*) still had a significant presence on the site (Table 10R-46.12). Both grasses and forbs were diverse, but individual species had low cover (Table 10R-46.10, 10R-46.11). After treatment, tree cover was reduced (though not eliminated) allowing mountain big sagebrush to become the dominant species (Table 10R-46.12). Forb cover remained similar while grass cover increased. Perennial grasses provide good cover, with squirreltail (*Elymus elymoides*) being the dominant species. Cheatgrass (*Bromus tectorum*) is present on the site, which may be an issue in subsequent study years if cover increases significantly (Table 10R-46.10). There are a number of small trees remaining on the site that will require continued maintenance to reach and keep in line with the project objectives (Table 10R-46.14).

Trend Summary Tables

Table 10R-46.6 - 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	7.7	0.2	20.6	11.6	-	42.9
2014	7.3	0.6	3.3	12.1	0.8	4.7
2017	13.4	0.9	1.9	17.4	1.4	1.8

Table 10R-46.7 - 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	21	233	46	108	0.0	3.6	0.2	0.9
2014	45	280	50	121	0.5	9.7	0.4	1.5
2017	221	351	56	102	5.1	15.9	0.3	1.6

Table 10R-46.8 - 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
2008	29.7	4.5	60.0	0.1	2.3	31.8
2014	22.5	0.2	59.6	0.0	0.9	26.1
2017	23.4	-	66.4	0.0	1.8	34.5

Table 10R-46.9 - 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	Rocky Mountain Elk	Rabbit
	Quadrat Frequency			
2008	-	7	5	41
2014	5	9	4	12
2017	7	5	1	10
Year	Days Use Per Acre (ha)			
2008	13.8 (34.1)	5.3 (13.2)	16.1 (39.7)	-
2014	4.4 (10.8)	20.8 (51.3)	5.3 (13.2)	-
2017	13.1 (32.3)	13.4 (33.1)	12.1 (29.8)	-

Table 10R-46.10 - Grass Species. Nested frequency and modified Daubenmire average cover by year.

GRASS SPECIES	<i>Bouteloua gracilis</i> (blue grama)	<i>Bromus tectorum</i> ^{ai} (cheatgrass)	<i>Carex</i> (sedge)	<i>Elymus elymoides</i> (squirreltail)	<i>Elymus lanceolatus</i> (thickspike wheatgrass)	<i>Hesperostipa comata</i> (needle and thread)	<i>Koeleria macrantha</i> (prairie Junegrass)	<i>Leymus cinereus</i> (basin wildrye)	<i>Poa fendleriana</i> (muttongrass)	<i>Poa pratensis</i> ⁱ (Kentucky bluegrass)	<i>Poa secunda</i> (Sandberg bluegrass)
year	Nested Frequency										
2008	58	21	38	90	31	17	12	-	47	-	95
2014	92	45	58	129	16	4	5	0	67	-	41
2017	85	221	90	170	119	5	11	-	80	4	21
year	Average Cover (%)										
2008	1.2	0.0	0.1	0.8	0.3	0.1	0.1	-	0.5	-	0.5
2014	3.1	0.5	0.8	3.0	0.3	0.4	0.1	0.0	1.8	-	0.3
2017	2.4	5.1	2.0	5.2	3.3	0.4	0.3	-	1.8	0.1	0.3

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

Table 10R-46.11 - Forb Species. Nested frequency and modified Daubenmire average cover by year.

FORB SPECIES	Agoseris glauca (pale agoseris)	Allium (onion)	Antennaria microphylla (littleleaf pussytoes)	Antennaria parvifolia (small-leaf pussytoes)	Arabis (rockcress)	Astragalus (milkvetch)	Astragalus convallarius (lesser rushy milkvetch)	Calochortus nuttallii (sego lily)	Camelina microcarpa ^{ai} (littlepod false flax)	Castilleja flava (yellow Indian paintbrush)	Ceratocephala testiculata ^{ai} (curveseed butterwort)	Chenopodium fremontii ^a (Fremont's goosefoot)	Comandra umbellata (bastard toadflax)	Cryptantha (cryptantha)	Descurainia pinnata ^a (western tansymustard)	Erigeron (fleabane)	Erigeron eatonii (Eaton's fleabane)
year	Nested Frequency																
2008	17	-	-	28	11	-	3	7	16	2	6	-	2	17	-	21	-
2014	3	4	-	18	36	3	-	-	6	-	-	6	-	3	-	3	2
2017	-	-	25	7	33	2	1	-	-	-	-	4	5	1	6	6	8
year	Average Cover (%)																
2008	0.0	-	-	0.1	0.1	-	0.0	0.0	0.1	0.0	0.0	-	0.0	0.1	-	0.1	-
2014	0.0	0.0	-	0.1	0.4	0.0	-	-	0.0	-	-	0.0	-	0.0	-	0.0	0.0
2017	-	-	0.7	0.2	0.1	0.0	0.0	-	-	-	-	0.0	0.0	0.0	0.0	0.1	0.1

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

FORB SPECIES	Erigeron pumilus (shaggy fleabane)	Eriogonum alatum (winged buckwheat)	Gayophytum ramosissimum ^a (pinyon groundsmoke)	Ipomopsis aggregata (scarlet gilia)	Lepidium ^a (pepperweed)	Lesquerella (bladderpod)	Linum perenne ⁱ (blue flax)	Microsteris gracilis ^a (slender phlox)	Nicotiana attenuata ^a (coyote tobacco)	Oenothera pallida ^a (pale evening primrose)	Onobrychis vicifolia ⁱ (sainfoin)	Packera multilobata (lobeleaf groundsel)	Penstemon caespitosus (mat penstemon)	Penstemon comarthenus (dusty beardtongue)	Phlox longifolia (longleaf phlox)	Polygonum douglasii ^a (Douglas' knotweed)	Silene antirrhina ^a (sleepy silene)
year	Nested Frequency																
2008	-	5	13	10	-	-	-	-	-	1	-	9	0	2	14	1	17
2014	-	-	24	3	1	46	3	-	3	16	-	8	15	4	-	1	-
2017	1	17	8	-	14	3	1	14	-	-	2	2	3	8	12	12	-
year	Average Cover (%)																
2008	-	0.1	0.0	0.1	-	-	-	-	-	0.0	-	0.0	0.0	0.0	0.0	0.0	0.0
2014	-	-	0.2	0.0	0.0	0.2	0.1	-	0.1	0.1	-	0.0	0.2	0.0	-	0.0	-
2017	0.0	0.1	0.0	-	0.1	0.0	0.0	0.0	-	-	0.0	0.0	0.1	0.0	0.0	0.1	-

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

FORB SPECIES		
	Sisymbrium altissimum ^{ai} (tall tumblemustard)	
	Symphotrichum (aster)	
year	Nested Frequency	
2008	-	7
2014	-	15
2017	1	-
year	Average Cover (%)	
2008	-	0.1
2014	-	0.1
2017	0.0	-

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

Table 10R-46.12 - 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 depressus ^p (longflower rabbitbrush)									
Escobaria (foxtail cactus)									
Juniperus osteosperma ^t (Utah juniper)									
Juniperus scopulorum ^t (Rocky Mountain juniper)									
Pinus edulis ^t (twoneedle pinyon)									
Symphoricarpos oreophilus (mountain snowberry)									
Tetradymia canescens (spineless horsebrush)									
year	Line Intercept Cover (%)								
2008	11.5	0.1	-	8.3	-	34.6	-	-	-
2014	12.1	-	-	2.4	0.2	2.1	0.8	-	-
2017	17.2	0.2	-	0.9	0.5	0.4	1.4	-	-
year	Quadrat Cover (%)								
2008	7.7	0.0	0.0	5.0	-	15.6	0.2	-	-
2014	7.2	0.1	-	1.4	1.0	0.9	0.5	0.0	0.0
2017	13.2	0.2	-	0.6	1.0	0.4	0.9	0.0	0.0

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

Table 10R-46.13 - 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.

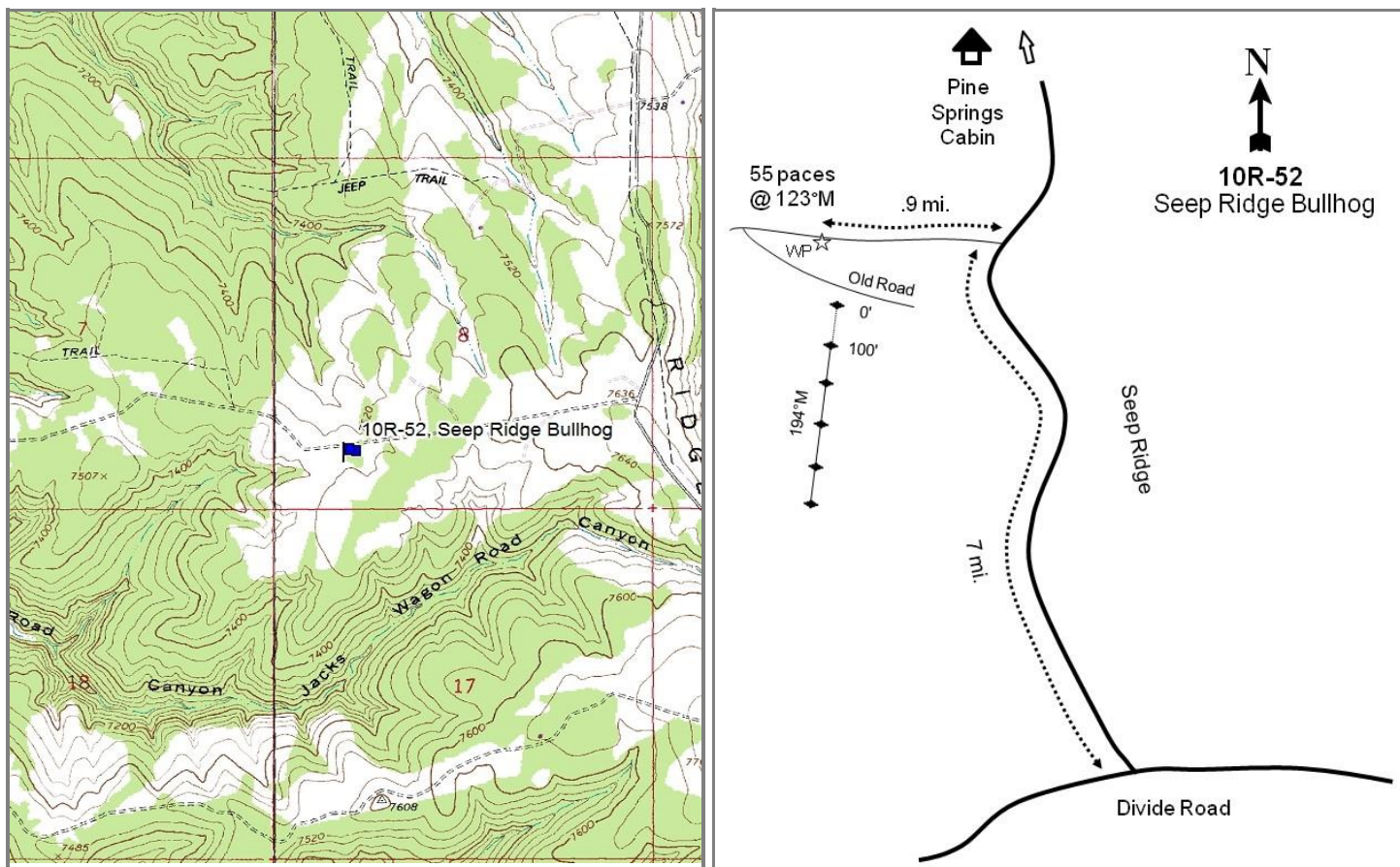
Year	Density		Age Class Distribution			Utilization		Poor Vigor (%)	Average Height Crown (cm)
	Plants Per Acre		Excluding Seedlings			Moderate (%)	Heavy (%)		
	Excluding Seedlings	Seedling	Young (%)	Mature (%)	Decadent (%)				
Amelanchier utahensis^p -- (Utah serviceberry)									
2008	-	-	-	-	-	-	-	-	-/-
2014	-	-	-	-	-	-	-	-	-/-
2017	-	-	-	-	-	-	-	-	57/74
Artemisia tridentata ssp. vaseyana^p -- (mountain big sagebrush)									
2008	3220	200	5	17	78	34	1	40	64/79
2014	3700	300	30	66	4	39	3	7	48/67
2017	4780	3120	39	55	6	5	3	2	62/84
Chrysothamnus depressus^p -- (longflower rabbitbrush)									
2008	540	-	0	85	15	0	15	15	10/20
2014	340	20	71	24	6	59	41	53	13/24
2017	320	-	0	100	0	13	88	0	10/23
Chrysothamnus viscidiflorus ssp. viscidiflorus var. viscidiflorus -- (yellow rabbitbrush)									
2008	-	-	-	-	-	-	-	-	41/27
2014	-	-	-	-	-	-	-	-	43/64
2017	-	-	-	-	-	-	-	-	44/53
Ericameria nauseosa -- (rubber rabbitbrush)									
2008	-	-	-	-	-	-	-	-	-/-
2014	-	-	-	-	-	-	-	-	81/110
2017	-	-	-	-	-	-	-	-	60/87
Escobaria -- (foxtail cactus)									
2008	20	-	0	100	0	0	0	0	-/-
2014	-	-	-	-	-	-	-	-	-/-
2017	-	-	-	-	-	-	-	-	-/-
Juniperus osteosperma^t -- (Utah juniper)									
2008	100	40	20	80	0	0	0	0	-/-
2014	140	20	86	14	0	0	0	14	-/-
2017	100	-	60	20	20	0	0	20	-/-
Juniperus scopulorum^t -- (Rocky Mountain juniper)									
2008	-	-	-	-	-	-	-	-	-/-
2014	20	-	0	100	0	0	0	100	-/-
2017	60	-	67	33	0	0	0	33	-/-
Opuntia -- (pricklypear)									
2008	-	-	-	-	-	-	-	-	7/25
2014	-	-	-	-	-	-	-	-	-/-
2017	-	-	-	-	-	-	-	-	6/37
Pediocactus simpsonii -- (mountain ball cactus)									
2008	-	-	-	-	-	-	-	-	2/3
2014	-	-	-	-	-	-	-	-	-/-
2017	-	-	-	-	-	-	-	-	2/8
Pinus edulis^t -- (twoneedle pinyon)									
2008	500	60	56	44	0	8	0	0	-/-
2014	220	-	100	0	0	0	0	0	-/-
2017	140	-	86	14	0	0	0	0	-/-
Purshia tridentata^p -- (antelope bitterbrush)									
2008	-	-	-	-	-	-	-	-	-/-
2014	-	-	-	-	-	-	-	-	43/64
2017	-	-	-	-	-	-	-	-	45/71
Symphoricarpos oreophilus -- (mountain snowberry)									
2008	60	-	0	100	0	0	0	0	20/29
2014	120	-	0	100	0	17	0	0	45/72
2017	80	-	0	100	0	0	0	0	55/121
Tetradymia canescens -- (spineless horsebrush)									
2008	-	-	-	-	-	-	-	-	-/-
2014	20	-	0	100	0	0	0	0	16/15
2017	20	-	0	100	0	0	0	0	20/18

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

Table 10R-46.14 - 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 & J. scopulorum (Utah and Rocky Mountain juniper)							
2014	94	-	44	56	-	-	9.8
Juniperus osteosperma (Utah juniper)							
2008	122	5	35	10	15	35	9.9
2017	47	12	82	6	-	-	7.3
Juniperus scopulorum (Rocky Mountain juniper)							
2017	43	13	88	-	-	-	7.8
Pinus edulis (twoneedle pinyon)							
2008	223	-	20	35	15	30	10.1
2014	188	-	65	35	-	-	3.6
2017	108	25	75	-	-	-	3.0

SEEP RIDGE BULLHOG - STUDY NO. 10R-52

**Location Information**

USGS 7.5 min Map Info
GPS (0' Stake)

Seep Canyon SW; Township 15S, Range 23E, Section 08
NAD 83 UTM ZONE 12, 639910 East 4375992 North

Transect Information

Browse Tag # (0' Stake)	183
Transect Bearing	188° magnetic
Length	500ft
Belt Placement	Line 1 (11ft), Line 2 (34ft), Line 3 (95ft), Line 4 (71ft), Line 5 (95ft)
Belt Marker Placement	Standard

Directions to Site

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

Site Information

Land Ownership	Federal
Land Administrator	BLM
Allotment	SWEET WATER
Elevation	7,550ft (2,301m)
Aspect	West
Slope	0-5%
Sample Dates	08/04/2011, 08/20/2014, 08/15/2017

Table 10R-52.1 Disturbance History. Recorded history of major disturbances.

Treatment/Disturbance	Name	WRI DB#	Date	Size (acres)
Seeding - Aerial After	Seep Ridge Bullhog Phase II	1950	December 2011	390
Seeding - Aerial Before	Seep Ridge Bullhog Phase II	1950	October 2011	390
Mechanical - Bullhog	Seep Ridge Bullhog Phase II	1950	November 2011-February 2012	390

Table 10R-52.2 Seed Mix. List of known seeded plant species and rates (if available).

Mix Name			Application Type	Application Date	Acres
Seep Ridge Bullhog Phase II			Aerial	Oct 2011	475
Type	Species	Common Name	Cultivar/Source ID	Bulk lbs/acre	PLS lbs/acre
G	Achnatherum hymenoides	Indian Ricegrass	Emery UT	1.05	0.80
G	Elymus lanceolatus	Thickspike Wheatgrass	Bannock	1.26	1.01
G	Elymus trachycaulus	Slender Wheatgrass	San Luis	1.47	1.35
G	Leymus cinereus	Great Basin Wildrye	Trailhead	0.74	0.68
G	Poa secunda	Big Bluegrass	Sherman	0.21	0.19
G	Poa secunda	Sandberg Bluegrass	UP/Colorado Plateau	0.07	0.07
G	Poa secunda	Sandberg Bluegrass	UP/Colorado Plateau	0.14	0.12
G	Poa secunda	Canby Bluegrass	Canbar	0.21	0.10
G	Pseudoroegneria spicata	Bluebunch Wheatgrass	P-7	1.26	1.09
F	Linum perenne	Blue Flax	Appar	0.42	0.39
F	Medicago sativa	Alfalfa	Nomad	0.74	0.66
F	Medicago sativa	Alfalfa	Spreador 4	0.74	0.65
F	Nassella viridula	Green Needlegrass	Lodorm	0.74	0.71
F	Onobrychis viciifolia	Sainfoin	Eski	2.00	1.92
F	Sanguisorba minor	Small Burnet	Delar	2.00	1.88
S	Cercocarpus montanus	True Mountain Mahogany	Sanpete/Sevier/Wasatch UT	0.21	0.14
S	Purshia tridentata	Bitterbrush	Summit UT	0.42	0.31
Mix Name			Application Type	Application Date	Acres
Seep Ridge Bullhog Phase II – Browse			Aerial	Dec 2011	400
Type	Species	Common Name	Cultivar/Source ID	Bulk lbs/acre	PLS lbs/acre
S	Artemisia tridentata ssp. wyomingensis	Wyoming Big Sagebrush	Sevier UT	1.00	0.16

Wildlife Habitat and Vegetation History**Table 10R-52.3 - Wildlife Seasonal Habitat.** UDWR wildlife habitat and seasonality.

Species	Habitat	Season
Bison	crucial	year-long
Deer	substantial	winter
Elk	crucial	summer

Table 10R-52.4 - Vegetation History. The dominant vegetation type(s) and phase of woodland succession (Tausch, Miller, Roundy, & Chambers, 2009).

Year	Vegetation Type	Woodland Succession
2011	Pinyon-Juniper	Phase III
2014	Perennial Grass-Forb	Phase I
2017	Mountain Big Sagebrush/Perennial Grass	Phase I

Site Notes

Cattle were seen in 2017 and a pinyon and juniper island on site was being used as a bedding area (likely by livestock).

Site Potential

1981 - 2010 Average Annual Precipitation	17 inches
NRCS Ecological Site	Mountain Stony Loam (Mountain Big Sagebrush)
NRCS Ecological Site #	048AY448UT
States and Transitions	No state and transition model is available for this ecological site.

When this site was established in 2011, it was in Phase III of encroachment by twoneedle pinyon (*Pinus edulis*) and Utah juniper (*Juniperus osteosperma*) with other browse species such as antelope bitterbrush (*Purshia tridentata*) and mountain big sagebrush (*Artemisia tridentata* ssp. *vaseyana*) also present (Table 10R-52.12). The herbaceous understory was depleted and sparse. Following treatment, the herbaceous understory became the dominant component on the site with both forbs and grasses being fairly diverse. Squirreltail (*Elymus elymoides*) is the dominant perennial grass with small burnet (*Sanguisorba minor*) being the dominant perennial forb (Table 10R-52.10, 10R-52.11). Cheatgrass (*Bromus tectorum*) is present on the site, but cover is low and does not pose a significant threat at this time (Table 10R-52.10). Tree cover decreased significantly following treatment. Although tree cover is less than 5 percent, tree seedlings were prevalent on the site, putting the site at risk for infilling if the seedlings persist (Table 10R-52.14).

Trend Summary Tables**Table 10R-52.6 - 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
2011	14.0	0.6	17.5	12.8	0.5	54.6
2014	4.9	1.2	0.4	4.3	0.9	-
2017	5.6	1.5	0.7	7.1	2.0	4.3

Table 10R-52.7 - 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
2011	-	141	42	19	-	3.9	0.3	0.1
2014	6	331	38	179	0.1	12.0	0.4	7.7
2017	70	368	21	163	0.5	20.2	0.1	5.4

Table 10R-52.8 - 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
2011	23.0	4.6	51.4	8.0	2.2	30.7
2014	7.3	0.0	78.0	0.7	1.2	26.1
2017	16.8	0.0	72.0	2.2	1.5	30.6

Table 10R-52.9 - 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	Rocky Mountain Elk	Rabbit
	Quadrat Frequency			
2011	-	4	6	-
2014	4	14	12	5
2017	6	9	6	3
Year	Days Use Per Acre (ha)			
2011	2.2 (5.4)	13.4 (33.1)	21.5 (53.0)	-
2014	21.8 (53.8)	9.4 (23.2)	24.8 (61.2)	-
2017	12.3 (30.5)	7.4 (18.2)	10.7 (26.5)	-

Table 10R-52.10 - 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)	Carex rossii (Ross' sedge)	Elymus elymoides (squirreltail)	Elymus lanceolatus (thickspike wheatgrass)	Elymus trachycaulus (slender wheatgrass)	Hesperostipa comata (needle and thread)	Koeleria macrantha (prairie Junegrass)	Leymus cinereus (basin wildrye)	Poa fendleriana (muttongrass)	Poa secunda (Sandberg bluegrass)	Pseudoroegneria spicata (bluebunch wheatgrass)
year	Nested Frequency												
2011	-	20	-	3	25	-	-	-	11	-	102	-	-
2014	6	24	6	6	164	115	38	-	13	1	49	19	38
2017	1	31	70	3	215	183	7	3	24	8	90	-	6
year	Average Cover (%)												
2011	-	0.3	-	0.0	0.2	-	-	-	0.2	-	3.3	-	-
2014	0.1	0.8	0.1	0.2	4.3	3.0	1.1	-	0.2	0.0	1.3	0.3	0.8
2017	0.0	0.6	0.5	0.2	8.2	7.1	0.3	0.1	0.9	0.6	2.0	-	0.2

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

Table 10R-52.11 - Forb Species. Nested frequency and modified Daubenmire average cover by year.

FORB SPECIES	Antennaria microphylla (littleleaf pussytoes)	Antennaria parvifolia (small-leaf pussytoes)	Arabis holboellii ^a (Holboell's rockcress)	Astragalus (milkvetch)	Chenopodium leptophyllum ^a (narrowleaf goosefoot)	Cryptantha (cryptantha)	Descurainia pinnata ^a (western tansymustard)	Erigeron pumilus (shaggy fleabane)	Eriogonum alatum (winged buckwheat)	Lappula occidentalis ^a (flatspine stickseed)	Lesquerella (bladderpod)	Linum perenne ⁱ (blue flax)	Medicago sativa ⁱ (alfalfa)	Monolepis nuttalliana ^a (Nuttall's povertyweed)	Onobrychis viciifolia ⁱ (sainfoin)	Penstemon caespitosus (mat penstemon)	Penstemon pachyphyllus (thickleaf beardtongue)	
year	Nested Frequency																	
2011	-	4	17	-	5	3	1	-	-	-	4	2	-	-	-	1	2	
2014	3	18	11	1	5	-	7	-	3	4	14	105	20	6	5	1	7	
2017	-	19	12	7	1	-	3	3	4	-	4	91	4	-	8	6	13	
year	Average Cover (%)																	
2011	-	0.0	0.0	-	0.2	0.0	0.0	-	-	-	0.0	0.0	-	-	-	0.0	0.0	
2014	0.0	0.3	0.0	0.0	0.0	-	0.0	-	0.0	0.0	0.1	4.3	0.5	0.3	0.0	0.0	0.2	
2017	-	0.9	0.1	0.2	0.0	-	0.0	0.0	0.0	-	0.0	1.3	0.1	-	0.1	0.1	0.2	

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

FORB SPECIES	Phacelia ^a (phacelia)	Phlox longifolia (longleaf phlox)	Polygonum douglasii ^a (Douglas' knotweed)	Sanguisorba minor ⁱ (small burnet)	Sphaeralcea coccinea (scarlet globemallow)	Taraxacum officinale (common dandelion)
year	Nested Frequency					
2011	-	3	21	-	-	-
2014	1	3	6	66	4	-
2017	-	3	5	55	17	4
year	Average Cover (%)					
2011	-	0.0	0.1	-	-	-
2014	0.0	0.0	0.0	2.2	0.1	-
2017	-	0.0	0.0	2.1	0.3	0.0

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

Table 10R-52.12 - Shrub and Tree Species. Average modified Daubenmire quadrat and line intercept cover by year.

SHRUB SPECIES	Artemisia tridentata ssp. vaseyana ^p (mountain big sagebrush)	Cercocarpus montanus ^p (alderleaf mountain mahogany)	Chrysothamnus viscidiflorus ssp. viscidiflorus var. viscidiflorus (yellow rabbitbrush)	Ericameria nauseosa (rubber rabbitbrush)	Gutierrezia sarothrae (broom snakeweed)	Juniperus osteosperma ^t (Utah juniper)	Juniperus scopulorum ^t (Rocky Mountain juniper)	Opuntia fragilis (brittle pricklypear)	Pinus edulis ^t (twoneedle pinyon)	Purshia tridentata ^p (antelope bitterbrush)	Symphoricarpos oreophilus (mountain snowberry)
year	Line Intercept Cover (%)										
2011	5.1	0.8	-	-	-	20.3	0.2	0	34.1	6.9	0.5
2014	2.1	-	-	-	-	-	-	-	0	2.2	0.9
2017	4.3	-	0.1	0.1	-	1.1	-	-	3.2	2.8	1.8
year	Quadrat Cover (%)										
2011	3.8	1.2	-	-	0.2	5.3	0.2	0.0	12.0	8.9	0.4
2014	2.8	-	-	-	0.3	0.2	-	0.1	0.2	2.2	0.8
2017	3.2	-	0.1	0.0	-	0.4	-	0.0	0.4	2.5	1.3

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

Table 10R-52.13 - 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.

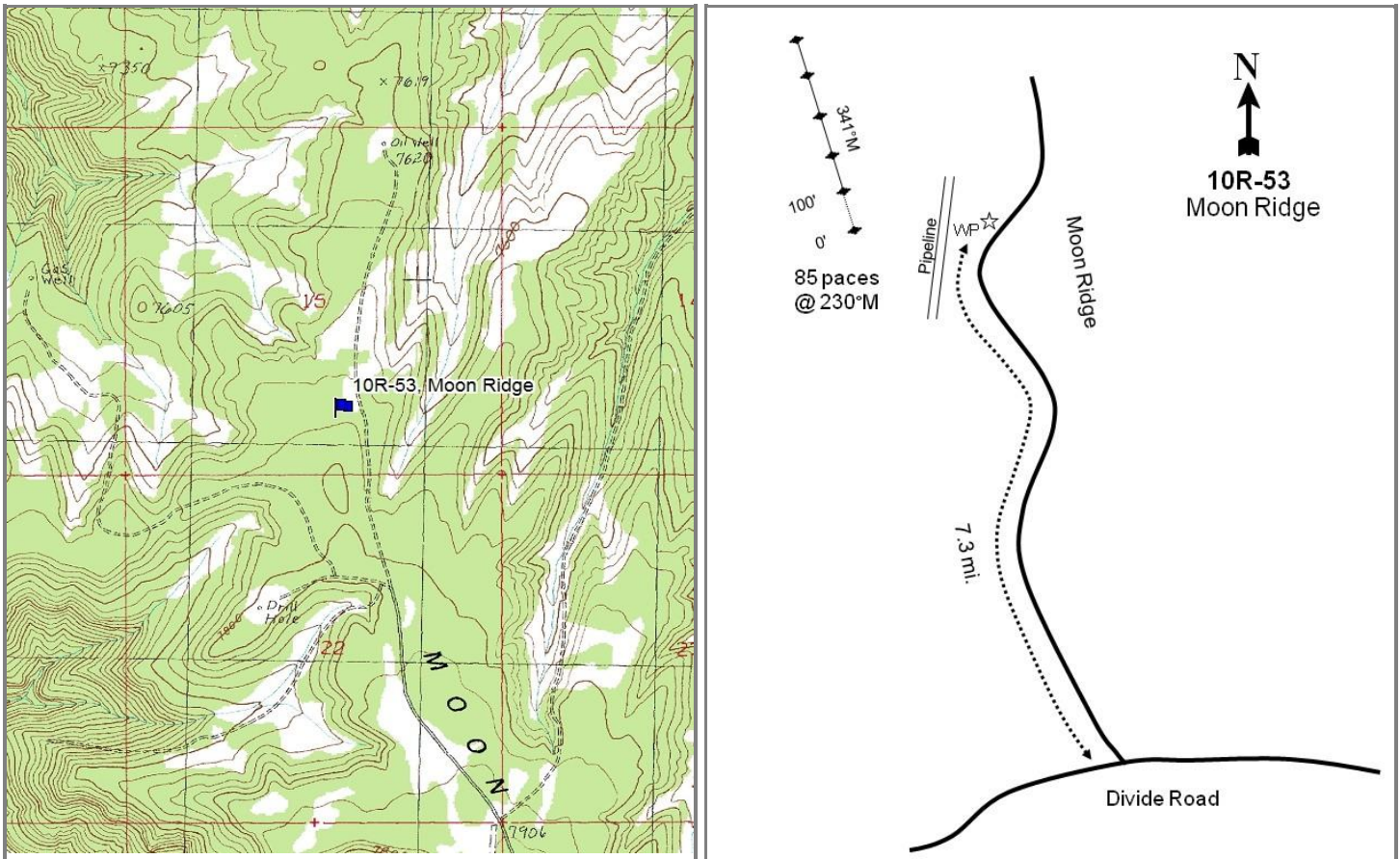
Year	Density		Age Class Distribution			Utilization		Poor Vigor (%)	Average Height Crown (cm)
	Plants Per Acre		Excluding Seedlings			Moderate (%)	Heavy (%)		
	Excluding Seedlings	Seedling	Young (%)	Mature (%)	Decadent (%)				
Amelanchier utahensis^p -- (Utah serviceberry)									
2011	-	-	-	-	-	-	-	-	7/26
2014	-	-	-	-	-	-	-	-	-/-
2017	-	-	-	-	-	-	-	-	-/-
Artemisia tridentata ssp. vaseyana^p -- (mountain big sagebrush)									
2011	1060	20	15	53	32	19	2	23	66/81
2014	760	-	32	68	0	34	3	16	53/65
2017	780	680	41	51	8	5	0	5	59/86
Cercocarpus montanus^p -- (alderleaf mountain mahogany)									
2011	60	-	33	67	0	0	0	0	104/111
2014	60	-	33	67	0	0	100	0	43/52
2017	40	-	50	50	0	0	50	0	39/51
Chrysothamnus depressus^p -- (longflower rabbitbrush)									
2011	-	-	-	-	-	-	-	-	-/-
2014	-	-	-	-	-	-	-	-	-/-
2017	-	-	-	-	-	-	-	-	10/17
Chrysothamnus viscidiflorus ssp. viscidiflorus var. viscidiflorus -- (yellow rabbitbrush)									
2011	-	-	-	-	-	-	-	-	-/-
2014	20	-	0	100	0	0	100	0	25/13
2017	60	-	0	100	0	0	0	0	26/29
Ericameria nauseosa -- (rubber rabbitbrush)									
2011	-	-	-	-	-	-	-	-	-/-
2014	-	-	-	-	-	-	-	-	-/-
2017	40	-	50	50	0	50	0	0	49/79
Gutierrezia sarothrae -- (broom snakeweed)									
2011	20	-	0	100	0	0	0	0	-/-
2014	60	-	0	100	0	67	0	0	31/47
2017	20	-	0	100	0	0	0	0	21/33
Juniperus osteosperma^t -- (Utah juniper)									
2011	220	80	55	46	0	0	0	0	-/-
2014	80	20	100	0	0	0	0	0	-/-
2017	100	40	80	20	0	0	0	0	-/-
Juniperus scopulorum^t -- (Rocky Mountain juniper)									
2011	40	20	100	0	0	0	0	0	-/-
2014	20	-	100	0	0	0	0	0	-/-
2017	-	-	-	-	-	-	-	-	-/-
Opuntia fragilis -- (brittle pricklypear)									
2011	100	-	0	100	0	0	0	0	10/25
2014	120	-	33	67	0	0	0	0	10/33
2017	100	-	20	80	0	0	0	0	9/38
Pediocactus simpsonii -- (mountain ball cactus)									
2011	-	-	-	-	-	-	-	-	4/4
2014	-	-	-	-	-	-	-	-	-/-
2017	-	-	-	-	-	-	-	-	-/-
Pinus edulis^t -- (twoneedle pinyon)									
2011	580	480	55	45	0	0	0	3	-/-
2014	40	40	100	0	0	0	0	0	-/-
2017	160	-	88	13	0	0	0	0	-/-
Purshia tridentata^p -- (antelope bitterbrush)									
2011	1440	80	31	67	3	11	10	6	48/68
2014	1040	60	21	79	0	33	40	2	29/57
2017	1060	40	25	76	0	2	94	2	30/66
Symphoricarpos oreophilus -- (mountain snowberry)									
2011	560	-	71	29	0	0	0	11	30/51
2014	760	-	5	95	0	26	3	0	34/67
2017	500	-	0	100	0	4	8	0	42/85

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

Table 10R-52.14 - 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 & J. scopulorum (Utah and Rocky Mountain juniper)							
2014	76	37	58	-	-	5	5.7
Juniperus osteosperma (Utah juniper)							
2011	285	15	15	30	25	15	9.5
2017	140	10	75	5	10	-	4.4
Juniperus scopulorum (Rocky Mountain juniper)							
2011	40	-	22	22	44	11	7.9
2017	7	-	100	-	-	-	2.4
Pinus edulis (twoneedle pinyon)							
2011	810	20	15	25	30	10	6.0
2014	124	72	22	6	-	-	1.8
2017	275	58	26	-	16	-	3.5

MOON RIDGE - STUDY NO. 10R-53

**Location Information**

USGS 7.5 min Map Info
GPS (0' Stake)

Tennile Canyon North; Township 16S, Range 21E, Section 15
NAD 83 UTM ZONE 12, 621556 East 4363326 North

Transect Information

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

Directions to Site

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

Site Information

Land Ownership	Federal
Land Administrator	BLM
Allotment	MCCLELLAND
Elevation	7,754ft (2,363m)
Aspect	Northeast
Slope	0-8%
Sample Dates	08/04/2011, 08/20/2014, 08/14/2017

Table 10R-53.1 Disturbance History. Recorded history of major disturbances.

Treatment/Disturbance	Name	WRI DB#	Date	Size (acres)
Lop and Scatter - Lop and Scatter	Moon Ridge Chaining Maintenance	3568	September-November 2016	692
Chaining - Two-Way Ely	Moon Ridge Chaining	2218	October-November 2013	540
Seeding - Aerial After	Moon Ridge Chaining	2218	November 2013	540
Seeding - Dribbler	Moon Ridge Chaining	2218	October-November 2013	540
Seeding - Aerial After	Moon Ridge Chaining	2218	December 2013	540

Table 10R-53.2 Seed Mix. List of known seeded plant species and rates (if available).

Mix Name			Application Type	Application Date	Acres
Moon Ridge Chaining			Aerial	Nov 2013	1100
Type	Species	Common Name	Cultivar/Source ID	Bulk lbs/acre	PLS lbs/acre
G	<i>Achnatherum hymenoides</i>	Indian Ricegrass	White River	0.45	0.43
G	<i>Achnatherum hymenoides</i>	Indian Ricegrass	Rio Grande CO	0.55	0.52
G	<i>Elymus lanceolatus</i>	Thickspike Wheatgrass	Bannock	1.18	1.03
G	<i>Elymus trachycaulus</i>	Slender Wheatgrass	First Strike	1.50	1.40
G	<i>Leymus cinereus</i>	Great Basin Wildrye	Magnar	0.82	0.55
G	<i>Nassella viridula</i>	Green Needlegrass	Lodorm	0.03	0.03
G	<i>Nassella viridula</i>	Green Needlegrass	Lodorm	0.59	0.56
G	<i>Nassella viridula</i>	Green Needlegrass	Lodorm	0.23	0.18
G	<i>Poa secunda</i>	Big Bluegrass	Sherman	0.20	0.17
G	<i>Poa secunda</i>	Canby Bluegrass	Canbar	0.20	0.17
G	<i>Poa secunda</i>	Sandberg Bluegrass	UP/Colorado Plateau	0.20	0.15
G	<i>Pseudoroegneria spicata</i>	Bluebunch Wheatgrass	Anatone	0.50	0.38
G	<i>Pseudoroegneria spicata</i>	Bluebunch Wheatgrass	Anatone	0.73	0.66
F	<i>Linum perenne</i>	Blue Flax	Appar	0.50	0.43
F	<i>Medicago sativa</i>	Alfalfa	Ladak	1.50	1.37
F	<i>Onobrychis viciifolia</i>	Sainfoin	Delaney	2.00	1.96
F	<i>Sanguisorba minor</i>	Small Burnet		2.00	1.84
Mix Name			Application Type	Application Date	Acres
Moon Ridge Chaining Dribbler			Dribbler	Nov 2013	1100
Type	Species	Common Name	Cultivar/Source ID	Bulk lbs/acre	PLS lbs/acre
S	<i>Cercocarpus montanus</i>	True Mountain Mahogany	Sanpete UT	0.16	0.12
S	<i>Cercocarpus montanus</i>	True Mountain Mahogany	Sanpete/Sevier/Wasatch UT	0.05	0.03
S	<i>Purshia tridentata</i>	Bitterbrush	Oneida, ID	0.40	0.34
Mix Name			Application Type	Application Date	Acres
Moon Ridge Chaining Sagebrush			Aerial	Dec 2013	920
Type	Species	Common Name	Cultivar/Source ID	Bulk lbs/acre	PLS lbs/acre
S	<i>Artemisia tridentata</i> ssp. <i>vaseyana</i>	Mountain Big Sagebrush	Sevier UT	0.27	0.07
S	<i>Artemisia tridentata</i> ssp. <i>vaseyana</i>	Mountain Big Sagebrush	Summit UT	0.74	0.16

Wildlife Habitat and Vegetation History**Table 10R-53.3 - Wildlife Seasonal Habitat.** UDWR wildlife habitat and seasonality.

Species	Habitat	Season	Brood/Young Rearing
Bison	Crucial	year-long	
Deer	substantial	summer	
Elk	Crucial	winter	
Greater Sage Grouse	occupied	year-long	brood-rearing
Rocky Mountain Bighorn	Crucial	year-long	

Table 10R-53.4 - Vegetation History. The dominant vegetation type(s) and phase of woodland succession (Tausch, Miller, Roundy, & Chambers, 2009).

Year	Vegetation Type	Woodland Succession
2011	Pinyon-Juniper	Phase III
2014	Pinyon-Juniper	Phase I
2017	Perennial Grass	Phase I

Site Notes

Due to the large amounts of litter and debris, point-quarter tree density data was not collected in 2014.

Site Potential

1981 - 2010 Average Annual Precipitation 16 inches
 NRCS Ecological Site Mountain Loam (Mountain Big Sagebrush)
 NRCS Ecological Site # 048AY405UT
 States and Transitions No state and transition model is available for this ecological site.

When established in 2011, the site was in Phase III of encroachment by pinyon pine (*Pinus edulis*) and Utah juniper (*Juniperus osteosperma*) with mountain big sagebrush (*Artemisia tridentata* ssp. *vaseyana*) as the only other significant browse species (Table 10R-53.12). The herbaceous understory was fairly abundant, but grasses and forbs were not very diverse. Following treatment, native perennial grass species responded very well and have become the dominant vegetation component on the site, with muttongrass (*Poa fendleriana*) being the dominant species (Table 10R-53.10). The primarily native seed mix has established to create a rich and diverse understory (Table 10R-53.11). Following treatment, it took several years for the resulting litter to decompose and for the understory to respond, but overall the site appears to be exhibiting an upward trending pattern of recovery.

Trend Summary Tables**Table 10R-53.6 - 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
2011	1.7	0.2	15.8	1.9	-	64.0
2014	0.2	-	4.4	1.0	-	7.3
2017	3.0	0.0	0.4	2.4	-	1.7

Table 10R-53.7 - 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
2011	-	188	9	147	-	7.6	0.0	6.2
2014	-	166	37	149	-	3.3	0.2	3.5
2017	2	336	18	120	0.0	22.8	0.1	2.3

Table 10R-53.8 - 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
2011	16.5	7.9	63.3	0.3	-	26.3
2014	16.4	1.3	77.3	0.1	0.0	9.9
2017	12.0	0.3	77.2	0.0	0.0	29.9

Table 10R-53.9 - 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	Rocky Mountain Elk	Horse	Rabbit
	Quadrat Frequency				
2011	-	-	-	-	-
2014	-	-	-	-	1
2017	5	2	12	2	2
Year	Days Use Per Acre (ha)				
2011	-	6.7 (16.6)	4.7 (11.6)	0.6 (1.4)	-
2014	0.7 (1.8)	3.4 (8.3)	2.0 (5.0)	-	-
2017	28.3 (69.9)	4.7 (11.6)	24.1 (59.6)	5.8 (14.3)	-

Table 10R-53.10 - Grass Species. Nested frequency and modified Daubenmire average cover by year.

GRASS SPECIES	Achnatherum hymenoides (Indian ricegrass)	Bromus tectorum ^{ai} (cheatgrass)	Carex (sedge)	Carex rossii (Ross' sedge)	Elymus elymoides (squirreltail)	Elymus lanceolatus (thickspike wheatgrass)	Elymus trachycaulus (slender wheatgrass)	Hesperostipa comata (needle and thread)	Koeleria macrantha (prairie Junegrass)	Leymus cinereus (basin wildrye)	Nassella viridula (green needlegrass)	Piptatheropsis micrantha (littelseed ricegrass)	Poa fendleriana (muttongrass)	Poa secunda (Sandberg bluegrass)	Pseudoroegneria spicata (bluebunch wheatgrass)
year	Nested Frequency														
2011	-	-	33	-	16	9	-	1	41	-	-	-	87	41	-
2014	-	-	13	-	30	4	-	-	-	-	-	-	109	22	-
2017	5	2	49	8	30	146	51	13	8	29	4	4	140	21	1
year	Average Cover (%)														
2011	-	-	0.7	-	0.1	0.0	-	0.0	1.0	-	-	-	3.8	2.0	-
2014	-	-	0.2	-	0.7	0.0	-	-	-	-	-	-	1.9	0.4	-
2017	0.4	0.0	1.1	0.8	1.1	6.4	2.7	0.4	0.1	1.2	0.1	0.3	7.9	0.5	0.0

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

Table 10R-53.11 - Forb Species. Nested frequency and modified Daubenmire average cover by year.

FORB SPECIES	Agoseris glauca (pale agoseris)	Androsace septentrionalis ^{ai} (pygmyflower rockjasmine)	Antennaria parvifolia (small-leaf pussytoes)	Arabis holboellii ^{ai} (Holboell's rockcress)	Astragalus (milkvetch)	Astragalus convallarius (lesser rushy milkvetch)	Astragalus tenellus (looseflower milkvetch)	Crepis acuminata (tapertip hawkbeard)	Erigeron eatonii (Eaton's fleabane)	Gayophytum ramosissimum ^a (pinyon groundsmoke)	Linum perenne ⁱ (blue flax)	Lupinus argenteus (silvery lupine)	Machaeranthera grindelioides (rayless tansyaster)	Medicago sativa ⁱ (alfalfa)	Onobrychis viciifolia ⁱ (sainfoin)	Packera multilobata (lobeleaf groundsel)	Penstemon comarthenus (dusty beardtongue)
year	Nested Frequency																
2011	9	-	46	4	4	-	2	1	19	-	-	6	-	-	-	-	3
2014	-	4	28	10	2	1	-	1	4	5	1	11	-	23	2	3	6
2017	-	-	38	15	-	-	2	-	9	3	20	2	5	9	-	-	31
year	Average Cover (%)																
2011	0.1	-	1.5	0.0	0.1	-	0.0	0.0	0.2	-	-	0.7	-	-	-	-	0.0
2014	-	0.0	1.0	0.1	0.0	0.0	-	0.0	0.1	0.0	0.0	0.3	-	0.0	0.0	0.0	0.0
2017	-	-	0.9	0.0	-	-	0.0	-	0.1	0.0	0.5	0.0	0.0	0.0	-	-	0.2

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

FORB SPECIES	Penstemon watsonii (Watson's penstemon)	Phlox austromontana (mountain phlox)	Phlox longifolia (longleaf phlox)	Polygonum douglasii ^a (Douglas' knotweed)	Sanguisorba minor ⁱ (small burnet)	Taraxacum officinale (common dandelion)
year	Nested Frequency					
2011	94	9	2	8	-	-
2014	73	3	9	22	25	-
2017	16	9	3	2	12	1
year	Average Cover (%)					
2011	3.2	0.5	0.0	0.0	-	-
2014	1.8	0.0	0.0	0.1	0.1	-
2017	0.2	0.2	0.0	0.0	0.2	0.0

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

Table 10R-53.12 - 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)	Cercocarpus montanus ^p (alderleaf mountain mahogany)	Chrysothamnus depressus ^p (longflower rabbitbrush)	Chrysothamnus viscidiflorus ssp. viscidiflorus var. viscidiflorus (yellow rabbitbrush)	Juniperus osteosperma ^t (Utah juniper)	Juniperus scopulorum ^t (Rocky Mountain juniper)	Opuntia fragilis (brittle pricklypear)	Pinus edulis ^t (twoneedle pinyon)
year	Line Intercept Cover (%)								
2011	0	1.9	0	-	-	20	1.2	-	42.8
2014	-	1	0	-	-	4.3	0.4	-	2.6
2017	-	2.3	0.1	-	-	1.2	-	-	0.5
year	Quadrat Cover (%)								
2011	0.0	1.6	0.1	0.0	-	1.7	0.1	0.2	13.9
2014	-	0.2	0.0	0.1	-	3.5	0.0	-	0.9
2017	-	2.8	0.0	0.2	0.0	0.3	0.0	-	0.1

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

Table 10R-53.13 - 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)									
2011	-	-	-	-	-	-	-	-	14/27
2014	-	-	-	-	-	-	-	-	-/-
2017	-	-	-	-	-	-	-	-	-/-
Artemisia tridentata ssp. vaseyana ^p -- (mountain big sagebrush)									
2011	280	-	29	64	7	0	0	21	61/68
2014	220	-	18	82	0	9	9	0	47/55
2017	1380	60	78	22	0	0	0	0	60/82

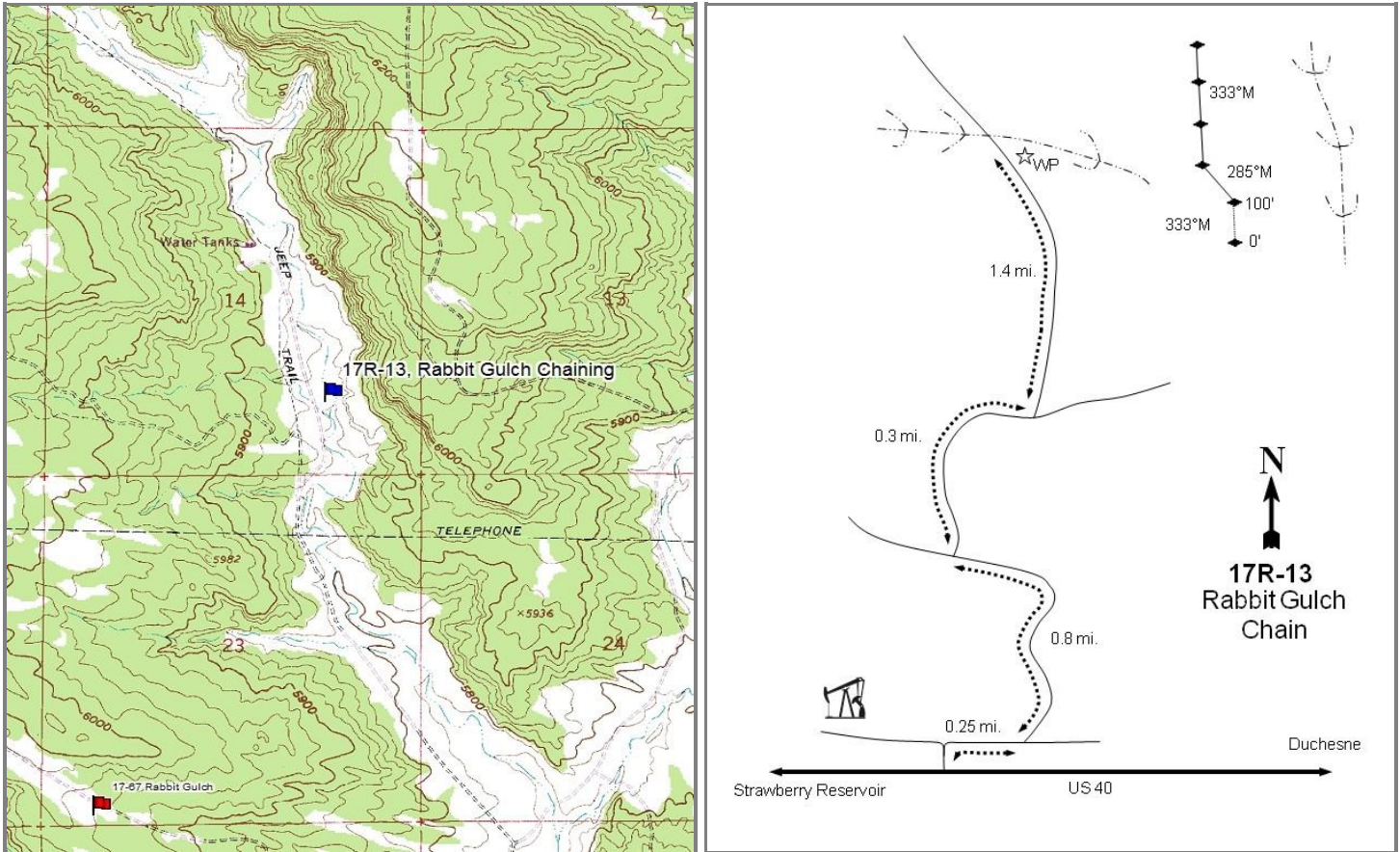
Year	Density		Age Class Distribution			Utilization		Poor Vigor (%)	Average Height Crown (cm)
	Plants Per Acre		Excluding Seedlings			Moderate (%)	Heavy (%)		
	Excluding Seedlings	Seedling	Young (%)	Mature (%)	Decadent (%)				
Cercocarpus montanus^P -- (alderleaf mountain mahogany)									
2011	-	-	-	-	-	-	-	-	99/98
2014	20	-	0	100	0	0	0	0	52/134
2017	20	-	0	0	100	0	100	100	91/92
Chrysothamnus depressus^P -- (longflower rabbitbrush)									
2011	60	20	0	100	0	0	0	0	13/20
2014	40	-	50	50	0	0	0	0	10/16
2017	140	-	14	86	0	29	57	0	8/19
Chrysothamnus viscidiflorus ssp. viscidiflorus var. viscidiflorus -- (yellow rabbitbrush)									
2011	40	-	50	50	0	0	0	0	64/61
2014	40	-	0	100	0	0	0	0	38/30
2017	60	-	33	67	0	0	0	0	39/52
Juniperus osteosperma^t -- (Utah juniper)									
2011	160	100	63	38	0	0	0	13	- / -
2014	160	-	100	0	0	0	0	13	- / -
2017	160	20	100	0	0	0	0	0	- / -
Juniperus scopulorum^t -- (Rocky Mountain juniper)									
2011	-	-	-	-	-	-	-	-	- / -
2014	-	-	-	-	-	-	-	-	- / -
2017	40	40	100	0	0	0	0	0	- / -
Opuntia fragilis -- (brittle pricklypear)									
2011	60	-	33	67	0	0	0	0	12/45
2014	120	-	0	100	0	0	0	0	11/27
2017	-	-	-	-	-	-	-	-	- / -
Pinus edulis^t -- (twoneedle pinyon)									
2011	500	480	36	64	0	0	0	0	- / -
2014	100	40	60	20	20	0	20	40	- / -
2017	140	40	100	0	0	0	0	14	- / -
Purshia tridentata^P -- (antelope bitterbrush)									
2011	-	-	-	-	-	-	-	-	37/65
2014	-	-	-	-	-	-	-	-	34/36
2017	-	-	-	-	-	-	-	-	65/97
Ribes^P -- (currant)									
2011	-	-	-	-	-	-	-	-	- / -
2014	-	-	-	-	-	-	-	-	- / -
2017	-	-	-	-	-	-	-	-	115/189
Symphoricarpos oreophilus -- (mountain snowberry)									
2011	-	-	-	-	-	-	-	-	37/76
2014	80	-	0	100	0	0	0	0	30/64
2017	-	-	-	-	-	-	-	-	66/115

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

Table 10R-53.14 - 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)							
2011	442	30	20	10	-	40	24.1
2017	138	28	72	-	-	-	3.4
Juniperus scopulorum (Rocky Mountain juniper)							
2017	7	50	50	-	-	-	1.0
Pinus edulis (twoneedle pinyon)							
2011	792	30	5	20	30	15	6.0
2017	150	44	44	11	-	-	2.1

RABBIT GULCH CHAINING - STUDY NO. 17R-13



Location Information

USGS 7.5 min Map Info
GPS (0' Stake)

Rabbit Gulch NE; Township 3S, Range 6W, Section 14
NAD 83 UTM ZONE 12, 540348 East 4451794 North

Transect Information

Browse Tag # (0' Stake)	137
Transect Bearing	333° 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 Strawberry River Road on US 40, drive east for 1.3 miles to a road on the left (north) side of the road (if coming from the east, drive 1.5 miles from the bridge over Starvation reservoir). Turn left (north) onto this road and immediately turn right, then drive 0.25 miles to a road on the left. Turn left and continue for 0.8 miles to a fork where the pavement will end. From the fork, stay right and proceed for 0.3 miles to another fork. Stay left at the fork and drive 1.4 miles to the witness post on the right (east) side of the road. From the witness post, walk 150 feet at 152 degrees magnetic to the 0-foot stake. The 0-foot stake is marked with browse tag #137.

Site Information

Land Ownership	State
Land Administrator	UDWR
Allotment	No data
Elevation	5,840ft (1,780m)
Aspect	Southeast
Slope	2%
Sample Dates	07/29/2005, 07/29/2008, 06/26/2013, 08/02/2017

Table 17R-13.1 Disturbance History. Recorded history of major disturbances.

Treatment/Disturbance	Name	WRI DB#	Date	Size (acres)
Herbicide - Tordon, 2,4-D	Rabbit Gulch WMA Range Rehabilitation	66	June 2005	167
Chaining - Two-Way Ely	Rabbit Gulch WMA Range Rehabilitation	66	January 2006	167
Seeding - Aerial Before	Rabbit Gulch WMA Range Rehabilitation	66	November 2005	300
Seeding - Aerial After	Rabbit Gulch WMA Range Rehabilitation	66	January 2006	167

Table 17R-13.2 Seed Mix. List of known seeded plant species and rates (if available).

Mix Name			Application Type	Application Date	Acres
Rabbit Gulch Greasewood			Aerial	Nov 2005	300
Type	Species	Common Name	Cultivar/Source ID	Bulk lbs/acre	PLS lbs/acre
G	<i>Agropyron cristatum</i>	Crested Wheatgrass	Douglas	2.00	1.62
G	<i>Elymus lanceolatus</i>	Thickspike Wheatgrass	Critana	1.92	1.63
G	<i>Leymus cinereus</i>	Great Basin Wildrye	Trailhead	2.00	1.64
G	<i>Psathyrostachys juncea</i>	Russian Wildrye		2.00	1.70
F	<i>Medicago sativa</i>	Alfalfa	Spredor 4	1.00	0.93
F	<i>Sanguisorba minor</i>	Small Burnet		1.08	1.04
F	<i>Sanguisorba minor</i>	Small Burnet	Delar	1.00	0.94
S	<i>Atriplex canescens</i>	Fourwing Saltbush	Carbon UT	1.50	0.44
Mix Name			Application Type	Application Date	Acres
Rabbit Gulch - Browse			Aerial	Jan 2006	190
Type	Species	Common Name	Cultivar/Source ID	Bulk lbs/acre	PLS lbs/acre
S	<i>Bassia prostrata</i>	Forage Kochia	Beaver UT	1.05	0.71
S	<i>Ericameria nana</i>	Whitestem Rubber Rabbitbrush	Sanpete/Beaver	0.45	0.11

Wildlife Habitat and Vegetation History**Table 17R-13.3 - Wildlife Seasonal Habitat.** UDWR wildlife habitat and seasonality.

Species	Habitat	Season
Deer	crucial	winter
Elk	crucial	winter

Table 17R-13.4 - 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/Annual Forb	No Encroachment
2013	Black Greasewood/Annual Forb	No Encroachment
2017	Black Greasewood/Annual Grass	No Encroachment

Site Notes

There is an oil/gas pad with storage tanks about 200 feet from this site.

Soils**Table 17R-13.5 - 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
Loamy Fine Sand	7.6	77.7	15.1	7.2	0.2	6.9	121.6	0.7	07/29/2005

Site Potential

1981 - 2010 Average Annual Precipitation	9 inches
NRCS Ecological Site	Semidesert Alkali Loam (Black Greasewood/Wyoming Big Sagebrush)
NRCS Ecological Site #	R034AY213UT
States and Transitions	No state and transition model is available for this ecological site.

This study was established in 2005, and despite treatments the browse component has remained dominated by black greasewood (*Sarcobatus vermiculatus*). Wyoming big sagebrush (*Artemisia tridentata* ssp. *wyomingensis*) is also present, but contributes much less cover (Table 17R-13.12, Table 17R-13.13). The herbaceous understory has fluctuated with native and introduced annual forbs, mainly the introduced species prickly Russian thistle (*Salsola tragus*), as a co-dominant vegetation component in 2008 and 2013. The introduced annual grass species cheatgrass (*Bromus tectorum*) increased significantly in 2017, and it was considered to be co-dominant with greasewood. Perennial grasses have remained rare, and perennial forbs have not been observed in any sample year (Table 17R-13.7, Table 17R-13.10, Table 17R-13.11).

Trend Summary Tables**Table 17R-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
2005	0.5	5.9	-	0.3	9.8	-
2008	0.6	3.9	-	0.7	5.5	-
2013	0.2	6.6	-	3.7	8.1	-
2017	0.2	7.0	-	1.0	11.0	-

Table 17R-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
2005	63	20	345	-	0.8	1.0	14.5	-
2008	80	34	337	-	0.6	0.7	35.6	-
2013	136	6	374	-	2.5	0.3	20.0	-
2017	380	17	168	-	25.9	0.6	8.8	-

Table 17R-13.8 - 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	28.3	18.3	44.4	0.2	0.1	18.4
2008	25.3	6.3	42.5	0.1	-	40.0
2013	23.6	5.6	50.7	0.0	-	33.5
2017	13.3	8.7	54.0	-	0.3	42.5

Table 17R-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	Mule Deer	Rocky Mountain Elk	Horse	Rabbit
	Quadrat Frequency			
2005	15	7	-	70
2008	13	-	-	54
2013	6	-	-	3
2017	5	-	-	70
Year	Days Use Per Acre (ha)			
2005	52.3 (129.1)	10.7 (26.5)	-	-
2008	24.8 (61.2)	19.4 (48.0)	-	-
2013	5.3 (13.2)	-	-	-
2017	30.2 (74.5)	0.7 (1.7)	0.6 (1.4)	-

Table 17R-13.10 - 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)	Hesperostipa comata (needle and thread)	Leymus cinereus (basin wildrye)	Psathyrostaichys juncea ⁱ (Russian wildrye)	Sporobolus cryptandrus (sand dropseed)	Vulpia octoflora ^a (sixweeks fescue)
year	Nested Frequency							
2005	-	3	4	5	-	-	12	63
2008	5	3	4	3	-	7	15	78
2013	1	70	-	1	0	1	3	100
2017	-	367	1	1	4	4	7	82
year	Average Cover (%)							
2005	-	0.2	0.2	0.5	-	-	0.3	0.6
2008	0.2	0.0	0.0	0.2	-	0.0	0.3	0.6
2013	0.0	2.3	-	0.1	0.1	0.0	0.1	0.2
2017	-	25.2	0.0	0.0	0.4	0.2	0.1	0.7

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

Table 17R-13.11 - 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 ^a (Fremont's goosefoot)	Chenopodium leptophyllum ^a (narrowleaf goosefoot)	Cleome lutea ^a (yellow spiderflower)	Collinsia parviflora ^a (maiden blue eyed Mary)	Cryptantha ^a (annual cryptantha)	Descurainia pinnata ^a (western tansymustard)	Epilobium brachycarpum ^a (tall annual willowherb)	Eriogonum cernuum ^a (nodding buckwheat)	Halogeton glomeratus ^{ai} (saltflower)	Lactuca serriola ^{ai} (prickly lettuce)	Lappula occidentalis ^a (flatspine stickseed)	Lepidium ^a (pepperweed)	Malcolmia africana ^{ai} (African mustard)	Mentzelia albicaulis ^a (whitestem blazingstar)
year	Nested Frequency																
2005	18	1	1	153	23	5	41	-	141	-	12	5	-	200	-	40	9
2008	-	9	-	5	1	1	-	-	11	1	4	89	-	113	-	-	31
2013	-	19	11	6	3	9	2	140	8	1	-	44	4	12	6	18	45
2017	1	11	-	-	-	1	-	13	10	-	-	0	1	75	17	-	-
year	Average Cover (%)																
2005	0.2	0.0	0.0	2.8	0.1	0.0	0.1	-	2.0	-	0.1	0.0	-	4.8	-	1.2	0.2
2008	-	0.3	-	0.0	0.0	0.0	-	-	0.1	0.0	0.1	4.8	-	3.8	-	-	1.6
2013	-	0.1	0.2	0.1	0.0	0.3	0.0	1.0	0.0	0.0	-	1.0	0.0	0.0	0.0	0.4	0.7
2017	0.0	0.5	-	-	-	0.0	-	0.1	0.9	-	-	0.1	0.0	1.1	0.1	-	-

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

FORB SPECIES				
<i>Oenothera pallida</i> ^a (pale evening primrose)				
<i>Plantago patagonica</i> ^a (woolly plantain)				
<i>Salsola tragus</i> ^{ai} (prickly Russian thistle)				
<i>Sisymbrium altissimum</i> ^{ai} (tall tumblemustard)				
year	Nested Frequency			
2005	44	3	74	-
2008	1	4	275	1
2013	2	6	310	21
2017	24	17	18	44
year	Average Cover (%)			
2005	0.8	0.0	2.2	-
2008	0.4	0.0	24.3	0.0
2013	0.1	0.0	16.0	0.1
2017	0.8	0.0	2.1	3.2

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

Table 17R-13.12 - Shrub and Tree Species. Average modified Daubenmire quadrat and line intercept cover by year.

SHRUB SPECIES				
<i>Artemisia tridentata</i> ssp. <i>wyomingensis</i> ^p (Wyoming big sagebrush)				
<i>Atriplex confertifolia</i> ^p (shadscale saltbush)				
<i>Opuntia</i> (pricklypear)				
<i>Sarcobatus vermiculatus</i> (greasewood)				
year	Line Intercept Cover (%)			
2005	0.3	-	1.5	8.3
2008	0.7	-	-	5.5
2013	3.7	-	-	8.1
2017	1	-	-	11
year	Quadrat Cover (%)			
2005	0.5	-	0.8	5.0
2008	0.5	0.1	-	3.9
2013	0.2	-	-	6.6
2017	0.2	-	-	7.0

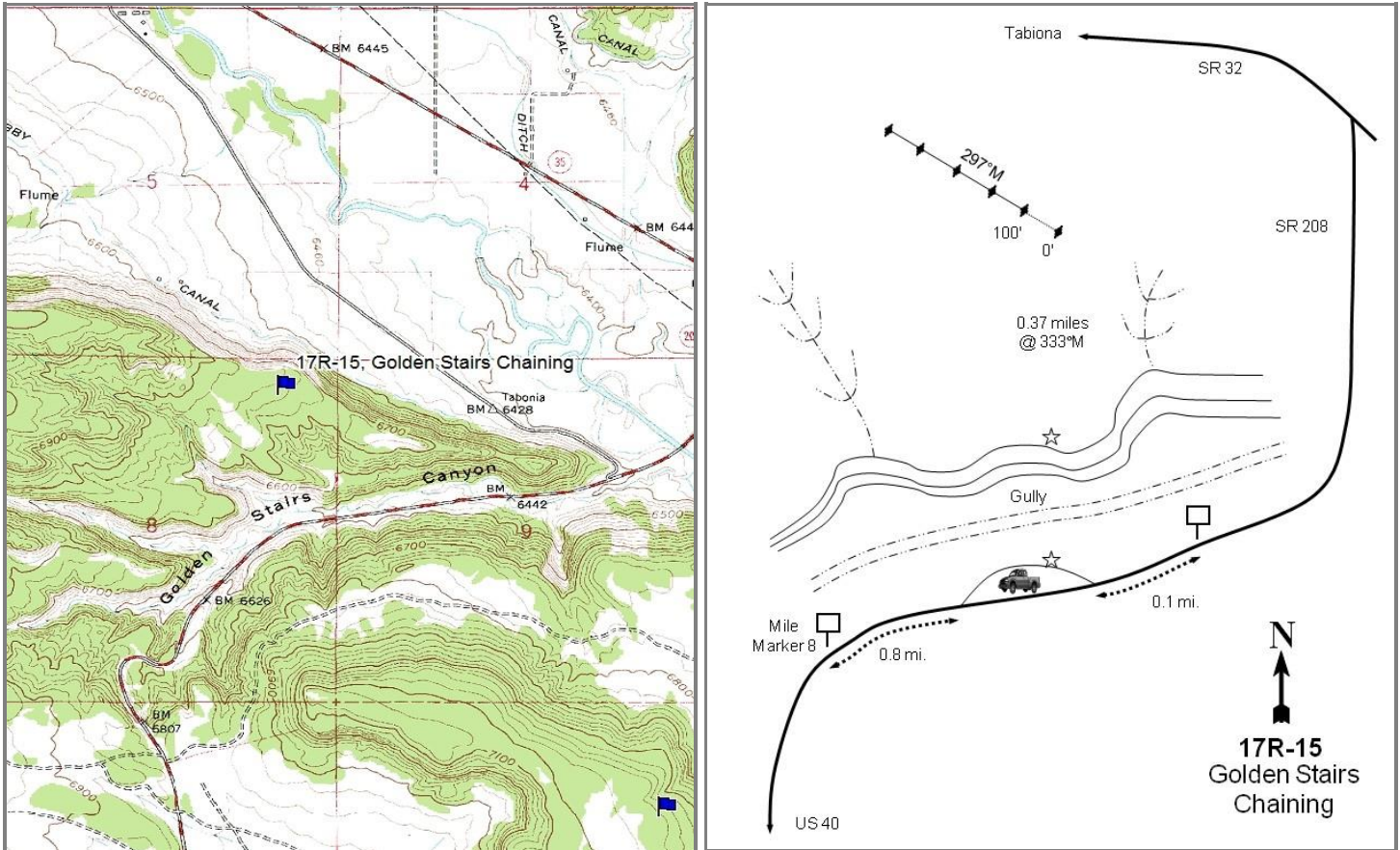
t - Tree Species; p - Preferred Browse; i - Introduced Species

Table 17R-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. wyomingensis^P -- (Wyoming big sagebrush)									
2005	540	5340	63	4	33	0	0	26	87/82
2008	280	-	64	36	0	0	0	0	67/66
2013	260	-	0	100	0	77	0	77	81/102
2017	220	-	18	46	36	36	9	36	87/94
Atriplex confertifolia^P -- (shadscale saltbush)									
2005	-	-	-	-	-	-	-	-	-/-
2008	-	-	-	-	-	-	-	-	-/-
2013	-	-	-	-	-	-	-	-	110/125
2017	-	-	-	-	-	-	-	-	84/111
Chrysothamnus viscidiflorus ssp. viscidiflorus var. viscidiflorus -- (yellow rabbitbrush)									
2005	-	-	-	-	-	-	-	-	60/70
2008	-	-	-	-	-	-	-	-	-/-
2013	-	-	-	-	-	-	-	-	-/-
2017	-	-	-	-	-	-	-	-	57/70
Gutierrezia sarothrae -- (broom snakeweed)									
2005	-	-	-	-	-	-	-	-	-/-
2008	-	-	-	-	-	-	-	-	-/-
2013	-	-	-	-	-	-	-	-	-/-
2017	-	-	-	-	-	-	-	-	24/33
Opuntia -- (pricklypear)									
2005	820	-	0	88	12	0	0	7	18/72
2008	20	-	0	0	100	0	0	100	-/-
2013	20	-	0	100	0	0	0	0	13/38
2017	40	-	0	100	0	0	0	0	16/47
Sarcobatus vermiculatus -- (greasewood)									
2005	720	420	11	36	53	0	0	94	124/157
2008	320	-	13	88	0	0	0	0	84/115
2013	260	-	0	100	0	0	0	8	109/195
2017	680	20	59	41	0	3	0	0	108/179
Suaeda moquinii -- (Mojave seablite)									
2005	-	-	-	-	-	-	-	-	-/-
2008	-	-	-	-	-	-	-	-	-/-
2013	40	-	0	100	0	0	0	0	-/-

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

GOLDEN STAIRS CHAINING - STUDY NO. 17R-15



Location Information

USGS 7.5 min Map Info
GPS (0' Stake)

Tabonia NW; Township 2S, Range 7W, Section 08
NAD 83 UTM ZONE 12, 526077 East 4464013 North

Transect Information

Browse Tag # (0' Stake)	85
Transect Bearing	297° magnetic
Length	500ft
Belt Placement	Line 1 (11ft), Line 2 (34ft), Line 3 (59ft), Line 4 (71ft), Line 5 (95ft)
Belt Marker Placement	No Rebar

Directions to Site

From the junction of US-40 and SR-208, drive north on SR-208 to mile marker 8. Drive 0.8 miles past the mile marker to a pullout on the left (north) side of the road: park at this pullout (there is a sign just 0.1 miles north of the pullout). From the pullout, walk 0.37 miles at 333 degrees magnetic to the 0-foot stake. There are some steep cliffs to the right and some less steep cliffs on the left: go between the cliffs to a big wash valley. The 0-foot stake is marked with browse tag #85.

Site Information

Land Ownership	State
Land Administrator	UDWR
Allotment	No data
Elevation	6,770ft (2,063m)
Aspect	Southeast
Slope	5%
Sample Dates	08/01/2005, 07/31/2008, 06/25/2013, 08/01/2017

Table 17R-15.1 Disturbance History. Recorded history of major disturbances.

Treatment/Disturbance	Name	WRI DB#	Date	Size (acres)
Chaining - Two-Way Ely	Golden Stairs Range Rehabilitation	52	Fall 2005	170
Seeding - Aerial Before	Golden Stairs Range Rehabilitation	52	September 2005	170
Seeding - Dribbler	Golden Stairs Range Rehabilitation	52	November 2005	170
Seeding - Aerial After	Golden Stairs Range Rehabilitation	52	December 2005	170

Table 17R-15.2 Seed Mix. List of known seeded plant species and rates (if available).

Mix Name		Application Type	Application Date	Acres	
Golden Stairs P/J Chaining		Aerial	Sep 2005	190	
Type	Species	Common Name	Cultivar/Source ID	Bulk lbs/acre	PLS lbs/acre
G	<i>Agropyron cristatum</i>	Crested Wheatgrass	Hycrest	0.79	0.74
G	<i>Dactylis glomerata</i>	Orchardgrass	Paiute	0.53	0.48
G	<i>Elymus lanceolatus</i>	Thickspike Wheatgrass	Critana	1.05	0.90
G	<i>Elymus wawawaiensis</i>	Snake River Wheatgrass	Secar	0.53	0.49
G	<i>Poa secunda</i>	Canby Bluegrass	Canbar	0.26	0.21
G	<i>Psathyrostachys juncea</i>	Russian Wildrye		1.05	0.95
F	<i>Linum perenne</i>	Blue Flax		0.26	0.23
F	<i>Medicago sativa</i>	Alfalfa	Ladak+	0.53	0.50
F	<i>Onobrychis viciifolia</i>	Sainfoin	Eski	2.11	1.97
F	<i>Sanguisorba minor</i>	Small Burnet	Delar	1.05	0.99
S	<i>Atriplex canescens</i>	Fourwing Saltbush	Juab/Millard UT	1.05	0.51
Mix Name		Application Type	Application Date	Acres	
Golden Stairs P/J Chaining Dribbler		Dribbler	Nov 2005	190	
Type	Species	Common Name	Cultivar/Source ID	Bulk lbs/acre	PLS lbs/acre
S	<i>Atriplex canescens</i>	Fourwing Saltbush	Juab/Millard UT	0.13	0.06
S	<i>Cercocarpus montanus</i>	True Mountain Mahogany		0.13	0.10
S	<i>Ephedra viridis</i>	Green Ephedra		0.13	0.05
S	<i>Purshia tridentata</i>	Bitterbrush	Ada/Boise ID	0.13	0.11
Mix Name		Application Type	Application Date	Acres	
Golden Stair - Browse		Aerial	Dec 2005	190	
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	Sanpete UT	1.05	0.31
S	<i>Bassia prostrata</i>	Forage Kochia	Millard UT	1.05	0.67

Wildlife Habitat and Vegetation History**Table 17R-15.3 - Wildlife Seasonal Habitat.** UDWR wildlife habitat and seasonality.

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

Table 17R-15.4 - Vegetation History. The dominant vegetation type(s) and phase of woodland succession (Tausch, Miller, Roundy, & Chambers, 2009).

Year	Vegetation Type	Woodland Succession
2005	Pinyon-Juniper	Phase III
2008	Perennial Grass	Phase I
2013	Perennial Grass	Phase I
2017	Perennial Grass	Phase I

Site Notes

An estimated 55 acres of scattered islands of twoneedle pinyon and Utah juniper were left unchained within the treatment area to provide wildlife with protective cover. The study transect ran through an untreated island of the treatment, and as such, parts of belts two and three were not treated.

Soils**Table 17R-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 Loam	7.6	57.0	27.4	15.6	2.0	3.5	89.6	0.8	08/01/2005

Site Potential

1981 - 2010 Average Annual Precipitation 12 inches
 NRCS Ecological Site Upland Loam (Mountain Big Sagebrush)
 NRCS Ecological Site # 047XC310UT
 States and Transitions No state and transition model is available for this ecological site.

When established in 2005, this site was encroached by twoneedle pinyon (*Pinus edulis*) and Utah juniper (*Juniperus osteosperma*) and was considered to be within Phase III of woodland succession; very few browse species were present. Following the chaining and seeding treatment, much of the tree cover was removed and the browse component increased in both diversity and cover -- the site has remained in Phase I of encroachment in all years following the treatment (photos, Table 17R-15.4, Table 17R-15.12, Table 17R-15.13, Table 17R-15.14). A mixture of native and perennial grasses, including thickspike wheatgrass (*Elymus lanceolatus*), crested wheatgrass (*Agropyron cristatum*), and needle and thread (*Hesperostipa comata*), have been the dominant vegetation component in all post-treatment sample years. Annual grasses have remained rare. Perennial and annual forbs, although diverse, have not been abundant in any sample year (Table 17R-15.7, Table 17R-15.10, Table 17R-15.11).

Trend Summary Tables**Table 17R-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
2005	0.1	1.3	12.6	1.0	1.6	22.8
2008	0.5	1.4	3.0	1.2	1.6	3.3
2013	0.5	0.9	3.8	1.1	2.3	5.7
2017	1.6	2.6	0.9	1.9	4.0	2.4

Table 17R-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
2005	18	261	174	52	0.3	9.1	2.4	0.7
2008	70	290	98	66	0.6	15.6	1.6	1.5
2013	61	367	22	101	0.1	12.2	0.1	1.2
2017	38	376	147	83	0.6	18.9	1.5	1.3

Table 17R-15.8 - 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	40.2	6.6	39.0	1.6	1.3	22.9
2008	38.8	2.4	47.7	1.2	2.0	20.3
2013	29.5	0.1	54.0	0.5	3.1	25.1
2017	32.0	0.4	43.8	1.8	2.6	29.8

Table 17R-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	Rocky Mountain Elk	Horse	Rabbit
	Quadrat Frequency				
2005	-	6	22	-	56
2008	-	21	15	-	30
2013	-	5	12	2	14
2017	-	10	29	3	29
Days Use Per Acre (ha)					
2005	4.4 (10.8)	13.4 (33.1)	41.5 (102.6)	-	-
2008	-	30.8 (76.1)	26.8 (66.2)	-	-
2013	-	8.1 (19.9)	63.7 (157.3)	1.7 (4.3)	-
2017	-	142.1 (350.9)	14.1 (34.8)	-	-

Table 17R-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 inermis ⁱ (smooth brome)	Bromus tectorum ^{ai} (cheatgrass)	Carex (sedge)	Dactylis glomerata ⁱ (orchardgrass)	Elymus elymoides (squirreltail)	Elymus lanceolatus (thickspike wheatgrass)	Elymus trachycaulus (slender wheatgrass)	Hesperotipa comata (needle and thread)	Pascopyrum smithii (western wheatgrass)	Poa secunda (Sandberg bluegrass)	Psathyrostachys juncea ⁱ (Russian wildrye)	Pseudoroegneria spicata (bluebunch wheatgrass)
year	Nested Frequency													
2005	26	-	-	18	8	-	-	-	211	68	41	30	-	-
2008	77	47	1	70	17	-	-	23	154	57	51	20	1	-
2013	108	102	1	61	10	2	1	151	32	135	14	20	16	11
2017	65	85	-	38	8	6	20	258	18	88	7	5	12	2
year	Average Cover (%)													
2005	0.5	-	-	0.3	0.6	-	-	-	6.2	0.9	0.2	0.7	-	-
2008	2.6	0.9	0.1	0.6	1.0	-	-	0.7	7.3	1.9	0.7	0.3	0.1	-
2013	1.8	2.6	0.0	0.1	0.2	0.0	0.0	3.0	0.7	3.2	0.2	0.1	0.3	0.1
2017	2.9	3.5	-	0.6	0.2	0.1	0.4	7.9	0.3	3.0	0.1	0.0	0.6	0.1

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

Table 17R-15.11 - Forb Species. Nested frequency and modified Daubenmire average cover by year.

FORB SPECIES	Alyssum desertorum ^{ai} (desert madwort)	Arabis (rockcress)	Artemisia dracunculoides (tarragon)	Astragalus chamaeleuce var. chamaeleuce (cicada milkvetch)	Astragalus convallarius (lesser rushy milkvetch)	Calochortus nuttallii (sego lily)	Chaenactis douglasii (Douglas' dustymaiden)	Chaetopappa ericoides (rose heath)	Chenopodium fremontii ^a (Fremont's goosefoot)	Chenopodium leptophyllum ^a (narrow/leaf goosefoot)	Collinsia parviflora ^a (maiden blue eyed Mary)	Cryptantha (cryptantha)	Descurainia pinnata ^a (western tansymustard)	Draba ^a (draba)	Eriogonum cernuum ^a (nodding buckwheat)	Gilia inconspicua ^a (shy gilia)	Ipomopsis congesta (ballhead ipomopsis)
year	Nested Frequency																
2005	-	7	-	-	0	-	-	4	15	10	96	20	55	36	13	-	11
2008	-	3	-	-	-	1	-	1	-	20	6	9	8	4	24	-	13
2013	10	16	1	-	2	-	3	1	-	-	-	26	12	-	-	-	1
2017	41	7	-	2	1	-	-	5	2	-	-	20	78	17	3	4	-
year	Average Cover (%)																
2005	-	0.2	-	-	0.0	-	-	0.1	0.5	0.2	0.4	0.1	0.5	0.2	0.0	-	0.1
2008	-	0.0	-	-	-	0.0	-	0.0	-	0.3	0.0	0.7	0.1	0.0	0.2	-	0.1
2013	0.0	0.0	0.0	-	0.1	-	0.0	0.0	-	-	-	0.4	0.0	-	-	-	0.0
2017	0.2	0.0	-	0.0	0.0	-	-	0.1	0.0	-	-	0.2	0.9	0.1	0.0	0.0	-

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

FORB SPECIES														
<i>Lappula occidentalis</i> ^a (flatspine stickseed)														
<i>Lepidium montanum</i> ^a (mountain pepperweed)														
<i>Lesquerella</i> (bladderpod)														
<i>Linum perenne</i> ⁱ (blue flax)														
<i>Lygodesmia grandiflora</i> (largeflower skeletonplant)														
<i>Machaeranthera canescens</i> (hoary tansyaster)														
<i>Packera multilobata</i> (lobeleaf groundsel)														
<i>Polygonum douglasii</i> ^a (Douglas' knotweed)														
<i>Salsola tragus</i> ^{ai} (prickly Russian thistle)														
<i>Sanguisorba minor</i> ⁱ (small burnet)														
<i>Schoenocrambe linifolia</i> (flaxleaf plainsmustard)														
<i>Townsendia</i> (Townsend daisy)														
<i>Tragopogon dubius</i> ^{ai} (yellow salsify)														
year	Nested Frequency													
2005	25	2	3	-	-	-	-	19	-	-	12	-	-	
2008	52	4	-	20	9	-	-	7	6	2	17	2	-	
2013	2	-	-	52	-	-	1	-	-	-	7	11	-	
2017	25	3	-	39	-	0	1	-	-	1	13	10	1	
year	Average Cover (%)													
2005	0.2	0.3	0.0	-	-	-	-	0.1	-	-	0.2	-	-	
2008	0.6	0.0	-	0.4	0.0	-	-	0.0	0.5	0.0	0.3	0.0	-	
2013	0.0	-	-	0.6	-	-	0.0	-	-	-	0.0	0.0	-	
2017	0.2	0.0	-	0.8	-	0.0	0.0	-	-	0.1	0.0	0.0	0.0	

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

Table 17R-15.12 - Shrub and Tree Species. Average modified Daubenmire quadrat and line intercept cover by year.

SHRUB SPECIES										
<i>Atriplex canescens</i> ^p (fourwing saltbush)										
<i>Bassia prostrata</i> ^{pi} (forage kochia)										
<i>Cercocarpus montanus</i> ^p (alderleaf mountain mahogany)										
<i>Eriogonum corymbosum</i> (crisp-leaf buckwheat)										
<i>Gutierrezia sarothrae</i> (broom snakeweed)										
<i>Juniperus osteosperma</i> ⁱ (Utah juniper)										
<i>Linanthus pungens</i> (granite prickly phlox)										
<i>Opuntia</i> (pricklypear)										
<i>Pinus edulis</i> ⁱ (twoneedle pinyon)										
year	Line Intercept Cover (%)									
2005	-	-	1	1.2	-	12.1	-	0.4	10.7	
2008	0.3	0.5	0.4	0.9	0.5	0.4	0.1	0.1	2.9	
2013	-	0.8	0.3	2.1	-	1	-	0.2	4.7	
2017	-	1.9	-	3.1	0.5	0.4	-	0.4	2	
year	Quadrat Cover (%)									
2005	-	-	0.1	0.4	0.1	3.2	-	0.7	9.4	
2008	0.0	0.5	0.0	0.6	0.4	1.0	0.0	0.4	2.0	
2013	-	0.5	0.0	0.5	0.1	1.5	0.0	0.3	2.3	
2017	-	1.4	0.2	1.3	0.4	0.2	0.0	0.9	0.8	

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

Table 17R-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. vaseyana^P -- (mountain big sagebrush)									
2005	-	-	-	-	-	-	-	-	53/58
2008	20	-	0	100	0	0	0	0	31/15
2013	40	-	0	100	0	0	0	0	31/38
2017	40	-	0	100	0	0	100	0	33/48
Atriplex canescens^P -- (fourwing saltbush)									
2005	-	-	-	-	-	-	-	-	-/-
2008	1020	260	28	73	0	0	0	0	41/49
2013	-	-	-	-	-	-	-	-	64/78
2017	-	-	-	-	-	-	-	-	89/101
Bassia prostrata^{Pi} -- (forage kochia)									
2005	-	-	-	-	-	-	-	-	-/-
2008	1100	180	6	93	2	7	0	0	23/29
2013	4820	300	68	32	0	24	0	0	20/24
2017	5820	20	1	99	0	0	0	0	14/21
Cercocarpus montanus^P -- (alderleaf mountain mahogany)									
2005	60	-	0	0	100	0	100	33	111/92
2008	40	-	0	0	100	100	0	0	88/85
2013	40	-	0	100	0	50	0	0	86/92
2017	60	-	0	100	0	0	0	33	84/94
Chrysothamnus viscidiflorus -- (yellow rabbitbrush)									
2005	-	-	-	-	-	-	-	-	-/-
2008	-	-	-	-	-	-	-	-	-/-
2013	20	-	100	0	0	0	0	0	-/-
2017	60	-	0	100	0	0	0	0	18/31
Eriogonum corymbosum -- (crispleaf buckwheat)									
2005	260	80	0	92	8	31	0	8	45/69
2008	980	200	18	82	0	0	0	0	36/55
2013	1880	40	54	46	0	2	0	0	30/38
2017	1540	-	23	77	0	0	0	0	37/58
Ericameria nauseosa -- (rubber rabbitbrush)									
2005	-	-	-	-	-	-	-	-	-/-
2008	-	-	-	-	-	-	-	-	-/-
2013	-	-	-	-	-	-	-	-	30/30
2017	-	-	-	-	-	-	-	-	38/54
Gutierrezia sarothrae -- (broom snakeweed)									
2005	480	20	4	96	0	0	0	0	15/19
2008	760	20	0	97	3	0	0	0	18/27
2013	1360	60	84	16	0	0	0	0	14/17
2017	920	100	0	76	24	0	0	24	17/23
Juniperus osteosperma^I -- (Utah juniper)									
2005	120	20	67	0	33	0	0	33	-/-
2008	60	-	33	67	0	0	0	0	-/-
2013	60	20	100	0	0	0	0	0	-/-
2017	80	-	75	25	0	0	0	0	-/-
Krascheninnikovia lanata^P -- (winterfat)									
2005	-	-	-	-	-	-	-	-	-/-
2008	-	-	-	-	-	-	-	-	-/-
2013	-	-	-	-	-	-	-	-	-/-
2017	-	-	-	-	-	-	-	-	34/52
Linanthus pungens -- (granite prickly phlox)									
2005	300	-	0	93	7	13	0	0	8/15
2008	160	-	0	100	0	0	0	0	11/15
2013	80	-	50	50	0	0	0	0	12/23
2017	200	-	0	100	0	0	0	0	9/18
Opuntia -- (pricklypear)									
2005	1380	40	12	78	10	0	0	1	12/33
2008	1020	60	6	57	37	0	2	10	11/30
2013	1060	-	9	89	2	0	0	0	11/19
2017	1080	20	2	96	2	0	0	2	11/25

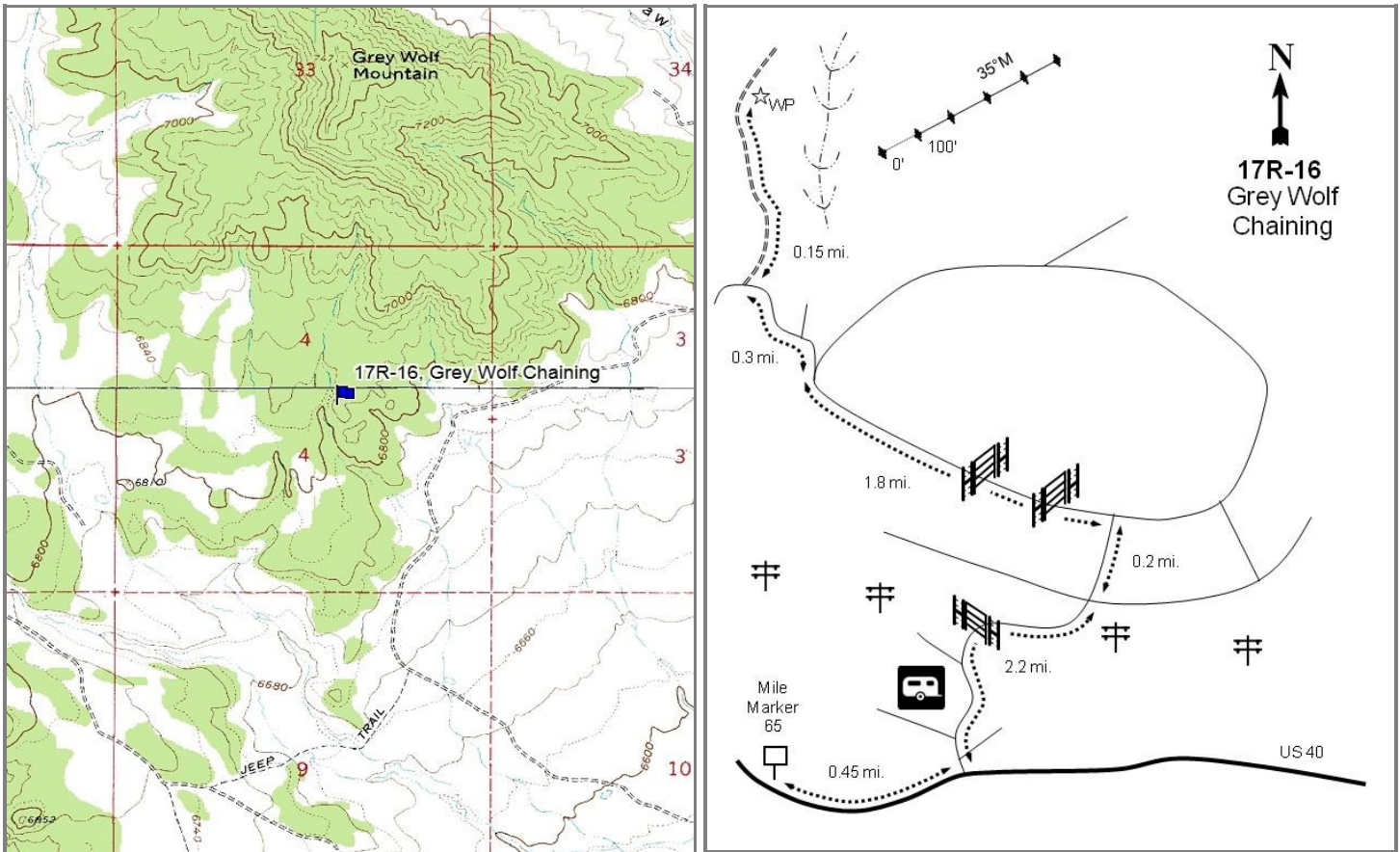
Year	Density		Age Class Distribution			Utilization		Poor Vigor (%)	Average Height Crown (cm)
	Plants Per Acre		Excluding Seedlings			Moderate (%)	Heavy (%)		
	Excluding Seedlings	Seedling	Young (%)	Mature (%)	Decadent (%)				
Pediocactus -- (pincushion cactus)									
2005	-	-	-	-	-	-	-	-	-/-
2008	-	-	-	-	-	-	-	-	-/-
2013	-	-	-	-	-	-	-	-	-/-
2017	-	-	-	-	-	-	-	-	5/7
Pinus edulis ^t -- (twoneedle pinyon)									
2005	260	60	69	31	0	0	0	0	-/-
2008	200	40	70	30	0	0	0	30	-/-
2013	180	20	89	11	0	0	0	0	-/-
2017	60	20	0	100	0	0	0	0	-/-

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

Table 17R-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)							
2005	91	11	33	17	6	33	25.4
2008	76	31	15	15	8	31	26.1
2013	54	8	67	-	-	25	20.9
2017	63	29	36	14	7	14	13.6
Pinus edulis (twoneedle pinyon)							
2005	251	10	35	25	10	20	12.7
2008	133	10	45	40	-	5	4.2
2013	70	12	53	29	6	-	5.1
2017	55	7	67	20	-	7	7.1

GREY WOLF CHAINING - STUDY NO. 17R-16



Location Information

USGS 7.5 min Map Info
GPS (0' Stake)

Fruitland NE; Township 3S, Range 8W, Section 04
NAD 83 UTM ZONE 12, 517755 East 4455435 North

Transect Information

Browse Tag # (0' Stake)	86
Transect Bearing	35° 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 Fruitland, drive east on US-40 to mile marker 65. Continue 0.45 miles past the mile marker to a road on the left (north). Turn left onto this road and drive 2.2 miles past several trailers and through a gate to a fork. Stay left at the fork and drive 0.2 miles to another fork, passing through an enclosure. Take the left fork and proceed for 1.8 miles through a gate to a road on the left (west) side. Turn left and continue for 0.3 miles to a two-track on the right (may be hard to see). Turn right (north) onto the two-track and drive for 0.15 miles to the witness post on the right (east). From the witness post, walk 520 feet at 75 degrees magnetic to the 0-foot stake, which is marked with browse tag #86.

Site Information

Land Ownership	State
Land Administrator	UDWR
Allotment	No data
Elevation	6,800ft (2,073m)
Aspect	Southwest
Slope	2-4%
Sample Dates	08/02/2005, 08/04/2008, 06/24/2013, 08/01/2017

Table 17R-16.1 Disturbance History. Recorded history of major disturbances.

Treatment/Disturbance	Name	WRI DB#	Date	Size (acres)
Chaining - Two-Way Ely	Grey Wolf Mountain Rehabilitation	93	Fall 2005	463
Seeding - Aerial Before	Grey Wolf Mountain Rehabilitation	93	October 2005	463
Seeding - Dribbler	Grey Wolf Mountain Rehabilitation	93	November 2005	463
Seeding - Aerial After	Grey Wolf Mountain Rehabilitation	93	February 2006	463

Table 17R-16.2 Seed Mix. List of known seeded plant species and rates (if available).

Mix Name		Application Type	Application Date	Acres	
Grey Wolf Mtn. P/J Chaining		Aerial	Oct 2005	775	
Type	Species	Common Name	Cultivar/Source ID	Bulk lbs/acre	PLS lbs/acre
G	<i>Agropyron cristatum</i>	Crested Wheatgrass	Douglas	0.97	0.77
G	<i>Dactylis glomerata</i>	Orchardgrass	Paiute	0.15	0.13
G	<i>Dactylis glomerata</i>	Orchardgrass	Paiute	0.33	0.30
G	<i>Elymus lanceolatus</i>	Thickspike Wheatgrass	Critana	1.03	0.88
G	<i>Elymus wawawaiensis</i>	Snake River Wheatgrass	Secar	0.52	0.48
G	<i>Poa secunda</i>	Canby Bluegrass	Canbar	0.26	0.21
G	<i>Psathyrostachys juncea</i>	Russian Wildrye		0.97	0.87
F	<i>Linum perenne</i>	Blue Flax		0.26	0.22
F	<i>Medicago sativa</i>	Alfalfa	Ladak+	0.52	0.49
F	<i>Onobrychis viciifolia</i>	Sainfoin	Eski	2.39	2.24
F	<i>Sanguisorba minor</i>	Small Burnet	Delar	2.00	1.89
S	<i>Atriplex canescens</i>	Fourwing Saltbush	Emery UT	0.52	0.27
S	<i>Atriplex canescens</i>	Fourwing Saltbush	Juab/Millard UT	0.39	0.19
Mix Name		Application Type	Application Date	Acres	
Grey Wolf Mtn. P/J Chaining - Dribbler		Dribbler	Nov 2005	775	
Type	Species	Common Name	Cultivar/Source ID	Bulk lbs/acre	PLS lbs/acre
S	<i>Atriplex canescens</i>	Fourwing Saltbush	Juab/Millard UT	0.06	0.03
S	<i>Cercocarpus montanus</i>	True Mountain Mahogany		0.03	0.02
S	<i>Ephedra viridis</i>	Green Ephedra		0.06	0.03
S	<i>Purshia tridentata</i>	Bitterbrush	Ada/Boise ID	0.03	0.03
Mix Name		Application Type	Application Date	Acres	
Grey Wolf - Browse		Aerial	Feb 2006	610	
Type	Species	Common Name	Cultivar/Source ID	Bulk lbs/acre	PLS lbs/acre
	<i>Bassia prostrata</i>	Forage Kochia	Millard UT	1.00	0.63
S	<i>Artemisia tridentata</i> ssp. <i>wyomingensis</i>	Wyoming Big Sagebrush	Sanpete UT	1.00	0.29

Wildlife Habitat and Vegetation History**Table 17R-16.3 - Wildlife Seasonal Habitat.** UDWR wildlife habitat and seasonality.

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

Table 17R-16.4 - Vegetation History. The dominant vegetation type(s) and phase of woodland succession (Tausch, Miller, Roundy, & Chambers, 2009).

Year	Vegetation Type	Woodland Succession
2005	Pinyon-Juniper	Phase III
2008	Perennial Grass	Phase I
2013	Perennial Grass	Phase I
2017	Perennial Grass	Phase I

Site Notes

Scattered islands of pinyon and juniper trees were left unchained within the treatment area to provide wildlife with protective cover. The treatment area is near the Lower Red Creek sage-grouse lek.

Soils**Table 17R-16.5 - 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	7.6	49.4	32.7	17.8	2.4	8.4	115.2	0.4	08/02/2005

Site Potential

1981 - 2010 Average Annual Precipitation	13 inches
NRCS Ecological Site	Upland Loam (Mountain Big Sagebrush)
NRCS Ecological Site #	047XC310UT
States and Transitions	No state and transition model is available for this ecological site.

When established in 2005, the site was in Phase III of woodland succession, being encroached by twoneedle pinyon (*Pinus edulis*) and Utah juniper (*Juniperus osteosperma*); other shrubs were rare. However, diversity and cover of browse increased following treatment, with forage kochia (*Bassia prostrata*) and alderleaf mountain mahogany (*Cercocarpus montanus*) providing the most preferred browse cover (photos, Table 17R-16.4, Table 17R-16.12, Table 17R-16.13, Table 17R-16.14). The herbaceous understory was sparse prior to treatment. However, perennial grasses, particularly Indian ricegrass (*Achnatherum hymenoides*), thickspike wheatgrass (*Elymus lanceolatus*), and Russian wildrye (*Psathrostachys juncea*), increased in cover and were the dominant vegetation component in all post-treatment sample years. Forbs have remained diverse and, although they initially increased following the treatment, have since decreased in both cover and frequency (Table 17R-16.7, Table 17R-16.10, Table 17R-16.11).

Trend Summary Tables**Table 17R-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
2005	0.3	2.2	0.7	1.8	1.3	21.5
2008	1.5	3.9	0.0	3.6	3.3	-
2013	2.8	1.3	0.4	4.2	2.6	0.5
2017	3.1	4.8	0.0	5.0	4.1	0.1

Table 17R-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
2005	-	147	126	73	-	2.3	1.9	1.3
2008	4	221	140	77	0.0	14.2	3.0	2.0
2013	-	324	41	63	-	13.0	0.4	1.0
2017	-	315	58	36	-	19.8	1.0	1.2

Table 17R-16.8 - 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	51.8	2.7	38.3	1.9	1.9	8.0
2008	41.7	-	36.6	1.4	1.6	29.1
2013	42.7	-	41.8	0.1	1.6	24.8
2017	43.3	-	32.9	1.1	1.4	27.1

Table 17R-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	Rocky Mountain Elk	Owl	Rabbit
	Quadrat Frequency				
2005	-	12	22	-	56
2008	2	17	16	-	34
2013	1	7	27	-	23
2017	-	13	9	-	38
Year	Days Use Per Acre (ha)				
2005	-	6.7 (16.6)	34.9 (86.1)	8.7 (21.5)*	-
2008	-	5.3 (13.2)	12.8 (31.5)	-	-
2013	2.9 (7.2)	6.7 (16.6)	73.0 (180.4)	-	-
2017	-	26.2 (64.6)	30.2 (74.5)	-	-

*Pellets per acre (ha)

Table 17R-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 tectorum ^{ai} (cheatgrass)	Carex (sedge)	Dactylis glomerata ⁱ (orchardgrass)	Elymus elymoides (squirreltail)	Elymus lanceolatus (thickspike wheatgrass)	Elymus trachycaulus (slender wheatgrass)	Hesperotipa comata (needle and thread)	Pascopyrum smithii (western wheatgrass)	Poa secunda (Sandberg bluegrass)	Psathyrostachys juncea ⁱ (Russian wildrye)	Pseudoroegneria spicata (bluebunch wheatgrass)	Thinopyrum intermedium ⁱ (intermediate wheatgrass)
year	Nested Frequency													
2005	88	-	-	6	-	-	-	61	21	2	10	-	3	-
2008	77	44	4	-	3	3	87	3	23	5	5	43	13	-
2013	129	49	-	-	2	17	158	2	35	3	-	79	2	10
2017	108	8	-	3	-	18	150	-	41	16	1	103	1	7
year	Average Cover (%)													
2005	0.8	-	-	0.0	-	-	-	0.9	0.5	0.0	0.1	-	0.0	-
2008	2.6	1.3	0.0	-	0.0	0.1	5.4	0.2	1.3	0.0	0.1	2.5	0.7	-
2013	5.3	0.7	-	-	0.0	0.2	3.0	0.1	0.9	0.0	-	2.6	0.0	0.1
2017	6.4	0.1	-	0.0	-	0.3	4.5	-	2.1	0.1	0.0	6.3	0.0	0.1

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

Table 17R-16.11 - Forb Species. Nested frequency and modified Daubenmire average cover by year.

FORB SPECIES	Arenaria (sandwort)	Astragalus convallarius (lesser rushy milkvetch)	Astragalus utahensis (Utah milkvetch)	Caulanthus crassicaulis ^a (thickstem wild cabbage)	Chaetopappa ericoides (rose heath)	Chenopodium fremontii ^a (Fremont's goosefoot)	Chenopodium leptophyllum ^a (narrow/leaf goosefoot)	Chorispora tenella ^{ai} (crossflower)	Collinsia parviflora ^a (maiden blue eyed Mary)	Cryptantha (cryptantha)	Cymopterus (springparsley)	Descurainia pinnata ^a (western tansymustard)	Eriogonum cernuum ^a (nodding buckwheat)	Eriogonum umbellatum (sulphur-flower buckwheat)	Gilia inconspicua ^a (shy gilia)	Hedysarum boreale (Utah sweetvetch)	Ipomopsis congesta (ballhead ipomopsis)
year	Nested Frequency																
2005	6	-	4	-	-	20	40	-	71	21	-	11	17	3	8	13	-
2008	6	-	1	7	-	14	25	3	-	9	1	10	24	3	18	7	0
2013	5	0	-	-	-	-	2	-	-	14	-	-	-	2	-	14	-
2017	3	0	-	3	1	-	1	-	2	2	-	20	-	-	-	9	-
year	Average Cover (%)																
2005	0.0	-	0.0	-	-	0.5	0.3	-	0.5	0.1	-	0.1	0.0	0.1	0.0	0.8	-
2008	0.1	-	0.0	0.2	-	0.2	0.1	0.0	-	0.4	0.0	0.0	0.3	0.2	0.1	0.3	0.0
2013	0.0	0.0	-	-	-	-	0.0	-	-	0.0	-	-	-	0.0	-	0.5	-
2017	0.0	0.0	-	0.0	0.0	-	0.0	-	0.0	0.0	-	0.6	-	-	-	0.7	-

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

FORB SPECIES	Lappula occidentalis ^a (flatspine stickseed)	Lepidium montanum ^a (mountain pepperweed)	Lesquerella (bladderpod)	Linum perenne ⁱ (blue flax)	Machaeranthera grindelioides (ray/less tansyaster)	Onobrychis vicifolia ⁱ (sainfoin)	Packera multilobata (lobeleaf groundsel)	Penstemon (beardtongue)	Phlox hoodii (spiny phlox)	Polygonum douglasii ^a (Douglas' knotweed)	Salsola tragus ^{ai} (prickly Russian thistle)	Sanguisorba minor ⁱ (small burnet)	Schoenocrambe linifolia (flaxleaf plainsmustard)	Sisymbrium altissimum ^{ai} (tall tumblemustard)	Thelypodium integrifolium ^a (entireleaved thelypody)	Townsendia (Townsend daisy)	Tragopogon dubius ^{ai} (yellow salsify)
year	Nested Frequency																
2005	10	12	-	-	-	-	12	1	13	1	-	-	7	-	18	-	-
2008	13	7	2	15	3	5	13	5	9	1	67	15	9	1	2	1	-
2013	2	-	4	16	1	-	-	4	3	-	41	3	8	-	-	-	-
2017	21	4	-	-	3	-	3	-	6	5	11	-	5	-	-	-	1
year	Average Cover (%)																
2005	0.0	0.2	-	-	-	-	0.1	0.0	0.1	0.0	-	-	0.0	-	0.2	-	-
2008	0.1	0.0	0.0	0.2	0.0	0.2	0.1	0.0	0.1	0.0	1.5	0.5	0.0	0.0	0.4	0.0	-
2013	0.0	-	0.0	0.1	0.0	-	-	0.0	0.1	-	0.4	0.0	0.0	-	-	-	-
2017	0.3	0.0	-	-	0.1	-	0.0	-	0.0	0.0	0.1	-	0.0	-	-	-	0.0

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

FORB SPECIES	Vicia americana (American vetch)
year	Nested Frequency
2005	-
2008	-
2013	3
2017	5
year	Average Cover (%)
2005	-
2008	-
2013	0.1
2017	0.4

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

Table 17R-16.12 - Shrub and Tree Species. Average modified Daubenmire quadrat and line intercept cover by year.

SHRUB SPECIES	Artemisia tridentata ssp. vaseyana ^p (mountain big sagebrush)	Atriplex canescens ^p (fourwing saltbush)	Bassia prostrata ^{pi} (forage kochia)	Cercocarpus montanus ^p (alderleaf mountain mahogany)	Chrysothamnus viscidiflorus (yellow rabbitbrush)	Ericameria nauseosa (rubber rabbitbrush)	Ericameria parryi (Parry's rabbitbrush)	Eriogonum corymbosum (crisp-leaf buckwheat)	Gutierrezia sarothrae (broom snakeweed)	Juniperus osteosperma ^t (Utah juniper)	Opuntia (pricklypear)	Pinus edulis ^t (twoneedle pinyon)
year	Line Intercept Cover (%)											
2005	-	-	-	1.8	-	-	-	1.1	0.2	14.6	-	6.9
2008	0	0.2	3	0.4	-	-	-	2.4	0.9	-	-	-
2013	0.6	0.8	1.5	1.3	-	0.2	-	2.4	-	0.5	-	-
2017	0.7	0.9	2.1	1.3	0	0.2	0.1	3.2	0.6	0.1	-	-
year	Quadrat Cover (%)											
2005	-	-	-	0.3	-	-	-	1.6	0.6	0.7	0.0	0.0
2008	0.0	0.0	1.4	0.0	0.0	-	-	3.0	0.8	-	-	0.0
2013	0.0	0.6	1.2	1.0	-	0.0	-	1.1	0.0	0.4	0.1	0.0
2017	0.1	0.2	1.7	1.0	0.1	0.4	0.1	3.4	0.7	0.0	0.0	-

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

Table 17R-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)									
2005	-	-	-	-	-	-	-	-	-/-
2008	-	-	-	-	-	-	-	-	15/36
2013	-	-	-	-	-	-	-	-	-/-
2017	20	-	0	100	0	0	0	0	-/-
Artemisia tridentata ssp. vaseyana ^p -- (mountain big sagebrush)									
2005	-	-	-	-	-	-	-	-	30/32
2008	100	20	100	0	0	0	0	0	27/39
2013	240	-	17	83	0	25	58	8	30/37
2017	200	-	0	100	0	20	0	0	43/57
Atriplex canescens ^p -- (fourwing saltbush)									
2005	-	-	-	-	-	-	-	-	-/-
2008	80	-	50	25	25	0	0	0	80/69
2013	40	-	0	50	50	0	0	50	79/89
2017	60	-	0	100	0	0	0	0	75/85
Bassia prostrata ^{pi} -- (forage kochia)									
2005	-	-	-	-	-	-	-	-	-/-
2008	1740	100	26	74	0	2	1	0	44/51
2013	3060	120	24	77	0	9	21	3	16/26
2017	2640	20	1	99	0	0	0	0	19/32
Cercocarpus montanus ^p -- (alderleaf mountain mahogany)									
2005	200	-	0	100	0	20	80	0	95/99
2008	120	-	17	67	17	33	50	0	68/80
2013	140	-	29	71	0	0	57	0	66/78
2017	100	-	0	100	0	0	40	20	76/84
Chrysothamnus viscidiflorus -- (yellow rabbitbrush)									
2005	20	-	0	100	0	0	0	0	16/27
2008	40	60	0	100	0	0	0	0	22/34
2013	20	-	0	100	0	0	0	0	47/73
2017	160	-	0	100	0	0	0	0	14/26

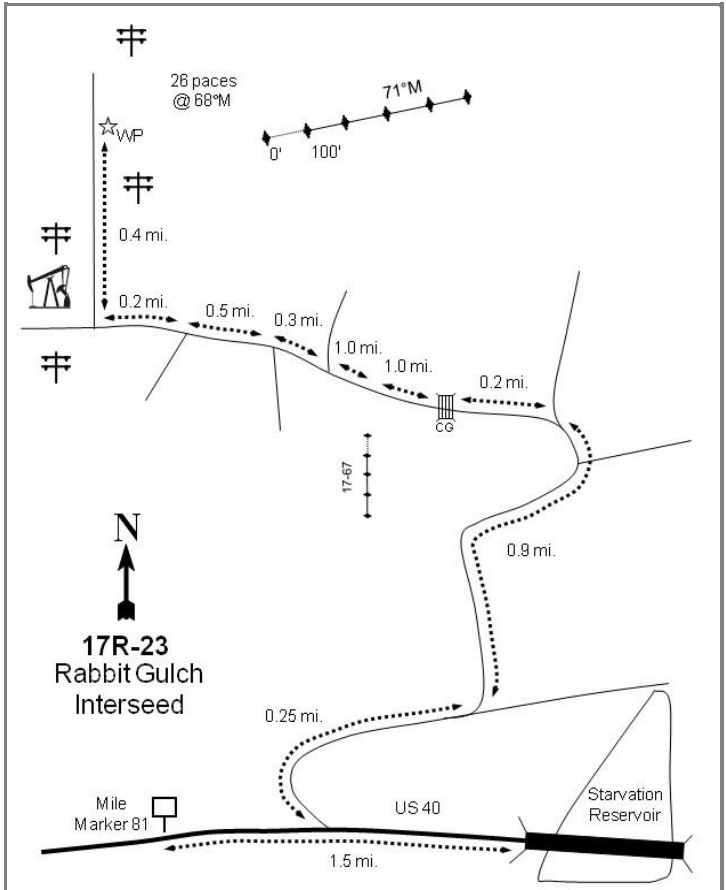
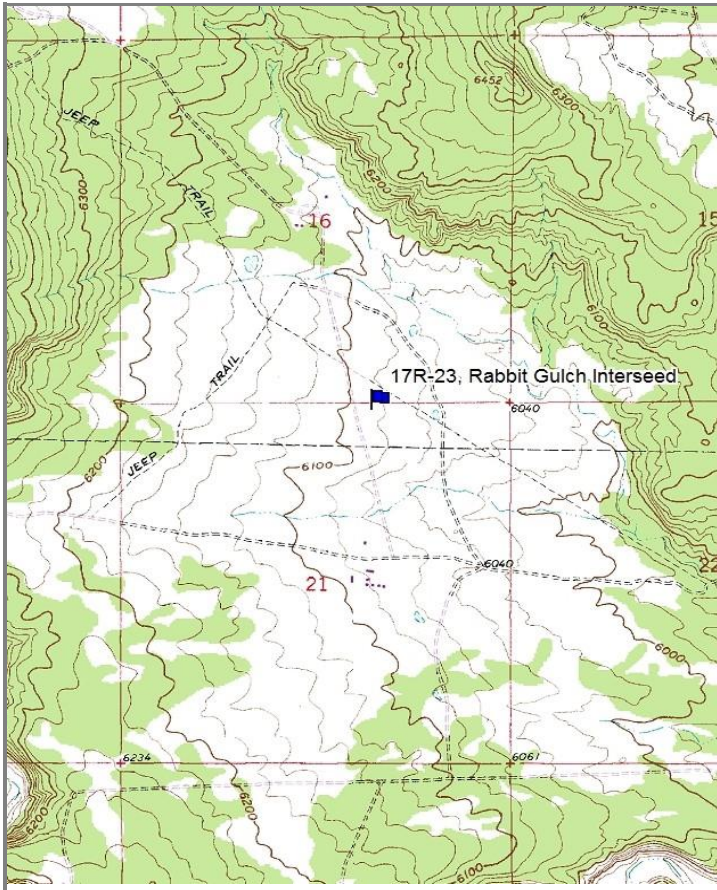
Year	Density		Age Class Distribution			Utilization		Poor Vigor (%)	Average Height Crown (cm)
	Plants Per Acre		Excluding Seedlings			Moderate (%)	Heavy (%)		
	Excluding Seedlings	Seedling	Young (%)	Mature (%)	Decadent (%)				
Eriogonum corymbosum -- (crispleaf buckwheat)									
2005	1300	480	35	62	3	22	11	0	38/47
2008	3560	980	38	57	5	0	0	0	29/45
2013	3760	100	50	51	0	32	9	0	32/43
2017	3700	-	16	84	0	4	1	0	32/40
Ericameria nauseosa -- (rubber rabbitbrush)									
2005	-	-	-	-	-	-	-	-	-/-
2008	-	-	-	-	-	-	-	-	-/-
2013	120	-	67	33	0	67	17	0	24/34
2017	-	-	-	-	-	-	-	-	61/115
Ericameria parryi -- (Parry's rabbitbrush)									
2005	-	-	-	-	-	-	-	-	-/-
2008	-	-	-	-	-	-	-	-	-/-
2013	-	-	-	-	-	-	-	-	-/-
2017	200	-	0	100	0	0	0	0	19/36
Gutierrezia sarothrae -- (broom snakeweed)									
2005	880	-	7	89	5	0	0	0	15/20
2008	720	-	8	92	0	0	0	0	20/35
2013	220	-	73	27	0	0	0	0	13/17
2017	800	100	3	98	0	0	0	0	15/21
Juniperus osteosperma^t -- (Utah juniper)									
2005	40	-	50	50	0	0	0	0	-/-
2008	20	20	100	0	0	0	0	0	-/-
2013	60	-	67	33	0	0	0	0	-/-
2017	60	80	67	0	33	0	0	0	-/-
Linanthus pungens -- (granite prickly phlox)									
2005	-	-	-	-	-	-	-	-	7/13
2008	-	-	-	-	-	-	-	-	10/21
2013	-	-	-	-	-	-	-	-	-/-
2017	-	-	-	-	-	-	-	-	-/-
Opuntia -- (pricklypear)									
2005	80	-	0	75	25	0	0	25	9/39
2008	40	-	100	0	0	0	0	0	8/20
2013	20	-	0	100	0	0	0	0	9/18
2017	20	-	0	100	0	0	0	0	12/36
Pinus edulis^t -- (twoneedle pinyon)									
2005	120	40	67	33	0	0	0	0	-/-
2008	-	40	0	0	0	0	0	0	-/-
2013	40	40	100	0	0	0	0	0	-/-
2017	-	-	-	-	-	-	-	-	-/-
Purshia tridentata^p -- (antelope bitterbrush)									
2005	-	-	-	-	-	-	-	-	24/155
2008	-	-	-	-	-	-	-	-	42/36

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

Table 17R-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)							
2005	70	5	-	5	21	68	62.3
2008	5	-	100	-	-	-	31.0
2013	20	45	45	-	-	9	14.2
2017	20	83	17	-	-	-	1.2
Pinus edulis (twoneedle pinyon)							
2005	48	20	7	13	7	53	23.3
2008	8	17	83	-	-	-	3.7
2013	16	75	13	13	-	-	3.5
2017	1	-	100	-	-	-	2.0

RABBIT GULCH INTERSEED - STUDY NO. 17R-23



Location Information

USGS 7.5 min Map Info
GPS (0' Stake)

Rabbit Gulch NW; Township 3S, Range 6W, Section 21
NAD 83 UTM ZONE 12, 536968 East 4451389 North

Transect Information

Browse Tag # (0' Stake)	145
Transect Bearing	71° 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 Starvation Bridge on US-40, travel west for 1.5 miles to a turnoff on the north side of the road (28000 West). Follow this road for 0.25 miles to a fork. Stay left, drive for 0.9 miles and continue to stay left. Proceed for 0.2 miles to a cattle guard and fence. After the cattle guard, drive for 1.0 mile to a witness post on the left side of the road. From the witness post drive 0.1 miles to a fork and stay left for 0.4 miles to another intersection again staying left. Continue 0.3 miles to an intersection staying right for 0.5 miles to a fork continuing right for 0.2 miles to another intersection. From here turn right (north) and drive 0.4 miles to a witness post on the right (east) side of the road. From the witness post, walk 26 paces at 68 degrees magnetic to the 0-foot stake marked with browse tag #145.

Site Information

Land Ownership	Private
Land Administrator	Private
Allotment	No data
Elevation	6,090ft (1,856m)
Aspect	East
Slope	2-3%
Sample Dates	07/06/2006, 06/30/2010, 06/26/2013, 08/02/2017

Table 17R-23.1 Disturbance History. Recorded history of major disturbances.

Treatment/Disturbance	Name	WRI DB#	Date	Size (acres)
Seeding - Rangeland Drill	Rabbit Gulch Interseeding	420	February-March 2007	129

Table 17R-23.2 Seed Mix. List of known seeded plant species and rates (if available).

Mix Name			Application Type	Application Date	Acres
Rabbit Gulch Interseeding			Drill	Feb 2007	250
Type	Species	Common Name	Cultivar/Source ID	Bulk lbs/acre	PLS lbs/acre
G	Agropyron cristatum	Crested Wheatgrass	Douglas	0.24	0.21
G	Bouteloua gracilis	Blue Grama		0.08	0.03
G	Elymus wawawaiensis	Snake River Wheatgrass	Secar	0.24	0.18
G	Pascopyrum smithii	Western Wheatgrass	Arriba	0.24	0.20
G	Poa secunda	Sandberg Bluegrass	Toole MT	0.24	0.20
G	Psathyrostachys juncea	Russian Wildrye	Bozoisky	0.24	0.22
F	Linum perenne	Blue Flax	Appar	0.24	0.22
F	Medicago sativa	Alfalfa	Ranger	1.00	0.88
F	Onobrychis viciifolia	Sainfoin	Eski	2.00	1.84
F	Sanguisorba minor	Small Burnet	Delar	2.00	1.86
Mix Name			Application Type	Application Date	Acres
Rabbit Gulch Interseeding Shrubs			Drill	Feb 2007	250
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	Atriplex canescens	Fourwing Saltbush	Emery UT	0.55	0.24
S	Atriplex canescens	Fourwing Saltbush	Carbon UT	0.45	0.21
S	Bassia prostrata	Forage Kochia	Immigrant	1.00	0.57
S	Krascheninnikovia lanata	Winterfat	Iron UT	0.50	0.21

Wildlife Habitat and Vegetation History**Table 17R-23.3 - Wildlife Seasonal Habitat.** UDWR wildlife habitat and seasonality.

Species	Habitat	Season
Deer	crucial	winter
Elk	crucial	winter

Table 17R-23.4 - Vegetation History. The dominant vegetation type(s) and phase of woodland succession (Tausch, Miller, Roundy, & Chambers, 2009).

Year	Vegetation Type	Woodland Succession
2006	Perennial Grass	No Encroachment
2010	Perennial Grass	No Encroachment
2013	Perennial Grass	No Encroachment
2017	Perennial Grass	No Encroachment

Site Notes

Rabbit Gulch suffered sagebrush mortality during the summer of 2002.

Soils**Table 17R-23.5 - 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	7.7	64.7	16.4	18.8	0.7	7.4	176.0	0.4	07/06/2006

Site Potential

1981 - 2010 Average Annual Precipitation	10 inches
NRCS Ecological Site	Semidesert Loam (Wyoming Big Sagebrush)
NRCS Ecological Site #	R034BY212UT
States and Transitions	No state and transition model is available for this ecological site.

Perennial grasses, mainly Indian ricegrass (*Achnatherum hymenoides*) and needle and thread (*Hesperostipa comata*), have dominated this site since study establishment in 2006; cover has exhibited an overall increase. Annual grasses are present, but not in large amounts, and perennial and annual forbs have remained rare (Table 17R-23.7, Table 17R- 23.10, Table 17R-23.11). Wyoming big sagebrush (*Artemisia tridentata* ssp. *wyomingensis*) and shadscale saltbush (*Atriplex confertifolia*) have been the dominant browse species in all study years, although they have never been particularly abundant (Table 17R-23.12, Table 17R-23.13).

Trend Summary Tables**Table 17R-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
2006	1.7	1.9	-	2.4	1.6	-
2010	1.5	2.1	-	2.7	2.5	-
2013	2.7	1.6	-	4.4	0.8	-
2017	2.2	2.7	-	2.0	1.6	-

Table 17R-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
2006	37	313	111	48	0.2	13.3	0.8	0.3
2010	19	344	85	63	0.2	17.8	1.7	1.3
2013	31	330	46	67	0.1	15.2	0.8	0.7
2017	281	362	166	53	6.1	22.9	1.3	0.5

Table 17R-23.8 - 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
2006	53.3	8.3	32.8	0.0	-	19.6
2010	51.1	1.9	29.5	-	-	26.4
2013	46.6	2.5	30.7	-	-	25.8
2017	47.2	0.6	26.7	0.0	-	36.8

Table 17R-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	Rocky Mountain Elk	Greater Sage-Grouse	Rabbit
	Quadrat Frequency				
2006	3	26	13	-	58
2010	6	16	13	-	7
2013	-	14	2	-	11
2017	1	7	6	-	52
Year	Days Use Per Acre (ha)				
2006	12.3 (30.5)	22.1 (54.6)	21.5 (53.0)	-	-
2010	11.6 (28.7)	10.0 (24.8)	17.4 (43.0)	-	-
2013	2.2 (5.4)	16.1 (39.7)	4.0 (9.9)	8.7 (21.5)*	-
2017	19.6 (48.4)	14.1 (34.8)	0.7 (1.7)	-	-

*Pellets per acre (ha)

Table 17R-23.10 - 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)	Pascopyrum smithii (western wheatgrass)	Pleuraphis jamesii (James' galleta)	Poa fendleriana (muttongrass)	Poa secunda (Sandberg bluegrass)	Psathyrostachys juncea ⁱ (Russian wildrye)	Pseudoroegneria spicata (bluebunch wheatgrass)	Vulpia octoflora ^a (sixweeks fescue)
year	Nested Frequency											
2006	244	-	2	4	124	-	-	1	5	-	-	35
2010	104	1	9	16	309	-	3	8	9	2	2	10
2013	94	-	10	27	289	-	7	-	17	-	-	21
2017	60	6	133	8	320	2	12	-	41	4	3	201
year	Average Cover (%)											
2006	9.1	-	0.0	0.0	4.1	-	-	0.0	0.0	-	-	0.2
2010	2.7	0.1	0.1	0.8	13.9	-	0.1	0.1	0.1	0.0	0.0	0.1
2013	2.8	-	0.1	0.4	11.8	-	0.1	-	0.2	-	-	0.1
2017	1.7	0.2	3.5	0.2	19.8	0.0	0.2	-	0.7	0.0	0.0	2.6

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

Table 17R-23.11 - Forb Species. Nested frequency and modified Daubenmire average cover by year.

FORB SPECIES	Alyssum desertorum ^{ai} (desert madwort)	Androsiphium breviflorum (pink funnel lily)	Calochortus nuttallii (sego lily)	Chaetopappa ericoides (rose heath)	Chenopodium leptophyllum ^a (narrowleaf goosefoot)	Collinsia parviflora ^a (maiden blue eyed Mary)	Cymopterus (springparsley)	Descurainia pinnata ^a (western tansymustard)	Draba ^a (draba)	Eriogonum cernuum ^a (nodding buckwheat)	Halogeton glomeratus ^{ai} (saltflower)	Lappula occidentalis ^a (flatspine stickseed)	Lepidium ^a (pepperweed)	Machaeranthera canescens (hoary tansyaster)	Mentzelia albicaulis ^a (whitestem blazingstar)	Oenothera (evening primrose)	Phacelia ivesiana ^a (Ives' phacelia)
year	Nested Frequency																
2006	-	-	-	6	-	-	-	14	2	15	56	31	-	4	-	-	-
2010	2	-	5	9	3	-	-	5	10	-	22	41	-	-	-	1	-
2013	2	13	-	11	7	5	4	3	-	-	14	-	4	-	1	-	16
2017	13	-	-	10	-	1	-	7	8	-	-	20	3	-	-	-	1
year	Average Cover (%)																
2006	-	-	-	0.1	-	-	-	0.1	0.0	0.1	0.5	0.1	-	0.0	-	-	-
2010	0.0	-	0.0	0.2	0.0	-	-	0.0	0.0	-	0.5	0.5	-	-	-	0.0	-
2013	0.0	0.0	-	0.2	0.2	0.0	0.0	0.0	-	-	0.3	-	0.0	-	0.0	-	0.1
2017	0.0	-	-	0.2	-	0.0	-	0.0	0.1	-	-	0.2	0.0	-	-	-	0.0

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

FORB SPECIES					
	<i>Plantago patagonica</i> ^a (woolly plantain)				
	<i>Salsola tragus</i> ^{ai} (prickly Russian thistle)				
	<i>Schoenocrambe limifolia</i> (flaxleaf plainsmustard)				
	<i>Sphaeralcea grossularifolia</i> (gooseberry/leaf globemallow)				
	<i>Townsendia</i> (Townsend daisy)				
year	Nested Frequency				
2006	6	1	4	35	-
2010	30	-	8	38	4
2013	5	2	12	29	5
2017	138	-	9	33	1
year	Average Cover (%)				
2006	0.0	0.0	0.0	0.2	-
2010	0.7	-	0.1	1.0	0.0
2013	0.0	0.1	0.0	0.4	0.0
2017	1.0	-	0.0	0.3	0.0

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

Table 17R-23.12 - Shrub and Tree Species. Average modified Daubenmire quadrat and line intercept cover by year.

SHRUB SPECIES						
	<i>Artemisia tridentata</i> ssp. <i>wyomingensis</i> ^p (Wyoming big sagebrush)					
	<i>Atriplex confertifolia</i> ^p (shadscale saltbush)					
	<i>Bassia prostrata</i> ^{pi} (forage kochia)					
	<i>Gutierrezia sarothrae</i> (broom snakeweed)					
	<i>Krascheninnikovia lanata</i> ^p (winterfat)					
	<i>Opuntia</i> (pricklypear)					
year	Line Intercept Cover (%)					
2006	0.8	1.5	-	0.1	0.1	1.5
2010	0.4	2.1	-	-	0.2	2.5
2013	1.9	2.2	0.2	-	0.1	0.8
2017	1	0.7	-	1	0.3	0.6
year	Quadrat Cover (%)					
2006	1.0	0.6	-	0.6	0.2	1.3
2010	0.4	0.8	-	0.1	0.3	2.0
2013	2.1	0.3	0.0	0.2	0.3	1.4
2017	1.4	0.4	0.1	1.4	0.4	1.3

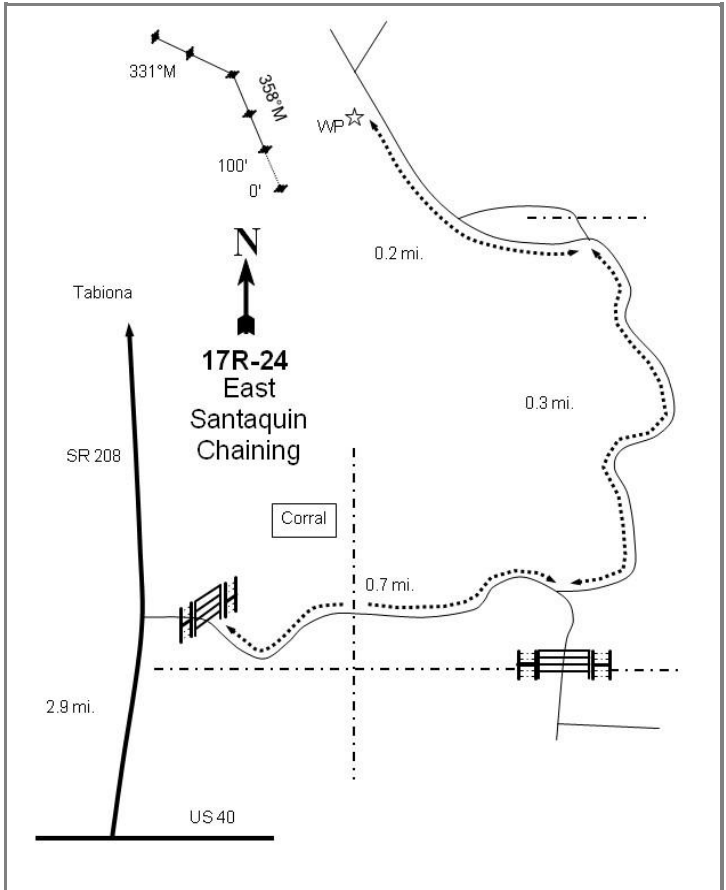
t - Tree Species; p - Preferred Browse; i - Introduced Species

Table 17R-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. wyomingensis^P -- (Wyoming big sagebrush)									
2006	220	1120	0	9	91	27	9	82	41/62
2010	840	-	50	36	14	14	17	12	41/69
2013	620	-	52	32	16	10	32	13	37/61
2017	500	-	20	60	20	24	16	20	35/52
Atriplex confertifolia^P -- (shadscale saltbush)									
2006	420	740	19	62	19	0	0	10	30/64
2010	440	-	14	86	0	5	0	0	33/72
2013	480	-	25	71	4	4	4	13	37/73
2017	400	-	0	90	10	0	0	10	26/47
Bassia prostrata^{Pi} -- (forage kochia)									
2006	-	-	-	-	-	-	-	-	-/-
2010	20	-	0	100	0	0	0	0	23/34
2013	260	-	54	46	0	0	8	0	11/27
2017	260	-	0	100	0	8	0	0	9/24
Gutierrezia sarothrae -- (broom snakeweed)									
2006	520	20	8	85	8	19	4	96	13/23
2010	220	-	9	91	0	0	0	0	19/28
2013	460	-	4	91	4	0	0	0	17/22
2017	1180	-	5	95	0	0	0	0	18/27
Krascheninnikovia lanata^P -- (winterfat)									
2006	260	160	62	39	0	8	8	23	12/24
2010	400	20	0	100	0	60	25	10	19/23
2013	680	20	15	85	0	59	24	18	16/22
2017	680	20	3	97	0	9	15	0	15/24
Opuntia -- (pricklypear)									
2006	1220	-	2	85	13	0	0	7	12/44
2010	1520	-	0	99	1	0	0	1	13/53
2013	1780	40	0	97	3	0	1	53	12/34
2017	2500	-	4	94	2	0	0	21	13/31

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

EAST SANTAQUIN CHAINING - STUDY NO. 17R-24

**Location Information**

USGS 7.5 min Map Info
GPS (0' Stake)

Tabiona SW; Township 3S, Range 7W, Section 05
NAD 83 UTM ZONE 12, 525694 East 4455581 North

Transect Information

Browse Tag # (0' Stake)	146
Transect Bearing	355° magnetic (Lines 4-5: 331° 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 US-40, drive north on SR-208 for 2.9 miles to a gated road on the right. Turn here, pass through the gate, and proceed for for 0.7 miles to a fork: turn left and follow the road for 0.3 miles to a fence. Veer left and drive for 0.2 miles to a witness post on the left (west) side of the road. Walk 15 paces at 265 degrees magnetic to the 0-foot stake which is marked with browse tag #146.

Site Information

Land Ownership	State
Land Administrator	UDWR
Allotment	No data
Elevation	6,900ft (2,103m)
Aspect	NW
Slope	3-5%
Sample Dates	07/07/2006, 06/30/2010, 06/25/2013, 07/31/2017

Table 17R-24.1 Disturbance History. Recorded history of major disturbances.

Treatment/Disturbance	Name	WRI DB#	Date	Size (acres)
Chaining - Two-Way Ely/Smooth	East Santaquin Draw P/J Chaining	367	September-October 2006	449
Seeding - Aerial Before	East Santaquin Draw P/J Chaining	367	September 2006	449
Seeding - Dribbler	East Santaquin Draw P/J Chaining	367	September-October 2006	449
Seeding - Aerial After	East Santaquin Draw P/J Chaining	367	January 2007	449

Table 17R-24.2 Seed Mix. List of known seeded plant species and rates (if available).

Mix Name			Application Type	Application Date	Acres
Santaquin East P-J Chaining			Aerial	Sep 2006	500
Type	Species	Common Name	Cultivar/Source ID	Bulk lbs/acre	PLS lbs/acre
G	<i>Agropyron cristatum</i>	Crested Wheatgrass	Ephraim	0.03	0.03
G	<i>Agropyron cristatum</i>	Crested Wheatgrass	Hycrest	1.00	0.90
G	<i>Dactylis glomerata</i>	Orchardgrass	Paiute	0.20	0.19
G	<i>Elymus lanceolatus</i>	Thickspike Wheatgrass	Bannock	1.00	0.92
G	<i>Elymus wawawaiensis</i>	Snake River Wheatgrass	Secar	0.50	0.46
G	<i>Poa secunda</i>	Canby Bluegrass	Canbar	0.25	0.23
G	<i>Psathyrostachys juncea</i>	Russian Wildrye		1.00	0.85
G	<i>Psathyrostachys juncea</i>	Russian Wildrye		0.03	0.02
F	<i>Linum perenne</i>	Blue Flax		0.25	0.22
F	<i>Medicago sativa</i>	Alfalfa	Ladak	0.30	0.28
F	<i>Medicago sativa</i>	Alfalfa	Nomad	0.30	0.27
F	<i>Medicago sativa</i>	Alfalfa	Ranger	0.40	0.35
F	<i>Onobrychis viciifolia</i>	Sainfoin	Eski	2.00	1.77
F	<i>Sanguisorba minor</i>	Small Burnet	Delar	2.00	1.86
S	<i>Atriplex canescens</i>	Fourwing Saltbush	Juab/Tooele UT	1.00	0.51
Mix Name			Application Type	Application Date	Acres
Santaquin East P-J Chaining - Dribble mix			Dribbler	Sep 2006	500
Type	Species	Common Name	Cultivar/Source ID	Bulk lbs/acre	PLS lbs/acre
F	<i>Sanguisorba minor</i>	Small Burnet	Delar	0.10	0.09
S	<i>Cercocarpus montanus</i>	True Mountain Mahogany		0.05	0.04
S	<i>Ephedra viridis</i>	Green Ephedra		0.10	0.09
S	<i>Purshia tridentata</i>	Bitterbrush	Millard UT	0.05	0.04
Mix Name			Application Type	Application Date	Acres
Santaquin East P-J Chaining Browse			Aerial	Jan 2007	500
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	Sanpete UT	1.00	0.20
S	<i>Bassia prostrata</i>	Forage Kochia	Beaver UT	1.00	0.70

Wildlife Habitat and Vegetation History**Table 17R-24.3 - Wildlife Seasonal Habitat.** UDWR wildlife habitat and seasonality.

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

Table 17R-24.4 - Vegetation History. The dominant vegetation type(s) and phase of woodland succession (Tausch, Miller, Roundy, & Chambers, 2009).

Year	Vegetation Type	Woodland Succession
2006	Pinyon-Juniper	Phase III
2010	Perennial Grass/Mixed Browse	Phase I
2013	Perennial Grass/Mixed Browse	Phase I
2017	Perennial Grass/Mixed Browse	Phase I

Site Notes

Over 217,000 acres of the Uintah Basin/Northeastern Region suffered sagebrush (*Artemisia sp.*) die-off following a six- year drought. Deer carcasses and limbs were found on site in 2017.

Soils

Table 17R-24.5 - 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	72.7	14.4	12.8	1.3	9.4	83.2	0.4	07/07/2006

Site Potential

1981 - 2010 Average Annual Precipitation 13 inches
 NRCS Ecological Site Upland Loam (Mountain Big Sagebrush)
 NRCS Ecological Site # 047XC310UT
 States and Transitions No state and transition model is available for this ecological site.

When established in 2006, this site was dominated by twoneedle pinyon (*Pinus edulis*) and Utah juniper (*Juniperus osteosperma*) and was considered to be within Phase III of woodland succession (photos, Table 17R-24.4, Table 17R- 24.14). After treatment, the browse component diversified and became a co-dominant site component, with forage kochia (*Bassia prostrata*), mountain big sagebrush (*Artemisia tridentata* ssp. *vaseyana*), and antelope bitterbrush (*Purshia tridentata*) contributing the most preferred browse cover (Table 17R-24.12, Table 17R-24.13). The herbaceous understory also increased in cover and diversity following treatment. Perennial grasses -- particularly the native species thickspike wheatgrass (*Elymus lanceolatus*), Indian ricegrass (*Achnatherum hymenoides*), and needle and thread (*Hesperostipa comata*) -- have provided the most herbaceous cover and were considered to be co-dominant with mixed browse in each post-treatment sample year. The introduced annual grass species cheatgrass (*Bromus tectorum*) was observed in all sample years, but with low abundance. Annual and perennial forbs have remained rare (Table 17R-24.7, Table 17R-24.10, Table 17R-24.11).

Trend Summary Tables

Table 17R-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
2006	1.0	2.6	2.0	1.3	2.8	30.0
2010	5.6	0.4	0.3	7.5	1.0	0.6
2013	9.1	0.3	0.1	11.7	0.4	0.6
2017	11.7	0.3	0.4	15.1	0.4	-

Table 17R-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
2006	76	245	61	65	0.6	3.8	0.2	0.6
2010	129	288	35	68	2.1	13.3	0.1	1.4
2013	61	368	22	59	0.1	11.4	0.1	0.7
2017	38	404	20	82	0.2	22.0	0.2	0.9

Table 17R-24.8 - 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
2006	34.5	2.2	58.1	0.0	2.4	10.1
2010	20.3	0.2	59.2	0.0	0.5	24.9
2013	21.3	0.1	59.1	0.0	0.9	28.3
2017	17.6	0.3	58.2	0.1	1.1	35.7

Table 17R-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	Rocky Mountain Elk	Rabbit
	Quadrat Frequency			
2006	-	27	22	70
2010	3	19	7	9
2013	2	8	22	31
2017	3	15	22	57
Year	Days Use Per Acre (ha)			
2006	-	42.2 (104.3)	48.3 (119.2)	-
2010	8.7 (21.5)	12.8 (31.5)	18.7 (46.3)	-
2013	14.5 (35.9)	7.4 (18.2)	75.1 (185.4)	-
2017	2.2 (5.4)	10.7 (26.5)	30.8 (76.1)	-

Table 17R-24.10 - 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)	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										
2006	95	-	76	91	1	-	29	94	37	-	-
2010	75	76	129	34	3	61	64	97	41	-	11
2013	44	77	61	69	3	199	88	45	6	5	10
2017	40	36	38	65	53	255	66	25	17	2	24
year	Average Cover (%)										
2006	2.1	-	0.6	0.4	0.0	-	0.5	0.3	0.4	-	-
2010	2.9	2.5	2.1	0.5	0.0	1.7	2.4	2.6	0.4	-	0.3
2013	2.2	1.5	0.1	0.5	0.0	4.3	2.2	0.4	0.0	0.0	0.2
2017	3.3	1.7	0.2	0.5	3.5	8.4	2.3	0.6	0.1	0.0	1.6

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

Table 17R-24.11 - Forb Species. Nested frequency and modified Daubenmire average cover by year.

FORB SPECIES	Antennaria (pussytoes)	Arabis (rockcress)	Arabis lignifera (desert rockcress)	Astragalus convallarius (lesser rusby milkvetch)	Carduus nutans ^{ani} (nodding plumelless thistle)	Chenopodium fremontii ^a (Fremont's goosefoot)	Chenopodium leptophyllum ^a (narrowleaf goosefoot)	Cryptantha (cryptantha)	Descurainia pinnata ^a (western tansymustard)	Draba ^a (draba)	Eriogonum (buckwheat)	Gayophytum ramosissimum ^a (pinyon groundsmoke)	Gilia inconspicua ^a (shy gilia)	Ipomopsis aggregata (scarlet gilia)	Ipomopsis congesta (ballhead ipomopsis)	Lappula occidentalis ^a (flatspine stickseed)	Linum perenne ⁱ (blue flax)
year	Nested Frequency																
2006	-	0	-	-	-	-	-	2	1	1	-	2	2	42	-	28	-
2010	-	-	-	2	-	12	13	9	3	-	3	-	-	1	6	3	12
2013	1	4	-	-	-	7	6	5	1	-	-	-	-	16	3	9	12
2017	-	9	2	2	3	-	2	-	4	-	-	-	-	13	2	6	1
year	Average Cover (%)																
2006	-	0.0	-	-	-	-	-	0.0	0.0	0.0	-	0.0	0.0	0.1	-	0.1	-
2010	-	-	-	0.0	-	0.0	0.1	0.1	0.0	-	0.0	-	-	0.0	0.1	0.0	0.2
2013	0.0	0.0	-	-	-	0.0	0.0	0.0	0.0	-	-	-	-	0.1	0.0	0.0	0.1
2017	-	0.0	0.0	0.0	0.1	-	0.0	-	0.0	-	-	-	-	0.1	0.0	0.0	0.0

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

FORB SPECIES	Medicago sativa ⁱ (alfalfa)	Onobrychis vicifolia ⁱ (sainfoin)	Packera multilobata (lobeleaf groundsel)	Penstemon cyananthus (Wasatch beardtongue)	Phlox austromontana (mountain phlox)	Polygonum douglasii ^a (Douglas' knotweed)	Sanguisorba minor ⁱ (small burnet)	Sisymbrium altissimum ^{ai} (tall tumblemustard)	Taraxacum officinale (common dandelion)	Tragopogon dubius ^{ai} (yellow salsify)
year	Nested Frequency									
2006	-	-	24	1	-	32	-	-	-	-
2010	7	3	33	2	-	4	2	-	-	-
2013	-	-	20	9	-	-	-	-	2	1
2017	-	-	48	6	6	3	-	2	-	-
year	Average Cover (%)									
2006	-	-	0.5	0.0	-	0.1	-	-	-	-
2010	0.1	0.2	0.4	0.2	-	0.0	0.1	-	-	-
2013	-	-	0.1	0.4	-	-	-	-	0.0	0.0
2017	-	-	0.5	0.1	0.2	0.0	-	0.0	-	-

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

Table 17R-24.12 - 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 ^{pi} (forage kochia)	Cercocarpus montanus ^p (alderleaf mountain mahogany)	Chrysothamnus viscidiflorus ssp. viscidiflorus var. viscidiflorus (yellow rabbitbrush)	Juniperus osteosperma ⁱ (Utah juniper)	Linanthus pungens (granite prickly phlox)	Opuntia (pricklypear)	Opuntia fragilis (brittle pricklypear)	Pinus edulis ⁱ (twoneedle pinyon)	Purshia tridentata ^p (antelope bitterbrush)
year	Line Intercept Cover (%)									
2006	-	-	-	0.1	8.5	-	0.6	2.1	21.5	1.3
2010	1.3	4.6	-	-	-	0.3	0.1	0.6	0.6	1.6
2013	3.2	5	0.8	0.2	0	0.2	0	0	0.6	2.7
2017	6	4.8	0.7	0.2	-	0.1	0	0.1	-	3.6
year	Quadrat Cover (%)									
2006	-	-	-	0.0	1.3	-	0.6	2.0	0.7	1.0
2010	1.1	2.8	-	-	-	0.2	0.0	0.2	0.3	1.6
2013	2.9	4.5	0.6	0.0	0.0	0.2	0.0	0.1	0.1	1.2
2017	5.0	5.2	0.4	0.0	0.0	0.1	0.0	0.1	0.4	1.2

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

Table 17R-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 (%)				
Amelanchier utahensis^P -- (Utah serviceberry)									
2006	-	-	-	-	-	-	-	-	49/101
2010	-	-	-	-	-	-	-	-	77/140
2013	-	-	-	-	-	-	-	-	113/190
2017	-	-	-	-	-	-	-	-	-/-
Artemisia tridentata ssp. vaseyana^P -- (mountain big sagebrush)									
2006	-	-	-	-	-	-	-	-	36/55
2010	800	-	18	83	0	10	0	5	41/40
2013	940	40	19	81	0	43	15	0	51/53
2017	1020	40	10	88	2	45	14	2	66/91
Atriplex canescens^P -- (fourwing saltbush)									
2006	-	-	-	-	-	-	-	-	-/-
2010	-	-	-	-	-	-	-	-	79/114
2013	-	-	-	-	-	-	-	-	-/-
2017	-	-	-	-	-	-	-	-	128/195
Bassia prostrata^{PI} -- (forage kochia)									
2006	-	-	-	-	-	-	-	-	-/-
2010	2900	9580	37	63	0	5	8	4	25/46
2013	6700	1480	75	25	0	7	0	0	25/35
2017	8040	40	14	86	0	3	0	0	15/29
Cercocarpus montanus^P -- (alderleaf mountain mahogany)									
2006	-	-	-	-	-	-	-	-	60/103
2010	-	20	0	0	0	0	0	0	70/73
2013	20	-	0	100	0	0	100	0	73/82
2017	20	-	0	100	0	100	0	0	115/133
Chrysothamnus viscidiflorus ssp. viscidiflorus var. viscidiflorus -- (yellow rabbitbrush)									
2006	20	40	0	100	0	0	0	0	29/50
2010	120	-	33	67	0	0	33	17	26/59
2013	160	-	50	50	0	0	0	25	34/65
2017	180	-	44	56	0	0	0	0	44/93
Ephedra viridis^P -- (mormon tea)									
2006	-	-	-	-	-	-	-	-	-/-
2010	-	-	-	-	-	-	-	-	29/8
2013	-	-	-	-	-	-	-	-	-/-
2017	-	-	-	-	-	-	-	-	-/-
Ericameria nauseosa -- (rubber rabbitbrush)									
2006	-	-	-	-	-	-	-	-	-/-
2010	-	-	-	-	-	-	-	-	-/-
2013	-	-	-	-	-	-	-	-	63/63
2017	-	-	-	-	-	-	-	-	-/-
Juniperus osteosperma^L -- (Utah juniper)									
2006	60	-	0	100	0	0	0	0	-/-
2010	-	20	0	0	0	0	0	0	-/-
2013	20	80	100	0	0	0	0	0	-/-
2017	40	-	100	0	0	0	0	0	-/-
Linanthus pungens -- (granite prickly phlox)									
2006	40	-	0	100	0	100	0	0	10/18
2010	300	-	7	93	0	0	0	0	11/33
2013	180	-	44	56	0	0	22	0	9/16
2017	100	-	0	100	0	0	0	0	10/18
Opuntia fragilis -- (brittle pricklypear)									
2006	6260	20	27	69	4	0	0	2	6/26
2010	3640	340	18	82	0	0	0	3	5/15
2013	840	-	19	81	0	0	0	19	5/13
2017	2000	-	2	95	3	0	0	1	4/9
Opuntia -- (pricklypear)									
2006	440	-	0	77	23	0	0	23	10/45
2010	140	-	71	29	0	0	0	0	12/36
2013	360	-	11	83	6	0	0	6	8/17
2017	280	-	14	86	0	0	0	0	9/24

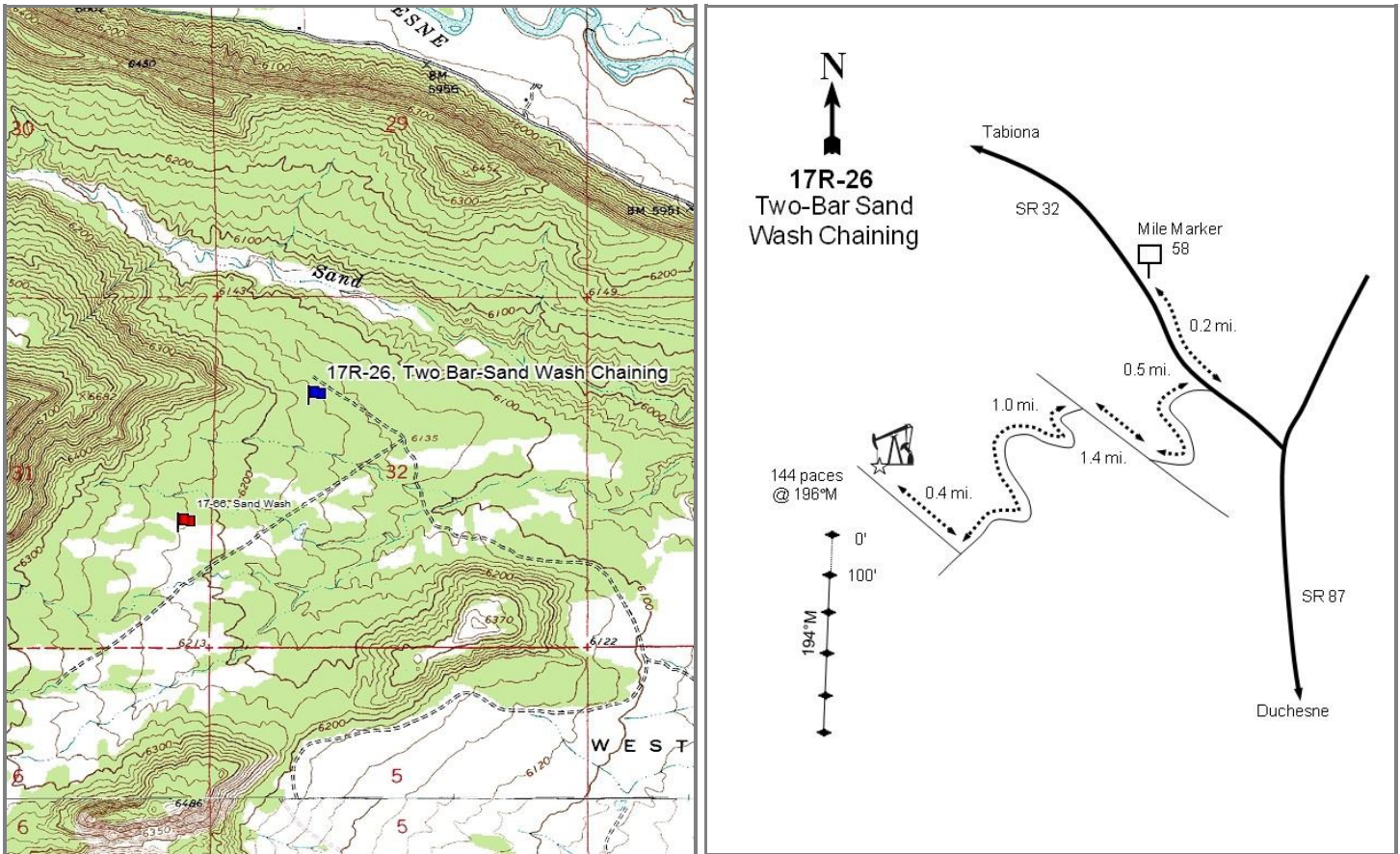
Year	Density		Age Class Distribution			Utilization		Poor Vigor (%)	Average Height Crown (cm)
	Plants Per Acre		Excluding Seedlings			Moderate (%)	Heavy (%)		
	Excluding Seedlings	Seedling	Young (%)	Mature (%)	Decadent (%)				
Pinus edulis ^t -- (twoneedle pinyon)									
2006	40	20	0	100	0	0	0	0	- / -
2010	40	20	50	50	0	0	0	0	- / -
2013	40	-	50	50	0	0	0	0	- / -
2017	-	-	-	-	-	-	-	-	- / -
Purshia tridentata ^p -- (antelope bitterbrush)									
2006	80	-	0	100	0	25	50	0	42/183
2010	180	-	22	78	0	0	0	0	45/90
2013	200	-	0	100	0	0	100	0	54/106
2017	160	-	13	88	0	0	75	0	73/138

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

Table 17R-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 osteosperma (Utah juniper)							
2006	41	-	5	5	5	84	53.7
2010	2	-	100	-	-	-	1.0
2013	10	67	-	-	-	33	17.3
2017	14	29	43	14	-	14	13.3
Pinus edulis (twoneedle pinyon)							
2006	45	7	7	-	-	87	43.3
2010	19	50	33	17	-	-	2.8
2013	18	17	67	-	-	17	8.8
2017	4	50	-	-	-	50	30.5

TWO BAR-SAND WASH CHAINING - STUDY NO. 17R-26

**Location Information**

USGS 7.5 min Map Info
GPS (0' Stake)

Talmage SW; Township 2S, Range 5W, Section 32
NAD 83 UTM ZONE 12, 544307 East 4457436 North

Transect Information

Browse Tag # (0' Stake)	195
Transect Bearing	194° magnetic
Length	500ft
Belt Placement	Line 1 (11ft), Line 2 (34ft), Line 3 (59ft), Line 4 (71ft), Line 5 (95ft)
Belt Marker Placement	Belt 3: 4ft

Directions to Site

From Tabiona, travel southeast on State Road 32 to mile marker 58 continuing on 0.2 miles to road coming into the right. Turn here and go 0.5 miles to a fork, stay right and go 1.4 miles to another fork. Here turn left and travel 1 mile to fork going right for 0.4 miles to natural gas pump pad on the right side of the road. The 0-foot stake is 114 paces from the oil derrick at 196 degrees magnetic and is marked with browse tag #195.

Site Information

Land Ownership	State
Land Administrator	UDWR
Allotment	No data
Elevation	6,200ft (1,890m)
Aspect	NE
Slope	5%
Sample Dates	07/06/2007, 06/29/2010, 06/27/2013, 08/02/2017

Table 17R-26.1 Disturbance History. Recorded history of major disturbances.

Treatment/Disturbance	Name	WRI DB#	Date	Size (acres)
Chaining - Two-Way Ely Chain	2-bar Pinyon and Juniper Thinning	368	September-October 2007	978
Seeding - Dribbler	2-bar Pinyon and Juniper Thinning	368	September-October 2007	978
Seeding - Aerial After	2-bar Pinyon and Juniper Thinning	368	October 2007	978
Seeding - Aerial After	2-bar Pinyon and Juniper Thinning	368	January 2008	978

Table 17R-26.2 Seed Mix. List of known seeded plant species and rates (if available).

Mix Name		Application Type	Application Date	Acres	
2-Bar PJ thinning- Sand Wash		Aerial	Oct 2007	400	
Type	Species	Common Name	Cultivar/Source ID	Bulk lbs/acre	PLS lbs/acre
G	<i>Achnatherum hymenoides</i>	Indian Ricegrass	Rimrock	1.00	0.87
G	<i>Agropyron cristatum</i>	Crested Wheatgrass	Douglas	0.50	0.42
G	<i>Agropyron cristatum</i>	Crested Wheatgrass	Hycrest	0.50	0.46
G	<i>Elymus lanceolatus</i>	Thickspike Wheatgrass	Critana	1.00	0.92
G	<i>Elymus wawawaiensis</i>	Snake River Wheatgrass	Secar	0.50	0.40
G	<i>Poa secunda</i>	Canby Bluegrass	Canbar	0.25	0.22
G	<i>Psathyrostachys juncea</i>	Russian Wildrye		0.32	0.26
G	<i>Psathyrostachys juncea</i>	Russian Wildrye		0.43	0.36
G	<i>Sporobolus cryptandrus</i>	Sand Dropseed		0.05	0.05
G	<i>Thinopyrum intermedium</i>	Pubescent Wheatgrass		0.50	0.42
F	<i>Linum perenne</i>	Blue Flax	Appar	0.25	0.23
F	<i>Medicago sativa</i>	Alfalfa	Ladak	0.50	0.46
F	<i>Medicago sativa</i>	Alfalfa	Ranger	0.50	0.44
F	<i>Sanguisorba minor</i>	Small Burnet	Delar	2.00	1.86
Mix Name		Application Type	Application Date	Acres	
2-Bar PJ thinning- Dribbler		Dribbler	Sep 2007	1000	
Type	Species	Common Name	Cultivar/Source ID	Bulk lbs/acre	PLS lbs/acre
S	<i>Atriplex canescens</i>	Fourwing Saltbush	Carbon UT	0.01	0.01
S	<i>Atriplex canescens</i>	Fourwing Saltbush	Lincoln NV	0.19	0.07
S	<i>Cercocarpus montanus</i>	True Mountain Mahogany	Sevier UT	0.05	0.04
S	<i>Purshia tridentata</i>	Bitterbrush	Elko NV	0.15	0.14
Mix Name		Application Type	Application Date	Acres	
Two Bar PJ Thinning Sagebrush		Aerial	Jan 2008	925	
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	Iron UT	1.04	0.22

Wildlife Habitat and Vegetation History**Table 17R-26.3 - Wildlife Seasonal Habitat.** UDWR wildlife habitat and seasonality.

Species	Habitat	Season
Deer	crucial	winter
Elk	crucial	winter

Table 17R-26.4 - Vegetation History. The dominant vegetation type(s) and phase of woodland succession (Tausch, Miller, Roundy, & Chambers, 2009).

Year	Vegetation Type	Woodland Succession
2007	Pinyon-Juniper	Phase III
2010	Perennial Grass/Pinyon-Juniper	Phase I transitioning to Phase II
2013	Perennial Grass/Black Sagebrush/Pinyon-Juniper	Phase I transitioning to Phase II
2017	Perennial Grass/Black Sagebrush/Pinyon-Juniper	Phase I transitioning to Phase II

Site Notes

The study was established in 2007 to monitor a twoneedle pinyon (*Pinus edulis*) and Utah juniper (*Juniperus osteosperma*) thinning project on the Tabby Mountain Wildlife Management Area (WMA). The area serves as deer and elk wintering habitat, but twoneedle pinyon (*Pinus edulis*) and Utah juniper (*Juniperus osteosperma*) encroachment has eliminated much of the sagebrush habitat. The objectives of the project were to restore the sagebrush steppe and improve mule deer and elk winter habitat (WRI Database 2014).

Soils

Table 17R-26.5 - 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	57.4	19.0	23.6	1.6	9.5	115.2	0.8	07/06/2007

Site Potential

1981 - 2010 Average Annual Precipitation 10 inches
 NRCS Ecological Site Upland Shallow Loam (Black Sagebrush)
 NRCS Ecological Site # R034XY320UT
 States and Transitions No state and transition model is available for the above ecological site.

When established in 2007, this site was dominated by encroaching pinyon pine (*Pinus edulis*) and Utah juniper (*Juniperus osteosperma*) with a scattered stretches of black sagebrush (*Artemisia nova*). The herbaceous understory was sparse and not very diverse, following the chaining there was an initial release of forbs that declined thereafter (Table 17R-26.11). Perennial native grasses increased following treatment, with Indian ricegrass (*Achnatherum hymenoides*) being the dominant species (Table 17R-26.10). After the treatment, black sagebrush became the dominant browse species (Table 17R-26.13). There is a fair amount of mature pinyon pine remaining on the site, increasing the vulnerability of this site to further woodland encroachment (Table 17R-26.14). It is likely that this site will remain in a perennial grass and sagebrush dominated ecosystem with a continued gradual increase of conifer cover.

Trend Summary Tables**Table 17R-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
2007	3.8	2.3	6.4	3.4	1.6	22.1
2010	2.6	3.2	1.8	3.9	2.0	5.1
2013	2.3	1.3	1.5	6.9	0.8	8.3
2017	5.1	2.5	2.5	6.6	2.4	4.0

Table 17R-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
2007	-	28	26	16	-	0.2	0.1	0.0
2010	15	89	270	86	0.2	4.9	9.1	4.5
2013	55	182	62	46	0.2	10.0	1.1	1.0
2017	70	208	15	39	2.1	14.3	0.1	0.7

Table 17R-26.8 - 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
2007	54.8	5.4	34.5	0.0	1.3	13.7
2010	45.0	0.5	42.3	0.2	1.6	24.8
2013	37.8	0.2	45.4	0.6	1.3	20.7
2017	46.5	0.2	41.9	0.8	1.5	24.3

Table 17R-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	Coyote	Mule Deer	Rocky Mountain Elk	Rabbit
	Quadrat Frequency				
2007	-	-	18	11	51
2010	-	-	16	1	16
2013	-	-	13	8	23
2017	-	-	19	14	50
Year	Days Use Per Acre (ha)				
2007	0.7 (1.8)	17.4 (43.0)*	36.2 (89.4)	5.3 (13.2)	-
2010	0.7 (1.8)	-	32.2 (79.5)	-	-
2013	-	-	19.4 (48.0)	3.4 (8.3)	-
2017	-	-	68.3 (168.8)	28.1 (69.5)	-

*Pellets per acre (ha)

Table 17R-26.10 - 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)	Elymus lanceolatus (thickspike wheatgrass)	Hesperostipa comata (needle and thread)	Pleuraphis jamesii (James' galleta)	Psathyrostachys juncea ⁱ (Russian wildrye)	Pseudoroegneria spicata (bluebunch wheatgrass)	Thinopyrum intermedium ⁱ (intermediate wheatgrass)	Vulpia octoflora ^a (sixweeks fescue)
year	Nested Frequency										
2007	11	-	-	2	-	-	4	-	15	-	-
2010	44	20	15	14	12	3	-	-	1	6	-
2013	83	21	54	58	37	19	-	0	1	1	1
2017	83	25	64	47	71	31	-	-	3	-	7
year	Average Cover (%)										
2007	0.1	-	-	0.0	-	-	0.0	-	0.1	-	-
2010	3.5	0.4	0.2	0.5	0.1	0.1	-	-	0.0	0.2	-
2013	6.5	0.4	0.2	1.6	0.7	0.5	-	0.0	0.1	0.0	0.0
2017	9.1	0.9	2.0	1.1	2.0	1.3	-	-	0.0	-	0.1

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

Table 17R-26.11 - Forb Species. Nested frequency and modified Daubenmire average cover by year.

FORB SPECIES	Arabis (rockcress)	Arenaria (sandwort)	Astragalus convallarius (lesser rushy milkvetch)	Astragalus spatulatus (tufted milkvetch)	Astragalus utahensis (Utah milkvetch)	Castilleja linariifolia (Wyoming Indian paintbrush)	Caulanthus crassicaulis ^a (thickstem wild cabbage)	Chenopodium album ^a (lambsquarters)	Chenopodium fremontii ^a (Fremont's goosefoot)	Chenopodium leptophyllum ^a (narrowleaf goosefoot)	Collinsia parviflora ^a (maiden blue eyed Mary)	Comandra umbellata (bastard toadflax)	Cryptantha (cryptantha)	Cymopterus (springparsley)	Descurainia pinnata ^a (western tansymustard)	Eriogonum cemuum ^a (nodding buckwheat)	Eriogonum ephedroides (ephedra buckwheat)	
year	Nested Frequency																	
2007	6	-	-	-	-	-	3	-	-	-	-	-	3	3	15	8	-	
2010	47	3	1	1	1	0	-	6	10	6	1	3	3	10	2	263	-	
2013	3	-	3	3	-	-	-	-	2	1	7	1	9	-	-	41	4	
2017	-	-	-	-	-	-	-	-	-	-	2	-	16	3	3	5	16	
year	Average Cover (%)																	
2007	0.0	-	-	-	-	-	0.0	-	-	-	-	-	0.0	0.0	0.0	0.0	-	
2010	2.4	0.0	0.0	0.0	0.0	0.0	-	0.2	0.2	0.0	0.0	0.0	0.7	0.1	0.0	8.0	-	
2013	0.0	-	0.0	0.0	-	-	-	-	0.0	0.0	0.0	0.0	0.3	-	-	0.1	0.2	
2017	-	-	-	-	-	-	-	-	-	-	0.0	-	0.3	0.0	0.0	0.0	0.2	

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

FORB SPECIES	Gilia inconspicua ^a (shy gilia)	Halogeton glomeratus ^{si} (saltlover)	Hedysarum boreale (Utah sweetvetch)	Ipomopsis congesta (ballhead ipomopsis)	Lactuca serriola ^{ai} (prickly lettuce)	Lappula occidentalis ^a (flatspine stickseed)	Linum perenne ⁱ (blue flax)	Machaeranthera grindelioides (rayless tansyaster)	Medicago sativa ⁱ (alfalfa)	Navarretia intertexta ^a (needleleaf navarretia)	Penstemon (beardtongue)	Phlox longifolia (longleaf phlox)	Salsola tragus ^{ai} (prickly Russian thistle)	Sanguisorba minor ⁱ (small burnet)	Sisymbrium altissimum ^{ai} (tall tumblemustard)	Streptanthus cordatus (heartleaf twistflower)	Townsendia (Townsend daisy)
year	Nested Frequency																
2007	-	-	-	3	-	-	-	-	-	-	-	-	-	-	-	1	-
2010	3	6	6	2	2	3	8	-	0	14	4	1	11	0	-	-	3
2013	3	2	2	-	-	-	-	3	3	-	13	-	27	-	-	-	8
2017	-	-	3	-	-	-	-	1	-	-	4	-	3	-	2	-	3
year	Average Cover (%)																
2007	-	-	-	0.0	-	-	-	-	-	-	-	-	-	-	-	0.0	-
2010	0.0	0.0	0.0	0.0	0.0	0.0	0.5	-	0.0	0.2	0.3	0.0	0.4	0.0	-	-	0.1
2013	0.0	0.0	0.0	-	-	-	-	0.0	0.1	-	0.3	-	0.9	-	-	-	0.0
2017	-	-	0.0	-	-	-	-	0.0	-	-	0.2	-	0.0	-	0.0	-	0.0

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

Table 17R-26.12 - 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)	Atriplex canescens ^p (fourwing saltbush)	Cercocarpus montanus ^p (alderleaf mountain mahogany)	Gutierrezia sarothrae (broom snakeweed)	Juniperus osteosperma ⁱ (Utah juniper)	Linanthus pungens (granite prickly phlox)	Opuntia (pricklypear)	Pinus edulis ⁱ (twoneedle pinyon)	Purshia tridentata ^p (antelope bitterbrush)
year	Line Intercept Cover (%)									
2007	2.7	-	-	0.7	-	10.2	-	1.6	11.9	-
2010	3.9	-	-	-	-	1.9	0.1	1.9	3.2	-
2013	6.9	-	-	-	-	1.4	0.3	0.5	6.9	-
2017	6.2	0.3	0.1	-	0	1.2	0.1	2.3	2.8	-
year	Quadrat Cover (%)									
2007	3.4	-	-	0.4	-	3.6	0.0	2.3	2.8	-
2010	2.6	-	-	-	0.1	0.8	0.2	2.9	0.9	-
2013	2.3	-	-	-	0.0	1.5	0.3	1.0	0.0	0.0
2017	4.0	1.0	0.0	-	0.3	1.1	0.2	2.0	1.4	-

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

Table 17R-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		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)									
2007	2420	60	2	36	62	26	38	48	16/44
2010	1700	100	22	73	5	2	2	7	25/50
2013	3940	2760	54	45	1	11	19	21	22/49
2017	5160	40	43	56	2	11	2	0	19/52

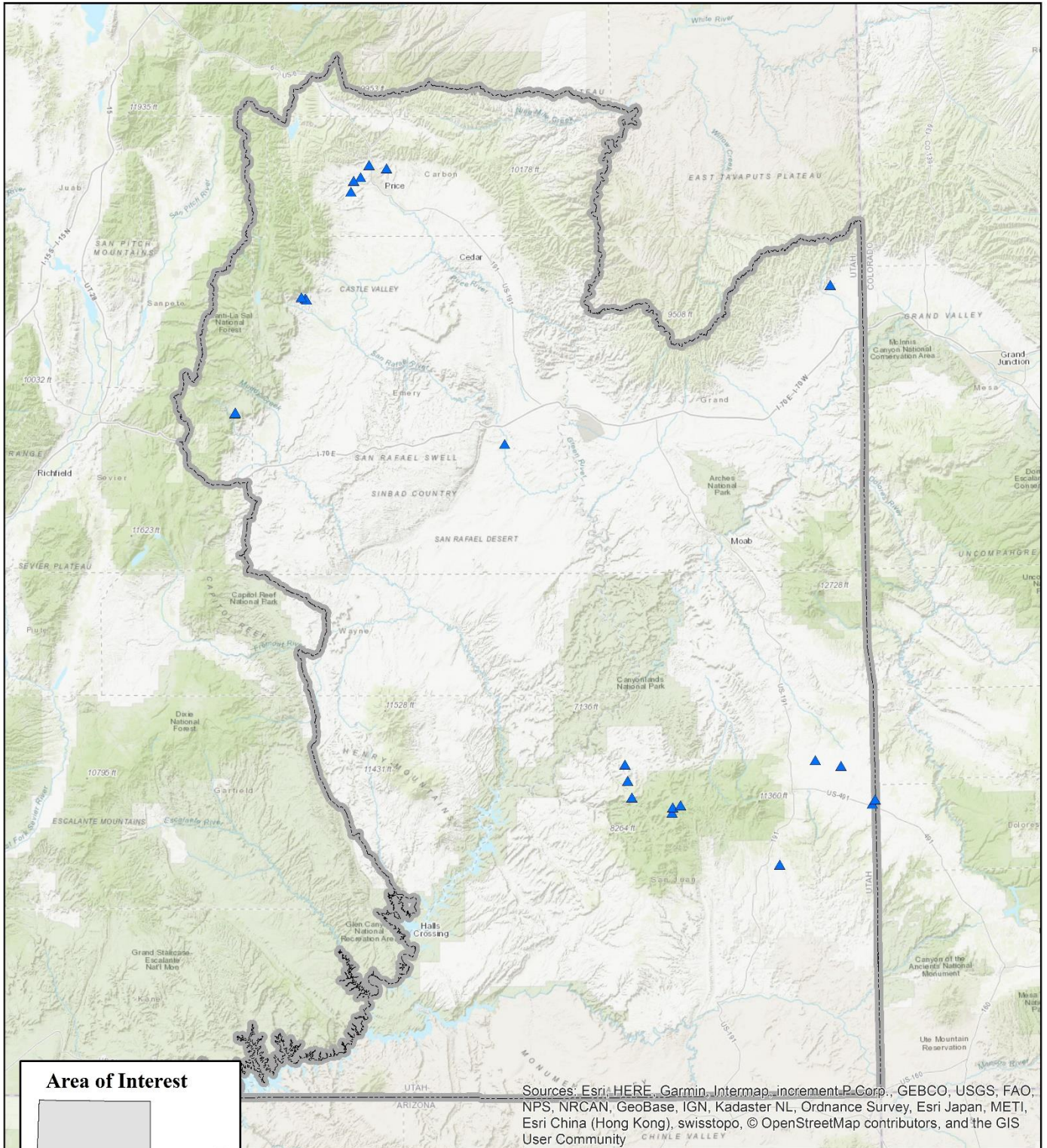
Year	Density		Age Class Distribution			Utilization		Poor Vigor (%)	Average Height Crown (cm)
	Plants Per Acre		Excluding Seedlings			Moderate (%)	Heavy (%)		
	Excluding Seedlings	Seedling	Young (%)	Mature (%)	Decadent (%)				
Artemisia tridentata ssp. vaseyana^P -- (mountain big sagebrush)									
2007	-	-	-	-	-	-	-	-	-/-
2010	-	-	-	-	-	-	-	-	-/-
2013	60	-	33	67	0	33	0	0	40/59
2017	960	-	29	69	2	6	6	0	25/42
Atriplex canescens^P -- (fourwing saltbush)									
2007	-	-	-	-	-	-	-	-	-/-
2010	20	-	0	100	0	0	0	0	57/68
2013	-	-	-	-	-	-	-	-	98/101
2017	80	-	25	75	0	0	50	0	78/82
Cercocarpus montanus^P -- (alderleaf mountain mahogany)									
2007	40	20	50	50	0	0	0	50	121/139
2010	20	-	100	0	0	0	0	0	97/127
2013	20	-	100	0	0	100	0	0	133/185
2017	20	-	0	100	0	100	0	0	92/106
Ephedra viridis^P -- (mormon tea)									
2007	-	-	-	-	-	-	-	-	70/90
2010	-	-	-	-	-	-	-	-	78/116
2013	-	-	-	-	-	-	-	-	29/54
2017	-	-	-	-	-	-	-	-	60/91
Ericameria nauseosa -- (rubber rabbitbrush)									
2007	-	-	-	-	-	-	-	-	-/-
2010	20	-	100	0	0	0	0	0	40/36
2013	40	-	0	100	0	0	0	0	56/54
2017	-	-	-	-	-	-	-	-	73/101
Gutierrezia sarothrae -- (broom snakeweed)									
2007	20	-	100	0	0	0	0	0	9/6
2010	60	-	100	0	0	0	0	0	31/47
2013	60	-	0	100	0	0	0	0	20/33
2017	180	-	0	100	0	0	0	0	12/17
Juniperus osteosperma^t -- (Utah juniper)									
2007	120	-	0	83	17	0	0	0	-/-
2010	140	200	43	57	0	0	0	0	-/-
2013	280	240	93	7	0	0	0	0	-/-
2017	360	40	89	6	6	0	0	6	-/-
Linanthus pungens -- (granite prickly phlox)									
2007	140	-	0	43	57	0	0	0	5/10
2010	240	-	17	83	0	0	0	0	13/22
2013	380	40	0	100	0	0	0	11	10/21
2017	200	-	0	100	0	70	0	70	15/24
Opuntia -- (pricklypear)									
2007	3080	-	0	94	7	23	0	7	9/32
2010	2760	40	9	91	0	0	0	4	10/31
2013	1560	-	3	86	12	0	0	15	8/32
2017	2520	-	2	96	2	6	0	0	9/39
Pinus edulis^t -- (twoneedle pinyon)									
2007	220	-	64	36	0	0	0	0	-/-
2010	20	80	100	0	0	0	0	0	-/-
2013	80	-	75	25	0	0	0	25	-/-
2017	80	-	75	25	0	0	0	0	-/-
Purshia tridentata^P -- (antelope bitterbrush)									
2007	-	-	-	-	-	-	-	-	-/-
2010	-	-	-	-	-	-	-	-	-/-
2013	-	20	0	0	0	0	0	0	-/-
2017	-	-	-	-	-	-	-	-	41/109

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

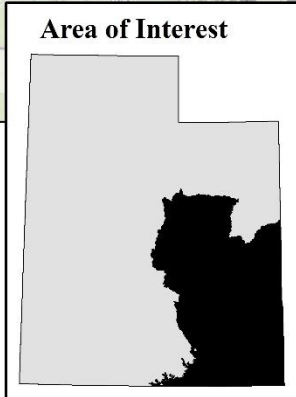
Table 17R-26.14 - Tree Characteristics. Point-quarter tree density, size class distribution, and average diameter.

Year	Density	Seedling (%)	Size Class Distribution				Average Diameter (cm)
	Trees per Acre		1-4'	4-8'	8-12'	>12' (%)	
Juniperus osteosperma (Utah juniper)							
2007	160	-	20	50	30	-	38.4
2010	86	-	83	11	6	-	8.4
2013	129	18	71	12	-	-	5.4
2017	122	37	42	16	-	5	13.5
Pinus edulis (twoneedle pinyon)							
2007	137	15	25	15	25	20	16.5
2010	43	13	63	25	-	-	3.9
2013	76	-	71	29	-	-	6.2
2017	49	-	87	13	-	-	6.7

SOUTHEASTERN REGION

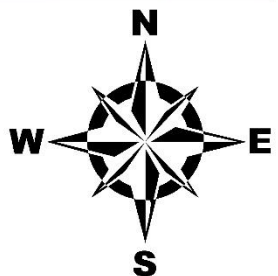


Sources: Esri, HERE, Garmin, Intermap, increment P Corp., GEBCO, USGS, FAO, NPS, NRCAN, GeoBase, IGN, Kadaster NL, Ordnance Survey, Esri Japan, METI, Esri China (Hong Kong), swisstopo, © OpenStreetMap contributors, and the GIS User Community

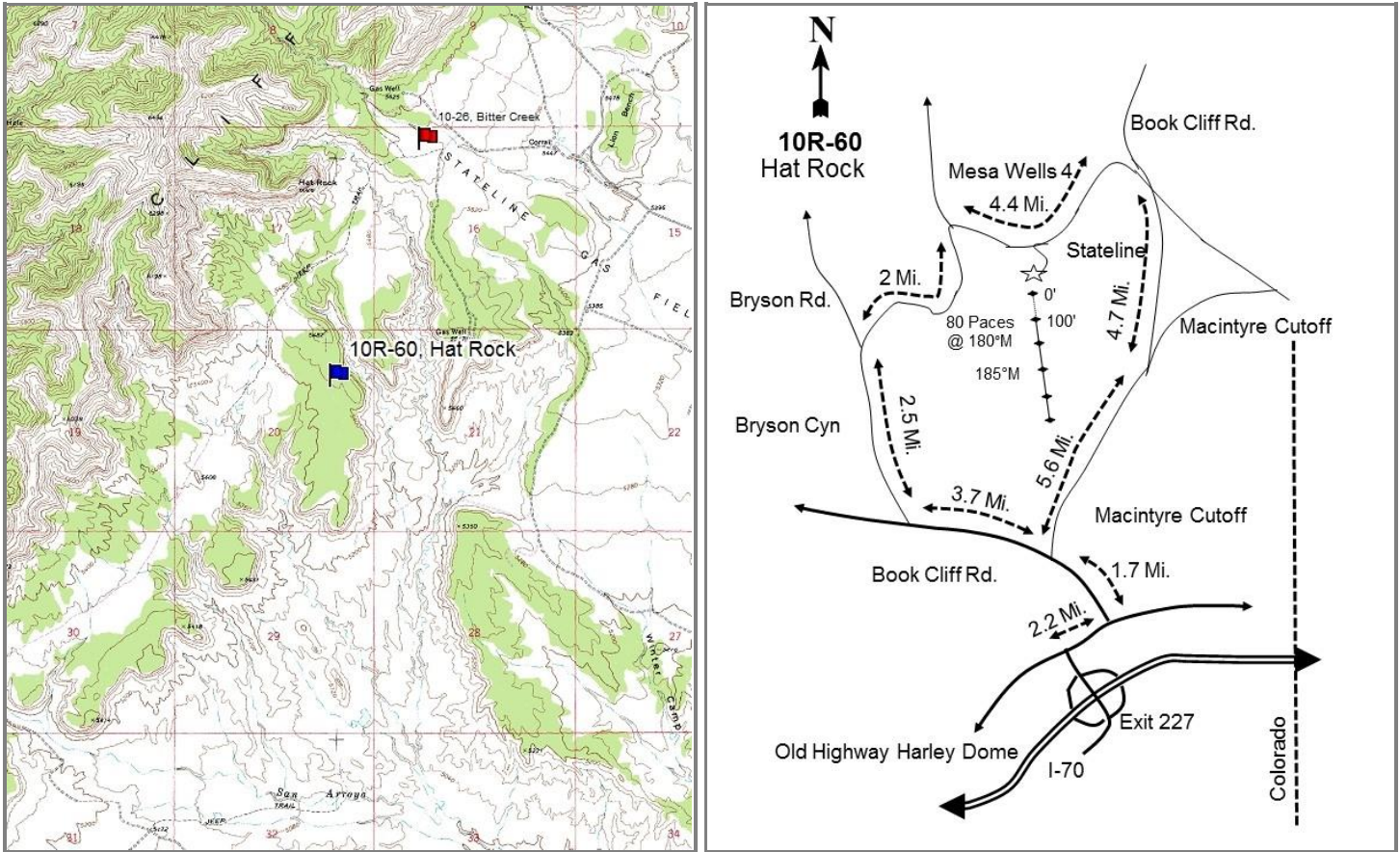


Project

- ▲ WRI
- Southeastern Region Boundaries



HAT ROCK - STUDY NO. 10R-60



Location Information

USGS 7.5 min Map Info
GPS (0' Stake)

Bryson Canyon NE; Township 17S, Range 25E, Section 20
NAD 83 UTM ZONE 12, 657938 East 4353537 North

Transect Information

Browse Tag # (0' Stake)	Not Available
Transect Bearing	185° 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 I-70, take exit 227 and turn north toward the Old Highway Harley Dome. Turn right on Old Highway and continue for 2.2 miles to Book Cliff Road. On Book Cliff Road, proceed for 5.4 miles to Bryson Canyon Road. Take this road for 2.5 Miles to a "Y", bear right, continue another 2 miles to a "T", and turn right. Proceed for another 2.1 miles and the site will be on the right (south) side of the road, about 80 paces away at 180 degrees magnetic.

Site Information

Land Ownership	Federal
Land Administrator	BLM
Allotment	SAN ARROYO
Elevation	5,435ft (1,657m)
Aspect	West
Slope	5-7%
Sample Dates	07/25/2017

Table 10R-60.1 Disturbance History. Recorded history of major disturbances.

Treatment/Disturbance	Name	WRI DB#	Date	Size (acres)
Mechanical - Bullhog	South Bookcliffs Phase 5 (Bryson)	3961	Fall 2017	324
Seeding - Aerial Before	South Bookcliffs Phase 5 (Bryson)	3961	Fall 2017	324

Table 10R-60.2 Seed Mix. List of known seeded plant species and rates (if available).

Mix Name			Application Type	Application Date	Acres
South Bookcliffs Bryson			Aerial	Sep 2017	325
Type	Species	Common Name	Cultivar/Source ID	Bulk lbs/acre	PLS lbs/acre
G	Achnatherum hymenoides	Indian Ricegrass	Emery, UT	1.00	0.96
G	Elymus lanceolatus	Thickspike Wheatgrass	Bannock	1.00	0.91
G	Poa secunda	Sandberg Bluegrass	UP Colorado Plateau	0.03	0.02
G	Poa secunda	Sandberg Bluegrass	UP Colorado Plateau	0.17	0.15
G	Pseudoroegneria spicata	Bluebunch Wheatgrass	Anatone	1.00	0.93
F	Achillea millefolium	Western Yarrow	Eagle	0.02	0.02
F	Achillea millefolium	Western Yarrow	Eagle	0.08	0.07
F	Cleome serrulata	Rocky Mountain Beeplant	Davis UT	0.45	0.40
F	Cleome serrulata	Rocky Mountain Beeplant	Sanpete UT	0.55	0.47
F	Dalea purpurea	Purple Prairie Clover	Bismark	0.62	0.61
F	Dalea purpurea	Purple Prairie Clover	Bismark	0.15	0.12
F	Helianthus annuus	Annual Sunflower	Montezuma CO	0.62	0.55
F	Linum perenne	Blue Flax	Appar	1.00	0.80
F	Medicago sativa	Alfalfa	Ladak	0.46	0.45
F	Medicago sativa	Alfalfa, Yellow	Don	0.31	0.30
F	Onobrychis viciifolia	Sainfoin	Eski	1.00	0.87
F	Penstemon palmeri	Palmer Penstemon		0.20	0.13
F	Ratibida columnifera	Prairie Coneflower	Stillwater	1.00	0.81
F	Sanguisorba minor	Small Burnet		1.00	0.90
F	Sphaeralcea coccinea	Scarlet Globemallow	Uintah, UT	0.09	0.03
F	Sphaeralcea munroana	Munro Globemallow	Tooele UT	0.01	0.01
F	Sphaeralcea munroana	Munro Globemallow	Uintah UT	0.10	0.03
S	Atriplex canescens	Fourwing Saltbush	Carbon UT	1.00	0.48

Wildlife Habitat and Vegetation History**Table 10R-60.3 - Wildlife Seasonal Habitat.** UDWR wildlife habitat and seasonality.

Species	Habitat	Season
Deer	crucial	winter
Elk	substantial	year-long
Pronghorn	crucial	year-long

Table 10R-60.4 - Vegetation History. The dominant vegetation type(s) and phase of woodland succession (Tausch, Miller, Roundy, & Chambers, 2009).

Year	Vegetation Type	Woodland Succession
2017	Pinyon-Juniper	Phase III

Site Notes

A midget faded rattlesnake was seen on the site in 2017.

Site Potential

1981 - 2010 Average Annual Precipitation 12 inches
 NRCS Ecological Site Semidesert Shallow Loam (Wyoming Big Sagebrush)
 NRCS Ecological Site # 034BY225UT
 States and Transitions No state and transition model is available for this ecological site.

At the time of study establishment in 2017, this site was a twoneedle pinyon (*Pinus edulis*) and Utah juniper (*Juniperus osteosperma*) dominated plant community with juniper being more common than pinyon; a bullhog and seeding treatment is proposed for the Fall of 2017. Encroachment of conifer trees has caused a significant reduction in understory browse and herbaceous diversity and cover. In addition, the prevalence of bare ground (Table 10R-60.8) makes this site susceptible to soil loss during heavy precipitation events. There were no grasses sampled in 2017 and only two forb species sampled -- rose heath (*Chaetopappa ericoides*) was the dominant forb, with nearly four percent cover (Table 10R-60.10, Table 10R-60.11). Browse species are very sparse, with broom snakeweed (*Gutierrezia sarothrae*) contributing a majority of the cover (Table 10R-60.12). Overall, the low production of desirable species and heavy tree encroachment of this site indicate the potential for significant post-treatment improvement.

Trend Summary Tables

Table 10R-60.6 - 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
2017	0.0	0.4	11.2	-	0.7	28.3

Table 10R-60.7 - 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
2017	-	-	-	130	-	-	-	4.1

Table 10R-60.8 - 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
2017	44.3	8.1	32.6	10.9	6.1	14.9

Table 10R-60.9 - 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	Rocky Mountain Elk	Rabbit
	Quadrat Frequency		
2017	1	4	25
Year	Days Use Per Acre (ha)		
	2017	-	4.0 (9.9)

Table 10R-60.10 - Grass Species. Nested frequency and modified Daubenmire average cover by year.

GRASS SPECIES	No Grasses Found
year	Average Cover (%)

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

Table 10R-60.11 - Forb Species. Nested frequency and modified Daubenmire average cover by year.

FORB SPECIES	Nested	
	Chaetopappa ericoides (rose heath)	115
Chamaesyce fendleri (Fendler's sandmat)		
year	Average Cover (%)	
	2017	3.8

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

Table 10R-60.12 - 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)	-	-	0.7	24.7	0
Eriogonum microthecum ^p (slender buckwheat)						
Gutierrezia sarothrae (broom snakeweed)						
Juniperus osteosperma ^t (Utah juniper)						
Opuntia polyacantha (plains pricklypear)						
Pinus edulis ^t (twoneedle pinyon)						
year	Quadrat Cover (%)					
	2017	0.0	0.0	0.2	10.9	0.2

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

Table 10R-60.13 - 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.

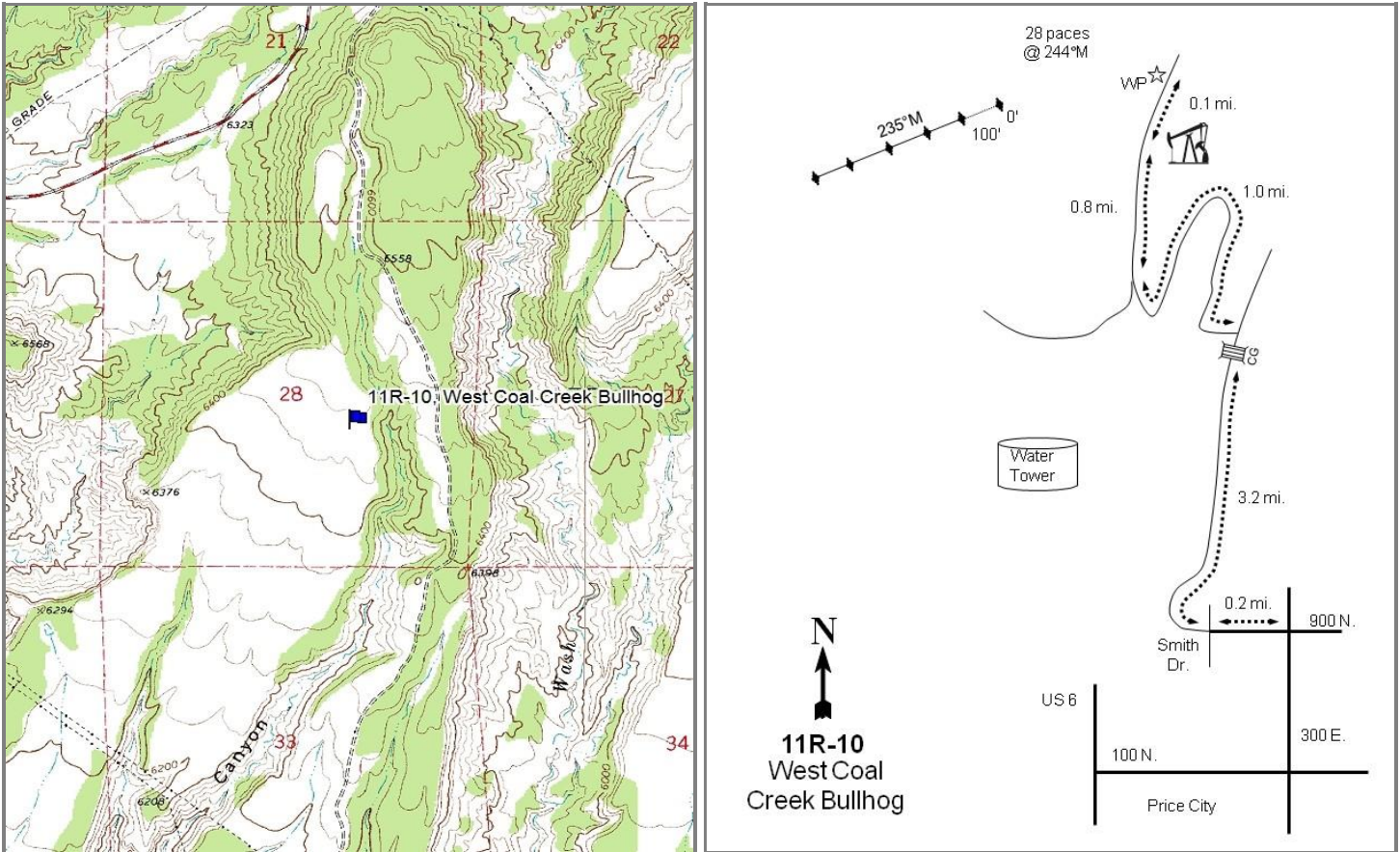
Year	Density		Age Class Distribution			Utilization		Poor Vigor (%)	Average Height Crown (cm)
	Plants Per Acre		Excluding Seedlings			Moderate (%)	Heavy (%)		
	Excluding Seedlings	Seedling	Young (%)	Mature (%)	Decadent (%)				
Artemisia tridentata ssp. wyomingensis ^p -- (Wyoming big sagebrush)									
2017	-	-	-	-	-	-	-	-	55/46
Ephedra nevadensis ^p -- (Nevada jointfir)									
2017	-	-	-	-	-	-	-	-	100/112
Eriogonum microthecum ^p -- (slender buckwheat)									
2017	40	-	0	100	0	0	50	0	8/13
Gutierrezia sarothrae -- (broom snakeweed)									
2017	700	-	6	94	0	0	0	0	20/22
Juniperus osteosperma ^t -- (Utah juniper)									
2017	260	-	0	69	31	23	0	31	- / -
Opuntia polyacantha -- (plains pricklypear)									
2017	180	-	0	100	0	0	0	0	7/17
Pinus edulis ^t -- (twoneedle pinyon)									
2017	60	-	0	100	0	0	0	0	- / -

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

Table 10R-60.14 - 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)							
2017	116	5	10	40	30	15	38.0
Pinus edulis (twoneedle pinyon)							
2017	22	22	44	-	-	33	7.3

WEST COAL CREEK BULLHOG - STUDY NO. 11R-10



Location Information

USGS 7.5 min Map Info GPS (0' Stake)	Helper SE; Township 13S, Range 10E, Section 28 NAD 83 UTM ZONE 12, 516812 East 4390586 North
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Transect Information

Browse Tag # (0' Stake)	189
Transect Bearing	235° 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 300 East in Price, turn left (west) on 900 North and proceed for 0.2 miles to Smith Drive. Continue west on 900 North, eventually heading north past a water tower and out of town for 3.2 miles, just past a cattle guard to a fork. Proceed left and continue for 1.0 mile to an intersection. Turn right (north) and drive for 0.8 miles to an oil/gas pump on the right side of the road. From here, travel north for 0.1 mile to a witness post on the left (west) side of the road. The 0-foot stake is 28 paces from the witness post at 244 degrees magnetic.

Site Information

Land Ownership	Federal
Land Administrator	BLM
Allotment	WOODHILL
Elevation	6,400ft (1,951m)
Aspect	South
Slope	3-5%
Sample Dates	07/02/2007, 06/30/2009, 07/02/2013, 08/16/2017

Table 11R-10.1 Disturbance History. Recorded history of major disturbances.

Treatment/Disturbance	Name	WRIDB#	Date	Size (acres)
Mechanical - Bullhog	West Coal Creek	847	Fall 2007 and Spring 2008	1868
Seeding - Aerial Before	West Coal Creek	847	August and December 2007	1868
Chaining - Two-Way Chain Unknown	-	-	Early 1960's	-
Seeding - Seed Unknown	-	-	Early 1960's	-

Table 11R-10.2 Seed Mix. List of known seeded plant species and rates (if available).

Mix Name		Application Type	Application Date	Acres	
West Coal Creek		Aerial	Aug 2007	1912	
Type	Species	Common Name	Cultivar/Source ID	Bulk lbs/acre	PLS lbs/acre
G	Achnatherum hymenoides	Indian Ricegrass	Rimrock	0.72	0.62
G	Achnatherum hymenoides	Indian Ricegrass	Rimrock	1.17	1.14
G	Agropyron fragile	Siberian Wheatgrass	Vavilov	1.35	1.16
G	Bouteloua gracilis	Blue Grama		0.07	0.02
G	Bouteloua gracilis	Blue Grama		0.26	0.25
G	Elymus wawawaiensis	Snake River Wheatgrass	Secar	1.35	1.09
G	Poa secunda	Big Bluegrass	Sherman	0.05	0.04
G	Psathyrostachys juncea	Russian Wildrye		0.80	0.64
G	Psathyrostachys juncea	Russian Wildrye		0.70	0.62
G	Sporobolus cryptandrus	Sand Dropseed		0.05	0.05
G	Thinopyrum intermedium	Intermediate Wheatgrass		1.35	1.29
F	Linum perenne	Blue Flax	Appar	0.26	0.24
F	Medicago sativa	Alfalfa	Ladak	0.13	0.12
F	Medicago sativa	Alfalfa	Ladak	0.18	0.17
F	Medicago sativa	Alfalfa	Ranger	0.31	0.28
F	Medicago sativa	Alfalfa	Spredor 4	0.16	0.15
F	Medicago sativa	Alfalfa	Spredor 4	0.16	0.14
F	Penstemon palmeri	Palmer Penstemon	Sanpete UT	0.03	0.02
F	Penstemon palmeri	Palmer Penstemon	Sanpete UT	0.05	0.04
S	Atriplex canescens	Fourwing Saltbush	Lincoln NV	1.00	0.36
S	Atriplex canescens	Fourwing Saltbush	Carbon UT	0.21	0.08
S	Bassia prostrata	Forage Kochia	Immigrant	0.47	0.42
S	Krascheninnikovia lanata	Winterfat	Iron UT	0.07	0.03

Wildlife Habitat and Vegetation History**Table 11R-10.3 - Wildlife Seasonal Habitat.** UDWR wildlife habitat and seasonality.

Species	Habitat	Season
Deer	crucial	winter

Table 11R-10.4 - Vegetation History. The dominant vegetation type(s) and phase of woodland succession (Tausch, Miller, Roundy, & Chambers, 2009).

Year	Vegetation Type	Woodland Succession
2007	Black Sagebrush/Pinyon-Juniper	Phase II
2009	Black Sagebrush	Phase I
2013	Black Sagebrush	Phase I
2017	Black Sagebrush	Phase I

Site Notes

There are many oil and gas pads in the general vicinity.

Soils**Table 11R-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
Loam	7.2	48.2	28.4	23.5	2.7	10.8	64.0	0.6	07/02/2007

Site Potential

1981 - 2010 Average Annual Precipitation	12 inches
NRCS Ecological Site	Upland Shallow Loam (Black Sagebrush)
NRCS Ecological Site #	R034BY320UT
States and Transitions	No state and transition model is available for this ecological site.

When established in 2007, the site was a stand of black sagebrush (*Artemisia nova*) with encroaching twoneedle pinyon (*Pinus edulis*) and Utah juniper (*Juniperus osteosperma*). Black sagebrush increased in cover following a bullhog treatment which eliminated most of the tree cover (Table 11R-10.12). The herbaceous understory was depleted and sparse prior to the treatment, but post-treatment some diversity returned to the forb community. Crested wheatgrass (*Agropyron cristatum*) was the dominant understory species in the most recent sample year. There is some remnant tree cover on the site, which puts the site at risk for infilling in future years (Table 11R-10.14). Overall, the site is in good condition with no undesirable introduced species present and tree cover reduced to lower levels.

Trend Summary Tables**Table 11R-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
2007	8.5	0.0	6.6	10.4	0.1	10.1
2009	9.5	0.0	0.1	10.8	-	-
2013	11.4	-	0.2	14.9	0.4	0.2
2017	16.1	0.1	0.6	18.2	0.3	0.6

Table 11R-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
2007	-	123	9	44	-	1.1	0.1	0.3
2009	-	147	11	117	-	4.7	0.8	3.6
2013	-	191	25	68	-	2.8	0.2	0.8
2017	-	250	59	110	-	11.5	0.4	0.8

Table 11R-10.8 - 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
2007	35.2	4.6	38.8	13.0	3.9	15.8
2009	26.5	0.1	47.4	8.2	2.4	18.9
2013	29.9	0.1	37.8	7.9	5.2	16.2
2017	26.4	0.2	39.6	15.7	3.4	27.3

Table 11R-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	Rocky Mountain Elk	Rabbit
	Quadrat Frequency			
2007	1	1	1	81
2009	5	5	-	29
2013	3	12	-	9
2017	2	20	-	66
Year	Days Use Per Acre (ha)			
2007	1.5 (3.6)	3.4 (8.3)	2.7 (6.6)	-
2009	7.2 (17.9)	16.1 (39.7)	2.7 (6.6)	-
2013	16.7 (41.2)	20.1 (49.7)	-	-
2017	17.4 (43.0)	30.8 (76.1)	0.7 (1.7)	-

Table 11R-10.10 - Grass Species. Nested frequency and modified Daubenmire average cover by year.

GRASS SPECIES	Achatherum hymenoides (Indian ricegrass)	Agropyron cristatum ⁱ (crested wheatgrass)	Bouteloua gracilis (blue grama)	Elymus elymoides (squirreltail)	Poa secunda (Sandberg bluegrass)	Psathyrostachys juncea ⁱ (Russian wildrye)	Pseudoroegneria spicata (bluebunch wheatgrass)	Thinopyrum intermedium ⁱ (intermediate wheatgrass)
year	Nested Frequency							
2007	-	120	1	1	2	-	-	-
2009	4	137	-	-	-	13	-	3
2013	3	182	-	3	3	-	3	-
2017	8	238	8	2	-	-	-	-
year	Average Cover (%)							
2007	-	1.1	0.0	0.0	0.0	-	-	-
2009	0.2	4.2	-	-	-	0.3	-	0.0
2013	0.0	2.8	-	0.0	0.0	-	0.0	-
2017	0.3	11.1	0.2	0.0	-	-	-	-

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

Table 11R-10.11 - Forb Species. Nested frequency and modified Daubenmire average cover by year.

FORB SPECIES	Astragalus (milkvetch)	Astragalus convallarius (lesser rushy milkvetch)	Chamaesyce (sandmat)	Chenopodium fremontii ^a (Fremont's goosefoot)	Chenopodium leptophyllum ^a (narrowleaf goosefoot)	Descurainia pinnata ^a (western tansymustard)	Eriogonum batemanii (Bateman's buckwheat)	Eriogonum cernuum ^a (nodding buckwheat)	Ipomopsis aggregata (scarlet gilia)	Lactuca serriola ^{ai} (prickly lettuce)	Lappula occidentalis ^a (flatspine stickseed)	Lesquerella (bladderpod)	Linum lewisii (Lewis flax)	Medicago sativa ⁱ (alfalfa)	Penstemon humilis (low beardtongue)	Salsola tragus ^{ai} (prickly Russian thistle)	Symphoricarum (aster)
year	Nested Frequency																
2007	-	1	12	-	-	2	-	7	-	-	-	-	-	-	30	-	1
2009	1	16	27	0	3	6	11	-	1	1	-	8	5	1	62	2	-
2013	2	22	32	-	7	1	10	7	1	-	-	1	-	2	13	14	-
2017	3	8	51	4	-	23	8	-	1	-	3	51	-	-	12	35	-
year	Average Cover (%)																
2007	-	0.0	0.2	-	-	0.0	-	0.1	-	-	-	-	-	-	0.1	-	0.0
2009	0.1	0.2	0.8	0.1	0.0	0.4	0.5	-	0.1	0.2	-	0.5	0.0	0.0	1.4	0.0	-
2013	0.0	0.1	0.2	-	0.0	0.0	0.3	0.0	0.0	-	-	0.0	-	0.0	0.1	0.1	-
2017	0.0	0.2	0.2	0.0	-	0.3	0.1	-	0.0	-	0.0	0.2	-	-	0.0	0.1	-

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

FORB SPECIES	Townsendia (Townsend daisy)
year	Nested Frequency
2007	1
2009	-
2013	-
2017	-
year	Average Cover (%)
2007	0.0
2009	-
2013	-
2017	-

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

Table 11R-10.12 - 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)	Opuntia (pricklypear)	Pinus edulis ^t (twoneedle pinyon)	Purshia tridentata ^p (antelope bitterbrush)
year	Line Intercept Cover (%)						
2007	10.4	-	-	2.7	0.1	7.4	-
2009	10.8	-	-	0	-	-	-
2013	14.9	-	-	0.2	0.4	-	-
2017	18.2	-	0.2	0.6	0.1	-	-
year	Quadrat Cover (%)						
2007	8.4	-	-	1.6	0.0	5.0	0.0
2009	9.3	0.2	-	0.0	0.0	0.1	-
2013	11.4	-	-	0.2	0.0	-	-
2017	16.1	-	0.0	0.2	0.0	0.4	-

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

Table 11R-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 nova ^p -- (black sagebrush)									
2007	7220	4160	2	68	30	58	8	13	33/55
2009	-	-	-	-	-	-	-	-	25/48
2013	11760	900	32	67	2	29	23	14	21/46
2017	11760	60	7	86	7	23	5	5	23/52

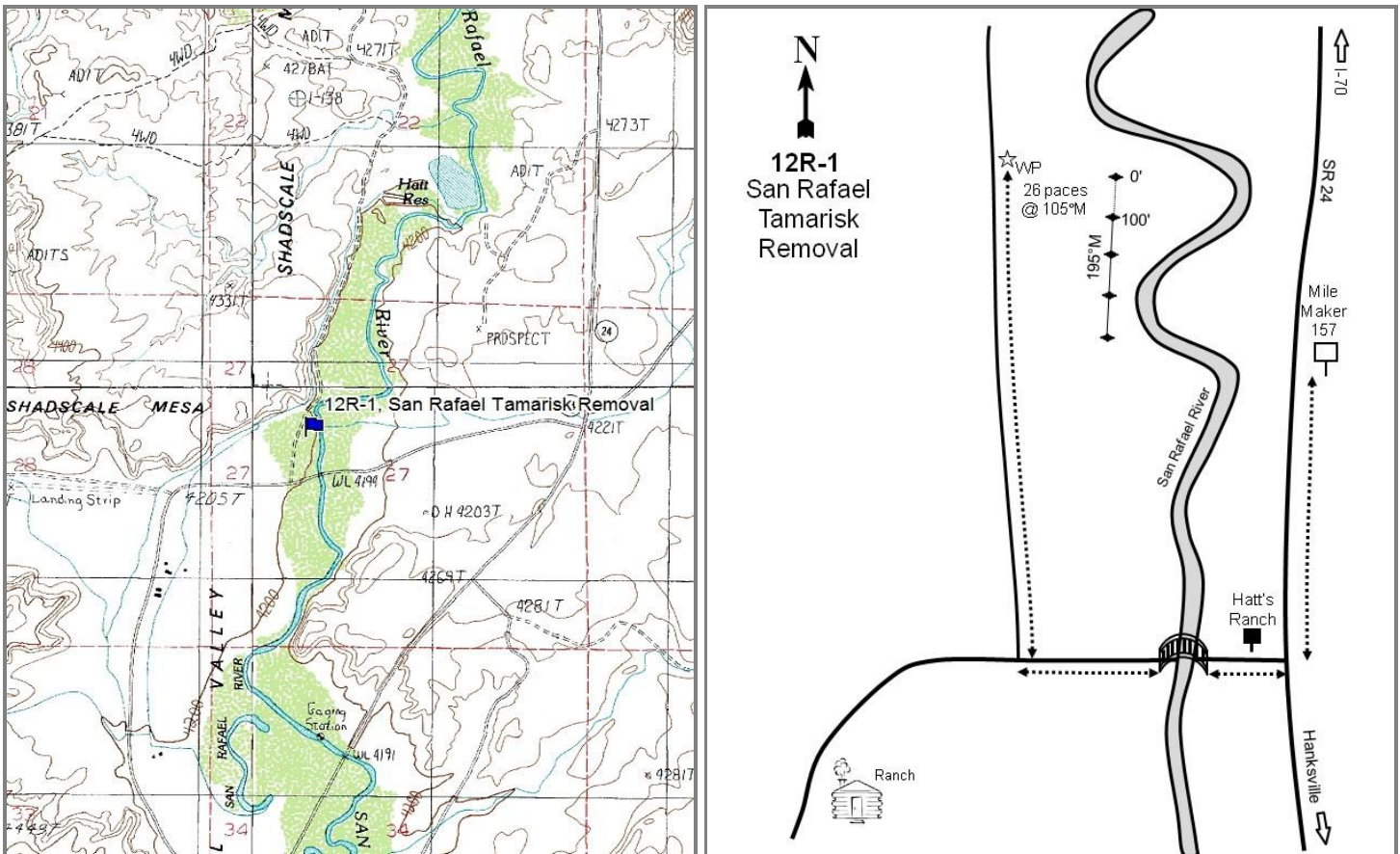
Year	Density		Age Class Distribution			Utilization		Poor Vigor (%)	Average Height Crown (cm)
	Plants Per Acre		Excluding Seedlings			Moderate (%)	Heavy (%)		
	Excluding Seedlings	Seedling	Young (%)	Mature (%)	Decadent (%)				
Artemisia tridentata ssp. wyomingensis ^P -- (Wyoming big sagebrush)									
2007	-	-	-	-	-	-	-	-	-/-
2009	-	-	-	-	-	-	-	-	27/35
2013	-	-	-	-	-	-	-	-	-/-
2017	20	-	100	0	0	0	0	100	-/-
Atriplex canescens ^P -- (fourwing saltbush)									
2007	-	-	-	-	-	-	-	-	122/125
2009	-	-	-	-	-	-	-	-	29/26
2013	60	-	67	33	0	33	0	33	53/54
2017	80	-	25	50	25	0	75	25	56/71
Cercocarpus montanus ^P -- (alderleaf mountain mahogany)									
2007	-	-	-	-	-	-	-	-	-/-
2009	-	-	-	-	-	-	-	-	95/120
2013	-	-	-	-	-	-	-	-	-/-
2017	-	-	-	-	-	-	-	-	118/136
Ephedra viridis ^P -- (mormon tea)									
2007	-	-	-	-	-	-	-	-	-/-
2009	-	-	-	-	-	-	-	-	-/-
2013	-	-	-	-	-	-	-	-	-/-
2017	80	-	75	25	0	0	0	0	18/19
Gutierrezia sarothrae -- (broom snakeweed)									
2007	-	-	-	-	-	-	-	-	-/-
2009	-	-	-	-	-	-	-	-	21/23
2013	-	-	-	-	-	-	-	-	23/34
2017	40	60	0	100	0	0	0	0	19/28
Juniperus osteosperma ^t -- (Utah juniper)									
2007	120	-	67	33	0	0	0	0	-/-
2009	-	-	-	-	-	-	-	-	-/-
2013	80	-	100	0	0	0	0	25	-/-
2017	80	-	75	25	0	0	0	0	-/-
Opuntia -- (pricklypear)									
2007	140	-	14	86	0	0	0	0	8/19
2009	-	-	-	-	-	-	-	-	8/29
2013	140	60	0	100	0	0	0	86	4/24
2017	300	-	0	100	0	0	0	0	7/23
Pinus edulis ^t -- (twoneedle pinyon)									
2007	160	-	25	75	0	0	0	0	-/-
2009	-	-	-	-	-	-	-	-	-/-
2013	-	-	-	-	-	-	-	-	-/-
2017	80	-	50	50	0	0	0	0	-/-
Purshia stansburiana ^P -- (Stansbury cliffrose)									
2007	-	-	-	-	-	-	-	-	110/78
2009	-	-	-	-	-	-	-	-	81/24
2013	-	-	-	-	-	-	-	-	54/85
2017	-	-	-	-	-	-	-	-	104/121
Purshia tridentata ^P -- (antelope bitterbrush)									
2007	-	-	-	-	-	-	-	-	102/177
2009	-	-	-	-	-	-	-	-	92/137
2013	20	-	0	100	0	0	100	100	130/163
2017	20	-	0	100	0	0	0	0	48/95
Sclerocactus -- (fishhook cactus)									
2007	-	-	-	-	-	-	-	-	-/-
2009	-	-	-	-	-	-	-	-	-/-
2013	-	-	-	-	-	-	-	-	-/-
2017	-	-	-	-	-	-	-	-	7/9

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

Table 11R-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)							
2007	178	-	45	45	10	-	9.8
2009	17	-	67	33	-	-	3.7
2013	69	17	83	-	-	-	4.6
2017	56	6	82	12	-	-	6.1
Pinus edulis (twoneedle pinyon)							
2007	121	-	25	70	5	-	9.9
2009	10	20	20	60	-	-	4.6
2013	21	22	44	33	-	-	4.7
2017	12	-	75	25	-	-	4.8

SAN RAFAEL TAMARISK REMOVAL - STUDY NO. 12R-1



Location Information

USGS 7.5 min Map Info
GPS (0' Stake)

Horse Bench West NW; Township 22S, Range 14E, Section 27
NAD 83 UTM ZONE 12, 554387 East 4302860 North

Transect Information

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

246
190° magnetic
400ft
Line 1 (11ft & 95ft), Line 2 (34ft), Line 3 (59ft), Line 4 (71ft)
No Rebar

Directions to Site

From I-70, take SR-24 south towards Hanksville. Proceed 0.4 miles past mile marker 157 and then turn right, near the Hatt's Ranch sign. Continue 0.6 miles past a gate to a bridge and then continue for 0.1 miles to a right turn. Drive 0.1 miles to the witness post on the right-hand side of the road. The 0-foot stake is 26 paces from the witness post at 105 degrees magnetic and is marked with browse tag #246.

Site Information

Land Ownership	State
Land Administrator	UDWR
Allotment	IRON WASH
Elevation	4,137ft (1,261m)
Aspect	Southeast
Slope	1-3%
Sample Dates	08/18/2008, 08/21/2012, 07/27/2017

Table 12R-01.1 Disturbance History. Recorded history of major disturbances.

Treatment/Disturbance	Name	WRI DB#	Date	Size (acres)
Herbicide - Vista	San Rafael River Restoration Phase III	2260	May 2013	310
Mechanical - Other	San Rafael River Restoration Phase I	867	September 2008-May 2010	740

Wildlife Habitat and Vegetation History**Table 12R-01.3 - Wildlife Seasonal Habitat.** UDWR wildlife habitat and seasonality.

Species	Habitat	Season
Deer	substantial	year-long

Table 12R-01.4 - Vegetation History. The dominant vegetation type(s) and phase of woodland succession (Tausch, Miller, Roundy, & Chambers, 2009).

Year	Vegetation Type	Woodland Succession
2008	Tamarisk	NA
2012	Greasewood	NA
2017	Greasewood	NA

Site Notes

No Notes

Site Potential

1981 - 2010 Average Annual Precipitation	6 inches
NRCS Ecological Site	Semidesert - River Floodplain (Fremont Cottonwood)
NRCS Ecological Site #	R034BY011UT
States and Transitions	No state and transition model is available for this ecological site.

This study site was dominated by five-stamen tamarisk (*Tamarix chinensis*) when it was established in 2008. Cover of tamarisk significantly decreased following a mechanical treatment sometime between 2008 and 2010 and greasewood (*Sarcobatus vermiculatus*) became the dominant site component in the 2012 and 2017 sample years. However, tamarisk cover and density increased between 2012 and 2017, indicating that it may have the potential to again dominate this area in the future (Table 12R-01.12, Table 12R-01.13). The herbaceous understory has remained relatively homogenous, with a majority of the cover being contributed by the introduced annual forb burningbush (*Bassia scoparia*) (Table 12R-01.7, Table 12R-01.10, Table 12R-01.11). One should note the presence of the perennial grass common reed (*Phragmites australis*) on this study site: although it is present in very low amounts, it is a noxious weed and may have the potential to increase over time (Table 12R-01.10).

Trend Summary Tables

Table 12R-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
2008	-	35.1	-	-	52.1	-
2012	2.3	8.8	-	2.3	16.4	-
2017	-	29.3	-	-	39.2	-

Table 12R-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
2008	-	23	263	-	-	1.0	10.3	-
2012	-	46	99	18	-	3.0	17.3	0.7
2017	-	45	233	60	-	1.1	15.0	2.2

Table 12R-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
2008	31.3	-	55.1	0.5	-	47.7
2012	57.2	-	28.1	0.0	-	33.1
2017	44.5	-	35.1	0.5	0.0	44.1

Table 12R-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	Rabbit
	Quadrat Frequency		
2008	-	3	30
2012	1	3	10
2017	-	3	9
Year	Days Use Per Acre (ha)		
2008	1.5 (3.6)	20.8 (51.3)	-
2012	-	4.0 (9.9)	-
2017	-	13.4 (33.1)	-

Table 12R-01.10 - Grass Species. Nested frequency and modified Daubenmire average cover by year.

GRASS SPECIES	Distichlis spicata (saltgrass)	Phragmites australis ⁿ (common reed)	Sporobolus airoides (alkali sacaton)
year	Nested Frequency		
2008	14	6	3
2012	31	5	13
2017	36	2	9
year	Average Cover (%)		
2008	0.2	0.2	0.7
2012	0.8	0.1	2.1
2017	0.4	0.1	0.7

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

Table 12R-01.11 - Forb Species. Nested frequency and modified Daubenmire average cover by year.

FORB SPECIES	Bassia scoparia ^{ai} (burningbush)	Chenopodium fremontii ^a (Fremont's goosefoot)	Descurainia pinnata ^a (western tansymustard)	Halogeton glomeratus ^{ai} (saltlover)	Iva axillaris (povertyweed)	Salsola tragus ^{ai} (prickly Russian thistle)
year	Nested Frequency					
2008	251	55	-	2	-	9
2012	85	-	-	13	18	6
2017	158	-	3	90	60	7
year	Average Cover (%)					
2008	9.0	1.0	-	0.0	-	0.3
2012	13.7	-	-	2.8	0.7	0.8
2017	10.6	-	0.5	3.8	2.2	0.0

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

Table 12R-01.12 - Shrub and Tree Species. Average modified Daubenmire quadrat and line intercept cover by year.

SHRUB SPECIES	Atriplex canescens ^p (fourwing saltbush)	Ericameria nauseosa (rubber rabbitbrush)	Sarcobatus vermiculatus (greasewood)	Suaeda moquini (Mojave seablite)	Tamarix chinensis ⁱ (five-stamen tamarisk)
year	Line Intercept Cover (%)				
2008	-	1.1	12.7	-	38.3
2012	2.3	4.8	11.6	-	-
2017	-	9.1	29.2	-	0.9
year	Quadrat Cover (%)				
2008	-	0.1	10.5	-	24.6
2012	2.3	1.1	7.6	-	0.1
2017	-	2.3	24.4	1.4	1.2

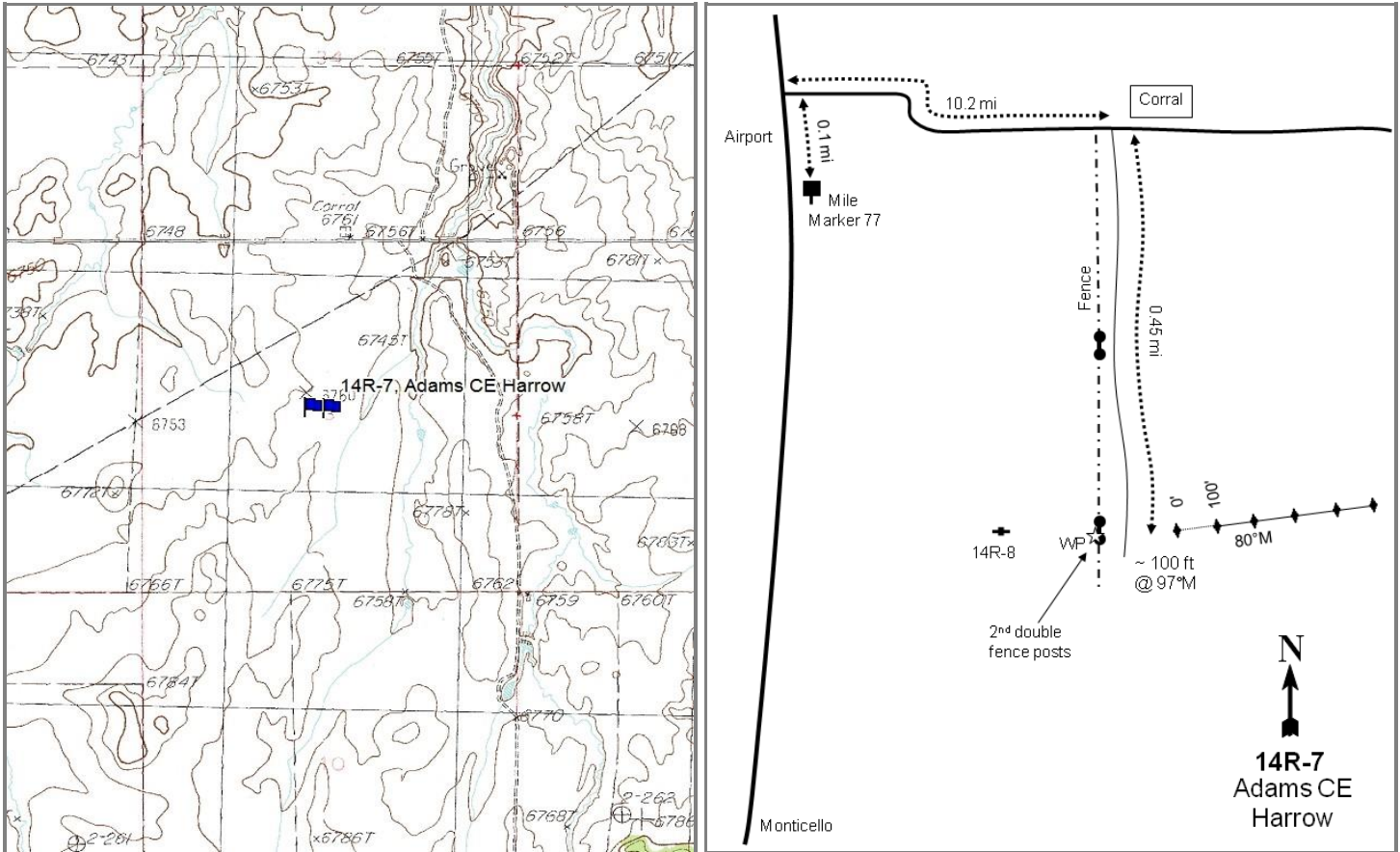
t - Tree Species; p - Preferred Browse; i - Introduced Species

Table 12R-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 (%)				
Atriplex canescens^p -- (fourwing saltbush)									
2008	-	-	-	-	-	-	-	-	-/-
2012	80	-	0	100	0	0	0	25	107/146
2017	-	-	-	-	-	-	-	-	121/231
Ericameria nauseosa -- (rubber rabbitbrush)									
2008	320	-	0	100	0	0	0	0	117/142
2012	520	-	23	77	0	0	0	0	87/131
2017	360	-	0	100	0	0	0	0	146/222
Sarcobatus vermiculatus -- (greasewood)									
2008	1520	-	37	62	1	0	0	4	95/118
2012	1360	-	22	78	0	0	0	2	103/136
2017	1180	-	3	97	0	0	0	0	120/173
Tamarix chinensisⁱ -- (five-stamen tamarisk)									
2008	3400	-	9	91	0	10	0	90	208/162
2012	60	-	100	0	0	0	0	0	86/95
2017	260	-	8	92	0	0	0	0	181/161

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

ADAMS CE HARROW - STUDY NO. 14R-7

**Location Information**

USGS 7.5 min Map Info Eastland NW NE; Township 33S, Range 25E, Section 03
 GPS (0' Stake) NAD 83 UTM ZONE 12, 661334 East 4200536 North

Transect Information

Browse Tag # (0' Stake) Not Available
 Transect Bearing 80° 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-191 travel north of Monticello for about 5.5 miles to mile marker 77. Continue for 0.1 miles to a road that comes in from the right. Turn here and follow this road for 10.2 miles to another road that comes in from the right. Turn right here and travel south for 0.45 miles to the second pair of wooden fenceposts on the right side of the road. The 0-foot stake is about 100 feet from these fenceposts at an azimuth of 97 degrees magnetic.

Site Information

Land Ownership	Private
Land Administrator	Private
Allotment	No data
Elevation	6,770ft (2,063m)
Aspect	North
Slope	2-5%
Sample Dates	09/10/2004, 06/12/2007, 06/20/2012, 07/26/2017

Table 14R-07.1 Disturbance History. Recorded history of major disturbances.

Treatment/Disturbance	Name	WRI DB#	Date	Size (acres)
Seeding - Broadcast Before	-	PDB	Fall 2001	320
Harrow - Two-Way Dixie	-	PDB	Fall 2001	320

Table 14R-07.2 Seed Mix. List of known seeded plant species and rates (if available).

Mix Name			Application Type	Application Date	Acres
			Broadcast	Sep 2001	320
Type	Species	Common Name	Cultivar/Source ID	Bulk lbs/acre	PLS lbs/acre
G	<i>Agropyron cristatum</i>	Crested Wheatgrass		1.00	0.00
G	<i>Elymus lanceolatus</i>	Thickspike Wheatgrass		2.00	0.00
G	<i>Elymus trachycaulus</i>	Slender Wheatgrass		1.00	0.00
G	<i>Pascopyrum smithii</i>	Western Wheatgrass		1.00	0.00
G	<i>Pseudoroegneria spicata</i>	Bluebunch Wheatgrass		2.00	0.00
G	<i>Thinopyrum intermedium</i>	Pubescent Wheatgrass		1.00	0.00
F	<i>Linum perenne</i>	Blue Flax		0.30	0.00
F	<i>Medicago sativa</i>	Alfalfa		2.00	0.00
F	<i>Sanguisorba minor</i>	Small Burnet		2.00	0.00

Wildlife Habitat and Vegetation History**Table 14R-07.3 - Wildlife Seasonal Habitat.** UDWR wildlife habitat and seasonality.

Species	Habitat	Season
Deer	crucial	winter

Table 14R-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	Black Sagebrush	NA
2007	Black Sagebrush	NA
2012	Black Sagebrush	NA
2017	Black Sagebrush	NA

Site Notes

No Notes

Soils**Table 14R-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
Clay	7.1	31.3	28.2	40.5	1.8	2.6	182.4	0.5	09/09/2004

Site Potential

1981 - 2010 Average Annual Precipitation	14 inches
NRCS Ecological Site	Upland Shallow Loam (Black Sagebrush)
NRCS Ecological Site #	R035XY312UT
States and Transitions	No state and transition model is available for this ecological site.

This study site has remained dominated by black sagebrush (*Artemisia nova*), the cover of which has exhibited an overall increase, since its establishment in 2004. Other preferred browse species are also present, but in lower amounts (Table 14R-07.12, Table 14R-07.13). The herbaceous understory is abundant with a diverse number of perennial grasses being sampled throughout the study years: crested wheatgrass (*Agropyron cristatum*) is the most abundant grass as of 2017 (Table 14R-07.10). Forbs have remained rare in comparison (Table 14R-07.7), with the most abundant species being the perennial species mountain phlox (*Phlox austromontana*) (Table 14R-07.11). This study site is expected to remain in a similar state in the future unless a major disturbance occurs.

Trend Summary Tables**Table 14R-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	10.7	0.2	-	13.0	0.3	-
2007	13.1	0.0	-	13.5	0.4	-
2012	10.9	0.0	-	9.7	0.1	-
2017	11.3	0.1	-	13.5	-	-

Table 14R-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	-	220	77	180	-	7.1	0.3	2.3
2007	13	351	152	208	0.0	21.1	1.5	5.0
2012	-	334	2	161	-	19.1	0.0	2.1
2017	-	314	3	148	-	16.5	0.0	2.8

Table 14R-07.8 - 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	67.5	0.0	19.6	2.0	0.4	20.1
2007	50.5	0.2	22.0	3.2	0.1	35.3
2012	48.6	-	23.8	4.2	0.2	35.1
2017	57.7	0.0	19.8	6.6	0.3	27.9

Table 14R-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	Coyote	Mule Deer	Gunnison Sage-Grouse	Rabbit
	Quadrat Frequency				
2004	-	-	-	-	2
2007	-	-	-	1	35
2012	2	-	-	-	-
2017	-	1	4	9	6
Year	Days Use Per Acre (ha)				
2004	4.4 (10.8)	-	-	26.2 (64.6)*	-
2007	14.5 (35.9)	-	-	104.5 (258.2)*	-
2012	12.3 (30.5)	8.7 (21.5)*	-	-	-
2017	8.7 (21.5)	-	-	-	-

*Pellets per acre (ha)

Table 14R-07.10 - 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 inermis ⁱ (smooth brome)	Bromus tectorum ^{ai} (cheatgrass)	Elymus elymoides (squirreltail)	Koeleria macrantha (prairie Junegrass)	Pascopyrum smithii (western wheatgrass)	Pleuraphis jamesii (James' galleta)	Poa secunda (Sandberg bluegrass)	Psathyrostachys juncea ⁱ (Russian wildrye)	Pseudoroegneria spicata (bluebunch wheatgrass)	Thinopyrum intermedium ⁱ (intermediate wheatgrass)
year	Nested Frequency												
2004	15	76	1	-	-	50	-	102	10	-	4	-	4
2007	24	195	1	10	13	112	4	111	14	-	14	-	30
2012	31	246	20	10	-	41	4	64	12	9	7	5	11
2017	6	297	17	9	-	-	-	2	-	-	-	-	-
year	Average Cover (%)												
2004	0.3	4.0	0.0	-	-	1.0	-	1.5	0.2	-	0.1	-	0.0
2007	1.1	11.2	0.0	0.5	0.0	4.1	0.4	2.3	0.5	-	0.7	-	0.3
2012	0.4	15.4	0.3	0.0	-	0.8	0.0	1.2	0.3	0.3	0.1	0.2	0.2
2017	0.4	15.3	0.6	0.3	-	-	-	0.0	-	-	-	-	-

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

Table 14R-07.11 - Forb Species. Nested frequency and modified Daubenmire average cover by year.

FORB SPECIES	Antennaria (pussytoes)	Ceratocephala testiculata ^{ai} (curvseed butterwort)	Chenopodium leptophyllum ^a (narrowleaf goosefoot)	Cordylanthus ^a (bird's-beak)	Cryptantha (cryptantha)	Descurainia pinnata ^a (western tansymustard)	Draba ^a (draba)	Erigeron pumilus (shaggy fleabane)	Lappula occidentalis ^a (flatspine stickseed)	Lesquerella (bladderpod)	Linum perenne ⁱ (blue flax)	Medicago sativa ⁱ (alfalfa)	Phlox austromontana (mountain phlox)	Salsola tragus ^{ai} (prickly Russian thistle)	Sanguisorba minor ⁱ (small burnet)	Sphaeralcea coccinea (scarlet globemallow)
year	Nested Frequency															
2004	-	-	60	6	6	4	-	2	5	8	-	12	132	11	8	71
2007	1	3	-	-	3	109	4	4	45	26	1	5	137	30	-	123
2012	-	-	-	-	12	2	-	2	-	9	-	-	123	-	-	68
2017	-	-	-	3	-	-	-	-	-	-	-	1	121	-	-	48
year	Average Cover (%)															
2004	-	-	0.1	0.0	0.0	0.0	-	0.0	0.0	0.2	-	0.0	1.1	0.1	0.0	0.9
2007	0.0	0.0	-	-	0.0	0.9	0.0	0.2	0.6	0.3	0.0	0.0	2.7	0.1	-	1.7
2012	-	-	-	-	0.0	0.0	-	0.0	-	0.0	-	-	1.9	-	-	0.2
2017	-	-	-	0.0	-	-	-	-	-	-	-	0.0	2.6	-	-	0.2

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

Table 14R-07.12 - Shrub and Tree Species. Average modified Daubenmire quadrat and line intercept cover by year.

SHRUB SPECIES						
Artemisia nova ^p (black sagebrush)						
Chrysothamnus depressus ^p (longflower rabbitbrush)						
Eriogonum microthecum ^p (slender buckwheat)						
Gutierrezia sarothrae (broom snakeweed)						
Krascheninnikovia lanata ^p (winterfat)						
Tetradymia canescens (spineless horsebrush)						
year	Line Intercept Cover (%)					
2004	6	3.8	0.1	0.1	3.1	0.2
2007	6.8	3.2	0	0.1	3.5	0.3
2012	6	1	0.2	0.1	2.5	-
2017	8.8	1.8	0	0	2.9	-
year	Quadrat Cover (%)					
2004	6.9	1.3	0.0	0.2	2.5	0.0
2007	7.5	2.1	0.1	0.0	3.4	0.0
2012	6.1	1.4	0.1	0.0	3.4	-
2017	6.6	1.8	0.0	0.1	2.9	0.0

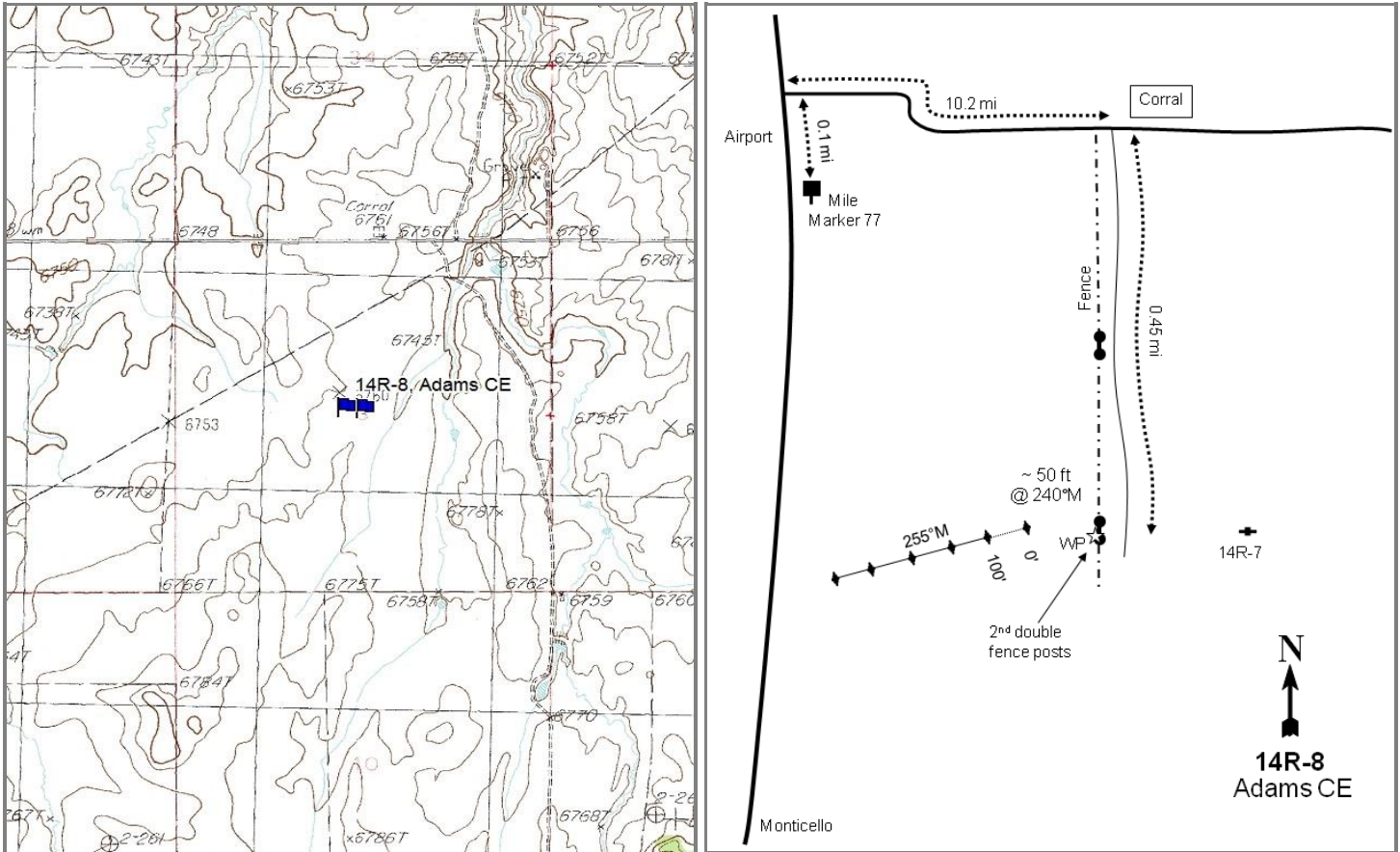
t - Tree Species; p - Preferred Browse; i - Introduced Species

Table 14R-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 frigida^P -- (prairie sagewort)									
2004	-	-	-	-	-	-	-	-	-/-
2007	-	-	-	-	-	-	-	-	10/21
2012	20	-	0	100	0	0	100	0	-/-
2017	-	-	-	-	-	-	-	-	-/-
Artemisia nova^P -- (black sagebrush)									
2004	5000	140	0	41	59	15	18	39	22/35
2007	4980	500	8	51	41	35	0	11	22/42
2012	4240	-	5	85	10	10	33	13	22/41
2017	4200	-	5	91	4	1	0	4	19/39
Chrysothamnus depressus^P -- (longflower rabbitbrush)									
2004	4260	120	1	87	13	13	0	7	15/25
2007	3820	200	9	79	12	14	1	5	14/26
2012	2580	40	5	91	5	12	1	4	11/33
2017	1840	-	1	99	0	5	0	0	12/25
Eriogonum microthecum^P -- (slender buckwheat)									
2004	480	20	0	100	0	4	0	0	8/12
2007	600	80	13	70	17	3	23	10	7/11
2012	660	20	0	97	3	0	0	3	9/12
2017	80	-	0	100	0	50	0	0	12/7
Ericameria nauseosa -- (rubber rabbitbrush)									
2004	-	-	-	-	-	-	-	-	-/-
2007	-	-	-	-	-	-	-	-	-/-
2012	-	-	-	-	-	-	-	-	43/63
2017	-	-	-	-	-	-	-	-	-/-
Gutierrezia sarothrae -- (broom snakeweed)									
2004	220	40	9	91	0	0	0	0	15/21
2007	160	-	25	75	0	0	0	0	12/17
2012	160	-	13	88	0	0	0	0	12/16
2017	120	-	0	100	0	0	0	0	16/24
Krascheninnikovia lanata^P -- (winterfat)									
2004	3420	2900	4	96	0	13	2	0	20/28
2007	9980	2500	39	56	5	6	8	1	17/25
2012	6900	80	7	90	3	27	14	4	13/19
2017	7380	120	11	88	1	16	9	4	14/19
Tetradymia canescens -- (spineless horsebrush)									
2004	20	-	0	100	0	0	0	0	-/-
2007	60	-	0	100	0	100	0	0	23/37
2012	100	-	0	100	0	20	0	0	15/28
2017	20	-	0	100	0	0	0	0	13/29

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

ADAMS CE CONTROL - STUDY NO. 14R-8

**Location Information**

USGS 7.5 min Map Info
GPS (0' Stake)

Eastland NW NE; Township 33S, Range 25E, Section 03
NAD 83 UTM ZONE 12, 661256 East 4200543 North

Transect Information

Browse Tag # (0' Stake)	Not Available
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	Standard

Directions to Site

On US-191, travel north of Monticello for about 5.5 miles to mile marker 77. Continue for 0.1 miles to a road that comes in from the right. Turn right here and follow this road for 10.2 miles to another road that comes in from the right. Turn here and travel south for 0.45 miles to the second pair of wooden fenceposts on the right side of the road. The 0- foot stake is 50 feet from the fenceposts at an azimuth of 240 degrees magnetic.

Site Information

Land Ownership	Private
Land Administrator	Private
Allotment	No data
Elevation	6,770ft (2,063m)
Aspect	Northwest
Slope	2-5%
Sample Dates	09/14/2004, 06/12/2007, 06/20/2012, 07/26/2017

Wildlife Habitat and Vegetation History**Table 14R-08.3 - Wildlife Seasonal Habitat.** UDWR wildlife habitat and seasonality.

Species	Habitat	Season
Deer	crucial	winter

Table 14R-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	Black Sagebrush	NA
2007	Black Sagebrush	NA
2012	Black Sagebrush	NA
2017	Black Sagebrush	NA

Site Notes

This study was established in 2004 as a control study for a Dixie pipe harrow project (14R-7 monitors the project).

Soils**Table 14R-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
Clay Loam	7.2	33.3	31.4	35.3	1.5	12.4	160.0	0.6	09/14/2004

Site Potential

1981 - 2010 Average Annual Precipitation	14 inches
NRCS Ecological Site	Upland Shallow Loam (Black Sagebrush)
NRCS Ecological Site #	R035XY312UT
States and Transitions	No state and transition model is available for this ecological site.

Black sagebrush (*Artemisia nova*) has been the dominant preferred browse species on this study site since its establishment in 2004, and cover has remained stable overall (Table 14R-08.12, Table 14R-08.13). The herbaceous understory is mainly composed of perennial grass species, particularly the introduced species crested wheatgrass (*Agropyron cristatum*) (Table 14R-08.7, Table 14R-08.10). Forbs are rare, and mountain phlox (*Phlox austromontana*) contributed nearly all of the forb cover in 2017 (Table 14R-08.11). Barring a major disturbance, this study site is expected to remain in this state in future sample years.

Trend Summary Tables**Table 14R-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	17.2	0.0	-	23.5	0.2	-
2007	16.4	0.2	-	19.7	0.2	-
2012	15.5	0.1	-	21.8	0.4	-
2017	20.1	0.1	-	22.9	0.2	-

Table 14R-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	-	262	22	112	-	7.5	0.1	0.9
2007	3	322	60	115	0.0	14.4	0.5	1.4
2012	-	303	-	106	-	13.5	-	1.9
2017	-	288	-	58	-	16.6	-	2.0

Table 14R-08.8 - 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	66.3	0.6	17.0	0.9	0.1	24.3
2007	60.6	0.7	20.2	0.3	0.0	29.4
2012	54.8	0.3	24.7	0.6	0.0	32.1
2017	59.1	0.3	19.6	0.2	0.0	32.3

Table 14R-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	Gunnison Sage-Grouse	Rabbit
	Quadrat Frequency		
2004	5	1	1
2007	6	7	17
2012	3	-	-
2017	1	-	6
Year	Days Use Per Acre (ha)		
2004	8.0 (19.7)	8.7 (21.5)*	-
2007	14.5 (35.9)	470.4 (1162.0)*	-
2012	0.7 (1.8)	34.9 (86.1)*	-
2017	8.0 (19.7)	-	-

*Pellets per acre (ha)

Table 14R-08.10 - 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)	Koeleria macrantha (prairie Junegrass)	Pascopyrum smithii (western wheatgrass)	Pleuraphis jamesii (James' galleta)	Psathyrostachys juncea ⁱ (Russian wildrye)	Thinopyrum intermedium ⁱ (intermediate wheatgrass)
year	Nested Frequency									
2004	2	160	-	-	9	2	127	1	-	-
2007	9	235	4	3	16	26	118	-	-	7
2012	11	244	10	-	8	7	53	9	10	-
2017	-	285	6	-	-	-	14	-	-	-
year	Average Cover (%)									
2004	0.1	5.0	-	-	0.3	0.0	2.2	0.0	-	-
2007	0.2	9.7	0.2	0.0	0.5	0.7	2.5	-	-	0.7
2012	0.5	11.1	0.2	-	0.0	0.0	1.4	0.1	0.1	-
2017	-	16.1	0.4	-	-	-	0.1	-	-	-

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

Table 14R-08.11 - Forb Species. Nested frequency and modified Daubenmire average cover by year.

FORB SPECIES	Calochortus nuttallii (sego lily)	Ceratocephala testiculata ^{ai} (curvseed butterwort)	Chenopodium leptophyllum ^a (narrowleaf goosefoot)	Descurainia pinnata ^a (western tansymustard)	Draba ^a (draba)	Erigeron (fleabane)	Erigeron eatonii (Eaton's fleabane)	Erigeron pumilus (shaggy fleabane)	Lappula occidentalis ^a (flatspine stickseed)	Lupinus (lupine)	Penstemon (beardtongue)	Phlox austromontana (mountain phlox)	Silene antirrhina ^a (sleepy silene)	Sphaeralcea coccinea (scarlet globemallow)	Tragopogon dubius ^{ai} (yellow salsify)	Trifolium (clover)	unknown perennial forb (unknown forb)
year	Nested Frequency																
2004	3	-	10	4	-	3	3	2	7	3	-	61	-	29	1	20	3
2007	-	5	-	31	15	-	-	10	19	-	0	57	11	31	-	23	-
2012	-	-	-	-	-	-	-	3	-	-	3	64	-	25	-	17	-
2017	-	-	-	-	-	-	-	-	-	-	-	51	-	8	-	-	-
year	Average Cover (%)																
2004	0.0	-	0.0	0.0	-	0.0	0.0	0.0	0.0	0.0	-	0.6	-	0.2	0.0	0.1	0.0
2007	-	0.0	-	0.2	0.0	-	-	0.2	0.2	-	0.0	1.0	0.1	0.1	-	0.1	-
2012	-	-	-	-	-	-	-	0.0	-	-	0.0	1.5	-	0.2	-	0.1	-
2017	-	-	-	-	-	-	-	-	-	-	-	2.0	-	0.0	-	-	-

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

Table 14R-08.12 - Shrub and Tree Species. Average modified Daubenmire quadrat and line intercept cover by year.

SHRUB SPECIES						
Artemisia nova ^p (black sagebrush)						
Chrysothamnus depressus ^p (longflower rabbitbrush)						
Chrysothamnus viscidiflorus ssp. viscidiflorus var. viscidiflorus (yellow rabbitbrush)						
Eriogonum microthecum ^p (slender buckwheat)						
Gutierrezia sarothrae (broom snakeweed)						
Krascheninnikovia lanata ^p (winterfat)						
year	Line Intercept Cover (%)					
2004	22.9	0.2	-	0.1	0.2	0.3
2007	19.6	-	0.2	-	-	0.1
2012	21.4	-	0.4	-	-	0.4
2017	22.9	-	0.2	-	-	-
year	Quadrat Cover (%)					
2004	17.0	0.0	-	0.1	0.0	0.1
2007	16.2	-	0.2	0.2	-	0.1
2012	15.3	0.0	0.1	0.0	-	0.1
2017	19.8	0.1	0.1	-	-	0.2

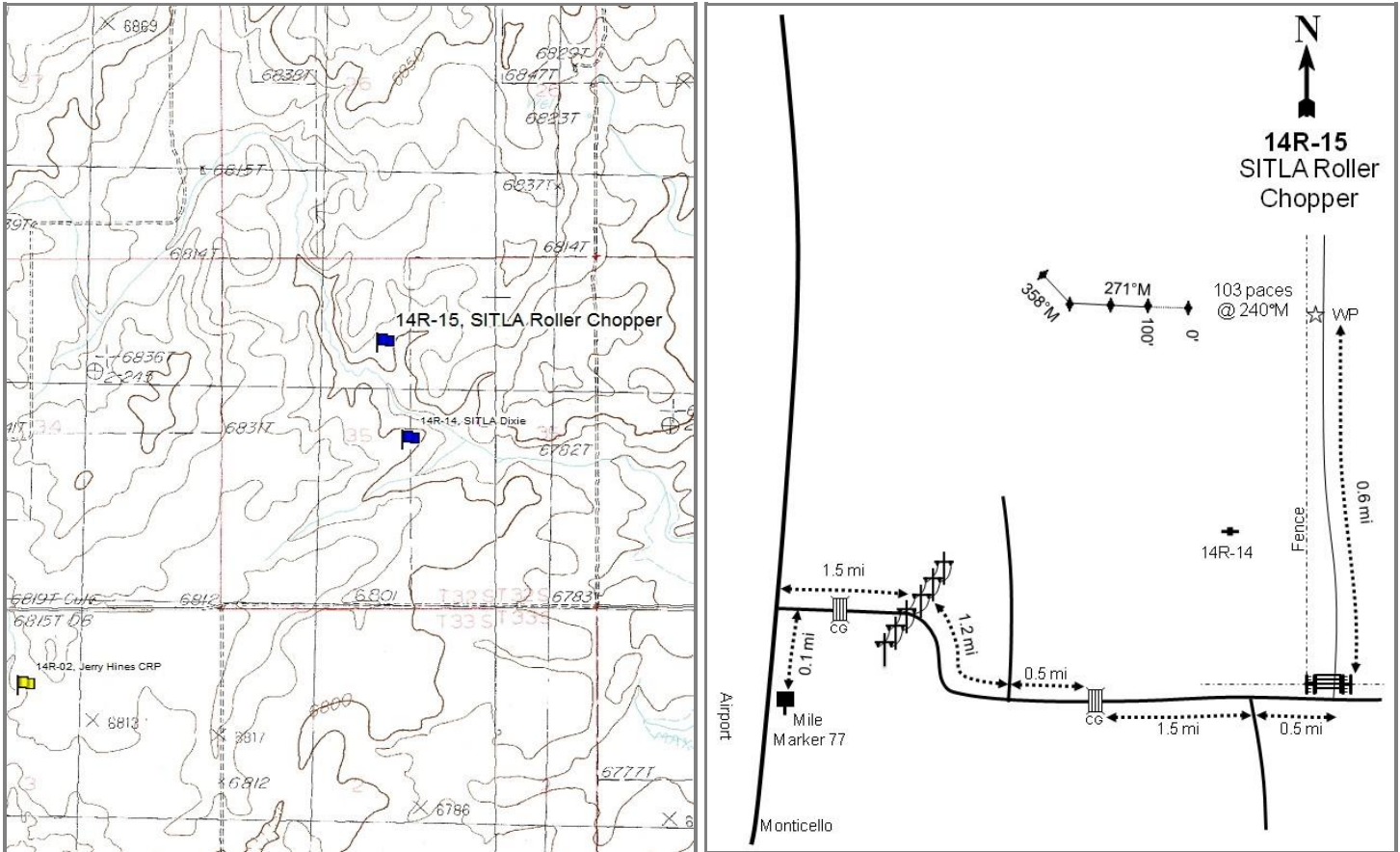
t - Tree Species; p - Preferred Browse; i - Introduced Species

Table 14R-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 frigida^P -- (prairie sagewort)									
2004	-	-	-	-	-	-	-	-	-/-
2007	-	-	-	-	-	-	-	-	-/-
2012	-	-	-	-	-	-	-	-	-/-
2017	60	-	0	100	0	100	0	0	12/29
Artemisia nova^P -- (black sagebrush)									
2004	7700	80	3	72	26	4	0	10	31/53
2007	6980	80	4	56	40	13	0	17	33/55
2012	6020	180	4	83	13	11	16	13	30/59
2017	7840	-	2	84	14	3	0	8	25/56
Chrysothamnus depressus^P -- (longflower rabbitbrush)									
2004	140	-	0	86	14	0	0	14	10/18
2007	80	-	0	75	25	0	0	25	13/34
2012	120	-	0	100	0	0	0	0	12/23
2017	60	-	0	100	0	0	0	0	14/32
Chrysothamnus viscidiflorus ssp. viscidiflorus var. viscidiflorus -- (yellow rabbitbrush)									
2004	80	-	0	100	0	0	0	0	19/29
2007	160	20	0	88	13	0	0	25	17/31
2012	140	-	0	100	0	29	0	0	18/33
2017	260	-	0	100	0	0	0	0	16/12
Eriogonum microthecum^P -- (slender buckwheat)									
2004	220	-	0	100	0	36	0	0	11/13
2007	220	-	0	82	18	0	0	9	14/23
2012	120	-	0	83	17	0	0	17	12/10
2017	-	-	-	-	-	-	-	-	-/-
Gutierrezia sarothrae -- (broom snakeweed)									
2004	220	-	0	100	0	0	0	0	13/26
2007	-	-	-	-	-	-	-	-	9/8
2012	-	-	-	-	-	-	-	-	-/-
2017	-	-	-	-	-	-	-	-	19/36
Krascheninnikovia lanata^P -- (winterfat)									
2004	220	-	0	82	18	9	0	9	18/26
2007	160	800	0	100	0	0	0	0	18/22
2012	160	20	0	100	0	13	0	25	21/28
2017	140	-	0	86	14	43	14	0	24/23
Tetradymia canescens -- (spineless horsebrush)									
2004	-	-	-	-	-	-	-	-	29/56

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

SITLA DIXIE 2 - STUDY NO. 14R-15

**Location Information**

USGS 7.5 min Map Info
GPS (0' Stake)

Monticello North NE; Township 32S, Range 24E, Section 35
NAD 83 UTM ZONE 12, 653183 East 4202362 North

Transect Information

Browse Tag # (0' Stake)	163
Transect Bearing	271° magnetic (Line 4: 358° 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 mile marker 77 on Highway 191 north of Monticello, drive 0.2 miles north and turn right onto a road heading east (Hickman Flat Road). From there, drive for 1.5 miles to some powerlines and a southward bend in the road. Continue for 1.2 miles to a junction and stay straight for another 0.5 miles to a cattle guard. From the cattle guard, drive for 1.5 miles to another junction and continue straight for 0.5 miles. Turn left onto a two-track road and a gate. Drive for 0.6 miles to a witness post on the left-hand (west) side of the road. Walk 103 paces from the witness post at an azimuth of 257 degrees magnetic to the 0-foot stake which is marked with browse tag #163.

Site Information

Land Ownership	State
Land Administrator	SITLA
Allotment	No data
Elevation	6,800ft (2,073m)
Aspect	Southwest
Slope	4%
Sample Dates	08/02/2006, 06/20/2012, 07/27/2017

Table 14R-15.1 Disturbance History. Recorded history of major disturbances.

Treatment/Disturbance	Name	WRI DB#	Date	Size (acres)
Harrow - One-Way Dixie	Gunnison Sage-grouse Sagebrush Treatments phase 1	334	Fall 2006	275
Seeding - Broadcast Before	Gunnison Sage-grouse Sagebrush Treatments phase 1	334	Fall 2006	275

Wildlife Habitat and Vegetation History**Table 14R-15.3 - Wildlife Seasonal Habitat.** UDWR wildlife habitat and seasonality.

Species	Habitat	Season
Deer	crucial	winter
Gunnison Sage Grouse	Occupied	

Table 14R-15.4 - 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	NA
2012	Wyoming Big Sagebrush	NA
2017	Wyoming Big Sagebrush	NA

Site Notes

No Notes

Soils**Table 14R-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	7.2	45.2	24.0	30.8	1.3	14.9	134.4	0.5	08/02/2006

Site Potential

1981 - 2010 Average Annual Precipitation	15 inches
NRCS Ecological Site	Upland Loam (Big Sagebrush)
NRCS Ecological Site #	R036XY306UT
States and Transitions	No state and transition model is available for this ecological site.

This study site has remained dominated by Wyoming big sagebrush (*Artemisia tridentata* ssp. *wyomingensis*) since 2006. Other preferred browse species, namely prairie sagewort (*A. frigida*) and rubber rabbitbrush (*Ericameria nauseosa* ssp. *nauseosa* var. *hololeuca*), are also present, but are not as abundant as sagebrush (Table 14R-15.12, Table 14R-15.13). The herbaceous understory is depleted, with the perennial forb scarlet globemallow (*Sphaeralcea coccinea*) providing the most cover of any herbaceous species in all sample years (Table 14R-15.7, Table 14R-15.10, Table 14R-15.11).

Trend Summary Tables

Table 14R-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
2006	22.3	2.1	-	28.8	1.5	-
2012	19.9	0.4	-	21.1	0.4	-
2017	17.7	1.4	-	23.5	0.4	-

Table 14R-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
2006	28	14	7	150	0.5	0.1	0.0	1.4
2012	15	65	3	203	0.0	1.5	0.0	1.5
2017	1	12	2	147	0.0	0.0	0.0	0.8

Table 14R-15.8 - 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
2006	47.6	0.9	33.3	3.6	6.3	24.8
2012	57.1	0.2	22.3	3.1	4.3	23.3
2017	63.1	0.4	23.8	4.2	3.5	18.6

Table 14R-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	Rabbit
	Quadrat Frequency			
2006	-	-	-	75
2012	-	-	-	28
2017	1	-	1	49
Year	Days Use Per Acre (ha)			
2006	0.7 (1.8)	-	4.0 (9.9)	-
2012	1.5 (3.6)	8.7 (21.5)*	-	-
2017	3.6 (9.0)	-	-	-

*Pellets per acre (ha)

Table 14R-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)	Bromus tectorum ^{ai} (cheatgrass)	Elymus elymoides (squirreltail)	Hesperostipa comata (needle and thread)	Pascopyrum smithii (western wheatgrass)	Pseudoroegneria spicata (bluebunch wheatgrass)
year	Nested Frequency							
2006	-	13	1	28	-	-	-	-
2012	1	31	-	15	13	4	-	16
2017	-	2	-	1	-	1	7	2
year	Average Cover (%)							
2006	-	0.1	0.0	0.5	-	-	-	-
2012	0.0	0.5	-	0.0	0.6	0.0	-	0.4
2017	-	0.0	-	0.0	-	0.0	0.0	0.0

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

Table 14R-15.11 - Forb Species. Nested frequency and modified Daubenmire average cover by year.

FORB SPECIES	Astragalus (milkvetch)	Astragalus convallarius (lesser rushy milkvetch)	Cryptantha (cryptantha)	Erodium cicutarium ⁱⁱ (redstem stork's bill)	Lappula occidentalis ^a (flatspine stickseed)	Linum perenne ⁱ (blue flax)	Packera multilobata (lobeleaf groundsel)	Phlox austromontana (mountain phlox)	Phlox longifolia (longleaf phlox)	Sphaeralcea coccinea (scarlet globemallow)	Trifolium (clover)
year	Nested Frequency										
2006	2	1	7	1	7	-	20	7	6	122	1
2012	2	-	4	-	3	-	4	-	7	187	14
2017	-	-	3	-	2	14	12	-	-	130	-
year	Average Cover (%)										
2006	0.0	0.0	0.0	0.0	0.0	-	0.1	0.0	0.0	1.2	0.0
2012	0.1	-	0.0	-	0.0	-	0.0	-	0.0	1.2	0.0
2017	-	-	0.0	-	0.0	0.1	0.0	-	-	0.6	-

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

Table 14R-15.12 - Shrub and Tree Species. Average modified Daubenmire quadrat and line intercept cover by year.

SHRUB SPECIES	Artemisia frigida ^p (prairie sagewort)	Artemisia tridentata ssp. wyomingensis ^p (Wyoming big sagebrush)	Ericameria nauseosa ssp. nauseosa var. hololeuca ^p (rubber rabbitbrush)	Gutierrezia sarothrae (broom snakeweed)	Opuntia (pricklypear)
year	Line Intercept Cover (%)				
2006	0.2	28.2	0.4	1.3	0.2
2012	0.7	19.9	0.5	0.3	0.1
2017	0.2	23.3	-	0.3	0.1
year	Quadrat Cover (%)				
2006	0.4	21.3	0.5	1.1	1.0
2012	0.5	19.4	0.0	0.4	0.0
2017	0.9	16.8	0.0	1.0	0.4

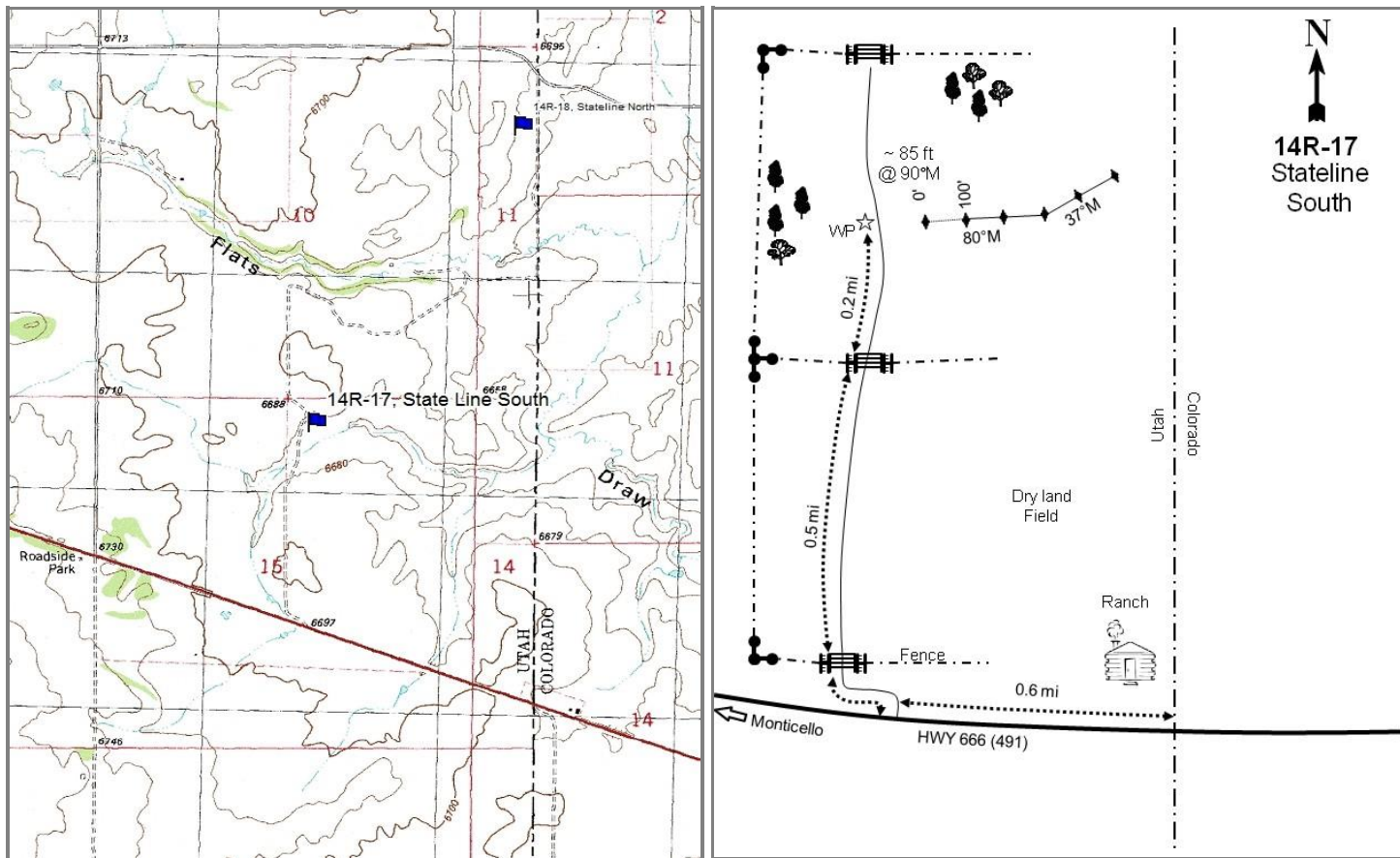
t - Tree Species; p - Preferred Browse; i - Introduced Species

Table 14R-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 frigida^P -- (prairie sagewort)									
2006	540	380	48	52	0	0	11	0	21/32
2012	780	-	18	82	0	0	0	0	8/19
2017	1160	-	14	86	0	7	0	0	9/20
Artemisia tridentata ssp. wyomingensis^P -- (Wyoming big sagebrush)									
2006	5900	14000	3	53	44	0	0	23	61/82
2012	5300	-	8	85	7	32	1	9	49/71
2017	5240	1860	1	89	10	0	0	8	40/64
Ericameria nauseosa ssp. nauseosa var. hololeuca^P -- (rubber rabbitbrush)									
2006	180	-	0	33	67	22	11	44	40/44
2012	160	-	0	88	13	13	0	13	39/51
2017	60	-	33	67	0	0	0	33	33/47
Gutierrezia sarothrae -- (broom snakeweed)									
2006	2820	2800	20	80	0	0	0	0	16/23
2012	640	-	6	94	0	0	0	0	12/16
2017	1700	40	6	94	0	0	0	0	16/18
Opuntia -- (pricklypear)									
2006	480	-	25	75	0	0	0	0	13/35
2012	20	-	0	100	0	0	0	0	12/34
2017	220	-	0	100	0	0	0	0	10/24

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

STATELINE SOUTH - STUDY NO. 14R-17



Location Information

USGS 7.5 min Map Info	Northdale NE; Township 34S, Range 26E, Section 15
GPS (0' Stake)	NAD 83 UTM ZONE 12, 671357 East 4188476 North

Transect Information

Browse Tag # (0' Stake)	Not Available
Transect Bearing	80° magnetic (Lines 3-5: 37° 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 Highway 666 (491), drive 0.6 miles west from the Utah/Colorado border to a turnoff on the right (north). Travel north on this road for 0.7 miles to a witness post on the right (east) side of the road. Walk 85 feet at 90 degrees magnetic to the 0-foot stake. There is no browse tag.

Site Information

Land Ownership	Federal
Land Administrator	BLM
Allotment	STATELINE
Elevation	6,700ft (2,042m)
Aspect	East
Slope	33%
Sample Dates	08/22/2006, 06/18/2012, 07/25/2017

Table 14R-17.1 Disturbance History. Recorded history of major disturbances.

Treatment/Disturbance	Name	WRI DB#	Date	Size (acres)
Seeding - Broadcast Before	Gunnison Sage-grouse Sagebrush Treatments phase 1	334	November-December 2006	240
Harrow - One-Way Dixie	Gunnison Sage-grouse Sagebrush Treatments phase 1	334	November-December 2006	240

Table 14R-17.2 Seed Mix. List of known seeded plant species and rates (if available).

Mix Name			Application Type	Application Date	Acres
Gunnison Sage Grouse Sagebrush Treatment 2			Broadcast	Nov 2006	150
Type	Species	Common Name	Cultivar/Source ID	Bulk lbs/acre	PLS lbs/acre
G	<i>Achnatherum hymenoides</i>	Indian Ricegrass	Rimrock	2.00	1.98
G	<i>Elymus lanceolatus</i>	Thickspike Wheatgrass	Bannock	2.00	1.84
G	<i>Pascopyrum smithii</i>	Western Wheatgrass	Arriba	1.00	0.81
G	<i>Pseudoroegneria spicata</i>	Bluebunch Wheatgrass	Anatone	2.00	1.71
G	<i>Sporobolus cryptandrus</i>	Sand Dropseed		0.07	0.06
G	<i>Thinopyrum intermedium</i>	Pubescent Wheatgrass		1.00	0.84
F	<i>Astragalus cicer</i>	Cicer Milkvetch	Lutana	1.00	0.92
F	<i>Medicago sativa</i>	Alfalfa		1.00	0.94
F	<i>Onobrychis viciifolia</i>	Sainfoin		3.00	2.76
F	<i>Sanguisorba minor</i>	Small Burnet	Delar	2.00	1.86
S	<i>Artemisia tridentata</i> ssp. <i>wyomingensis</i>	Wyoming Big Sagebrush	Sanpete UT	1.00	0.20

Wildlife Habitat and Vegetation History**Table 14R-17.3 - Wildlife Seasonal Habitat.** UDWR wildlife habitat and seasonality.

Species	Habitat	Season
Deer	crucial	winter
Elk	substantial	year-long
Gunnison Sage Grouse	Potential	

Table 14R-17.4 - Vegetation History. The dominant vegetation type(s) and phase of woodland succession (Tausch, Miller, Roundy, & Chambers, 2009).

Year	Vegetation Type	Woodland Succession
2006	Black Sagebrush	Phase I
2012	Black Sagebrush	Phase I
2017	Black Sagebrush	Phase I

Site Notes

No Notes

Soils**Table 14R-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
Clay Loam	7.3	39.2	33.0	27.8	2.1	15.0	156.8	0.5	08/22/2006

Site Potential

1981 - 2010 Average Annual Precipitation	12 inches
NRCS Ecological Site	Upland Shallow Loam (Black Sagebrush)
NRCS Ecological Site #	R035XY312UT
States and Transitions	No state and transition model is available for this ecological site.

This site has remained dominated by black sagebrush (*Artemisia nova*) since study establishment in 2006 with a number of other shrubs also present; line intercept cover of sagebrush has remained nearly stable overall (Table 14R- 17.12, Table 14R-17.13). The herbaceous understory is diverse, but was not particularly abundant in 2006 or 2012 (Table 14R-17.7). Perennial grasses -- namely blue grama (*Bouteloua gracilis*) and the introduced species intermediate wheatgrass (*Thinopyrum intermedium*) -- have contributed the most herbaceous cover in all sample years (Table 14R- 17.10). Both perennial and annual forbs have remained relatively rare throughout the study period (Table 14R-17.11). Twoneedle pinyon (*Pinus edulis*) and Utah juniper (*Juniperus osteosperma*) are found on this site in low amounts (Table 14R-17.14), placing it in Phase I of woodland succession (Table 14R-17.4).

Trend Summary Tables

Table 14R-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
2006	19.7	3.9	0.0	22.6	4.9	-
2012	11.8	5.1	-	14.9	4.9	-
2017	16.4	6.2	-	21.3	5.5	-

Table 14R-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
2006	182	137	-	83	1.4	3.0	-	0.6
2012	258	153	53	205	2.3	5.7	0.2	2.3
2017	85	218	49	118	1.5	11.6	0.2	3.3

Table 14R-17.8 - 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
2006	51.8	3.6	26.2	2.2	3.0	28.0
2012	44.4	0.3	31.8	1.8	2.7	28.0
2017	42.0	0.4	25.1	3.9	3.6	33.0

Table 14R-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	Rabbit
	Quadrat Frequency		
2006	-	5	70
2012	-	3	2
2017	-	14	38
Year	Days Use Per Acre (ha)		
2006	5.8 (14.3)	2.0 (5.0)	-
2012	0.7 (1.8)	4.0 (9.9)	-
2017	-	6.0 (14.9)	-

Table 14R-17.10 - 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)	Carex (sedge)	Elymus elymoides (squirreltail)	Hesperostipa comata (needle and thread)	Koeleria macrantha (prairie Junegrass)	Poa (bluegrass)	Poa fendleriana (muttongrass)	Poa secunda (Sandberg bluegrass)	Pseudoroegneria spicata (bluebunch wheatgrass)	Thinopyrum intermedium ⁱ (intermediate wheatgrass)
year	Nested Frequency											
2006	1	39	182	-	12	-	7	65	34	3	-	-
2012	1	38	258	4	31	8	15	-	37	6	13	36
2017	10	61	85	-	13	22	37	-	13	-	3	100
year	Average Cover (%)											
2006	0.0	1.5	1.4	-	0.1	-	0.1	0.7	0.6	0.0	-	-
2012	0.0	2.0	2.3	0.0	0.5	0.1	0.3	-	1.1	0.4	0.1	1.1
2017	0.4	4.0	1.5	-	0.5	1.4	0.9	-	0.3	-	0.2	4.0

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

Table 14R-17.11 - Forb Species. Nested frequency and modified Daubenmire average cover by year.

FORB SPECIES	Alyssum desertorum ^{ai} (desert madwort)	Antennaria dimorpha (low pussytoes)	Astragalus tenellus (looseflower milkvetch)	Astragalus zionis (Zion milkvetch)	Calochortus nuttallii (sego lily)	Ceratocephala testiculata ^{ai} (curveseed butterwort)	Chaenactis douglasii (Douglas' dustymaiden)	Cirsium (thistle)	Collinsia parviflora ^a (maiden blue eyed Mary)	Crepis acuminata (tapertip hawksbeard)	Cryptantha (cryptantha)	Cymopterus (springparsley)	Erigeron eatonii (Eaton's fleabane)	Erigeron pumilus (shaggy fleabane)	Eriogonum racemosum (redroot buckwheat)	Eriogonum umbellatum (sulphur-flower buckwheat)	Erodium cicutarium ^{ai} (redstem stork's bill)
year	Nested Frequency																
2006	-	-	1	7	-	-	-	1	-	-	2	-	12	-	3	9	-
2012	8	4	6	22	-	8	10	-	3	5	1	1	11	8	11	11	1
2017	45	-	11	-	1	-	2	-	-	1	-	-	2	5	4	9	-
year	Average Cover (%)																
2006	-	-	0.0	0.0	-	-	-	0.0	-	-	0.0	-	0.0	-	0.0	0.2	-
2012	0.0	0.0	0.2	0.1	-	0.0	0.1	-	0.0	0.0	0.0	0.0	0.1	0.2	0.0	0.1	0.0
2017	0.2	-	0.4	-	0.0	-	0.0	-	-	0.0	-	-	0.0	0.0	0.1	0.2	-

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

FORB SPECIES	Heterotheca villosa (hairy false goldenaster)	Lappula occidentalis ^{ai} (flatspine stickseed)	Medicago sativa ⁱ (alfalfa)	Oenothera (evening primrose)	Orobanche fasciculata (clustered broomrape)	Penstemon (beardtongue)	Penstemon caespitosus (mat penstemon)	Phlox hoodii (spiny phlox)	Phlox longifolia (longleaf phlox)	Polygonum douglasii ^a (Douglas' knotweed)	Sanguisorba minor ⁱ (small burnet)	Sphaeralcea coccinea (scarlet globemallow)	Tragopogon dubius ^{ai} (yellow salsify)	Trifolium gymnocarpon (hollyleaf clover)
year	Nested Frequency													
2006	-	-	-	2	-	10	3	22	3	-	-	22	-	-
2012	12	38	3	6	3	-	11	24	35	2	0	39	1	62
2017	7	2	-	-	-	1	-	37	14	1	-	36	3	6
year	Average Cover (%)													
2006	-	-	-	0.0	-	0.0	0.0	0.1	0.0	-	-	0.1	-	-
2012	0.2	0.1	0.0	0.0	0.0	-	0.1	0.2	0.3	0.0	0.0	0.5	0.0	0.2
2017	0.8	0.0	-	-	-	0.0	-	1.3	0.1	0.0	-	0.4	0.0	0.0

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

Table 14R-17.12 - Shrub and Tree Species. Average modified Daubenmire quadrat and line intercept cover by year.

SHRUB SPECIES	Line Intercept Cover (%)											
	year											
Artemisia frigida ^p (prairie sagewort)	2006	0.1	16.6	5.9	-	1.5	3.2	-	0.1	0.1	-	-
Artemisia nova ^p (black sagebrush)	2012	0.1	11.4	3.2	0.2	2.9	1.7	-	0.3	0	-	-
Artemisia tridentata ssp. wyomingensis ^p (Wyoming big sagebrush)	2017	0.5	15.7	4.2	0.9	2.4	1.8	-	1.3	-	-	-
Chrysothamnus depressus ^p (longflower rabbitbrush)	year	Quadrat Cover (%)										
Chrysothamnus viscidiflorus ssp. viscidiflorus var. viscidiflorus (yellow rabbitbrush)	2006	0.0	13.0	6.6	-	1.1	2.4	0.0	0.4	0.0	0.0	-
Ericameria nauseosa (rubber rabbitbrush)	2012	0.2	4.9	6.4	0.3	2.2	2.6	-	0.2	0.0	-	-
Escobaria (foxtail cactus)	2017	1.0	12.7	1.8	0.8	2.3	2.8	-	1.1	-	-	0.0
Gutierrezia sarothrae (broom snakeweed)												
Opuntia (pricklypear)												
Pinus edulis ⁱ (twoneedle pinyon)												
Quercus gambelii ^p (Gambel oak)												

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

Table 14R-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)									
2006	320	-	0	100	0	31	6	0	15/24
2012	280	-	0	100	0	93	0	0	18/40
2017	800	-	45	55	0	3	0	3	14/33
Artemisia nova^p -- (black sagebrush)									
2006	5540	140	2	69	30	2	0	17	29/57
2012	2760	860	11	82	7	45	25	2	26/58
2017	4600	-	3	93	4	15	26	2	28/59
Artemisia tridentata ssp. wyomingensis^p -- (Wyoming big sagebrush)									
2006	1200	40	10	55	35	0	0	12	77/108
2012	820	40	12	88	0	5	2	2	44/88
2017	560	-	0	93	7	36	0	0	60/97
Chrysothamnus depressus^p -- (longflower rabbitbrush)									
2006	-	-	-	-	-	-	-	-	-/-
2012	220	-	0	100	0	18	0	0	14/27
2017	300	-	7	93	0	20	0	0	20/49
Chrysothamnus viscidiflorus ssp. viscidiflorus var. viscidiflorus -- (yellow rabbitbrush)									
2006	1300	-	5	71	25	39	59	17	13/29
2012	1060	-	21	72	8	0	0	2	22/40
2017	800	-	15	70	15	5	0	0	36/65
Echinocereus coccineus var. coccineus -- (scarlet hedgehog cactus)									
2006	-	-	-	-	-	-	-	-	14/32
2012	-	-	-	-	-	-	-	-	-/-
2017	-	-	-	-	-	-	-	-	-/-
Ericameria nauseosa -- (rubber rabbitbrush)									
2006	380	-	0	79	21	0	0	0	61/79
2012	340	-	35	59	6	0	0	24	58/94
2017	500	-	12	88	0	0	0	0	60/97
Escobaria -- (foxtail cactus)									
2006	40	-	50	50	0	0	0	0	12/30
2012	-	-	-	-	-	-	-	-	-/-
2017	-	-	-	-	-	-	-	-	-/-

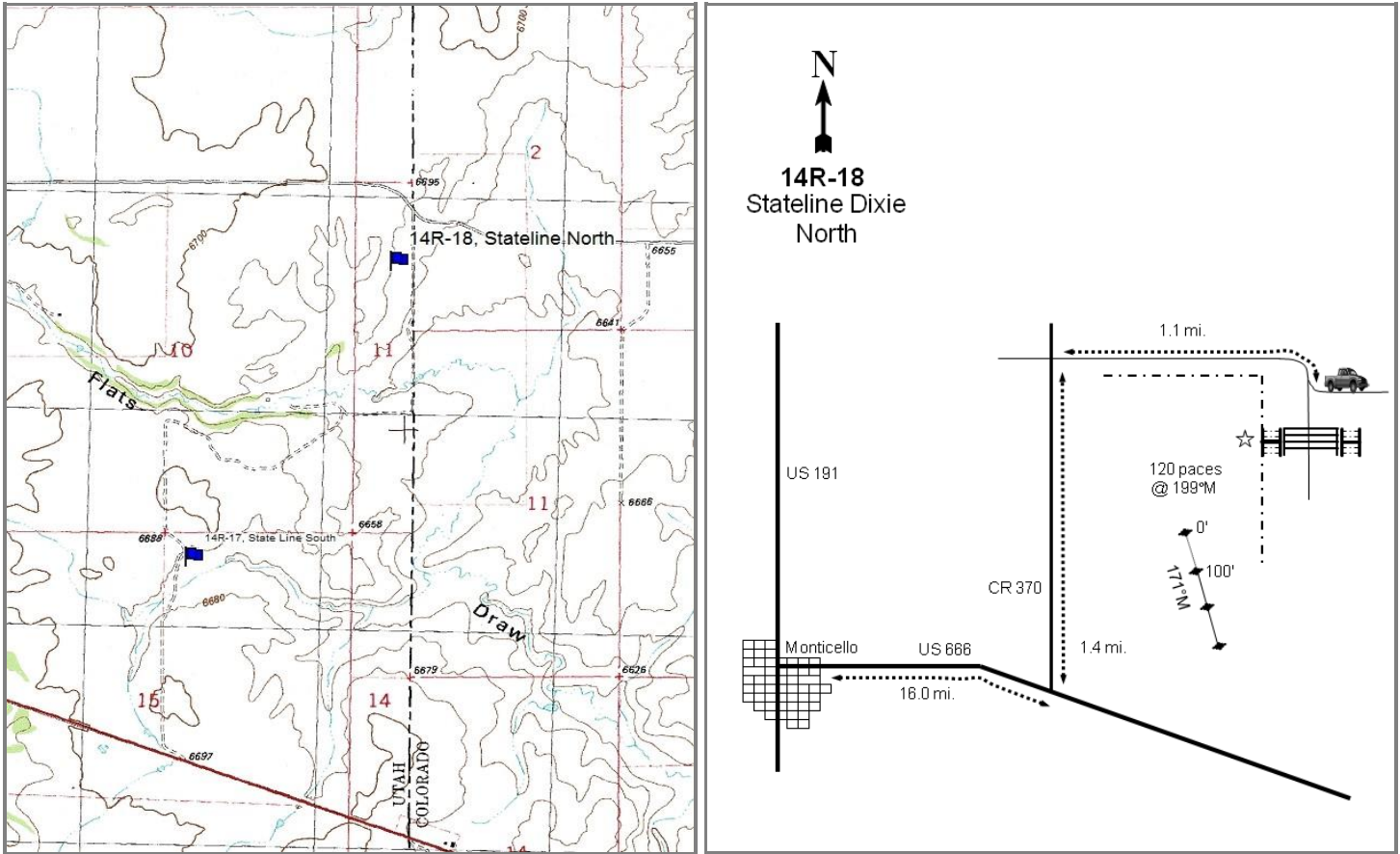
Year	Density		Age Class Distribution			Utilization		Poor Vigor (%)	Average Height Crown (cm)
	Plants Per Acre		Excluding Seedlings			Moderate (%)	Heavy (%)		
	Excluding Seedlings	Seedling	Young (%)	Mature (%)	Decadent (%)				
Gutierrezia sarothrae -- (broom snakeweed)									
2006	580	60	10	90	0	0	0	0	17/28
2012	520	-	27	73	0	4	0	0	19/27
2017	3720	-	8	88	4	0	0	2	16/20
Opuntia -- (pricklypear)									
2006	80	-	50	50	0	0	0	0	10/26
2012	20	-	0	100	0	0	0	0	10/21
2017	100	-	0	100	0	0	0	0	11/17
Pediocactus simpsonii -- (mountain ball cactus)									
2006	40	-	0	100	0	0	0	0	4/7
2012	-	-	-	-	-	-	-	-	7/7
2017	-	-	-	-	-	-	-	-	-/-
Pinus edulis^t -- (twoneedle pinyon)									
2006	-	20	0	0	0	0	0	0	-/-
2012	-	-	-	-	-	-	-	-	-/-
2017	-	-	-	-	-	-	-	-	-/-
Quercus gambelii^p -- (Gambel oak)									
2006	-	-	-	-	-	-	-	-	-/-
2012	-	-	-	-	-	-	-	-	60/45
2017	-	-	-	-	-	-	-	-	-/-
Tetradymia canescens -- (spineless horsebrush)									
2006	-	-	-	-	-	-	-	-	-/-
2012	-	-	-	-	-	-	-	-	27/47
2017	20	-	0	100	0	0	0	0	43/61

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

Table 14R-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)							
2017	1	-	100	-	-	-	4.0
Pinus edulis (twoneedle pinyon)							
2017	8	-	-	100	-	-	6.0

STATELINE NORTH - STUDY NO. 14R-18



Location Information

USGS 7.5 min Map Info	Northdale NE; Township 34S, Range 26E, Section 11
GPS (0' Stake)	NAD 83 UTM ZONE 12, 672205 East 4189852 North

Transect Information

Browse Tag # (0' Stake)	100
Transect Bearing	171° magnetic
Length	300ft
Belt Placement	Line 1 (11ft & 95ft), Line 2 (34ft & 71ft), Line 3 (59ft)
Belt Marker Placement	Standard

Directions to Site

From Highway 191, turn east onto Highway 666 (491). Proceed for 16.0 miles to County Road 370. Turn left (north) and drive for 1.4 miles to an intersection. Turn right at the intersection and drive for 1.1 miles to a road going south. Turn and park by the gate. Walk from the west post (cedar post) of the gate 120 paces at 199 degrees magnetic to the 0- foot stake marked with browse tag #100.

Site Information

Land Ownership	Federal
Land Administrator	BLM
Allotment	STATELINE
Elevation	6,679ft (2,036m)
Aspect	East
Slope	4%
Sample Dates	08/22/2006, 06/18/2009, 06/24/2013, 07/26/2017

Table 14R-18.1 Disturbance History. Recorded history of major disturbances.

Treatment/Disturbance	Name	WRI DB#	Date	Size (acres)
Harrow - One-Way Dixie	Gunnison Sage-grouse Sagebrush Treatments phase 1	334	Fall 2006	240
Seeding - Broadcast Before	Gunnison Sage-grouse Sagebrush Treatments phase 1	334	Fall 2006	240

Table 14R-18.2 Seed Mix. List of known seeded plant species and rates (if available).

Mix Name			Application Type	Application Date	Acres
Gunnison Sage Grouse Sagebrush Treatment 2			Broadcast	Nov 2006	150
Type	Species	Common Name	Cultivar/Source ID	Bulk lbs/acre	PLS lbs/acre
G	Achnatherum hymenoides	Indian Ricegrass	Rimrock	2.00	1.98
G	Elymus lanceolatus	Thickspike Wheatgrass	Bannock	2.00	1.84
G	Pascopyrum smithii	Western Wheatgrass	Arriba	1.00	0.81
G	Pseudoroegneria spicata	Bluebunch Wheatgrass	Anatone	2.00	1.71
G	Sporobolus cryptandrus	Sand Dropseed		0.07	0.06
G	Thinopyrum intermedium	Pubescent Wheatgrass		1.00	0.84
F	Astragalus cicer	Cicer Milkvetch	Lutana	1.00	0.92
F	Medicago sativa	Alfalfa		1.00	0.94
F	Onobrychis viciifolia	Sainfoin		3.00	2.76
F	Sanguisorba minor	Small Burnet	Delar	2.00	1.86
S	Artemisia tridentata ssp. wyomingensis	Wyoming Big Sagebrush	Sanpete UT	1.00	0.20

Wildlife Habitat and Vegetation History**Table 14R-18.3 - Wildlife Seasonal Habitat.** UDWR wildlife habitat and seasonality.

Species	Habitat	Season
Deer	crucial	winter
Elk	substantial	year-long
Gunnison Sage Grouse	Potential	

Table 14R-18.4 - 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
2009	Wyoming Big Sagebrush	No Encroachment
2013	Wyoming Big Sagebrush	No Encroachment

Site Notes

The study monitors a Dixie harrow treatment to rejuvenate sagebrush stands currently occupied by sage-grouse. There have been some rodent holes/mounds observed across the site.

Soils**Table 14R-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
Loam	7.3	38.2	38.0	23.8	0.9	13.8	70.4	0.4	08/22/2006

Site Potential

1981 - 2010 Average Annual Precipitation 12 inches
 NRCS Ecological Site Upland Loam (Big Sagebrush)
 NRCS Ecological Site # R036XY306UT
 States and Transitions No state and transition model is available for this ecological site.

Since establishment in 2006, this site has remained in a stable state as a Wyoming big sagebrush (*Artemisia tridentata* ssp. *wyomingensis*) dominated plant community. Post-treatment sagebrush stand age class has diversified, and overall density has increased (Table 14R-18.12, 14R-18.13). The herbaceous understory has remained a mixture of perennial and annual grasses and forbs. Perennial forbs, mainly scarlet globemallow (*Sphaeralcea coccinea*) and lupine (*Lupinus* sp.), and perennial grasses dominated the understory in 2017 (Table 14R-18.7, Table 14R-18.11). The introduced annual grass cheatgrass (*Bromus tectorum*) is present under some of the sagebrush and although it provides little cover, it may pose a potential risk to the resilience of this site in future sample years (Table 14R-18.10).

Trend Summary Tables

Table 14R-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
2006	20.5	1.2	-	23.0	0.8	-
2009	11.4	2.0	-	14.8	2.0	-
2013	8.5	1.9	-	12.0	2.3	-
2017	12.2	2.3	-	17.3	1.5	-

Table 14R-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
2006	14	226	-	43	0.0	6.8	-	0.1
2009	188	177	229	183	4.9	5.2	7.6	7.3
2013	152	214	55	230	1.7	4.3	0.9	2.8
2017	143	204	3	245	2.0	7.8	0.0	7.0

Table 14R-18.8 - 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
2006	54.0	2.8	30.2	0.1	0.7	27.7
2009	43.4	1.8	40.0	0.3	0.7	34.8
2013	42.2	0.6	40.2	0.0	-	26.7
2017	47.3	0.5	39.5	0.1	-	26.6

Table 14R-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	Rabbit
	Quadrat Frequency		
2006	2	-	94
2009	1	12	67
2013	3	1	45
2017	7	16	79
Year	Days Use Per Acre (ha)		
2006	2.2 (5.4)	3.4 (8.3)	-
2009	0.7 (1.8)	12.1 (29.8)	-
2013	4.4 (10.8)	2.7 (6.6)	-
2017	6.5 (16.1)	2.0 (5.0)	-

Table 14R-18.10 - Grass Species. Nested frequency and modified Daubenmire average cover by year.

GRASS SPECIES	Achatherum hymenoides (Indian ricegrass)	Agropyron cristatum ⁱ (crested wheatgrass)	Bromus tectorum ^{ai} (cheatgrass)	Elymus elymoides (squirreltail)	Koeleria macrantha (prairie Junegrass)	Pascopyrum smithii (western wheatgrass)	Pleuraphis jamesii (James' galleta)	Poa (bluegrass)	Poa fendleriana (muttongrass)	Poa secunda (Sandberg bluegrass)	Pseudoroegneria spicata (bluebunch wheatgrass)	Thinopyrum intermedium ⁱ (intermediate wheatgrass)
year	Nested Frequency											
2006	-	1	14	9	0	-	-	209	5	8	-	-
2009	3	1	188	34	-	-	-	135	2	1	13	17
2013	11	7	152	62	1	8	1	36	20	2	111	6
2017	2	7	143	65	4	12	-	-	93	-	66	12
year	Average Cover (%)											
2006	-	0.0	0.0	0.1	0.0	-	-	6.6	0.0	0.0	-	-
2009	0.0	0.0	4.9	0.7	-	-	-	3.8	0.0	0.0	0.2	0.5
2013	0.1	0.1	1.7	0.7	0.0	0.1	0.0	0.5	0.3	0.0	2.5	0.0
2017	0.1	0.1	2.0	2.4	0.0	0.3	-	-	2.7	-	1.7	0.4

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

Table 14R-18.11 - Forb Species. Nested frequency and modified Daubenmire average cover by year.

FORB SPECIES	Astragalus (milkvetch)	Castilleja angustifolia (northwestern Indian paintbrush)	Ceratocephala testiculata ^{ai} (curvseed butterwort)	Cordylanthus ^a (bird's-beak)	Cryptantha (cryptantha)	Descurainia pinnata ^a (western tansymustard)	Erigeron eatonii (Eaton's fleabane)	Erodium cicutarium ^{ai} (redstem stork's bill)	Lactuca serriola ^{ai} (prickly lettuce)	Lappula occidentalis ^a (flatspine stickseed)	Lupinus (lupine)	Packera multilobata (lobeleaf groundsel)	Phlox austromontana (mountain phlox)	Phlox hoodii (spiny phlox)	Phlox longifolia (longleaf phlox)	Sphaeralcea coccinea (scarlet globemallow)	Trifolium (clover)
year	Nested Frequency																
2006	-	-	-	-	3	-	3	-	-	-	-	-	-	-	-	37	-
2009	0	-	26	7	-	1	2	5	4	202	110	0	10	2	40	55	31
2013	-	2	-	-	4	-	5	21	-	42	98	4	8	-	38	142	34
2017	-	-	-	3	-	-	1	-	-	-	91	-	-	-	4	193	-
year	Average Cover (%)																
2006	-	-	-	-	0.0	-	0.0	-	-	-	-	-	-	-	-	0.1	-
2009	0.0	-	0.4	0.0	-	0.0	0.0	0.0	0.0	7.2	6.2	0.0	0.0	0.0	0.1	0.8	0.1
2013	-	0.0	-	-	0.0	-	0.0	0.2	-	0.8	1.0	0.0	0.0	-	0.1	1.6	0.1
2017	-	-	-	0.0	-	-	0.0	-	-	-	2.6	-	-	-	0.0	4.4	-

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

FORB SPECIES	Zigadenus paniculatus (foothill deathcamas)
year	Nested Frequency
2006	-
2009	-
2013	-
2017	5
year	Average Cover (%)
2006	-
2009	-
2013	-
2017	0.0

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

Table 14R-18.12 - 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. viscidiflorus (yellow rabbitbrush)	Ericameria nauseosa (rubber rabbitbrush)	Eriogonum microthecum ^p (slender buckwheat)	Gutierrezia sarothrae (broom snakeweed)	Linanthus pungens (granite prickly phlox)	Opuntia (pricklypear)
year	Line Intercept Cover (%)						
2006	23	0.7	-	-	-	-	0.1
2009	14.8	1.5	-	-	0.4	-	0.1
2013	12	1.1	-	-	1	0.1	0.1
2017	17.3	1	-	-	-	-	0.5
year	Quadrat Cover (%)						
2006	20.5	0.4	-	-	-	-	0.8
2009	11.4	1.1	0.0	-	0.2	-	0.6
2013	8.5	0.3	-	0.0	1.5	0.0	0.0
2017	12.2	1.4	-	0.0	0.1	-	0.8

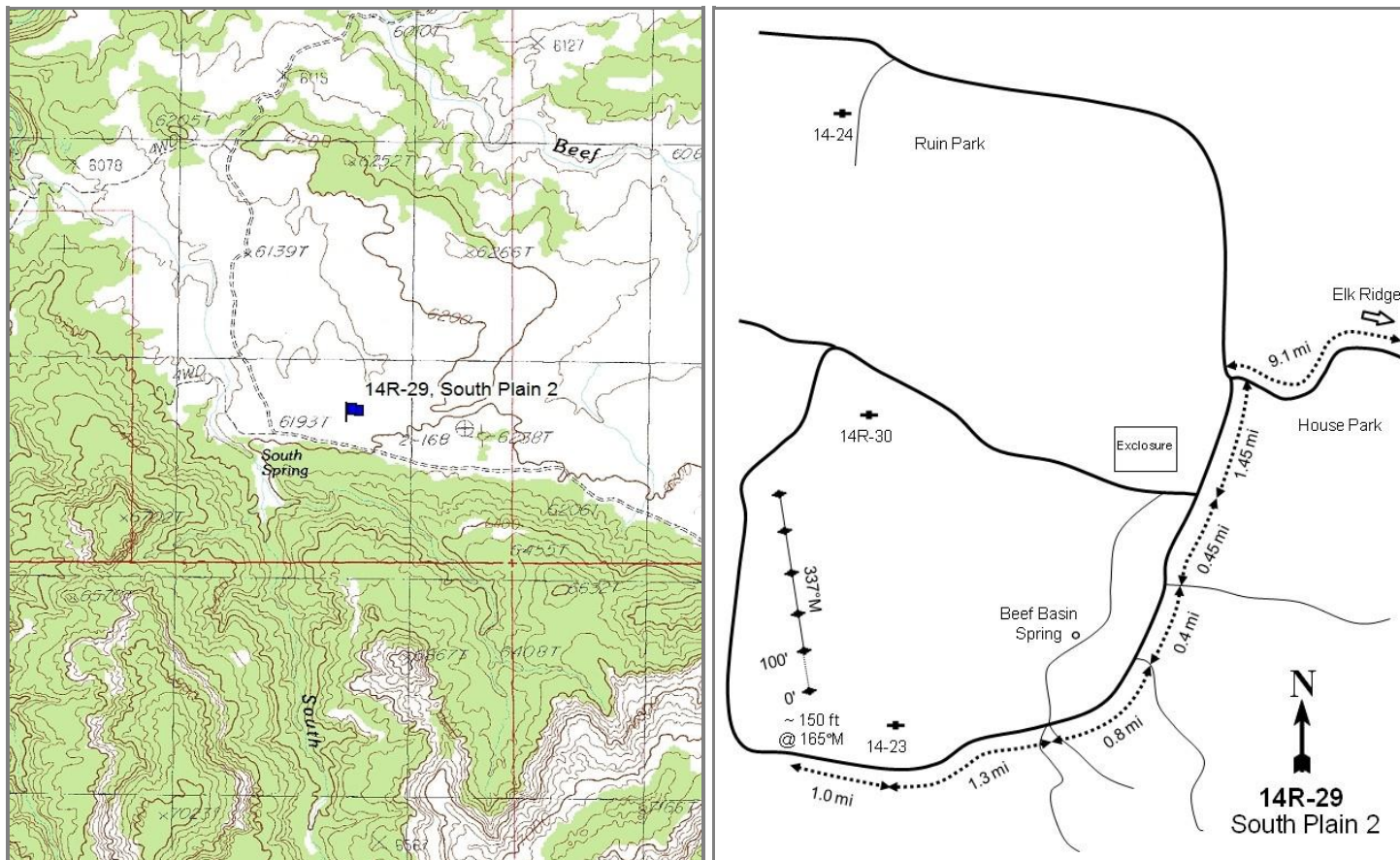
t - Tree Species; p - Preferred Browse; i - Introduced Species

Table 14R-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 tridentata ssp. wyomingensis^P -- (Wyoming big sagebrush)									
2006	5160	120	2	63	35	9	0	16	73/91
2009	-	-	-	-	-	-	-	-	61/77
2013	6360	2260	54	42	4	9	1	14	50/68
2017	7560	20	11	82	7	3	1	3	44/61
Chrysothamnus viscidiflorus ssp. viscidiflorus var. viscidiflorus -- (yellow rabbitbrush)									
2006	1400	20	6	90	4	20	59	3	9/20
2009	-	-	-	-	-	-	-	-	20/31
2013	660	60	12	85	3	0	0	6	23/38
2017	1400	-	1	99	0	29	0	0	17/33
Eriogonum microthecum^P -- (slender buckwheat)									
2006	-	-	-	-	-	-	-	-	-/-
2009	-	-	-	-	-	-	-	-	-/-
2013	-	-	-	-	-	-	-	-	-/-
2017	40	-	50	50	0	0	50	0	- / -
Ericameria nauseosa -- (rubber rabbitbrush)									
2006	-	-	-	-	-	-	-	-	83/92
2009	-	-	-	-	-	-	-	-	48/34
2013	-	-	-	-	-	-	-	-	-/-
2017	-	-	-	-	-	-	-	-	-/-
Gutierrezia sarothrae -- (broom snakeweed)									
2006	40	20	0	100	0	0	0	0	12/24
2009	-	-	-	-	-	-	-	-	17/29
2013	880	-	18	73	9	0	2	7	22/36
2017	440	-	14	86	0	0	0	0	16/21
Linanthus pungens -- (granite prickly phlox)									
2006	-	-	-	-	-	-	-	-	-/-
2009	-	-	-	-	-	-	-	-	-/-
2013	20	-	0	100	0	0	0	0	- / -
2017	-	-	-	-	-	-	-	-	-/-
Opuntia -- (pricklypear)									
2006	320	-	0	94	6	19	0	0	14/45
2009	-	-	-	-	-	-	-	-	14/46
2013	460	20	13	87	0	0	0	0	11/30
2017	1060	20	2	98	0	0	0	0	12/30

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

SOUTH PLAIN 2 - STUDY NO. 14R-29

**Location Information**

USGS 7.5 min Map Info
GPS (0' Stake)

Fable Valley NW; Township 32S, Range 18E, Section 63
NAD 83 UTM ZONE 12, 592659 East 4200914 North

Transect Information

Browse Tag # (0' Stake)	683
Transect Bearing	332° magnetic
Length	500ft
Belt Placement	Line 1 (11ft), Line 2 (34ft), Line 3 (59ft), Line 4 (71ft), Line 5 (95ft)
Belt Marker Placement	Standard

Directions to Site

At the junction of the Elk Ridge-Salt Creek Mesa-Beef Basin Roads, proceed north down into the Beef Basin area. Follow the main road for 9.1 miles, passing the FS/BLM boundary down to an intersection where there is a BLM register box. Stay left on County Road #104 and proceed 1.45 miles to the turnoff to an enclosure. Stay left for 0.45 miles to a fork. Stay right and go 0.4 miles to a fork. Go right at the intersection with the Beef Basin Canyon Road and go 0.8 miles to a 5-way intersection. Take the west fork straight through the intersection (left fork goes to Native American ruins) and continue 1.3 miles to a large pinyon pine on the right. Travel 1.0 mile and stop. The study site is approximately 150 ft to the north at 165 degrees magnetic.

Site Information

Land Ownership	Federal
Land Administrator	BLM
Allotment	INDIAN CREEK
Elevation	6,198ft (1,889m)
Aspect	North
Slope	2-3%
Sample Dates	08/29/2012, 08/21/2017

Table 14R-29.1 Disturbance History. Recorded history of major disturbances.

Treatment/Disturbance	Name	WRI DB#	Date	Size (acres)
Seeding - Aerial	Beef Basin Phase I	2939	January 2015	272
Herbicide - Plateau	Beef Basin Phase I	2939	November 2014	272

Table 14R-29.2 Seed Mix. List of known seeded plant species and rates (if available).

Mix Name		Application Type	Application Date	Acres	
Beef Basin Sagebrush		Aerial	Jan 2015	875	
Type	Species	Common Name	Cultivar/Source ID	Bulk lbs/acre	PLS lbs/acre
		Rice Hulls		0.57	0.00
S	Artemisia tridentata ssp. wyomingensis	Wyoming Big Sagebrush	Paiute UT	1.06	0.20

Wildlife Habitat and Vegetation History**Table 14R-29.3 - Wildlife Seasonal Habitat.** UDWR wildlife habitat and seasonality.

Species	Habitat	Season
Deer	crucial	winter

Table 14R-29.4 - Vegetation History. The dominant vegetation type(s) and phase of woodland succession (Tausch, Miller, Roundy, & Chambers, 2009).

Year	Vegetation Type	Woodland Succession
2012	Perennial Grass	No Encroachment
2017	Perennial Grass	No Encroachment

Site Notes

No Notes

Site Potential

1981 - 2010 Average Annual Precipitation	12 inches
NRCS Ecological Site	Upland Sand (Mountain big sagebrush)
NRCS Ecological Site #	035XY307UT
States and Transitions	No state and transition model is available for this ecological site.

This site has existed as a perennial grass -- namely blue grama (*Bouteloua gracilis*) and needle and thread (*Hesperostipa comata*) -- plant community type since 2012 (Table 14R-29.7, Table 14R-29.10). Browse species are scattered throughout the area, with winterfat (*Krascheninnikovia lanata*) as the most abundant preferred species in both pre- and post-treatment sample years (Table 14R-29.12, Table 14R-29.13). Annual and perennial forbs have remained rare (Table 14R-29.11).

Trend Summary Tables

Table 14R-29.6 - 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	1.7	0.5	-	1.5	0.2	-
2017	1.8	0.6	-	1.8	0.1	-

Table 14R-29.7 - 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	64	406	92	15	0.3	29.1	0.7	0.3
2017	138	370	268	50	3.2	22.9	3.8	0.2

Table 14R-29.8 - 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
2012	41.6	1.2	38.8	0.2	-	32.8
2017	35.3	-	38.9	0.0	-	34.9

Table 14R-29.9 - 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	Rocky Mountain Elk	Rabbit
	Quadrat Frequency			
2012	9	8	1	8
2017	8	6	-	37
Year	Days Use Per Acre (ha)			
2012	10.9 (26.9)	8.1 (19.9)	0.7 (1.7)	-
2017	12.3 (30.5)	1.3 (3.3)	8.7 (21.5)	-

Table 14R-29.10 - Grass Species. Nested frequency and modified Daubenmire average cover by year.

GRASS SPECIES	Achnatherum hymenoides (Indian ricegrass)	Bouteloua gracilis (blue grama)	Bromus tectorum ⁱⁱ (cheatgrass)	Elymus elymoides (squirreltail)	Hesperostipa comata (needle and thread)	Poa secunda (Sandberg bluegrass)	Sporobolus cryptandrus (sand dropseed)	Vulpia octoflora ^a (sixweeks fescue)
year	Nested Frequency							
2012	4	320	64	9	172	-	56	-
2017	2	264	131	4	209	8	54	10
year	Average Cover (%)							
2012	0.0	19.3	0.3	0.1	7.2	-	2.4	-
2017	0.1	14.6	3.1	0.0	6.8	0.0	1.3	0.1

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

Table 14R-29.11 - Forb Species. Nested frequency and modified Daubenmire average cover by year.

FORB SPECIES																
Astragalus (milkvetch)																
Chenopodium leptophyllum ^a (narrowleaf goosefoot)																
Cordylanthus ^a (bird's-beak)																
Cryptantha ^a (annual cryptantha)																
Cryptantha (cryptantha)																
Descurainia pinnata ^a (western tansymustard)																
Erigeron pumilus (shaggy fleabane)																
Erodium cicutarium ⁱⁱ (redstem stork's bill)																
Gilia inconspicua ^a (shy gilia)																
Lappula occidentalis ^a (flatspine stickseed)																
Machaeranthera canescens (hoary tansyaster)																
Plantago patagonica ^a (woolly plantain)																
Portulaca oleracea ⁱⁱ (little hogweed)																
Salsola tragus ⁱⁱ (prickly Russian thistle)																
Tragopogon dubius ⁱⁱ (yellow salsify)																
year	Nested Frequency															
2012	1	23	4	7	-	1	2	-	-	-	12	-	58	9	-	
2017	3	15	-	21	6	38	1	76	134	11	42	164	7	5	3	
year	Average Cover (%)															
2012	0.0	0.3	0.0	0.0	-	0.0	0.0	-	-	-	0.3	-	0.1	0.2	-	
2017	0.0	0.1	-	0.1	0.0	0.2	0.0	1.1	1.2	0.0	0.1	0.9	0.0	0.0	0.0	

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

Table 14R-29.12 - Shrub and Tree Species. Average modified Daubenmire quadrat and line intercept cover by year.

SHRUB SPECIES						
Artemisia tridentata ssp. vaseyana ^p (mountain big sagebrush)						
Atriplex canescens ^p (fourwing saltbush)						
Krascheninnikovia lanata ^p (winterfat)						
Opuntia polyacantha (plains pricklypear)						
Pediocactus simpsonii (mountain ball cactus)						
Sclerocactus whipplei (Whipple's fishhook cactus)						
year	Line Intercept Cover (%)					
2012	0.6	-	0.9	0.2	-	-
2017	0.4	0.3	1.1	0.1	-	-
year	Quadrat Cover (%)					
2012	0.5	-	1.2	0.5	-	0.0
2017	0.8	0.2	0.8	0.6	0.0	-

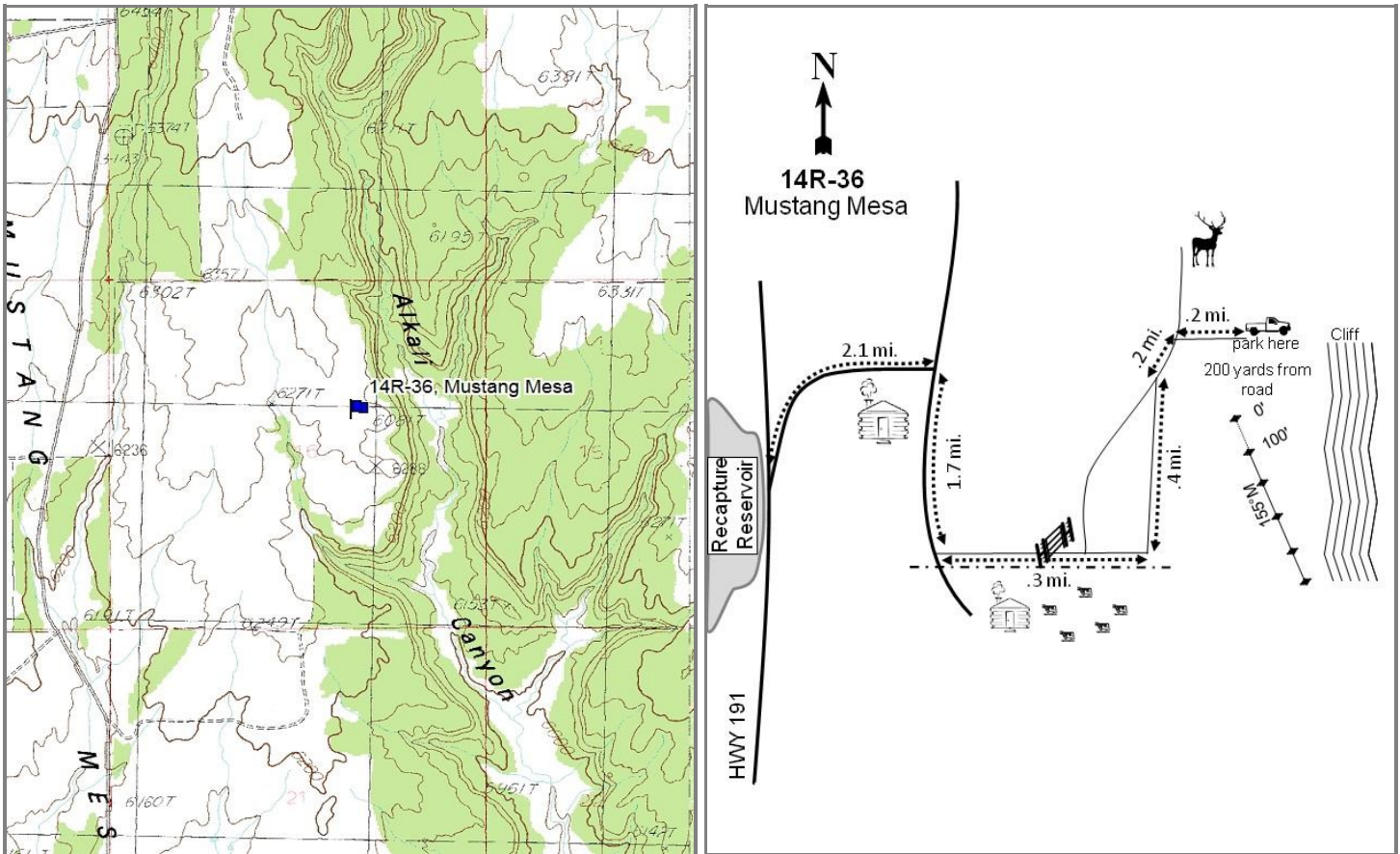
t - Tree Species; p - Preferred Browse; i - Introduced Species

Table 14R-29.13 - 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	260	-	0	39	62	0	62	62	29/57
2017	280	-	7	64	29	50	50	21	27/59
Atriplex canescens^P -- (fourwing saltbush)									
2012	-	-	-	-	-	-	-	-	105/188
2017	1320	-	80	20	0	29	0	0	62/90
Chrysothamnus viscidiflorus ssp. viscidiflorus var. stenophyllus -- (yellow rabbitbrush)									
2012	-	-	-	-	-	-	-	-	28/70
2017	-	-	-	-	-	-	-	-	28/52
Gutierrezia sarothrae -- (broom snakeweed)									
2012	-	-	-	-	-	-	-	-	-/-
2017	120	-	33	67	0	0	0	0	22/41
Krascheninnikovia lanata^P -- (winterfat)									
2012	1280	160	33	67	0	17	45	3	27/33
2017	1760	-	0	100	0	30	35	0	28/32
Opuntia polyacantha -- (plains pricklypear)									
2012	280	-	29	57	14	0	0	21	14/54
2017	320	-	6	94	0	0	0	6	11/28
Pediocactus simpsonii -- (mountain ball cactus)									
2012	40	-	0	100	0	0	0	0	6/11
2017	80	-	0	100	0	0	0	0	4/6
Sclerocactus whipplei -- (Whipple's fishhook cactus)									
2012	20	20	0	100	0	0	0	0	11/13
2017	20	-	0	100	0	0	0	0	8/8

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

MUSTANG MESA - STUDY NO. 14R-36

**Location Information**

USGS 7.5 min Map Info
GPS (0' Stake)

Blanding North SE; Township 36S, Range 23E, Section 16
NAD 83 UTM ZONE 12, 641832 East 4169137 North

Transect Information

Browse Tag # (0' Stake)	662
Transect Bearing	155° magnetic (Line 2: 147° magnetic, Line 3: 151° magnetic, Lines 4-5: 155° magnetic)
Length	500ft
Belt Placement	Line 1 (11ft), Line 2 (34ft), Line 3 (59ft), Line 4 (71ft), Line 5 (95ft)
Belt Marker Placement	Belt 2: 8ft

Directions to Site

Driving on Highway 191, turn east across from Recapture Reservoir and follow the road around a curve until it "T"s into another road. Turn right (south) here and follow this road for 1.7 miles. Turn left (east) and drive along the fence line for 0.3 miles, passing through a gate. After 0.3 miles turn left again and proceed north for 0.4 miles. The road forks at this point: follow the right fork for 0.2 miles and then turn right at the following fork. Drive on this road for 0.2 miles and then park; the site is 200 yards from the road.

Site Information

Land Ownership	State
Land Administrator	SITLA
Allotment	ALKALI POINT
Elevation	6,299ft (1,920m)
Aspect	East
Slope	3-4%
Sample Dates	08/26/2014, 08/21/2017

Table 14R-36.1 Disturbance History. Recorded history of major disturbances.

Treatment/Disturbance	Name	WRI DB#	Date	Size (acres)
Hand Crew - Lop and Scatter	Mustang Mesa Lop and Scatter	3050	Fall 2014	418
Seeding - Aerial Before	Mustang Mesa Lop and Scatter	3050	Fall 2014	418

Table 14R-36.2 Seed Mix. List of known seeded plant species and rates (if available).

Mix Name			Application Type	Application Date	Acres
Mustang Mesa Lop and Scatter			Aerial	Oct 2014	450
Type	Species	Common Name	Cultivar/Source ID	Bulk lbs/acre	PLS lbs/acre
G	<i>Achnatherum hymenoides</i>	Indian Ricegrass	Nezpar	2.00	1.79
G	<i>Agropyron cristatum</i>	Crested Wheatgrass	Nordan	2.00	1.61
G	<i>Agropyron fragile</i>	Siberian Wheatgrass	Vavilov	2.00	1.76
G	<i>Hesperostipa comata</i>	Needle and Threadgrass	Iron UT	0.20	0.15
G	<i>Pascopyrum smithii</i>	Western Wheatgrass	Arriba	2.00	1.89
G	<i>Pleuraphis jamesii</i>	Galleta		0.27	0.08
G	<i>Poa secunda</i>	Sandberg Bluegrass	UP Colorado Plateau	0.20	0.16
G	<i>Sporobolus cryptandrus</i>	Sand Dropseed	Washington CO	0.10	0.09
G	<i>Thinopyrum intermedium</i>	Intermediate Wheatgrass		2.00	1.26
F	<i>Helianthus annuus</i>	Annual Sunflower	Box Elder UT	0.22	0.18
F	<i>Linum perenne</i>	Blue Flax	Appar	0.50	0.42
F	<i>Penstemon palmeri</i>	Palmer Penstemon	Lincoln NV	0.11	0.05
Mix Name			Application Type	Application Date	Acres
Mustang Mesa Lop and Scatter - Bitterbrush			Aerial	Oct 2014	450
Type	Species	Common Name	Cultivar/Source ID	Bulk lbs/acre	PLS lbs/acre
S	<i>Purshia tridentata</i>	Bitterbrush	Elko NV	0.07	0.05

Wildlife Habitat and Vegetation History**Table 14R-36.3 - Wildlife Seasonal Habitat.** UDWR wildlife habitat and seasonality.

Species	Habitat	Season
Deer	crucial	spring/fall

Table 14R-36.4 - Vegetation History. The dominant vegetation type(s) and phase of woodland succession (Tausch, Miller, Roundy, & Chambers, 2009).

Year	Vegetation Type	Woodland Succession
2014	Pinyon-Juniper	Phase II
2017	Wyoming Big Sagebrush/Antelope Bitterbrush	Phase I

Site Notes

No Notes

Site Potential

1981 - 2010 Average Annual Precipitation	14 inches
NRCS Ecological Site	Upland Loam (Big Sagebrush)
NRCS Ecological Site #	R036XY306UT
States and Transitions	No state and transition model is available for this ecological site.

This site was established in 2014 and was a pinyon pine (*Pinus edulis*) and Utah juniper (*Juniperus osteosperma*) dominated plant community in Phase II of woodland succession; a number of browse species were also present to a lesser extent. Tree cover and density decreased following a lop and scatter and seeding treatment in 2015, placing the study site in Phase I of succession. When the site was sampled in 2017, it had transitioned into one dominated by Wyoming big sagebrush (*Artemisia tridentata* ssp. *wyomingensis*) and antelope bitterbrush (*Purshia tridentata*) (Table 14R-36.4, Table 14R-36.12, Table 14R-36.13, Table 14R-36.14). The herbaceous understory has remained rare in both the pre- and post-treatment samplings, but both perennial grasses and forbs diversified and exhibited a slight increase in cover following the treatment (Table 14R-36.7, Table 14R-36.10, Table 14R-36.11).

Trend Summary Tables**Table 14R-36.6 - 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
2014	7.5	1.6	11.7	12.5	1.5	21.6
2017	12.9	7.3	0.6	22.6	7.1	0.7

Table 14R-36.7 - 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
2014	-	8	40	9	-	0.1	0.1	0.2
2017	2	109	0	61	0.0	5.2	0.0	2.3

Table 14R-36.8 - 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
2014	46.6	0.1	45.7	0.7	1.0	21.9
2017	27.2	0.0	62.1	0.6	1.3	29.1

Table 14R-36.9 - 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	Rocky Mountain Elk	Rabbit
	Quadrat Frequency			
2014	-	9	-	13
2017	-	11	-	7
Days Use Per Acre (ha)				
2014	-	18.1 (44.7)	2.0 (5.0)	-
2017	0.7 (1.8)	13.4 (33.1)	-	-

Table 14R-36.10 - Grass Species. Nested frequency and modified Daubenmire average cover by year.

GRASS SPECIES	Achnatherum hymenoides (Indian ricegrass)	Agropyron cristatum ⁱ (crested wheatgrass)	Agropyron fragile ⁱ (Siberian wheatgrass)	Bromus tectorum ^{ai} (cheatgrass)	Elymus elymoides (squirreltail)	Pascopyrum smithii (western wheatgrass)	Poa secunda (Sandberg bluegrass)	Sporobolus cryptandrus (sand dropseed)	Thinopyrum intermedium ⁱ (intermediate wheatgrass)
year	Nested Frequency								
2014	3	-	-	-	7	-	-	-	-
2017	7	72	13	2	14	3	3	6	11
year	Average Cover (%)								
2014	0.0	-	-	-	0.0	-	-	-	-
2017	0.3	3.9	0.1	0.0	0.4	0.1	0.0	0.2	0.2

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

Table 14R-36.11 - Forb Species. Nested frequency and modified Daubenmire average cover by year.

FORB SPECIES	Astragalus tenellus (looseflower milkvetch)	Chamaesyce (sandmat)	Cordylanthus ^a (bird's-beak)	Descurainia pinnata ^a (western tansymustard)	Lepidium ^a (pepperweed)	Linum perenne ⁱ (blue flax)	Machaeranthera grindelioides (rayless tansyaster)	Penstemon (beardtongue)	Penstemon palmeri (Palmer's penstemon)	Phlox longifolia (longleaf phlox)	Platyschuhria integrifolia (basindaisy)
year	Nested Frequency										
2014	-	3	-	1	39	-	-	5	-	-	1
2017	12	-	0	-	-	34	3	2	2	6	8
year	Average Cover (%)										
2014	-	0.0	-	0.0	0.1	-	-	0.0	-	-	0.1
2017	0.5	-	0.0	-	-	1.2	0.0	0.0	0.0	0.1	0.4

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

Table 14R-36.12 - Shrub and Tree Species. Average modified Daubenmire quadrat and line intercept cover by year.

SHRUB SPECIES	Amelanchier utahensis ^p (Utah serviceberry)	Artemisia tridentata ssp. wyomingensis ^p (Wyoming big sagebrush)	Cercocarpus montanus ^p (alderleaf mountain mahogany)	Ephedra viridis ^p (mormon tea)	Gutierrezia sarothrae (broom snakeweed)	Juniperus osteosperma ^t (Utah juniper)	Pinus edulis ^t (twoneedle pinyon)	Purshia stansburiana ^p (Stansbury cliffrose)	Purshia tridentata ^p (antelope bitterbrush)
year	Line Intercept Cover (%)								
2014	-	7.7	1.2	1.3	1.5	15.3	6.3	0.7	1.6
2017	0.6	7.2	1.6	1.3	7.1	0.7	-	3.4	8.5
year	Quadrat Cover (%)								
2014	-	5.5	0.4	0.3	1.6	8.9	2.8	0.0	1.3
2017	0.1	5.0	1.4	0.9	7.3	0.6	-	1.4	4.0

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

Table 14R-36.13 - 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.

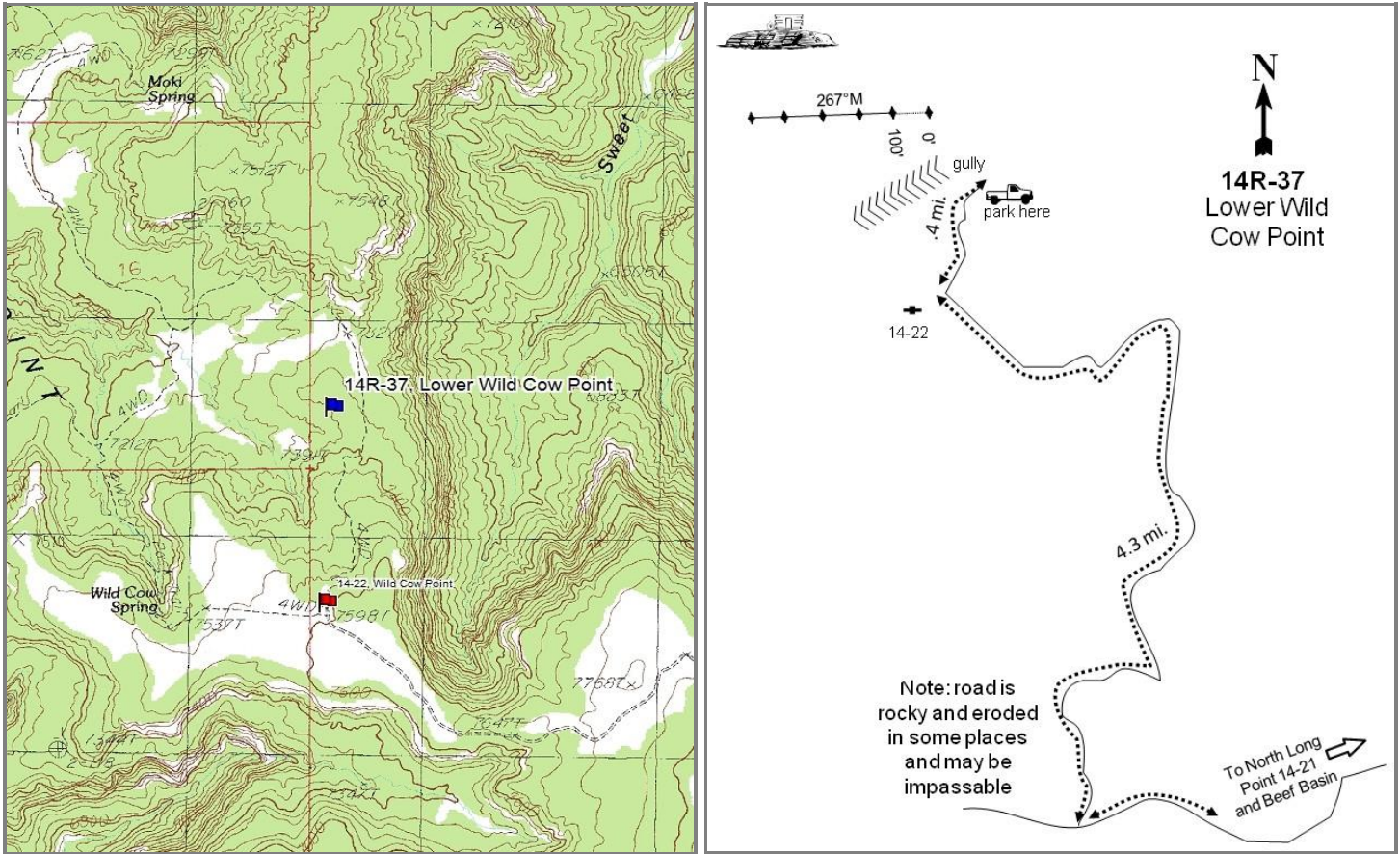
Year	Density		Age Class Distribution			Utilization		Poor Vigor (%)	Average Height Crown (cm)
	Plants Per Acre		Excluding Seedlings			Moderate (%)	Heavy (%)		
	Excluding Seedlings	Seedling	Young (%)	Mature (%)	Decadent (%)				
Amelanchier utahensis ^p -- (Utah serviceberry)									
2014	-	-	-	-	-	-	-	-	193/181
2017	-	-	-	-	-	-	-	-	223/225
Artemisia tridentata ssp. wyomingensis ^p -- (Wyoming big sagebrush)									
2014	840	20	26	57	17	10	2	19	84/98
2017	900	60	40	60	0	7	0	0	75/93
Cercocarpus montanus ^p -- (alderleaf mountain mahogany)									
2014	60	-	0	33	67	33	0	67	94/124
2017	40	-	0	100	0	0	0	0	153/177
Ephedra viridis ^p -- (mormon tea)									
2014	120	-	33	50	17	0	0	33	90/106
2017	160	-	63	38	0	0	0	0	117/193
Gutierrezia sarothrae -- (broom snakeweed)									
2014	3320	220	14	78	8	0	0	7	18/20
2017	7960	-	0	98	2	0	0	2	21/30
Juniperus osteosperma ^t -- (Utah juniper)									
2014	140	-	14	86	0	0	0	0	-/-
2017	160	-	63	25	13	0	0	13	-/-
Pinus edulis ^t -- (twoneedle pinyon)									
2014	60	-	33	67	0	0	0	0	-/-
2017	-	-	-	-	-	-	-	-	-/-
Purshia stansburiana ^p -- (Stansbury cliffrose)									
2014	80	-	0	25	75	100	0	0	156/148
2017	220	-	9	91	0	18	0	9	182/182
Purshia tridentata ^p -- (antelope bitterbrush)									
2014	520	-	0	27	73	4	0	27	64/87
2017	460	-	9	78	13	35	0	13	73/126
Sclerocactus -- (fishhook cactus)									
2014	-	-	-	-	-	-	-	-	-/-
2017	-	-	-	-	-	-	-	-	15/12

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

Table 14R-36.14 - 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)							
2014	140	-	-	10	85	5	18.6
2017	38	-	75	25	-	-	13.7
Pinus edulis (twoneedle pinyon)							
2014	27	-	-	38	38	23	15.7
2017	1	-	100	-	-	-	2.0

LOWER WILD COW POINT - STUDY NO. 14R-37



Location Information

USGS 7.5 min Map Info Fable Valley SE; Township 33S, Range 18E, Section 50
 GPS (0' Stake) NAD 83 UTM ZONE 12, 593513 East 4195753 North

Transect Information

Browse Tag # (0' Stake) 109
 Transect Bearing 267° magnetic
 Length 500ft
 Belt Placement Line 1 (11ft), Line 2 (34ft), Line 3 (59ft), Line 4 (71ft), Line 5 (95ft)
 Belt Marker Placement Belts 3-4: 3ft

Directions to Site

Drive to the North Long Point study (14-21). From the west rim of North Long Point, proceed west down the dugway on the Dark Canyon Plateau Road for 5.4 miles. Turn north on the Wild Cow Point Road and go 4.3 miles to a chaining and a faint road on the left (west). This is the Wild Cow Point study (14-22). Continue down the road for another 0.4 miles, park on the road and hike down to the study, crossing a gully.

Site Information

Land Ownership	Federal
Land Administrator	BLM
Allotment	INDIAN CREEK
Elevation	7,349ft (2,240m)
Aspect	South
Slope	3-6%
Sample Dates	08/27/2014, 08/22/2017

Table 14R-37.1 Disturbance History. Recorded history of major disturbances.

Treatment/Disturbance	Name	WRI DB#	Date	Size (acres)
Mechanical - Bullhog	Dark Canyon Plateau Phase II	2938	May 2015	238

Wildlife Habitat and Vegetation History**Table 14R-37.3 - Wildlife Seasonal Habitat.** UDWR wildlife habitat and seasonality.

Species	Habitat	Season
Deer	crucial	winter
Elk	crucial	winter

Table 14R-37.4 - Vegetation History. The dominant vegetation type(s) and phase of woodland succession (Tausch, Miller, Roundy, & Chambers, 2009).

Year	Vegetation Type	Woodland Succession
2014	Pinyon-Juniper	Phase III
2017	Pinyon-Juniper/Mountain Big Sagebrush	Phase II

Site Notes

No Notes

Site Potential

1981 - 2010 Average Annual Precipitation	15 inches
NRCS Ecological Site	Upland Loam (Mountain Big Sagebrush)
NRCS Ecological Site #	R048AY306UT
States and Transitions	No state and transition model is available for this ecological site.

This study site was encroached by pinyon pine (*Pinus edulis*) and Utah juniper (*Juniperus osteosperma*) and considered to be in Phase III of woodland succession upon establishment in 2014; Wyoming big sagebrush (*Artemisia tridentata* ssp. *wyomingensis*) and other browse species provided limited cover. A bullhog treatment in 2015 removed some of the trees, causing the site to transition into one co-dominated by Phase II pinyon-juniper and Wyoming big sagebrush (Table 14R-37.4, Table 14R-37.12, Table 14R-37.13, Table 14R-37.14). Perennial grasses and forbs provided minimal cover on the site in 2014, but cover increased in 2017 with the native perennial grass species muttongrass (*Poa fendleriana*) and blue grama (*Bouteloua gracilis*) as the dominant herbaceous species (Table 14R-37.7, Table 14R- 37.10, Table 14R-37.11).

Trend Summary Tables

Table 14R-37.6 - 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
2014	2.9	0.6	8.8	6.3	0.4	47.4
2017	3.2	1.2	3.1	7.5	0.2	27.4

Table 14R-37.7 - 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
2014	36	230	38	137	0.1	9.3	0.2	2.1
2017	14	277	27	162	0.1	15.3	0.1	5.9

Table 14R-37.8 - 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
2014	26.4	15.0	50.9	0.5	2.9	22.1
2017	34.1	2.0	57.4	0.5	3.1	23.8

Table 14R-37.9 - 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	Rocky Mountain Elk	Rabbit
	Quadrat Frequency			
2014	3	11	1	36
2017	-	6	4	5
Year	Days Use Per Acre (ha)			
2014	-	5.3 (13.2)	6.0 (14.9)	-
2017	2.9 (7.2)	15.4 (38.1)	8.7 (21.5)	-

Table 14R-37.10 - 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 ⁱⁱ (cheatgrass)	Elymus elymoides (squirreltail)	Hesperostipa comata (needle and thread)	Poa fendleriana (muttongrass)	Pseudoroegneria spicata (bluebunch wheatgrass)	Vulpia octoflora ^a (sixweeks fescue)
year	Nested Frequency								
2014	13	-	68	9	49	31	108	3	29
2017	14	3	68	9	18	100	125	-	5
year	Average Cover (%)								
2014	0.1	-	4.0	0.0	0.6	1.6	3.0	0.0	0.1
2017	0.7	0.1	4.6	0.1	0.6	2.9	6.3	-	0.0

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

Table 14R-37.11 - Forb Species. Nested frequency and modified Daubenmire average cover by year.

FORB SPECIES	Arabis (rockcress)	Astragalus convallarius (lesser rushy milkvetch)	Astragalus mollissimus (woolly locoweed)	Chaenactis douglasii (Douglas' dustymaiden)	Chenopodium atrovirens ^a (pinyon goosefoot)	Cordylanthus ^a (bird's-beak)	Cryptantha (cryptantha)	Descurainia pinnata ^a (western tansymustard)	Erigeron pumilus (shaggy fleabane)	Eriogonum racemosum (redroot buckwheat)	Eriogonum umbellatum (sulphur-flower buckwheat)	Gilia inconspicua ^a (shy gilia)	Hymenopappus filifolius (fine-leaf hymenopappus)	Ipomopsis aggregata (scarlet gilia)	Lappula occidentalis ^a (flatspine stickseed)	Lesquerella (bladderpod)	Machaeranthera canescens (hoary tansyaster)
year	Nested Frequency																
2014	22	4	12	8	-	2	3	12	1	11	5	19	-	6	7	18	45
2017	-	35	15	-	8	4	-	2	5	9	9	13	8	1	-	31	35
year	Average Cover (%)																
2014	0.1	0.0	0.1	0.1	-	0.0	0.2	0.1	0.0	0.2	0.1	0.0	-	0.0	0.0	0.1	0.6
2017	-	0.8	0.3	-	0.0	0.0	-	0.0	0.1	0.5	0.4	0.0	0.3	0.0	-	0.9	0.9

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

FORB SPECIES	Machaeranthera grindelioioides (rayless tansyaster)	Packera multilobata (lobeleaf groundsel)	Penstemon (beardtongue)	Petradonia pumila (rock goldenrod)	Phlox hoodii (spiny phlox)	Polygonum douglasii ^a (Douglas' knotweed)	Stenotus acaulis (stemless mock goldenweed)	Streptanthus cordatus (heartleaf twistflower)
year	Nested Frequency							
2014	3	35	-	12	4	5	3	-
2017	2	38	1	10	6	2	10	1
year	Average Cover (%)							
2014	0.0	0.2	-	0.4	0.1	0.0	0.0	-
2017	0.0	1.0	0.0	0.5	0.2	0.0	0.1	0.0

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

Table 14R-37.12 - 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)	Cercocarpus intricatus ^p (littleleaf mountain mahogany)	Chrysothamnus viscidiflorus ssp. viscidiflorus var. viscidiflorus (yellow rabbitbrush)	Gutierrezia sarothrae (broom snakeweed)	Juniperus osteosperma ^t (Utah juniper)	Linanthus pungens (granite prickly phlox)	Opuntia fragilis (brittle pricklypear)	Pinus edulis ^t (twoneedle pinyon)	Purshia stansburiana ^p (Stansbury cliffrose)	Purshia tridentata ^p (antelope bitterbrush)	Sclerocactus parviflorus (smallflower fishhook cactus)
year	Line Intercept Cover (%)												
2014	-	0.4	3.9	0.8	-	0.2	13.1	0.2	0	34.3	-	1.2	-
2017	-	0.2	3.4	1.5	-	0.1	10.5	0.1	-	16.9	0.4	2	0
year	Quadrat Cover (%)												
2014	0.0	0.4	1.3	0.6	-	0.2	1.9	0.2	0.2	7.0	-	0.6	0.0
2017	0.1	0.2	1.7	0.8	0.0	0.3	1.7	0.8	-	1.5	0.0	0.4	0.1

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

Table 14R-37.13 - 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 (%)		
Amelanchier utahensis ^p -- (Utah serviceberry)									
2014	-	20	0	0	0	0	0	0	139/136
2017	20	20	0	100	0	0	0	100	107/116
Artemisia nova ^p -- (black sagebrush)									
2014	260	-	46	54	0	8	0	0	19/57
2017	180	-	0	100	0	0	0	0	18/38
Artemisia tridentata ssp. vaseyana ^p -- (mountain big sagebrush)									
2014	400	-	15	65	20	5	0	20	47/88
2017	420	-	10	67	24	38	19	14	48/82
Cercocarpus intricatus ^p -- (littleleaf mountain mahogany)									
2014	160	-	0	100	0	100	0	0	61/70
2017	120	-	0	67	33	0	0	0	47/83
Cercocarpus montanus ^p -- (alderleaf mountain mahogany)									
2014	-	-	-	-	-	-	-	-	142/154
2017	-	-	-	-	-	-	-	-	-/-
Chrysothamnus viscidiflorus ssp. viscidiflorus var. stenophyllus -- (yellow rabbitbrush)									
2014	-	-	-	-	-	-	-	-	-/-
2017	-	-	-	-	-	-	-	-	34/31
Chrysothamnus viscidiflorus ssp. viscidiflorus var. viscidiflorus -- (yellow rabbitbrush)									
2014	-	-	-	-	-	-	-	-	31/34
2017	20	-	100	0	0	0	0	0	46/85
Ephedra viridis ^p -- (mormon tea)									
2014	-	-	-	-	-	-	-	-	-/-
2017	-	-	-	-	-	-	-	-	49/52
Ericameria nauseosa -- (rubber rabbitbrush)									
2014	-	-	-	-	-	-	-	-	41/57
2017	-	-	-	-	-	-	-	-	-/-
Gutierrezia sarothrae -- (broom snakeweed)									
2014	400	20	60	35	5	0	0	0	15/23
2017	800	-	0	100	0	0	0	0	20/35
Juniperus osteosperma ^t -- (Utah juniper)									
2014	-	-	-	-	-	-	-	-	-/-
2017	-	20	0	0	0	0	0	0	-/-
Linanthus pungens -- (granite prickly phlox)									
2014	680	-	0	65	35	6	0	3	10/20
2017	640	-	3	78	19	0	0	19	15/24

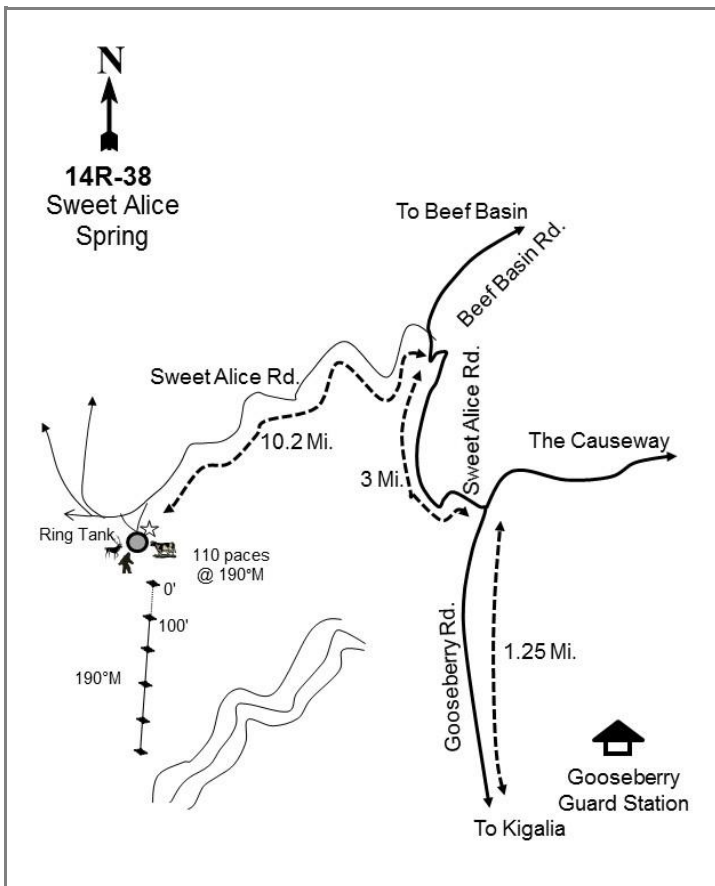
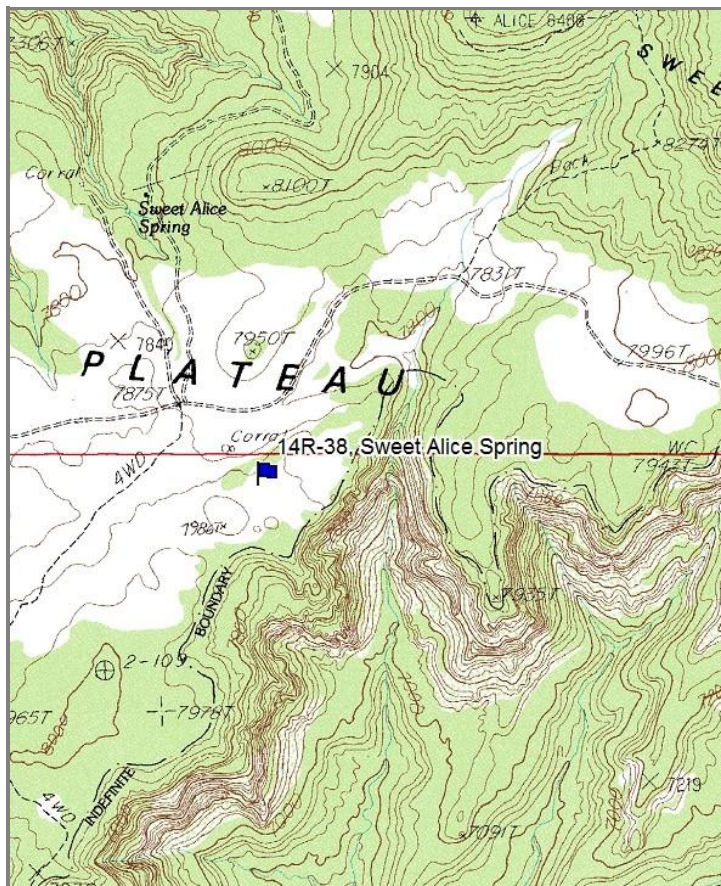
Year	Density		Age Class Distribution			Utilization		Poor Vigor (%)	Average Height Crown (cm)
	Plants Per Acre		Excluding Seedlings			Moderate (%)	Heavy (%)		
	Excluding Seedlings	Seedling	Young (%)	Mature (%)	Decadent (%)				
Mahonia fremontii -- (Fremont's mahonia)									
2014	-	-	-	-	-	-	-	-	-/-
2017	-	-	-	-	-	-	-	-	40/55
Opuntia fragilis -- (brittle pricklypear)									
2014	300	-	60	40	0	0	0	27	6/15
2017	100	-	0	100	0	0	0	0	4/15
Peraphyllum ramosissimum^P -- (wild crab apple)									
2014	-	-	-	-	-	-	-	-	87/113
2017	-	-	-	-	-	-	-	-	84/145
Pinus edulis^t -- (twoneedle pinyon)									
2014	160	20	13	88	0	0	0	0	-/-
2017	40	100	100	0	0	0	0	50	-/-
Purshia stansburiana^P -- (Stansbury cliffrose)									
2014	-	-	-	-	-	-	-	-	-/-
2017	-	-	-	-	-	-	-	-	103/133
Purshia tridentata^P -- (antelope bitterbrush)									
2014	300	-	0	80	20	80	7	40	25/51
2017	220	-	0	100	0	0	0	9	47/92
Sclerocactus parviflorus -- (smallflower fishhook cactus)									
2014	220	-	0	100	0	0	0	0	14/12
2017	180	-	11	89	0	0	0	0	12/10
Yucca -- (yucca)									
2014	-	-	-	-	-	-	-	-	27/37

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

Table 14R-37.14 - 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)							
2014	42	-	-	20	50	30	33.4
2017	14	-	22	-	-	78	61.2
Pinus edulis (twoneedle pinyon)							
2014	254	5	20	15	25	35	25.1
2017	65	47	7	13	-	33	27.1

SWEET ALICE SPRING - STUDY NO. 14R-38



Location Information

USGS 7.5 min Map Info
GPS (0' Stake)

Warren Canyon NE; Township 34S, Range 18E, Section 40
NAD 83 UTM ZONE 12, 594855 East 4190505 North

Transect Information

Browse Tag # (0' Stake)	Not Available
Transect Bearing	190° magnetic
Length	500ft
Belt Placement	Line 1 (11ft), Line 2 (34ft), Line 3 (59ft), Line 4 (71ft), Line 5 (95ft)
Belt Marker Placement	No Rebar or Stakes

Directions to Site

From the Gooseberry Guard Station on Elk Ridge, drive north for 1.25 miles on Gooseberry Road, then turn left onto Sweet Alice Road. Proceed for 3 miles, where there will be an intersection with Beef Basin Road to the right. Continue straight on Sweet Alice Road for 10.2 miles. There will be a pullout with a ring tank for cattle on the left (south) side of the road: park here. The study site is about 110 paces at an azimuth of 190 degrees magnetic from the ring tank.

Site Information

Land Ownership	Federal
Land Administrator	BLM
Allotment	INDIAN CREEK
Elevation	No data
Aspect	North
Slope	0-5%
Sample Dates	08/22/2017

Table 14R-38.1 Disturbance History. Recorded history of major disturbances.

Treatment/Disturbance	Name	WRI DB#	Date	Size (acres)
Mechanical - Bullhog	Dark Canyon Plateau Phase 4	4018	2017?	1042

Wildlife Habitat and Vegetation History**Table 14R-38.3 - Wildlife Seasonal Habitat.** UDWR wildlife habitat and seasonality.

Species	Habitat	Season
Deer	crucial	winter
Elk	crucial	winter

Table 14R-38.4 - Vegetation History. The dominant vegetation type(s) and phase of woodland succession (Tausch, Miller, Roundy, & Chambers, 2009).

Year	Vegetation Type	Woodland Succession
2017	Manzanita	Phase I

Site Notes

No Notes

Site Potential

1981 - 2010 Average Annual Precipitation	16 inches
NRCS Ecological Site	Upland Sand (Mountain Big Sagebrush)
NRCS Ecological Site #	035XY307UT
States and Transitions	No state and transition model is available for this ecological site.

When established in 2017, the most abundant shrub on this study site was greenleaf manzanita (*Arctostaphylos patula*), although preferred browse species such as Utah serviceberry (*Amelanchier utahensis*), mountain big sagebrush (*Artemisia tridentata* ssp. *vaseyana*), and antelope bitterbrush (*Purshia tridentata*) were also present to a much lesser extent (Table 14R-38.12, Table 14R-38.13). Twoneedle pinyon (*Pinus edulis*) and Utah juniper (*Juniperus osteosperma*) trees were scattered throughout the area, placing the study site in Phase I of woodland succession (Table 14R-38.4, Table 14R-38.14). The herbaceous understory was mainly composed of native perennial grasses and forbs and, although somewhat diverse, was diminished in quantity (Table 14R-38.7, Table 14R-38.10, Table 14R-39.11). Without a shrub/tree-removing disturbance, this study site is expected to remain in a similar state in the future with the potential for progression in phases of woodland succession.

Trend Summary Tables

Table 14R-38.6 - 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
2017	10.7	42.3	8.1	12.7	51.7	12.2

Table 14R-38.7 - 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
2017	-	118	1	93	-	3.8	0.0	3.3

Table 14R-38.8 - 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
2017	14.1	1.2	77.8	0.1	0.3	58.1

Table 14R-38.9 - 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	Rocky Mountain Elk	Rabbit
	Quadrat Frequency		
2017	3	-	4
Year	Days Use Per Acre (ha)		
	2017	40.9 (101.0)	4.7 (11.6)

Table 14R-38.10 - Grass Species. Nested frequency and modified Daubenmire average cover by year.

GRASS SPECIES	Agropyron cristatum' (crested wheatgrass)	Carex geyeri (Geyer's sedge)	Elymus elymoides (squirreltail)	Poa fendleriana (muttongrass)
year	Nested Frequency			
2017	4	2	6	110
year	Average Cover (%)			
2017	0.0	0.2	0.0	3.6

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

Table 14R-38.11 - Forb Species. Nested frequency and modified Daubenmire average cover by year.

FORB SPECIES	Antennaria (pussytoes)	Cordylanthus ^a (bird's-beak)	Erigeron pumilus (shaggy fleabane)	Eriogonum alatum (winged buckwheat)	Eriogonum racemosum (redroot buckwheat)	Eriogonum umbellatum (sulphur-flower buckwheat)	Lesquerella (bladderpod)	Lithospermum ruderale (western stoneseed)	Lupinus argenteus (silvery lupine)	Machaeranthera canescens (hoary tansyaster)	Packera multilobata (lobeleaf groundsel)	Petradoria pumila (rock goldenrod)	Phlox austromontana (mountain phlox)
year	Nested Frequency												
2017	2	1	6	3	10	3	7	1	0	4	21	29	37
year	Average Cover (%)												
2017	0.0	0.0	0.1	0.1	0.1	0.0	0.0	0.0	0.0	0.0	0.3	1.5	1.1

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

Table 14R-38.12 - Shrub and Tree Species. Average modified Daubenmire quadrat and line intercept cover by year.

SHRUB SPECIES	Amelanchier utahensis ^p (Utah serviceberry)	Arctostaphylos patula (greenleaf manzanita)	Artemisia tridentata ssp. vaseyana ^p (mountain big sagebrush)	Gutierrezia sarothrae (broom snakeweed)	Mahonia repens (creeping barberry)	Opuntia fragilis (brittle pricklypear)	Pinus edulis ⁱ (twoneedle pinyon)	Purshia tridentata ^p (antelope bitterbrush)	Symphoricarpos oreophilus (mountain snowberry)
year	Line Intercept Cover (%)								
2017	7	48.1	3.7	0.5	0	-	12.2	2	3.1
year	Quadrat Cover (%)								
2017	6.1	39.1	2.4	0.4	0.0	0.5	8.1	2.2	2.3

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

Table 14R-38.13 - 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.

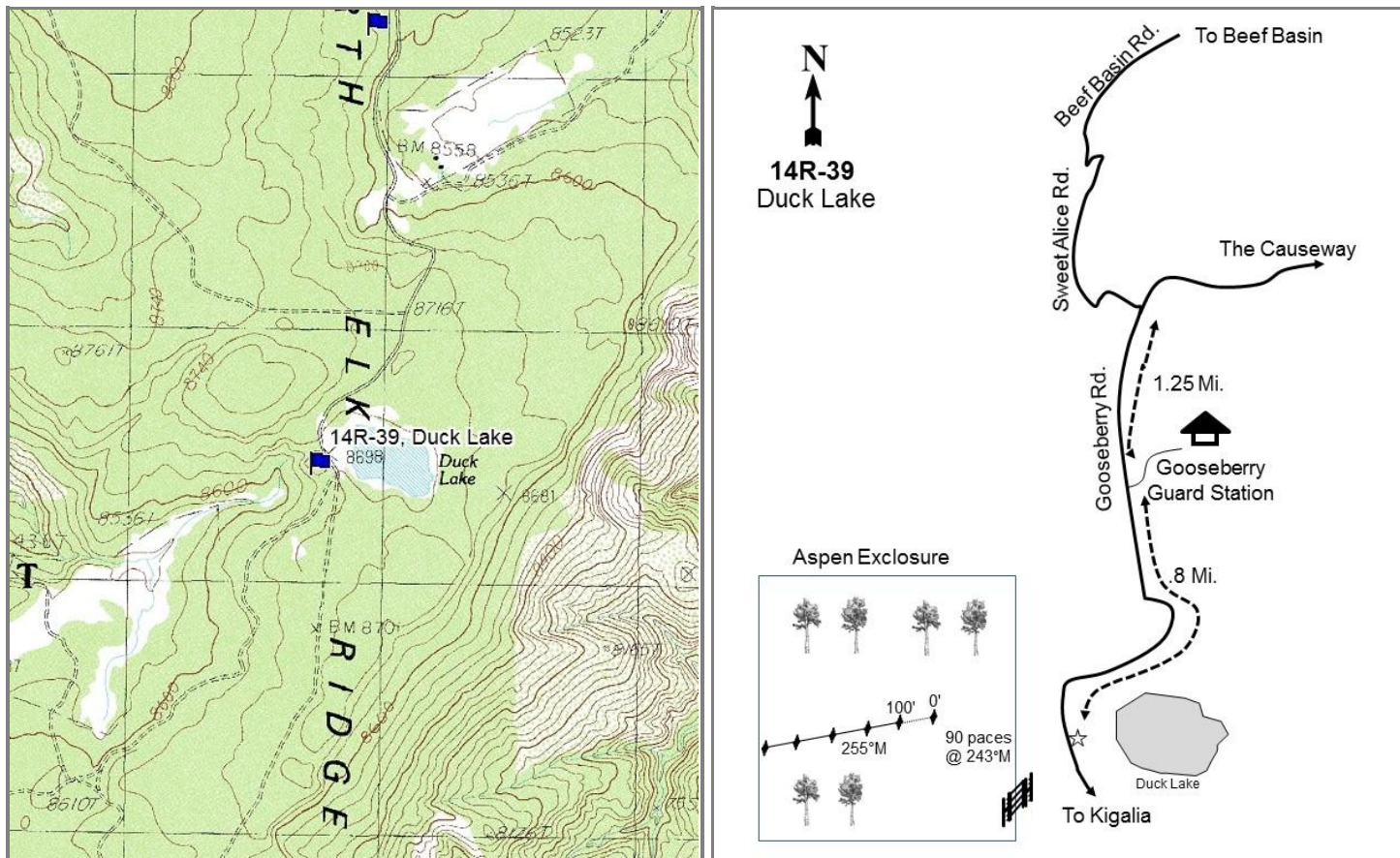
Year	Density		Age Class Distribution			Utilization		Poor Vigor (%)	Average Height Crown (cm)
	Plants Per Acre		Excluding Seedlings			Moderate (%)	Heavy (%)		
	Excluding Seedlings	Seedling	Young (%)	Mature (%)	Decadent (%)				
Amelanchier utahensis ^p -- (Utah serviceberry)									
2017	480	-	8	83	8	8	8	0	176/186
Arctostaphylos patula -- (greenleaf manzanita)									
2017	9600	-	2	97	1	0	0	0	50/79
Artemisia tridentata ssp. vaseyana ^p -- (mountain big sagebrush)									
2017	620	-	7	74	19	0	7	19	57/90
Chrysothamnus viscidiflorus ssp. viscidiflorus var. viscidiflorus -- (yellow rabbitbrush)									
2017	20	-	100	0	0	0	0	0	- / -
Gutierrezia sarothrae -- (broom snakeweed)									
2017	1440	20	0	100	0	0	0	0	17/26
Mahonia repens -- (creeping barberry)									
2017	40	-	0	100	0	0	0	0	5/8
Opuntia fragilis -- (brittle pricklypear)									
2017	220	-	0	100	0	0	0	0	9/37
Paxistima myrsinites -- (Oregon boxleaf)									
2017	-	-	-	-	-	-	-	-	15/5
Pinus edulis ^t -- (twoneedle pinyon)									
2017	40	20	0	100	0	0	0	0	- / -
Purshia tridentata ^p -- (antelope bitterbrush)									
2017	260	-	0	100	0	15	39	0	78/123
Quercus gambelii ^p -- (Gambel oak)									
2017	-	-	-	-	-	-	-	-	71/94
Symphoricarpos oreophilus -- (mountain snowberry)									
2017	720	-	0	100	0	0	0	0	50/64

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

Table 14R-38.14 - 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)							
2017	1	-	-	-	-	100	45.0
Pinus edulis (twoneedle pinyon)							
2017	48	-	-	24	35	41	21.3

DUCK LAKE - STUDY NO. 14R-39



Location Information

USGS 7.5 min Map Info GPS (0' Stake)	Poison Canyon SE; Township 34S, Range 19E, Section 24 NAD 83 UTM ZONE 12, 607642 East 4185622 North
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Transect Information

Browse Tag # (0' Stake)	Not Available
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 or Stakes

Directions to Site

From the Gooseberry Guard Station on Elk Ridge, proceed south for approximately 0.8 miles to Duck Lake (there will be a sign): park here. The study is approximately 90 paces from the road at an azimuth of 243 degrees magnetic, inside an enclosure and slightly downhill.

Site Information

Land Ownership	Federal
Land Administrator	USFS
Allotment	GOOSEBERRY
Elevation	No data
Aspect	Southwest
Slope	23%
Sample Dates	08/23/2017

Table 14R-39.1 Disturbance History. Recorded history of major disturbances.

Treatment/Disturbance	Name	WRI DB#	Date	Size (acres)
Logging - Selective	North Elk Ridge Aspen Restoration Phase II	3773	June 2016-June 2017	84

Wildlife Habitat and Vegetation History**Table 14R-39.3 - Wildlife Seasonal Habitat.** UDWR wildlife habitat and seasonality.

Species	Habitat	Season
Deer	crucial	summer
Elk	crucial	summer

Table 14R-39.4 - Vegetation History. The dominant vegetation type(s) and phase of woodland succession (Tausch, Miller, Roundy, & Chambers, 2009).

Year	Vegetation Type	Woodland Succession
2017	Quaking Aspen/Perennial Grass	Phase I

Site Notes

This study site is located inside a total enclosure which was constructed in 2015 to exclude big game and livestock (WRI Project #3004).

Site Potential

1981 - 2010 Average Annual Precipitation	25 inches
NRCS Ecological Site	High Mountain Loam (Aspen)
NRCS Ecological Site #	048AY506UT
States and Transitions	No state and transition model is available for this ecological site.

When the study was established in 2017, quaking aspen (*Populus tremuloides*) and mountain snowberry (*Symphoricarpos oreophilus*) were the dominant tree and shrub species; lesser amounts of other preferred browse species including Utah serviceberry (*Amelanchier utahensis*) and Gambel oak (*Quercus gambelii*) were also present (Table 14R-39.12, Table 14R-39.13). Age class of aspen plants showed that over half were young and the remainder were mature (Table 14R-39.13a). The herbaceous understory was very abundant (Table 14R-39.7), with a vast majority of the cover being contributed by the perennial grasses orchardgrass (*Dactylis glomerata*) and Kentucky bluegrass (*Poa pratensis*) (Table 14R-39.10). Forbs were rare in comparison, and the native perennial forb Nevada pea (*Lathyrus lanszwertii*) was the most abundant species (Table 14R-39.11). Although a majority of the ponderosa pine (*Pinus ponderosa*) trees were removed by a logging treatment, point quarter data reveals that they were still present in low density during the sample period: this indicates that there may be potential for conifer infilling in the future (Table 14R- 39.14).

Trend Summary Tables

Table 14R-39.6 - 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
2017	1.0	12.7	0.5	2.4	27.8	23.8

Table 14R-39.7 - 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
2017	-	444	-	211	-	63.1	-	6.5

Table 14R-39.8 - 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
2017	2.3	0.1	72.0	0.0	4.6	70.8

Table 14R-39.9 - 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
	Quadrat Frequency
2017	2
Year	Days Use Per Acre (ha)
	2017

Table 14R-39.10 - Grass Species. Nested frequency and modified Daubenmire average cover by year.

GRASS SPECIES	Achnatherum nelsonii (Columbia needlegrass)	Bromus inermis ⁱ (smooth brome)	Bromus porteri (Porter brome)	Carex rossii (Ross' sedge)	Dactylis glomerata ⁱ (orchardgrass)	Elymus elymoides (squirreltail)	Festuca (fescue)	Poa pratensis ⁱ (Kentucky bluegrass)
year	Nested Frequency							
2017	12	33	2	4	306	1	6	355
year	Average Cover (%)							
2017	1.2	2.5	0.0	0.0	31.8	0.0	0.1	27.4

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

Table 14R-39.11 - Forb Species. Nested frequency and modified Daubenmire average cover by year.

FORB SPECIES	Achillea millefolium (Common yarrow)	Agoseris glauca (pale agoseris)	Erigeron flagellaris (trailing fleabane)	Frasera speciosa (elkweed)	Heterotheca villosa (hairy false goldenaster)	Lathyrus lanszwertii (Nevada pea)	Pseudostellaria jamesiana (tuber starwort)	Solidago multiradiata (Rocky Mountain goldenrod)	Symphotrichum ascendens (western aster)	Taraxacum officinale (common dandelion)	Thalictrum fendleri (Fendler's meadow-rue)	Trifolium longipes (longstalk clover)	Vicia americana (American vetch)
year	Nested Frequency												
2017	31	14	22	2	1	114	9	22	8	73	3	23	49
year	Average Cover (%)												
2017	1.1	0.1	0.1	0.0	0.1	2.9	0.1	0.8	0.1	0.6	0.1	0.1	0.5

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

Table 14R-39.12 - Shrub and Tree Species. Average modified Daubenmire quadrat and line intercept cover by year.

SHRUB SPECIES	Amelanchier utahensis ^p (Utah serviceberry)	Mahonia repens (creeping barberry)	Populus tremuloides ^t (quaking aspen)	Quercus gambelii ^p (Gambel oak)	Rosa woodsii ^p (Woods' rose)	Symphoricarpos oreophilus (mountain snowberry)
year	Line Intercept Cover (%)					
2017	0.1	1.4	23.8	2.3	-	26.4
year	Quadrat Cover (%)					
2017	0.0	1.7	0.5	0.8	0.1	11.0

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

Table 14R-39.13 - 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)									
2017	20	-	100	0	0	0	0	0	278/396
Mahonia repens -- (creeping barberry)									
2017	3780	-	1	100	0	0	0	0	12/15
Prunus virginiana ^p -- (chokecherry)									
2017	-	-	-	-	-	-	-	-	66/69
Quercus gambelii ^p -- (Gambel oak)									
2017	600	60	70	30	0	0	3	0	128/86
Rosa woodsii ^p -- (Woods' rose)									
2017	20	-	0	100	0	0	0	0	83/59
Symphoricarpos oreophilus -- (mountain snowberry)									
2017	5100	-	9	90	1	19	6	2	67/80

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

Table 14R-39.13a - Aspen Characteristics. Characteristics of aspen populations including density, size class distribution, and vigor of plants.

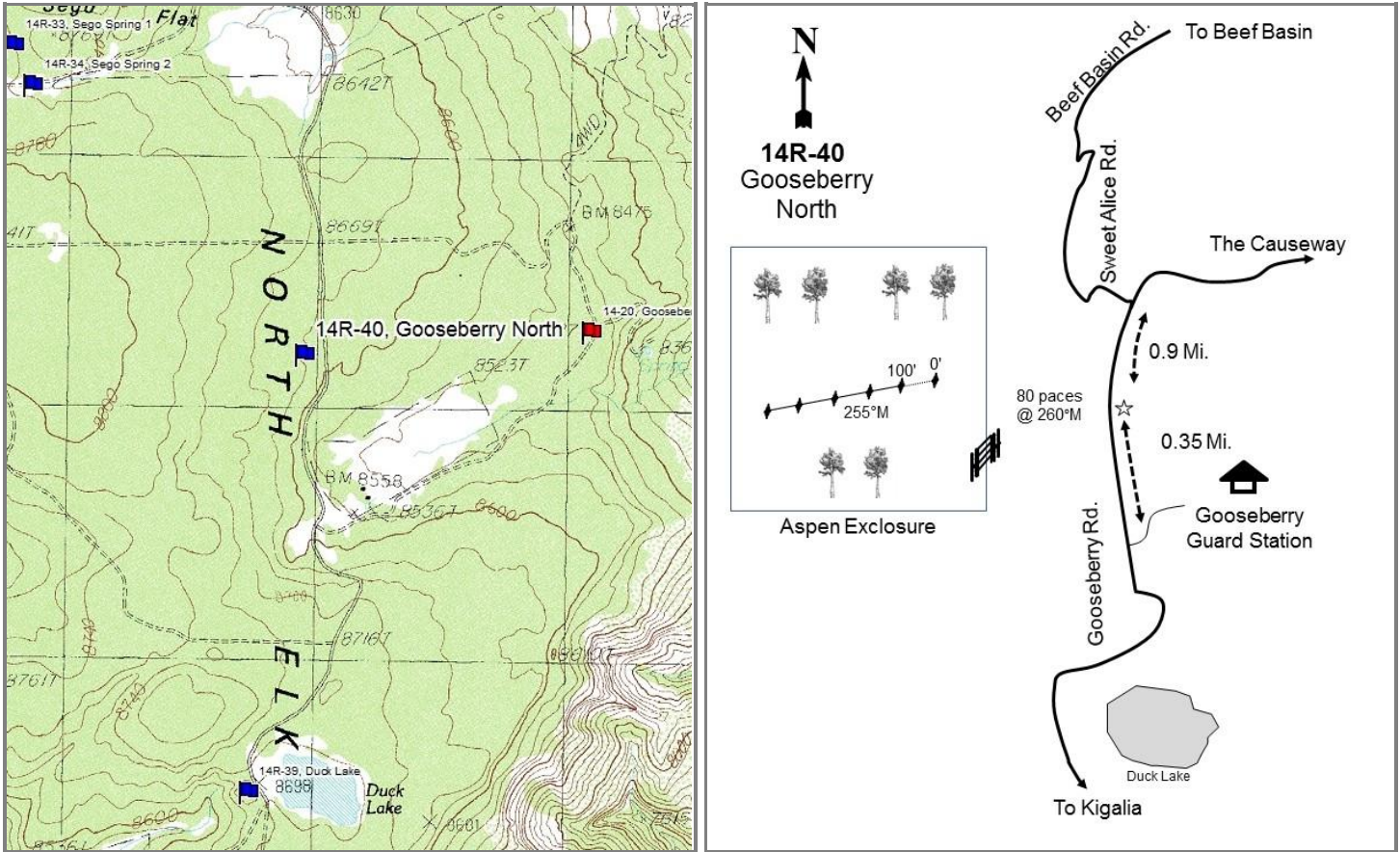
Year	Density	Size Class Distribution				Utilization		Poor Vigor (%)
	Plants per Acre	Class I (%)	Class II (%)	Class III (%)	Class IV (%)	Moderate (%)	Heavy (%)	
Populus tremuloides (quaking aspen)								
2017	180	56	-	-	44	0	0	0

Class I - ? 1.5 feet; Class II - > 1.5 Feet to 5 feet; Class III - > 5 Feet and up to 1 inch diameter at breast height (dbh); Class I - > 1 inch diameter at breast height (dbh)

Table 14R-39.14 - 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)							
2017	6	-	-	100	-	-	6.0
Pinus ponderosa (ponderosa pine)							
2017	1	-	-	-	-	100	58.0
Populus tremuloides (quaking aspen)							
2017	127	-	-	-	-	100	38.6

GOOSEBERRY NORTH - STUDY NO. 14R-40



Location Information

USGS 7.5 min Map Info Poison Canyon NE; Township 34S, Range 19E, Section 13
 GPS (0' Stake) NAD 83 UTM ZONE 12, 607846 East 4187363 North

Transect Information

Browse Tag # (0' Stake) Not Available
 Transect Bearing 241° magnetic
 Length 500ft
 Belt Placement Line 1 (11ft), Line 2 (34ft), Line 3 (59ft), Line 4 (71ft), Line 5 (95ft)
 Belt Marker Placement No Rebar or Stakes

Directions to Site

From the Gooseberry Guard Station on Elk Ridge, drive north for 0.35 miles and park on the side of the road; there is no witness post. The study site is on the left-hand (west) side of the road inside of an enclosure and is about 80 paces at 260 degrees magnetic away from the road.

Site Information

Land Ownership	Federal
Land Administrator	USFS
Allotment	GOOSEBERRY
Elevation	No data
Aspect	Northeast
Slope	13%
Sample Dates	08/23/2017

Table 14R-40.1 Disturbance History. Recorded history of major disturbances.

Treatment/Disturbance	Name	WRI DB#	Date	Size (acres)
Logging - Selective	North Elk Ridge Aspen Restoration Phase II	3773	June 2016-June 2017	84

Wildlife Habitat and Vegetation History**Table 14R-40.3 - Wildlife Seasonal Habitat.** UDWR wildlife habitat and seasonality.

Species	Habitat	Season
Deer	crucial	summer
Elk	crucial	summer

Table 14R-40.4 - Vegetation History. The dominant vegetation type(s) and phase of woodland succession (Tausch, Miller, Roundy, & Chambers, 2009).

Year	Vegetation Type	Woodland Succession
2017	Ponderosa Pine/Mountain Snowberry	NA

Site Notes

This study site is located inside a total enclosure which was constructed in 2015 to exclude big game and livestock (WRI Project #3004). A buck mule deer and deer beds were seen on site in 2017.

Site Potential

1981 - 2010 Average Annual Precipitation	26 inches
NRCS Ecological Site	High Mountain Loam (Aspen)
NRCS Ecological Site #	048AY506UT
States and Transitions	No state and transition model is available for this ecological site.

This study site was dominated by ponderosa pine (*Pinus ponderosa*) and mountain snowberry (*Symphoricarpos oreophilus*) when established in 2017 with other shrub and preferred browse species as minor components (Table 14R- 40.12, Table 14R-40.13). Many young quaking aspen (*Populus tremuloides*) plants were also present, and cover may increase over time as the stand matures (Table 14R-40.13a). The herbaceous understory was diverse, abundant, and primarily composed of a number of perennial grass species (Table 14R-40.7, Table 14R-40.10). Most forb cover was contributed by native perennial species, namely common yarrow (*Achillea millefolium*), common dandelion (*Taraxacum officinale*), and Nevada pea (*Lathyrus lanszwertii*) (Table 14R-40.11). Although a selective logging treatment prior to study establishment removed some of the ponderosa pine trees, their presence post-treatment (Table 14R-40.14) indicates that this site may become conifer-encroached in the future.

Trend Summary Tables

Table 14R-40.6 - 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
2017	1.0	19.8	0.3	0.7	23.2	15.6

Table 14R-40.7 - 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
2017	-	421	3	308	-	34.2	0.1	12.6

Table 14R-40.8 - 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
2017	0.5	1.3	84.9	0.0	-	55.7

Table 14R-40.9 - 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		Rocky Mountain Elk	
	Quadrat Frequency			
2017	-		1	
Year	Days Use Per Acre (ha)			
2017	1.3 (3.3)		0.7 (1.7)	

Table 14R-40.10 - 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)	Carex rossii (Ross' sedge)	Dactylis glomerata ⁱ (orchardgrass)	Elymus elymoides (squirreltail)	Festuca thurberi (Thurber's fescue)	Hesperostipa comata (needle and thread)	Pascopyrum smithii (western wheatgrass)	Poa pratensis ⁱ (Kentucky bluegrass)
year	Nested Frequency										
2017	236	53	69	10	23	12	17	56	10	27	187
year	Average Cover (%)										
2017	11.0	1.9	4.5	0.4	0.5	0.4	0.2	7.0	0.7	0.9	6.7

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

Table 14R-40.11 - Forb Species. Nested frequency and modified Daubenmire average cover by year.

FORB SPECIES	Achillea millefolium (Common yarrow)	Agoseris glauca (pale agoseris)	Antennaria parvifolia (small-leaf pussytoes)	Arenaria (sandwort)	Erigeron flagellaris (trailing fleabane)	Gayophytum racemosum ^a (blackfoot groundsmoke)	Gentiana (gentian)	Lathyrus lanszwertii (Nevada pea)	Ligusticum porteri (Porter's licorice-root)	Packera cana (woolly groundsel)	Phlox longifolia (longleaf phlox)	Pseudocymopterus montanus (alpine false springparsley)	Pseudostellaria jamesiana (tuber starwort)	Symphotrichum ascendens (western aster)	Taraxacum officinale (common dandelion)	Thalictrum fendleri (Fendler's meadow-rue)	Trifolium longipes (longstalk clover)
year	Nested Frequency																
2017	156	13	7	3	6	3	1	79	1	33	6	26	30	8	112	22	39
year	Average Cover (%)																
2017	3.0	0.1	0.8	0.0	0.2	0.1	0.0	2.5	0.2	0.3	0.1	0.3	0.4	0.2	3.1	0.7	0.3

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

FORB SPECIES	Vicia americana (American vetch)
year	Nested
2017	25
year	Average Cover (%)
2017	0.4

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

Table 14R-40.12 - Shrub and Tree Species. Average modified Daubenmire quadrat and line intercept cover by year.

SHRUB SPECIES	Amelanchier utahensis ^p (Utah serviceberry)	Mahonia repens (creeping barberry)	Pinus ponderosa ^a (ponderosa pine)	Quercus gambelii ^p (Gambel oak)	Symphoricarpos oreophilus (mountain snowberry)
year	Line Intercept Cover (%)				
2017	0	2.4	15.6	0.7	20.8
year	Quadrat Cover (%)				
2017	0.0	3.8	0.3	1.0	16.1

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

Table 14R-40.13 - 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)									
2017	20	-	100	0	0	0	0	0	40/47
Mahonia repens -- (creeping barberry)									
2017	14000	-	0	100	0	0	0	0	12/12
Pinus ponderosa ^t -- (ponderosa pine)									
2017	140	560	71	29	0	0	0	0	- / -
Quercus gambelii ^p -- (Gambel oak)									
2017	300	460	93	7	0	0	0	0	57/64
Rosa woodsii ^p -- (Woods' rose)									
2017	60	-	33	67	0	0	0	0	34/17
Symphoricarpos oreophilus -- (mountain snowberry)									
2017	8580	-	7	93	0	1	0	1	53/57

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

Table 14R-40.13a - Aspen Characteristics. Characteristics of aspen populations including density, size class distribution, and vigor of plants.

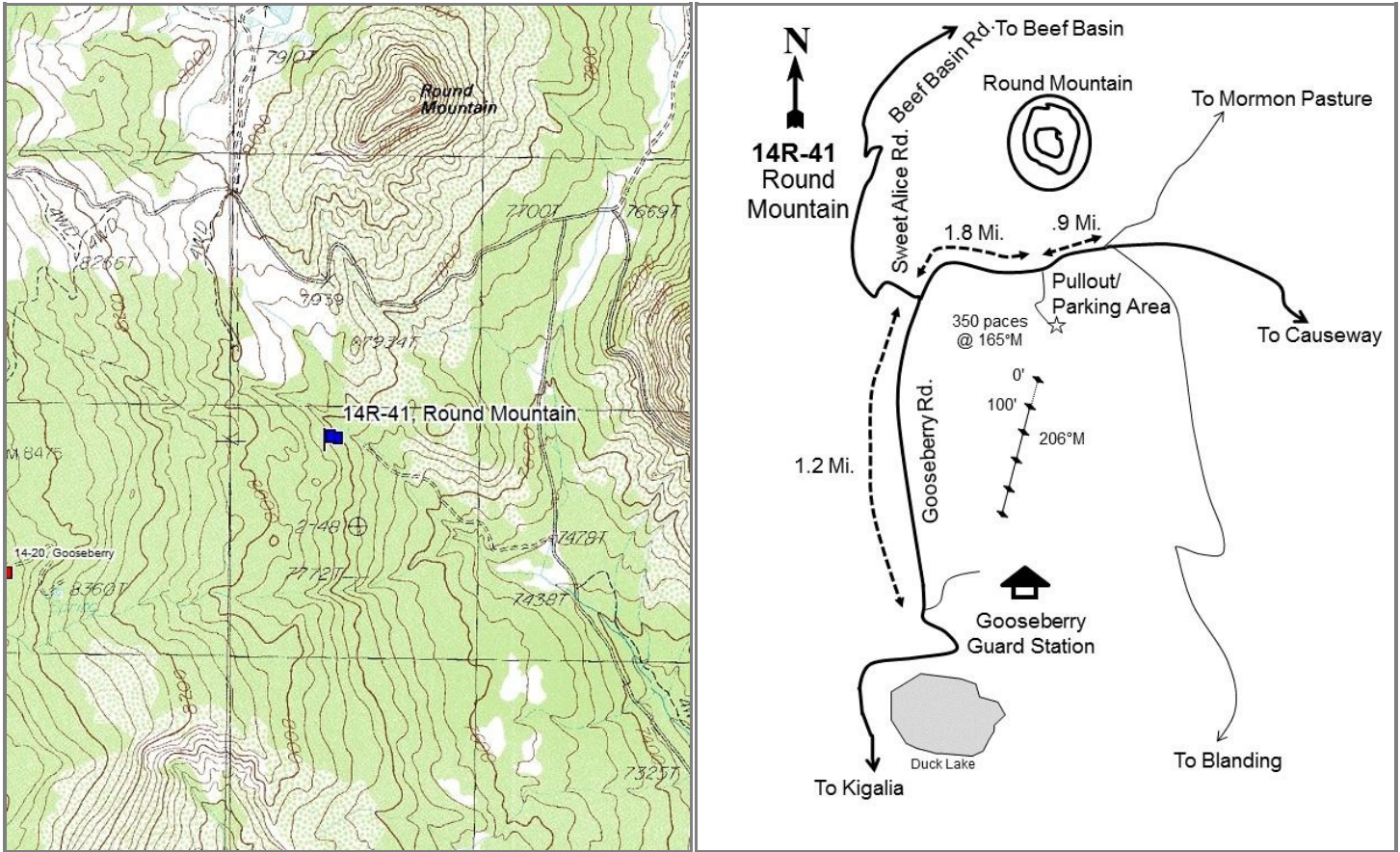
Year	Density	Size Class Distribution				Utilization		Poor Vigor (%)
	Plants per Acre	Class I (%)	Class II (%)	Class III (%)	Class IV (%)	Moderate (%)	Heavy (%)	
Populus tremuloides (quaking aspen)								
2017	120	50	50	-	-	33	33	0

Class I - ? 1.5 feet; Class II - > 1.5 Feet to 5 feet; Class III - > 5 Feet and up to 1 inch diameter at breast height (dbh); Class I - > 1 inch diameter at breast height (dbh)

Table 14R-40.14 - 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'	
Juniperus scopulorum (Rocky Mountain juniper)						
2017	1	-	100	-	-	5.0
Pinus ponderosa (ponderosa pine)						
2017	59	55	18	-	9	13.5
Populus tremuloides (quaking aspen)						
2017	50	14	79	-	-	3.2

ROUND MOUNTAIN - STUDY NO. 14R-41



Location Information

USGS 7.5 min Map Info
GPS (0' Stake)

Chippean Rocks NW; Township 34S, Range 20E, Section 08
NAD 83 UTM ZONE 12, 610317 East 4188020 North

Transect Information

Browse Tag # (0' Stake)	Not Available
Transect Bearing	206° magnetic
Length	300ft
Belt Placement	Line 1 (11ft & 95ft), Line 2 (34ft & 71ft), Line 3 (59ft)
Belt Marker Placement	No Rebar or Stakes

Directions to Site

From the Gooseberry Guard Station on Elk Ridge, drive north on Gooseberry Road for 1.2 miles to the intersection with Sweet Alice Road. Continue straight on Gooseberry Road for 1.8 miles to a pullout/parking area on the right (south). Park here and walk about 350 paces at an azimuth of 165 degrees to the study site.

Site Information

Land Ownership	Federal
Land Administrator	USFS
Allotment	COTTONWOOD
Elevation	No data
Aspect	North-Northeast
Slope	20-23%
Sample Dates	08/23/2017

Wildlife Habitat and Vegetation History

Table 14R-41.3 - Wildlife Seasonal Habitat. UDWR wildlife habitat and seasonality.

Species	Habitat	Season
Deer	crucial	summer
Elk	crucial	summer

Table 14R-41.4 - Vegetation History. The dominant vegetation type(s) and phase of woodland succession (Tausch, Miller, Roundy, & Chambers, 2009).

Year	Vegetation Type	Woodland Succession
2017	Mixed Mountain Brush/Quaking Aspen	NA

Site Notes

Fifth point quarter stake located 90 degrees to the left of the 200 stake and 100 feet away, with the end of the line used as 5th stake.

Site Potential

1981 - 2010 Average Annual Precipitation	21 inches
NRCS Ecological Site	High Mountain Loam (Aspen)
NRCS Ecological Site #	048AY506UT
States and Transitions	No state and transition model is available for this ecological site.

In 2017, this study site existed as a mixed mountain brush plant community type which included species such as Gambel oak (*Quercus gambelii*) and mountain snowberry (*Symphoricarpos oreophilus*), among others; mature quaking aspen (*Populus tremuloides*) trees were also scattered throughout the area and were a co-dominant site component (Table 14R-41.12, Table 14R-41.13, Table 14R-41.13a, Table 14R-41.14). A diverse mixture of perennial grasses were the dominant herbaceous component with Kentucky bluegrass (*Poa pratensis*) as the most abundant species (Table 14R-41.7, Table 14R-41.10). Forbs, while moderately diverse in composition, were rare in comparison (Table 14R-41.11). Without a major disturbance such as a fire to remove some of the dense vegetation on this study site, this aspen stand is at risk of sudden aspen decline.

Trend Summary Tables

Table 14R-41.6 - 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
2017	14.2	17.9	9.1	38.6	27.8	15.6

Table 14R-41.7 - 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
2017	-	389	128	201	-	29.2	2.7	5.5

Table 14R-41.8 - 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
2017	0.6	0.1	85.5	-	3.2	64.0

Table 14R-41.9 - 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	Rocky Mountain Elk	Rabbit
	Quadrat Frequency		
2017	2	15	1
Year	Days Use Per Acre (ha)		
	2017	2.0 (5.0)	28.8 (71.2)

Table 14R-41.10 - Grass Species. Nested frequency and modified Daubenmire average cover by year.

GRASS SPECIES	Achnatherum nelsonii (Columbia needlegrass)	Bromus inermis ⁱ (smooth brome)	Bromus marginatus (mountain brome)	Bromus porteri (Porter brome)	Carex (sedge)	Carex rossii (Ross' sedge)	Dactylis glomerata ⁱ (orchardgrass)	Elymus elymoides (squirreltail)	Pascopyrum smithii (western wheatgrass)	Poa fendleriana (muttongrass)	Poa pratensis ⁱ (Kentucky bluegrass)
year	Nested Frequency										
2017	77	21	13	75	25	8	2	5	35	3	335
year	Average Cover (%)										
2017	2.2	0.6	0.4	3.1	2.2	0.4	0.0	0.0	1.5	0.1	18.6

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

Table 14R-41.11 - Forb Species. Nested frequency and modified Daubenmire average cover by year.

FORB SPECIES	Achillea millefolium (Common yarrow)	Agoseris glauca (pale agoseris)	Arabis drummondii (Drummond's rockcress)	Galium ^a (bedstraw)	Lathyrus lanszwertii (Nevada pea)	Ligusticum porteri (Porter's licorice-root)	Maianthemum (mayflower)	Phlox longifolia (longleaf phlox)	Pseudostellaria jamesiana (tuber starwort)	Symphotrichum ascendens (western aster)	Taraxacum officinale (common dandelion)	Thalictrum fendleri (Fendler's meadow-rue)	Trifolium longipes (longstalk clover)	Vicia americana (American vetch)	Viola (violet)
year	Nested Frequency														
2017	116	16	2	128	75	6	2	2	24	1	35	4	1	22	29
year	Average Cover (%)														
2017	2.7	0.4	0.0	2.7	0.9	0.0	0.0	0.0	0.3	0.0	0.5	0.0	0.0	0.1	0.4

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

Table 14R-41.12 - Shrub and Tree Species. Average modified Daubenmire quadrat and line intercept cover by year.

SHRUB SPECIES	Acer grandidentatum ⁱ (bigtooth maple)	Amelanchier utahensis ^p (Utah serviceberry)	Mahonia repens (creeping barberry)	Picea engelmannii ⁱ (Engelmann spruce)	Pinus ponderosa ^a (ponderosa pine)	Populus tremuloides ⁱ (quaking aspen)	Quercus gambelii ^p (Gambel oak)	Rosa woodsii ^p (Woods' rose)	Symphoricarpos oreophilus (mountain snowberry)
year	Line Intercept Cover (%)								
2017	11.7	0	4.1	2	0.9	1	38.4	0.2	23.7
year	Quadrat Cover (%)								
2017	9.0	0.2	3.5	0.1	0.0	0.0	13.9	0.1	14.4

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

Table 14R-41.13 - 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 (%)				
Acer grandidentatum ⁱ -- (bigtooth maple)									
2017	1680	-	51	49	0	0	0	0	- / -
Amelanchier utahensis ^p -- (Utah serviceberry)									
2017	360	180	89	11	0	0	11	0	59/40
Mahonia repens -- (creeping barberry)									
2017	9580	-	0	100	0	0	0	0	14/16
Pinus ponderosa ⁱ -- (ponderosa pine)									
2017	20	-	0	100	0	0	0	0	- / -
Quercus gambelii ^p -- (Gambel oak)									
2017	9880	40	63	37	0	18	12	0	129/66
Rosa woodsii ^p -- (Woods' rose)									
2017	200	-	0	100	0	0	0	0	67/42
Symphoricarpos oreophilus -- (mountain snowberry)									
2017	12100	-	3	97	0	6	5	0	65/60

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

Table 14R-41.13a - Aspen Characteristics. Characteristics of aspen populations including density, size class distribution, and vigor of plants.

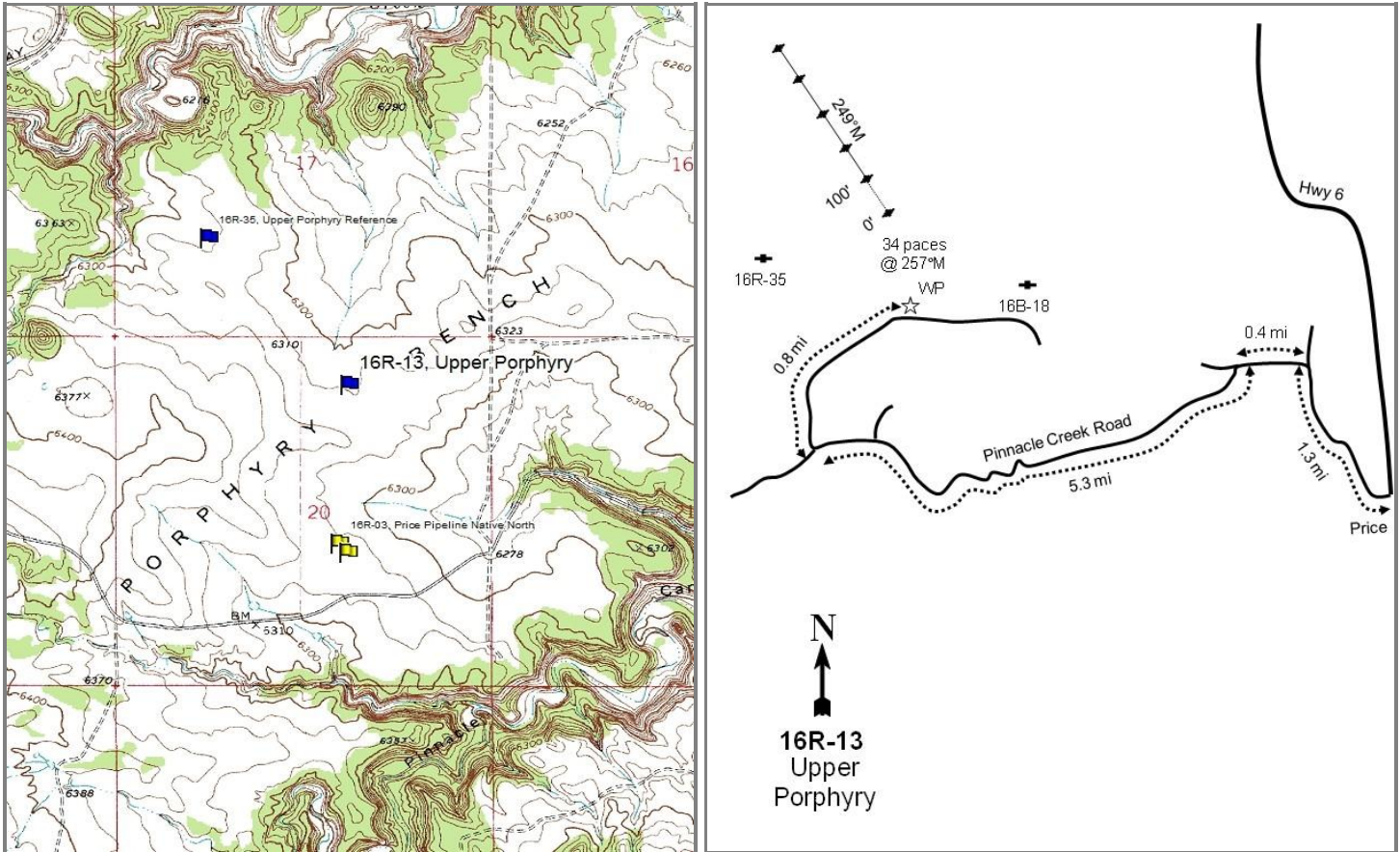
Year	Density	Size Class Distribution				Utilization		Poor Vigor (%)
	Plants per Acre	Class I (%)	Class II (%)	Class III (%)	Class IV (%)	Moderate (%)	Heavy (%)	
Populus tremuloides (quaking aspen)								
2017	40	-	-	-	100	0	0	0

Class I - ? 1.5 feet; Class II - > 1.5 Feet to 5 feet; Class III - > 5 Feet and up to 1 inch diameter at breast height (dbh); Class I - > 1 inch diameter at breast height (dbh)

Table 14R-41.14 - 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)							
2017	96	-	-	-	-	100	64.0
Acer grandidentatum (bigtooth maple)							
2017	99	17	28	50	6	-	3.1
Juniperus scopulorum (Rocky Mountain juniper)							
2017	2	-	-	50	-	50	16.0
Picea engelmannii (Engelmann spruce)							
2017	18	-	14	29	-	57	26.3
Pinus ponderosa (ponderosa pine)							
2017	36	-	-	-	-	100	49.4
Populus tremuloides (quaking aspen)							
2017	10	17	-	-	-	83	30.2
Pseudotsuga menziesii (Douglas-fir)							
2017	1	-	-	-	-	100	68.0

UPPER PORPHYRY - STUDY NO. 16R-13

**Location Information**

USGS 7.5 min Map Info
GPS (0' Stake)

Pinnacle Peak NE; Township 14S, Range 9E, Section 20
NAD 83 UTM ZONE 12, 505484 East 4383157 North

Transect Information

Browse Tag # (0' Stake)	51
Transect Bearing	249° magnetic
Length	500ft
Belt Placement	Line 1 (11ft), Line 2 (34ft), Line 3 (59ft), Line 4 (71ft), Line 5 (95ft)
Belt Marker Placement	Belt 5: No Rebar

Directions to Site

Travel on Westwood Boulevard (1550 W) northwest out of Price for 2.35 miles to a major intersection. Turn left onto Gordon Creek Road and proceed for 0.45 miles to a fork. Bear left away from Gordon Creek Road, going 0.1 miles to a gravel pit. Continue for 5.5 miles on Pinnacle Peak Road to a three-way fork at the top of the bench; an oil rig is near this intersection. Take the right fork and drive for 0.6 miles to the north, passing another oil rig, to a witness post on the left (northwest) side of the road. The 0-foot post is 34 paces from the witness post at 257 degrees magnetic and is marked with browse tag #51.

Site Information

Land Ownership	Private
Land Administrator	Private
Allotment	PORPHYRY BENCH
Elevation	6,330ft (1,929m)
Aspect	Northwest
Slope	2%
Sample Dates	08/02/2004, 06/14/2007, 06/29/2009, 08/25/2010, 07/31/2012, 08/15/2017

Table 16R-13.1 Disturbance History. Recorded history of major disturbances.

Treatment/Disturbance	Name	WRI DB#	Date	Size (acres)
Aerator - Double Drum/Seed	Price West Benches (Year1) Porphyry Bench	229	November 2004, April-May 2005	1104
Seeding - Aerial After	Price West Benches (Year1) Porphyry Bench	229	December 2004	1104

Table 16R-13.2 Seed Mix. List of known seeded plant species and rates (if available).

Mix Name			Application Type	Application Date	Acres
Porphyry Bench A			Aerial	Dec 2004	1160
Type	Species	Common Name	Cultivar/Source ID	Bulk lbs/acre	PLS lbs/acre
		Rice Hulls		0.69	0.00
S	Bassia prostrata	Forage Kochia	Immigrant	0.75	0.50
S	Krascheninnikovia lanata	Winterfat	Duchesne/Uintah UT	0.06	0.03
Mix Name			Application Type	Application Date	Acres
Porphyry Bench B1			Broadcast	Nov 2004	85
Type	Species	Common Name	Cultivar/Source ID	Bulk lbs/acre	PLS lbs/acre
S	Artemisia tridentata ssp. wyomingensis	Wyoming Big Sagebrush	Sanpete UT	0.88	0.25
Mix Name			Application Type	Application Date	Acres
Porphyry Bench B2			Broadcast	Nov 2004	495
Type	Species	Common Name	Cultivar/Source ID	Bulk lbs/acre	PLS lbs/acre
S	Artemisia tridentata ssp. wyomingensis	Wyoming Big Sagebrush	Sanpete UT	0.89	0.25
S	Atriplex canescens	Fourwing Saltbush	Emery UT	0.26	0.12
Mix Name			Application Type	Application Date	Acres
Porphyry Bench C1			Broadcast	Nov 2004	410
Type	Species	Common Name	Cultivar/Source ID	Bulk lbs/acre	PLS lbs/acre
G	Agropyron cristatum	Crested Wheatgrass	Douglas	1.22	1.01
G	Agropyron fragile	Siberian Wheatgrass	Vavilov	1.10	1.00
G	Psathyrostachys juncea	Russian Wildrye	Bozoisky	2.15	2.00
F	Melilotus officinalis	Yellow Sweetclover		0.55	0.50
F	Sanguisorba minor	Small Burnet	Delar	0.52	0.50
S	Atriplex canescens	Fourwing Saltbush	Emery UT	1.50	0.68
Mix Name			Application Type	Application Date	Acres
Porphyry Bench C2			Broadcast	Nov 2004	85
Type	Species	Common Name	Cultivar/Source ID	Bulk lbs/acre	PLS lbs/acre
G	Achnatherum hymenoides	Indian Ricegrass	Rimrock	1.00	0.97
G	Festuca ovina	Sheep Fescue		1.12	0.98
G	Leymus cinereus	Great Basin Wildrye	Trailhead	1.06	0.99
G	Pascopyrum smithii	Western Wheatgrass	Arriba	1.18	0.98
F	Cleome serrulata	Rocky Mountain Beeplant	Sanpete UT	0.20	0.20
F	Linum perenne	Blue Flax	Appar	0.11	0.10
S	Atriplex canescens	Fourwing Saltbush	Emery UT	1.48	0.67

Wildlife Habitat and Vegetation History**Table 16R-13.3 - Wildlife Seasonal Habitat.** UDWR wildlife habitat and seasonality.

Species	Habitat	Season
Deer	crucial	winter
Greater Sage Grouse	occupied	year-long

Table 16R-13.4 - 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	NA
2007	Wyoming Big Sagebrush/Perennial Grass	NA
2009	Wyoming Big Sagebrush/Perennial Grass	NA
2010	Wyoming Big Sagebrush/Perennial Grass	NA
2012	Wyoming Big Sagebrush/Perennial Grass	NA
2017	Perennial Grass/Wyoming Big Sagebrush	NA

Site Notes

Oil and gas activity is in the general vicinity.

Soils**Table 16R-13.5 - 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	7.1	43.6	28.9	27.5	1.7	8.8	80.0	0.5	08/02/2004

Site Potential

1981 - 2010 Average Annual Precipitation 11 inches
 NRCS Ecological Site Semidesert Loam (Wyoming Big Sagebrush)
 NRCS Ecological Site # 034BY212UT
 States and Transitions No state and transition model is available for the above ecological site

At the time of establishment in 2004, this was a decadent Wyoming big sagebrush (*Artemisia tridentata* ssp. *wyomingensis*) dominated site with a sparse understory. The site was treated with an aerator and seeded in 2005 to reduce sagebrush decadence. Cover of sagebrush decreased slightly following the treatment, although the population did exhibit a shift towards more young and mature plants (Table 16R-13.12, Table 16R-13.13). Prior to treatment, the understory was dominated by native annual forbs (Table 16R-13.7), particularly narrowleaf goosefoot (*Chenopodium leptophyllum*). Perennial grasses became the dominant herbaceous component following treatment with Indian ricegrass (*Achnatherum hymenoides*), crested wheatgrass (*Agropyron cristatum*) and needle and thread (*Hesperostipa comata*) displaying co-dominance in all post-treatment sample years (Table 16R-13.10). Forb cover has fluctuated post-treatment with scarlet globemallow (*Sphaeralcea coccinea*) being the dominant species (Table 16R-13.11). Overall, the site has transitioned from a sagebrush-dominated state into a perennial grass and sagebrush co-dominant state, and it is likely that it will remain in this state without a future disturbance.

Trend Summary Tables**Table 16R-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
2004	4.6	1.6	-	6.4	1.6	-
2007	6.2	3.4	-	4.7	3.9	-
2009	8.0	5.1	-	6.4	3.2	-
2010	8.5	4.6	-	5.8	3.6	-
2012	6.2	1.8	-	6.2	2.3	-
2017	6.2	3.4	-	6.2	3.7	-

Table 16R-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
2004	-	139	274	78	-	1.2	9.0	2.0
2007	43	313	302	190	0.3	10.7	5.2	3.0
2009	7	294	77	129	0.0	17.1	1.0	1.8
2010	13	268	63	119	0.0	15.9	0.6	2.1
2012	7	302	16	118	0.1	10.0	0.1	0.9
2017	35	324	150	158	0.6	25.9	4.4	3.5

Table 16R-13.8 - 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	60.1	4.8	26.7	-	-	19.7
2007	52.1	2.0	29.3	0.0	-	30.5
2009	47.1	2.7	37.6	-	-	33.4
2010	51.2	0.6	30.9	0.0	0.1	29.9
2012	51.4	1.1	41.7	-	0.0	19.1
2017	36.0	0.3	33.9	-	-	44.1

Table 16R-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	Rocky Mountain Elk	Greater Sage- Grouse	Horse	Rabbit
	Quadrat Frequency					
2004	3	47	1	-	-	56
2007	2	52	6	-	-	89
2009	2	56	6	-	-	63
2010	4	50	4	-	-	44
2012	2	36	2	1	-	24
2017	1	17	1	-	-	69
Year	Days Use Per Acre (ha)					
2004	0.7 (1.8)	95.8 (236.7)	-	-	0.6 (1.4)	-
2007	5.1 (12.6)	171.6 (423.8)	1.3 (3.3)	-	-	-
2009	13.1 (32.3)	153.5 (379.1)	14.1 (34.8)	-	-	-
2010	5.1 (12.6)	71.1 (175.5)	-	-	-	-
2012	0.7 (1.8)	81.1 (200.3)	8.1 (19.9)	8.7 (21.5)*	-	-
2017	19.6 (48.4)	72.4 (178.8)	-	-	-	-

*Pellets per acre (ha)

Table 16R-13.10 - Grass Species. Nested frequency and modified Daubenmire average cover by year.

GRASS SPECIES	Achnatherum hymenoides (Indian ricegrass)	Agropyron cristatum ⁱ (crested wheatgrass)	Agropyron fragile ⁱ (Siberian wheatgrass)	Bouteloua gracilis (blue grama)	Bromus tectorum ^{ai} (cheatgrass)	Elymus elymoides (squirreltail)	Hesperostipa comata (needle and thread)	Pascopyrum smithii (western wheatgrass)	Poa fendleriana (muttongrass)	Poa secunda (Sandberg bluegrass)	Psathyrostachys juncea ⁱ (Russian wildrye)	Vulpia octoflora ^a (sixweeks fescue)
year	Nested Frequency											
2004	45	1	-	1	-	59	32	9	-	-	-	-
2007	51	34	51	8	38	217	55	17	-	-	15	5
2009	85	86	3	9	7	175	80	15	-	-	24	-
2010	78	114	-	-	13	47	52	51	1	-	25	-
2012	154	78	-	12	7	52	31	78	-	1	25	-
2017	108	96	-	8	17	55	109	116	2	1	51	30
year	Average Cover (%)											
2004	0.1	0.0	-	0.0	-	0.7	0.2	0.2	-	-	-	-
2007	0.8	0.7	1.4	0.5	0.2	5.2	1.4	0.6	-	-	0.1	0.0
2009	2.2	4.2	0.0	0.3	0.0	7.0	2.3	0.5	-	-	0.8	-
2010	2.5	7.2	-	-	0.0	1.0	1.5	2.4	0.0	-	1.3	-
2012	3.0	3.6	-	0.0	0.1	0.8	0.3	1.5	-	0.0	0.7	-
2017	3.6	7.2	-	0.0	0.3	1.8	6.6	3.5	0.0	0.0	3.2	0.2

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

Table 16R-13.11 - Forb Species. Nested frequency and modified Daubenmire average cover by year.

FORB SPECIES	Arabis (rockcress)	Astragalus convallarius (lesser rushy milkvetch)	Calochortus nuttallii (sego lily)	Castilleja (Indian paintbrush)	Chenopodium fremontii ^a (Fremont's goosefoot)	Chenopodium leptophyllum ^a (narrowleaf goosefoot)	Cordylanthus ^a (bird's-beak)	Descurainia pinnata ^a (western tansymustard)	Draba ^a (draba)	Eriogonum (buckwheat)	Eriogonum cernuum ^a (nodding buckwheat)	Gayophytum ramosissimum ^a (pinyon groundsmoke)	Gilia inconspicua ^a (shy gilia)	Lappula occidentalis ^a (flatspine stickseed)	Lesquerella (bladderpod)	Linum perenne ⁱ (blue flax)	Penstemon (beardtongue)
year	Nested Frequency																
2004	2	5	-	4	3	184	44	53	-	-	15	50	2	42	-	-	7
2007	4	9	-	-	-	-	13	43	2	-	30	-	-	273	7	-	15
2009	-	3	-	-	-	1	-	-	-	1	31	-	-	-	1	-	9
2010	-	-	-	-	2	24	14	-	3	-	25	-	-	7	-	-	5
2012	-	-	-	-	-	1	-	12	-	-	3	1	-	-	4	-	8
2017	5	15	2	-	-	13	-	112	3	-	-	-	-	74	-	1	-
year	Average Cover (%)																
2004	0.0	0.1	-	0.0	0.2	4.5	0.6	0.5	-	-	0.2	1.3	0.0	1.0	-	-	0.1
2007	0.0	0.2	-	-	-	-	0.0	0.1	0.0	-	0.1	-	-	4.2	0.1	-	0.1
2009	-	0.0	-	-	-	0.0	-	-	-	0.0	0.3	-	-	-	0.0	-	0.0
2010	-	-	-	-	0.0	0.1	0.4	-	0.0	-	0.1	-	-	0.0	-	-	0.0
2012	-	-	-	-	-	0.0	-	0.0	-	-	0.0	0.0	-	-	0.0	-	0.0
2017	0.0	0.3	0.0	-	-	0.0	-	3.1	0.0	-	-	-	-	1.2	-	0.0	-

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

FORB SPECIES	Phlox hoodii (spiny phlox)	Phlox longifolia (longleaf phlox)	Plantago patagonica ^a (woolly plantain)	Salsola tragus ^{ai} (prickly Russian thistle)	Schoenocrambe linifolia (flaxleaf plainsmustard)	Sphaeralcea coccinea (scarlet globemallow)	unknown annual forb ^a (unknown forb)
year	Nested Frequency						
2004	-	20	26	8	-	49	-
2007	3	64	75	27	4	124	-
2009	-	16	-	5	3	104	44
2010	3	29	3	2	3	95	-
2012	-	12	-	-	-	104	-
2017	-	6	29	-	-	141	-
year	Average Cover (%)						
2004	-	0.1	0.5	0.3	-	1.7	-
2007	0.0	0.2	0.6	0.1	0.0	2.3	-
2009	-	0.1	-	0.0	0.0	1.6	0.7
2010	0.0	0.3	0.0	0.0	0.0	1.7	-
2012	-	0.1	-	-	-	0.9	-
2017	-	0.0	0.2	-	-	3.1	-

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

Table 16R-13.12 - 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 ^{pi} (forage kochia)	Chrysothamnus depressus ^p (longflower rabbitbrush)	Chrysothamnus viscidiflorus ssp. viscidiflorus var. viscidiflorus (yellow rabbitbrush)	Eriogonum microthecum ^p (slender buckwheat)	Gutierrezia sarothrae (broom snakeweed)	Opuntia (pricklypear)
year	Line Intercept Cover (%)						
2004	5.8	-	-	1.6	0.6	-	-
2007	4.1	0	-	3.7	0.6	0.2	-
2009	6.4	0	-	2.8	-	0.3	0.1
2010	5.1	-	-	3.5	0.7	-	0.1
2012	6	-	-	2.2	0.2	0	0.1
2017	5	0.2	0.2	2.5	0.8	1.2	-
year	Quadrat Cover (%)						
2004	4.2	-	-	1.6	0.4	-	0.0
2007	5.7	0.0	-	3.3	0.5	0.1	0.0
2009	8.0	0.0	-	4.9	-	0.2	0.0
2010	7.1	0.2	-	4.5	1.2	0.1	0.0
2012	5.7	0.1	-	1.6	0.4	0.1	0.0
2017	4.6	0.3	0.0	2.0	1.3	1.3	0.1

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

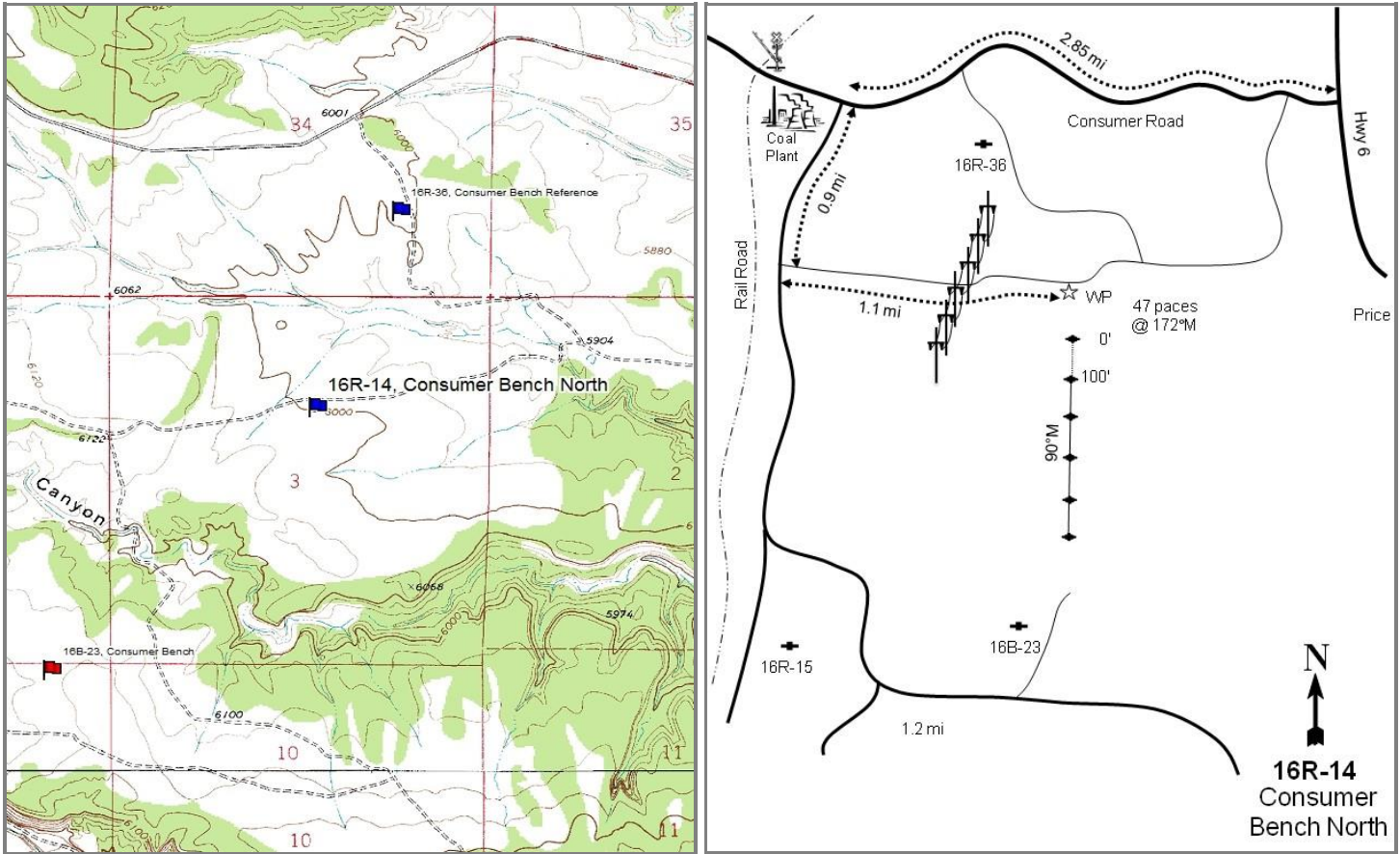
Table 16R-13.13 - Shrub/Tree Characteristics. Population characteristics of shrub/tree species populations including density reproduction (seedlings), age distribution, utilization, vigor and average size (height/crown) of plants.

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 (%)				
<i>Artemisia tridentata</i> ssp. <i>wyomingensis</i> ^P -- (Wyoming big sagebrush)									
2004	2380	-	0	4	96	13	29	69	52/75
2007	3420	22960	37	16	47	19	6	30	51/77
2009	-	-	-	-	-	-	-	-	39/57
2010	3620	260	43	28	30	14	9	27	47/74
2012	4140	260	44	30	26	13	77	17	36/57
2017	2680	-	8	50	42	18	24	36	37/52
<i>Atriplex canescens</i> ^P -- (fourwing saltbush)									
2004	-	-	-	-	-	-	-	-	-/-
2007	-	-	-	-	-	-	-	-	-/-
2009	-	-	-	-	-	-	-	-	-/-
2010	-	-	-	-	-	-	-	-	-/-
2012	-	-	-	-	-	-	-	-	-/-
2017	20	-	0	100	0	0	0	0	26/53
<i>Bassia prostrata</i> ^{Pi} -- (forage kochia)									
2004	-	-	-	-	-	-	-	-	-/-
2007	60	40	67	33	0	0	0	0	6/7
2009	-	-	-	-	-	-	-	-	14/16
2010	120	20	83	17	0	0	0	0	13/14
2012	240	-	8	92	0	17	33	0	10/16
2017	40	-	0	100	0	0	0	0	20/35
<i>Chrysothamnus depressus</i> ^P -- (longflower rabbitbrush)									
2004	-	-	-	-	-	-	-	-	-/-
2007	-	-	-	-	-	-	-	-	-/-
2009	-	-	-	-	-	-	-	-	17/30
2010	-	-	-	-	-	-	-	-	-/-
2012	-	-	-	-	-	-	-	-	-/-
2017	80	-	0	100	0	0	0	0	14/22
<i>Chrysothamnus viscidiflorus</i> ssp. <i>viscidiflorus</i> var. <i>viscidiflorus</i> -- (yellow rabbitbrush)									
2004	2080	1580	0	100	0	0	0	0	22/33
2007	12100	4540	49	51	0	3	6	0	16/24
2009	-	-	-	-	-	-	-	-	14/21
2010	6000	-	15	85	0	1	0	10	16/27
2012	6160	140	27	68	5	10	75	9	8/20
2017	3400	20	10	90	0	0	0	0	18/27
<i>Eriogonum microthecum</i> ^P -- (slender buckwheat)									
2004	2020	-	19	81	0	0	0	0	16/17
2007	4760	6200	42	58	0	3	12	0	9/11
2009	-	-	-	-	-	-	-	-	7/18
2010	3760	20	11	89	0	0	0	0	12/14
2012	3120	40	15	85	0	2	22	0	7/8
2017	4080	-	1	100	0	0	0	0	14/16
<i>Gutierrezia sarothrae</i> -- (broom snakeweed)									
2004	-	-	-	-	-	-	-	-	-/-
2007	1260	940	35	65	0	0	0	0	17/16
2009	-	-	-	-	-	-	-	-	23/24
2010	100	-	0	100	0	0	0	0	19/28
2012	660	140	85	15	0	0	0	0	10/8
2017	1660	20	14	84	1	0	0	1	27/35
<i>Krascheninnikovia lanata</i> ^P -- (winterfat)									
2004	-	-	-	-	-	-	-	-	-/-
2007	-	-	-	-	-	-	-	-	-/-
2009	-	-	-	-	-	-	-	-	-/-
2010	-	-	-	-	-	-	-	-	-/-
2012	-	-	-	-	-	-	-	-	-/-
2017	-	-	-	-	-	-	-	-	37/34

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	-	-	-	-	-	-	-	-	-/-
2009	-	-	-	-	-	-	-	-	-/-
2010	20	-	0	100	0	0	0	0	7/13
2012	-	-	-	-	-	-	-	-	-/-
2017	-	-	-	-	-	-	-	-	-/-
Opuntia -- (pricklypear)									
2004	140	-	0	100	0	0	0	0	5/23
2007	260	-	39	39	23	0	0	0	6/18
2009	-	-	-	-	-	-	-	-	10/18
2010	40	-	0	100	0	0	0	50	7/18
2012	40	-	50	50	0	0	0	50	7/23
2017	60	-	0	100	0	0	0	0	7/23

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

CONSUMER BENCH NORTH - STUDY NO. 16R-14



Location Information

USGS 7.5 min Map Info	Standardville SE; Township 14S, Range 9E, Section 03
GPS (0' Stake)	NAD 83 UTM ZONE 12, 508558 East 4387768 North

Transect Information

Browse Tag # (0' Stake)	63
Transect Bearing	190° magnetic
Length	500ft
Belt Placement	Line 1 (11ft), Line 2 (34ft), Line 3 (59ft), Line 4 (71ft), Line 5 (95ft)
Belt Marker Placement	Standard

Directions to Site

From the junction of US-6 and SSR-139 in Price, drive west on SSR-139 for 2.1 miles to a dirt road on the left (south) side of the road. Make an immediate left and drive for 0.3 miles to a fork. Take the right fork at the derrick pup and continue for 0.1 miles. Stay left and drive for 0.2 miles to a fork, then proceed for another 0.1 miles to another fork. Stay left at the fork and drive for 0.3 miles to another fork. Stay left again at the fork and continue for 0.1 miles to a better road. Turn right and drive 0.1 miles through a dry creek and gully. Proceed through the dry creek and continue for 0.4 miles to a fork. Go straight and drive for 0.3 miles to the witness post on the left (south) side of the road; the witness post is near a natural gas pipeline sign. From the witness post, walk 47 paces at 172 degrees magnetic to the 0- foot stake. The 0-foot stake is marked with browse tag #63.

Alternate route (and probably better route) is to drive ~2.8 miles from the junction of US-6 and SSR-139 to a road to the right (south) just before the railroad tracks. Turn onto this road and drive for 1.0 mile to Trestle road. Turn left, drive 0.6 miles to a fork, and stay left. Continue east for 0.6 miles to the witness post on the right (south) side of the road.

Site Information

Land Ownership	Federal
Land Administrator	BLM
Allotment	CONSUMERS WASH
Elevation	6,000ft (1,829m)
Aspect	Northwest
Slope	5%
Sample Dates	06/27/2005, 08/07/2008, 08/01/2012, 08/16/2017

Table 16R-14.1 Disturbance History. Recorded history of major disturbances.

Treatment/Disturbance	Name	WRI DB#	Date	Size (acres)
Aerator - Double Drum/Seed	Price West Benches (Year2)(Consumers)(airport)	228	November 2004-March 2005	2658
Seeding - Aerial After	Price West Benches (Year2)(Consumers)(airport)	228	March 2005	2658

Table 16R-14.2 Seed Mix. List of known seeded plant species and rates (if available).

Mix Name			Application Type	Application Date	Acres
Price West Benches Year 2- Consumers-Airport			Broadcast	Nov 2004	1851
Type	Species	Common Name	Cultivar/Source ID	Bulk lbs/acre	PLS lbs/acre
G	Achnatherum hymenoides	Indian Ricegrass	Nezpar	0.46	0.43
G	Achnatherum hymenoides	Indian Ricegrass	Rimrock	0.54	0.52
G	Agropyron cristatum	Crested Wheatgrass	Douglas	0.62	0.50
G	Agropyron cristatum	Crested Wheatgrass	Hycrest	0.54	0.47
G	Pascopyrum smithii	Western Wheatgrass		0.16	0.13
G	Pascopyrum smithii	Western Wheatgrass		0.84	0.69
G	Psathyrostachys juncea	Russian Wildrye	Bozoisky	1.60	1.48
G	Psathyrostachys juncea	Russian Wildrye		0.62	0.53
F	Medicago sativa	Alfalfa	Ladak+	0.41	0.38
F	Medicago sativa	Alfalfa	Nomad	0.41	0.38
F	Medicago sativa	Alfalfa	Ranger	0.41	0.36
F	Melilotus officinalis	Yellow Sweetclover		0.22	0.16
F	Onobrychis viciifolia	Sainfoin	Eski	1.35	1.27
F	Sanguisorba minor	Small Burnet	Delar	0.81	0.76
S	Atriplex canescens	Fourwing Saltbush	Juab UT	1.08	0.37
Mix Name			Application Type	Application Date	Acres
Price West Benches Year 2- Consumers-Airport-Browse			Aerial	Mar 2004	2750
Type	Species	Common Name	Cultivar/Source ID	Bulk lbs/acre	PLS lbs/acre
S	Artemisia tridentata ssp. wyomingensis	Wyoming Big Sagebrush	Sanpete UT	0.48	0.10
S	Bassia prostrata	Forage Kochia	Millard UT	0.13	0.10

Wildlife Habitat and Vegetation History

Table 16R-14.3 - Wildlife Seasonal Habitat. UDWR wildlife habitat and seasonality.

Species	Habitat	Season
Deer	crucial	winter
Greater Sage Grouse	occupied	year-long

Table 16R-14.4 - Vegetation History. The dominant vegetation type(s) and phase of woodland succession (Tausch, Miller, Roundy, & Chambers, 2009).

Year	Vegetation Type	Woodland Succession
2005	Wyoming Big Sagebrush/Perennial Grass	No Encroachment
2008	Wyoming Big Sagebrush/Perennial Grass	No Encroachment
2012	Wyoming Big Sagebrush	No Encroachment
2017	Wyoming Big Sagebrush/Perennial Grass	Phase I

Site Notes

No Notes

Soils

Table 16R-14.5 - 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	28.0	45.2	26.8	1.3	6.5	118.4	0.4	06/27/2005

Site Potential

1981 - 2010 Average Annual Precipitation 11 inches
 NRCS Ecological Site Semidesert Loam (Wyoming Big Sagebrush)
 NRCS Ecological Site # 034BY212UT
 States and Transitions No state and transition model is available for this ecological site.

At the time of establishment in 2005, the site was a decadent Wyoming big sagebrush (*Artemisia tridentata* ssp. *wyomingensis*) and perennial grass dominated plant community. The site was treated in 2004 and 2005 with a double drum aerator and seeding. In the years following treatment, the number of decadent sagebrush decreased. Graminoids in the herbaceous understory are diverse and plentiful, while the forb community is mostly depleted. The dominant grass is the perennial species squirreltail (*Elymus elymoides*); the forb community varies, but scarlet globemallow (*Sphaeralcea coccinea*) has consistently been the dominant perennial species (Table 16R-14.10, Table 16R-14.11). The shrub community is dominated by Wyoming big sagebrush with broom snakeweed (*Gutierrezia sarothrae*) as a significant browse component in 2017 (Table 16R-14.12). In 2017, Utah juniper (*Juniperus osteosperma*) was sampled for the first time on the site, possibly indicating potential for future encroachment (Table 16R-14.14). Overall, the treatment of this site did reduce the sagebrush decadence and seeding increased the biodiversity of grasses.

Trend Summary Tables

Table 16R-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
2005	17.1	1.7	-	14.4	1.6	-
2008	10.8	2.4	-	13.6	1.7	-
2012	12.0	1.1	-	15.0	0.4	-
2017	13.2	8.4	-	17.4	9.0	-

Table 16R-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
2005	40	328	119	78	0.6	21.8	1.3	2.0
2008	6	301	18	115	0.0	15.9	0.1	1.4
2012	-	236	34	49	-	7.3	0.1	0.1
2017	69	219	200	60	0.6	9.6	4.6	0.4

Table 16R-14.8 - 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	43.7	3.6	29.0	0.0	-	36.8
2008	43.8	1.4	41.2	0.1	-	32.4
2012	52.0	0.8	42.6	0.0	0.0	20.1
2017	43.1	1.2	35.3	0.0	0.0	35.6

Table 16R-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	Coyote	Mule Deer	Rocky Mountain Elk	Horse	Rabbit	Domestic Sheep
	Quadrat Frequency						
2005	-	-	38	11	-	15	-
2008	3	-	65	3	-	45	-
2012	-	-	29	1	-	18	-
2017	-	-	30	3	-	46	-
Year	Days Use Per Acre (ha)						
2005	-	-	48.3 (119.2)	28.1 (69.5)	-	-	-
2008	2.2 (5.4)	17.4 (43.0)*	83.8 (206.9)	-	-	-	-
2012	-	8.7 (21.5)*	69.0 (170.5)	12.8 (31.5)	-	-	0.7 (1.7)
2017	1.5 (3.6)	-	87.1 (215.2)	0.7 (1.7)	2.9 (7.2)	-	6.0 (14.9)

*Pellets per acre (ha)

Table 16R-14.10 - 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)	Hesperostipa comata (needle and thread)	Pascopyrum smithii (western wheatgrass)	Poa secunda (Sandberg bluegrass)	Psathyrostachys juncea ⁱ (Russian wildrye)	Sporobolus cryptandrus (sand dropseed)	Vulpia octoflora ^a (sixweeks fescue)
year	Nested Frequency									
2005	21	-	2	322	1	-	-	-	1	38
2008	45	2	3	286	14	3	-	2	2	4
2012	108	18	-	133	-	3	6	13	3	-
2017	85	2	14	137	19	2	-	19	5	58
year	Average Cover (%)									
2005	1.0	-	0.0	20.8	0.1	-	-	-	0.0	0.6
2008	1.9	0.0	0.0	13.1	0.7	0.0	-	0.1	0.0	0.0
2012	3.1	0.3	-	3.3	-	0.0	0.0	0.5	0.0	-
2017	2.5	0.0	0.2	5.2	0.9	0.0	-	1.0	0.0	0.4

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

Table 16R-14.11 - Forb Species. Nested frequency and modified Daubenmire average cover by year.

FORB SPECIES	Arabis (rockcress)	Astragalus convallarius (lesser rushy milkvetch)	Calochortus nuttallii (sego lily)	Castilleja (Indian paintbrush)	Ceratocephala testiculata ^{ai} (curvseed butterwort)	Chenopodium leptophyllum ^a (narrowleaf goosefoot)	Descurainia pinnata ^a (western tansymustard)	Eriogonum ovalifolium (cushion buckwheat)	Eriogonum umbellatum (sulphur-flower buckwheat)	Gayophytum ramosissimum ^a (pinyon groundsmoke)	Gilia inconspicua ^a (shy gilia)	Lappula occidentalis ^a (flatspine stickseed)	Lepidium montanum ^a (mountain pepperweed)	Machaeranthera canescens (hoary tansyaster)	Machaeranthera grindelioides (rayless tansyaster)	Penstemon (beardtongue)	Phlox longifolia (longleaf phlox)
year	Nested Frequency																
2005	2	3	-	2	1	88	29	5	4	2	0	11	8	-	3	0	2
2008	-	9	-	-	-	13	-	-	-	-	-	1	4	-	-	-	2
2012	-	1	-	-	-	6	3	-	-	-	-	-	7	2	-	-	-
2017	-	-	1	-	-	58	177	-	-	-	7	12	9	-	-	-	-
year	Average Cover (%)																
2005	0.0	0.4	-	0.0	0.0	0.7	0.4	0.0	0.0	0.0	0.0	0.1	0.2	-	0.1	0.0	0.0
2008	-	0.1	-	-	-	0.0	-	-	-	-	-	0.0	0.0	-	-	-	0.0
2012	-	0.0	-	-	-	0.0	0.0	-	-	-	-	-	0.0	0.0	-	-	-
2017	-	-	0.0	-	-	0.6	3.8	-	-	-	0.0	0.1	0.1	-	-	-	-

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

FORB SPECIES	Plantago patagonica ^a (woolly plantain)	Salsola tragus ^{ai} (prickly Russian thistle)	Schoenocrambe limifolia (flaxleaf plainsmustard)	Senecio integerrimus ^a (lambstongue ragwort)	Sphaeralcea coccinea (scarlet globemallow)	Townsendia (Townsend daisy)
year	Nested Frequency					
2005	1	-	5	5	59	2
2008	-	-	35	-	77	-
2012	-	19	-	-	43	3
2017	-	1	13	-	44	2
year	Average Cover (%)					
2005	0.0	-	0.0	0.0	1.3	0.0
2008	-	-	0.3	-	1.0	-
2012	-	0.0	-	-	0.1	0.0
2017	-	0.0	0.1	-	0.3	0.0

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

Table 16R-14.12 - 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 (yellow rabbitbrush)	Gutierrezia sarothrae (broom snakeweed)	Opuntia (pricklypear)
year	Line Intercept Cover (%)			
2005	14.4	0.3	1	0.3
2008	13.6	0.2	1.3	0.2
2012	15	0.2	0.1	0.1
2017	17.4	0.3	8.3	0.4
year	Quadrat Cover (%)			
2005	17.1	0.5	0.5	0.8
2008	10.8	0.3	1.7	0.4
2012	12.0	0.4	0.3	0.4
2017	13.2	1.5	5.9	1.1

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

Table 16R-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.

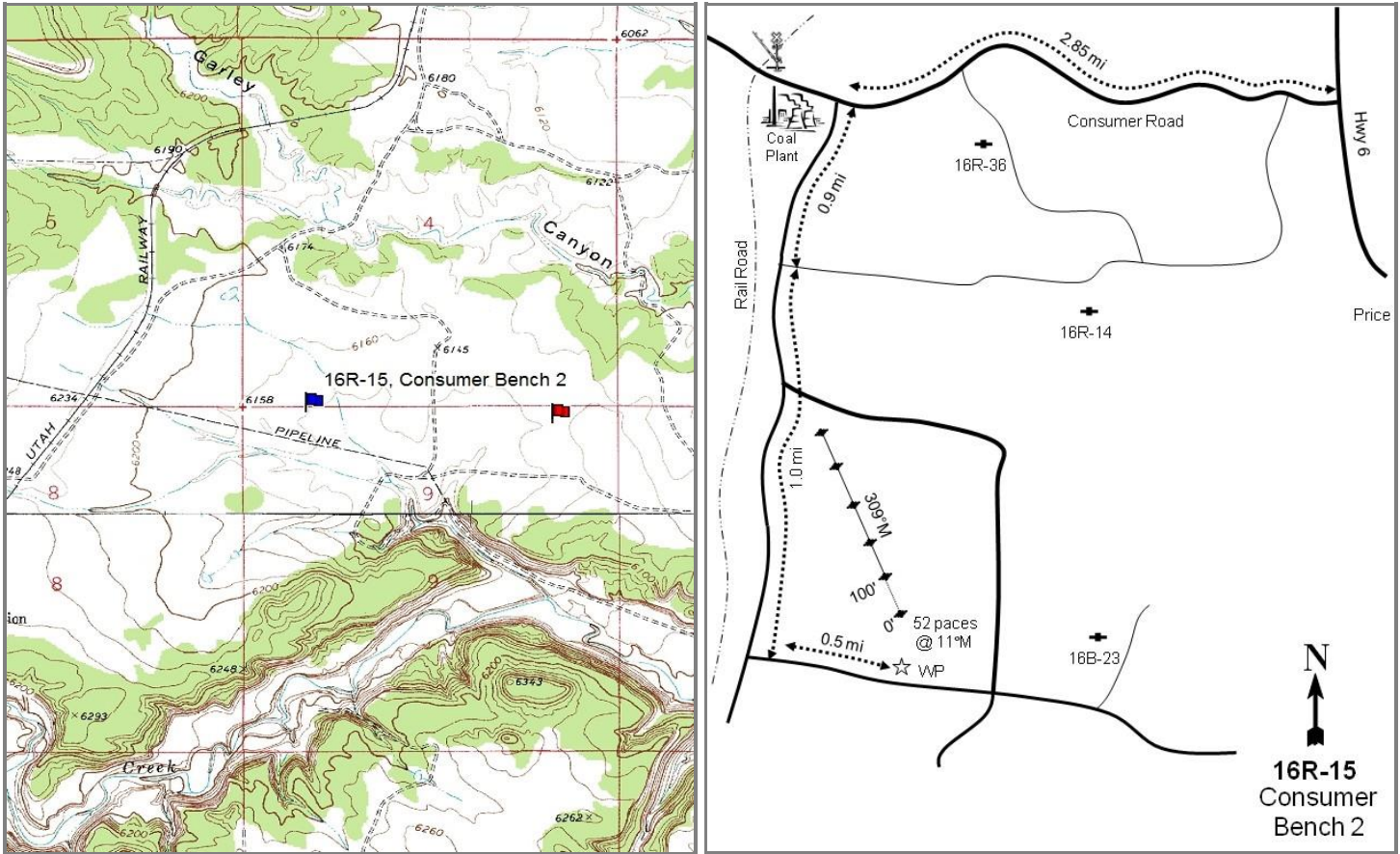
Year	Density		Age Class Distribution			Utilization		Poor Vigor (%)	Average Height Crown (cm)
	Plants Per Acre		Excluding Seedlings			Moderate (%)	Heavy (%)		
	Excluding Seedlings	Seedling	Young (%)	Mature (%)	Decadent (%)				
Artemisia tridentata ssp. wyomingensis^P -- (Wyoming big sagebrush)									
2005	4580	40600	2	23	75	38	21	50	57/77
2008	4040	1100	27	10	63	17	30	55	49/80
2012	4380	620	24	45	31	31	47	13	42/72
2017	4300	11300	6	71	24	29	24	28	46/81
Atriplex canescens^P -- (fourwing saltbush)									
2005	-	-	-	-	-	-	-	-	-/-
2008	20	-	100	0	0	0	0	0	104/77
2012	20	-	100	0	0	0	100	0	63/58
2017	20	-	0	100	0	0	0	0	-/-
Bassia prostrata^{Pi} -- (forage kochia)									
2005	-	-	-	-	-	-	-	-	-/-
2008	-	-	-	-	-	-	-	-	-/-
2012	-	-	-	-	-	-	-	-	-/-
2017	-	-	-	-	-	-	-	-	6/10
Chrysothamnus viscidiflorus -- (yellow rabbitbrush)									
2005	320	-	0	100	0	0	38	0	28/35
2008	700	-	46	54	0	6	37	6	23/35
2012	840	80	7	93	0	17	60	2	11/18
2017	720	-	0	100	0	17	6	0	25/37
Gutierrezia sarothrae -- (broom snakeweed)									
2005	1500	140	9	91	0	0	0	0	25/25
2008	2040	-	1	94	5	2	2	1	23/27
2012	2600	360	94	6	0	1	0	2	14/13
2017	8880	120	43	57	0	0	0	0	27/37
Opuntia -- (pricklypear)									
2005	360	-	0	100	0	0	0	11	12/39
2008	260	-	23	54	23	0	0	23	11/37
2012	240	-	25	75	0	0	0	0	9/29
2017	240	-	0	100	0	0	0	8	8/35

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

Table 16R-14.14 - 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)							
2017	1	-	100	-	-	-	3.5

CONSUMER BENCH 2 - STUDY NO. 16R-15



Location Information

USGS 7.5 min Map Info	Standardville SE; Township 14S, Range 9E, Section 09
GPS (0' Stake)	NAD 83 UTM ZONE 12, 506377 East 4386606 North

Transect Information

Browse Tag # (0' Stake)	785
Transect Bearing	309° magnetic
Length	500ft
Belt Placement	Line 1 (11ft), Line 2 (34ft), Line 3 (59ft), Line 4 (71ft), Line 5 (95ft)
Belt Marker Placement	Belt 4: No Rebar

Directions to Site

From the junction of US-6 and SSR-139 in Price, drive west on SSR-139 for 2.8 miles to a dirt road on the left (south) side of the road. Drive for 0.8 miles on this road that parallels the railroad tracks to a two-track road on the left. Continue straight for another 0.1 miles to another side road on the right and left. Continue straight (south) for 1.0 miles, passing through a wash and a gas derrick road on the left, to a fork. Stay left at the fork and drive 0.5 miles to the witness post on the left (north) side of the road. From the witness post, walk 52 paces at 11 degrees magnetic to the 0- foot baseline stake, which is marked with browse tag #785 (road(s) to site are not shown or have changed from Topo USA).

Site Information

Land Ownership	Federal
Land Administrator	BLM
Allotment	CONSUMERS WASH
Elevation	6,125ft (1,867m)
Aspect	Northeast
Slope	4-8%
Sample Dates	06/28/2005, 07/17/2008, 08/01/2012, 08/16/2017

Table 16R-15.1 Disturbance History. Recorded history of major disturbances.

Treatment/Disturbance	Name	WRI DB#	Date	Size (acres)
Aerator - Double Drum/Seed	Price West Benches (Year2)(Consumers)(airport)	228	November 2004-March 2005	2658
Seeding - Aerial After	Price West Benches (Year2)(Consumers)(airport)	228	March 2005	2658

Table 16R-15.2 Seed Mix. List of known seeded plant species and rates (if available).

Mix Name			Application Type	Application Date	Acres
Price West Benches Year 2- Consumers-Airport			Broadcast	Nov 2004	1851
Type	Species	Common Name	Cultivar/Source ID	Bulk lbs/acre	PLS lbs/acre
G	Achnatherum hymenoides	Indian Ricegrass	Nezpar	0.46	0.43
G	Achnatherum hymenoides	Indian Ricegrass	Rimrock	0.54	0.52
G	Agropyron cristatum	Crested Wheatgrass	Douglas	0.62	0.50
G	Agropyron cristatum	Crested Wheatgrass	Hycrest	0.54	0.47
G	Pascopyrum smithii	Western Wheatgrass		0.16	0.13
G	Pascopyrum smithii	Western Wheatgrass		0.84	0.69
G	Psathyrostachys juncea	Russian Wildrye	Bozoisky	1.60	1.48
G	Psathyrostachys juncea	Russian Wildrye		0.62	0.53
F	Medicago sativa	Alfalfa	Ladak+	0.41	0.38
F	Medicago sativa	Alfalfa	Nomad	0.41	0.38
F	Medicago sativa	Alfalfa	Ranger	0.41	0.36
F	Melilotus officinalis	Yellow Sweetclover		0.22	0.16
F	Onobrychis viciifolia	Sainfoin	Eski	1.35	1.27
F	Sanguisorba minor	Small Burnet	Delar	0.81	0.76
S	Atriplex canescens	Fourwing Saltbush	Juab UT	1.08	0.37
Mix Name			Application Type	Application Date	Acres
Price West Benches Year 2- Consumers-Airport-Browse			Aerial	Mar 2004	2750
Type	Species	Common Name	Cultivar/Source ID	Bulk lbs/acre	PLS lbs/acre
S	Artemisia tridentata ssp. wyomingensis	Wyoming Big Sagebrush	Sanpete UT	0.48	0.10
S	Bassia prostrata	Forage Kochia	Millard UT	0.13	0.10

Wildlife Habitat and Vegetation History

Table 16R-15.3 - Wildlife Seasonal Habitat. UDWR wildlife habitat and seasonality.

Species	Habitat	Season
Deer	crucial	winter
Greater Sage Grouse	occupied	year-long

Table 16R-15.4 - 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	No Encroachment
2008	Mountain Big Sagebrush	No Encroachment
2012	Mountain Big Sagebrush	No Encroachment
2017	Mountain Big Sagebrush	No Encroachment

Site Notes

No Notes

Soils

Table 16R-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
Clay Loam	7.6	24.4	47.4	28.2	1.0	5.0	86.4	0.4	06/28/2005

Site Potential

1981 - 2010 Average Annual Precipitation 11 inches
 NRCS Ecological Site Semidesert Loam (Wyoming Big Sagebrush)
 NRCS Ecological Site # 034BY212UT
 States and Transitions No state and transition model is available for this ecological site.

At the time of site establishment in 2005, this site was a Wyoming big sagebrush (*Artemisia tridentata* ssp. *wyomingensis*) dominated site (Table 16R-15.7, Table 16R-15.12). Grasses were sparse, but forbs were abundant and diverse; the perennial forb scarlet globemallow (*Sphaeralcea coccinea*) was the most dominant species during the initial sampling. Following treatment, however, perennial grass cover increased, but forb cover decreased (Table 16R- 15.10, 16R-15.11). The treatment reduced cover of sagebrush, but also reduced the decadence of plants on the site (Table 16R-15.13). Overall, this site is in fair condition and has shown cover of forbs and grasses to be variable, which could be a factor of grazing as well as annual precipitation. The goal of the project to reduce sagebrush decadence does appear to have been accomplished.

Trend Summary Tables

Table 16R-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
2005	9.9	1.8	-	10.4	1.3	-
2008	6.7	1.8	-	8.3	2.2	-
2012	7.3	1.3	-	6.9	1.2	-
2017	6.7	6.2	-	6.7	7.0	-

Table 16R-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
2005	0	151	405	202	0.0	2.5	16.8	9.2
2008	-	209	128	259	-	8.9	1.1	3.2
2012	2	176	76	38	0.0	6.9	1.5	0.1
2017	2	217	269	84	0.1	7.4	12.2	0.4

Table 16R-15.8 - 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	50.9	6.0	26.8	0.1	-	29.6
2008	64.5	2.3	22.7	0.1	-	19.5
2012	61.3	1.9	30.1	-	-	16.8
2017	52.0	1.3	27.3	0.1	-	32.4

Table 16R-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/Domestic Sheep	Rocky Mountain Elk	Rabbit
	Quadrat Frequency			
2005	-	62	4	36
2008	-	58	6	50
2012	-	41	-	17
2017	-	25	-	41
Year	Days Use Per Acre (ha)			
2005	-	113.2 (279.7)	3.4 (8.3)	-
2008	-	51.6 (127.5)	-	-
2012	-	31.5 (77.8)	-	-
2017	6.5 (16.1)	91.8 (226.8)	-	-

Table 16R-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)									
Bromus tectorum ^{ai} (cheatgrass)									
Elymus elymoides (squirreltail)									
Elymus trachycaulus (slender wheatgrass)									
Hesperostipa comata (needle and thread)									
Pascopyrum smithii (western wheatgrass)									
Psathyrostachys juncea ⁱ (Russian wildrye)									
year	Nested Frequency								
2005	52	-	3	0	107	2	-	-	-
2008	86	6	-	-	137	17	-	-	2
2012	117	5	-	2	60	8	2	4	-
2017	118	5	-	2	85	5	9	13	13
year	Average Cover (%)								
2005	0.4	-	0.0	0.0	2.0	0.1	-	-	-
2008	3.0	0.0	-	-	5.4	0.4	-	-	0.0
2012	5.0	0.0	-	0.0	1.3	0.6	0.0	0.0	-
2017	3.9	0.1	-	0.1	2.3	0.2	0.4	0.2	0.3

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

Table 16R-15.11 - Forb Species. Nested frequency and modified Daubenmire average cover by year.

FORB SPECIES																	
Chenopodium fremontii ^a (Fremont's goosefoot)																	
Chenopodium leptophyllum ^a (narrowleaf goosefoot)																	
Collomia linearis ^a (tiny trumpet)																	
Comandra umbellata (bastard toadflax)																	
Cryptantha ^a (annual cryptantha)																	
Cryptantha (cryptantha)																	
Descurainia pinnata ^a (western tansymustard)																	
Eriogonum cernuum ^a (nodding buckwheat)																	
Erodium cicutarium ^{ai} (redstem stork's bill)																	
Halogeton glomeratus ^{ai} (saltlover)																	
Lactuca serriola ^{ai} (prickly lettuce)																	
Lappula occidentalis ^a (flatspine stickseed)																	
Lepidium montanum ^a (mountain pepperweed)																	
Mentzelia albicaulis ^a (whitestem blazingstar)																	
Salsola tragus ^{ai} (prickly Russian thistle)																	
Schoenocrambe limifolia (flaxleaf plainsmustard)																	
Sisymbrium altissimum ^{ai} (tall tumblemustard)																	
year	Nested Frequency																
2005	360	71	4	3	-	14	193	104	-	-	1	147	68	-	5	22	2
2008	3	13	-	-	7	-	2	29	7	-	-	24	74	4	2	10	-
2012	6	-	-	-	-	-	-	11	-	-	-	-	1	-	59	-	-
2017	168	44	-	-	-	-	148	5	3	2	4	35	5	-	63	-	1
year	Average Cover (%)																
2005	5.2	0.2	0.0	0.2	-	0.1	4.8	0.3	-	-	0.0	2.6	3.6	-	0.0	0.3	0.0
2008	0.0	0.0	-	-	0.0	-	0.0	0.1	0.0	-	-	0.1	0.9	0.0	0.0	0.0	-
2012	0.0	-	-	-	-	-	-	0.0	-	-	-	-	0.0	-	1.4	-	-
2017	3.8	0.4	-	-	-	-	3.0	0.1	0.0	0.2	0.0	0.3	0.0	-	4.3	-	0.0

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

FORB SPECIES		
	Sphaeralcea coccinea (scarlet globemallow)	
	Tragopogon dubius ^{ai} (yellow salsify)	
year	Nested Frequency	
2005	178	2
2008	252	-
2012	38	-
2017	84	-
year	Average Cover (%)	
2005	8.6	0.0
2008	3.2	-
2012	0.1	-
2017	0.4	-

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

Table 16R-15.12 - 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 ^{pi} (forage kochia)							
Chrysothamnus depressus ^p (longflower rabbitbrush)							
Chrysothamnus viscidiflorus (yellow rabbitbrush)							
Gutierrezia sarothrae (broom snakeweed)							
Krascheninnikovia lanata ^p (winterfat)							
Opuntia (pricklypear)							
year	Line Intercept Cover (%)						
2005	10.4	-	-	0.6	0.7	-	0
2008	8.3	-	-	0.9	1.2	-	0.1
2012	6.8	0.1	-	1	0.2	-	0
2017	6.5	0.2	-	4.2	2.6	-	0.2
year	Quadrat Cover (%)						
2005	9.9	-	-	1.4	0.4	-	0.0
2008	6.7	-	-	1.0	0.7	-	0.2
2012	7.3	0.0	0.0	0.9	0.1	-	0.3
2017	6.5	0.2	-	3.8	2.1	0.0	0.2

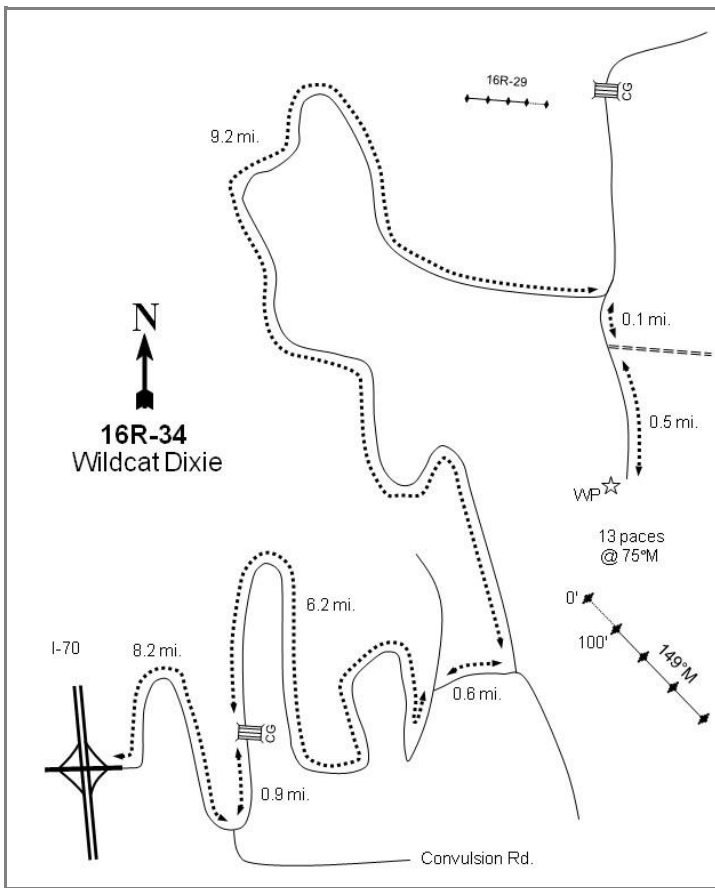
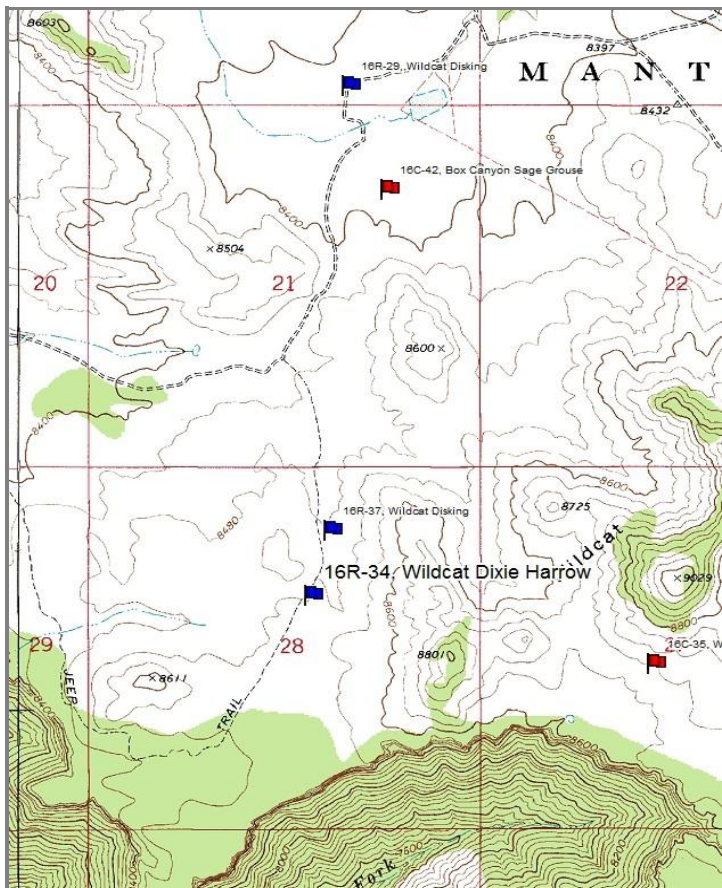
t - Tree Species; p - Preferred Browse; i - Introduced Species

Table 16R-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)									
2005	3420	53000	1	28	71	39	19	49	61/68
2008	7880	12260	63	16	22	14	14	12	53/66
2012	9960	1560	66	22	13	18	61	17	42/57
2017	5080	20	21	53	26	37	33	21	38/50
Atriplex canescens^P -- (fourwing saltbush)									
2005	-	-	-	-	-	-	-	-	-/-
2008	-	-	-	-	-	-	-	-	-/-
2012	-	-	-	-	-	-	-	-	-/-
2017	-	-	-	-	-	-	-	-	75/91
Bassia prostrata^{Pi} -- (forage kochia)									
2005	-	-	-	-	-	-	-	-	-/-
2008	60	20	100	0	0	0	0	0	- / -
2012	120	-	17	83	0	33	67	0	6/13
2017	120	-	0	100	0	0	0	0	20/29
Chrysothamnus depressus^P -- (longflower rabbitbrush)									
2005	-	-	-	-	-	-	-	-	-/-
2008	-	-	-	-	-	-	-	-	-/-
2012	20	-	0	100	0	0	100	0	12/10
2017	-	-	-	-	-	-	-	-	23/22
Chrysothamnus viscidiflorus -- (yellow rabbitbrush)									
2005	740	3920	51	46	3	0	0	0	28/37
2008	2420	640	38	61	1	14	9	0	21/29
2012	3060	-	41	58	1	11	86	58	11/19
2017	3480	20	3	94	3	5	2	3	25/37
Ericameria nauseosa -- (rubber rabbitbrush)									
2005	-	-	-	-	-	-	-	-	-/-
2008	-	-	-	-	-	-	-	-	-/-
2012	-	-	-	-	-	-	-	-	94/94
2017	-	-	-	-	-	-	-	-	-/-
Gutierrezia sarothrae -- (broom snakeweed)									
2005	420	860	10	86	5	0	0	5	31/40
2008	4060	80	16	83	1	5	6	0	20/22
2012	880	60	48	52	0	0	0	0	12/14
2017	3780	220	29	71	0	0	0	0	26/34
Krascheninnikovia lanata^P -- (winterfat)									
2005	-	-	-	-	-	-	-	-	-/-
2008	-	-	-	-	-	-	-	-	-/-
2012	-	-	-	-	-	-	-	-	49/33
2017	20	-	100	0	0	0	0	0	44/44
Opuntia -- (pricklypear)									
2005	180	-	11	78	11	0	0	11	11/43
2008	200	20	20	70	10	0	0	10	11/43
2012	200	40	10	90	0	20	0	30	9/45
2017	300	-	0	100	0	0	0	0	8/60

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

WILDCAT DIXIE HARROW - STUDY NO. 16R-34



Location Information

USGS 7.5 min Map Info
GPS (0' Stake)

Emery West NW; Township 21S, Range 5E, Section 28
NAD 83 UTM ZONE 12, 468630 East 4312670 North

Transect Information

Browse Tag # (0' Stake)	235
Transect Bearing	120° magnetic
Length	400ft
Belt Placement	Line 1 (11ft & 95ft), Line 2 (34ft), Line 3 (59ft), Line 4 (71ft)
Belt Marker Placement	Line 4: 75ft long Standard

Directions to Site

From Exit 73 on I-70, drive for 8.2 miles, then turn onto a road on the left. Continue for 0.9 miles, following signs for Duncan Mountain. On Convulsion Road, drive for 6.2 miles to a fork. Go right, then proceed for 0.6 miles to another fork. Go left and continue for 9.2 miles to a two-track road on the right. Drive for 0.1 miles on the two-track to another fork and go right. Continue for 0.5 miles to the witness post on the right (west) side of the road. The 0-foot stake is 19 paces from the witness post at 60 degrees magnetic and is marked with browse tag #235.

Site Information

Land Ownership	Federal
Land Administrator	USFS
Allotment	EMERY
Elevation	8,457ft (2,578m)
Aspect	North
Slope	4%
Sample Dates	08/06/2008, 08/12/2009, 06/23/2010, 07/01/2013, 08/14/2017

Table 16R-34.1 Disturbance History. Recorded history of major disturbances.

Treatment/Disturbance	Name	WRI DB#	Date	Size (acres)
Harrow - One-Way Dixie	Wildcat Knolls Habitat Improvement	1161	September-November 2008	435
Seeding - Broadcast	Wildcat Knolls Habitat Improvement	1161	September-November 2008	810

Table 16R-34.2 Seed Mix. List of known seeded plant species and rates (if available).

Mix Name			Application Type	Application Date	Acres
Wildcat Knolls Habitat Improvement			Broadcast	Sep 2008	1000
Type	Species	Common Name	Cultivar/Source ID	Bulk lbs/acre	PLS lbs/acre
G	<i>Elymus elymoides</i>	Bottlebrush Squirreltail	Toe Jam	0.50	0.42
G	<i>Elymus trachycaulus</i>	Slender Wheatgrass	San Luis	0.98	0.88
G	<i>Elymus trachycaulus</i>	Slender Wheatgrass	San Luis	1.05	0.89
G	<i>Leymus cinereus</i>	Great Basin Wildrye	Trailhead	1.00	0.91
G	<i>Pascopyrum smithii</i>	Western Wheatgrass	Arriba	1.00	0.94
G	<i>Poa secunda</i>	Sandberg Bluegrass	Toole MT	1.00	0.84
F	<i>Achillea millefolium</i>	Western Yarrow		0.10	0.10
F	<i>Astragalus cicer</i>	Cicer Milkvetch	Lutana	1.00	0.76
F	<i>Hedysarum boreale</i> ssp. <i>boreale</i> var. <i>boreale</i>	Utah Sweetvech		0.25	0.22
F	<i>Heliomeris multiflora</i>	Showy Goldeneye	Sanpete UT	0.03	0.02
F	<i>Lactuca serriola</i>	Prickly Lettuce		0.14	0.11
F	<i>Linum perenne</i>	Blue Flax	Appar	0.27	0.22
F	<i>Linum perenne</i>	Blue Flax	Appar	0.20	0.18
F	<i>Linum perenne</i>	Blue Flax	Appar	0.54	0.48
F	<i>Penstemon strictus</i>	Rocky Mountain Penstemon	Bandera	0.02	0.01
F	<i>Penstemon strictus</i>	Rocky Mountain Penstemon	Bandera	0.05	0.05
F	<i>Sanguisorba minor</i>	Small Burnet	Delar	1.50	1.39
S	<i>Artemisia tridentata</i> ssp. <i>vaseyana</i>	Mountain Big Sagebrush	Sanpete UT	0.22	0.04
S	<i>Artemisia tridentata</i> ssp. <i>vaseyana</i>	Mountain Big Sagebrush	Sevier/Wayne UT	0.28	0.08

Wildlife Habitat and Vegetation History**Table 16R-34.3 - Wildlife Seasonal Habitat.** UDWR wildlife habitat and seasonality.

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

Table 16R-34.4 - Vegetation History. The dominant vegetation type(s) and phase of woodland succession (Tausch, Miller, Roundy, & Chambers, 2009).

Year	Vegetation Type	Woodland Succession
2008	Mountain Big Sagebrush/Perennial grass/Perennial Forb	No Encroachment
2009	Mountain Big Sagebrush/Perennial Grass	No Encroachment
2010	Mountain Big Sagebrush/Perennial Grass	No Encroachment
2013	Mountain Big Sagebrush/Perennial Grass	No Encroachment
2017	Mountain Big Sagebrush/Perennial Grass	No Encroachment

Site Notes

Sage grouse were observed in the area in 2017.

Site Potential

1981 - 2010 Average Annual Precipitation	16 inches
NRCS Ecological Site	Mountain Loam (Mountain Big Sagebrush)
NRCS Ecological Site #	047XA430UT
States and Transitions	No state and transition model is available for this ecological site.

At the time of study establishment in 2008, this was a mountain big sagebrush (*Artemisia tridentata* ssp. *vaseyana*) site with a co-dominant component of a variety of perennial grasses and forbs. In the Fall of 2008, it was treated with a one- way dixie harrow to reduce sagebrush decadence and invigorate the understory. Following treatment, the cover of sagebrush decreased significantly, but decadence was reduced (Table 16R-34.13). As time since treatment has passed, the cover of sagebrush has steadily increased. The understory is robust and diverse, with the dominant graminoid being muttongrass (*Poa fendleriana*) (Table 16R-34.10); the dominant perennial forb on the site is redroot buckwheat (*Eriogonum racemosum*) (Table 16R-34.11). Overall, the site is in good ecological condition with little presence of undesirable introduced species.

Trend Summary Tables**Table 16R-34.6 - 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	24.5	4.0	-	32.1	5.5	-
2009	5.1	4.6	-	3.7	3.6	-
2010	6.2	7.2	-	5.6	6.7	-
2013	7.4	7.1	-	10.6	7.7	-
2017	15.3	9.1	-	17.0	8.6	-

Table 16R-34.7 - 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	-	388	63	289	-	16.5	0.1	13.1
2009	-	315	36	209	-	11.8	0.2	6.6
2010	-	313	218	243	-	10.4	3.0	8.2
2013	-	403	119	263	-	12.5	0.3	5.9
2017	-	452	43	253	-	25.3	0.1	9.6

Table 16R-34.8 - 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
2008	23.3	0.3	45.3	0.0	-	55.1
2009	40.4	-	44.0	0.1	0.0	25.8
2010	40.1	-	43.2	0.0	0.0	33.3
2013	27.5	-	42.2	0.0	0.0	40.4
2017	23.6	-	41.0	0.3	0.0	53.9

Table 16R-34.9 - 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	Rocky Mountain Elk	Greater Sage-Grouse	Rabbit
	Quadrat Frequency				
2008	2	4	59	1	10
2009	10	23	22	-	3
2010	1	24	17	2	4
2013	2	6	24	6	3
2017	8	9	28	1	14
Year	Days Use Per Acre (ha)				
2008	25.4 (62.8)	-	63.0 (155.6)	17.4 (43.0)*	-
2009	18.1 (44.8)	0.7 (1.7)	38.2 (94.4)	-	-
2010	2.2 (5.4)	19.4 (48.0)	15.4 (38.1)	8.7 (21.5)*	-
2013	12.3 (30.5)	6.0 (14.9)	65.0 (160.6)	34.9 (86.1)*	-
2017	20.3 (50.2)	0.7 (1.7)	46.9 (115.9)	34.9 (86.1)*	-

*Pellets per acre (ha)

Table 16R-34.10 - Grass Species. Nested frequency and modified Daubenmire average cover by year.

GRASS SPECIES	Achnatherum lettermanii (Letterman's needlegrass)	Bromus inermis ⁱ (smooth brome)	Carex (sedge)	Elymus elymoides (squirreltail)	Hesperostipa comata (needle and thread)	Koeleria macrantha (prairie Junegrass)	Pascopyrum smithii (western wheatgrass)	Poa fendleriana (muttongrass)	Poa secunda (Sandberg bluegrass)	Pseudoroegneria spicata (bluebunch wheatgrass)
year	Nested Frequency									
2008	92	7	66	58	30	55	138	250	16	2
2009	14	-	106	3	-	-	128	191	8	8
2010	37	0	-	5	-	-	190	156	39	-
2013	56	2	146	16	69	14	197	173	23	1
2017	63	-	135	57	85	2	238	208	92	4
year	Average Cover (%)									
2008	2.0	0.0	0.5	0.7	0.6	1.3	1.3	9.8	0.3	0.0
2009	0.2	-	2.1	0.1	-	-	2.5	6.3	0.2	0.5
2010	1.4	0.0	-	0.0	-	-	3.5	4.5	0.9	-
2013	1.9	0.0	1.0	0.1	1.9	0.4	2.2	4.4	0.4	0.0
2017	2.1	-	3.1	1.6	2.9	0.0	4.2	9.3	2.1	0.1

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

Table 16R-34.11 - Forb Species. Nested frequency and modified Daubenmire average cover by year.

FORB SPECIES	Agoseris glauca (pale agoseris)	Androsace septentrionalis ^a (pygmyflower rockjasmine)	Antennaria (pussytoes)	Arabis (rockcress)	Astragalus (milkvetch)	Astragalus convallarius (lesser rushy milkvetch)	Calochortus nuttallii (sego lily)	Castilleja angustifolia (northwestern Indian paintbrush)	Castilleja linariifolia (Wyoming Indian paintbrush)	Chaenactis douglasii (Douglas' dustymaiden)	Chenopodium album ^a (lambquarters)	Chenopodium leptophyllum ^a (narrowleaf goosefoot)	Collinsia parviflora ^a (maiden blue eyed Mary)	Comandra umbellata (bastard toadflax)	Crepis acuminata (tapertip hawksbeard)	Erigeron (fleabane)	Eriogonum alatum (winged buckwheat)
year	Nested Frequency																
2008	-	-	7	5	-	47	-	-	53	4	-	-	28	72	5	139	3
2009	-	-	1	-	-	44	-	-	36	4	4	27	-	34	3	64	-
2010	10	-	2	4	-	41	-	5	28	2	9	61	1	29	9	64	4
2013	19	8	4	7	-	47	1	1	34	7	-	5	21	51	7	43	-
2017	1	1	5	9	2	17	-	-	19	-	-	4	3	68	6	51	5
year	Average Cover (%)																
2008	-	-	0.0	0.0	-	1.6	-	-	1.9	0.1	-	-	0.0	0.5	0.1	1.9	0.0
2009	-	-	0.0	-	-	0.7	-	-	1.5	0.0	0.0	0.1	-	0.5	0.0	1.4	-
2010	0.4	-	0.0	0.1	-	0.8	-	0.1	0.9	0.0	0.0	0.2	0.0	0.2	0.3	1.5	0.0
2013	0.1	0.1	0.1	0.1	-	0.2	0.0	0.0	0.6	0.0	-	0.0	0.0	0.9	0.2	0.7	-
2017	0.0	0.0	0.2	0.2	0.0	0.2	-	-	0.4	-	-	0.0	0.0	1.1	0.1	0.6	0.0

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

FORB SPECIES	Eriogonum racemosum (redroot buckwheat)	Eriogonum umbellatum (sulphur-flower buckwheat)	Gayophytum ramosissimum ^a (pinyon groundsmoke)	Heliomeris multiflora var. multiflora (showy goldeneye)	Ipomopsis aggregata (scarlet gilia)	Lappula occidentalis ^a (flatspine stickseed)	Lesquerella (bladderpod)	Linum perenne ⁱ (blue flax)	Lithospermum ruderale (western stone seed)	Lupinus (lupine)	Lupinus argenteus (silvery lupine)	Machaeranthera canescens (hoary tansyaster)	Microsteris gracilis ^a (slender phlox)	Orobanche (broomrape)	Packera multilobata (lobeleaf groundsel)	Penstemon comarrhenus (dusty beardtongue)	Penstemon watsonii (Watson's penstemon)
year	Nested Frequency																
2008	134	25	-	-	18	-	-	-	1	3	32	5	-	1	-	46	30
2009	57	43	7	1	3	-	5	12	-	-	8	0	-	-	3	-	25
2010	123	13	195	-	28	3	-	0	-	12	3	3	1	-	1	1	19
2013	139	27	68	-	9	-	-	1	1	-	27	8	22	-	4	18	13
2017	116	30	-	23	23	-	-	11	-	1	9	14	-	-	41	32	15
year	Average Cover (%)																
2008	3.1	0.7	-	-	0.1	-	-	-	0.0	0.0	2.0	0.1	-	0.0	-	0.3	0.7
2009	0.6	0.8	0.0	0.1	0.1	-	0.0	0.0	-	-	0.5	0.0	-	-	0.0	-	0.3
2010	1.7	0.0	2.7	-	0.6	0.0	-	0.0	-	0.6	0.0	0.0	0.0	-	0.0	0.0	0.7
2013	1.3	0.1	0.1	-	0.1	-	-	0.0	0.0	-	0.8	0.0	0.1	-	0.0	0.1	0.4
2017	2.5	0.5	-	0.2	0.3	-	-	0.1	-	0.4	1.0	0.3	-	-	0.8	0.5	0.1

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

FORB SPECIES	Polygonum douglasii ^a (Douglas' knotweed)	Sanguisorba minor ⁱ (small burnet)	Silene drummondii (Drummond's campion)	Symphoricarum (aster)	Taraxacum officinale (common dandelion)	Trifolium (clover)	Zigadenus paniculatus (foothill deathcamas)
year	Nested Frequency						
2008	49	3	-	2	-	-	5
2009	2	-	-	-	-	-	-
2010	4	-	-	-	-	2	2
2013	17	-	-	2	-	2	1
2017	35	-	3	2	2	-	-
year	Average Cover (%)						
2008	0.1	0.0	-	0.0	-	-	0.1
2009	0.0	-	-	-	-	-	-
2010	0.0	-	-	-	-	0.0	0.0
2013	0.0	-	-	0.0	-	0.0	0.0
2017	0.1	-	0.0	0.0	0.0	-	-

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

Table 16R-34.12 - 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)	Artemisia tridentata ssp. vaseyana ^p (mountain big sagebrush)	Chrysothamnus viscidiflorus (yellow rabbitbrush)	Chrysothamnus viscidiflorus ssp. viscidiflorus var. viscidiflorus (yellow rabbitbrush)	Ericameria nauseosa (rubber rabbitbrush)	Ericameria parryi (Parry's rabbitbrush)	Symphoricarpos oreophilus (mountain snowberry)
2008	-	32.1	1.8	3.7	-	-	-	-
2009	-	3.7	0.5	2.7	-	-	0.3	0.1
2010	-	5.6	0.4	5.8	-	-	0.4	0.1
2013	-	10.6	0.7	6.2	-	-	0.6	0.2
2017	0.2	16.8	0.6	7.2	-	-	0.7	0.1
year	Quadrat Cover (%)							
2008	-	24.5	1.5	2.5	-	-	0.0	-
2009	-	5.1	1.1	3.1	0.0	-	0.1	0.3
2010	-	6.2	2.3	4.1	-	-	0.4	0.3
2013	-	7.4	1.0	5.4	0.0	-	0.4	0.3
2017	0.4	14.9	2.1	5.9	-	0.0	0.5	0.5

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

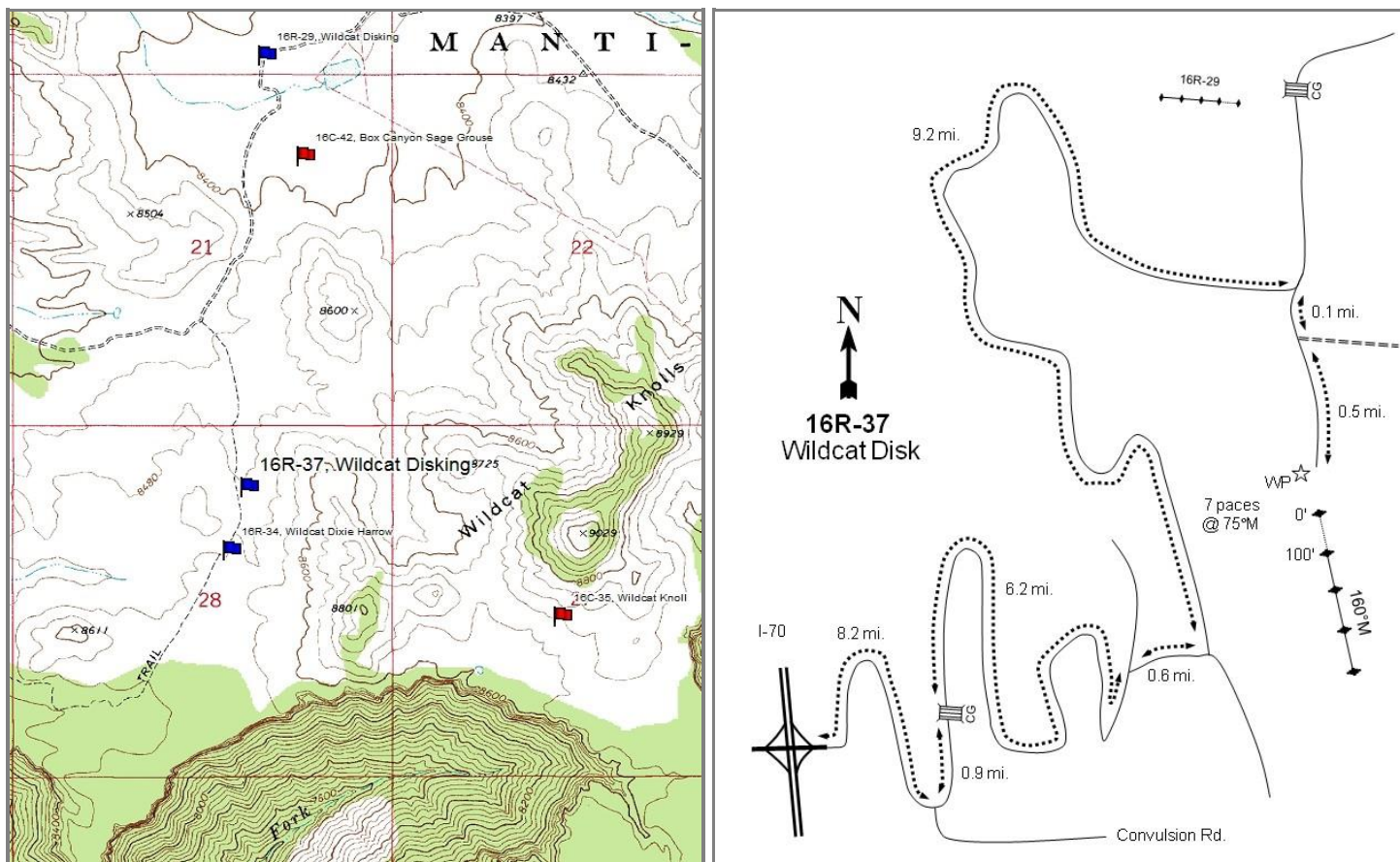
Table 16R-34.13 - Shrub/Tree Characteristics. Population characteristics of shrub/tree species populations including density reproduction (seedlings), age distribution, utilization, vigor and average size (height/crown) of plants.

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	-	-	-	-	-	-	-	-	-/-
2009	-	-	-	-	-	-	-	-	-/-
2010	-	-	-	-	-	-	-	-	-/-
2013	-	-	-	-	-	-	-	-	-/-
2017	-	-	-	-	-	-	-	-	43/48
Artemisia nova^p -- (black sagebrush)									
2008	-	-	-	-	-	-	-	-	-/-
2009	-	-	-	-	-	-	-	-	23/17
2010	-	-	-	-	-	-	-	-	-/-
2013	-	-	-	-	-	-	-	-	-/-
2017	220	-	0	100	0	0	0	0	18/37
Artemisia tridentata ssp. vaseyana^p -- (mountain big sagebrush)									
2008	8420	180	6	53	41	16	1	8	46/76
2009	-	-	-	-	-	-	-	-	31/38
2010	5200	60	17	75	9	8	0	7	34/47
2013	5340	960	20	72	8	27	5	21	33/45
2017	9980	1240	40	57	3	10	0	3	31/53
Chrysothamnus viscidiflorus -- (yellow rabbitbrush)									
2008	3060	-	1	95	4	0	1	0	12/26
2009	-	-	-	-	-	-	-	-	18/27
2010	980	20	8	92	0	0	0	0	18/33
2013	500	-	0	100	0	0	0	0	11/28
2017	1380	-	7	93	0	0	0	4	17/33
Chrysothamnus viscidiflorus ssp. viscidiflorus var. viscidiflorus -- (yellow rabbitbrush)									
2008	5520	-	25	71	4	0	0	1	23/31
2009	-	-	-	-	-	-	-	-	20/27
2010	5680	80	13	87	0	0	0	0	22/33
2013	5420	100	9	90	2	7	2	6	26/35
2017	5640	-	7	91	2	0	0	3	29/39

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 (%)				
Ericameria nauseosa -- (rubber rabbitbrush)									
2008	-	-	-	-	-	-	-	-	-/-
2009	-	-	-	-	-	-	-	-	24/35
2010	-	-	-	-	-	-	-	-	-/-
2013	60	-	0	100	0	33	0	0	17/34
2017	-	-	-	-	-	-	-	-	35/47
Ericameria parryi -- (Parry's rabbitbrush)									
2008	-	-	-	-	-	-	-	-	-/-
2009	-	-	-	-	-	-	-	-	-/-
2010	-	-	-	-	-	-	-	-	-/-
2013	-	-	-	-	-	-	-	-	-/-
2017	20	-	0	100	0	0	0	0	25/47
Gutierrezia sarothrae -- (broom snakeweed)									
2008	-	-	-	-	-	-	-	-	-/-
2009	-	-	-	-	-	-	-	-	-/-
2010	-	-	-	-	-	-	-	-	28/34
2013	-	-	-	-	-	-	-	-	-/-
2017	-	-	-	-	-	-	-	-	-/-
Rosa woodsii^P -- (Woods' rose)									
2008	-	-	-	-	-	-	-	-	-/-
2009	-	-	-	-	-	-	-	-	13/14
2010	-	-	-	-	-	-	-	-	-/-
2013	-	-	-	-	-	-	-	-	-/-
2017	-	-	-	-	-	-	-	-	23/13
Symphoricarpos oreophilus -- (mountain snowberry)									
2008	60	20	67	33	0	0	0	0	30/55
2009	-	-	-	-	-	-	-	-	24/25
2010	620	20	19	81	0	0	0	0	23/40
2013	560	-	0	100	0	21	0	0	36/45
2017	420	-	14	86	0	10	0	0	44/75
Tetradymia canescens -- (spineless horsebrush)									
2008	-	-	-	-	-	-	-	-	24/36
2009	-	-	-	-	-	-	-	-	14/15
2010	440	180	27	73	0	0	0	0	19/28
2013	480	-	21	79	0	38	0	0	13/27
2017	500	-	28	68	4	8	0	8	17/23

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

WILDCAT DISKING - STUDY NO. 16R-37

**Location Information**

USGS 7.5 min Map Info
GPS (0' Stake)

Emery West NW; Township 21S, Range 5E, Section 28
NAD 83 UTM ZONE 12, 468707 East 4312960 North

Transect Information

Browse Tag # (0' Stake)	672
Transect Bearing	160° magnetic
Length	500ft
Belt Placement	Read baseline, No belts
Belt Marker Placement	No belts

Directions to Site

From Exit 73 on I-70, drive for 8.2 miles, then turn onto a road on the left. Continue for 0.9 miles, following signs to Duncan Mountain. On Convulsion Road, drive for 6.2 miles to a fork. Go right and proceed for 0.6 miles to another fork. Go left, then continue for 9.2 miles to a two-track road on the right. Drive for 0.1 miles on the two-track to a fork and go right. Continue for 0.3 miles to the witness post on the right (west) side of the road. Walk for 7 paces at 75 degrees magnetic to the 0-foot stake.

Site Information

Land Ownership	Federal
Land Administrator	USFS
Allotment	EMERY
Elevation	8,425ft (2,568m)
Aspect	North
Slope	3%
Sample Dates	08/12/2009, 06/23/2010, 07/01/2013, 08/14/2017

Table 16R-37.1 Disturbance History. Recorded history of major disturbances.

Treatment/Disturbance	Name	WRI DB#	Date	Size (acres)
Disk - Two-Way	Wildcat Knolls Habitat Improvement	1161	September-November 2008	375
Disk - Two-Way	Wildcat Knolls Habitat Improvement	1161	September-November 2008	375
Seeding - Broadcast Before	Wildcat Knolls Habitat Improvement	1161	September-November 2008	810
Seeding - Rangeland Drill	Wildcat Sagebrush Restoration Project Phase II	1392	September 2009	466

Table 16R-37.2 Seed Mix. List of known seeded plant species and rates (if available).

Mix Name			Application Type	Application Date	Acres
Wildcat Knolls Habitat Improvement			Broadcast	Sep 2008	1000
Type	Species	Common Name	Cultivar/Source ID	Bulk lbs/acre	PLS lbs/acre
G	<i>Elymus elymoides</i>	Bottlebrush Squirreltail	Toe Jam	0.50	0.42
G	<i>Elymus trachycaulus</i>	Slender Wheatgrass	San Luis	0.98	0.88
G	<i>Elymus trachycaulus</i>	Slender Wheatgrass	San Luis	1.05	0.89
G	<i>Leymus cinereus</i>	Great Basin Wildrye	Trailhead	1.00	0.91
G	<i>Pascopyrum smithii</i>	Western Wheatgrass	Arriba	1.00	0.94
G	<i>Poa secunda</i>	Sandberg Bluegrass	Toole MT	1.00	0.84
F	<i>Achillea millefolium</i>	Western Yarrow		0.10	0.10
F	<i>Astragalus cicer</i>	Cicer Milkvetch	Lutana	1.00	0.76
F	<i>Hedysarum boreale</i> ssp. <i>boreale</i> var. <i>boreale</i>	Utah Sweetvech		0.25	0.22
F	<i>Heliomeris multiflora</i>	Showy Goldeneye	Sanpete UT	0.03	0.02
F	<i>Lactuca serriola</i>	Prickly Lettuce		0.14	0.11
F	<i>Linum perenne</i>	Blue Flax	Appar	0.27	0.22
F	<i>Linum perenne</i>	Blue Flax	Appar	0.20	0.18
F	<i>Linum perenne</i>	Blue Flax	Appar	0.54	0.48
F	<i>Penstemon strictus</i>	Rocky Mountain Penstemon	Bandera	0.02	0.01
F	<i>Penstemon strictus</i>	Rocky Mountain Penstemon	Bandera	0.05	0.05
F	<i>Sanguisorba minor</i>	Small Burnet	Delar	1.50	1.39
S	<i>Artemisia tridentata</i> ssp. <i>vaseyana</i>	Mountain Big Sagebrush	Sanpete UT	0.22	0.04
S	<i>Artemisia tridentata</i> ssp. <i>vaseyana</i>	Mountain Big Sagebrush	Sevier/Wayne UT	0.28	0.08
Mix Name			Application Type	Application Date	Acres
Wildcat Sagebrush Restoration Project Phase 2			Drill	Sep 2009	500
Type	Species	Common Name	Cultivar/Source ID	Bulk lbs/acre	PLS lbs/acre
G	<i>Elymus elymoides</i>	Bottlebrush Squirreltail	Toe Jam	0.50	0.43
G	<i>Elymus trachycaulus</i>	Slender Wheatgrass	San Luis	2.00	1.93
G	<i>Leymus cinereus</i>	Great Basin Wildrye	Trailhead	1.00	0.85
G	<i>Pascopyrum smithii</i>	Western Wheatgrass	Arriba	1.00	0.87
G	<i>Poa secunda</i>	Sandberg Bluegrass	Toole MT	0.75	0.63
F	<i>Achillea millefolium</i>	Western Yarrow		0.10	0.09
F	<i>Astragalus cicer</i>	Cicer Milkvetch	Lutana	1.00	0.97
F	<i>Hedysarum boreale</i> ssp. <i>boreale</i> var. <i>boreale</i>	Utah Sweetvech	Timp	0.25	0.19
F	<i>Heliomeris multiflora</i>	Showey Goldeneye		0.03	0.02
F	<i>Lactuca serriola</i>	Prickly Lettuce		0.10	0.09
F	<i>Linum perenne</i>	Blue Flax	Appar	1.00	0.87
F	<i>Penstemon strictus</i>	Rocky Mountain Penstemon	Bandera	0.10	0.08
F	<i>Sanguisorba minor</i>	Small Burnet	Delar	1.50	1.39
Mix Name			Application Type	Application Date	Acres
Wildcat Sagebrush Restoration Project Phase 2 - Sagebrush			Drill	Sep 2009	500
Type	Species	Common Name	Cultivar/Source ID	Bulk lbs/acre	PLS lbs/acre
S	<i>Artemisia tridentata</i> ssp. <i>vaseyana</i>	Mountain Big Sagebrush	Sanpete UT	0.50	0.09

Wildlife Habitat and Vegetation History**Table 16R-37.3 - Wildlife Seasonal Habitat.** UDWR wildlife habitat and seasonality.

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

Table 16R-37.4 - Vegetation History. The dominant vegetation type(s) and phase of woodland succession (Tausch, Miller, Roundy, & Chambers, 2009).

Year	Vegetation Type	Woodland Succession
2009	Annual Forb	No Encroachment
2010	Annual Forb	No Encroachment
2013	Perennial Grass	No Encroachment
2017	Perennial Grass	No Encroachment

Site Notes

Sage-grouse pellets were found on the site in 2010 and cattle use was high in 2013 (Table 16R-37.9).

Site Potential

1981 - 2010 Average Annual Precipitation 17 inches
 NRCS Ecological Site Mountain Loam (Mountain Big Sagebrush)
 NRCS Ecological Site # R047XA430UT
 States and Transitions No state and transition model is available for this ecological site.

In 2009, this site was an annual forb plant community that was disked prior to study establishment in order to improve the plant community for sage grouse. The dominant species in 2009 and 2010 was narrowleaf goosefoot (*Chenopodium leptophyllum*) (Table 16R-37.11). In the 2013, the site was dominated by perennial grasses with squirreltail (*Elymus elymoides*) contributing the most cover in 2013. In 2017, western wheatgrass (*Pascopyrum smithii*) and crested wheatgrass (*Agropyron cristatum*) were co-dominant (Table 16R-37.10). The forb community has remained diverse and abundant in the years following treatment (Table 16R-37.11). Shrub species are sparse on the site, with the only cover provided by mountain big sagebrush (*Artemisia tridentata* ssp. *vaseyana*) (Table 16R-37.12). It is possible that heavy grazing will shift the plant community and allow crested wheatgrass to increase further due to the grazing tolerance of this plant.

Trend Summary Tables

Table 16R-37.6 - 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	-	-	-	-	-	-
2010	-	-	-	-	-	-
2013	0.1	-	-	0.1	-	-
2017	1.0	-	-	0.3	-	-

Table 16R-37.7 - 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	-	226	276	159	-	4.7	24.6	1.8
2010	3	168	411	124	0.0	1.2	30.4	0.6
2013	6	351	205	149	0.0	22.2	2.3	4.1
2017	-	428	112	215	-	33.5	2.4	6.8

Table 16R-37.8 - 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
2009	59.7	-	23.9	0.0	0.1	27.7
2010	72.3	-	12.2	-	0.1	31.4
2013	45.1	-	26.9	-	0.0	36.1
2017	32.4	-	34.4	0.0	0.2	46.5

Table 16R-37.9 - 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	Rocky Mountain Elk	Greater Sage-Grouse	Rabbit
	Quadrat Frequency				
2009	4	6	8	-	3
2010	-	1	14	-	3
2013	8	1	17	-	19
2017	8	6	10	-	32
Year	Days Use Per Acre (ha)				
2009	8.7 (21.5)	-	6.0 (14.9)	-	-
2010	-	1.3 (3.3)	10.7 (26.5)	34.9 (86.1)*	-
2013	40.6 (100.4)	4.7 (11.6)	24.8 (61.2)	-	-
2017	31.2 (77.1)	2.0 (5.0)	14.1 (34.8)	-	-

*Pellets per acre (ha)

Table 16R-37.10 - Grass Species. Nested frequency and modified Daubenmire average cover by year.

GRASS SPECIES	Agropyron cristatum ⁱ (crested wheatgrass)	Bromus inermis ⁱ (smooth brome)	Bromus marginatus (mountain brome)	Bromus tectorum ^{ai} (cheatgrass)	Elymus elymoides (squirreltail)	Elymus trachycaulus (slender wheatgrass)	Koeleria macrantha (prairie Junegrass)	Leymus cinereus (basin wildrye)	Pascopyrum smithii (western wheatgrass)	Poa fendleriana (muttongrass)	Poa secunda (Sandberg bluegrass)	Pseudoroegneria spicata (bluebunch wheatgrass)
year	Nested Frequency											
2009	72	27	-	-	6	-	-	-	148	2	10	-
2010	34	17	-	3	-	-	-	-	135	6	12	-
2013	107	53	12	6	119	58	9	23	128	21	104	10
2017	208	79	-	-	4	44	-	3	269	47	117	-
year	Average Cover (%)											
2009	0.5	0.7	-	-	0.0	-	-	-	3.3	0.0	0.1	-
2010	0.1	0.2	-	0.0	-	-	-	-	0.8	0.0	0.0	-
2013	4.2	2.9	0.2	0.0	5.0	1.8	0.3	1.9	2.8	0.4	1.8	1.1
2017	12.7	4.2	-	-	0.1	0.7	-	0.2	11.2	1.3	3.2	-

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

Table 16R-37.11 - Forb Species. Nested frequency and modified Daubenmire average cover by year.

FORB SPECIES	Achillea millefolium (Common yarrow)	Agoseris glauca (pale agoseris)	Arabis (rockcress)	Astragalus agrestis (purple milkvetch)	Calochortus nuttallii (sego lily)	Chenopodium leptophyllum ^a (narrowleaf goosefoot)	Cirsium (thistle)	Collinsia parviflora ^a (maiden blue eyed Mary)	Comandra umbellata (bastard toadflax)	Crepis acuminata (tapertip hawksbeard)	Descurainia pinnata ^a (western tansymustard)	Dracocephalum parviflorum (American dragonhead)	Eriogonum racemosum (redroot buckwheat)	Eriogonum umbellatum (sulphur-flower buckwheat)	Gayophytum ramosissimum ^a (pinyon groundsmoke)	Heliomeris multiflora var. multiflora (showy goldeneye)	Ipomopsis aggregata (scarlet gilia)
year	Nested Frequency																
2009	-	-	-	5	-	262	-	-	-	1	-	-	-	-	-	-	-
2010	3	2	-	1	1	398	-	2	36	-	-	-	-	4	38	-	-
2013	12	1	-	69	1	19	-	5	-	-	14	2	5	-	30	6	3
2017	21	4	1	45	-	-	122	-	-	1	56	8	-	3	-	12	-
year	Average Cover (%)																
2009	-	-	-	0.0	-	24.0	-	-	-	0.0	-	-	-	-	-	-	-
2010	0.0	0.0	-	0.0	0.0	22.7	-	0.0	0.3	-	-	-	-	0.0	0.4	-	-
2013	0.0	0.0	-	1.4	0.0	0.0	-	0.0	-	-	0.0	0.2	0.0	-	0.1	0.1	0.0
2017	1.9	0.2	0.0	1.1	-	-	0.3	-	-	0.0	1.6	0.1	-	0.0	-	0.4	-

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

FORB SPECIES	Lactuca serriola ^{ai} (prickly lettuce)	Lappula occidentalis ^a (flatspine stickseed)	Linum perenne ⁱ (blue flax)	Lithophragma (woodland-star)	Machaeranthera canescens (hoary tansyaster)	Monolepis nuttalliana ^a (Nuttall's povertyweed)	Penstemon pachyphyllus (thickleaf beardtongue)	Penstemon strictus (Rocky Mountain penstemon)	Polygonum douglasii ^a (Douglas' knotweed)	Sanguisorba minor ⁱ (small burnet)	Taraxacum officinale (common dandelion)	Tragopogon dubius ^{ai} (yellow salsify)	Trifolium (clover)	Zigadenus paniculatus (foothill deathcamas)
year	Nested Frequency													
2009	3	-	150	-	-	-	-	-	48	12	-	-	-	-
2010	38	74	6	9	-	147	-	-	33	-	-	-	81	12
2013	5	176	86	-	-	14	2	31	5	-	-	17	-	6
2017	-	2	43	-	1	66	3	33	5	-	7	15	1	-
year	Average Cover (%)													
2009	0.0	-	1.7	-	-	-	-	-	0.5	0.0	-	-	-	-
2010	0.2	1.0	0.0	0.0	-	5.8	-	-	0.2	-	-	-	0.2	0.0
2013	0.0	1.7	1.7	-	-	0.1	0.0	0.6	0.0	-	-	0.3	-	0.0
2017	-	0.0	0.6	-	0.0	0.4	0.0	2.1	0.0	-	0.1	0.4	0.0	-

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

Table 16R-37.12 - Shrub and Tree Species. Average modified Daubenmire quadrat and line intercept cover by year.

SHRUB SPECIES	Artemisia tridentata ssp. vaseyana ^p (mountain big sagebrush)
year	Line Intercept Cover (%)
2009	-
2010	-
2013	0.1
2017	0.3
year	Quadrat Cover (%)
2009	-
2010	-
2013	0.1
2017	1.0

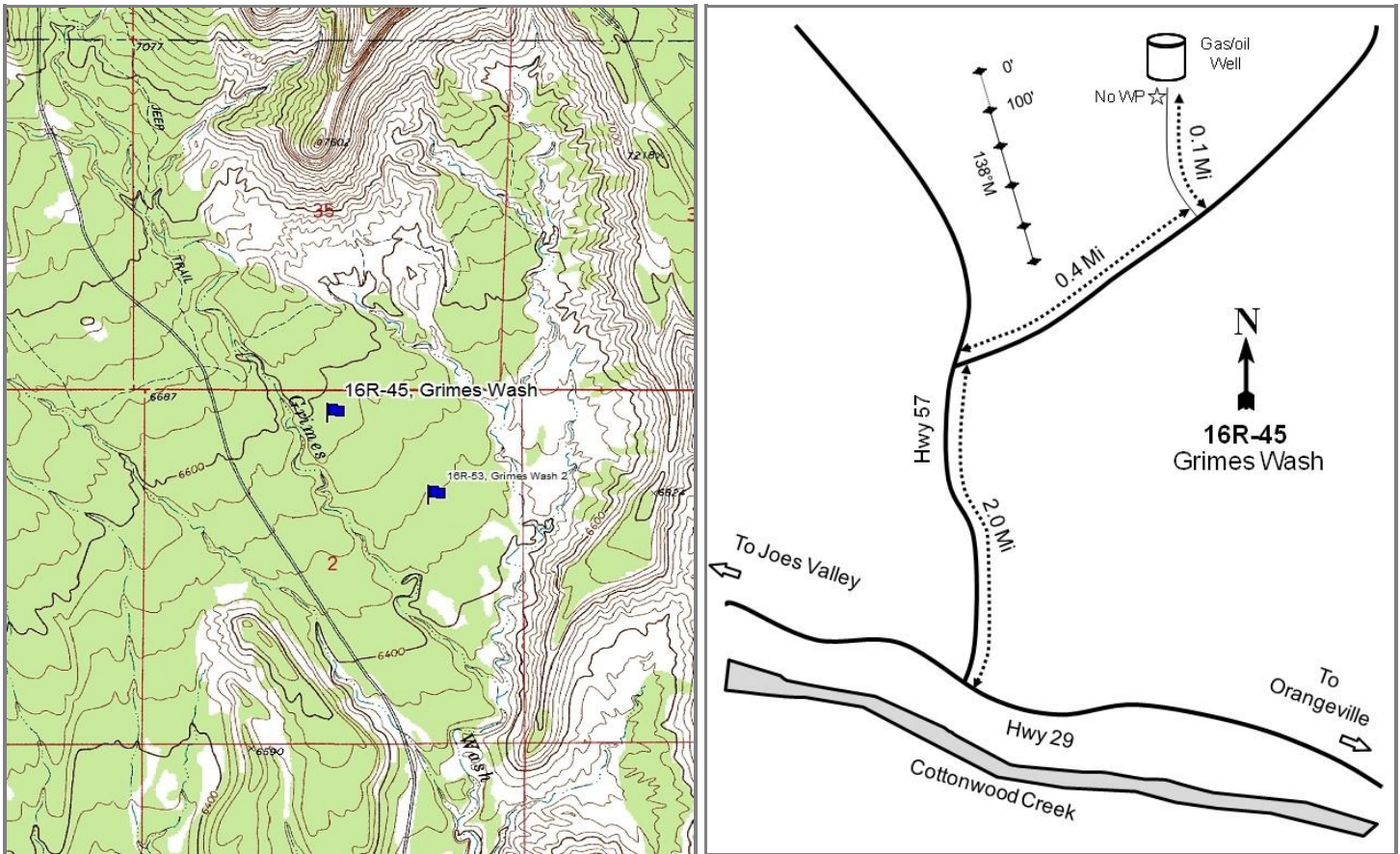
t - Tree Species; p - Preferred Browse; i - Introduced Species

Table 16R-37.13 - 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)									
2009	-	-	-	-	-	-	-	-	-/-
2010	-	-	-	-	-	-	-	-	-/-
2013	-	-	-	-	-	-	-	-	-/-
2017	-	-	-	-	-	-	-	-	16/47
Artemisia tridentata ssp. vaseyana^P -- (mountain big sagebrush)									
2009	-	-	-	-	-	-	-	-	-/-
2010	-	-	-	-	-	-	-	-	-/-
2013	320	-	88	13	0	25	0	0	24/26
2017	500	-	32	68	0	20	4	0	26/40
Chrysothamnus viscidiflorus ssp. viscidiflorus var. viscidiflorus -- (yellow rabbitbrush)									
2009	-	-	-	-	-	-	-	-	-/-
2010	-	-	-	-	-	-	-	-	12/15
2013	-	-	-	-	-	-	-	-	-/-
2017	20	-	0	100	0	0	0	0	22/33
Ericameria nauseosa -- (rubber rabbitbrush)									
2009	-	-	-	-	-	-	-	-	41/31
2010	-	-	-	-	-	-	-	-	35/25
2013	-	-	-	-	-	-	-	-	60/114
2017	-	-	-	-	-	-	-	-	61/75

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

GRIMES WASH - STUDY NO. 16R-45

**Location Information**

USGS 7.5 min Map Info
GPS (0' Stake)

Red Point SW; Township 18S, Range 7E, Section 02
NAD 83 UTM ZONE 12, 490931 East 4349164 North

Transect Information

Browse Tag # (0' Stake)	184
Transect Bearing	135° 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 intersection of SR-29 and SR-57, drive 2.0 miles north on SR-57. Turn right, traveling northeast, and drive for 0.4 miles. Turn right (northwest) and proceed for 0.1 miles. There is a gas/oil well: park near it and walk 65 paces west. The 0-foot stake is marked with browse tag #184.

Site Information

Land Ownership	State
Land Administrator	SITLA
Allotment	No data
Elevation	6,583ft (2,006m)
Aspect	Southeast
Slope	6%
Sample Dates	07/28/2011, 08/14/2017

Table 16R-45.1 Disturbance History. Recorded history of major disturbances.

Treatment/Disturbance	Name	WRI DB#	Date	Size (acres)
Mechanical - Bullhog	Grimes Wash Phase 2	4041	Fall 2017	181
Seeding - Aerial Before	Grimes Wash Phase 2	4041	Fall 2017	352

Wildlife Habitat and Vegetation History**Table 16R-45.3 - Wildlife Seasonal Habitat.** UDWR wildlife habitat and seasonality.

Species	Habitat	Season
Deer	crucial	winter
Elk	substantial	winter

Table 16R-45.4 - Vegetation History. The dominant vegetation type(s) and phase of woodland succession (Tausch, Miller, Roundy, & Chambers, 2009).

Year	Vegetation Type	Woodland Succession
2011	Pinyon-Juniper	Phase III
2017	Pinyon-Juniper	Phase III

Site Notes

This study was established in 2011 to monitor the effects of a two-way chaining. Prior to the proposed chaining, the project was aerially seeded but due to the ruggedness of terrain and large boulders present, the area was not chained. It will be treated with a bullhog and aerially seeded in the Fall of 2017. The project will be rested from livestock grazing for two growing seasons following the treatment (WRI 2017).

Site Potential

1981 - 2010 Average Annual Precipitation	12 inches
NRCS Ecological Site	Semidesert Stony Loam (Wyoming Big Sagebrush)
NRCS Ecological Site #	034BY241UT
States and Transitions	No state and transition model is available for this ecological site.

From study establishment in 2011 through 2017, this site was a twoneedle pinyon (*Pinus edulis*) and Utah juniper (*Juniperus osteosperma*) dominated site in Phase III of woodland succession. Browse species are sparse, with mormon tea (*Ephedra viridis*) contributing the most cover (Table 16R-45.12). No grasses were sampled in either year and the forb species on the site are depleted, with little cover being provided (Table 16R-45.7, Table 16R-45.11). When complete and established, the treatment and seeding should help to increase the understory and shrub species on the site as well as increase the value of the site for wildlife.

Trend Summary Tables**Table 16R-45.6 - 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
2011	1.4	0.0	10.7	2.2	-	26.9
2017	1.5	0.0	10.7	2.4	-	29.8

Table 16R-45.7 - 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
2011	-	-	74	29	-	-	0.6	0.3
2017	-	-	42	34	-	-	0.1	0.2

Table 16R-45.8 - 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
2011	41.6	1.8	34.1	15.3	12.8	12.5
2017	25.9	1.8	39.1	17.5	11.0	13.9

Table 16R-45.9 - 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	Rocky Mountain Elk	Rabbit
	Quadrat Frequency		
2011	13	5	2
2017	14	-	45
Days Use Per Acre (ha)			
2011	14.7 (36.4)	-	-
2017	13.4 (33.1)	-	-

Table 16R-45.10 - Grass Species. Nested frequency and modified Daubenmire average cover by year.

GRASS SPECIES	No Grasses Found
	year
year	Average Cover (%)

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

Table 16R-45.11 - Forb Species. Nested frequency and modified Daubenmire average cover by year.

FORB SPECIES	Arabis holboellii ^a (Holboell's rockcress)	Caulanthus crassicaulis ^a (thickstem wild cabbage)	Chamaesyce albomarginata (whitemargin sandmat)	Chenopodium fremontii ^a (Fremont's goosefoot)	Cryptantha (cryptantha)	Descurainia pinnata ^a (western tansymustard)	Draba ^a (draba)	Eriastrum sparsiflorum ^a (Great Basin woollystar)	Eriogonum (buckwheat)	Eriogonum alatum (winged buckwheat)	Lactuca serriola ^{ai} (prickly lettuce)	Lepidium ^a (pepperweed)	Penstemon (beardtongue)	Salsola tragus ^{ai} (prickly Russian thistle)	Stanleya viridiflora (green princesplume)
year	Nested Frequency														
2011	1	2	3	12	8	38	4	2	8	-	2	17	8	3	3
2017	4	1	24	11	-	3	-	3	-	5	-	7	5	15	-
year	Average Cover (%)														
2011	0.0	0.0	0.0	0.2	0.1	0.1	0.0	0.0	0.1	-	0.0	0.2	0.1	0.0	0.0
2017	0.0	0.0	0.2	0.0	-	0.0	-	0.0	-	0.0	-	0.0	0.0	0.0	-

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

Table 16R-45.12 - Shrub and Tree Species. Average modified Daubenmire quadrat and line intercept cover by year.

SHRUB SPECIES	Atriplex canescens ^p (fourwing saltbush)	Ephedra viridis ^p (mormon tea)	Eriogonum microthecum ^p (slender buckwheat)	Juniperus osteosperma ⁱ (Utah juniper)	Opuntia polyacantha (plains pricklypear)	Pinus edulis ⁱ (twoneedle pinyon)
year	Line Intercept Cover (%)					
2011	-	2	0.2	13.1	-	13.8
2017	-	2.4	-	15.4	-	14.4
year	Quadrat Cover (%)					
2011	-	1.4	0.0	5.3	0.0	5.3
2017	0.0	1.4	0.1	7.0	0.0	3.7

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

Table 16R-45.13 - 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.

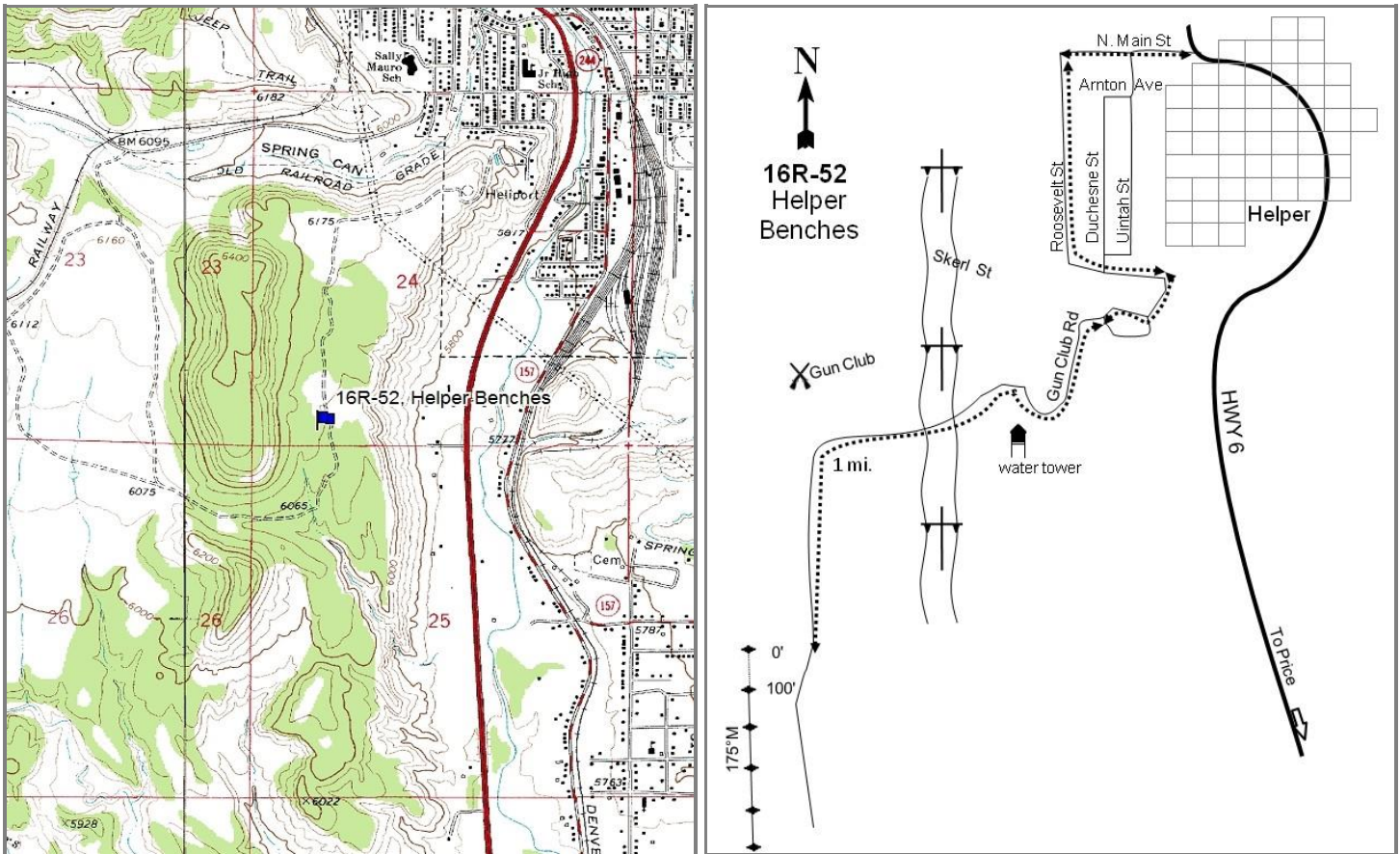
Year	Density		Age Class Distribution			Utilization		Poor Vigor (%)	Average Height Crown (cm)
	Plants Per Acre		Excluding Seedlings			Moderate (%)	Heavy (%)		
	Excluding Seedlings	Seedling	Young (%)	Mature (%)	Decadent (%)				
Atriplex canescens^P -- (fourwing saltbush)									
2011	-	-	-	-	-	-	-	-	-/-
2017	20	-	100	0	0	0	0	0	-/-
Cercocarpus montanus^P -- (alderleaf mountain mahogany)									
2011	-	20	0	0	0	0	0	0	88/125
2017	-	-	-	-	-	-	-	-	82/114
Ephedra viridis^P -- (mormon tea)									
2011	160	-	13	63	25	25	25	13	69/90
2017	160	-	0	75	25	0	0	13	71/97
Eriogonum microthecum^P -- (slender buckwheat)									
2011	1440	260	46	54	0	3	6	0	6/9
2017	1100	-	16	82	2	0	0	0	5/8
Gutierrezia sarothrae -- (broom snakeweed)									
2011	-	-	-	-	-	-	-	-	-/-
2017	20	-	0	100	0	0	0	0	21/34
Juniperus osteosperma^I -- (Utah juniper)									
2011	80	20	0	100	0	0	0	0	-/-
2017	200	-	20	80	0	0	0	0	-/-
Opuntia polyacantha -- (plains pricklypear)									
2011	80	-	25	75	0	0	0	0	7/21
2017	20	-	0	100	0	0	0	0	7/23
Pinus edulis^I -- (twoneedle pinyon)									
2011	300	40	73	27	0	0	0	7	-/-
2017	260	40	77	23	0	0	0	0	-/-
Sclerocactus -- (fishhook cactus)									
2011	-	-	-	-	-	-	-	-	16/17
2017	-	-	-	-	-	-	-	-	7/18
Yucca -- (yucca)									
2011	-	-	-	-	-	-	-	-	25/39

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

Table 16R-45.14 - 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)							
2011	159	15	-	40	35	10	29.4
2017	146	-	-	50	30	20	28.4
Pinus edulis (twoneedle pinyon)							
2011	222	25	45	15	15	-	7.3
2017	246	25	55	5	10	5	6.8

HELPER BENCHES - STUDY NO. 16R-52

**Location Information**

USGS 7.5 min Map Info
GPS (0' Stake)

Helper SW; Township 13S, Range 9E, Section 24
NAD 83 UTM ZONE 12, 511228 East 4391631 North

Transect Information

Browse Tag # (0' Stake)	670
Transect Bearing	173° magnetic
Length	500ft
Belt Placement	Line 1 (11ft), Line 2 (34ft), Line 3 (59ft), Line 4 (71ft), Line 5 (95ft)
Belt Marker Placement	Belt 3: 4ft

Directions to Site

Heading west out of Price on Highway 6, take exit 232 in Helper. Follow Main Street and turn left (south) on Roosevelt Street, then take Roosevelt Street to Gun Club Road. Follow Gun Club Road for approximately 1 mile. The site will be on the right (west) side of the road.

Site Information

Land Ownership	State
Land Administrator	SITLA
Allotment	No data
Elevation	6,132ft (1,869m)
Aspect	Northeast
Slope	3-5%
Sample Dates	08/28/2014, 08/17/2017

Table 16R-52.1 Disturbance History. Recorded history of major disturbances.

Treatment/Disturbance	Name	WRI DB#	Date	Size (acres)
Chaining - Two-Way Ely	Helper Benches Pinyon/Juniper Removal	3006	October 2014	241
Seeding - Aerial Before	Helper Benches Pinyon/Juniper Removal	3006	October 2014	241

Table 16R-52.2 Seed Mix. List of known seeded plant species and rates (if available).

Mix Name			Application Type	Application Date	Acres
Helper Benches			Aerial	Oct 2014	308
Type	Species	Common Name	Cultivar/Source ID	Bulk lbs/acre	PLS lbs/acre
G	<i>Achnatherum hymenoides</i>	Indian Ricegrass	Nezpar	1.14	1.02
G	<i>Agropyron fragile</i>	Siberian Wheatgrass	Vavilov	0.49	0.43
G	<i>Elymus lanceolatus</i>	Thickspike Wheatgrass	Critana	0.65	0.56
G	<i>Poa secunda</i>	Canby Bluegrass	Canbar	0.65	0.50
F	<i>Achillea millefolium</i>	Western Yarrow	Lincoln WA	0.10	0.09
F	<i>Cleome serrulata</i>	Rocky Mountain Beeplant	Utah UT	0.49	0.43
F	<i>Helianthus annuus</i>	Annual Sunflower	Montezuma CO	0.32	0.30
F	<i>Linum perenne</i>	Blue Flax	Appar	0.97	0.82
F	<i>Medicago sativa</i>	Alfalfa	Ranger NC	1.30	1.16
F	<i>Medicago sativa</i>	Yellow Sweetclover		0.49	0.46
F	<i>Penstemon palmeri</i>	Palmer Penstemon	Carbon/Emery UT	0.29	0.23
F	<i>Sanguisorba minor</i>	Small Burnet		1.46	1.21
S	<i>Atriplex canescens</i>	Fourwing Saltbush	Carbon/Emery UT	1.14	0.50
Mix Name			Application Type	Application Date	Acres
Helper Benches Sagebrush			Aerial	Dec 2014	308
Type	Species	Common Name	Cultivar/Source ID	Bulk lbs/acre	PLS lbs/acre
F	<i>Medicago sativa</i>	Alfalfa	Ladak +	0.32	0.30
S	<i>Artemisia tridentata</i> ssp. <i>wyomingensis</i>	Wyoming Big Sagebrush	Sanpete UT	0.59	0.10
S	<i>Bassia prostrata</i>	Forage Kochia	Beaver UT	0.57	0.42

Wildlife Habitat and Vegetation History**Table 16R-52.3 - Wildlife Seasonal Habitat.** UDWR wildlife habitat and seasonality.

Species	Habitat	Season
Deer	crucial	winter

Table 16R-52.4 - Vegetation History. The dominant vegetation type(s) and phase of woodland succession (Tausch, Miller, Roundy, & Chambers, 2009).

Year	Vegetation Type	Woodland Succession
2014	Pinyon-Juniper	Phase III
2017	Annual Forb/Perennial Grass	Phase I

Site Notes

No Notes

Site Potential

1981 - 2010 Average Annual Precipitation	11 inches
NRCS Ecological Site	Semidesert Stony Loam (Wyoming Big Sagebrush)
NRCS Ecological Site #	034BY241UT
States and Transitions	No state and transition model is available for the above ecological site.

This site was established in 2014 and was dominated by twoneedle pinyon (*Pinus edulis*) and Utah juniper (*Juniperus osteosperma*). Prior to treatment, there was little cover of grasses, forbs, or shrubs. In 2017 following treatment, the site was dominated primarily by annual forbs (Table 16R-52.7). Forb cover is high, but the diversity is low and the most abundant forb is the introduced species prickly Russian thistle (*Salsola tragus*) (Table 16R-52.11). There is some establishment of perennial grasses and forbs, with Siberian wheatgrass (*Agropyron fragile*) being the dominant species (Table 16R-52.10). The browse species include fourwing saltbush (*Atriplex canescens*) and forage kochia (*Bassia prostrata*), which established following the seeding (Table 16R-52.12). Tree cover did decrease significantly post- treatment (Table 16R-52.14). Trees that are still present on the site indicate the potential for infilling in the future.

Trend Summary Tables**Table 16R-52.6 - 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
2014	-	0.4	8.5	-	0.1	29.3
2017	0.8	-	1.8	0.5	-	2.3

Table 16R-52.7 - 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
2014	-	1	-	25	-	0.0	-	0.1
2017	13	149	382	132	0.3	6.6	16.4	4.9

Table 16R-52.8 - 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
2014	23.0	0.4	43.4	21.6	11.3	9.4
2017	12.3	-	43.7	18.0	8.1	30.7

Table 16R-52.9 - 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	Rocky Mountain Elk	Rabbit
	Quadrat Frequency			
2014	-	58	-	7
2017	-	26	1	20
Year	Days Use Per Acre (ha)			
2014	-	71.7 (177.1)	-	-
2017	0.7 (1.8)	66.4 (163.9)	14.7 (36.4)	-

Table 16R-52.10 - 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)	Elymus lanceolatus (thickspike wheatgrass)	Poa secunda (Sandberg bluegrass)
year	Nested Frequency					
2014	-	-	-	1	-	-
2017	25	91	13	6	59	10
year	Average Cover (%)					
2014	-	-	-	0.0	-	-
2017	1.5	3.1	0.3	0.1	1.9	0.1

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

Table 16R-52.11 - Forb Species. Nested frequency and modified Daubenmire average cover by year.

FORB SPECIES	Arabis (rockcress)	Chamaesyce fendleri (Fendler's sandmat)	Cryptantha (cryptantha)	Descurainia pinnata ^{ai} (western tansymustard)	Eriogonum (buckwheat)	Helianthus annuus ^{ai} (common sunflower)	Lactuca serriola ^{ai} (prickly lettuce)	Linum perenne ⁱ (blue flax)	Machaeranthera canescens (hoary tansyaster)	Medicago sativa ⁱ (alfalfa)	Penstemon palmeri (Palmer's penstemon)	Salsola tragus ^{ai} (prickly Russian thistle)	Sanguisorba minor ⁱ (small burnet)	Tetranneuris acaulis (stemless four-nerve daisy)
year	Nested Frequency													
2014	1	21	6	-	3	-	-	-	-	-	-	-	-	-
2017	-	25	17	17	10	3	8	44	2	43	17	380	22	4
year	Average Cover (%)													
2014	0.0	0.1	0.1	-	0.0	-	-	-	-	-	-	-	-	-
2017	-	0.4	1.1	0.2	0.1	0.0	0.0	0.8	0.0	1.2	0.6	16.1	0.4	0.2

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

Table 16R-52.12 - Shrub and Tree Species. Average modified Daubenmire quadrat and line intercept cover by year.

SHRUB SPECIES	Line Intercept Cover (%)					
	year	Line Intercept Cover (%)				
Atriplex canescens ^p (fourwing saltbush)	2014	-	-	15.3	0.1	14
Bassia prostrata ^{pi} (forage kochia)	2017	0.4	0.1	2.2	-	0.1
Juniperus osteosperma ^t (Utah juniper)	year	Quadrat Cover (%)				
Opuntia polyacantha (plains pricklypear)	2014	-	-	3.3	0.4	5.2
Pinus edulis ^t (twoneedle pinyon)	2017	0.4	0.4	1.8	-	0.0

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

Table 16R-52.13 - 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.

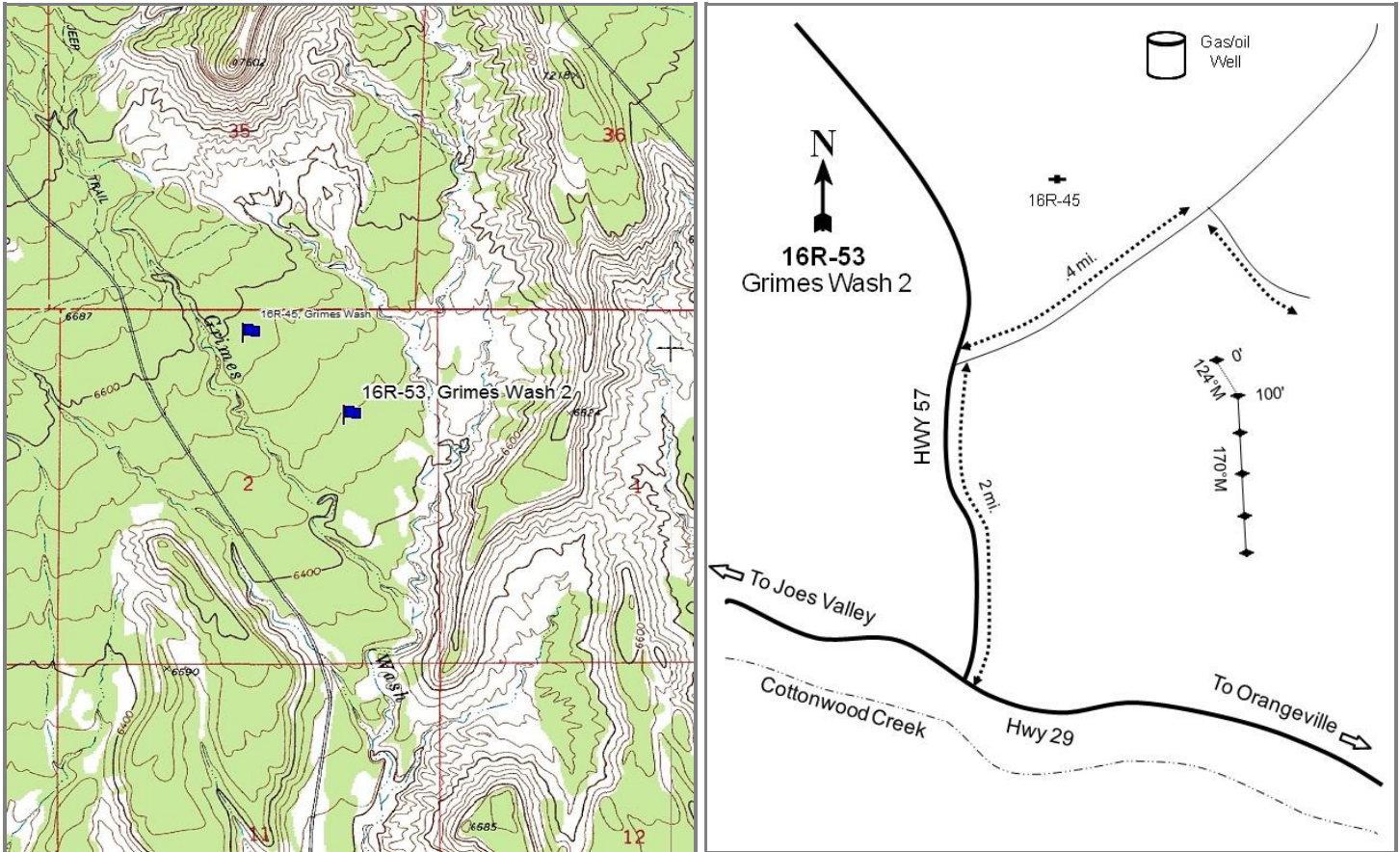
Year	Density		Age Class Distribution			Utilization		Poor Vigor (%)	Average Height Crown (cm)
	Plants Per Acre		Excluding Seedlings			Moderate (%)	Heavy (%)		
	Excluding Seedlings	Seedling	Young (%)	Mature (%)	Decadent (%)				
Atriplex canescens ^p -- (fourwing saltbush)									
2014	-	-	-	-	-	-	-	-	-/-
2017	60	-	33	67	0	0	0	0	54/49
Bassia prostrata ^{pi} -- (forage kochia)									
2014	-	-	-	-	-	-	-	-	-/-
2017	360	-	22	78	0	22	0	0	21/35
Ephedra viridis ^p -- (mormon tea)									
2014	-	-	-	-	-	-	-	-	28/22
2017	-	-	-	-	-	-	-	-	-/-
Gutierrezia sarothrae -- (broom snakeweed)									
2014	-	-	-	-	-	-	-	-	-/-
2017	20	-	0	100	0	0	0	0	24/35
Juniperus osteosperma ^t -- (Utah juniper)									
2014	260	-	15	77	8	0	0	15	-/-
2017	40	-	100	0	0	0	0	0	-/-
Opuntia polyacantha -- (plains pricklypear)									
2014	40	-	0	100	0	100	0	0	10/43
2017	20	-	0	100	0	0	0	0	8/22
Pinus edulis ^t -- (twoneedle pinyon)									
2014	380	-	63	32	5	0	0	5	-/-
2017	40	-	50	50	0	0	0	0	-/-

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

Table 16R-52.14 - 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)							
2014	366	-	-	10	75	15	20.0
2017	51	17	50	25	8	-	14.9
Pinus edulis (twoneedle pinyon)							
2014	163	20	30	20	15	15	9.8
2017	23	18	82	-	-	-	5.4

GRIMES WASH 2 - STUDY NO. 16R-53

**Location Information**

USGS 7.5 min Map Info
GPS (0' Stake)

Red Point SW; Township 18S, Range 7E, Section 02
NAD 83 UTM ZONE 12, 491361 East 4348787 North

Transect Information

Browse Tag # (0' Stake)	140
Transect Bearing	124° magnetic (Lines 2-5: 170° magnetic)
Length	500ft
Belt Placement	Line 1 (11ft), Line 2 (34ft), Line 3 (59ft), Line 4 (71ft), Line 5 (95ft)
Belt Marker Placement	Standard

Directions to Site

From the intersection of SR-29 and SR-57, drive 2 miles north on SR-57. Turn right, heading northeast, and continue for 0.4 miles. Turn right, heading southeast, and proceed for 0.1 miles. The site will be to the south.

Site Information

Land Ownership	State
Land Administrator	SITLA
Allotment	No data
Elevation	6,506ft (1,983m)
Aspect	Southeast
Slope	5%
Sample Dates	07/31/2014, 08/15/2017

Table 16R-53.1 Disturbance History. Recorded history of major disturbances.

Treatment/Disturbance	Name	WRI DB#	Date	Size (acres)
Seeding - Aerial	Grimes Wash Phase 2	4041	Fall 2017	169
Chaining - Two-Way Ely	Grimes Wash PJ Removal	1946	October 2011	148
Seeding - Aerial Before	Grimes Wash PJ Removal	1946	October 2011	272

Wildlife Habitat and Vegetation History**Table 16R-53.3 - Wildlife Seasonal Habitat.** UDWR wildlife habitat and seasonality.

Species	Habitat	Season
Deer	crucial	winter
Elk	substantial	winter

Table 16R-53.4 - Vegetation History. The dominant vegetation type(s) and phase of woodland succession (Tausch, Miller, Roundy, & Chambers, 2009).

Year	Vegetation Type	Woodland Succession
2014	Annual Forb	Phase I
2017	Annual Forb	Phase I

Site Notes

The original Grimes Wash study (16R-45) was not included in the treatment, so it became a reference site for the Grimes Wash 2 study that was established in 2014 after the treatment.

Site Potential

1981 - 2010 Average Annual Precipitation	11 inches
NRCS Ecological Site	Semidesert Stony Loam (Wyoming Big Sagebrush)
NRCS Ecological Site #	034BY241UT
States and Transitions	No state and transition model is available for this ecological site.

Upon establishment in 2014 and the subsequent reading in 2017, this site was dominated by annual forbs, particularly introduced prickly Russian thistle (*Salsola tragus*). Perennial grasses are sparse, with Indian ricegrass (*Achnatherum hymenoides*) contributing the most cover (Table 16R-53.10). Shrub cover is low, and broom snakeweed (*Gutierrezia sarothrae*) is the dominant species. Lesser amounts of Wyoming big sagebrush (*Artemisia tridentata* ssp. *wyomingensis*), black sagebrush (*A. nova*) and fourwing saltbush (*Atriplex canescens*) are also present. Tree cover is low on the site, with it being placed in Phase I of woodland succession. Continued monitoring is recommended as the annual forb cover as well as low cover for perennial grasses and forbs could be detrimental to the resilience of the site.

Trend Summary Tables**Table 16R-53.6 - 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
2014	0.1	0.1	0.0	0.3	-	0.2
2017	1.5	2.1	0.2	1.5	3.0	0.4

Table 16R-53.7 - 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
2014	-	11	342	41	-	0.1	22.2	0.8
2017	-	25	345	56	-	0.6	30.6	1.8

Table 16R-53.8 - 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
2014	32.6	0.0	33.9	10.0	6.1	24.3
2017	24.2	0.2	46.4	7.2	5.5	36.4

Table 16R-53.9 - 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	
2014	5	12
2017	7	38
Year	Days Use Per Acre (ha)	
2014	0.7 (1.7)	-
2017	4.0 (9.9)	-

Table 16R-53.10 - Grass Species. Nested frequency and modified Daubenmire average cover by year.

GRASS SPECIES	Achnatherum hymenoides (Indian ricegrass)	Agropyron fragile ⁱ (Siberian wheatgrass)	Elymus elymoides (squirreltail)	Poa secunda (Sandberg bluegrass)
year	Nested Frequency			
2014	3	6	0	2
2017	2	10	9	4
year	Average Cover (%)			
2014	0.0	0.0	0.0	0.0
2017	0.4	0.2	0.1	0.0

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

Table 16R-53.11 - Forb Species. Nested frequency and modified Daubenmire average cover by year.

FORB SPECIES	Achillea millefolium (Common yarrow)	Arabis holboellii ^a (Holboell's rockcress)	Chamaesyce (sandmat)	Chenopodium fremontii ^a (Fremont's goosefoot)	Collinsia parviflora ^a (maiden blue eyed Mary)	Descurainia pinnata ^a (western tansymustard)	Eriogonum (buckwheat)	Eriogonum alatum (winged buckwheat)	Halogeton glomeratus ^{ai} (saltlover)	Lactuca serriola ^{ai} (prickly lettuce)	Lappula occidentalis ^a (flatspine stickseed)	Lepidium ^a (pepperweed)	Lithospermum ruderales (western stone seed)	Lomatium (desertparsley)	Melilotus officinalis ⁱ (sweetclover)	Penstemon (beardtongue)	Salsola tragus ^{ai} (prickly Russian thistle)
year	Nested Frequency																
2014	-	4	11	-	-	8	4	0	50	-	-	24	2	15	6	2	328
2017	12	9	18	7	2	111	4	23	7	6	2	11	1	-	5	2	318
year	Average Cover (%)																
2014	-	0.2	0.3	-	-	0.2	0.0	0.0	0.5	-	-	0.5	0.0	0.4	0.0	0.0	20.9
2017	0.2	0.2	1.2	0.4	0.0	4.6	0.0	0.2	0.0	0.0	0.0	0.5	0.1	-	0.0	0.0	19.6

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

FORB SPECIES	Sisymbrium altissimum ^{ai} (tall tumblemustard)	Stanleya viridiflora (green princesplume)	Tetranneuris acaulis (stemless four-nerve daisy)
year	Nested Frequency		
2014	6	0	1
2017	65	-	5
year	Average Cover (%)		
2014	0.0	0.0	0.0
2017	5.3	-	0.1

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

Table 16R-53.12 - Shrub and Tree Species. Average modified Daubenmire quadrat and line intercept cover by year.

SHRUB SPECIES	Line Intercept Cover (%)						
	Artemisia nova ^p (black sagebrush)	Artemisia tridentata ssp. wyomingensis ^p (Wyoming big sagebrush)	Atriplex canescens ^p (fourwing saltbush)	Eriogonum microthecum ^p (slender buckwheat)	Gutierrezia sarothrae (broom snakeweed)	Juniperus osteosperma ^t (Utah juniper)	Opuntia polyacantha (plains pricklypear)
year	Line Intercept Cover (%)						
2014	-	0.2	-	0.1	0	0.2	-
2017	0.4	1	-	0.1	3	0.4	-
year	Quadrat Cover (%)						
2014	0.1	0.0	0.0	0.0	0.0	0.0	0.1
2017	0.4	1.1	0.0	0.1	2.1	0.2	0.0

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

Table 16R-53.13 - 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.

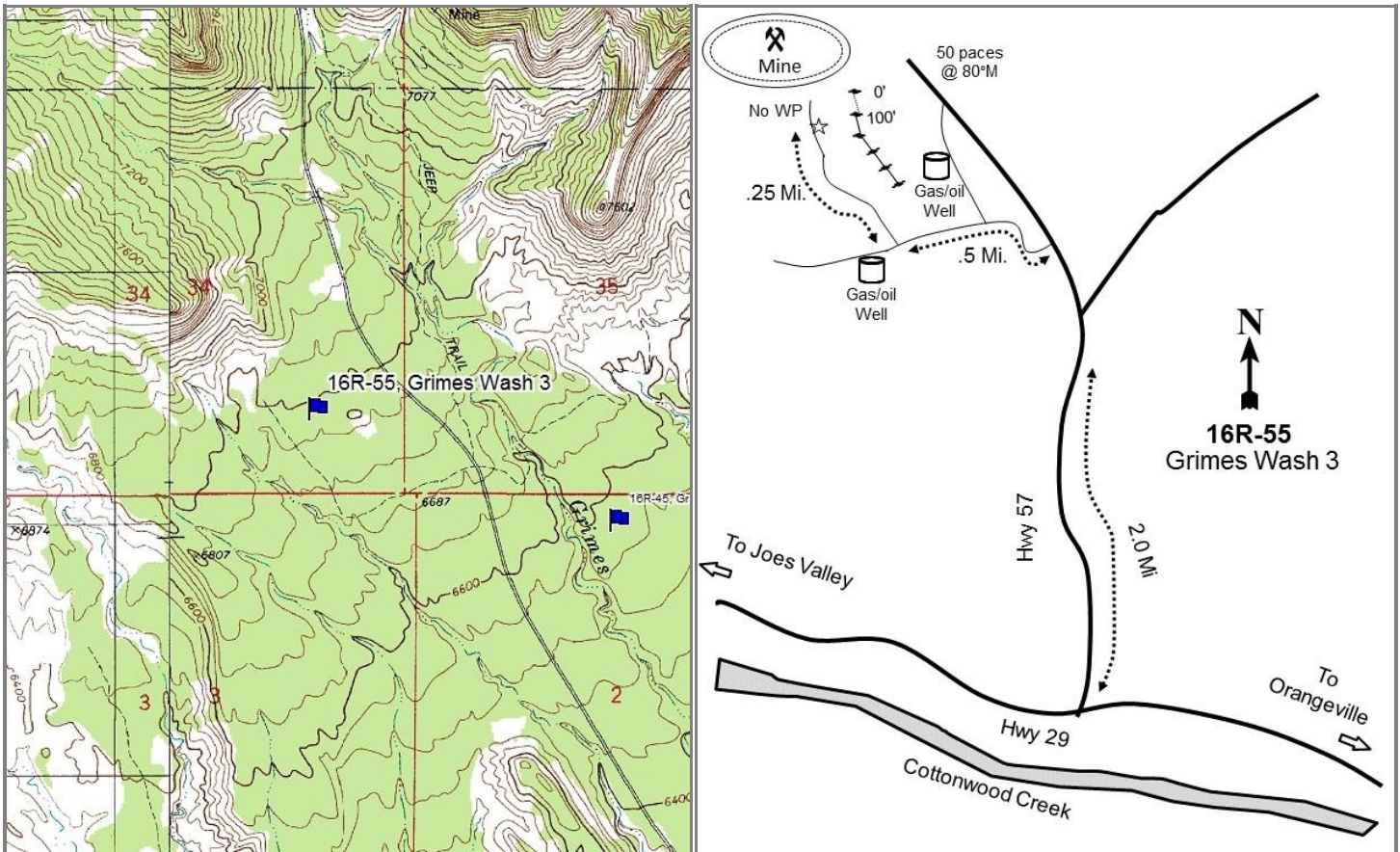
Year	Density		Age Class Distribution			Utilization		Poor Vigor (%)	Average Height Crown (cm)
	Plants Per Acre		Excluding Seedlings			Moderate (%)	Heavy (%)		
	Excluding Seedlings	Seedling	Young (%)	Mature (%)	Decadent (%)				
Artemisia nova ^p -- (black sagebrush)									
2014	120	140	33	67	0	0	0	0	16/35
2017	200	-	0	100	0	0	40	0	27/57
Artemisia tridentata ssp. wyomingensis ^p -- (Wyoming big sagebrush)									
2014	220	-	18	82	0	18	0	0	21/34
2017	400	-	15	85	0	0	0	0	42/50
Atriplex canescens ^p -- (fourwing saltbush)									
2014	20	-	100	0	0	0	0	0	- / -
2017	20	-	100	0	0	0	0	0	51/46
Cercocarpus montanus ^p -- (alderleaf mountain mahogany)									
2014	20	-	0	100	0	0	0	0	56/90
2017	-	-	-	-	-	-	-	-	- / -
Echinocereus -- (hedgehog cactus)									
2014	-	-	-	-	-	-	-	-	- / -
2017	-	-	-	-	-	-	-	-	7/8
Ephedra viridis ^p -- (mormon tea)									
2014	-	-	-	-	-	-	-	-	31/60
2017	-	-	-	-	-	-	-	-	26/35
Eriogonum microthecum ^p -- (slender buckwheat)									
2014	80	-	0	100	0	0	0	0	8/14
2017	240	-	0	100	0	0	0	0	9/17
Ericameria nauseosa -- (rubber rabbitbrush)									
2014	-	-	-	-	-	-	-	-	- / -
2017	-	-	-	-	-	-	-	-	59/59
Gutierrezia sarothrae -- (broom snakeweed)									
2014	260	-	77	23	0	0	0	0	26/40
2017	4260	-	29	70	1	0	0	1	24/38
Juniperus osteosperma ^t -- (Utah juniper)									
2014	-	-	-	-	-	-	-	-	- / -
2017	40	-	50	50	0	0	0	0	- / -
Opuntia polyacantha -- (plains pricklypear)									
2014	20	-	0	100	0	0	0	0	6/18
2017	20	-	0	100	0	0	0	0	7/24

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

Table 16R-53.14 - 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)							
2014	27	44	33	22	-	-	5.0
2017	32	21	71	7	-	-	13.4
Pinus edulis (twoneedle pinyon)							
2014	28	-	100	-	-	-	2.4
2017	26	25	75	-	-	-	3.9

GRIMES WASH 3 - STUDY NO. 16R-55

**Location Information**

USGS 7.5 min Map Info
GPS (0' Stake)

Red Point SW; Township 17S, Range 7E, Section 34
NAD 83 UTM ZONE 12, 489712 East 4349604 North

Transect Information

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

Not Available
175° magnetic (Lines 3-5: 130° magnetic)
500ft
Line 1 (11ft), Line 2 (34ft), Line 3 (59ft), Line 4 (71ft), Line 5 (95ft)
No Rebar or Stakes

Directions to Site

From Orangeville, take Highway 29 3.25 miles west to North Coal Haul Road. Turn right and proceed for 2.8 miles. There is a road on the left that runs past an oil pad: take this road for 0.34 miles, bearing left at a "Y". There is a small road heading north. Take this road and proceed for 0.2 miles to the site, which will be on the right-hand side of the road.

Site Information

Land Ownership	Federal
Land Administrator	BLM
Allotment	WEST GRIMES
Elevation	6,776ft (2,065m)
Aspect	S
Slope	8%
Sample Dates	08/15/2017

Table 16R-55.1 Disturbance History. Recorded history of major disturbances.

Treatment/Disturbance	Name	WRI DB#	Date	Size (acres)
Mechanical - Bullhog	Grimes Wash Phase 2	4041	Fall 2017	181
Seeding - Aerial Before	Grimes Wash Phase 2	4041	Fall 2017	181

Wildlife Habitat and Vegetation History**Table 16R-55.3 - Wildlife Seasonal Habitat.** UDWR wildlife habitat and seasonality.

Species	Habitat	Season
Deer	crucial	winter
Elk	substantial	winter

Table 16R-55.4 - Vegetation History. The dominant vegetation type(s) and phase of woodland succession (Tausch, Miller, Roundy, & Chambers, 2009).

Year	Vegetation Type	Woodland Succession
2017	Pinyon-Juniper	Phase I

Site Notes

Oil and gas development in the area.

Site Potential

1981 - 2010 Average Annual Precipitation	13 inches
NRCS Ecological Site	Semidesert Stony Loam (Wyoming Big Sagebrush)
NRCS Ecological Site #	034BY241UT
States and Transitions	No state and transition model is available for the above ecological site.

This site was established in 2017 to monitor the Grimes Wash Phase 2 treatment which will remove twoneedle pinyon (*Pinus edulis*) and Utah juniper (*Juniperus osteosperma*). The site had very little herbaceous cover, but no introduced species were sampled (Table 16R-55.10, 16R-55.11). Browse species were depleted and had low amounts of cover, with Mormon tea (*Ephedra viridis*) as the dominant species and black sagebrush (*Artemisia nova*) as a lesser component (Table 16R-55.12). Tree cover was high, placing the site in Phase III of woodland succession (Table 16R-55.4, Table 16R-55.14). Once complete, the bullhog treatment will likely help reduce fuel loads. In addition, it will open up the herbaceous understory, which the seeding should help bolster; increasing the browse and forb components will increase the value of the site for wildlife.

Trend Summary Tables**Table 16R-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
2017	3.9	-	10.5	5.1	-	32.4

Table 16R-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
2017	-	1	33	27	-	0.0	0.1	0.1

Table 16R-55.8 - 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
2017	20.2	0.5	46.6	18.5	12.9	17.0

Table 16R-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	Rabbit
	Quadrat Frequency	
2017	13	34
Year	Days Use Per Acre (ha)	
2017	16.8 (41.4)	
		-

Table 16R-55.10 - Grass Species. Nested frequency and modified Daubenmire average cover by year.

GRASS SPECIES	
<i>Pascopyrum smithii</i> (western wheatgrass)	
year	Nested
2017	1
year	Average Cover (%)
2017	0.0

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

Table 16R-55.11 - Forb Species. Nested frequency and modified Daubenmire average cover by year.

FORB SPECIES	Arabis holboellii ^a (Holboell's rockcress)	Caulanthus crassicaulis ^a (thickstem wild cabbage)	Chenopodium fremontii ^a (Fremont's goosefoot)	Cryptantha (cryptantha)	Descurainia pinnata ^a (western tansymustard)	Eriogonum alatum (winged buckwheat)	Lepidium ^a (pepperweed)	Penstemon (beardtongue)	Stanleya viridiflora (green princesplume)
year	Nested Frequency								
2017	1	1	1	4	23	1	8	18	4
year	Average Cover (%)								
2017	0.0	0.0	0.0	0.0	0.1	0.0	0.0	0.1	0.0

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

Table 16R-55.12 - Shrub and Tree Species. Average modified Daubenmire quadrat and line intercept cover by year.

SHRUB SPECIES	Artemisia nova ^p (black sagebrush)	Ephedra viridis ^p (mormon tea)	Eriogonum microthecum ^p (slender buckwheat)	Juniperus osteosperma ^t (Utah juniper)	Pinus edulis ^t (twoneedle pinyon)
year	Line Intercept Cover (%)				
2017	1.4	3.6	0.1	10.5	21.9
year	Quadrat Cover (%)				
2017	0.5	3.2	0.1	1.0	9.5

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

Table 16R-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.

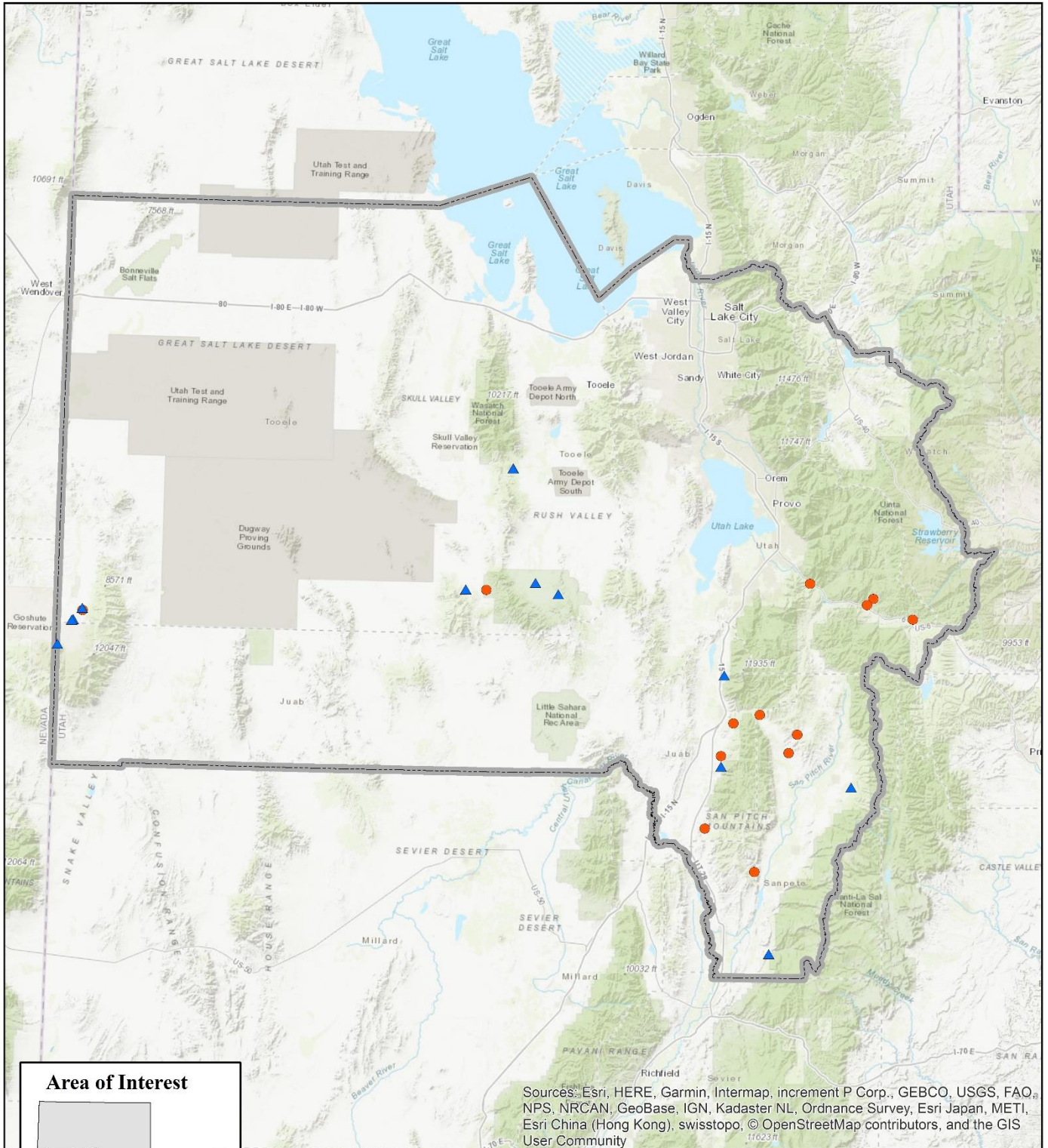
Year	Density		Age Class Distribution			Utilization		Poor Vigor (%)	Average Height Crown (cm)
	Plants Per Acre	Seedling	Young (%)	Mature (%)	Decadent (%)	Moderate (%)	Heavy (%)		
Artemisia nova ^p -- (black sagebrush)									
2017	900	-	0	51	49	27	7	33	12/37
Cercocarpus montanus ^p -- (alderleaf mountain mahogany)									
2017	-	-	-	-	-	-	-	-	84/92
Ephedra viridis ^p -- (mormon tea)									
2017	600	-	17	63	20	20	0	7	78/98
Eriogonum microthecum ^p -- (slender buckwheat)									
2017	1920	-	13	88	0	3	1	0	5/7
Juniperus osteosperma ^t -- (Utah juniper)									
2017	140	20	29	57	14	0	0	0	- / -
Opuntia -- (pricklypear)									
2017	-	-	-	-	-	-	-	-	6/11
Pinus edulis ^t -- (twoneedle pinyon)									
2017	300	20	53	40	7	0	0	0	- / -

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

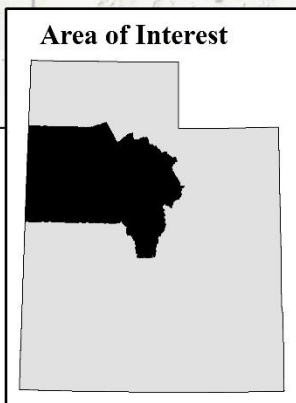
Table 16R-55.14 - Tree Characteristics. Point-quarter tree density, size class distribution, and average diameter.

Year	Density	Size Class Distribution				Average Diameter (cm)	
	Trees per Acre	Seedling (%)	1-4'	4-8'	8-12'		>12' (%)
Juniperus osteosperma (Utah juniper)							
2017	177	10	10	30	35	15	44.9
Pinus edulis (twoneedle pinyon)							
2017	221	15	40	30	15	-	12.3

CENTRAL REGION

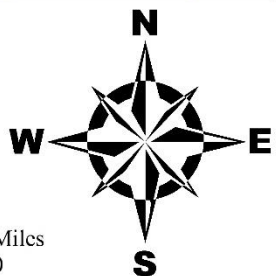


Sources: Esri, HERE, Garmin, Intermap, increment P Corp., GEBCO, USGS, FAO, NPS, NRCAN, GeoBase, IGN, Kadaster NL, Ordnance Survey, Esri Japan, METI, Esri China (Hong Kong), swisstopo, © OpenStreetMap contributors, and the GIS User Community

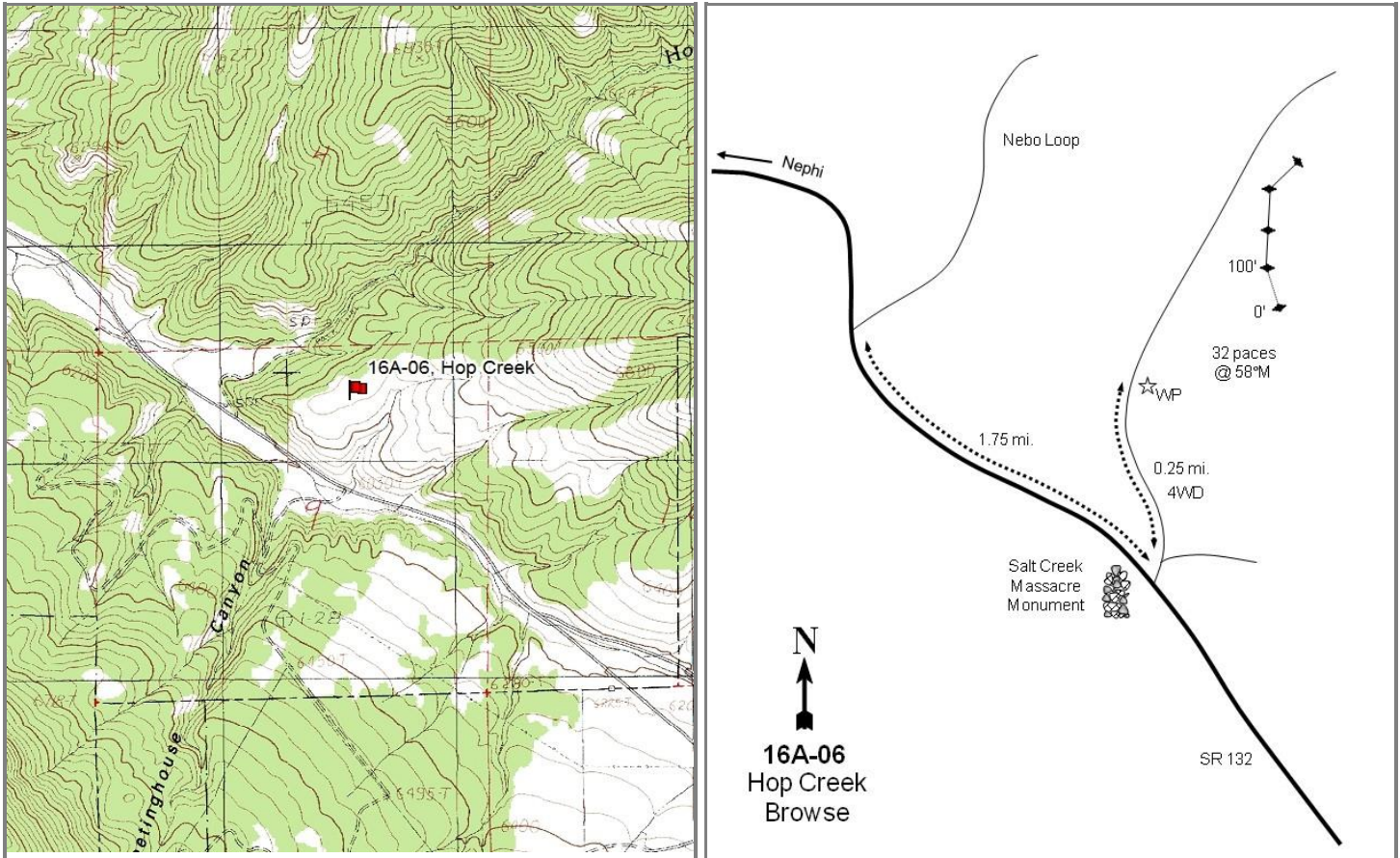


Project

- ▲ WRI
- RT
- Central Region Boundaries



HOP CREEK BROWSE - STUDY NO. 16A-6

**Location Information**

USGS 7.5 min Map Info
GPS (0' Stake)

Fountain Green North; Township 13S, Range 2E, Section 09
NAD 83 UTM ZONE 12, 439487 East 4395491 North

Transect Information

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

3959
163° magnetic
400ft
Line 1 (11ft & 95ft), Line 2 (34ft), Line 3 (59ft), Line 4 (71ft)
Standard

Directions to Site

From the intersection of Highway 132 and Nebo Loop Road, proceed south on Highway 132 for 1.75 miles. Just past the Salt Creek Massacre Monument, stop at a turnoff on the north side of the road. Drive up the left fork of a four-wheel drive road for 0.25 miles to a witness post on the right (east) side of the road. From the witness post, walk 32 paces at 58 degrees magnetic to the 0-foot stake.

Site Information

Land Ownership	State
Land Administrator	UDWR
Allotment	No data
Elevation	6,300ft (1,920m)
Aspect	South
Slope	5%
Sample Dates	05/28/1997, 10/25/2002, 05/24/2007, 05/16/2012, 05/18/2017

Table 16A-06.1 Disturbance History. Recorded history of major disturbances.

Treatment/Disturbance	Name	WRI DB#	Date	Size (acres)
Seeding - Dribbler	Salt Creek Wildfire Rehabilitation	970	December 2007	1197
Fire - Wildfire	Salt Creek	-	July-August 2007	25913
Chaining - One-Way Ely	Salt Creek Wildfire Rehabilitation	970	December 2007	1197
Seeding - Aerial Before	Salt Creek Wildfire Rehabilitation	970	November 2007	1197

Table 16A-06.2 Seed Mix. List of known seeded plant species and rates (if available).

Mix Name			Application Type	Application Date	Acres
Salt Creek Fire DWR Aerial			Aerial	Nov 2007	1150
Type	Species	Common Name	Cultivar/Source ID	Bulk lbs/acre	PLS lbs/acre
G	<i>Achnatherum hymenoides</i>	Indian Ricegrass	Rimrock	1.00	0.91
G	<i>Agropyron cristatum</i>	Crested Wheatgrass	Hycrest	1.00	0.76
G	<i>Agropyron cristatum</i>	Crested Wheatgrass	Nordan	1.00	0.86
G	<i>Agropyron fragile</i>	Siberian Wheatgrass	Vavilov	1.00	0.84
G	<i>Dactylis glomerata</i>	Orchardgrass	Paiute	0.50	0.47
G	<i>Pseudoroegneria spicata</i>	Bluebunch Wheatgrass	Anatone	0.61	0.54
G	<i>Pseudoroegneria spicata</i>	Bluebunch Wheatgrass	Anatone	0.39	0.34
G	<i>Thinopyrum intermedium</i>	Intermediate Wheatgrass	Oahe	1.00	0.92
G	<i>Thinopyrum intermedium</i>	Pubescent Wheatgrass		2.00	1.82
F	<i>Achillea millefolium</i>	Western Yarrow		0.10	0.10
F	<i>Medicago sativa</i>	Alfalfa	Ladak	1.00	0.99
F	<i>Medicago sativa</i>	Alfalfa	Ranger	1.00	0.93
F	<i>Melilotus officinalis</i>	Yellow Sweetclover		0.25	0.20
F	<i>Onobrychis viciifolia</i>	Sainfoin	Eski	2.00	1.84
F	<i>Sanguisorba minor</i>	Small Burnet	Delar	1.00	0.94
S	<i>Artemisia tridentata</i> ssp. <i>vaseyana</i>	Mountain Big Sagebrush	Sanpete UT	0.25	0.09
S	<i>Artemisia tridentata</i> ssp. <i>wyomingensis</i>	Wyoming Big Sagebrush	Sanpete UT	0.25	0.08
Mix Name			Application Type	Application Date	Acres
Salt Creek Fire DWR Dribbler			Dribbler	Dec 2007	335
Type	Species	Common Name	Cultivar/Source ID	Bulk lbs/acre	PLS lbs/acre
F	<i>Sanguisorba minor</i>	Small Burnet	Delar	0.45	0.42
S	<i>Purshia tridentata</i>	Bitterbrush	Millard UT	0.45	0.39

Wildlife Habitat and Vegetation History**Table 16A-06.3 - Wildlife Seasonal Habitat.** UDWR wildlife habitat and seasonality.

Species	Habitat	Season
Deer	crucial	winter
Elk	crucial	winter
Moose	substantial	year-long

Table 16A-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	Phase I
1989	Mountain Big Sagebrush	Phase I
1997	Mountain Big Sagebrush	Phase I
2002	Mountain Big Sagebrush	Phase I
2007	Mountain Big Sagebrush	Phase I
2012	Perennial Grass	No Encroachment
2017	Perennial-Annual Grass	No Encroachment

Site Notes

No Notes

Soils**Table 16A-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	6.9	42.4	27.1	30.6	3.2	9.6	67.2	0.6	05/29/1997

Site Potential

1981 - 2010 Average Annual Precipitation 18 inches
 NRCS Ecological Site Mountain Loam (Mountain Big Sagebrush)
 NRCS Ecological Site # R047XA430UT
 States and Transitions No state and transition model is available for this ecological site.

From study establishment in 1983 through the 2007 sample year, this study site existed as a mountain big sagebrush (*Artemisia tridentata* ssp. *vaseyana*) dominated plant community with other preferred browse such as Utah serviceberry (*Amelanchier utahensis*) and antelope bitterbrush (*Purshia tridentata*) present to a lesser extent (photos, Table 16A- 06.12, Table 16A-06.13). A fire soon after the 2007 sampling removed most of the shrubs, and the site transitioned into one dominated by perennial grasses including bluebunch wheatgrass (*Pseudoroegneria spicata*) and western wheatgrass (*Pascopyrum smithii*). The introduced perennial species bulbous bluegrass (*Poa bulbosa*) has been observed each sample year since 2007, but in low amounts. In addition, the introduced annual grass species cheatgrass (*Bromus tectorum*) has been sampled since 1997, and was a co-dominant site component in 2017 (Table 16A-06.10). Forbs have remained diverse and were abundant in 2017, with most of the cover being contributed by the annual species desert madwort (*Alyssum desertorum*) (Table 16A-06.7, Table 16A-06.11).

Trend Summary Tables**Table 16A-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	12.2	0.3	0.8	-	-	-
2002	12.7	2.1	0.8	-	-	-
2007	11.6	0.3	0.8	16.1	1.0	3.9
2012	0.0	0.5	-	0.3	1.5	-
2017	0.2	1.0	-	0.9	1.6	-

Table 16A-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	71	441	310	252	0.7	19.6	2.9	5.2
2002	93	379	313	207	0.8	16.7	4.4	4.1
2007	256	394	397	258	6.5	25.7	8.0	6.6
2012	98	404	274	258	1.0	23.5	1.8	6.7
2017	296	420	458	236	12.6	23.5	22.1	6.5

Table 16A-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	
1997	17.6	4.6	51.0	1.9	0.2	43.6	
2002	17.7	2.6	51.5	1.2	0.1	43.2	
2007	14.5	3.0	41.3	1.3	0.1	57.4	
2012	18.0	0.0	56.5	1.4	0.2	39.0	
2017	11.4	0.5	51.4	3.6	0.2	61.1	

Table 16A-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	Rocky Mountain Elk	Horse	Rabbit
	Quadrat Frequency				
1997	-	34	24	-	4
2002	1	43	17	-	18
2007	-	64	19	-	44
2012	1	2	4	-	1
2017	1	11	12	-	8
Year	Days Use Per Acre (ha)				
1997	-	-	-	-	-
2002	2.2 (5.4)	146.1 (360.9)	22.8 (56.3)	-	-
2007	8.7 (21.5)	147.4 (364.2)	23.4 (57.9)	-	-
2012	-	2.0 (5.0)	4.7 (11.6)	0.6 (1.4)	-
2017	-	5.3 (13.2)	14.7 (36.4)	-	-

Table 16A-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)	Dactylis glomerata ⁱ (orchardgrass)	Festuca idahoensis (Idaho fescue)	Hesperostipa comata (needle and thread)	Melica bulbosa (oniongrass)	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													
1997	-	-	71	-	1	41	10	138	-	78	207	95	195	-
2002	3	-	93	-	3	44	37	140	-	30	91	130	191	-
2007	2	-	256	-	-	20	3	157	3	38	68	205	184	-
2012	2	28	98	1	-	22	-	237	1	29	52	133	168	33
2017	6	53	296	-	-	37	3	304	33	34	15	142	50	73
year	Average Cover (%)													
1997	-	-	0.7	-	0.0	1.0	0.2	1.6	-	1.6	7.6	2.5	5.0	-
2002	0.1	-	0.8	-	0.0	1.2	1.2	3.1	-	0.9	2.2	2.8	5.0	-
2007	0.1	-	6.5	-	-	0.3	0.1	2.4	0.0	0.6	2.2	7.7	12.2	-
2012	0.0	0.7	1.0	0.0	-	0.4	-	3.8	0.0	0.7	0.9	2.8	13.1	1.0
2017	0.4	1.9	12.6	-	-	1.6	0.0	10.5	0.9	0.4	0.2	2.8	2.9	1.9

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

Table 16A-06.11 - 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 parvifolia (small-leaf pussytoes)	Arabis (rockcress)	Astragalus cibirius (browse milkvetch)	Astragalus convallarius (lesser rushy milkvetch)	Calochortus nuttallii (sego lily)	Camelina microcarpa ^{ai} (littledod false flax)	Castilleja linariifolia (Wyoming Indian paintbrush)	Ceratocephala testiculata ^{ai} (curveseed butterwort)	Chaenactis douglasii (Douglas' dustymaiden)	Chenopodium album ^a (lambsquarters)	Chorispora tenella ^{ai} (crossflower)	Cirsium undulatum ^a (wavyleaf thistle)	Collinsia parviflora ^a (maiden blue eyed Mary)	Collomia linearis ^a (tiny trumpet)
year	Nested Frequency																
1997	23	0	138	5	1	1	9	10	8	33	84	2	-	-	19	195	47
2002	36	1	187	7	-	2	8	38	-	8	54	-	3	2	16	216	27
2007	36	-	359	7	-	-	36	16	7	9	103	-	-	-	14	131	7
2012	54	-	194	-	3	1	6	3	-	-	21	-	-	8	32	19	5
2017	120	-	455	-	-	1	18	17	4	-	-	-	-	-	8	5	-
year	Average Cover (%)																
1997	0.1	0.0	0.5	0.0	0.0	0.0	0.1	0.0	0.0	0.6	0.5	0.0	-	-	0.2	1.3	0.1
2002	0.4	0.0	0.8	0.0	-	0.0	0.0	0.1	-	0.1	0.5	-	0.0	0.1	0.3	2.2	0.1
2007	0.2	-	4.5	0.2	-	-	0.5	0.0	0.0	0.1	0.9	-	-	-	0.3	0.4	0.0
2012	0.5	-	1.1	-	0.0	0.0	0.0	0.0	-	-	0.1	-	-	0.2	0.2	0.0	0.0
2017	1.6	-	18.9	-	-	0.0	0.3	0.1	0.6	-	-	-	-	-	0.3	0.0	-

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

FORB SPECIES	Comandra umbellata (bastard toadflax)	Crepis acuminata (tapertip hawksbeard)	Cryptantha (cryptantha)	Cymopterus longipes (longstalk springparsley)	Descurainia pinnata ^a (western tansymustard)	Draba ^a (draba)	Epilobium brachycarpum ^a (tall annual willowherb)	Eriogonum racemosum (redroot buckwheat)	Eriogonum umbellatum (sulphur-flower buckwheat)	Erodium cicutarium ^{ai} (redstem stork's bill)	Erysimum (wallflower)	Galium ^a (bedstraw)	Lactuca serriola ^{ai} (prickly lettuce)	Lappula occidentalis ^a (flatspine stickseed)	Linum lewisii (Lewis flax)	Lupinus argenteus (silvery lupine)	Machaeranthera canescens (hoary tansyaster)
year	Nested Frequency																
1997	94	45	-	53	3	3	40	1	3	-	1	-	3	-	98	2	-
2002	32	69	-	44	6	-	25	5	3	-	-	1	-	2	23	1	1
2007	89	111	-	48	6	82	28	1	3	-	-	-	5	-	65	2	-
2012	29	197	1	46	11	1	12	2	-	-	-	-	5	9	1	8	-
2017	14	117	-	31	-	-	-	3	-	13	-	-	31	-	14	3	-
year	Average Cover (%)																
1997	0.9	0.5	-	0.4	0.0	0.0	0.1	0.0	0.1	-	0.0	-	0.0	-	0.6	0.4	-
2002	0.2	1.3	-	0.5	0.0	-	0.1	0.1	0.0	-	-	0.0	-	0.0	0.1	0.0	0.0
2007	0.7	1.6	-	0.5	0.0	1.4	0.1	0.0	0.1	-	-	-	0.0	-	0.7	0.1	-
2012	0.2	4.3	0.0	0.5	0.0	0.0	0.0	0.0	-	-	-	-	0.0	0.0	0.0	0.0	-
2017	0.1	1.9	-	0.2	-	-	-	0.0	-	0.3	-	-	0.2	-	0.1	0.0	-

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

FORB SPECIES	Microsteris gracilis ^a (slender phlox)	Phlox longifolia (longleaf phlox)	Polygonum douglasii ^a (Douglas' knotweed)	Sisymbrium altissimum ^{ai} (tall tumblemustard)	Sphaeralcea coccinea (scarlet globemallow)	Symphyotrichum ascendens (western aster)	Tragopogon dubius ^{ai} (yellow salsify)	Zigadenus paniculatus (foothill deathcamas)
year	Nested Frequency							
1997	9	41	3	-	3	29	17	24
2002	42	28	4	-	1	31	15	35
2007	45	51	4	-	-	39	13	35
2012	1	27	27	1	10	26	16	34
2017	-	-	-	21	4	27	53	32
year	Average Cover (%)							
1997	0.0	0.1	0.0	-	0.0	1.2	0.1	0.2
2002	0.1	0.2	0.0	-	0.0	0.9	0.1	0.3
2007	0.1	0.3	0.0	-	-	1.1	0.3	0.3
2012	0.0	0.2	0.1	0.0	0.0	0.3	0.0	0.4
2017	-	-	-	0.9	0.0	0.3	0.8	1.9

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

Table 16A-06.12 - Shrub and Tree Species. Average modified Daubenmire quadrat and line intercept cover by year.

SHRUB SPECIES	Line Intercept Cover (%)						
	year	1997	2002	2007	2012	2017	
Amelanchier utahensis ^p (Utah serviceberry)	-	-	-	-	-	-	-
Artemisia tridentata ssp. vaseyana ^p (mountain big sagebrush)	-	-	-	-	-	-	-
Chrysothamnus viscidiflorus ssp. viscidiflorus var. viscidiflorus (yellow rabbitbrush)	0.2	13.6	0.6	0.3	3.9	2.3	0.1
Gutierrezia sarothrae (broom snakeweed)	-	-	-	-	-	0.3	1.5
Juniperus osteosperma ⁱ (Utah juniper)	-	0.3	0.2	0.2	-	0.6	1.2
Purshia tridentata ^p (antelope bitterbrush)							
Tetradymia canescens (spineless horsebrush)							

year	Quadrat Cover (%)						
	1997	2002	2007	2012	2017		
1997	0.2	9.1	0.2	0.1	0.8	3.0	0.0
2002	0.4	9.9	0.3	1.2	0.8	2.5	0.5
2007	0.5	9.1	0.1	0.1	0.8	2.0	0.2
2012	0.0	-	0.2	-	-	0.0	0.3
2017	0.0	0.0	0.1	0.3	-	0.2	0.6

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

Table 16A-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 (%)				
Amelanchier utahensis^p -- (Utah serviceberry)									
1997	100	-	20	60	20	80	0	20	72/74
2002	60	-	0	100	0	33	33	0	82/81
2007	60	-	33	67	0	0	67	0	105/103
2012	20	-	100	0	0	0	100	100	39/50
2017	20	-	0	100	0	0	100	0	32/28
Artemisia tridentata ssp. vaseyana^p -- (mountain big sagebrush)									
1997	2300	40	33	55	12	29	4	9	83/114
2002	3120	20	33	36	31	27	5	15	77/100
2007	2260	200	3	64	34	27	9	22	77/95
2012	20	-	100	0	0	0	100	0	36/39
2017	20	-	0	100	0	100	0	0	41/57
Chrysothamnus viscidiflorus ssp. viscidiflorus var. viscidiflorus -- (yellow rabbitbrush)									
1997	300	-	0	100	0	0	0	0	34/57
2002	740	-	14	76	11	0	3	8	29/44
2007	640	-	25	66	9	13	9	6	34/48
2012	280	-	7	93	0	7	0	7	33/50
2017	380	20	11	90	0	0	0	0	35/70
Ericameria nauseosa -- (rubber rabbitbrush)									
1997	-	-	-	-	-	-	-	-	-/-
2002	-	-	-	-	-	-	-	-	-/-
2007	-	-	-	-	-	-	-	-	-/-
2012	-	-	-	-	-	-	-	-	-/-
2017	-	-	-	-	-	-	-	-	32/45
Gutierrezia sarothrae -- (broom snakeweed)									
1997	840	20	36	60	5	0	0	5	15/16
2002	1780	-	6	81	14	0	0	6	15/36
2007	480	-	13	79	8	4	0	33	21/26
2012	40	-	0	100	0	0	0	0	15/25
2017	120	-	0	100	0	0	0	0	16/32

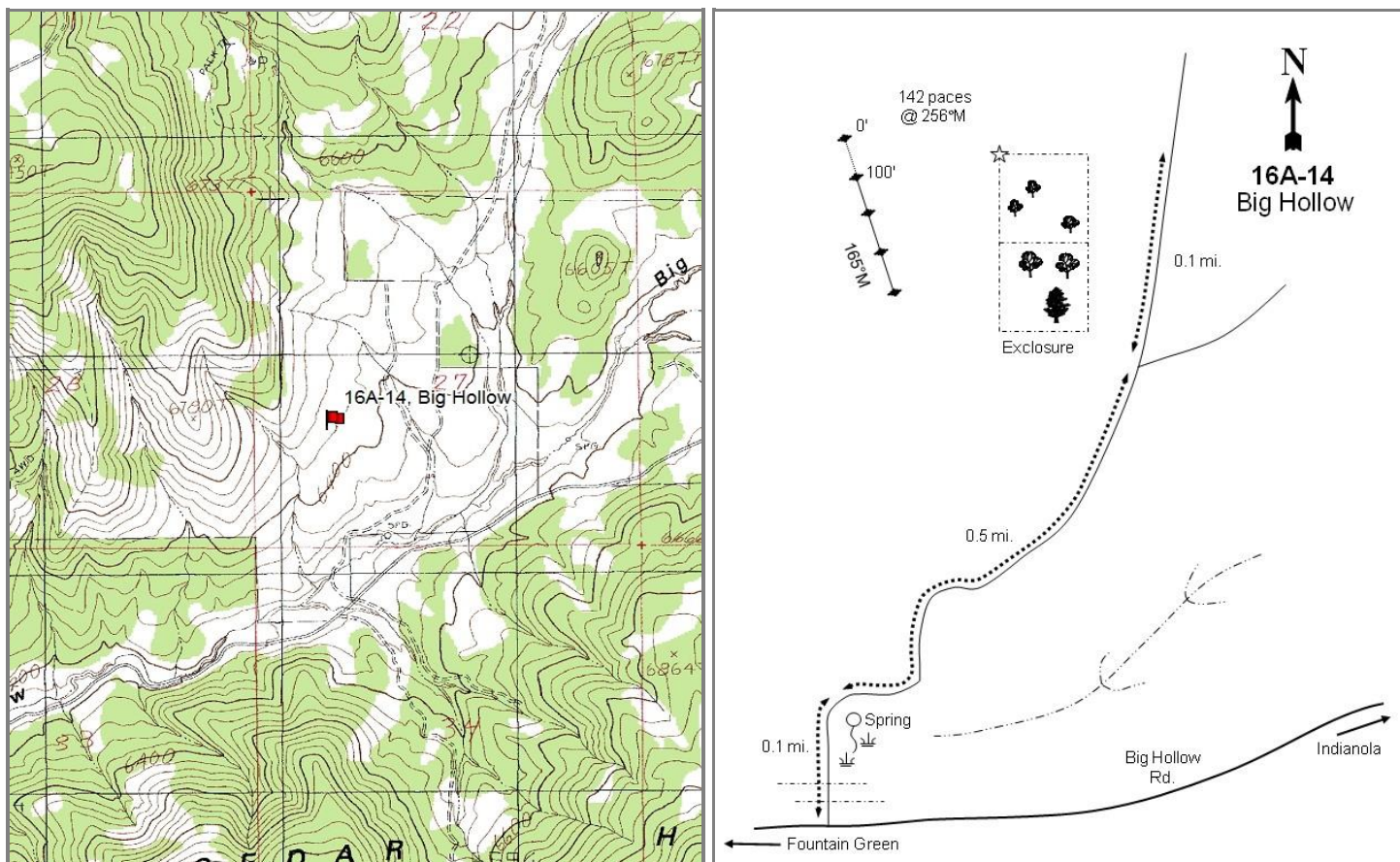
Year	Density		Age Class Distribution			Utilization		Poor Vigor (%)	Average Height Crown (cm)
	Plants Per Acre		Excluding Seedlings			Moderate (%)	Heavy (%)		
	Excluding Seedlings	Seedling	Young (%)	Mature (%)	Decadent (%)				
Juniperus osteosperma^t -- (Utah juniper)									
1997	-	-	-	-	-	-	-	-	-/-
2002	-	-	-	-	-	-	-	-	-/-
2007	-	20	0	0	0	0	0	0	-/-
2012	-	-	-	-	-	-	-	-	-/-
2017	-	-	-	-	-	-	-	-	-/-
Purshia tridentata^p -- (antelope bitterbrush)									
1997	540	40	4	89	7	15	70	11	98/141
2002	480	-	8	63	29	4	63	4	104/121
2007	520	20	8	50	42	15	85	23	115/129
2012	40	20	0	100	0	50	50	0	36/91
2017	60	-	0	100	0	0	100	0	38/109
Quercus gambelii^p -- (Gambel oak)									
1997	-	-	-	-	-	-	-	-	-/-
2002	-	-	-	-	-	-	-	-	-/-
2007	-	-	-	-	-	-	-	-	-/-
2012	-	-	-	-	-	-	-	-	100/168
2017	-	-	-	-	-	-	-	-	60/45
Rosa woodsii^p -- (Woods' rose)									
1997	-	-	-	-	-	-	-	-	-/-
2002	-	-	-	-	-	-	-	-	-/-
2007	-	-	-	-	-	-	-	-	-/-
2012	-	-	-	-	-	-	-	-	38/15
2017	-	-	-	-	-	-	-	-	33/31
Symphoricarpos oreophilus -- (mountain snowberry)									
1997	-	-	-	-	-	-	-	-	-/-
2002	-	-	-	-	-	-	-	-	-/-
2007	-	-	-	-	-	-	-	-	40/60
2012	-	-	-	-	-	-	-	-	19/15
2017	-	-	-	-	-	-	-	-	29/39
Tetradymia canescens -- (spineless horsebrush)									
1997	80	-	0	100	0	0	0	0	35/29
2002	260	-	15	85	0	0	8	8	28/41
2007	220	-	0	91	9	27	9	9	27/42
2012	400	60	5	95	0	0	0	0	26/40
2017	280	-	0	100	0	0	0	0	32/68

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

Table 16A-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)							
2002	22	-	-	-	-	-	25.2
2007	57	-	11	11	-	78	19.8

BIG HOLLOW - STUDY NO. 16A-14

**Location Information**

USGS 7.5 min Map Info
GPS (0' Stake)

Big Hollow SW; Township 13S, Range 3E, Section 27
NAD 83 UTM ZONE 12, 450138 East 4389859 North

Transect Information

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

Not Available
165° magnetic
400ft
Line 1 (11ft & 95ft), Line 2 (34ft), Line 3 (59ft), Line 4 (71ft)
Standard

Directions to Site

At the intersection of State Street and 100 North in Fountain Green, go east on 100 North for 0.3 miles to the old dump. Continue up Big Hollow for 3.3 miles to a gate parallel to the road onto DWR land. Turn left (north) through the gates and go 0.1 miles to a spring in a wash. Continue on this road for 0.5 miles to a fork. Stay left at the fork and continue for 0.1 miles to the north end of an exclosure: park here. From the northwest corner of the exclosure, walk 142 paces at a bearing of 256 degrees magnetic to a tall fencepost: this 4-foot tall green fencepost is the 0-foot baseline stake.

Site Information

Land Ownership	State
Land Administrator	UDWR
Allotment	No data
Elevation	6,450ft (1,966m)
Aspect	Southeast
Slope	10-15%
Sample Dates	08/22/1997, 10/25/2002, 05/24/2007, 05/15/2012, 05/16/2017

Table 16A-14.1 Disturbance History. Recorded history of major disturbances.

Treatment/Disturbance	Name	WRI DB#	Date	Size (acres)
Chaining - Chain Unknown	-	-	1964	-
Seeding - Dribbler	Salt Creek Wildfire Rehabilitation	970	November 2007	221
Fire - Wildfire	Salt Creek	-	July 2007	25913
Chaining - One-Way Ely	Salt Creek Wildfire Rehabilitation	970	November 2007	221
Seeding - Aerial Before	Salt Creek Wildfire Rehabilitation	970	November 2007	1197
Fire - Wildfire	Wood Hollow	-	July 2012	47387
Seeding - Aerial	Wood Hollow Fire	2481	January 2013	301

Table 16A-14.2 Seed Mix. List of known seeded plant species and rates (if available).

Mix Name			Application Type	Application Date	Acres
Salt Creek Fire DWR Aerial			Aerial	Nov 2007	1150
Type	Species	Common Name	Cultivar/Source ID	Bulk lbs/acre	PLS lbs/acre
G	<i>Achnatherum hymenoides</i>	Indian Ricegrass	Rimrock	1.00	0.91
G	<i>Agropyron cristatum</i>	Crested Wheatgrass	Hycrest	1.00	0.76
G	<i>Agropyron cristatum</i>	Crested Wheatgrass	Nordan	1.00	0.86
G	<i>Agropyron fragile</i>	Siberian Wheatgrass	Vavilov	1.00	0.84
G	<i>Dactylis glomerata</i>	Orchardgrass	Paiute	0.50	0.47
G	<i>Pseudoroegneria spicata</i>	Bluebunch Wheatgrass	Anatone	0.61	0.54
G	<i>Pseudoroegneria spicata</i>	Bluebunch Wheatgrass	Anatone	0.39	0.34
G	<i>Thinopyrum intermedium</i>	Intermediate Wheatgrass	Oahe	1.00	0.92
G	<i>Thinopyrum intermedium</i>	Pubescent Wheatgrass		2.00	1.82
F	<i>Achillea millefolium</i>	Western Yarrow		0.10	0.10
F	<i>Medicago sativa</i>	Alfalfa	Ladak	1.00	0.99
F	<i>Medicago sativa</i>	Alfalfa	Ranger	1.00	0.93
F	<i>Melilotus officinalis</i>	Yellow Sweetclover		0.25	0.20
F	<i>Onobrychis viciifolia</i>	Sainfoin	Eski	2.00	1.84
F	<i>Sanguisorba minor</i>	Small Burnet	Delar	1.00	0.94
S	<i>Artemisia tridentata</i> ssp. <i>vaseyana</i>	Mountain Big Sagebrush	Sanpete UT	0.25	0.09
S	<i>Artemisia tridentata</i> ssp. <i>wyomingensis</i>	Wyoming Big Sagebrush	Sanpete UT	0.25	0.08
Mix Name			Application Type	Application Date	Acres
Salt Creek Fire DWR Dribbler			Dribbler	Nov 2007	335
Type	Species	Common Name	Cultivar/Source ID	Bulk lbs/acre	PLS lbs/acre
F	<i>Sanguisorba minor</i>	Small Burnet	Delar	0.45	0.42
S	<i>Purshia tridentata</i>	Bitterbrush	Millard UT	0.45	0.39
Mix Name			Application Type	Application Date	Acres
Wood Hollow Sage and Kochia			Aerial	Jan 2013	10486
Type	Species	Common Name	Cultivar/Source ID	Bulk lbs/acre	PLS lbs/acre
F	<i>Medicago sativa</i>	Alfalfa	Ladak DL	0.51	0.47
S	<i>Artemisia tridentata</i> ssp. <i>tridentata</i>	Basin Big Sagebrush	Sanpete UT	0.05	0.01
S	<i>Artemisia tridentata</i> ssp. <i>vaseyana</i>	Mountain Big Sagebrush	Sevier UT	0.27	0.09
S	<i>Artemisia tridentata</i> ssp. <i>vaseyana</i>	Mountain Big Sagebrush	Sevier UT	0.07	0.02
S	<i>Artemisia tridentata</i> ssp. <i>vaseyana</i>	Mountain Big Sagebrush	Sevier UT	0.61	0.17
S	<i>Bassia prostrata</i>	Forage Kochia	Elmore ID	0.25	0.20
S	<i>Bassia prostrata</i>	Forage Kochia	Sevier UT	0.25	0.19

Wildlife Habitat and Vegetation History**Table 16A-14.3 - Wildlife Seasonal Habitat.** UDWR wildlife habitat and seasonality.

Species	Habitat	Season
Deer	crucial	winter
Elk	crucial	winter
Moose	substantial	year-long

Table 16A-14.4 - Vegetation History. The dominant vegetation type(s) and phase of woodland succession (Tausch, Miller, Roundy, & Chambers, 2009).

Year	Vegetation Type	Woodland Succession
1989	Mountain Big Sagebrush	Phase I
1997	Mountain Big Sagebrush	Phase I
2002	Mountain Big Sagebrush	Phase I
2007	Mountain Big Sagebrush/Annual Grass	Phase I
2012	Perennial Grass	Phase I
2017	Perennial-Annual Grass	No Encroachment

Site Notes

There is a perennial spring 200 yards (183m) southeast of the study. During the dry year of 1989, deer were using the area during the summer due to the availability of water. However, the majority of big game use usually occurs in winter and spring. A winter-killed fawn was found in 1989, and an antler drop was noted in 2007.

Soils**Table 16A-14.5 - 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	48.0	27.1	24.9	2.9	13.3	166.4	0.5	08/21/1997

Site Potential

1981 - 2010 Average Annual Precipitation 18 inches
 NRCS Ecological Site Mountain Loam (Mountain Big Sagebrush)
 NRCS Ecological Site # R047XA430UT
 States and Transitions No state and transition model is available for this ecological site.

From study establishment in 1989 through the 2007 sample year, this study site existed as a mountain big sagebrush (*Artemisia tridentata* ssp. *vaseyana*) dominated plant community with antelope bitterbrush (*Purshia tridentata*) scattered throughout. A wildfire after the 2007 sampling removed most of the browse component, and although some browse did remain, another fire in 2012 removed most of the extant shrubs (Table 16A-14.12, Table 16A-14.13). The site transitioned into one dominated by herbaceous species following the first fire in 2007. A mixture of perennial grasses including (but not limited to) the native species Indian ricegrass (*Achnatherum hymenoides*), needle and thread (*Hesperostipa comata*), and the introduced species crested wheatgrass (*Agropyron cristatum*) dominated the site in 2012 and 2017. Cover of the introduced annual species cheatgrass (*Bromus tectorum*) has fluctuated throughout the duration of the study, and it was a co-dominant site component in 2007 and 2012 (Table 16A-14.10). Forbs have remained rare in most years. However, annual forbs -- namely the introduced and weedy species desert madwort (*Alyssum desertorum*) and redstem stork's bill (*Erodium cicutarium*) -- contributed nearly 24% cover in 2017 (Table 16A-14.7, Table 16A-14.11).

Trend Summary Tables

Table 16A-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
1997	17.2	5.9	-	-	-	-
2002	17.7	0.0	0.0	-	-	-
2007	11.6	7.5	0.1	15.5	7.2	0.1
2012	4.1	0.2	-	5.4	0.5	-
2017	0.0	0.7	-	-	0.8	-

Table 16A-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
1997	266	218	188	64	3.7	5.2	1.1	0.6
2002	284	248	295	56	4.9	9.2	2.5	0.7
2007	409	200	422	63	13.3	8.6	9.1	0.7
2012	263	296	362	100	4.9	17.2	4.1	1.0
2017	386	311	479	132	11.3	16.4	23.5	1.3

Table 16A-14.8 - 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
1997	11.1	1.6	43.9	17.5	5.1	33.6
2002	20.8	5.3	37.9	15.0	4.7	35.5
2007	13.1	4.5	35.3	13.0	4.1	48.3
2012	12.9	0.0	44.2	4.8	3.3	35.6
2017	15.6	0.0	27.0	17.9	7.5	48.0

Table 16A-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	Rocky Mountain Elk	Rabbit
	Quadrat Frequency			
1997	1	32	2	26
2002	3	14	1	73
2007	3	9	3	50
2012	4	1	4	2
2017	2	5	3	27
Year	Days Use Per Acre (ha)			
1997	-	-	-	-
2002	8.0 (19.7)	62.3 (153.9)	0.7 (1.7)	-
2007	8.0 (19.7)	58.3 (144.0)	4.7 (11.6)	-
2012	3.6 (9.0)	0.7 (1.7)	3.4 (8.3)	-
2017	-	1.3 (3.3)	0.7 (1.7)	-

Table 16A-14.10 - 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)	Carex (sedge)	Elymus elymoides (squirreltail)	Hesperotipa comata (needle and thread)	Pascopyrum smithii (western wheatgrass)	Poa bulbosa ⁱ (bulbous bluegrass)	Poa secunda (Sandberg bluegrass)	Pseudoroegneria spicata (bluebunch wheatgrass)	Thinopyrum intermedium ⁱ (intermediate wheatgrass)
year	Nested Frequency											
1997	72	-	-	266	49	42	50	-	-	3	41	-
2002	50	-	22	284	73	88	60	5	-	-	42	-
2007	45	-	-	409	70	26	42	37	-	-	36	-
2012	78	56	3	262	86	7	37	56	-	-	65	40
2017	54	73	-	386	96	46	79	63	4	-	23	44
year	Average Cover (%)											
1997	1.9	-	-	3.7	0.7	0.9	1.1	-	-	0.0	0.7	-
2002	1.1	-	0.1	4.8	2.3	2.2	1.0	0.0	-	-	2.4	-
2007	1.4	-	-	13.3	1.5	1.1	1.5	1.0	-	-	2.2	-
2012	3.3	2.3	0.1	4.7	4.6	0.2	1.3	2.2	-	-	2.3	0.9
2017	2.9	3.8	-	11.3	2.4	0.6	3.0	1.6	0.0	-	1.0	1.0

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

Table 16A-14.11 - Forb Species. Nested frequency and modified Daubenmire average cover by year.

FORB SPECIES	Agoseris glauca (pale agoseris)	Alyssum desertorum ^{ai} (desert madwort)	Arabis (rockcress)	Astragalus newberryi (Newberry's milkvetch)	Calochortus nuttallii (sego lily)	Camelina microcarpa ^{ai} (littledod false flax)	Ceratocephala testiculata ^{ai} (curveseed butterwort)	Chaenactis douglasii (Douglas' dustymaiden)	Chenopodium ^a (goosefoot)	Cirsium undulatum ^a (wavyleaf thistle)	Collinsia parviflora ^a (maiden blue eyed Mary)	Cryptantha humilis (roundspike cryptantha)	Descurainia pinnata ^a (western tansymustard)	Draba ^a (draba)	Eriogonum cernuum ^a (nodding buckwheat)	Erodium cicutarium ^{ai} (redstem stork's bill)	Gilia inconspicua ^a (shy gilia)
year	Nested Frequency																
1997	-	163	-	-	2	-	-	21	2	18	-	-	-	-	2	-	1
2002	-	287	-	3	5	-	33	5	-	18	5	-	1	-	3	5	-
2007	-	415	6	-	15	-	42	6	1	-	11	3	47	4	1	9	6
2012	-	348	-	6	9	7	6	2	-	26	-	-	5	-	-	-	-
2017	2	474	-	2	16	-	2	2	-	9	-	-	-	-	2	294	-
year	Average Cover (%)																
1997	-	1.0	-	-	0.0	-	-	0.1	0.0	0.0	-	-	-	-	0.0	-	0.0
2002	-	2.1	-	0.0	0.0	-	0.1	0.0	-	0.3	0.0	-	0.0	-	0.0	0.0	-
2007	-	8.4	0.0	-	0.0	-	0.1	0.0	0.0	-	0.0	0.0	0.3	0.0	0.0	0.0	0.0
2012	-	3.3	-	0.0	0.0	0.0	0.0	0.0	-	0.1	-	-	0.0	-	-	-	-
2017	0.0	17.5	-	0.0	0.1	-	0.0	0.0	-	0.1	-	-	-	-	0.0	5.8	-

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

FORB SPECIES	Hackelia patens (spotted stickseed)	Lactuca serriola ^{ai} (prickly lettuce)	Lappula occidentalis ^a (flatspine stickseed)	Machaeranthera canescens (hoary tansyaster)	Medicago sativa ⁱ (alfalfa)	Microsteris gracilis ^a (slender phlox)	Onobrychis vicifolia ⁱ (sainfoin)	Orobanche fasciculata (clustered broomrape)	Penstemon (beardtongue)	Polygonum douglasii ^{ai} (Douglas' knotweed)	Salsola tragus ^{ai} (prickly Russian thistle)	Sisymbrium altissimum ^{ai} (tall tumblemustard)	Sphaeralcea coccinea (scarlet globemallow)	Tragopogon dubius ^{ai} (yellow salsify)
year	Nested Frequency													
1997	5	1	-	-	-	-	-	1	-	16	-	-	37	3
2002	-	-	-	-	-	12	-	-	1	2	-	-	46	1
2007	-	6	38	-	-	-	-	-	-	-	-	3	39	3
2012	-	1	-	3	3	-	7	-	-	-	-	2	81	75
2017	-	2	2	-	3	-	-	-	-	-	4	-	117	14
year	Average Cover (%)													
1997	0.0	0.0	-	-	-	-	-	0.0	-	0.1	-	-	0.5	0.0
2002	-	-	-	-	-	0.0	-	-	0.0	0.0	-	-	0.6	0.0
2007	-	0.0	0.1	-	-	-	-	-	-	-	-	0.0	0.6	0.0
2012	-	0.0	-	0.0	0.0	-	0.1	-	-	-	-	0.0	0.8	0.6
2017	-	0.0	0.0	-	0.0	-	-	-	-	-	0.1	-	1.2	0.1

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

Table 16A-14.12 - 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 ^{pt} (forage kochia)	Gutierrezia sarothrae (broom snakeweed)	Juniperus osteosperma ⁱ (Utah juniper)	Opuntia polyacantha (plains pricklypear)	Purshia tridentata ^p (antelope bitterbrush)
year	Line Intercept Cover (%)					
1997	-	-	-	-	-	-
2002	-	-	-	-	-	-
2007	13.5	-	7.1	0.1	0.1	2
2012	2	-	0.4	-	0.1	3.4
2017	-	-	0.8	-	-	-
year	Quadrat Cover (%)					
1997	15.0	-	5.7	-	0.2	2.3
2002	15.4	-	0.0	0.0	-	2.4
2007	9.9	-	7.3	0.1	0.1	1.8
2012	2.0	-	0.1	-	0.0	2.0
2017	-	0.0	0.7	-	-	-

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

Table 16A-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.

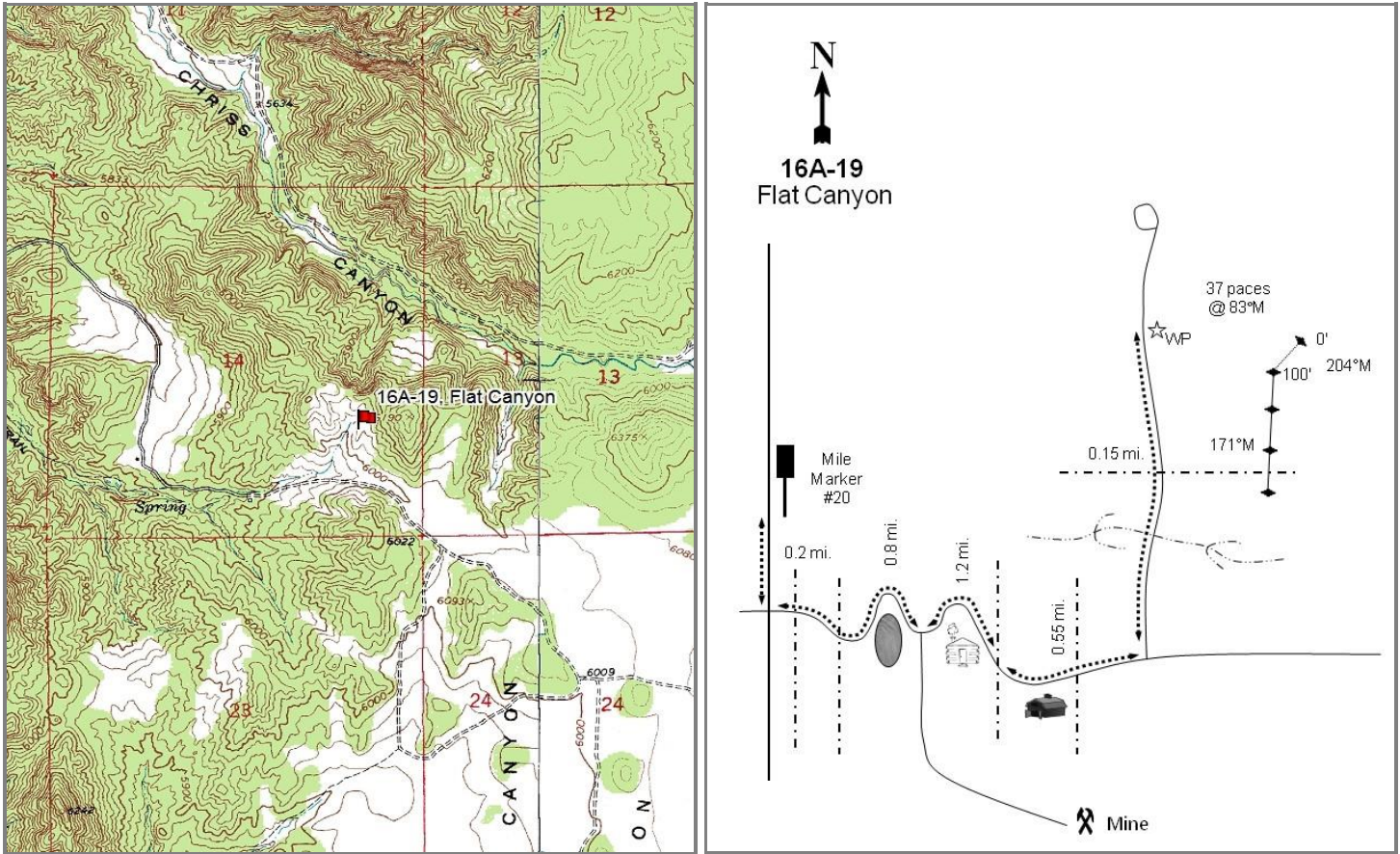
Year	Density		Age Class Distribution			Utilization		Poor Vigor (%)	Average Height Crown (cm)
	Plants Per Acre		Excluding Seedlings			Moderate (%)	Heavy (%)		
	Excluding Seedlings	Seedling	Young (%)	Mature (%)	Decadent (%)				
Artemisia tridentata ssp. vaseyana^P -- (mountain big sagebrush)									
1997	1800	80	10	63	27	3	0	9	83/97
2002	1900	180	7	58	35	18	5	19	110/128
2007	1580	20	1	53	46	22	1	29	89/112
2012	440	-	0	82	18	0	0	9	42/70
2017	-	-	-	-	-	-	-	-	33/38
Bassia prostrata^{Pi} -- (forage kochia)									
1997	-	-	-	-	-	-	-	-	-/-
2002	-	-	-	-	-	-	-	-	-/-
2007	-	-	-	-	-	-	-	-	-/-
2012	-	-	-	-	-	-	-	-	-/-
2017	40	-	50	50	0	0	50	0	5/16
Chrysothamnus viscidiflorus ssp. viscidiflorus var. viscidiflorus -- (yellow rabbitbrush)									
1997	-	-	-	-	-	-	-	-	-/-
2002	-	-	-	-	-	-	-	-	-/-
2007	-	-	-	-	-	-	-	-	-/-
2012	-	-	-	-	-	-	-	-	-/-
2017	-	-	-	-	-	-	-	-	14/23
Gutierrezia sarothrae -- (broom snakeweed)									
1997	22560	20	30	70	0	0	0	0	24/27
2002	160	20	100	0	0	0	0	0	-/-
2007	9400	1120	1	98	0	0	0	11	23/31
2012	840	-	14	71	14	17	0	17	14/22
2017	1280	80	14	86	0	3	0	0	16/24
Juniperus osteospermaⁱ -- (Utah juniper)									
1997	-	-	-	-	-	-	-	-	-/-
2002	20	-	0	100	0	100	0	0	-/-
2007	-	-	-	-	-	-	-	-	-/-
2012	-	-	-	-	-	-	-	-	-/-
2017	-	-	-	-	-	-	-	-	-/-
Opuntia polyacantha -- (plains pricklypear)									
1997	160	-	13	88	0	0	0	0	-/15
2002	60	-	0	67	33	67	0	0	13/26
2007	60	-	0	100	0	0	0	0	16/36
2012	40	-	0	100	0	0	0	50	10/16
2017	-	-	-	-	-	-	-	-	14/42
Pediocactus simpsonii -- (mountain ball cactus)									
1997	-	-	-	-	-	-	-	-	-/-
2002	-	-	-	-	-	-	-	-	-/-
2007	-	-	-	-	-	-	-	-	-/-
2012	20	-	0	100	0	0	0	0	7/11
2017	-	-	-	-	-	-	-	-	-/-
Purshia stansburiana^P -- (Stansbury cliffrose)									
1997	-	-	-	-	-	-	-	-	-/-
2002	-	-	-	-	-	-	-	-	164/238
2007	-	-	-	-	-	-	-	-	-/-
2012	-	-	-	-	-	-	-	-	-/-
2017	-	-	-	-	-	-	-	-	-/-
Purshia tridentata^P -- (antelope bitterbrush)									
1997	280	-	29	50	21	36	29	21	121/172
2002	320	-	0	38	63	6	88	25	173/156
2007	260	-	0	23	77	8	69	8	152/158
2012	140	-	0	86	14	57	0	0	68/116
2017	20	-	0	100	0	100	0	0	47/107
Tetradymia canescens -- (spineless horsebrush)									
1997	-	-	-	-	-	-	-	-	-/-
2002	-	-	-	-	-	-	-	-	-/-
2007	-	-	-	-	-	-	-	-	20/36
2012	-	-	-	-	-	-	-	-	-/-
2017	-	-	-	-	-	-	-	-	20/26

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

Table 16A-14.14 - 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	23	-	-	-	-	16.0	
2007	30	-	10	20	20	50	16.6
2012	6	-	-	60	40	-	24.0

FLAT CANYON - STUDY NO. 16A-19



Location Information

USGS 7.5 min Map Info	Skinner Peaks SE; Township 16S, Range 1W, Section 14
GPS (0' Stake)	NAD 83 UTM ZONE 12, 423841 East 4363153 North

Transect Information

Browse Tag # (0' Stake)	9084
Transect Bearing	204° 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 Levan, drive south on Highway 28 to 0.2 miles south of mile marker #20. Turn left (east) and go 0.8 miles to a fork. Keep left at the fork and continue for 1.2 miles to an old fence by an old cabin where the road makes a 90 degree turn to the east. Continue up the main road for 0.55 miles to a faint road which turns off to the left and goes down into the sagebrush. Follow this road for 0.15 miles to a witness post on the right (east) side of the road. From here, walk up the hill for about 37 paces at a bearing of 83 degrees magnetic to the 0-foot baseline stake, which is marked with browse tag #9084.

Site Information

Land Ownership	Federal
Land Administrator	BLM
Allotment	SALT CREEK
Elevation	6,040ft (1,841m)
Aspect	Southwest
Slope	20-30%
Sample Dates	05/21/1997, 10/25/2002, 05/30/2007, 05/30/2012, 05/25/2017

Table 16A-19.1 Disturbance History. Recorded history of major disturbances.

Treatment/Disturbance	Name	WRI DB#	Date	Size (acres)
Seeding - Aerial Before	Chriss Creek PJ Removal Phase 2	2223	October 2012	333
Mechanical - Bullhog	Chriss Creek PJ Removal Phase 2	2223	December 2012-March 2013	333

Table 16A-19.2 Seed Mix. List of known seeded plant species and rates (if available).

Mix Name			Application Type	Application Date	Acres
Chriss Creek PJ Removal - Phase II			Aerial	Oct 2012	500
Type	Species	Common Name	Cultivar/Source ID	Bulk lbs/acre	PLS lbs/acre
G	Achnatherum hymenoides	Indian Ricegrass	Rimrock	1.00	0.94
G	Dactylis glomerata	Orchardgrass	Paiute	1.00	0.95
G	Elymus lanceolatus	Thickspike Wheatgrass	Critana	1.00	0.88
G	Leymus cinereus	Great Basin Wildrye	Trailhead	1.00	0.92
G	Psathyrostachys juncea	Russian Wildrye		1.00	0.75
G	Pseudoroegneria spicata	Bluebunch Wheatgrass	P-7	2.00	1.79
F	Achillea millefolium	Western Yarrow	Eagle	0.05	0.04
F	Linum perenne	Blue Flax	Appar	0.15	0.13
F	Medicago sativa	Alfalfa	Ladak DL	0.85	0.79
F	Medicago sativa	Alfalfa	Ladak +	0.15	0.14
F	Onobrychis viciifolia	Sainfoin	Eski	1.00	0.78
F	Sanguisorba minor	Small Burnet	Delar	1.00	0.89

Wildlife Habitat and Vegetation History

Table 16A-19.3 - Wildlife Seasonal Habitat. UDWR wildlife habitat and seasonality.

Species	Habitat	Season
Deer	crucial	winter
Elk	crucial	winter

Table 16A-19.4 - Vegetation History. The dominant vegetation type(s) and phase of woodland succession (Tausch, Miller, Roundy, & Chambers, 2009).

Year	Vegetation Type	Woodland Succession
1989	Wyoming Big Sagebrush/Antelope Bitterbrush	Phase I
1997	Wyoming Big Sagebrush/Antelope Bitterbrush	Phase I
2002	Wyoming Big Sagebrush/Antelope Bitterbrush	Phase I transitioning to Phase II
2007	Wyoming Big Sagebrush/Antelope Bitterbrush/Annual Grass	Phase I transitioning to Phase II
2012	Wyoming Big Sagebrush/Antelope Bitterbrush	Phase I transitioning to Phase II
2017	Wyoming Big Sagebrush/Antelope Bitterbrush/Annual Grass	Phase I

Site Notes

Livestock use was noted in 2017.

Soils

Table 16A-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	7.2	70.4	15.8	13.8	1.6	4.4	153.6	0.5	05/21/1997

Site Potential

1981 - 2010 Average Annual Precipitation 15 inches
 NRCS Ecological Site Upland Gravelly Loam (Wyoming Big Sagebrush)
 NRCS Ecological Site # R047XA306UT
 States and Transitions No state and transition model is available for this ecological site.

Wyoming big sagebrush (*Artemisia tridentata* ssp. *wyomingensis*) and antelope bitterbrush (*Purshia tridentata*) have comprised a majority of the browse component since 1989. In addition, Utah juniper (*Juniperus osteosperma*) and twoneedle pinyon (*Pinus edulis*) are scattered throughout the site. Prior to a bullhog and seeding treatment in late 2012/early 2013 (Table 16A-19.1), the site was considered to be within Phase I transitioning to Phase II of woodland succession. The treatment removed much of the tree cover, and the site is currently in Phase I of encroachment (photos, Table 16A-19.4, Table 16A-19.12, Table 16A-19.13, Table 16A-19.14). Perennial grasses, mainly bluebunch wheatgrass (*Pseudoroegneria spicata*), and the introduced annual grass species cheatgrass (*Bromus tectorum*) have contributed a majority of the herbaceous cover in most sample years since 1997; annual grasses were a co-dominant site component in 2007 and 2017 (Table 16A-19.7, Table 16A-19.10). Although diverse, annual and perennial forbs have remained rare (Table 16A-19.11).

Trend Summary Tables

Table 16A-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
1997	11.8	0.5	2.9	-	-	-
2002	15.0	0.4	6.5	-	-	-
2007	11.7	0.0	6.6	10.5	0.1	16.9
2012	13.1	0.2	5.0	16.9	0.2	18.3
2017	11.4	0.2	0.4	18.0	0.2	-

Table 16A-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
1997	319	213	82	110	5.8	6.2	0.3	1.0
2002	244	221	62	56	1.3	10.0	0.2	0.3
2007	428	214	224	47	12.3	9.2	1.5	0.5
2012	285	247	330	44	4.1	9.5	1.8	0.4
2017	393	206	345	63	13.6	8.9	5.2	1.4

Table 16A-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
1997	28.3	0.9	32.3	15.7	7.5	26.8
2002	30.1	0.8	35.2	11.8	9.2	31.7
2007	23.3	0.3	33.1	14.0	7.9	37.2
2012	24.7	1.5	33.2	8.8	6.7	38.5
2017	23.7	0.6	50.2	10.4	5.5	35.9

Table 16A-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	Rocky Mountain Elk	Horse	Rabbit
	Quadrat Frequency				
1997	-	28	1	-	2
2002	2	29	-	1	23
2007	2	13	1	-	59
2012	-	4	-	-	16
2017	2	9	-	-	14
Days Use Per Acre (ha)					
1997	-	-	-	-	-
2002	2.2 (5.4)	44.2 (109.2)	-	-	-
2007	2.2 (5.4)	16.8 (41.4)	2.7 (6.6)	-	-
2012	-	6.0 (14.9)	-	-	-
2017	-	7.4 (18.2)	-	-	-

Table 16A-19.10 - Grass Species. Nested frequency and modified Daubenmire average cover by year.

GRASS SPECIES	Achnatherum hymenoides (Indian ricegrass)	Bromus arvensis ^{ai} (field brome)	Bromus tectorum ^{ai} (cheatgrass)	Elymus elymoides (squirreltail)	Hesperostipa comata (needle and thread)	Poa bulbosa ⁱ (bulbous bluegrass)	Poa fendleriana (muttongrass)	Poa secunda (Sandberg bluegrass)	Pseudoroegneria spicata (bluebunch wheatgrass)
year	Nested Frequency								
1997	11	-	319	6	28	-	-	74	138
2002	0	21	241	-	44	-	-	62	167
2007	16	-	428	12	41	-	-	80	132
2012	2	-	285	-	59	-	2	131	119
2017	12	23	370	-	29	2	-	69	157
year	Average Cover (%)								
1997	0.1	-	5.8	0.2	1.3	-	-	1.2	3.4
2002	0.0	0.1	1.2	-	1.8	-	-	1.5	6.6
2007	0.5	-	12.3	0.1	1.8	-	-	1.3	5.5
2012	0.0	-	4.1	-	2.3	-	0.0	3.6	3.6
2017	0.5	0.8	12.8	-	0.8	0.0	-	1.1	6.4

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

Table 16A-19.11 - 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)	Arabis (rockcress)	Astragalus eurekaensis (Eureka milkvetch)	Astragalus lentiginosus (freckled milkvetch)	Calochortus nuttallii (sego lily)	Camelina microcarpa ^{ai} (littledod false flax)	Castilleja linariifolia (Wyoming Indian paintbrush)	Ceratocephala testiculata ^{ai} (curveseed butterwort)	Chaenactis douglasii (Douglas' dustymaiden)	Chorispora tenella ^{ai} (crossflower)	Cirsium undulatum ⁿ (wavyleaf thistle)	Collinsia parviflora ⁿ (maiden blue eyed Mary)	Convolvulus arvensis ⁿⁱ (field bindweed)	Crepis acuminata (tapertip hawksbeard)
year	Nested Frequency																
1997	-	21	-	1	-	-	4	42	-	2	-	24	5	5	-	-	-
2002	-	13	2	29	1	6	5	18	-	-	-	2	3	-	3	-	0
2007	-	8	-	194	-	6	6	6	2	-	8	-	-	-	2	-	0
2012	-	-	-	324	-	9	6	-	-	1	3	9	-	3	1	-	4
2017	10	9	-	338	-	7	6	19	-	2	-	1	-	4	2	5	0
year	Average Cover (%)																
1997	-	0.3	-	0.0	-	-	0.1	0.2	-	0.1	-	0.1	0.0	0.0	-	-	-
2002	-	0.1	0.0	0.0	0.0	0.0	0.0	0.1	-	-	-	0.0	0.0	-	0.0	-	0.0
2007	-	0.0	-	1.2	-	0.0	0.2	0.0	0.0	-	0.0	-	-	-	0.0	-	0.0
2012	-	-	-	1.5	-	0.0	0.1	-	-	0.0	0.0	0.0	-	0.1	0.0	-	0.0
2017	0.2	0.2	-	4.8	-	0.1	0.2	0.1	-	0.1	-	0.0	-	0.0	0.0	0.0	0.0

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

FORB SPECIES	Cryptantha humilis (roundspike cryptantha)	Cymopterus longipes (longstalk springparsley)	Descurainia pinnata ^a (western tansymustard)	Draba ^a (draba)	Epilobium brachycarpum ^a (tall annual willowherb)	Eriogonum racemosum (redroot buckwheat)	Erodium cicutarium ^{ai} (redstem stork's bill)	Erysimum (wallflower)	Gaium aparine ^a (stickywilly)	Gilia inconspicua ^a (shy gilia)	Lactuca serriola ^{ai} (prickly lettuce)	Lappula occidentalis ^a (flatspine stickseed)	Machaeranthera canescens (hoary tansyaster)	Microsteris gracilis ^a (slender phlox)	Phlox austromontana (mountain phlox)	Phlox longifolia (longleaf phlox)	Polygonum douglasii ^a (Douglas' knotweed)	
year	Nested Frequency																	
1997	16	-	-	-	3	-	2	-	-	54	5	-	0	-	7	9	3	
2002	-	-	8	-	7	2	4	-	1	11	-	-	-	3	-	7	-	
2007	10	-	14	1	2	-	11	-	2	19	2	13	-	1	3	7	-	
2012	4	-	-	2	3	3	8	3	-	-	3	2	2	2	3	1	-	
2017	4	3	12	-	2	-	19	-	1	18	17	1	2	-	2	-	-	
year	Average Cover (%)																	
1997	0.1	-	-	-	0.0	-	0.0	-	-	0.1	0.0	-	0.0	-	0.2	0.0	0.0	
2002	-	-	0.0	-	0.0	0.0	0.0	-	0.0	0.0	-	-	-	0.0	-	0.0	-	
2007	0.0	-	0.0	0.0	0.0	-	0.1	-	0.0	0.1	0.0	0.1	-	0.0	0.2	0.0	-	
2012	0.0	-	-	0.0	0.0	0.0	0.0	0.0	-	-	0.0	0.0	0.0	0.0	0.2	0.0	-	
2017	0.2	0.0	0.0	-	0.0	-	0.3	-	0.0	0.1	0.0	0.0	0.0	-	0.1	-	-	

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

FORB SPECIES	Sanguisorba minor ⁱ (small burnet)	Streptanthus cordatus (heartleaf twistflower)	Tragopogon dubius ^{ai} (yellow salsify)	Veronica biloba ^{ai} (twolobe speedwell)	Zigadenus paniculatus (foothill deathcamas)
year	Nested Frequency				
1997	-	5	9	-	-
2002	-	1	-	2	3
2007	-	2	2	2	-
2012	-	-	1	1	-
2017	1	2	2	-	7
year	Average Cover (%)				
1997	-	0.0	0.1	-	-
2002	-	0.0	-	0.0	0.0
2007	-	0.0	0.1	0.0	-
2012	-	-	0.0	0.0	-
2017	0.0	0.0	0.0	-	0.1

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

Table 16A-19.12 - 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. viscidiflorus (yellow rabbitbrush)	Ephedra viridis ^p (mormon tea)	Gutierrezia sarothrae (broom snakeweed)	Juniperus osteosperma ⁱ (Utah juniper)	Opuntia polyacantha (plains pricklypear)	Purshia tridentata ^p (antelope bitterbrush)	Quercus gambelii ^p (Gambel oak)
year	Line Intercept Cover (%)							
1997	-	-	-	-	-	-	-	-
2002	-	-	-	-	-	-	-	-
2007	6.1	0.1	-	-	16.9	-	4.4	-
2012	7.7	0.2	-	-	18.3	-	9	0.2
2017	7.2	-	-	0.2	-	-	10.8	-
year	Quadrat Cover (%)							
1997	8.8	0.1	-	0.3	2.9	0.0	3.0	-
2002	10.9	0.1	0.0	0.3	6.5	-	4.1	-
2007	7.2	0.0	0.0	0.0	6.6	-	4.5	0.0
2012	5.9	0.0	0.0	0.1	5.0	-	7.2	0.0
2017	3.8	0.0	0.0	0.2	0.4	-	7.2	0.4

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

Table 16A-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 tridentata ssp. wyomingensis ^p -- (Wyoming big sagebrush)									
1997	1220	120	13	72	15	10	0	2	56/89
2002	1280	-	6	72	22	33	2	11	49/75
2007	1340	-	3	55	42	31	13	21	68/86
2012	1080	20	2	69	30	2	0	11	63/87
2017	1040	280	12	73	15	10	0	12	61/90
Chrysothamnus viscidiflorus ssp. viscidiflorus var. viscidiflorus -- (yellow rabbitbrush)									
1997	140	-	29	71	0	0	0	0	32/51
2002	120	-	17	50	33	0	0	0	24/34
2007	120	-	0	67	33	0	0	17	19/22
2012	120	-	50	50	0	0	0	0	33/37
2017	-	20	0	0	0	0	0	0	32/55
Ephedra viridis ^p -- (mormon tea)									
1997	-	-	-	-	-	-	-	-	45/34
2002	-	-	-	-	-	-	-	-	41/32
2007	-	-	-	-	-	-	-	-	109/138
2012	60	-	0	67	33	0	67	33	91/116
2017	-	-	-	-	-	-	-	-	47/68
Ericameria nauseosa ssp. nauseosa var. speciosa ^p -- (rubber rabbitbrush)									
1997	-	-	-	-	-	-	-	-	71/84
2002	-	-	-	-	-	-	-	-	-/-
2007	-	-	-	-	-	-	-	-	-/-
2012	-	-	-	-	-	-	-	-	59/43
2017	-	-	-	-	-	-	-	-	42/46
Gutierrezia sarothrae -- (broom snakeweed)									
1997	1400	180	83	17	0	0	0	0	25/36
2002	400	-	0	25	75	0	0	75	11/14
2007	80	20	50	50	0	0	0	0	30/28
2012	120	-	0	100	0	0	0	0	23/37
2017	200	-	20	80	0	0	0	0	29/40

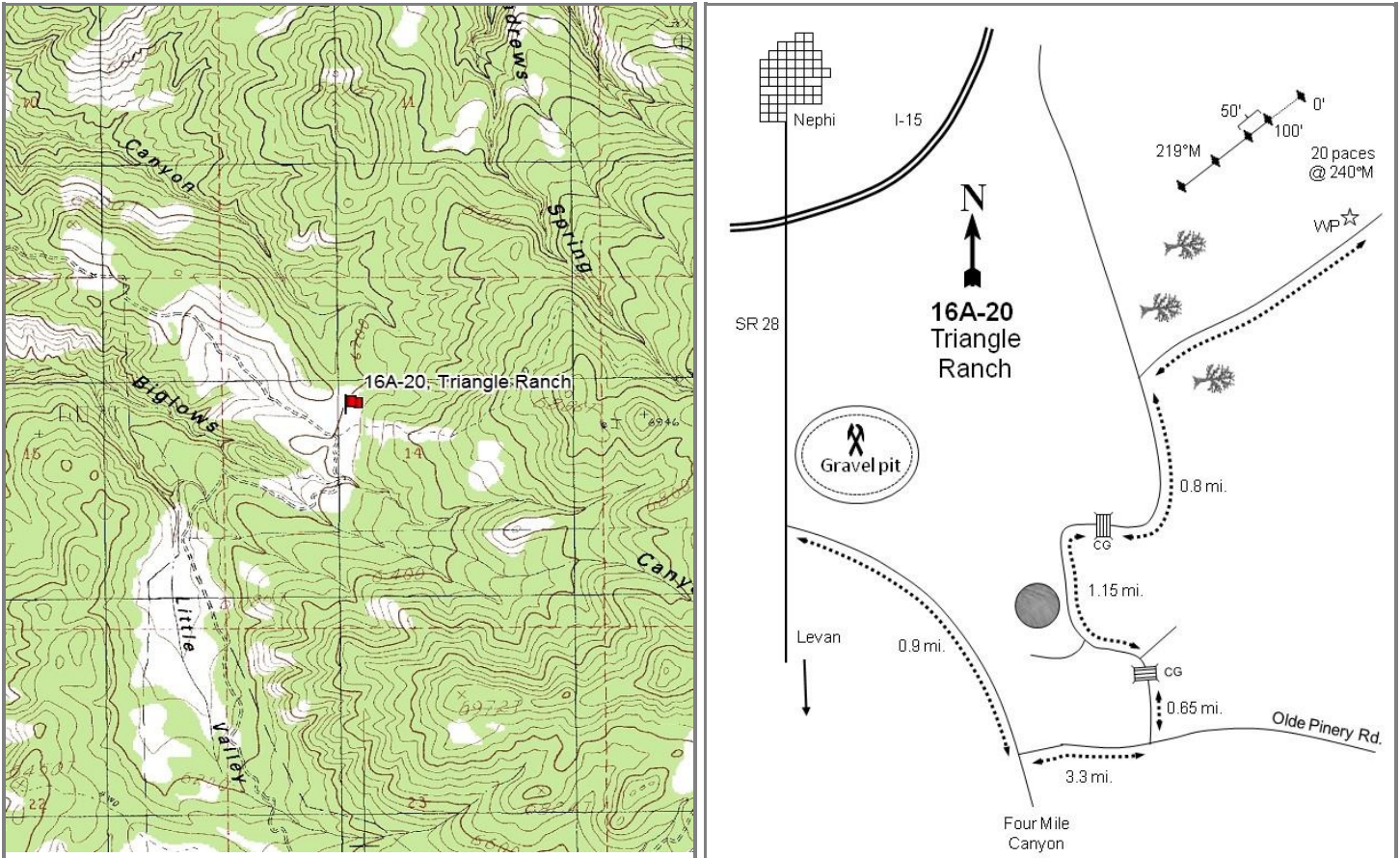
Year	Density		Age Class Distribution			Utilization		Poor Vigor (%)	Average Height Crown (cm)
	Plants Per Acre		Excluding Seedlings			Moderate (%)	Heavy (%)		
	Excluding Seedlings	Seedling	Young (%)	Mature (%)	Decadent (%)				
Juniperus osteosperma^t -- (Utah juniper)									
1997	20	-	0	100	0	0	0	0	- / -
2002	80	-	0	100	0	0	0	0	- / -
2007	100	20	20	80	0	0	0	0	- / -
2012	100	20	0	100	0	0	0	0	- / -
2017	120	-	83	17	0	0	0	0	- / -
Opuntia polyacantha -- (plains pricklypear)									
1997	80	-	0	100	0	0	0	0	7/25
2002	-	-	-	-	-	-	-	-	- / -
2007	100	-	20	80	0	0	0	0	8/18
2012	60	-	0	100	0	0	0	0	10/14
2017	20	-	0	100	0	0	0	0	6/10
Purshia tridentata^p -- (antelope bitterbrush)									
1997	600	-	17	80	3	67	27	0	63/131
2002	620	-	3	84	13	23	45	10	57/150
2007	620	-	3	77	19	23	71	13	63/154
2012	940	-	0	98	2	34	0	0	76/144
2017	1180	-	0	97	3	46	24	0	60/122
Quercus gambelii^p -- (Gambel oak)									
1997	-	-	-	-	-	-	-	-	- / -
2002	20	-	0	100	0	0	0	0	- / -
2007	20	-	100	0	0	0	0	0	- / -
2012	20	-	100	0	0	0	0	0	223/253
2017	40	-	0	100	0	0	0	0	42/37

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

Table 16A-19.14 - 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)							
2002	43	-	-	-	-	-	17.6
2007	35	6	6	18	41	29	22.4
2012	41	-	17	28	17	39	17.7
2017	31	7	47	27	-	20	14.1
Pinus edulis (twoneedle pinyon)							
2002	14	-	-	-	-	-	13.0
2007	2	-	-	-	-	100	20.0

TRIANGLE RANCH - STUDY NO. 16A-20



Location Information

USGS 7.5 min Map Info
GPS (0' Stake)

Nephi SE; Township 13S, Range 1E, Section 14
NAD 83 UTM ZONE 12, 431970 East 4393043 North

Transect Information

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

N/A
256° magnetic
400ft
Line 1 (11ft & 95ft), Line 2 (34ft), Line 3 (59ft), Line 4 (71ft)
Belt 2: No Rebar, Belt 5: 4ft, Line 2: 50ft Long

Directions to Site

Just south of Nephi on Highway 28, turn south past the gravel pit onto a graded road. Drive for 0.9 miles to a fork. Bear left on the Old Pinery Road and proceed for 3.3 miles to an intersection. Turn left here and go 0.65 miles to a cattle guard at the top of the hill, then drive through Little Valley 1.1 miles to a gate at the north end of the valley. Continue for 0.05 more miles to a cattle guard. Proceed up the jeep trail 0.8 miles to a fork in a chained area. Take the right fork and proceed for 0.05 miles to the witness post on the left (north) side of the road. From the witness post, walk for 20 paces at 341 degrees magnetic to the 0-foot baseline stake.

Site Information

Land Ownership	State
Land Administrator	UDWR
Allotment	No data
Elevation	6,200ft (1,890m)
Aspect	West
Slope	15%
Sample Dates	05/27/1997, 12/13/2002, 05/31/2007, 05/29/2012, 05/18/2017

Table 16A-20.1 Disturbance History. Recorded history of major disturbances.

Treatment/Disturbance	Name	WRI DB#	Date	Size (acres)
Seeding - Dribbler	Triangle Ranch WMA Bullhog Project	3447	Spring 2016	302
Mechanical - Bullhog	Triangle Ranch WMA Bullhog Project	3447	July 2015-April 2016	302
Chaining - Chain Unknown	-	-	Early 1970s	-
Seeding - Seed Unknown	-	-	Early 1970s	-

Wildlife Habitat and Vegetation History

Table 16A-20.3 - Wildlife Seasonal Habitat. UDWR wildlife habitat and seasonality.

Species	Habitat	Season
Deer	crucial	winter
Elk	crucial	winter
Moose	substantial	year-long

Table 16A-20.4 - Vegetation History. The dominant vegetation type(s) and phase of woodland succession (Tausch, Miller, Roundy, & Chambers, 2009).

Year	Vegetation Type	Woodland Succession
1989	Mountain Big Sagebrush	Phase I
1997	Mountain Big Sagebrush	Phase I
2002	Mountain Big Sagebrush/Bulbous Bluegrass	Phase I
2007	Mountain Big Sagebrush/Bulbous Bluegrass	Phase I
2012	Mountain Big Sagebrush/Bulbous Bluegrass	Phase I
2017	Perennial Grass/Bulbous Bluegrass/Mountain Big Sagebrush	Phase I

Site Notes

No Notes

Soils

Table 16A-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	6.2	42.0	31.4	26.6	1.9	17.6	185.6	0.4	05/27/1997

Site Potential

1981 - 2010 Average Annual Precipitation	17 inches
NRCS Ecological Site	Mountain Loam (Mountain Big Sagebrush)
NRCS Ecological Site #	R047XA430UT
States and Transitions	No state and transition model is available for this ecological site.

From study establishment in 1989, mountain big sagebrush (*Artemisia tridentata* ssp. *vaseyana*) has been the dominant browse species on this site. Utah juniper (*Juniperus osteosperma*) trees have also been present throughout the duration of the study, although both cover and density decreased in 2017 following a bullhog treatment (Table 16A-20.1); the study site has been considered to be in Phase I of woodland succession in all study years (photos, Table 16A-20.4, Table 16A-20.12, Table 16A-20.13, Table 16A-20.14). The herbaceous understory has remained very abundant and diverse, with perennial grasses, including the introduced species smooth brome (*Bromus inermis*), intermediate wheatgrass (*Thinopyrum intermedium*), and orchardgrass (*Dactylis glomerata*), as the most abundant component in all sample years. However, the introduced species bulbous bluegrass (*Poa bulbosa*) has contributed the most cover of any one perennial grass species since 2002, and has been a co-dominant site component since 2002. Forbs have remained rare in comparison (Table 16A-20.7, Table 16A-20.10, Table 16A-20.11).

Trend Summary Tables

Table 16A-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
1997	12.8	0.0	1.1	-	-	-
2002	15.0	0.3	3.0	-	-	-
2007	10.2	0.5	4.7	8.1	0.1	0.7
2012	9.6	0.0	4.3	12.6	0.1	6.9
2017	7.0	0.0	-	6.0	0.1	0.2

Table 16A-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
1997	78	448	304	164	0.4	26.0	2.4	3.3
2002	56	422	245	157	0.1	29.7	1.2	3.7
2007	76	453	161	139	0.8	45.3	1.4	4.1
2012	8	463	62	138	0.0	42.3	0.3	3.3
2017	30	441	254	192	0.2	51.6	3.8	7.2

Table 16A-20.8 - 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
1997	12.8	0.1	50.8	1.1	0.2	47.7
2002	19.0	0.2	42.6	1.8	0.2	55.0
2007	12.4	0.2	39.8	2.4	0.1	60.1
2012	9.6	0.1	45.0	1.5	0.1	60.3
2017	9.5	0.0	58.8	1.8	0.1	63.2

Table 16A-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	Cattle	Mule Deer	Rocky Mountain Elk	Greater Sage-Grouse	Rabbit
	Quadrat Frequency				
1997	7	-	-	-	2
2002	5	9	-	-	8
2007	2	11	1	-	13
2012	4	2	-	-	16
2017	1	6	-	-	15
Year	Days Use Per Acre (ha)				
1997	-	-	-	-	-
2002	4.4 (10.8)	35.5 (87.7)	-	-	-
2007	4.4 (10.8)	40.2 (99.3)	-	-	-
2012	3.6 (9.0)	4.7 (11.6)	-	8.7 (21.5)*	-
2017	8.7 (21.5)	10.0 (24.8)	-	-	-

*Pellets per acre (ha)

Table 16A-20.10 - 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)	Dactylis glomerata ⁱ (orchardgrass)	Festuca idahoensis (Idaho fescue)	Leymus cinereus (basin wildrye)	Leymus salinus (saline wildrye)	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														
1997	18	-	43	78	91	102	1	6	164	77	1	218	66	-	127
2002	15	-	56	56	66	95	4	-	81	223	-	133	52	-	136
2007	13	26	61	58	82	128	6	2	81	304	-	52	37	1	113
2012	16	-	85	8	94	159	12	2	81	318	8	58	34	6	110
2017	7	-	91	30	80	96	25	-	55	362	5	30	62	1	153
year	Average Cover (%)														
1997	0.8	-	1.2	0.4	2.3	4.0	0.0	0.8	1.1	2.3	0.0	8.1	1.2	-	4.2
2002	0.4	-	2.7	0.1	3.1	6.1	0.8	-	0.8	7.9	-	3.6	0.8	-	3.5
2007	0.4	0.2	3.9	0.6	6.3	11.0	0.5	0.0	0.8	13.8	-	1.8	0.8	0.0	6.0
2012	0.5	-	3.6	0.0	4.9	8.5	1.1	0.1	1.2	14.9	0.1	0.7	0.5	0.2	5.9
2017	0.7	-	4.2	0.2	5.7	4.3	1.5	-	1.1	21.6	0.0	0.3	1.9	0.0	10.4

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

Table 16A-20.11 - Forb Species. Nested frequency and modified Daubenmire average cover by year.

FORB SPECIES	Agoseris glauca (pale agoseris)	Alyssum alyssoides ^{ai} (pale madwort)	Alyssum desertorum ^{ai} (desert madwort)	Antennaria parvifolia (small-leaf pussytoes)	Arabis (rockcress)	Astragalus cibirarius (browse milkvetch)	Astragalus convallarius (lesser rushy milkvetch)	Balsamorhiza sagittata (arrow/leaf balsamroot)	Calochortus nuttallii (sego lily)	Camelina microcarpa ^{ai} (littlepod false flax)	Castilleja linariifolia (Wyoming Indian paintbrush)	Ceratocephala testiculata ^{ai} (curveseed butterwort)	Cirsium undulatum ^a (wavy/leaf thistle)	Collinsia parviflora ^a (maiden blue eyed Mary)	Collomia linearis ^a (tiny trumpet)	Crepis acuminata (tapertip hawksbeard)	Cymopterus (springparsley)
year	Nested Frequency																
1997	98	-	41	6	10	68	7	3	10	-	-	117	0	217	7	12	4
2002	61	-	98	-	2	86	2	4	15	-	-	51	-	190	9	34	8
2007	30	-	76	-	-	72	0	-	10	2	-	30	-	70	-	31	6
2012	24	-	14	-	-	83	2	0	-	-	3	1	1	10	-	44	6
2017	51	12	150	3	-	108	8	-	11	2	-	10	3	68	11	44	1
year	Average Cover (%)																
1997	0.8	-	0.1	0.0	0.0	1.8	0.1	0.0	0.0	-	-	0.3	0.0	0.6	0.1	0.1	0.0
2002	0.3	-	0.3	-	0.0	2.1	0.2	0.0	0.0	-	-	0.1	-	0.6	0.0	0.7	0.0
2007	0.2	-	0.2	-	-	2.4	0.0	-	0.0	0.0	-	0.1	-	0.2	-	0.8	0.0
2012	0.1	-	0.0	-	-	2.5	0.0	0.0	-	-	0.0	0.0	0.0	0.0	-	0.5	0.0
2017	0.3	0.0	2.1	0.0	-	4.3	0.2	-	0.1	0.0	-	0.0	0.2	0.4	0.0	1.4	0.0

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

FORB SPECIES	Draba ^a (draba)	Epilobium brachycarpum ^a (tall annual willowherb)	Eriogonum racemosum (redroot buckwheat)	Eriogonum umbellatum (sulphur-flower buckwheat)	Erodium cicutarium ^{ai} (redstem stork's bill)	Galium aparine ^a (stickywilly)	Lactuca serriola ^{ai} (prickly lettuce)	Lappula occidentalis ^a (flatspine stickseed)	Linum perenne ⁱ (blue flax)	Medicago sativa ⁱ (alfalfa)	Microseris nutans (nodding microseris)	Microsteris gracilis ^a (slender phlox)	Penstemon (beardtongue)	Phlox longifolia (longleaf phlox)	Polygonum douglasii ^a (Douglas' knotweed)	Silene antirrhina ^a (sleepy silene)	Sphaeralcea coccinea (scarlet globemallow)
year	Nested Frequency																
1997	3	69	3	6	-	28	2	14	21	-	-	-	-	21	8	-	9
2002	-	21	1	6	-	-	-	-	6	-	-	22	2	21	4	-	3
2007	2	27	6	6	-	29	1	-	0	1	-	5	-	24	-	1	5
2012	-	6	2	3	-	10	3	-	7	-	-	-	-	7	-	2	3
2017	-	22	-	5	2	20	69	8	6	-	16	18	-	11	-	-	1
year	Average Cover (%)																
1997	0.0	0.2	0.0	0.1	-	0.5	0.0	0.0	0.1	-	-	-	-	0.0	0.0	-	0.0
2002	-	0.1	0.0	0.0	-	-	-	-	0.0	-	-	0.0	0.0	0.0	0.0	-	0.0
2007	0.0	0.1	0.0	0.1	-	0.8	0.0	-	0.1	0.0	-	0.0	-	0.1	-	0.0	0.0
2012	-	0.0	0.0	0.0	-	0.0	0.0	-	0.0	-	-	-	-	0.0	-	0.0	0.0
2017	-	0.1	-	0.0	0.0	0.3	0.3	0.1	0.1	-	0.1	0.0	-	0.1	-	-	0.0

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

FORB SPECIES	Symphoricarum ascendens (western aster)	Taraxacum officinale (common dandelion)	Tragopogon dubius ^{ai} (yellow salsify)	unknown annual forb ^a (unknown forb)	Vicia americana (American vetch)	Viola (violet)	Zigadenus paniculatus (foothill deathcamas)
year	Nested Frequency						
1997	-	1	60	24	-	5	6
2002	4	-	14	-	-	1	7
2007	5	-	6	-	3	0	5
2012	-	-	18	-	2	8	6
2017	-	-	24	-	9	5	6
year	Average Cover (%)						
1997	-	0.0	0.6	0.1	-	0.0	0.0
2002	0.1	-	0.1	-	-	0.0	0.1
2007	0.2	-	0.0	-	0.1	0.0	0.1
2012	-	-	0.2	-	0.0	0.0	0.0
2017	-	-	0.2	-	0.5	0.0	0.1

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

Table 16A-20.12 - Shrub and Tree Species. Average modified Daubenmire quadrat and line intercept cover by year.

SHRUB SPECIES	Line Intercept Cover (%)					
	year	1997	2002	2007	2012	2017
Artemisia tridentata ssp. vaseyana ^p (mountain big sagebrush)	-	-	-	-	-	-
Ericameria nauseosa ssp. nauseosa var. speciosa ^p (rubber rabbitbrush)	-	-	-	-	-	-
Gutierrezia sarothrae (broom snakeweed)	7.8	0.3	0.1	0.7	-	-
Juniperus osteosperma ⁱ (Utah juniper)	9.5	-	0.1	6.9	-	3.1
Purshia tridentata ^p (antelope bitterbrush)	4.7	-	0.1	0.2	-	1.3
Quercus gambelii ^p (Gambel oak)	-	-	-	-	-	-

year	Quadrat Cover (%)					
	1997	2002	2007	2012	2017	
1997	12.0	0.1	0.0	1.1	0.1	0.6
2002	13.7	0.7	0.3	3.0	-	0.6
2007	9.2	0.2	0.5	4.7	-	0.8
2012	8.9	-	0.0	4.3	-	0.8
2017	6.0	-	0.0	0.0	-	1.0

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

Table 16A-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 (%)				
Amelanchier utahensis^p -- (Utah serviceberry)									
1997	-	-	-	-	-	-	-	-	82/76
2002	-	-	-	-	-	-	-	-	98/104
2007	-	-	-	-	-	-	-	-	81/90
2012	-	-	-	-	-	-	-	-	88/74
2017	-	-	-	-	-	-	-	-	87/93
Artemisia tridentata ssp. vaseyana^p -- (mountain big sagebrush)									
1997	3180	140	28	65	8	16	3	5	67/96
2002	2900	20	10	61	29	26	0	11	64/93
2007	2320	-	6	59	35	27	28	28	67/98
2012	1940	-	14	63	23	17	1	18	64/83
2017	2380	1100	48	37	15	6	0	13	51/73
Chrysothamnus viscidiflorus ssp. viscidiflorus var. viscidiflorus -- (yellow rabbitbrush)									
1997	-	-	-	-	-	-	-	-	-/-
2002	-	-	-	-	-	-	-	-	27/38
2007	-	-	-	-	-	-	-	-	-/-
2012	-	-	-	-	-	-	-	-	49/47
2017	20	-	0	100	0	0	0	0	21/34
Ericameria nauseosa ssp. nauseosa var. speciosa^p -- (rubber rabbitbrush)									
1997	140	-	29	57	14	0	0	14	83/72
2002	140	-	0	43	57	71	0	0	68/72
2007	80	-	0	0	100	50	25	75	76/78
2012	20	-	100	0	0	0	0	0	64/63
2017	-	-	-	-	-	-	-	-	34/40
Gutierrezia sarothrae -- (broom snakeweed)									
1997	240	20	42	58	0	0	0	0	11/9
2002	1320	-	21	73	6	0	0	5	11/16
2007	520	20	4	77	19	0	0	4	18/20
2012	80	-	50	50	0	0	0	0	15/18
2017	320	40	13	88	0	0	0	0	16/24

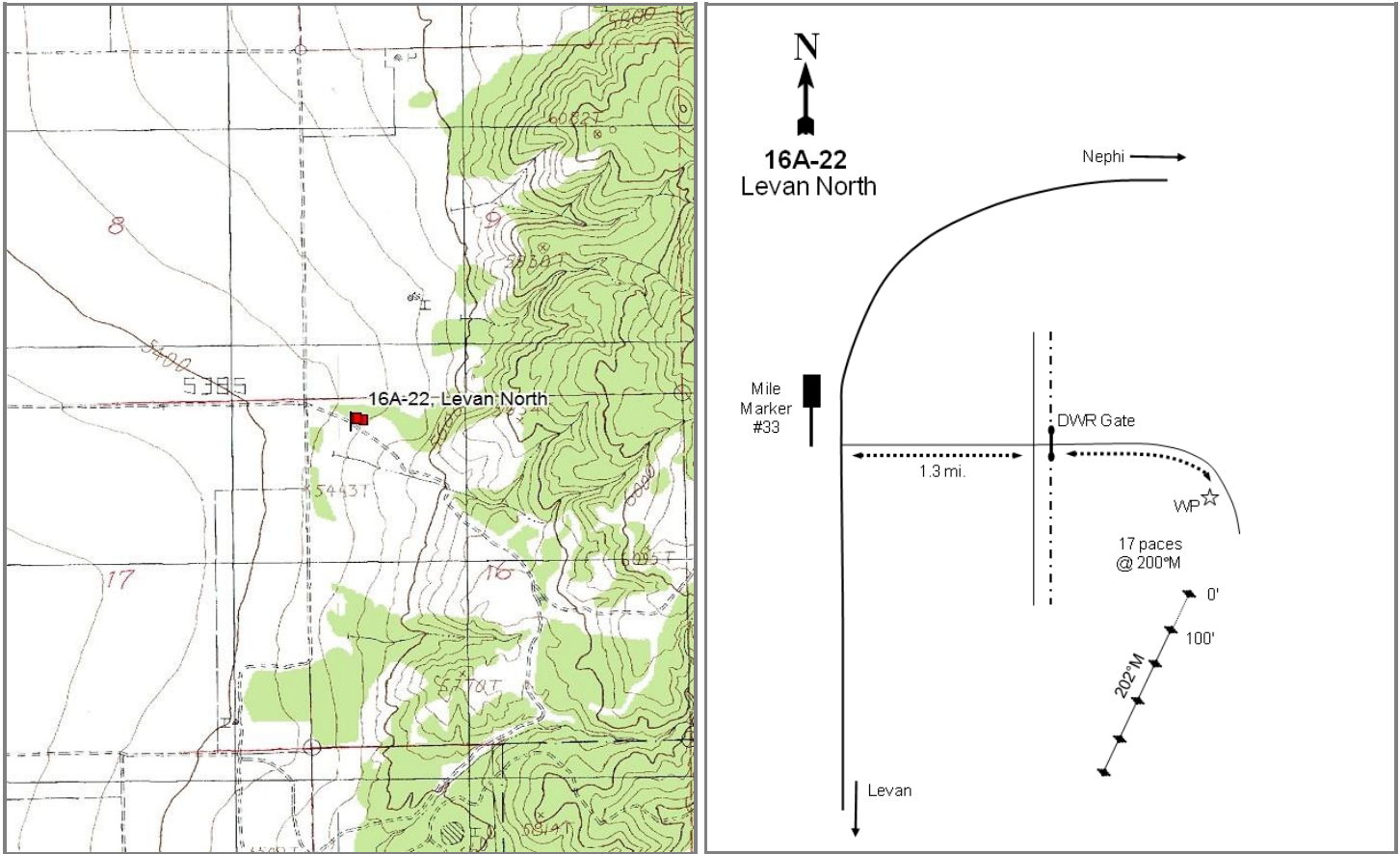
Year	Density		Age Class Distribution			Utilization		Poor Vigor (%)	Average Height Crown (cm)
	Plants Per Acre		Excluding Seedlings			Moderate (%)	Heavy (%)		
	Excluding Seedlings	Seedling	Young (%)	Mature (%)	Decadent (%)				
Juniperus osteosperma^t -- (Utah juniper)									
1997	40	-	100	0	0	0	0	0	- / -
2002	160	-	0	100	0	0	0	0	- / -
2007	160	-	25	75	0	0	0	0	- / -
2012	120	-	50	50	0	0	0	0	- / -
2017	-	-	-	-	-	-	-	-	- / -
Peraphyllum ramosissimum^p -- (wild crab apple)									
1997	-	-	-	-	-	-	-	-	- / -
2002	-	-	-	-	-	-	-	-	130/163
2007	-	-	-	-	-	-	-	-	- / -
2012	-	-	-	-	-	-	-	-	163/161
2017	-	-	-	-	-	-	-	-	173/176
Purshia stansburiana^p -- (Stansbury cliffrose)									
1997	-	-	-	-	-	-	-	-	- / -
2002	-	-	-	-	-	-	-	-	- / -
2007	-	-	-	-	-	-	-	-	- / -
2012	20	-	100	0	0	0	0	0	101/131
2017	-	-	-	-	-	-	-	-	59/81
Purshia tridentata^p -- (antelope bitterbrush)									
1997	40	-	0	100	0	0	100	0	59/83
2002	20	-	0	100	0	0	0	0	49/129
2007	-	-	-	-	-	-	-	-	77/99
2012	-	-	-	-	-	-	-	-	76/238
2017	-	-	-	-	-	-	-	-	79/120
Quercus gambelii^p -- (Gambel oak)									
1997	-	-	-	-	-	-	-	-	- / -
2002	300	-	0	100	0	53	0	0	137/91
2007	220	-	9	73	18	0	0	27	- / -
2012	160	-	25	75	0	0	0	25	109/90
2017	120	-	33	67	0	67	0	0	74/91
Symphoricarpos oreophilus -- (mountain snowberry)									
1997	-	-	-	-	-	-	-	-	- / -
2002	-	-	-	-	-	-	-	-	- / -
2007	-	-	-	-	-	-	-	-	- / -
2012	-	-	-	-	-	-	-	-	143/160
2017	-	-	-	-	-	-	-	-	54/61

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

Table 16A-20.14 - 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	110	-	-	-	-	-	10.7
2007	117	5	20	25	25	25	10.7
2012	131	-	20	10	30	40	12.7
2017	10	-	100	-	-	-	31.0

LEVAN NORTH - STUDY NO. 16A-22



Location Information

USGS 7.5 min Map Info	Levan NW; Township 14S, Range 1E, Section 16
GPS (0' Stake)	NAD 83 UTM ZONE 12, 428447 East 4383802 North

Transect Information

Browse Tag # (0' Stake)	184
Transect Bearing	202° 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 Nephi, travel south on Highway 28 and turn left (east) at mile marker 33. Travel east for 1.3 miles; cross a road and a UDWR fence that is immediately after the road. Continue east for 0.15 miles to a witness post on the right (south). From the witness post, the 0-foot baseline stake is 17 paces away at 200 degrees magnetic and is marked by browse tag #184.

Site Information

Land Ownership	State
Land Administrator	UDWR
Allotment	No data
Elevation	5,460ft (1,664m)
Aspect	Northwest
Slope	5-10%
Sample Dates	06/18/2007, 05/24/2012, 05/24/2017

Table 16A-22.1 Disturbance History. Recorded history of major disturbances.

Treatment/Disturbance	Name	WRI DB#	Date	Size (acres)
Mechanical - Bullhog	Levan Wildlife Management Area Bullhog	3954	2017 or 2018?	808
Chaining - Chain Unknown	-	-	Early 1970s	-
Seeding - Seed Unknown	-	-	Early 1970s	-
Hand Crew - Lop and Scatter	Levan Farm WMA Habitat Improvement	271	Fall 2006	700

Wildlife Habitat and Vegetation History

Table 16A-22.3 - Wildlife Seasonal Habitat. UDWR wildlife habitat and seasonality.

Species	Habitat	Season
Deer	crucial	winter

Table 16A-22.4 - Vegetation History. The dominant vegetation type(s) and phase of woodland succession (Tausch, Miller, Roundy, & Chambers, 2009).

Year	Vegetation Type	Woodland Succession
2007	Perennial Grass/Mountain Big Sagebrush	Phase I
2012	Perennial Grass/Mountain Big Sagebrush	Phase I
2017	Bulbous Bluegrass/Mountain Big Sagebrush	Phase I

Site Notes

This study was established (in part) to replace the Levan Farm Chaining (16A-16) study.

Soils

Table 16A-22.5 - 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	67.2	15.5	17.3	2.9	11.9	227.2	0.8	06/18/2007

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.

Since study establishment in 2007, mountain big sagebrush (*Artemisia tridentata* ssp. *vaseyana*) has been the dominant browse species on this site with antelope bitterbrush (*Purshia tridentata*) as a minor component. Utah juniper (*Juniperus osteosperma*) trees are also present, placing the site in Phase I of encroachment (Table 16A-22.4, Table 16A- 22.12, Table 16A-22.13, Table 16A-22.14). The herbaceous understory has been abundant in all sample years, with a diverse mixture of perennial grasses including the introduced species crested wheatgrass (*Agropyron cristatum*) providing the most herbaceous cover; in 2017 the introduced species bulbous bluegrass (*Poa bulbosa*) was the most abundant species. In addition, the noxious and introduced perennial forb field bindweed (*Convolvulus arvensis*) has been observed in each sample year, albeit in low abundance. Forbs, although diverse, have remained rare (Table 16A- 22.7, Table 16A-22.10, Table 16A-22.11).

Trend Summary Tables

Table 16A-22.6 - 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	1.0	0.0	6.5	2.0	0.2	9.7
2012	1.2	0.1	5.1	2.9	-	8.3
2017	1.8	0.9	4.3	2.4	0.9	6.2

Table 16A-22.7 - 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	361	360	339	62	9.6	21.8	3.1	0.6
2012	182	432	240	77	3.1	31.2	1.4	1.1
2017	151	436	265	98	4.3	34.9	5.5	1.7

Table 16A-22.8 - 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
2007	9.2	2.7	46.9	4.2	3.7	45.7
2012	9.5	1.0	50.2	3.5	4.7	51.1
2017	16.3	4.1	37.5	8.1	4.3	52.2

Table 16A-22.9 - 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	Rocky Mountain Elk	Rabbit
	Quadrat Frequency			
2007	6	23	5	52
2012	3	6	-	9
2017	5	14	2	18
Year	Days Use Per Acre (ha)			
2007	12.3 (30.5)	37.5 (92.7)	1.3 (3.3)	-
2012	13.8 (34.1)	11.4 (28.1)	-	-
2017	11.6 (28.7)	20.8 (51.3)	-	-

Table 16A-22.10 - Grass Species. Nested frequency and modified Daubenmire average cover by year.

GRASS SPECIES	Agropyron cristatum ⁱ (crested wheatgrass)	Bromus arvensis ^{at} (field brome)	Bromus inermis ⁱ (smooth brome)	Bromus tectorum ^{at} (cheatgrass)	Dactylis glomerata ⁱ (orchardgrass)	Festuca idahoensis (Idaho fescue)	Poa bulbosa ⁱ (bulbous bluegrass)	Poa secunda (Sandberg bluegrass)	Pseudoroegneria spicata (bluebunch wheatgrass)	Thinopyrum intermedium ⁱ (intermediate wheatgrass)
year	Nested Frequency									
2007	276	45	1	352	5	-	54	109	80	14
2012	233	40	1	153	9	7	200	189	122	39
2017	281	66	8	100	8	-	323	61	46	71
year	Average Cover (%)									
2007	15.0	0.2	0.0	9.4	0.2	-	1.2	2.6	2.4	0.3
2012	10.5	0.2	0.0	2.9	0.9	0.3	7.6	6.5	4.3	1.0
2017	11.1	1.5	0.7	2.7	0.6	-	17.6	2.1	1.3	1.5

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

Table 16A-22.11 - Forb Species. Nested frequency and modified Daubenmire average cover by year.

FORB SPECIES	Allium acuminatum (tapertip onion)	Alyssum desertorum ^{ai} (desert madwort)	Astragalus eurekaensis (Eureka milkvetch)	Calochortus nuttallii (sego lily)	Camelina microcarpa ^{ai} (littlepod false flax)	Ceratocephala testiculata ^{ai} (curveseed butterwort)	Chaetopappa ericoides (rose heath)	Collinsia parviflora ^a (maiden blue eyed Mary)	Convolvulus arvensis ⁿⁱ (field bindweed)	Descurainia pinnata ^a (western tansymustard)	Draba ^a (draba)	Eriogonum racemosum (redroot buckwheat)	Erodium cicutarium ^{ai} (redstem stork's bill)	Lactuca serriola ^{ai} (prickly lettuce)	Microsteris gracilis ^a (slender phlox)	Phlox longifolia (longleaf phlox)	Silene antirrhina ^a (steepy silene)
year	Nested Frequency																
2007	-	302	7	-	4	64	9	37	29	-	14	1	58	6	13	2	140
2012	-	184	6	5	-	38	11	33	26	-	17	3	12	-	5	11	61
2017	1	237	5	17	-	-	21	20	32	1	-	1	61	19	-	8	5
year	Average Cover (%)																
2007	-	1.4	0.0	-	0.0	0.2	0.1	0.1	0.4	-	0.1	0.0	0.4	0.0	0.0	0.0	0.8
2012	-	0.6	0.1	0.0	-	0.1	0.3	0.1	0.2	-	0.0	0.1	0.0	-	0.0	0.0	0.3
2017	0.0	3.0	0.0	0.0	-	-	0.5	0.3	0.6	0.0	-	0.0	2.0	0.0	-	0.0	0.0

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

FORB SPECIES	Sisymbrium altissimum ^{ai} (tall tumbledustard)	Sphaeralcea coccinea (scarlet globemallow)	Tragopogon dubius ^{ai} (yellow salsify)
year	Nested Frequency		
2007	1	17	6
2012	-	26	23
2017	-	26	7
year	Average Cover (%)		
2007	0.0	0.2	0.0
2012	-	0.4	0.2
2017	-	0.5	0.0

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

Table 16A-22.12 - Shrub and Tree Species. Average modified Daubenmire quadrat and line intercept cover by year.

SHRUB SPECIES	Line Intercept Cover (%)				
	year	2007	2012	2017	
Artemisia tridentata ssp. vaseyana ^p (mountain big sagebrush)	1.8	0.2	9.7	0.2	
Gutierrezia sarothrae (broom snakeweed)	1.6	0	8.3	1.3	
Juniperus osteosperma ^t (Utah juniper)	2.4	0.9	6.2	0	
Purshia tridentata ^p (antelope bitterbrush)	1.0	0.0	6.5	0.0	
	2012	1.2	0.1	5.1	0.0
	2017	1.8	0.9	4.3	0.0

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

Table 16A-22.13 - 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)									
2007	480	-	0	17	83	21	54	79	64/83
2012	380	1020	5	53	42	26	16	0	62/78
2017	780	-	31	51	18	26	3	8	63/91
Chrysothamnus viscidiflorus ssp. viscidiflorus var. viscidiflorus -- (yellow rabbitbrush)									
2007	-	-	-	-	-	-	-	-	23/47
2012	20	-	0	100	0	100	0	0	20/46
2017	-	-	-	-	-	-	-	-	-/-
Ephedra viridis^p -- (mormon tea)									
2007	-	-	-	-	-	-	-	-	-/-
2012	-	-	-	-	-	-	-	-	92/105
2017	-	-	-	-	-	-	-	-	-/-
Ericameria nauseosa ssp. nauseosa var. speciosa^p -- (rubber rabbitbrush)									
2007	-	-	-	-	-	-	-	-	-/-
2012	-	-	-	-	-	-	-	-	33/34
2017	-	-	-	-	-	-	-	-	-/-
Gutierrezia sarothrae -- (broom snakeweed)									
2007	80	-	50	50	0	0	0	0	21/29
2012	260	60	62	39	0	0	0	0	21/29
2017	1540	120	20	81	0	1	0	0	23/27
Juniperus osteosperma^t -- (Utah juniper)									
2007	80	-	25	75	0	0	0	0	-/-
2012	160	20	13	75	13	0	13	14	-/-
2017	80	-	0	100	0	0	0	0	-/-
Pinus edulis^t -- (twoneedle pinyon)									
2007	-	-	-	-	-	-	-	-	-/-
2012	20	-	0	100	0	0	0	0	-/-
2017	-	-	-	-	-	-	-	-	-/-
Purshia stansburiana^p -- (Stansbury cliffrose)									
2007	-	-	-	-	-	-	-	-	161/117
2012	-	-	-	-	-	-	-	-	163/159
2017	-	-	-	-	-	-	-	-	184/186

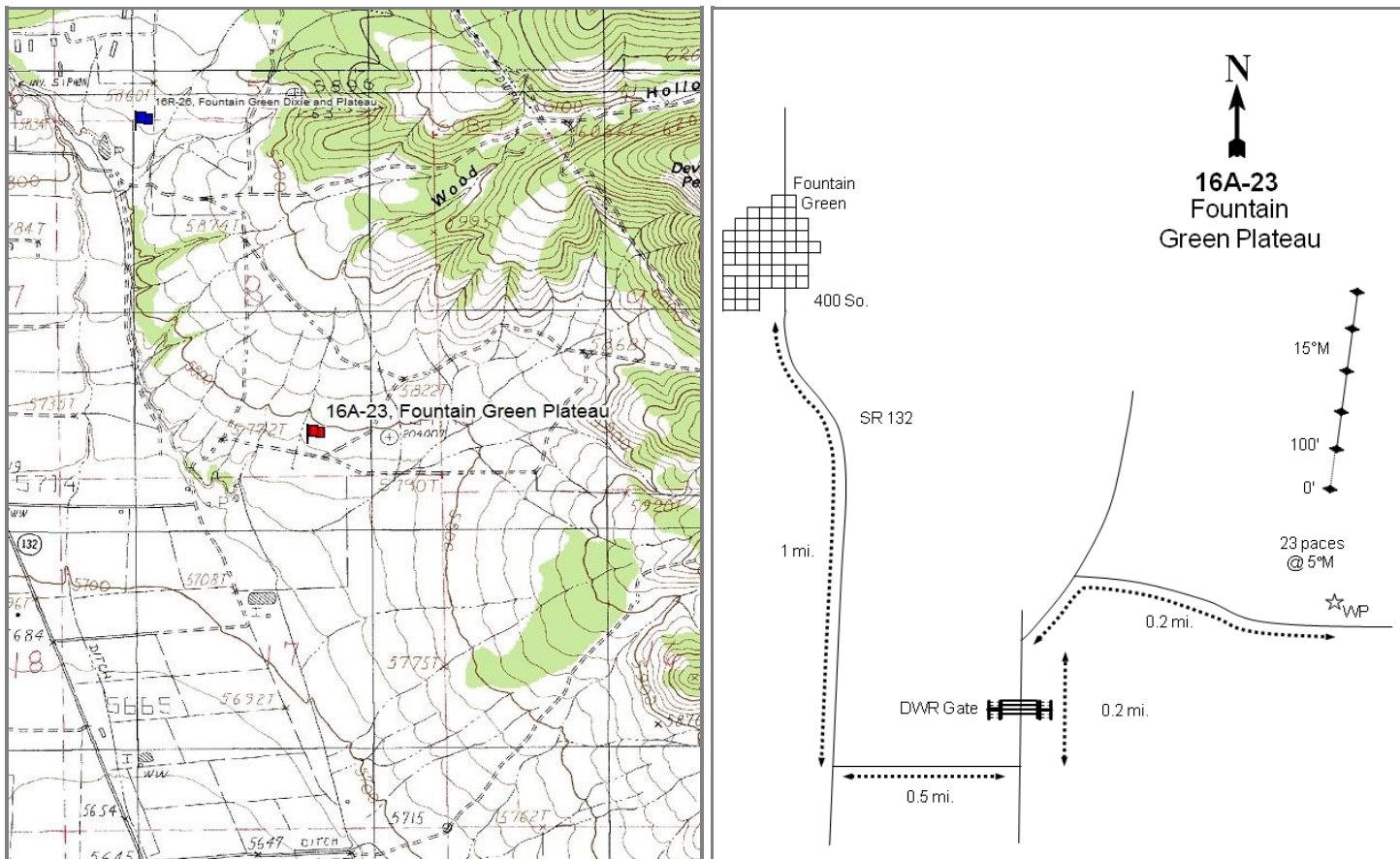
Year	Density		Age Class Distribution			Utilization		Poor Vigor (%)	Average Height Crown (cm)
	Plants Per Acre		Excluding Seedlings			Moderate (%)	Heavy (%)		
	Excluding Seedlings	Seedling	Young (%)	Mature (%)	Decadent (%)				
Purshia tridentata ^P -- (antelope bitterbrush)									
2007	20	-	0	100	0	0	0	0	69/126
2012	180	-	0	100	0	11	89	0	62/105
2017	20	-	0	100	0	0	100	0	99/181

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

Table 16A-22.14 - 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	36	-	-	13	38	50	21.0
2012	28	8	8	25	25	33	16.7
2017	27	-	17	33	42	8	15.7

FOUNTAIN GREEN PLATEAU - STUDY NO. 16A-23



Location Information

USGS 7.5 min Map Info	Moroni NW; Township 14S, Range 3E, Section 08
GPS (0' Stake)	NAD 83 UTM ZONE 12, 447673 East 4384594 North

Transect Information

Browse Tag # (0' Stake)	193
Transect Bearing	15° 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 curve in SR-132 on the south end of Fountain Green, travel south on SR-132 for 1 mile and turn left (east) onto a dirt road that goes toward the GBRC farm. Travel on this road for 0.5 miles to a "T"-intersection and turn left (north) towards a hill. Travel for 0.2 miles up the hill, passing through a gate to the DWR property to an intersection. Turn right (east) here and travel 0.2 miles to the witness post on the left (north) side of the road. From the witness post, the 0-foot baseline stake is 23 paces away at 5 degrees magnetic and is marked by browse tag #193.

Site Information

Land Ownership	State
Land Administrator	UDWR
Allotment	No data
Elevation	5,775ft (1,760m)
Aspect	Southwest
Slope	5%
Sample Dates	07/03/2007, 05/14/2012, 05/15/2017

Table 16A-23.1 Disturbance History. Recorded history of major disturbances.

Treatment/Disturbance	Name	WRI DB#	Date	Size (acres)
Herbicide - Plateau	Fountain Green WMA Habitat Improvement	288	September 2007	275

Table 16A-23.2 Seed Mix. List of known seeded plant species and rates (if available).

Mix Name			Application Type	Application Date	Acres
CRO WMA			Broadcast	Oct 2016	57
Type	Species	Common Name	Cultivar/Source ID	Bulk lbs/acre	PLS lbs/acre
G	Leymus cinereus	Great Basin Wildrye	UDWR IntMtn Tetra	0.88	0.59
G	Pascopyrum smithii	Western Wheatgrass	Arriba	0.88	0.81
G	Poa secunda	Sandberg Bluegrass	Mountain Home	0.44	0.35
G	Pseudoroegneria spicata	Bluebunch Wheatgrass	Columbia	1.75	1.55
F	Linum perenne	Blue Flax	Appar	0.88	0.78
F	Medicago sativa	Alfalfa	Ladak +	0.88	0.84
F	Onobrychis viciifolia	Sainfoin	Eski	3.51	3.33
F	Sanguisorba minor	Small Burnet	Delar	1.75	1.65
S	Artemisia tridentata ssp. wyomingensis	Wyoming Big Sagebrush	Sanpete UT	1.40	0.27

Wildlife Habitat and Vegetation History

Table 16A-23.3 - Wildlife Seasonal Habitat. UDWR wildlife habitat and seasonality.

Species	Habitat	Season
Greater Sage Grouse	occupied	year-long

Table 16A-23.4 - 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	No Encroachment
2012	Wyoming Big Sagebrush/Annual Grass	No Encroachment
2017	Wyoming Big Sagebrush/Annual Grass	No Encroachment

Site Notes

Two deer carcasses were found on site in 2007, and sheep were on the site when it was read in May of 2012.

Soils

Table 16A-23.5 - 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	56.2	24.0	19.8	1.6	12.3	486.4	0.6	07/03/2007

Site Potential

1981 - 2010 Average Annual Precipitation	13 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.

Wyoming big sagebrush (*Artemisia tridentata* ssp. *wyomingensis*) has dominated the shrub component of this site since study establishment in 2007, although density decreased by more than half between 2012 and 2017 (Table 16A-23.12, Table 16A-23.13). The introduced annual grass cheatgrass (*Bromus tectorum*) is the most abundant species in the herbaceous understory. Cover and frequency of cheatgrass did decrease as of the first sampling after a herbicide treatment (Table 16A-23.1) while that of perennial grasses increased, but annual grasses were nearly at pre-treatment levels in 2017; as such, this study site may suffer the effects of an increased fuel load should a wildfire occur. Forbs have remained rare (Table 16A-23.7, Table 16A-23.10, Table 16A-23.11).

Trend Summary Tables

Table 16A-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
2007	3.4	1.1	-	3.7	0.8	-
2012	8.2	1.0	-	8.2	1.6	-
2017	2.0	1.0	-	2.2	2.0	-

Table 16A-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
2007	475	221	396	77	27.1	1.9	4.3	0.4
2012	312	350	295	42	9.8	15.2	1.9	0.1
2017	451	317	327	77	26.3	8.1	3.5	0.5

Table 16A-23.8 - 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
2007	19.5	1.8	44.5	0.5	2.2	41.6
2012	21.3	0.8	39.1	0.3	2.5	35.7
2017	33.5	1.7	34.0	1.8	2.8	42.9

Table 16A-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/Domestic Sheep	Rocky Mountain Elk	Greater Sage-Grouse	Rabbit
	Quadrat Frequency				
2007	-	52	5	-	60
2012	-	23	-	-	42
2017	1	23	-	-	52
Year	Days Use Per Acre (ha)				
2007	-	87.8 (216.8)	1.3 (3.3)	-	-
2012	-	46.2 (114.2)	0.7 (1.7)	8.7 (21.5)*	-
2017	-	22.1 (54.6)	-	-	-

*Pellets per acre (ha)

Table 16A-23.10 - Grass Species. Nested frequency and modified Daubenmire average cover by year.

GRASS SPECIES	Bromus tectorum ^{ai} (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)	Secale cereale ^{ai} (cereal rye)	Sporobolus cryptandrus (sand dropseed)	Vulpia octoflora ^a (sixweeks fescue)
year	Nested Frequency									
2007	475	8	10	202	-	4	10	11	-	3
2012	312	-	25	336	-	9	13	-	3	-
2017	451	10	28	302	4	3	6	-	5	-
year	Average Cover (%)									
2007	27.0	0.1	0.3	1.2	-	0.1	0.3	0.1	-	0.0
2012	9.8	-	0.1	14.1	-	0.1	0.9	-	0.0	-
2017	26.3	0.6	0.6	6.4	0.1	0.0	0.5	-	0.0	-

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

Table 16A-23.11 - Forb Species. Nested frequency and modified Daubenmire average cover by year.

FORB SPECIES																
Alyssum desertorum ^{ai} (desert madwort)																
Calochortus nuttallii (sego lily)																
Ceratocephala testiculata ^{ai} (curveseed butterwort)																
Crepis acuminata (tapertip hawkbeard)																
Erigeron pumilus (shaggy fleabane)																
Eriogonum umbellatum (sulphur-flower buckwheat)																
Erodium cicutarium ^{ai} (redstem stork's bill)																
Gilia inconspicua ^a (shy gilia)																
Lappula occidentalis ^a (flatspine stickseed)																
Lotus utahensis (Utah bird's-foot trefoil)																
Onobrychis vicifolia ^a (sainfoin)																
Phlox longifolia (longleaf phlox)																
Salsola tragus ^{ai} (prickly Russian thistle)																
Sisymbrium altissimum ^{ai} (tall tumbled mustard)																
Sphaeralcea coccinea (scarlet globemallow)																
year	Nested Frequency															
2007	376	-	160	-	-	-	103	-	1	-	-	-	-	2	77	
2012	239	-	138	3	2	1	9	-	13	1	-	3	3	-	36	
2017	158	7	293	6	7	-	23	20	-	2	22	1	-	-	42	
year	Average Cover (%)															
2007	2.0	-	0.5	-	-	-	1.7	-	0.0	-	-	-	-	0.0	0.4	
2012	1.0	-	0.8	0.0	0.0	0.0	0.0	-	0.0	0.0	-	0.0	0.0	-	0.1	
2017	0.3	0.1	3.0	0.0	0.0	-	0.1	0.1	-	0.0	0.1	0.0	-	-	0.3	

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

Table 16A-23.12 - 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 sp. viscidiflorus var. viscidiflorus (yellow rabbitbrush)			
Opuntia polyacantha (plains pricklypear)			
year	Line Intercept Cover (%)		
2007	3.7	-	0.8
2012	8.2	0	1.6
2017	2.2	-	2
year	Quadrat Cover (%)		
2007	3.4	-	1.1
2012	8.2	0.0	1.0
2017	2.0	-	1.0

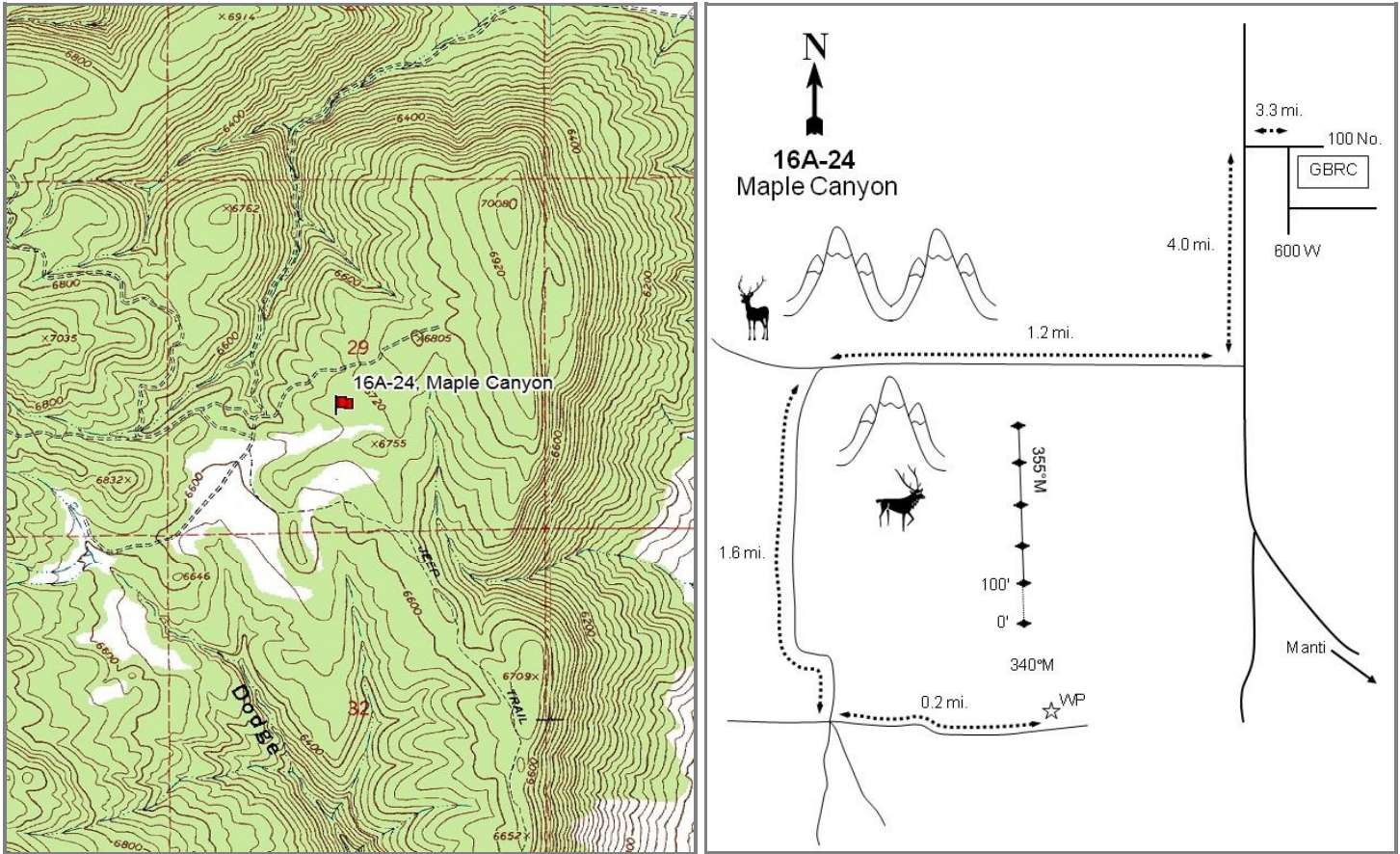
t - Tree Species; p - Preferred Browse; i - Introduced Species

Table 16A-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. wyomingensis^p -- (Wyoming big sagebrush)									
2007	1200	-	0	32	68	12	87	55	73/101
2012	2460	760	47	38	15	26	9	9	76/100
2017	920	200	37	13	50	17	28	28	71/92
Chrysothamnus viscidiflorus ssp. viscidiflorus var. viscidiflorus -- (yellow rabbitbrush)									
2007	-	-	-	-	-	-	-	-	53/124
2012	40	-	50	50	0	0	100	50	- / -
2017	-	-	-	-	-	-	-	-	18/20
Echinocereus -- (hedgehog cactus)									
2007	-	-	-	-	-	-	-	-	- / -
2012	-	-	-	-	-	-	-	-	- / -
2017	-	-	-	-	-	-	-	-	31/60
Opuntia polyacantha -- (plains pricklypear)									
2007	440	-	0	91	9	0	0	0	20/47
2012	520	-	4	85	12	4	8	8	17/74
2017	1060	-	13	85	2	0	2	2	17/62

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

MAPLE CANYON - STUDY NO. 16A-24



Location Information

USGS 7.5 min Map Info	Manti SW; Township 17S, Range 2E, Section 29
GPS (0' Stake)	NAD 83 UTM ZONE 12, 437954 East 4350784 North

Transect Information

Browse Tag # (0' Stake)	179
Transect Bearing	355° magnetic (Line 5: 66° magnetic)
Length	500ft
Belt Placement	Line 1 (11ft), Line 2 (34ft), Line 3 (59ft), Line 4 (71ft), Line 5 (95ft)
Belt Marker Placement	Standard

Directions to Site

Starting at the intersection of 100 North and 600 West in Ephraim, travel 3.3 miles west on 100 North. Turn left (south) at the intersection and travel 4.0 miles to another intersection. Turn right (west). Travel for 1.2 miles up the canyon to a "Y" intersection and turn left (south). Travel 1.6 miles to five point intersection on top of the ridge. Take the furthest left (east) road and travel 0.2 miles to a witness post on the north side of the road. The 0-foot stake (browse tag #179) is found 340 degrees magnetic from the witness post.

Site Information

Land Ownership	State
Land Administrator	UDWR
Allotment	No data
Elevation	6,660ft (2,030m)
Aspect	West
Slope	5%
Sample Dates	05/30/2012, 05/31/2017

Table 16A-24.1 Disturbance History. Recorded history of major disturbances.

Treatment/Disturbance	Name	WRI DB#	Date	Size (acres)
Mechanical - Bullhog	Maple Canyon WMA Habitat Improvement	2352	September 2012-October 2013	514

Wildlife Habitat and Vegetation History

Table 16A-24.3 - Wildlife Seasonal Habitat. UDWR wildlife habitat and seasonality.

Species	Habitat	Season
Deer	crucial	winter/spring

Table 16A-24.4 - 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	Phase II transitioning to Phase III
2017	Perennial Grass/Mountain Big Sagebrush	Phase I

Site Notes

No Notes

Soils

Table 16A-24.5 - 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	32.4	33.1	34.5	3.5	4.1	92.0	1.0	05/30/2012

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.

When established in 2012, this study site was dominated by Utah juniper (*Juniperus osteosperma*) and twoneedle pinyon (*Pinus edulis*) and was considered to be within Phase II transitioning to Phase III of woodland succession. Browse species such as mountain big sagebrush (*Artemisia tridentata* ssp. *vaseyana*) and antelope bitterbrush (*Purshia tridentata*) were present, but contributed much less cover. A bullhog treatment in 2012/2013 removed most of the trees (photos, Table 16A-24.4, Table 16A-24.12, Table 16A-24.13, Table 16A-24.14), and the site transitioned to one dominated by perennial grasses -- namely the introduced species crested wheatgrass (*Agropyron cristatum*) and the native species bluebunch wheatgrass (*Pseudoroegneria spicata*) -- and sagebrush (Table 16A-24.7, Table 16A-24.10); the densities and cover of both bitterbrush and sagebrush increased between 2012 and 2017 (Table 16A-24.12, Table 16A-24.13). Forbs have remained rare, and the noxious and introduced annual forb species nodding plumeless thistle (*Carduus nutans*) was observed in 2017 (Table 16A-24.11).

Trend Summary Tables

Table 16A-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
2012	2.5	-	14.6	1.0	-	18.6
2017	3.0	-	0.2	2.8	-	0.1

Table 16A-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
2012	-	246	102	118	-	10.8	0.3	0.9
2017	17	315	274	130	0.2	24.1	3.8	1.8

Table 16A-24.8 - 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
2012	21.6	2.5	38.4	14.5	4.5	30.4
2017	17.4	0.6	54.1	13.0	2.6	33.1

Table 16A-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	Rabbit
	Quadrat Frequency		
2012	-	13	18
2017	6	14	41
Year	Days Use Per Acre (ha)		
2012	-	8.1 (19.9)	-
2017	8.7 (21.5)	20.1 (49.7)	-

Table 16A-24.10 - Grass Species. Nested frequency and modified Daubenmire average cover by year.

GRASS SPECIES	Agropyron cristatum ⁱ (crested wheatgrass)	Bromus tectorum ⁱⁱ (cheatgrass)	Festuca idahoensis (Idaho fescue)	Pascopyrum smithii (western wheatgrass)	Poa secunda (Sandberg bluegrass)	Psathyrostachys juncea ⁱ (Russian wildrye)	Pseudoroegneria spicata (bluebunch wheatgrass)	Thinopyrum intermedium ⁱ (intermediate wheatgrass)
year	Nested Frequency							
2012	130	-	32	4	104	12	36	3
2017	180	17	66	2	68	12	92	7
year	Average Cover (%)							
2012	5.5	-	1.2	0.0	2.7	0.4	1.1	0.0
2017	11.5	0.2	4.5	0.0	0.8	0.8	6.2	0.2

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

Table 16A-24.11 - Forb Species. Nested frequency and modified Daubenmire average cover by year.

FORB SPECIES	Agoseris glauca (pale agoseris)	Alyssum desertorum ^{ai} (desert madwort)	Antennaria dimorpha (low pussytoes)	Arenaria fendleri (Fendler's sandwort)	Astragalus eurekaensis (Eureka milkvetch)	Astragalus utahensis (Utah milkvetch)	Calochortus nuttallii (sego lily)	Carduus nutans ^{ami} (nodding plumeless thistle)	Ceratocephala testiculata ^{ai} (curveseed butterwort)	Chaenactis douglasii (Douglas' dustymaiden)	Cirsium undulatum ^a (wavyleaf thistle)	Collinsia parviflora ^a (maiden blue eyed Mary)	Crepis acuminata (tapertip hawkbeard)	Cryptantha humilis (roundspike cryptantha)	Cymopterus (springparsley)	Descurainia pinnata ^a (western tansymustard)	Eriogonum breviceale (shortstem buckwheat)
year	Nested Frequency																
2012	2	24	18	-	11	4	-	-	69	-	-	8	1	-	25	-	3
2017	37	170	9	4	11	2	8	0	135	6	7	11	-	3	46	34	-
year	Average Cover (%)																
2012	0.0	0.0	0.1	-	0.1	0.0	-	-	0.1	-	-	0.0	0.0	-	0.1	-	0.0
2017	0.2	3.1	0.2	0.0	0.2	0.0	0.0	0.0	0.4	0.2	0.0	0.1	-	0.0	0.4	0.1	-

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

FORB SPECIES	Lactuca serriola ^{ai} (prickly lettuce)	Lathyrus brachycalyx (Bonneville pea)	Microsteris gracilis ^a (slender phlox)	Phlox austromontana (mountain phlox)	Phlox longifolia (longleaf phlox)	Sisymbrium altissimum ^{ai} (tall tumbledmustard)	Stenotus acaulis (stemless mock goldenweed)	Streptanthus cordatus (heartleaf twistflower)	Trifolium longipes (longstalk clover)
year	Nested Frequency								
2012	-	5	28	46	3	-	3	3	30
2017	5	8	55	18	-	1	7	4	10
year	Average Cover (%)								
2012	-	0.0	0.1	0.5	0.0	-	0.0	0.0	0.1
2017	0.0	0.3	0.1	0.1	-	0.0	0.1	0.0	0.0

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

Table 16A-24.12 - Shrub and Tree Species. Average modified Daubenmire quadrat and line intercept cover by year.

SHRUB SPECIES	Line Intercept Cover (%)						
	year						
Amelanchier utahensis ^p (Utah serviceberry)	2012	0.1	0.8	-	11	7.6	0.1
Artemisia tridentata ssp. vaseyana ^p (mountain big sagebrush)	2017	-	1.4	-	0.1	-	1.4
Chrysothamnus depressus ^p (longflower rabbitbrush)	year	Quadrat Cover (%)					
Juniperus osteosperma ^t (Utah juniper)	2012	0.0	1.2	0.1	8.5	6.0	1.1
Pinus edulis ^t (twoneedle pinyon)	2017	-	1.8	0.0	0.2	-	1.2
Purshia tridentata ^p (antelope bitterbrush)							

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

Table 16A-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.

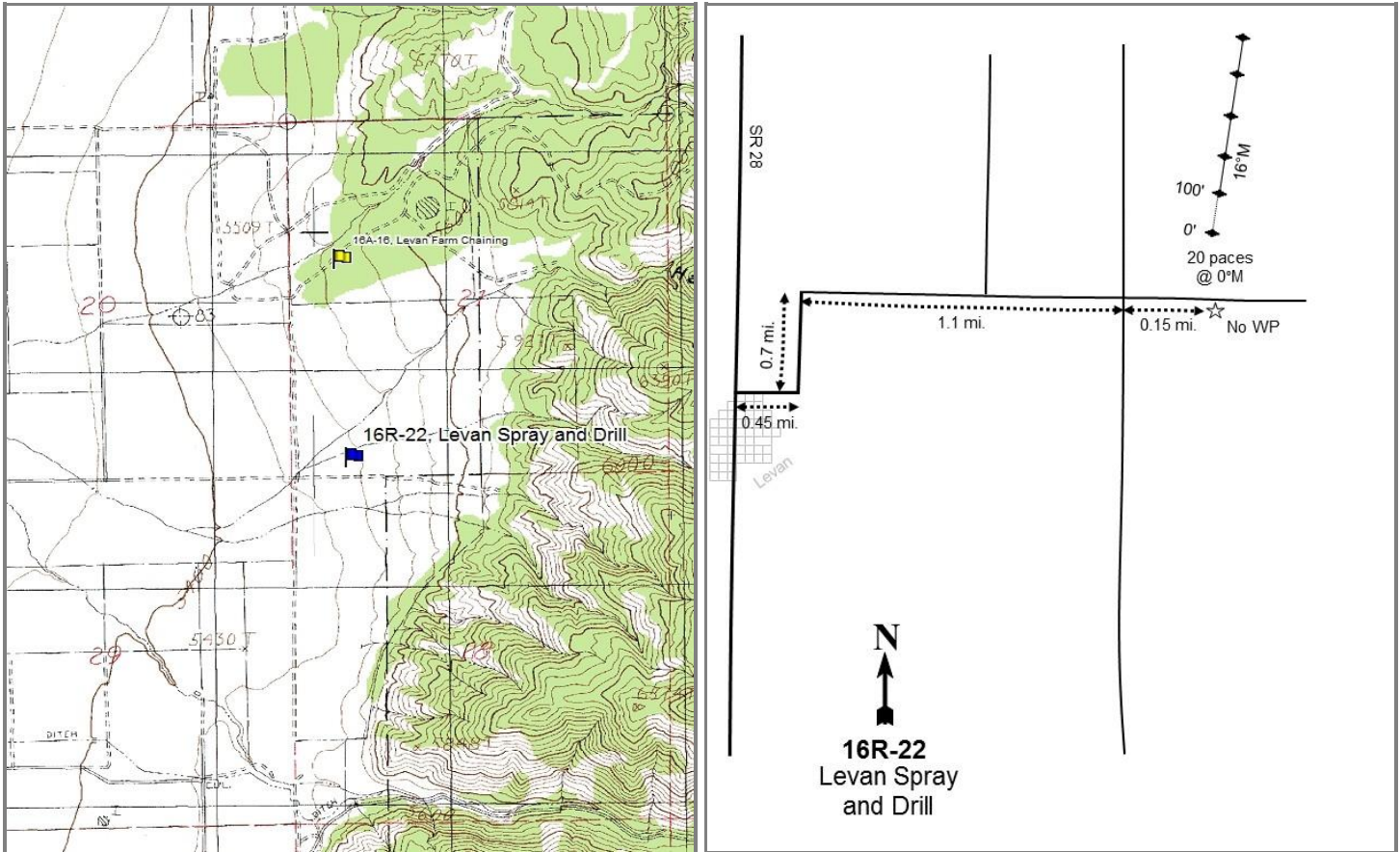
Year	Density		Age Class Distribution			Utilization		Poor Vigor (%)	Average Height Crown (cm)
	Plants Per Acre		Excluding Seedlings			Moderate (%)	Heavy (%)		
	Excluding Seedlings	Seedling	Young (%)	Mature (%)	Decadent (%)				
Amelanchier utahensis ^p -- (Utah serviceberry)									
2012	60	-	0	100	0	0	0	0	47/133
2017	-	-	-	-	-	-	-	-	-/-
Artemisia tridentata ssp. vaseyana ^p -- (mountain big sagebrush)									
2012	400	40	10	60	30	39	11	6	47/60
2017	460	-	13	61	26	9	4	26	56/72
Chrysothamnus depressus ^p -- (longflower rabbitbrush)									
2012	140	-	0	100	0	0	0	0	9/14
2017	120	-	0	100	0	0	0	0	10/19
Ephedra viridis ^p -- (mormon tea)									
2012	-	-	-	-	-	-	-	-	106/85
2017	-	-	-	-	-	-	-	-	96/114
Ericameria nauseosa ssp. nauseosa var. speciosa ^p -- (rubber rabbitbrush)									
2012	-	-	-	-	-	-	-	-	94/45
2017	-	-	-	-	-	-	-	-	61/61
Gutierrezia sarothrae -- (broom snakeweed)									
2012	80	-	0	100	0	25	0	0	18/27
2017	20	-	0	100	0	0	0	0	15/19
Juniperus osteosperma ^t -- (Utah juniper)									
2012	160	20	38	50	13	0	0	0	-/-
2017	40	60	50	50	0	0	0	50	-/-
Peraphyllum ramosissimum ^p -- (wild crab apple)									
2012	-	-	-	-	-	-	-	-	47/59
2017	-	-	-	-	-	-	-	-	33/34
Pinus edulis ^t -- (twoneedle pinyon)									
2012	160	40	50	38	13	0	0	13	-/-
2017	20	-	0	100	0	0	0	0	-/-
Purshia tridentata ^p -- (antelope bitterbrush)									
2012	60	-	0	33	67	0	67	67	33/109
2017	320	-	0	100	0	75	25	0	27/73

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

Table 16A-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 osteosperma (Utah juniper)							
2012	226	-	10	50	30	10	9.8
2017	38	10	90	-	-	-	6.8
Pinus edulis (twoneedle pinyon)							
2012	165	5	10	40	40	5	8.3
2017	10	38	63	-	-	-	4.0

LEVAN SPRAY AND DRILL - STUDY NO. 16R-22



Location Information

USGS 7.5 min Map Info	Levan NW; Township 14S, Range 1E, Section 21
GPS (0' Stake)	NAD 83 UTM ZONE 12, 428499 East 4380754 North

Transect Information

Browse Tag # (0' Stake)	200
Transect Bearing	16° 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 SR-28, turn east onto 3rd North in Levan. On 3rd North, drive 0.45 miles and turn north on 5th East (there may not be a street sign). Drive for 0.7 miles, then turn east. Continue for 1.1 miles, passing a road on the left, to a well-maintained gravel road. Cross this street, drive for 0.15 miles, and park (no witness post was put in). From here, walk 20 paces at 0 degrees magnetic to the 0-foot stake marked with browse tag #200.

Site Information

Land Ownership	State
Land Administrator	UDWR
Allotment	No data
Elevation	5,500ft (1,676m)
Aspect	West
Slope	5%
Sample Dates	08/15/2006, 07/21/2010, 05/31/2017

Table 16R-22.1 Disturbance History. Recorded history of major disturbances.

Treatment/Disturbance	Name	WRI DB#	Date	Size (acres)
Agriculture - Agricultural Field	-	-	Historic	-
Herbicide - Plateau, Roundup, Paramount	Levan Farm WMA Habitat Improvement	271	Fall 2006	62
Herbicide - Roundup	Levan Farm WMA Habitat Improvement	271	May 2007	62
Herbicide - Plateau, Roundup	Levan Farm WMA Habitat Improvement	271	October 2007	62
Seeding - Rangeland Drill	Levan Farm WMA Habitat Improvement	271	October 2007	40

Table 16R-22.2 Seed Mix. List of known seeded plant species and rates (if available).

Mix Name			Application Type	Application Date	Acres
Levan Farm WMA			Drill	Oct 2007	70
Type	Species	Common Name	Cultivar/Source ID	Bulk lbs/acre	PLS lbs/acre
G	Achnatherum hymenoides	Indian Ricegrass	Rimrock	0.50	0.49
G	Agropyron cristatum	Crested Wheatgrass	Douglas	1.00	0.84
G	Agropyron cristatum	Crested Wheatgrass	Ephraim	1.00	0.89
G	Dactylis glomerata	Orchardgrass	Paiute	0.50	0.39
G	Elymus wawawaiensis	Snake River Wheatgrass	Secar	2.00	1.76
G	Poa secunda	Canby Bluegrass	Canbar	0.50	0.45
G	Pseudoroegneria spicata	Bluebunch Wheatgrass	Anatone	1.00	0.85
G	Thinopyrum intermedium	Intermediate Wheatgrass		2.00	1.92
F	Achillea millefolium	Western Yarrow		0.10	0.10
F	Medicago sativa	Alfalfa	Spredor 4	0.71	0.68
F	Medicago sativa	Alfalfa	Ladak	0.29	0.26
F	Melilotus officinalis	Yellow Sweetclover		0.26	0.23
F	Onobrychis viciifolia	Sainfoin	Eski	2.00	1.84
F	Sanguisorba minor	Small Burnet	Delar	2.00	1.87
S	Atriplex canescens	Fourwing Saltbush	Juab/Millard UT	0.50	0.20
Mix Name			Application Type	Application Date	Acres
Levan Farm WMA Kochia			Drill	Oct 2007	70
Type	Species	Common Name	Cultivar/Source ID	Bulk lbs/acre	PLS lbs/acre
		Rice Hulls		0.86	0.00
S	Bassia prostrata	Forage Kochia	Immigrant	1.00	0.94

Wildlife Habitat and Vegetation History

Table 16R-22.3 - Wildlife Seasonal Habitat. UDWR wildlife habitat and seasonality.

Species	Habitat	Season
Deer	crucial	winter

Table 16R-22.4 - Vegetation History. The dominant vegetation type(s) and phase of woodland succession (Tausch, Miller, Roundy, & Chambers, 2009).

Year	Vegetation Type	Woodland Succession
2006	Annual Grass/Field Bindweed	No Encroachment
2010	Annual Grass/Field Bindweed	No Encroachment
2017	Annual Grass/Field Bindweed	No Encroachment

Site Notes

It was noted that many snakes were present in 2017.

Soils

Table 16R-22.5 - 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	7.2	36.7	19.4	43.8	2.6	14.7	352.0	0.8	08/15/2006

Site Potential

1981 - 2010 Average Annual Precipitation 16 inches
 NRCS Ecological Site Upland Loam (Mountain Big Sagebrush)
 NRCS Ecological Site # 028AY310UT
 States and Transitions No state and transition model is available for this ecological site.

This site has remained dominated by the noxious and introduced annual grass species jointed goatgrass (*Aegilops cylindrica*) and perennial forb species field bindweed (*Convolvulus arvensis*) since the study was established in 2006. Although some seeded grass species have established in lesser amounts, the herbicide treatment (Table 16R-22.1) has failed to control jointed goatgrass and field bindweed. Furthermore, the introduced perennial grass bulbous bluegrass (*Poa bulbosa*) was observed in low amounts for the first time in 2017 (Table 16R-22.7, Table 16R-22.10, Table 16R- 22.11). Shrubs have remained rare throughout the duration of the study (Table 16R-22.12, Table 16R-22.13).

Trend Summary Tables

Table 16R-22.6 - 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	-	0.4	-	-	0.4	-
2010	-	-	-	-	0.1	-
2017	-	-	-	-	0.2	-

Table 16R-22.7 - 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	402	65	19	322	15.6	2.4	0.2	13.9
2010	444	76	103	310	64.5	6.6	1.3	19.3
2017	426	216	333	382	27.6	13.5	4.1	20.5

Table 16R-22.8 - 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
2006	5.3	-	68.6	2.3	0.9	34.5
2010	8.5	-	67.0	0.4	1.3	77.3
2017	15.6	-	41.4	6.3	0.6	60.0

Table 16R-22.9 - 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	Horse	Rabbit
	Quadrat Frequency		
2006	13	-	25
2017	19	-	4
Days Use Per Acre (ha)			
2006	55.2 (136.3)	-	-
2017	78.4 (193.7)	1.2 (2.9)	-

Table 16R-22.10 - Grass Species. Nested frequency and modified Daubenmire average cover by year.

GRASS SPECIES											
Aegilops cylindrica ^{mi} (jointed goatgrass)											
Agropyron cristatum ⁱ (crested wheatgrass)											
Bromus arvensis ^{ai} (field brome)											
Bromus tectorum ^{ai} (cheatgrass)											
Elymus wawawaiensis (Snake River wheatgrass)											
Poa bulbosa ⁱ (bulbous bluegrass)											
Poa secunda (Sandberg bluegrass)											
Psathyrostachys juncea ⁱ (Russian wildrye)											
Pseudoroegneria spicata (bluebunch wheatgrass)											
Thinopyrum intermedium ⁱ (intermediate wheatgrass)											
Vulpia octoflora ^a (sixweeks fescue)											
year	Nested Frequency										
2006	394	65	55	32	-	-	0	-	-	-	-
2010	441	15	-	9	-	-	5	-	4	59	4
2017	425	40	10	25	53	26	2	5	51	94	-
year	Average Cover (%)										
2006	14.7	2.4	0.6	0.3	-	-	0.0	-	-	-	-
2010	64.4	1.5	-	0.0	-	-	0.1	-	0.1	5.0	0.0
2017	27.2	2.7	0.1	0.3	3.0	0.3	0.1	0.3	2.8	4.2	-

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

Table 16R-22.11 - 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 utahensis (Utah milkvetch)																	
Buglossoides arvensis ^{ai} (corn gromwell)																	
Calochortus nuttallii (sego lily)																	
Camelina microcarpa ^{ai} (littlepod false flax)																	
Ceratocephala testiculata ^{ai} (curveseed butterwort)																	
Convolvulus arvensis ^{ai} (field bindweed)																	
Crepis acuminata (tapertip hawkbeard)																	
Cymopterus longipes (longstalk springparsley)																	
Erodium cicutarium ^{ai} (redstem stork's bill)																	
Helianthus annuus ^a (common sunflower)																	
Lactuca serriola ^{ai} (prickly lettuce)																	
Lathyrus brachycalyx (Bonneville pea)																	
Malcolmia africana ^{ai} (African mustard)																	
Onobrychis viciifolia ⁱ (sainfoin)																	
year	Nested Frequency																
2006	-	-	7	3	5	-	-	-	319	-	-	-	1	2	-	-	-
2010	-	-	44	-	-	-	-	65	307	-	-	-	-	4	-	-	0
2017	5	3	166	10	4	1	22	230	377	4	3	9	-	9	6	3	-
year	Average Cover (%)																
2006	-	-	0.0	0.0	0.2	-	-	-	13.8	-	-	-	0.0	0.0	-	-	-
2010	-	-	0.3	-	-	-	-	0.8	19.3	-	-	-	-	0.1	-	-	0.0
2017	0.0	0.0	1.3	0.0	0.0	0.0	0.1	1.8	19.5	0.1	0.0	0.1	-	0.1	0.2	0.0	-

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

FORB SPECIES	Phlox longifolia (longleaf phlox)	Rumex (dock)	Sphaeralcea coccinea (scarlet globemallow)	Symphotrichum ascendens (western aster)	Tragopogon dubius ^{ai} (yellow salsify)	Veronica biloba ^{ai} (two-lobed speedwell)
year	Nested Frequency					
2006	12	-	1	-	4	-
2010	6	-	6	-	3	-
2017	22	3	7	3	0	110
year	Average Cover (%)					
2006	0.1	-	0.0	-	0.0	-
2010	0.0	-	0.0	-	0.0	-
2017	0.3	0.1	0.0	0.1	0.0	0.7

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

Table 16R-22.12 - Shrub and Tree Species. Average modified Daubenmire quadrat and line intercept cover by year.

SHRUB SPECIES	Gutierrezia sarothrae (broom snakeweed)
year	Line Intercept Cover (%)
2006	0.4
2010	0.1
2017	0.2
year	Quadrat Cover (%)
2006	0.4
2010	0.0
2017	0.0

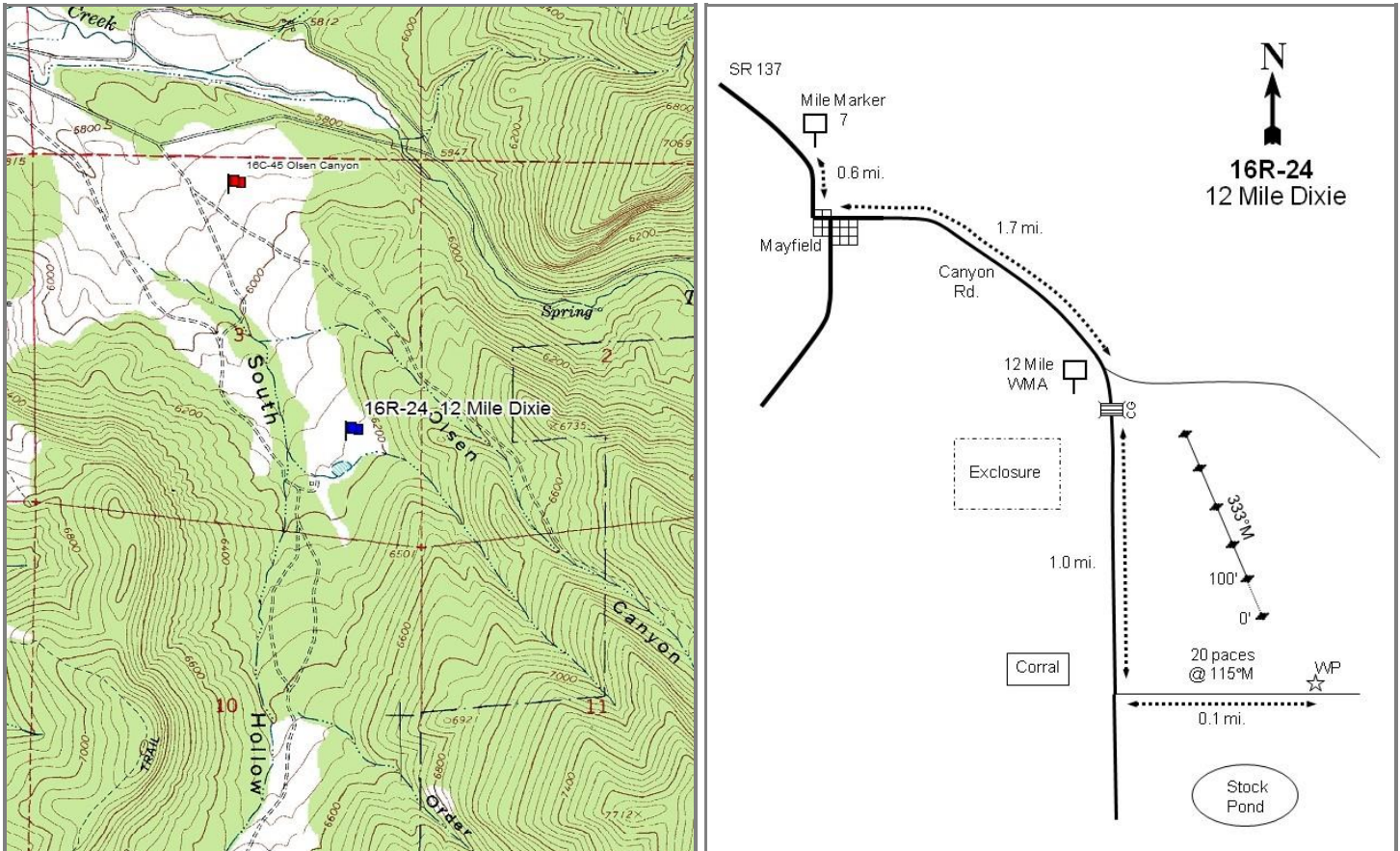
t - Tree Species; p - Preferred Browse; i - Introduced Species

Table 16R-22.13 - 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	-	-	-	-	-	-	-	-	72/156
2010	-	-	-	-	-	-	-	-	116/180
2017	-	-	-	-	-	-	-	-	80/153
Bassia prostrata^{Pi} -- (forage kochia)									
2006	-	-	-	-	-	-	-	-	33/85
2010	-	-	-	-	-	-	-	-	-/-
2017	-	-	-	-	-	-	-	-	15/27
Ericameria nauseosa ssp. nauseosa var. speciosa^P -- (rubber rabbitbrush)									
2006	-	-	-	-	-	-	-	-	54/65
2010	-	-	-	-	-	-	-	-	-/-
2017	-	-	-	-	-	-	-	-	-/-
Gutierrezia sarothrae -- (broom snakeweed)									
2006	940	-	2	32	66	0	0	55	23/25
2010	20	-	0	100	0	0	0	0	36/47
2017	20	-	0	100	0	0	0	0	21/30
Tetradymia canescens -- (spineless horsebrush)									
2006	-	-	-	-	-	-	-	-	-/-
2010	-	-	-	-	-	-	-	-	66/48

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

12 MILE DIXIE - STUDY NO. 16R-24

**Location Information**

USGS 7.5 min Map Info
GPS (0' Stake)

Mayfield NE; Township 20S, Range 2E, Section 03
NAD 83 UTM ZONE 12, 442056 East 4327496 North

Transect Information

Browse Tag # (0' Stake)	591
Transect Bearing	333° magnetic
Length	500ft
Belt Placement	Line 1 (11ft), Line 2 (34ft), Line 3 (59ft), Line 4 (71ft), Line 5 (95ft)
Belt Marker Placement	Standard

Directions to Site

Drive south on SR-137 toward Mayfield. From mile marker #7, drive 0.6 miles and turn left (east) onto Canyon Road. Drive on this paved road for 1.7 miles to a fork and the end of the pavement and beginning of the dirt road with a sign showing "12 Mile WMA." From the dirt road, cross a cattle guard and drive 1.0 mile, passing a road on the right, to a corral on the right and road on the left (east). Turn here and drive 0.1 miles to a half-high witness post on the left (north). From here, walk 20 paces northwest to the 0-foot stake marked with browse tag #199.

Site Information

Land Ownership	State
Land Administrator	UDWR
Allotment	No data
Elevation	6,200ft (1,890m)
Aspect	West
Slope	3%
Sample Dates	08/17/2006, 08/12/2010, 07/02/2013, 05/31/2017

Table 16R-24.1 Disturbance History. Recorded history of major disturbances.

Treatment/Disturbance	Name	WRI DB#	Date	Size (acres)
Agriculture - Agricultural Field	-	-	Historic	-
Herbicide - Roundup, Paramount	Twelve Mile WMA Habitat Improvement	273	November 2006	40
Herbicide - Roundup	Twelve Mile WMA Habitat Improvement	273	May 2007	40
Herbicide - Roundup	Twelve Mile WMA Habitat Improvement	273	October 2007	40
Seeding - Truax Drill	Twelve Mile WMA Habitat Improvement	273	October 2007	45
Seeding - Broadcast	Twelve Mile WMA Habitat Improvement	273	January 2008	40

Table 16R-24.2 Seed Mix. List of known seeded plant species and rates (if available).

Mix Name			Application Type	Application Date	Acres
12 Mile WMA			Drill	Oct 2007	60
Type	Species	Common Name	Cultivar/Source ID	Bulk lbs/acre	PLS lbs/acre
G	<i>Achnatherum hymenoides</i>	Indian Ricegrass	Rimrock	0.08	0.07
G	<i>Achnatherum hymenoides</i>	Indian Ricegrass	Rimrock	0.42	0.41
G	<i>Agropyron cristatum</i>	Crested Wheatgrass	Douglas	1.00	0.84
G	<i>Agropyron cristatum</i>	Crested Wheatgrass	Hycrest	1.00	0.92
G	<i>Dactylis glomerata</i>	Orchardgrass	Paiute	0.50	0.39
G	<i>Elymus wawawaiensis</i>	Snake River Wheatgrass	Secar	2.00	1.76
G	<i>Poa secunda</i>	Canby Bluegrass	Canbar	0.50	0.45
G	<i>Psathyrostachys juncea</i>	Russian Wildrye		2.00	1.67
G	<i>Pseudoroegneria spicata</i>	Bluebunch Wheatgrass	Anatone	1.00	0.85
G	<i>Thinopyrum intermedium</i>	Intermediate Wheatgrass		2.00	1.92
F	<i>Achillea millefolium</i>	Western Yarrow		0.25	0.24
F	<i>Astragalus cicer</i>	Cicer Milkvetch	Lutana	0.50	0.41
F	<i>Linum perenne</i>	Blue Flax	Appar	0.50	0.46
F	<i>Medicago sativa</i>	Alfalfa	Ladak	1.00	0.92
F	<i>Melilotus officinalis</i>	Yellow Sweetclover		0.25	0.23
F	<i>Sanguisorba minor</i>	Small Burnet	Delar	2.00	1.87
S	<i>Purshia tridentata</i>	Bitterbrush	Millard UT	0.50	0.44
Mix Name			Application Type	Application Date	Acres
12 Mile WMA Kochia			Broadcast	Jan 2008	60
Type	Species	Common Name	Cultivar/Source ID	Bulk lbs/acre	PLS lbs/acre
		Rice Hulls		1.00	0.00
S	<i>Bassia prostrata</i>	Forage Kochia	Immigrant	1.00	0.94

Wildlife Habitat and Vegetation History**Table 16R-24.3 - Wildlife Seasonal Habitat.** UDWR wildlife habitat and seasonality.

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

Table 16R-24.4 - Vegetation History. The dominant vegetation type(s) and phase of woodland succession (Tausch, Miller, Roundy, & Chambers, 2009).

Year	Vegetation Type	Woodland Succession
2006	Annual Grass/Field Bindweed	No Encroachment
2010	Field Bindweed	No Encroachment
2013	Perennial Grass/Rubber Rabbitbrush	No Encroachment
2017	Perennial Grass/Rubber Rabbitbrush	No Encroachment

Site Notes

This site is located in a small valley surrounded by pinyon pine (*Pinus edulis*) and Utah juniper (*Juniperus osteosperma*) woodlands and scattered sagebrush. There are some roads and a dry stock pond near the study.

Soils**Table 16R-24.5 - 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	48.7	17.4	33.8	2.5	17.2	224.0	0.7	08/17/2006

Site Potential

1981 - 2010 Average Annual Precipitation	16 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.

When established in 2006, this site was dominated by annual grasses, mainly cheatgrass (*Bromus tectorum*), and the noxious and introduced perennial forb field bindweed (*Convolvulus arvensis*). In the first sample year following treatment, annual grass cover decreased, but the site remained dominated by bindweed. Perennial grass cover increased, and a mixture of native and introduced species dominated the site in 2013 and 2017. In addition, the introduced perennial grass species bulbous bluegrass (*Poa bulbosa*) and noxious annual species jointed goatgrass (*Aegilops cylindrica*) have been observed each sample year, but in mostly low amounts. The noxious perennial forb species squarrose knapweed (*Centaurea virgata*) and whitetop (*Cardaria draba*) have also been observed in low amounts in different sample years (Table 16R-24.7, Table 16R-24.10, Table 16R-24.11). Though shrubs were initially rare, density of rubber rabbitbrush (*Ericameria nauseosa* ssp. *consimilis* and *E. nauseosa* ssp. *nauseosa* var. *hololeuca*) increased in post-treatment samplings, and it was a co-dominant site component in 2013 and 2017 (photos, Table 16R-24.12, Table 16R-24.13).

Trend Summary Tables**Table 16R-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
2006	-	-	-	-	0.4	-
2010	-	0.9	-	0.1	0.6	-
2013	0.0	0.9	-	0.9	0.7	-
2017	0.8	2.8	-	1.9	2.7	-

Table 16R-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
2006	230	47	357	302	12.5	0.7	7.8	11.1
2010	67	258	354	320	1.0	12.9	9.9	15.8
2013	93	304	369	298	0.8	12.7	6.8	6.3
2017	251	339	447	246	8.1	30.4	26.8	6.8

Table 16R-24.8 - 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
2006	41.6	0.4	24.4	7.7	1.0	35.5
2010	41.1	-	26.4	8.1	0.4	37.3
2013	49.3	-	19.6	3.6	1.9	34.7
2017	23.6	0.0	30.6	6.7	1.5	59.3

Table 16R-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	Coyote	Mule Deer	Rocky Mountain Elk	Rabbit
	Quadrat Frequency				
2006	7	-	8	-	38
2010	3	-	4	-	4
2013	26	-	14	-	10
2017	10	-	10	-	10
Year	Days Use Per Acre (ha)				
2006	10.9 (26.9)	-	20.1 (49.7)	-	-
2010	13.8 (34.1)	8.7 (21.5)*	3.4 (8.3)	-	-
2013	26.8 (66.3)	-	24.1 (59.6)	-	-
2017	64.6 (159.6)	-	14.1 (34.8)	0.7 (1.7)	-

*Pellets per acre (ha)

Table 16R-24.10 - Grass Species. Nested frequency and modified Daubenmire average cover by year.

GRASS SPECIES										
Aegilops cylindrica ⁿⁱ (jointed goatgrass)										
Agropyron cristatum ⁱ (crested wheatgrass)										
Bromus tectorum ⁿⁱ (cheatgrass)										
Elymus wawawaiensis (Snake River wheatgrass)										
Hordeum pusillum ⁿ (little barley)										
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									
2006	53	-	189	-	27	47	-	-	-	-
2010	19	53	44	-	11	26	2	1	38	218
2013	26	110	69	-	7	11	17	21	97	214
2017	33	121	240	106	9	132	7	97	73	106
year	Average Cover (%)									
2006	0.9	-	10.0	-	1.6	0.7	-	-	-	-
2010	0.3	2.0	0.4	-	0.4	0.4	0.0	0.1	1.2	9.2
2013	0.1	3.2	0.3	-	0.4	0.1	0.3	0.3	2.7	6.2
2017	0.1	7.2	7.9	5.9	0.0	5.5	0.1	5.8	2.8	3.2

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

Table 16R-24.11 - Forb Species. Nested frequency and modified Daubenmire average cover by year.

FORB SPECIES																	
Achillea millefolium (Common yarrow)																	
Alyssum desertorum ⁿⁱ (desert madwort)																	
Cardaria draba ⁿⁱ (whitetop)																	
Centaurea virgata ⁿⁱ (squarrose knapweed)																	
Ceratocephala testiculata ⁿⁱ (curvseed butterwort)																	
Collinsia parviflora ^a (maiden blue eyed Mary)																	
Convolvulus arvensis ⁿⁱ (field bindweed)																	
Cryptantha (cryptantha)																	
Descurainia pinnata ^a (western tansymustard)																	
Erodium cicutarium ⁿⁱ (redstem stork's bill)																	
Grindelia squarrosa (curlycup gumweed)																	
Helianthus annuus ^a (common sunflower)																	
Lactuca serriola ⁿⁱ (prickly lettuce)																	
Machaeranthera canescens (hoary tansyaster)																	
Medicago sativa ⁱ (alfalfa)																	
Microsteris gracilis ^a (slender phlox)																	
Salsola tragus ⁿⁱ (prickly Russian thistle)																	
year	Nested Frequency																
2006	-	3	-	-	309	3	302	3	2	211	-	-	-	-	1	-	-
2010	-	5	-	1	333	-	320	-	12	87	-	9	-	-	-	-	27
2013	2	35	-	2	303	3	290	-	-	193	2	-	1	3	-	4	6
2017	-	140	1	-	376	6	244	-	-	376	-	-	-	-	1	5	-
year	Average Cover (%)																
2006	-	0.0	-	-	2.4	0.0	11.0	0.0	0.0	5.2	-	-	-	-	0.0	-	-
2010	-	0.0	-	0.2	7.2	-	15.6	-	0.0	2.3	-	0.0	-	-	-	-	0.3
2013	0.0	0.2	-	0.0	1.6	0.0	6.0	-	-	4.9	0.1	-	0.0	0.0	-	0.0	0.1
2017	-	1.1	0.0	-	13.4	0.3	6.8	-	-	12.0	-	-	-	-	0.0	0.0	-

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

FORB SPECIES						
Sanguisorba minor ⁱ (small burnet)						
Sisymbrium altissimum ^{ai} (tall tumbledmustard)						
Symphoricarum ascendens (western aster)						
Tragopogon dubius ^{ai} (yellow salsify)						
Trifolium (clover)						
Veronica biloba ^{ai} (two-lobed speedwell)						
year	Nested Frequency					
2006	-	0	-	3	-	5
2010	2	1	-	-	-	-
2013	5	-	-	-	3	3
2017	-	-	1	-	-	2
year	Average Cover (%)					
2006	-	0.0	-	0.0	-	0.0
2010	0.0	0.0	-	-	-	-
2013	0.0	-	-	-	0.0	0.0
2017	-	-	0.0	-	-	0.0

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

Table 16R-24.12 - Shrub and Tree Species. Average modified Daubenmire quadrat and line intercept cover by year.

SHRUB SPECIES			
Ericameria nauseosa ssp. consimilis (rubber rabbitbrush)			
Ericameria nauseosa ssp. nauseosa var. hololeuca ^p (rubber rabbitbrush)			
Gutierrezia sarothrae (broom snakeweed)			
year	Line Intercept Cover (%)		
2006	-	-	0.4
2010	0.6	0.1	-
2013	0.7	0.9	-
2017	2.7	1.9	-
year	Quadrat Cover (%)		
2006	-	-	0.0
2010	0.9	0.0	-
2013	0.9	0.0	-
2017	2.8	0.8	-

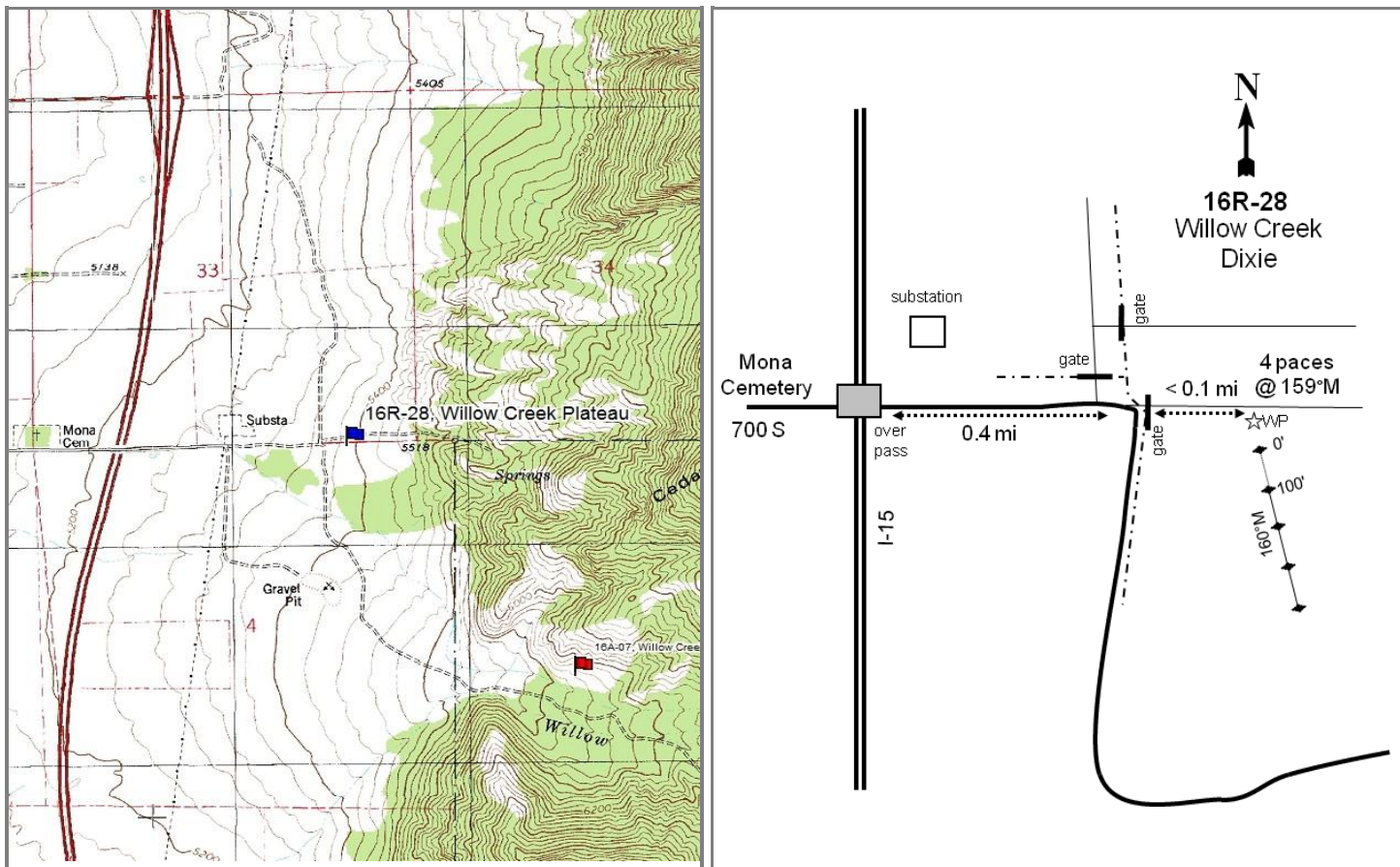
t - Tree Species; p - Preferred Browse; i - Introduced Species

Table 16R-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 (%)				
<i>Ericameria nauseosa</i> ssp. <i>consimilis</i> -- (rubber rabbitbrush)									
2006	-	-	-	-	-	-	-	-	99/166
2010	740	-	97	3	0	3	0	0	63/51
2013	840	-	33	67	0	7	0	50	64/70
2017	800	-	8	93	0	3	0	0	59/69
<i>Ericameria nauseosa</i> ssp. <i>nauseosa</i> var. <i>hololeuca</i> ^P -- (rubber rabbitbrush)									
2006	-	-	-	-	-	-	-	-	77/111
2010	40	-	50	50	0	50	0	0	50/48
2013	240	-	25	67	8	8	8	8	62/72
2017	280	-	29	71	0	0	0	0	54/68
<i>Gutierrezia sarothrae</i> -- (broom snakeweed)									
2006	20	-	0	100	0	0	0	0	- / -
2010	-	-	-	-	-	-	-	-	34/44
2013	-	-	-	-	-	-	-	-	- / -
2017	40	-	0	100	0	0	0	0	29/38

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

WILLOW CREEK DIXIE - STUDY NO. 16R-28



Location Information

USGS 7.5 min Map Info
GPS (0' Stake)

Mona SW; Township 12S, Range 1E, Section 04
NAD 83 UTM ZONE 12, 429425 East 4406654 North

Transect Information

Browse Tag # (0' Stake)	255
Transect Bearing	159° magnetic
Length	400ft
Belt Placement	Line 1 (11ft & 71ft), Line 2 (34ft), Line 3 (59ft), Line 4 (95ft)
Belt Marker Placement	Standard

Directions to Site

From S Main Street in Mona, turn onto W 700 S (E Cemetery Lane) and proceed to the overpass on I-15. From the overpass, continue straight on this road for 0.4 miles. At the curve in the road there is a gate: if it is unlocked proceed to the site, otherwise park at the small dirt lot and walk 100 paces to the witness post. The line runs at 160 magnetic.

Site Information

Land Ownership	Private
Land Administrator	Private
Allotment	No data
Elevation	No data
Aspect	West
Slope	10-15%
Sample Dates	07/01/2008, 07/06/2011, 07/17/2017

Table 16R-28.1 Disturbance History. Recorded history of major disturbances.

Treatment/Disturbance	Name	WRI DB#	Date	Size (acres)
Harrow - One-Way Dixie	Willow Creek Habitat Improvement	1101	November-December 2008	52
Seeding - Broadcast Before	Willow Creek Habitat Improvement	1101	November-December 2008	52

Table 16R-28.2 Seed Mix. List of known seeded plant species and rates (if available).

Mix Name			Application Type	Application Date	Acres
Willow Creek Habitat Improvement			Broadcast	Nov 2008	100
Type	Species	Common Name	Cultivar/Source ID	Bulk lbs/acre	PLS lbs/acre
G	<i>Achnatherum hymenoides</i>	Indian Ricegrass	Rimrock	1.00	0.92
G	<i>Agropyron cristatum</i>	Crested Wheatgrass	Nordan	3.00	2.66
G	<i>Pascopyrum smithii</i>	Western Wheatgrass	Arriba	1.00	0.87
G	<i>Poa secunda</i>	Sandberg Bluegrass	Toole MT	0.50	0.42
G	<i>Poa secunda</i>	Canby Bluegrass	Canbar	0.50	0.43
G	<i>Pseudoroegneria spicata</i>	Bluebunch Wheatgrass	Goldar	1.00	0.76
G	<i>Thinopyrum intermedium</i>	Intermediate Wheatgrass	Oahe	1.00	0.91
G	<i>Thinopyrum intermedium</i>	Pubescent Wheatgrass	Luna	1.00	0.90
F	<i>Linum perenne</i>	Blue Flax	Appar	0.50	0.45
F	<i>Medicago sativa</i>	Alfalfa	Ladak	1.00	0.91
F	<i>Onobrychis viciifolia</i>	Sainfoin	Eski	2.00	1.76
F	<i>Sanguisorba minor</i>	Small Burnet	Delar	0.25	0.24
F	<i>Sanguisorba minor</i>	Small Burnet	Delar	1.00	0.95

Wildlife Habitat and Vegetation History**Table 16R-28.3 - Wildlife Seasonal Habitat.** UDWR wildlife habitat and seasonality.

Species	Habitat	Season
Elk	crucial	winter

Table 16R-28.4 - Vegetation History. The dominant vegetation type(s) and phase of woodland succession (Tausch, Miller, Roundy, & Chambers, 2009).

Year	Vegetation Type	Woodland Succession
2008	Annual Grass/Annual Forb	NA
2011	<i>Poa Bulbosa</i> /Annual Grass/Annual Forb	NA
2017	Perennial Grass/ <i>Poa Bulbosa</i> /Annual Forb	NA

Site Notes

No Notes

Site Potential

1981 - 2010 Average Annual Precipitation	17 inches
NRCS Ecological Site	Upland Loam (Mountain Big Sagebrush)
NRCS Ecological Site #	028AY310UT
States and Transitions	No state and transition model is available for this ecological site.

At the time of study establishment in 2008, this site was a weedy annual forb plant community. At the first post-treatment sampling, the site was dominated by cheatgrass (*Bromus tectorum*) and bulbous bluegrass (*Poa bulbosa*) (Table 16R-28.10). At the 2017 sampling, it transitioned to a perennial grass and bulbous bluegrass dominated site. The forb component was dominated by redstem stork's bill (*Erodium cicutarium*) in 2008 and 2017, but prickly lettuce (*Lactuca serriola*) expressed dominance in 2011 (Table 16R-28.11). Browse species are very rare across the site (Table 16R-28.12, Table 16R-28.13). Some species seeded during the treatment had established in 2011, but by 2017 many of the seeded species were either not sampled or were greatly reduced. This site would require more rehabilitation in order to achieve the desired functional aspects of the initial treatment.

Trend Summary Tables

Table 16R-28.6 - 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	0.0	-	-	-	-	-
2017	-	-	-	-	-	-

Table 16R-28.7 - 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	412	210	416	133	4.7	4.2	14.9	1.3
2011	434	380	326	126	32.6	35.9	11.1	10.4
2017	229	446	446	6	2.3	33.1	24.0	0.0

Table 16R-28.8 - 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
2008	8.3	0.0	58.9	9.1	3.3	29.0
2011	3.7	-	17.5	14.1	5.3	76.2
2017	9.3	-	13.8	30.1	8.2	56.9

Table 16R-28.9 - 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	Rocky Mountain Elk	Rabbit
	Quadrat Frequency			
2008	16	1	1	4
2011	1	-	-	-
2017	16	4	1	4
Year	Days Use Per Acre (ha)			
2008	25.4 (62.8)	-	-	-
2011	-	1.3 (3.3)	-	-
2017	68.3 (168.6)	8.1 (19.9)	-	-

Table 16R-28.10 - Grass Species. Nested frequency and modified Daubenmire average cover by year.

GRASS SPECIES	Achnatherum hymenoides (Indian ricegrass)	Aegilops cylindrica ^{mi} (jointed goatgrass)	Agropyron cristatum ⁱ (crested wheatgrass)	Aristida purpurea (purple threeawn)	Bromus tectorum ^{mi} (cheatgrass)	Pascopyrum smithii (western wheatgrass)	Poa bulbosa ⁱ (bulbous bluegrass)	Poa secunda (Sandberg bluegrass)	Pseudoroegneria spicata (bluebunch wheatgrass)	Sporobolus cryptandrus (sand dropseed)	Thinopyrum intermedium ⁱ (intermediate wheatgrass)
year	Nested Frequency										
2008	-	-	1	206	412	-	19	-	-	-	4
2011	2	6	14	118	434	4	348	4	3	-	46
2017	-	-	1	260	229	-	409	-	5	17	3
year	Average Cover (%)										
2008	-	-	0.0	3.7	4.7	-	0.3	-	-	-	0.2
2011	0.0	0.2	0.5	9.6	32.4	0.2	24.3	0.1	0.0	-	1.2
2017	-	-	0.0	14.9	2.3	-	17.7	-	0.2	0.3	0.0

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

Table 16R-28.11 - Forb Species. Nested frequency and modified Daubenmire average cover by year.

FORB SPECIES	Alyssum desertorum ^{ai} (desert madwort)	Artemisia ludoviciana (white sagebrush)	Astragalus utahensis (Utah milkvetch)	Calochortus nuttallii (sego lily)	Ceratocephala testiculata ^{ai} (curveseed butterwort)	Chaetopappa ericooides (rose heath)	Chamaesyce (sandmat)	Convolvulus arvensis ^{ai} (field bindweed)	Erodium cicutarium ^{ai} (redstem stork's bill)	Grindelia squarrosa (curlycup gumweed)	Helianthus annuus ^a (common sunflower)	Lactuca serriola ^{ai} (prickly lettuce)	Lygodesmia grandiflora (largeflower skeletonplant)	Medicago sativa ⁱ (alfalfa)	Phlox longifolia (longleaf phlox)	Salsola tragus ^{ai} (prickly Russian thistle)	Silene antirrhina ^a (sleepy silene)
year	Nested Frequency																
2008	4	-	-	-	-	10	5	117	414	-	-	38	-	-	-	-	-
2011	4	2	-	16	-	-	-	100	58	7	25	316	1	4	2	1	3
2017	6	-	2	-	3	4	-	-	446	-	-	-	-	-	-	5	-
year	Average Cover (%)																
2008	0.0	-	-	-	-	0.0	0.0	1.1	14.6	-	-	0.2	-	-	-	-	-
2011	0.0	0.1	-	0.1	-	-	-	8.9	0.4	0.3	0.1	10.5	0.0	0.7	0.0	0.0	0.0
2017	0.0	-	0.0	-	0.0	0.0	-	-	23.9	-	-	-	-	-	-	0.1	-

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

FORB SPECIES	Sisymbrium altissimum ^{ai} (tall tumbled mustard)	Sphaeralcea coccinea (scarlet globemallow)	Tragopogon dubius ^{ai} (yellow salsify)
year	Nested Frequency		
2008	2	6	21
2011	0	6	7
2017	-	-	1
year	Average Cover (%)		
2008	0.0	0.0	0.1
2011	0.0	0.4	0.1
2017	-	-	0.0

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

Table 16R-28.12 - Shrub and Tree Species. Average modified Daubenmire quadrat and line intercept cover by year.

SHRUB SPECIES	Artemisia tridentata ssp. vaseyana ^P (mountain big sagebrush)
year	Line Intercept Cover (%)
2008	-
2011	-
2017	-
year	Quadrat Cover (%)
2008	-
2011	0.0
2017	-

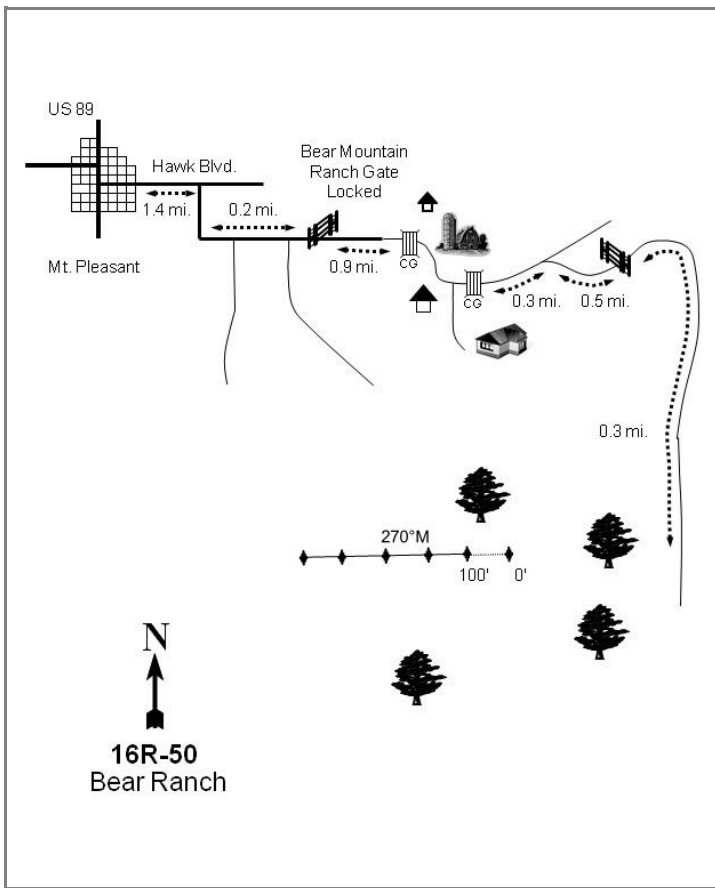
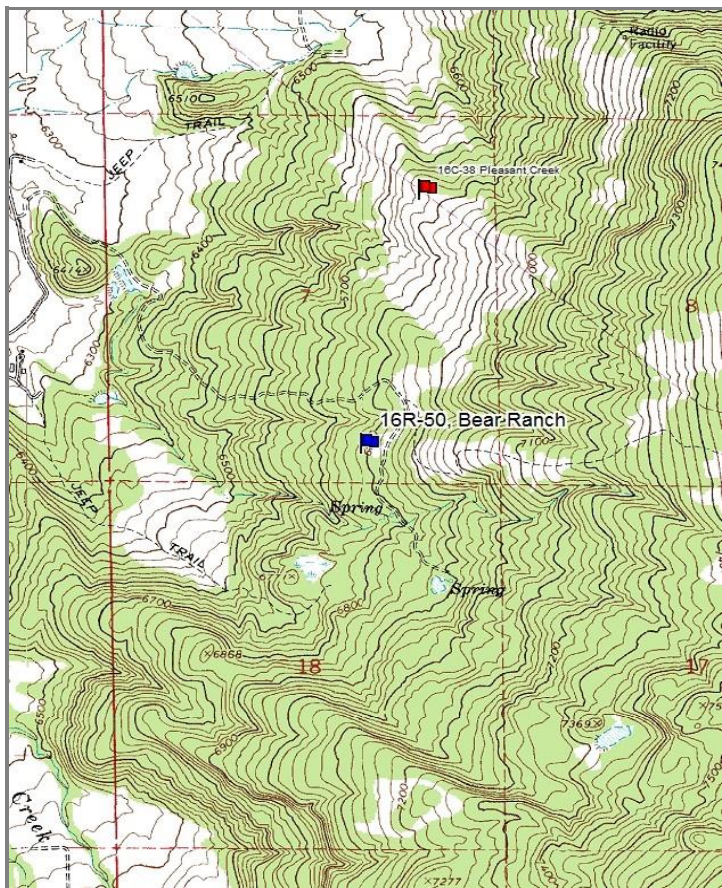
t - Tree Species; p - Preferred Browse; i - Introduced Species

Table 16R-28.13 - 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)									
2008	-	-	-	-	-	-	-	-	-/-
2011	20	-	100	0	0	0	0	0	11/8
2017	-	-	-	-	-	-	-	-	30/34
Ericameria nauseosa -- (rubber rabbitbrush)									
2008	-	-	-	-	-	-	-	-	-/-
2011	-	-	-	-	-	-	-	-	37/47
2017	-	-	-	-	-	-	-	-	62/108
Gutierrezia sarothrae -- (broom snakeweed)									
2008	-	-	-	-	-	-	-	-	27/27
2011	20	-	0	100	0	0	0	0	40/42

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

BEAR RANCH - STUDY NO. 16R-50



Location Information

USGS 7.5 min Map Info
GPS (0' Stake)

Mount Pleasant SE; Township 15S, Range 5E, Section 07
NAD 83 UTM ZONE 12, 465496 East 4374859 North

Transect Information

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

N/A
275° magnetic (Lines 2-3: 265° magnetic, Lines 4-5: 245° magnetic)
500ft
Line 1 (11ft), Line 2 (34ft), Line 3 (59ft), Line 4 (71ft), Line 5 (95ft)
Standard

Directions to Site

From US-89 in Mt. Pleasant, turn east onto Hawk Boulevard and drive for 1.4 miles. Turn right (south) and drive for 0.2 miles to where the Bear Mt. Ranch gate should be. After the gate, drive 0.9 miles and cross a cattle guard; keep driving to another cattle guard. After the second cattle guard, drive 0.3 miles and take the road off to the right; in 0.5 miles there will be another gate. After passing through this gate, drive for 0.3 miles. The transect will be to the right: there is no witness post.

Site Information

Land Ownership	Private
Land Administrator	Private
Allotment	No data
Elevation	6,740ft (2,054m)
Aspect	West
Slope	5%
Sample Dates	07/03/2013, 06/01/2017

Table 16R-50.1 Disturbance History. Recorded history of major disturbances.

Treatment/Disturbance	Name	WRI DB#	Date	Size (acres)
Seeding - Dribbler	Bear Mountain CWMU Habitat Enhancement	2602	October 2013-February 2014	232
Seeding - Aerial After	Bear Mountain CWMU Habitat Enhancement	2602	October 2013-February 2014	232
Chaining - Two-Way Ely/Smooth	Bear Mountain CWMU Habitat Enhancement	2602	October 2013-February 2014	232
Seeding - Aerial Before	Bear Mountain CWMU Habitat Enhancement	2602	October 2013-February 2014	232

Table 16R-50.2 Seed Mix. List of known seeded plant species and rates (if available).

Mix Name			Application Type	Application Date	Acres
Bear Mtn CWMU			Aerial	Oct 2013	300
Type	Species	Common Name	Cultivar/Source ID	Bulk lbs/acre	PLS lbs/acre
G	Achnatherum hymenoides	Indian Ricegrass	Nezpar	1.00	0.97
G	Agropyron cristatum	Crested Wheatgrass	Hycrest	1.00	0.87
G	Dactylis glomerata	Orchardgrass	Paiute	0.50	0.43
G	Leymus cinereus	Great Basin Wildrye	UDWR IntMtn Tetra	0.50	0.43
G	Pascopyrum smithii	Western Wheatgrass	Arriba	1.00	0.89
G	Poa secunda	Sandberg Bluegrass	UP/Colorado Plateau	0.52	0.38
G	Pseudoroegneria spicata	Bluebunch Wheatgrass	Anatone	1.50	1.35
F	Helianthus annuus	Annual Sunflower	Utah UT	0.50	0.48
F	Linum lewisii	Lewis Flax	Maple Grove	0.49	0.43
F	Medicago sativa	Alfalfa	Ladak	2.00	1.83
F	Melilotus officinalis	Yellow Sweetclover		0.50	0.44
F	Onobrychis viciifolia	Sainfoin	Delaney	2.00	1.96
F	Sanguisorba minor	Small Burnet		2.00	1.84
Mix Name			Application Type	Application Date	Acres
Bear Mtn CWMU Dribbler			Dribbler	Oct 2013	300
Type	Species	Common Name	Cultivar/Source ID	Bulk lbs/acre	PLS lbs/acre
S	Atriplex canescens	Fourwing Saltbush	Juab, Utah, Carbon UT	0.25	0.12
S	Cercocarpus ledifolius	Curleaf Mountain Mahogany	Sevier UT	0.25	0.20
S	Ephedra viridis	Green Ephedra	Emery UT	0.25	0.23
S	Purshia tridentata	Bitterbrush	Oneida, ID	0.25	0.21
Mix Name			Application Type	Application Date	Acres
Bear Mountain Shrubs			Aerial	Feb 2014	300
Type	Species	Common Name	Cultivar/Source ID	Bulk lbs/acre	PLS lbs/acre
F	Medicago sativa	Alfalfa	Ranger NC	0.50	0.47
S	Artemisia tridentata ssp. vaseyana	Mountain Big Sagebrush	Beaver UT	0.53	0.23
S	Bassia prostrata	Forage Kochia	Beaver UT	0.50	0.31
S	Bassia prostrata	Forage Kochia	Snowstorm	0.67	0.36

Wildlife Habitat and Vegetation History

Table 16R-50.3 - Wildlife Seasonal Habitat. UDWR wildlife habitat and seasonality.

Species	Habitat	Season
Deer	crucial	winter
Elk	crucial	winter
Moose	substantial	year-long

Table 16R-50.4 - Vegetation History. The dominant vegetation type(s) and phase of woodland succession (Tausch, Miller, Roundy, & Chambers, 2009).

Year	Vegetation Type	Woodland Succession
2013	Juniper/Gambel Oak	Phase III
2017	Gambel Oak/Annual Grass	Phase I

Site Notes

There are game trails and evidence of bedding on the site, and Bear Ranch is not far from the study area.

Site Potential

1981 - 2010 Average Annual Precipitation	19 inches
NRCS Ecological Site	Mountain Gravelly Loam (Oak)
NRCS Ecological Site #	R047XA410UT
States and Transitions	No state and transition model is available for this ecological site.

When established in 2013, this site was dominated by Utah juniper (*Juniperus osteosperma*) and Gambel oak (*Quercus gambelii*) and all other browse species provided little cover. A chaining and seeding treatment later that year (Table 16R-50.1) removed much of the tree cover. Density of oak plants increased, and the site transitioned to one dominated by oak; diversity of browse species also increased (Table 16R-50.12, Table 16R-50.13, Table 16R-50.14). The herbaceous understory has remained diverse, though it was not abundant prior to treatment. In 2017, the introduced annual grass cheatgrass (*Bromus tectorum*) increased in both cover and frequency and became a co-dominant site component. Annual forb cover also increased, mainly due to the introduced species desert madwort (*Alyssum desertorum*); perennial forb cover also increased to a lesser extent between 2012 and 2017. Finally, the introduced and noxious annual forb species gypsiflower (*Cynoglossum officinale*) was sampled for the first time in 2017, albeit in low amounts (Table 16R-50.7, Table 16R-50.10, Table 16R-50.11).

Trend Summary Tables**Table 16R-50.6 - 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	20.0	0.9	2.5	28.8	1.3	47.8
2017	10.4	1.1	0.8	17.1	1.2	1.6

Table 16R-50.7 - 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	78	64	131	188	0.5	0.7	0.4	1.5
2017	290	229	355	119	15.2	11.1	14.9	4.9

Table 16R-50.8 - 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
2013	15.7	3.6	59.0	2.0	5.5	27.6
2017	11.1	-	63.8	3.7	3.4	54.5

Table 16R-50.9 - 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/Domestic Sheep	Rocky Mountain Elk	Rabbit
	Quadrat Frequency			
2013	-	9	1	12
2017	3	13	3	14
Days Use Per Acre (ha)				
2013	2.2 (5.4)	22.8 (56.3)	10.7 (26.5)	-
2017	-	18.1 (44.7)	8.1 (19.9)	-

Table 16R-50.10 - 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 ^{ai} (cheatgrass)	Carex (sedge)	Dactylis glomerata ⁱ (orchardgrass)	Elymus elymoides (squirreltail)	Leymus cinereus (basin wildrye)	Pascopyrum smithii (western wheatgrass)	Poa pratensis ⁱ (Kentucky bluegrass)	Poa secunda (Sandberg bluegrass)	Pseudoroegneria spicata (bluebunch wheatgrass)
year	Nested Frequency											
2013	22	5	-	78	4	-	10	-	-	14	13	-
2017	7	9	62	290	29	25	19	5	18	35	8	84
year	Average Cover (%)											
2013	0.5	0.0	-	0.5	0.0	-	0.1	-	-	0.0	0.1	-
2017	0.1	0.1	1.9	15.2	1.6	1.4	0.5	0.4	0.6	1.4	0.4	2.7

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

Table 16R-50.11 - Forb Species. Nested frequency and modified Daubenmire average cover by year.

FORB SPECIES	Achillea millefolium (Common yarrow)	Alyssum desertorum ^{ai} (desert madwort)	Astragalus argophyllus (silverleaf milkvetch)	Astragalus convallarius (lesser rusby milkvetch)	Astragalus utahensis (Utah milkvetch)	Camelina microcarpa ^{ai} (littledod false flax)	Carduus nutans ^{ani} (nodding plumeless thistle)	Ceratocephala testiculata ^{ai} (curveseed butterwort)	Chaenactis douglasii (Douglas' dustymaiden)	Cirsium (thistle)	Collinsia parviflora ^a (maiden blue eyed Mary)	Comandra umbellata (bastard toadflax)	Cryptantha (cryptantha)	Cymopterus (springparsley)	Cynoglossum officinale ^{ani} (gypsyflower)	Descurainia pinnata ^a (western tansymustard)	Erigeron eatonii (Eaton's fleabane)
year	Nested Frequency																
2013	1	22	-	19	2	-	-	52	1	-	7	2	1	7	-	-	3
2017	18	309	5	9	1	3	52	8	2	2	-	7	-	12	10	10	1
year	Average Cover (%)																
2013	0.0	0.1	-	0.1	0.0	-	-	0.1	0.0	-	0.0	0.0	0.0	0.0	-	-	0.0
2017	1.3	11.2	0.0	0.0	0.0	0.0	2.0	0.1	0.0	0.0	-	0.0	-	0.1	0.4	0.0	0.0

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

FORB SPECIES	Erodium cicutarium ^{ai} (redstem stork's bill)	Hackelia patens (spotted stickseed)	Helianthus annuus ^a (common sunflower)	Lactuca serriola ^{ai} (prickly lettuce)	Linum perenne ⁱ (blue flax)	Medicago sativa ⁱ (alfalfa)	Melilotus officinalis ⁱ (sweetclover)	Microsteris gracilis ^{ai} (slender phlox)	Onobrychis vicifolia ⁱ (sainfoin)	Penstemon (beardtongue)	Penstemon humilis (low beardtongue)	Phlox austromontana (mountain phlox)	Phlox longifolia (longleaf phlox)	Polygonum douglasii ^a (Douglas' knotweed)	Sanguisorba minor ⁱ (small burnet)	Silene antirrhina ^a (sleepy silene)	Streptanthus cordatus (heartleaf twistflower)
year	Nested Frequency																
2013	-	2	-	-	-	-	-	91	-	15	-	1	113	4	-	3	1
2017	12	9	4	69	34	4	8	-	1	-	9	-	1	1	30	-	1
year	Average Cover (%)																
2013	-	0.0	-	-	-	-	-	0.2	-	0.2	-	0.0	0.7	0.0	-	0.0	0.0
2017	0.4	0.2	0.0	0.6	0.8	0.0	0.7	-	0.0	-	0.2	-	0.0	0.0	1.3	-	0.0

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

FORB SPECIES	Symphyotrichum ascendens (western aster)	Tragopogon dubius ^{ai} (yellow salsify)	Veronica biloba ^{ai} (twolobe speedwell)	Vicia americana (American vetch)
year	Nested Frequency			
2013	47	-	7	6
2017	12	9	2	3
year	Average Cover (%)			
2013	0.3	-	0.0	0.1
2017	0.2	0.1	0.0	0.0

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

Table 16R-50.12 - Shrub and Tree Species. Average modified Daubenmire quadrat and line intercept cover by year.

SHRUB SPECIES	Amelanchier utahensis ^p (Utah serviceberry)	Bassia prostrata ^{pi} (forage kochia)	Cercocarpus montanus ^p (alderleaf mountain mahogany)	Chrysothamnus viscidiflorus ssp. viscidiflorus var. viscidiflorus (yellow rabbitbrush)	Gutierrezia sarothrae (broom snakeweed)	Juniperus osteosperma ^t (Utah juniper)	Mahonia repens (creeping barberry)	Pinus edulis ^t (twoneedle pinyon)	Purshia tridentata ^p (antelope bitterbrush)	Quercus gambelii ^p (Gambel oak)	Symphoricarpos oreophilus (mountain snowberry)
year	Line Intercept Cover (%)										
2013	-	-	0.5	-	-	47.8	0.1	-	2.3	26	1.2
2017	-	-	-	-	0.1	1.6	0	-	2.1	15	1.1
year	Quadrat Cover (%)										
2013	0.0	-	0.4	-	-	2.5	0.0	0.0	1.6	18.0	0.8
2017	-	0.1	-	0.2	0.3	0.6	0.0	0.1	0.5	9.8	0.6

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

Table 16R-50.13 - 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)									
2013	20	40	0	100	0	100	0	100	168/95
2017	-	-	-	-	-	-	-	-	-/-
Artemisia tridentata ssp. vaseyana ^p -- (mountain big sagebrush)									
2013	-	-	-	-	-	-	-	-	-/-
2017	80	-	25	75	0	0	0	0	33/36
Bassia prostrata ^{pi} -- (forage kochia)									
2013	-	-	-	-	-	-	-	-	-/-
2017	240	-	25	75	0	0	17	0	17/30
Cercocarpus montanus ^p -- (alderleaf mountain mahogany)									
2013	60	-	67	33	0	67	33	33	47/82
2017	-	-	-	-	-	-	-	-	49/47
Chrysothamnus viscidiflorus ssp. viscidiflorus var. viscidiflorus -- (yellow rabbitbrush)									
2013	-	-	-	-	-	-	-	-	-/-
2017	180	-	0	100	0	11	0	0	23/31
Eriogonum heracleoides -- (parsnipflower buckwheat)									
2013	20	-	0	100	0	0	0	0	10/7
2017	-	-	-	-	-	-	-	-	-/-
Ericameria nauseosa -- (rubber rabbitbrush)									
2013	-	-	-	-	-	-	-	-	-/-
2017	20	-	0	100	0	0	0	0	-/-
Gutierrezia sarothrae -- (broom snakeweed)									
2013	-	-	-	-	-	-	-	-	15/11
2017	180	60	0	100	0	0	0	0	19/25
Juniperus osteosperma ^t -- (Utah juniper)									
2013	180	60	33	67	0	0	0	11	-/-
2017	60	-	33	67	0	0	0	33	-/-
Linanthus pungens -- (granite prickly phlox)									
2013	20	-	0	0	100	0	100	100	5/12
2017	-	-	-	-	-	-	-	-	-/-
Mahonia repens -- (creeping barberry)									
2013	800	20	5	95	0	0	0	0	6/10
2017	660	-	0	100	0	0	0	0	7/8
Pinus edulis ^t -- (twoneedle pinyon)									
2013	-	20	0	0	0	0	0	0	-/-
2017	20	-	0	100	0	0	0	0	-/-

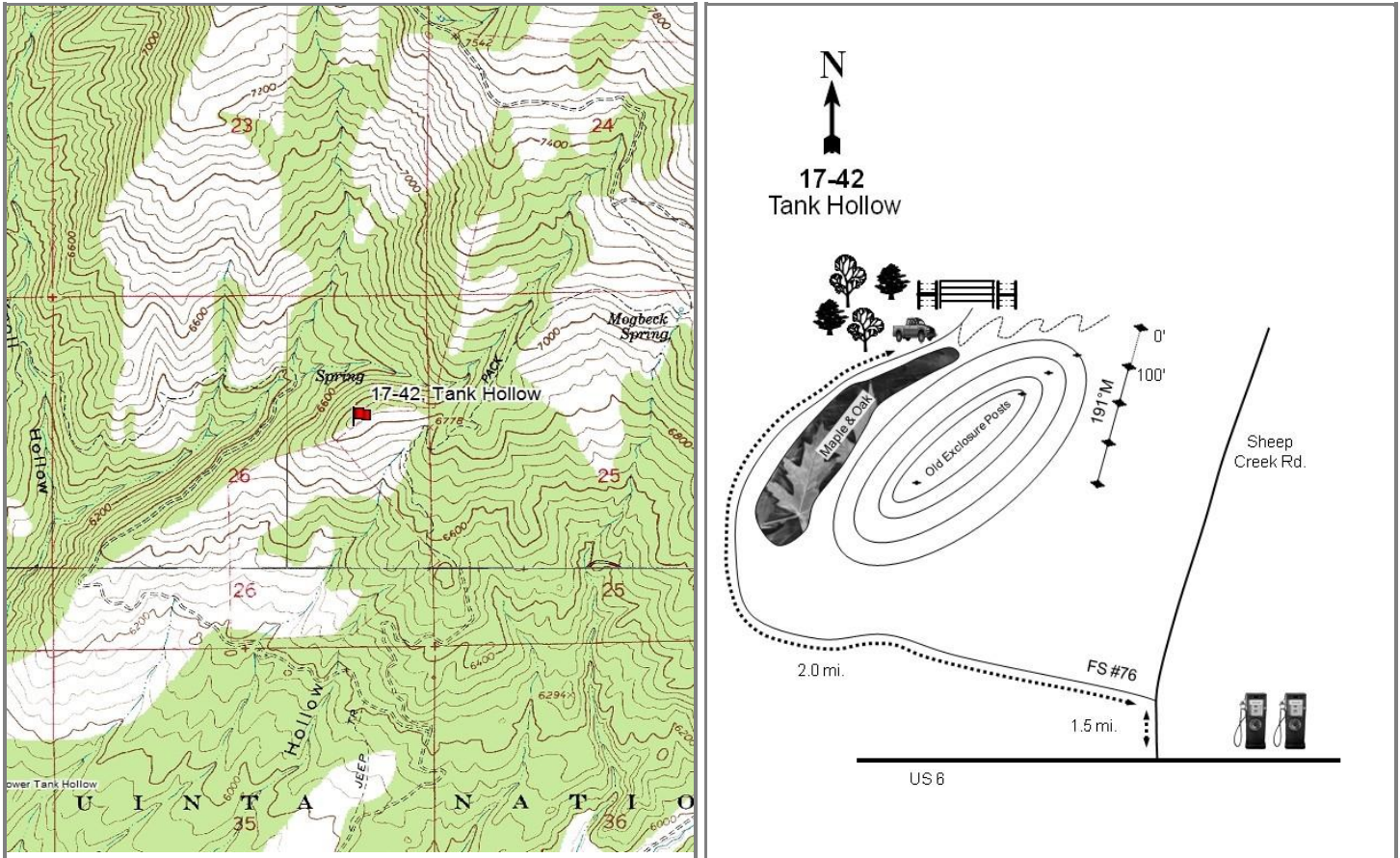
Year	Density		Age Class Distribution			Utilization		Poor Vigor (%)	Average Height Crown (cm)
	Plants Per Acre		Excluding Seedlings			Moderate (%)	Heavy (%)		
	Excluding Seedlings	Seedling	Young (%)	Mature (%)	Decadent (%)				
Purshia tridentata ^P -- (antelope bitterbrush)									
2013	560	-	0	100	0	86	4	0	30/104
2017	500	-	52	48	0	40	60	0	22/71
Quercus gambelii ^P -- (Gambel oak)									
2013	5220	440	56	44	0	4	0	0	62/62
2017	7820	20	10	90	0	23	30	1	59/54
Rosa woodsii ^P -- (Woods' rose)									
2013	-	-	-	-	-	-	-	-	-/-
2017	20	-	0	100	0	0	0	0	26/24
Symphoricarpos oreophilus -- (mountain snowberry)									
2013	820	40	37	63	0	5	5	17	21/33
2017	760	-	29	71	0	50	0	0	25/37

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

Table 16R-50.14 - 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	169	16	11	11	11	53	17.1
2017	74	11	67	22	-	-	5.4

TANK HOLLOW - STUDY NO. 17-42



Location Information

USGS 7.5 min Map Info
GPS (0' Stake)

Rays Valley SW; Township 9S, Range 5E, Section 26
NAD 83 UTM ZONE 12, 471773 East 4428457 North

Transect Information

Browse Tag # (0' Stake)	719
Transect Bearing	191° magnetic
Length	400ft
Belt Placement	Line 1 (11ft & 95ft), Line 2 (34ft), Line 3 (59ft), Line 4 (71ft)
Belt Marker Placement	Belt 5: 3ft

Directions to Site

Turn north off of Highway US-6 (near mile post 195) onto the new Sheep Creek Road. Continue 1.5 miles on the paved road to an intersection with Forest Service road #076. From the intersection with the FS road drive approximately 2 miles to a large gate. Park near the gate and hike up the steep hill for about 900 feet to the site location. The 0-foot stake is marked with browse tag #719.

Site Information

Land Ownership	Federal
Land Administrator	USFS
Allotment	DIAMOND FORK
Elevation	6,840ft (2,085m)
Aspect	South
Slope	20%
Sample Dates	06/12/1997, 06/21/2002, 06/25/2007, 07/12/2012, 07/06/2017

Table 17-42.1 Disturbance History. Recorded history of major disturbances.

Treatment/Disturbance	Name	WRI DB#	Date	Size (acres)
Hand Crew - Lop and Scatter	Tank Hollow Habitat Improvement Project	658	July 2007-December 2008	1117

Wildlife Habitat and Vegetation History**Table 17-42.3 - Wildlife Seasonal Habitat.** UDWR wildlife habitat and seasonality.

Species	Habitat	Season
Deer	crucial	winter/spring
Elk	crucial	winter
Moose	substantial	winter

Table 17-42.4 - 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/Bitterbrush	Phase I
1989	Mountain Big Sagebrush/Bitterbrush	Phase I
1997	Mountain Big Sagebrush/Bitterbrush	Phase I
2002	Mountain Big Sagebrush/Bitterbrush	Phase I
2007	Mountain Big Sagebrush/Bitterbrush	Phase I
2012	Mountain Big Sagebrush/Bitterbrush/Perennial Grass	Phase I
2017	Mountain Big Sagebrush/Bitterbrush/Perennial Grass	Phase I

Site Notes

The nearest perennial water source is a spring located 1000 feet northwest on the opposite side of the ridge.

Soils**Table 17-42.5 - 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	25.4	34.7	39.8	3.4	6.9	64.0	0.7	06/12/1997

Site Potential

1981 - 2010 Average Annual Precipitation	22 inches
NRCS Ecological Site	Mountain Loam (Browse)
NRCS Ecological Site #	R047XA420UT
States and Transitions	No state and transition model is available for this ecological site.

Mountain big sagebrush (*Artemisia tridentata* ssp. *vaseyana*) and antelope bitterbrush (*Purshia tridentata*) have been the dominant shrub species on this site since 1983, although a number of other species are also present. Utah juniper (*Juniperus osteosperma*) has been observed in all sample years, and increased in cover from study establishment through 2007; a lop and scatter treatment then removed many of the trees and cover decreased in 2012 (photos, Table 17-42.1, Table 17-42.12, Table 17-42.13, Table 17-42.14). This site has been considered to be in Phase I of woodland succession throughout the study period (Table 17-42.4). Herbaceous species are diverse and the understory is abundant overall (Table 17-42.7). Perennial grasses, particularly crested wheatgrass (*Agropyron cristatum*), contribute the most herbaceous cover and became a co-dominant site component in 2012 (Table 17-42.10). Forbs have remained rare since 2002 (Table 17-42.11).

Trend Summary Tables**Table 17-42.6 - 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	25.1	6.1	2.5	-	-	-
2002	15.3	5.5	3.0	9.7	4.4	0.8
2007	7.6	5.3	3.6	10.3	4.5	3.6
2012	11.7	4.6	0.1	16.8	4.4	0.8
2017	11.6	4.8	0.4	17.3	4.8	-

Table 17-42.7 - 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	79	211	234	320	0.9	11.0	1.7	16.1
2002	41	247	61	175	0.2	11.9	0.5	2.7
2007	94	355	102	130	1.5	15.8	0.4	3.1
2012	24	378	55	72	0.3	33.9	0.2	1.1
2017	10	397	165	119	0.4	28.9	1.3	2.1

Table 17-42.8 - 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
1997	11.9	0.3	53.1	1.7	4.2	52.6
2002	23.2	0.7	49.6	0.9	3.3	37.9
2007	24.4	0.3	41.0	1.6	3.5	42.4
2012	11.9	0.5	59.3	0.9	3.7	56.1
2017	13.5	0.9	63.4	3.1	4.6	50.5

Table 17-42.9 - 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	Rocky Mountain Elk	Rabbit
	Quadrat Frequency			
1997	-	38	36	1
2002	4	52	20	6
2007	3	31	33	4
2012	1	23	4	3
2017	-	36	1	12
Year	Days Use Per Acre (ha)			
1997	-	-	-	-
2002	5.1 (12.6)	155.5 (384.0)	48.9 (120.8)	-
2007	2.2 (5.4)	21.5 (53.0)	46.2 (114.2)	-
2012	6.5 (16.1)	45.6 (112.6)	14.1 (34.8)	-
2017	2.2 (5.4)	43.6 (107.6)	5.3 (13.2)	-

Table 17-42.10 - 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 marginatus (mountain brome)											
Bromus tectorum ^{ai} (cheatgrass)											
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										
1997	6	95	-	6	79	-	3	6	52	28	61
2002	9	148	-	6	41	12	11	13	32	25	52
2007	3	241	8	-	94	6	15	7	65	104	41
2012	8	275	-	8	24	2	1	-	50	77	87
2017	1	328	8	-	10	46	-	-	30	46	108
year	Average Cover (%)										
1997	0.1	5.4	-	0.1	0.9	-	0.0	0.7	1.4	1.0	2.5
2002	0.2	7.1	-	0.5	0.2	0.1	0.1	0.1	0.6	1.7	1.4
2007	0.1	9.6	0.5	-	1.5	0.0	0.1	0.3	1.4	2.8	0.9
2012	0.2	22.9	-	0.8	0.3	0.0	0.0	-	1.9	4.0	4.0
2017	0.0	20.7	0.3	-	0.4	0.9	-	-	0.4	2.1	4.4

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

Table 17-42.11 - Forb Species. Nested frequency and modified Daubenmire average cover by year.

FORB SPECIES																		
Agoseris glauca (pale agoseris)																		
Allium (onion)																		
Alyssum desertorum ^{ai} (desert madwort)																		
Arabis (rockcress)																		
Astragalus (milkvetch)																		
Astragalus beekwithii (Beekwith's milkvetch)																		
Astragalus convallarius (lesser rushy milkvetch)																		
Balsamorhiza sagittata (arrow/leaf balsamroot)																		
Camelina microcarpa ^{ai} (littledod false flax)																		
Castilleja linariifolia (Wyoming Indian paintbrush)																		
Ceratocephala testiculata ^{ai} (curveseed butterwort)																		
Chenopodium album ^a (lambquarters)																		
Cirsium (thistle)																		
Collinsia parviflora ^a (maiden blue eyed Mary)																		
Collomia linearis ^a (tiny trumpet)																		
Comandra umbellata (bastaard toadflax)																		
Crepis acuminata (tapertip hawksbeard)																		
year	Nested Frequency																	
1997	0	19	-	8	2	4	11	1	15	4	-	2	53	27	9	3	58	
2002	13	19	3	3	-	-	-	4	18	-	-	-	2	12	-	-	11	
2007	2	3	35	-	-	-	-	3	55	-	7	-	2	1	-	-	1	
2012	-	-	47	-	-	-	-	2	-	-	3	-	4	6	1	2	-	
2017	3	11	140	-	-	-	-	3	5	1	9	-	1	7	-	1	2	
year	Average Cover (%)																	
1997	0.0	0.1	-	0.0	0.0	0.2	0.0	0.1	0.1	0.0	-	0.0	1.8	0.0	0.0	0.0	0.6	
2002	0.0	0.1	0.0	0.0	-	-	-	0.1	0.3	-	-	-	0.0	0.0	-	-	0.2	
2007	0.0	0.0	0.1	-	-	-	-	0.1	0.2	-	0.0	-	0.4	0.0	-	-	0.0	
2012	-	-	0.1	-	-	-	-	0.0	-	-	0.0	-	0.0	0.1	0.0	0.0	-	
2017	0.0	0.1	1.0	-	-	-	-	0.1	0.0	0.0	0.1	-	0.2	0.0	-	0.0	0.0	

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

FORB SPECIES	Cymopterus (springparsley)	Descurainia pinnata ^a (western tansymustard)	Erigeron pumilus (shaggy fleabane)	Eriogonum brevicaulis (shortstem buckwheat)	Erodium cicutarium ^{ai} (redstem stork's bill)	Hackelia patens (spotted stickseed)	Lappula occidentalis ^a (flatspine stickseed)	Linum lewisii (Lewis flax)	Lithospermum ruderale (western stone seed)	Lomatium (desertparsley)	Machaeranthera canescens (hoary tansyaster)	Microsteris gracilis ^a (slender phlox)	Packera multilobata (lobeleaf groundsel)	Penstemon humilis (low beardtongue)	Phlox longifolia (longleaf phlox)	Polygonum douglasii ^a (Douglas' knotweed)	Senecio integerrimus ^a (lambstongue ragwort)
year	Nested Frequency																
1997	35	7	1	-	-	87	5	182	5	-	7	5	7	9	49	1	-
2002	-	9	0	3	-	59	-	-	6	-	1	41	-	3	45	-	-
2007	21	7	-	4	-	53	-	12	7	3	1	14	-	-	28	-	-
2012	9	-	-	0	-	15	-	12	2	-	-	-	-	-	9	-	-
2017	12	15	-	-	3	9	1	5	7	-	-	-	2	3	32	-	3
year	Average Cover (%)																
1997	0.2	0.0	0.0	-	-	3.0	0.0	6.3	0.3	-	0.1	0.0	0.1	0.1	0.3	0.0	-
2002	-	0.1	0.0	0.1	-	0.8	-	-	0.6	-	0.0	0.1	-	0.0	0.1	-	-
2007	0.1	0.0	-	0.1	-	1.1	-	0.2	0.2	0.0	0.0	0.0	-	-	0.3	-	-
2012	0.0	-	-	0.0	-	0.3	-	0.1	0.2	-	-	-	-	-	0.0	-	-
2017	0.0	0.1	-	-	0.0	0.2	0.0	0.0	0.6	-	-	-	0.0	0.0	0.1	-	0.0

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

FORB SPECIES	Streptanthus cordatus (heartleaf twistflower)	Symphoricarum ascendens (western aster)	Thalictrum (meadow-rue)	Tragopogon dubius ^{ai} (yellow salsify)	Trifolium (clover)	Veronica biloba ^{ai} (twolobe speedwell)	Vicia americana (American vetch)	Viola (violet)
year	Nested Frequency							
1997	9	28	-	18	-	189	78	3
2002	9	14	-	-	2	-	58	-
2007	2	10	1	12	-	9	30	-
2012	5	14	-	-	-	-	13	-
2017	3	17	-	1	-	36	41	-
year	Average Cover (%)							
1997	0.2	0.9	-	0.1	-	1.4	1.6	0.0
2002	0.0	0.1	-	-	0.0	-	0.4	-
2007	0.0	0.1	0.1	0.1	-	0.0	0.2	-
2012	0.0	0.3	-	-	-	-	0.2	-
2017	0.0	0.2	-	0.0	-	0.1	0.4	-

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

Table 17-42.12 - Shrub and Tree Species. Average modified Daubenmire quadrat and line intercept cover by year.

SHRUB SPECIES	Amelanchier utahensis ^s (Utah serviceberry)	Artemisia tridentata ssp. vaseyana ^p (mountain big sagebrush)	Cercocarpus montanus ^p (alderleaf mountain mahogany)	Chrysothamnus viscidiflorus ssp. viscidiflorus var. viscidiflorus (yellow rabbitbrush)	Gutierrezia sarothrae (broom snakeweed)	Juniperus osteosperma ^t (Utah juniper)	Mahonia repens (creeping barberry)	Opuntia (pricklypear)	Purshia tridentata ^p (antelope bitterbrush)	Quercus gambelii ^p (Gambel oak)	Symphoricarpos oreophilus (mountain snowberry)
year	Line Intercept Cover (%)										
1997	-	-	-	-	-	-	-	-	-	-	-
2002	0.2	5.9	0.8	1.9	0.6	0.8	-	-	2.6	0.2	1.9
2007	0.1	5.6	1.2	2	1.2	3.6	-	0.1	3.2	0.2	1.2
2012	-	5.7	2.9	2.4	0.5	0.8	-	0	7.5	0.7	1.5
2017	0	5.3	2.3	3.2	0.6	-	-	0.1	8.6	1.1	0.9
year	Quadrat Cover (%)										
1997	0.6	13.2	1.1	2.0	2.0	2.5	0.0	-	9.8	0.4	2.1
2002	0.6	8.4	1.6	2.0	1.9	3.0	-	0.0	4.6	0.2	1.6
2007	0.2	4.2	0.5	1.9	2.2	3.6	0.0	0.1	2.7	0.1	1.1
2012	0.2	4.2	2.1	2.6	0.3	0.1	-	0.1	5.0	0.3	1.6
2017	0.3	4.5	2.3	2.6	1.0	0.4	-	0.1	4.4	0.1	1.1

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

Table 17-42.13 - 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	200	40	40	60	0	20	20	0	88/89
2002	180	-	44	0	56	11	78	22	53/47
2007	160	-	25	50	25	50	0	13	69/66
2012	100	40	0	100	0	80	20	0	83/73
2017	100	-	20	80	0	20	40	0	71/70
Artemisia tridentata ssp. vaseyana^p -- (mountain big sagebrush)									
1997	1720	-	5	64	31	57	13	23	76/118
2002	1780	-	2	33	65	16	80	44	66/84
2007	1080	60	2	48	50	37	46	37	70/92
2012	900	-	2	56	42	47	27	40	63/73
2017	840	-	2	62	36	50	31	26	61/74
Cercocarpus montanus^p -- (alderleaf mountain mahogany)									
1997	320	-	6	94	0	19	75	6	83/103
2002	380	-	11	21	68	0	95	58	97/88
2007	180	20	0	89	11	44	56	11	72/74
2012	220	-	0	100	0	46	55	9	90/89
2017	300	-	20	73	7	27	53	7	100/98
Chrysothamnus viscidiflorus ssp. viscidiflorus var. viscidiflorus -- (yellow rabbitbrush)									
1997	1460	20	7	93	0	0	0	0	30/43
2002	1700	-	4	95	1	4	1	0	22/37
2007	1340	-	2	97	2	0	0	0	22/42
2012	1360	-	2	96	3	0	0	3	27/47
2017	1980	20	4	95	1	0	0	1	29/40
Gutierrezia sarothrae -- (broom snakeweed)									
1997	5420	400	22	78	0	0	0	0	25/26
2002	3840	20	1	73	27	0	0	10	19/20
2007	3460	20	3	92	5	0	0	2	21/25
2012	600	20	3	97	0	0	0	3	21/29
2017	1120	-	0	100	0	0	0	0	26/27

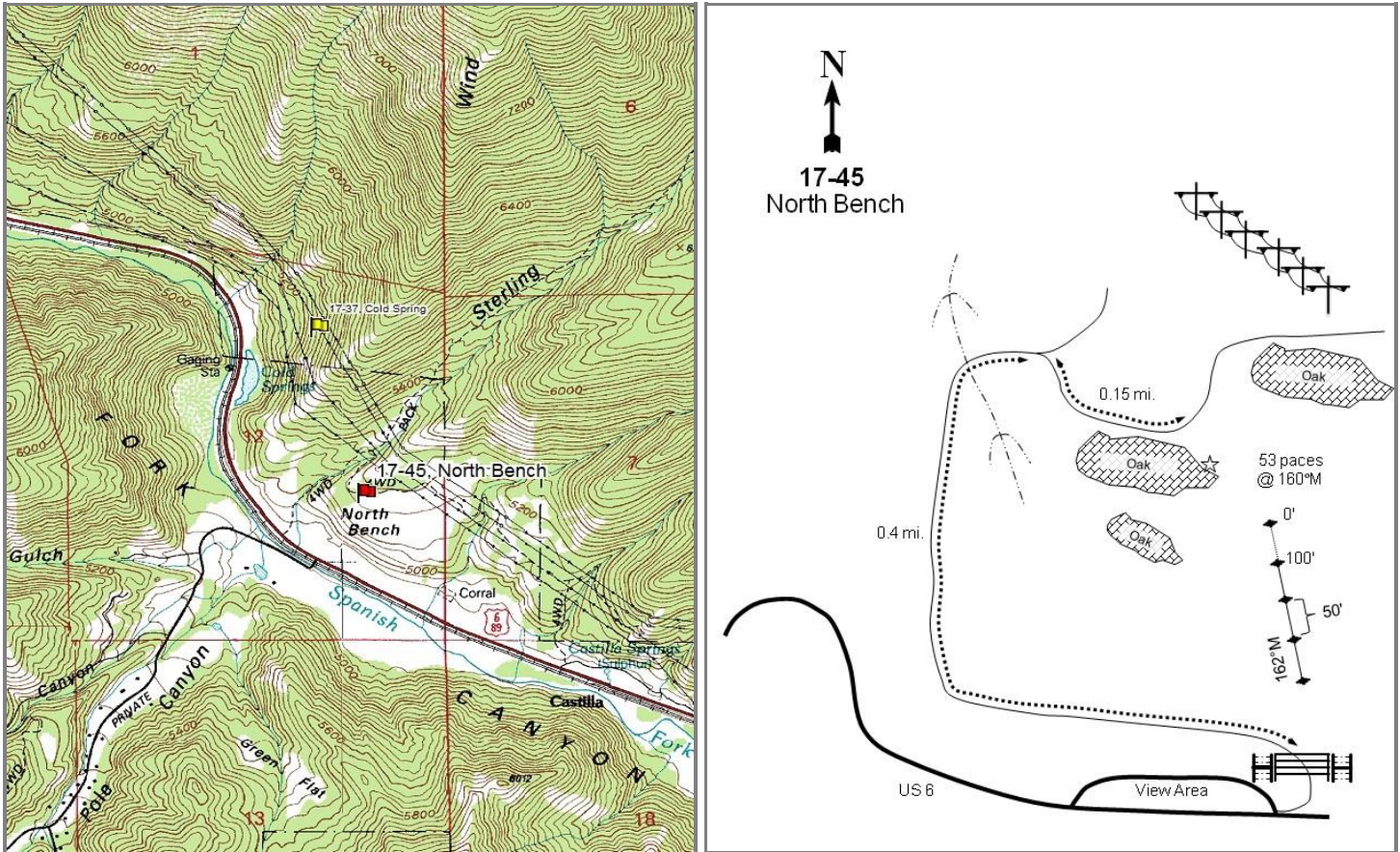
Year	Density		Age Class Distribution			Utilization		Poor Vigor (%)	Average Height Crown (cm)
	Plants Per Acre		Excluding Seedlings			Moderate (%)	Heavy (%)		
	Excluding Seedlings	Seedling	Young (%)	Mature (%)	Decadent (%)				
Juniperus osteosperma^t -- (Utah juniper)									
1997	80	-	0	100	0	0	0	0	179/157
2002	60	-	0	100	0	0	33	33	- / -
2007	40	-	50	50	0	0	0	0	- / -
2012	20	-	100	0	0	0	0	0	- / -
2017	20	-	100	0	0	0	0	0	- / -
Mahonia repens -- (creeping barberry)									
1997	80	-	25	75	0	0	0	0	8/14
2002	-	-	-	-	-	-	-	-	- / -
2007	120	-	0	100	0	0	0	0	- / -
2012	20	-	0	100	0	0	0	0	7/11
2017	-	-	-	-	-	-	-	-	11/12
Opuntia -- (pricklypear)									
1997	20	-	0	100	0	0	0	0	9/14
2002	60	-	33	33	33	0	0	67	7/18
2007	100	-	20	80	0	0	0	0	16/21
2012	20	-	0	100	0	0	0	0	15/18
2017	300	-	0	100	0	0	0	0	13/15
Purshia tridentata^p -- (antelope bitterbrush)									
1997	1960	20	14	86	0	52	36	0	68/123
2002	2140	-	1	14	85	8	88	48	35/73
2007	1020	-	16	67	18	43	33	6	40/84
2012	1040	-	2	98	0	69	27	0	53/88
2017	1180	-	0	97	3	39	15	0	53/94
Quercus gambelii^p -- (Gambel oak)									
1997	140	20	71	29	0	0	0	0	138/86
2002	160	-	50	0	50	0	38	50	66/68
2007	120	-	33	67	0	0	0	50	229/144
2012	180	-	89	11	0	0	0	0	86/82
2017	180	-	0	100	0	0	0	0	103/95
Ribes^p -- (currant)									
1997	-	-	-	-	-	-	-	-	- / -
2002	-	-	-	-	-	-	-	-	48/179
2007	-	-	-	-	-	-	-	-	- / -
2012	-	-	-	-	-	-	-	-	- / -
2017	-	-	-	-	-	-	-	-	- / -
Symphoricarpos oreophilus -- (mountain snowberry)									
1997	1000	-	10	90	0	0	0	0	46/92
2002	960	-	21	65	15	21	8	2	33/68
2007	900	-	69	31	0	0	0	7	33/47
2012	840	-	26	74	0	21	0	2	41/48
2017	940	-	21	79	0	0	0	0	41/54

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

Table 17-42.14 - 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'	
Juniperus osteosperma (Utah juniper)						
2002	44	-	-	-	-	13.1
2007	63	-	31	6	44	12.3
2012	32	-	45	45	-	8.6
2017	21	-	11	67	11	11.3
Pinus edulis (twoneedle pinyon)						
2002	2	-	-	-	-	6.0

NORTH BENCH - STUDY NO. 17-45

**Location Information**

USGS 7.5 min Map Info
GPS (0' Stake)

Spanish Fork Peak SE; Township 9S, Range 3E, Section 12
NAD 83 UTM ZONE 12, 453800 East 4432784 North

Transect Information

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

Not Available
162° magnetic
400ft
Line 1 (11ft & 95ft), Line 2 (34ft), Line 3 (59ft), Line 4 (71ft)
No Rebar

Directions to Site

From the west side of the viewing area in lower Spanish Fork Canyon (about 3.5 miles east of the mouth), look for a dirt road that goes through a gate and by an old corral. Take this rough road for 0.4 miles to an intersection. At the intersection, turn right and continue for 0.15 miles to the top of the bench and an old fence line. From the wooden post near the left-hand (north) side of the road, walk 53 paces at a bearing of 160 degrees magnetic into the sagebrush flat. The first stake marks the 0-foot end of the baseline, and the remainder of the study stakes are south at 100 foot intervals.

Site Information

Land Ownership	Private
Land Administrator	Private
Allotment	No data
Elevation	5,150ft (1,570m)
Aspect	South
Slope	3-10%
Sample Dates	05/28/1997, 06/05/2002, 07/23/2007, 07/02/2012, 06/01/2017

Table 17-45.1 Disturbance History. Recorded history of major disturbances.

Treatment/Disturbance	Name	WRI DB#	Date	Size (acres)
Herbicide - Milestone	Utah County CWMA Priority Weeds Treatment and Restoration-Phase I	1116	2009	50

Wildlife Habitat and Vegetation History**Table 17-45.3 - Wildlife Seasonal Habitat.** UDWR wildlife habitat and seasonality.

Species	Habitat	Season
Deer	crucial	winter
Moose	substantial	winter

Table 17-45.4 - Vegetation History. The dominant vegetation type(s) and phase of woodland succession (Tausch, Miller, Roundy, & Chambers, 2009).

Year	Vegetation Type	Woodland Succession
1989	Sagebrush/Perennial Grass	No Encroachment
1997	Sagebrush/Perennial Grass	No Encroachment
2002	Sagebrush/Perennial Grass	No Encroachment
2007	Sagebrush/Perennial Grass	No Encroachment
2012	Sagebrush/Perennial Grass	No Encroachment
2017	Sagebrush/Perennial Grass	No Encroachment

Site Notes

The nearest perennial sources of water are Spanish Fork River 0.2 miles southwest and Cold Springs 0.4 miles northwest of the study. Spanish Fork River is on the opposite side of US-6, but Cold Springs is on the same side as the study site, which may make it the primary water source. The slope west of the study was being developed during the 2007 sample year.

Soils**Table 17-45.5 - 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	6.1	36.7	36.4	26.8	1.7	27.3	227.2	0.3	05/28/1997

Site Potential

1981 - 2010 Average Annual Precipitation	23 inches
NRCS Ecological Site	Mountain Loam (Mountain Big Sagebrush)
NRCS Ecological Site #	047XA430UT
States and Transitions	No state and transition model is available for this ecological site.

From the time of establishment in 1989 through the most recent sample year, the site has remained dominated by mountain big sagebrush (*Artemisia tridentata* ssp. *vaseyana*) and perennial grasses. The forb community on this site is abundant and diverse, with hairy false goldenaster (*Heterotheca villosa*) and silvery lupine (*Lupinus argenteus*) being the co-dominant species (Table 17-45.11). The grasses on the site are mostly introduced perennial grasses, with crested wheatgrass (*Agropyron cristatum*), bulbous bluegrass (*Poa bulbosa*), and Kentucky bluegrass (*P. pratensis*) being co-dominant (Table 17-45.10). Mountain big sagebrush is the dominant browse species, while broom snakeweed (*Gutierrezia sarothrae*) is a lesser component of the shrub layer (Table 17-45.12, Table 17-45.13). The presence of high levels of introduced perennial grasses, in particular bulbous bluegrass, could lead to an ecological shift away from the rich forb component currently found on the site to a more depleted forb community.

Trend Summary Tables**Table 17-45.6 - 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	8.8	1.2	-	-	-	-
2002	13.1	2.4	-	-	-	-
2007	12.1	1.6	-	18.8	0.7	-
2012	11.4	1.2	-	10.8	1.1	-
2017	21.8	2.6	-	19.7	0.9	-

Table 17-45.7 - 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	17	490	296	238	0.1	45.8	3.9	8.8
2002	-	489	171	257	-	50.7	3.1	12.9
2007	-	455	96	303	-	27.1	0.5	14.1
2012	5	453	146	282	0.0	30.5	1.2	10.9
2017	13	475	173	279	0.7	68.4	2.8	18.6

Table 17-45.8 - 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
1997	10.4	1.0	39.0	0.3	0.1	58.8
2002	5.0	0.8	37.4	0.1	0.0	71.5
2007	13.9	0.0	42.4	0.0	-	56.2
2012	3.7	0.0	51.9	0.0	0.7	54.9
2017	14.3	2.0	46.7	0.2	0.0	73.9

Table 17-45.9 - 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	Rocky Mountain Elk
	Quadrat Frequency		
1997	2	1	-
2002	5	7	1
2007	3	4	4
2012	1	1	-
2017	6	1	1
Year	Days Use Per Acre (ha)		
1997	-	-	-
2002	5.8 (14.3)	8.1 (19.9)	-
2007	31.2 (77.1)	4.0 (9.9)	4.0 (9.9)
2012	8.7 (21.5)	0.7 (1.7)	0.7 (1.7)
2017	28.3 (69.9)	18.7 (46.3)	-

Table 17-45.10 - 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)	Dactylis glomerata ⁱ (orchardgrass)	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									
1997	229	-	-	17	14	443	157	14	-	-
2002	262	-	-	-	19	456	166	9	-	-
2007	194	-	-	-	12	314	213	11	3	-
2012	322	-	-	5	34	216	88	43	-	-
2017	234	1	3	12	41	401	261	-	4	19
year	Average Cover (%)									
1997	9.3	-	-	0.1	0.7	31.3	4.0	0.5	-	-
2002	12.3	-	-	-	0.7	32.9	4.8	0.0	-	-
2007	6.3	-	-	-	0.3	12.3	8.1	0.0	0.0	-
2012	15.4	-	-	0.0	0.5	9.6	1.1	3.9	-	-
2017	18.5	0.0	0.1	0.7	1.8	30.6	16.6	-	0.1	0.6

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

Table 17-45.11 - Forb Species. Nested frequency and modified Daubenmire average cover by year.

FORB SPECIES	Agoseris glauca (pale agoseris)	Antennaria parvifolia (small-leaf pussytoes)	Artemisia ludoviciana (white sagebrush)	Astragalus cibirius (browse milkvetch)	Cardaria draba ^{ai} (whitetop)	Cirsium (thistle)	Collinsia parviflora ^a (maiden blue eyed Mary)	Collomia linearis ^a (tiny trumpet)	Comandra umbellata (bastard toadflax)	Cynoglossum officinale ^{ai} (gypsoflower)	Descurainia pinnata ^a (western tansymustard)	Draba ^a (draba)	Epilobium brachycarpum ^a (tall annual willowherb)	Erigeron divergens ^a (spreading fleabane)	Erigeron pumilus (shaggy fleabane)	Erodium cicutarium ^{ai} (redstem stork's bill)	Galium aparine ^a (stickywilly)
year	Nested Frequency																
1997	-	-	4	-	-	27	2	-	-	70	-	-	164	-	32	-	-
2002	-	-	2	-	31	10	-	2	9	20	-	-	57	-	-	-	-
2007	1	1	5	-	-	4	-	-	-	1	-	-	36	-	2	-	-
2012	20	47	8	3	-	-	5	-	-	2	-	-	12	-	3	-	-
2017	6	31	4	-	-	-	9	-	-	17	5	5	45	1	2	17	3
year	Average Cover (%)																
1997	-	-	0.1	-	-	0.7	0.0	-	-	0.7	-	-	0.4	-	0.1	-	-
2002	-	-	0.1	-	0.4	0.0	-	0.0	0.0	0.4	-	-	0.2	-	-	-	-
2007	0.0	0.0	0.0	-	-	0.0	-	-	-	0.0	-	-	0.1	-	0.0	-	-
2012	0.1	1.2	0.2	0.0	-	-	0.0	-	-	0.0	-	-	0.0	-	0.0	-	-
2017	0.0	2.0	0.2	-	-	-	0.1	-	-	0.3	0.1	0.0	0.2	0.0	0.0	0.1	0.0

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

FORB SPECIES																
Grindelia squarrosa (curlycup gumweed)																
Helianthus annuus ^a (common sunflower)																
Heterotheca villosa (hairy false goldenaster)																
Iva axillaris (povertyweed)																
Lactuca serriola ^{ai} (prickly lettuce)																
Lupinus argenteus (silvery lupine)																
Machaeranthera canescens (hoary fansyaster)																
Medicago sativa ⁱ (alfalfa)																
Melilotus officinalis ⁱ (sweetclover)																
Phlox longifolia (longleaf phlox)																
Polygonum douglasii ^{ai} (Douglas' knotweed)																
Symphotrichum ascendens (western aster)																
Taraxacum officinale (common dandelion)																
Tragopogon dubius ^{ai} (yellow salsify)																
Verbascum thapsus ^{ai} (common mullein)																
Wyethia amplexicaulis (mule-ears)																
year	Nested Frequency															
1997	83	29	139	-	6	20	-	14	4	-	3	4	55	225	-	-
2002	8	6	214	-	-	29	-	22	1	-	-	6	16	139	-	-
2007	43	2	272	-	3	49	8	12	9	5	-	14	5	64	-	-
2012	71	8	150	-	11	66	-	21	52	13	-	8	17	117	6	-
2017	42	2	157	19	31	118	-	51	1	3	-	27	71	93	11	1
year	Average Cover (%)															
1997	1.1	0.3	3.5	-	0.0	0.9	-	0.9	0.2	-	0.0	0.2	1.1	2.5	-	-
2002	0.1	0.0	9.0	-	-	1.3	-	1.5	0.0	-	-	0.2	0.3	2.5	-	-
2007	0.7	0.0	9.9	-	0.0	2.6	0.0	0.3	0.1	0.0	-	0.3	0.0	0.4	-	-
2012	0.8	0.0	4.3	-	0.2	1.9	-	1.0	1.0	0.3	-	0.0	0.0	0.8	0.0	-
2017	0.3	0.0	6.2	0.2	0.3	4.4	-	2.8	0.0	0.0	-	1.1	1.4	1.7	0.1	0.0

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

Table 17-45.12 - 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 (%)		
1997	-	-	-
2002	-	-	-
2007	18.7	0.1	0.7
2012	10.7	0.1	1.1
2017	19.6	0.1	0.9
year	Quadrat Cover (%)		
1997	8.8	-	1.2
2002	13.1	-	2.4
2007	12.1	0.0	1.6
2012	11.4	0.0	1.2
2017	21.6	0.1	2.6

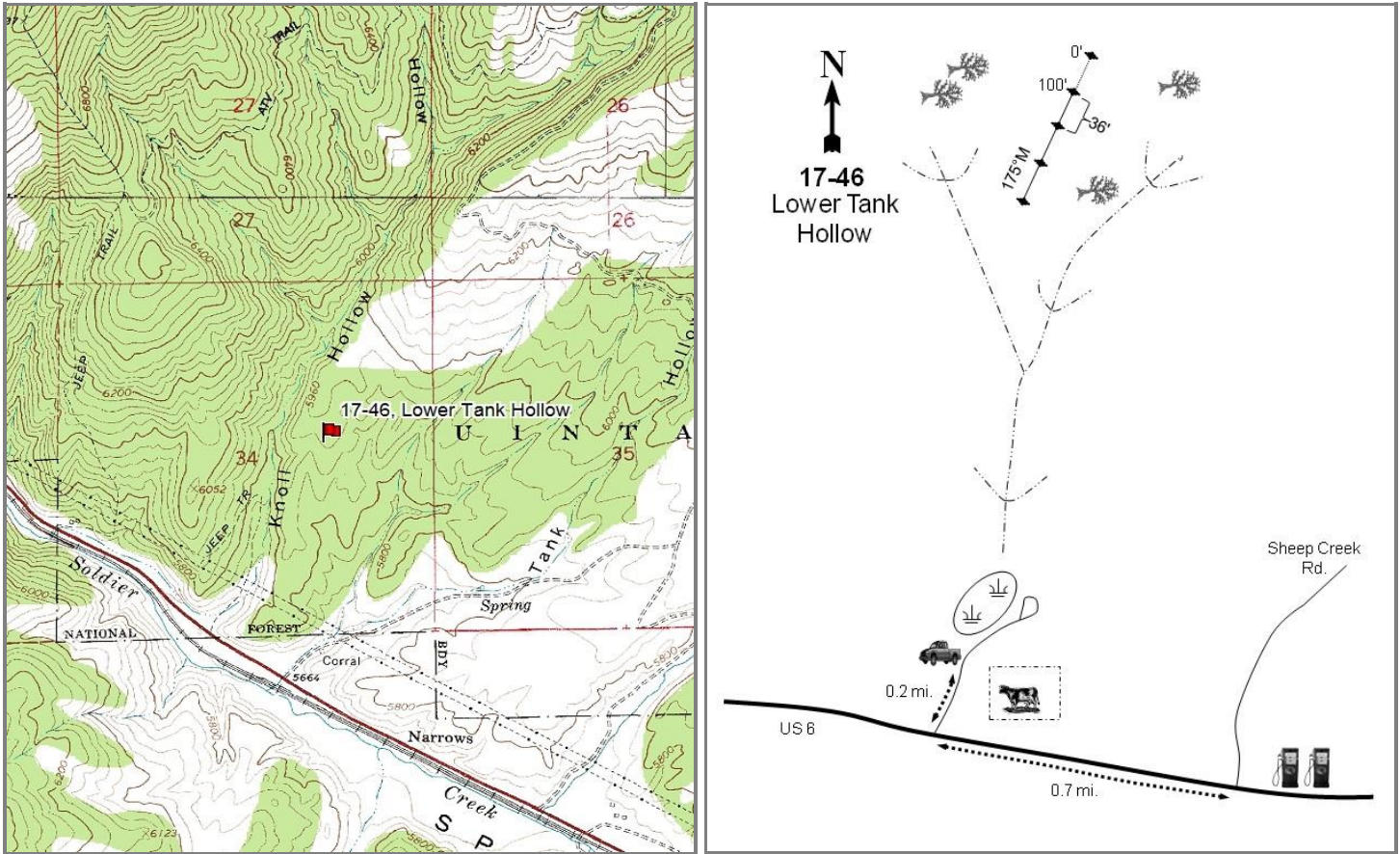
t - Tree Species; p - Preferred Browse; i - Introduced Species

Table 17-45.13 - 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 (%)				
Acer grandidentatum^t -- (bigtooth maple)									
1997	-	-	-	-	-	-	-	-	-/-
2002	-	-	-	-	-	-	-	-	-/-
2007	-	-	-	-	-	-	-	-	-/-
2012	40	-	100	0	0	0	0	0	37/19
2017	-	-	-	-	-	-	-	-	-/-
Artemisia tridentata ssp. vaseyana^p -- (mountain big sagebrush)									
1997	5500	1480	56	35	9	3	0	5	93/108
2002	5000	40	11	68	21	10	2	6	49/59
2007	3380	380	2	85	14	24	7	9	53/73
2012	3200	60	16	59	24	9	1	30	52/67
2017	3680	2240	13	82	5	0	0	5	51/78
Ericameria nauseosa ssp. nauseosa var. speciosa^p -- (rubber rabbitbrush)									
1997	20	-	0	100	0	0	0	0	72/122
2002	-	-	-	-	-	-	-	-	47/71
2007	40	-	0	100	0	0	0	0	69/62
2012	20	-	0	100	0	0	0	0	63/42
2017	20	-	0	100	0	0	0	0	53/80
Gutierrezia sarothrae -- (broom snakeweed)									
1997	3400	1100	39	59	2	0	0	0	16/20
2002	4800	20	4	88	8	0	0	1	20/22
2007	2180	20	5	95	1	7	2	1	24/24
2012	1440	-	3	96	1	0	1	25	21/21
2017	1200	1280	7	93	0	0	0	0	25/29
Purshia tridentata^p -- (antelope bitterbrush)									
1997	-	-	-	-	-	-	-	-	-/-
2002	-	-	-	-	-	-	-	-	-/-
2007	20	-	0	100	0	0	0	0	-/-
2012	-	-	-	-	-	-	-	-	-/-
2017	-	-	-	-	-	-	-	-	-/-
Quercus gambelii^p -- (Gambel oak)									
1997	-	-	-	-	-	-	-	-	-/-
2002	-	-	-	-	-	-	-	-	-/-
2007	20	-	100	0	0	0	0	0	83/71
2012	20	-	100	0	0	100	0	0	60/26
2017	-	-	-	-	-	-	-	-	-/-
Symphoricarpos oreophilus -- (mountain snowberry)									
1997	-	-	-	-	-	-	-	-	-/-
2002	-	-	-	-	-	-	-	-	-/-
2007	-	-	-	-	-	-	-	-	35/41
2012	-	-	-	-	-	-	-	-	93/68

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

LOWER TANK HOLLOW - STUDY NO. 17-46



Location Information

USGS 7.5 min Map Info	Mill Fork NW; Township 9S, Range 5E, Section 34
GPS (0' Stake)	NAD 83 UTM ZONE 12, 470018 East 4426679 North

Transect Information

Browse Tag # (0' Stake)	Not Available
Transect Bearing	175° 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

In Spanish Fork Canyon, turn north up Tank Hollow, which is 0.7 miles west of the Sheep Creek Road and cafe on Highway 6. Drive for about 0.2 miles and stop by a small stock pond in the forks of the drainage. From there, walk north about 1/2 mile up the left fork, and keep left at two other major forks. Where the wash starts to flatten out at the head, there is a chained ridge to the right. The study site is on the ridge, about 20 paces from the center of the drainage, and the 0-foot baseline stake is near the highest point on the ridge.

Site Information

Land Ownership	Federal
Land Administrator	USFS
Allotment	DIAMOND FORK
Elevation	5,900ft (1,798m)
Aspect	Southwest
Slope	10%
Sample Dates	06/11/1997, 06/17/2002, 06/25/2007, 07/11/2012, 08/16/2017

Table 17-46.1 Disturbance History. Recorded history of major disturbances.

Treatment/Disturbance	Name	WRI DB#	Date	Size (acres)
Chaining - Chain Unknown	-	-	1971	-
Seeding - Seed Unknown	-	-	1971	-
Hand Crew - Lop and Scatter	Tank Hollow Habitat Improvement Project	658	July 2007-December 2008	1116

Wildlife Habitat and Vegetation History

Table 17-46.3 - Wildlife Seasonal Habitat. UDWR wildlife habitat and seasonality.

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

Table 17-46.4 - Vegetation History. The dominant vegetation type(s) and phase of woodland succession (Tausch, Miller, Roundy, & Chambers, 2009).

Year	Vegetation Type	Woodland Succession
1989	Yellow Rabbitbrush/Perennial Grass	Phase I
1997	Perennial Grass/Bitterbrush	Phase I
2002	Perennial Grass/Bitterbrush	Phase I transitioning to Phase II
2007	Perennial Grass/Bitterbrush	Phase I transitioning to Phase II
2012	Perennial Grass/Bitterbrush/Mountain Big Sagebrush	Phase I
2017	Perennial Grass/Bitterbrush/Mountain Big Sagebrush	Phase I

Site Notes

The nearest perennial source of water is Soldier Creek, which is 0.7 miles south of the study site, and a stock pond that is 0.5 miles south. A deer carcass was observed on the hike to the study site in 2017.

Soils

Table 17-46.5 - 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	40.7	21.4	37.8	3.2	6.8	275.2	0.5	06/11/1997

Site Potential

1981 - 2010 Average Annual Precipitation	22 inches
NRCS Ecological Site	Mountain Loam (Mountain Big Sagebrush)
NRCS Ecological Site #	R047XA430UT
States and Transitions	No state and transition model is available for this ecological site.

This study site has existed as a mixed shrub plant community since establishment in 1989 through the most recent sample year: basin big sagebrush (*Artemisia tridentata* ssp. *tridentata*), yellow rabbitbrush (*Chrysothamnus viscidiflorus* ssp. *viscidiflorus* var. *viscidiflorus*), and antelope bitterbrush (*Purshia tridentata*) are the main browse species (Table 17-46.12). The dominant grass species on the site is crested wheatgrass (*Agropyron cristatum*) (Table 17- 46.10). The forb community is diverse and contributes moderate cover; the most dominant species are spiny phlox (*Phlox hoodii*) and western stoneseed (*Lithospermum ruderae*) (Table 17-46.11). Utah juniper (*Juniperus osteosperma*) is present on the site, although there was a lop and scatter treatment in 2007 and 2008 that significantly reduced density and cover (Table 17-46.12, Table 17-46.14). However, there were still trees on the site following treatment, which leaves possibility for infilling the future.

Trend Summary Tables

Table 17-46.6 - 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	3.7	2.6	6.3	-	-	-
2002	5.4	2.3	10.6	5.1	2.1	5.8
2007	3.0	1.5	7.4	4.1	1.7	13.2
2012	4.0	2.1	1.4	6.4	3.5	3.7
2017	6.5	3.4	1.5	8.2	4.6	6.8

Table 17-46.7 - 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	30	323	130	233	0.5	19.1	1.9	5.1
2002	6	320	6	104	0.0	15.9	0.1	1.8
2007	22	309	146	110	0.1	18.5	0.6	1.9
2012	1	306	72	108	0.0	19.5	0.5	1.7
2017	-	348	201	94	-	29.5	0.9	3.7

Table 17-46.8 - 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
1997	24.1	1.4	41.1	5.8	0.7	36.6
2002	35.6	2.5	40.2	3.6	2.0	34.6
2007	40.5	2.6	28.0	4.6	0.9	33.7
2012	25.3	0.9	50.5	4.1	1.3	28.7
2017	33.0	0.1	46.2	6.0	1.6	38.5

Table 17-46.9 - 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	Rocky Mountain Elk	Rabbit
	Quadrat Frequency			
1997	1	30	11	3
2002	2	36	14	8
2007	5	42	4	7
2012	4	18	1	5
2017	3	31	-	7
Year	Days Use Per Acre (ha)			
1997	-	-	-	-
2002	6.5 (16.1)	46.9 (115.9)	5.3 (13.2)	-
2007	8.0 (19.7)	24.1 (59.6)	12.1 (29.8)	-
2012	12.3 (30.5)	20.1 (49.7)	1.3 (3.3)	-
2017	-	29.5 (72.8)	0.7 (1.7)	-

Table 17-46.10 - 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 inermis ⁱ (smooth brome)	Bromus tectorum ^{ai} (cheatgrass)	Dactylis glomerata ⁱ (orchardgrass)	Elymus elymoides (squirreltail)	Poa fendleriana (muttongrass)	Poa pratensis ⁱ (Kentucky bluegrass)	Poa secunda (Sandberg bluegrass)	Pseudoroegneria spicata (bluebunch wheatgrass)	Thinopyrum intermedium ⁱ (intermediate wheatgrass)
year	Nested Frequency												
1997	33	16	196	-	8	30	1	-	1	70	22	42	20
2002	40	4	259	-	-	6	3	1	1	18	3	5	25
2007	26	-	283	15	-	9	-	-	-	3	16	3	14
2012	1	-	300	-	-	1	-	-	2	-	10	1	3
2017	57	-	274	-	9	-	-	4	5	18	1	-	15
year	Average Cover (%)												
1997	0.7	0.7	12.5	-	0.2	0.5	0.0	-	0.0	1.4	0.6	2.8	0.2
2002	0.8	0.1	14.4	-	-	0.0	0.0	0.0	0.0	0.3	0.0	0.0	0.2
2007	0.5	-	17.4	0.1	-	0.0	-	-	-	0.0	0.4	0.1	0.2
2012	0.0	-	19.4	-	-	0.0	-	-	0.0	-	0.0	0.0	0.0
2017	4.7	-	23.5	-	0.1	-	-	0.2	0.1	0.6	0.0	-	0.3

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

Table 17-46.11 - 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 cibirarius (browse milkvetch)	Astragalus convallarius (lesser rushy milkvetch)	Astragalus utahensis (Utah milkvetch)	Calochortus nuttallii (sego lily)	Camelina microcarpa ^{ai} (littledod false flax)	Cardaria draba ⁿⁱ (whitetop)	Carduus nutans ^{ai} (nodding plumeless thistle)	Castilleja linariifolia (Wyoming Indian paintbrush)	Ceratocephala testiculata ^{ai} (curveseed butterwort)	Chaenactis douglasii (Douglas' dustymaiden)	Cirsium (thistle)	Collinsia parviflora ^a (maiden blue eyed Mary)	Comandra umbellata (bastard toadflax)
year	Nested Frequency																
1997	1	5	11	74	-	27	4	2	13	-	22	9	4	19	22	-	32
2002	-	-	2	2	-	3	-	-	1	12	-	-	-	-	4	-	-
2007	-	2	6	131	3	30	3	1	3	-	4	-	9	4	3	-	-
2012	-	-	-	68	7	4	8	4	-	-	-	3	-	-	9	2	1
2017	-	1	-	198	-	19	4	-	-	-	-	-	-	-	2	-	-
year	Average Cover (%)																
1997	0.0	0.0	0.0	1.2	-	0.4	0.1	0.0	0.0	-	0.4	0.0	0.0	0.1	0.5	-	0.4
2002	-	-	0.0	0.0	-	0.0	-	-	0.0	0.0	-	-	-	-	0.1	-	-
2007	-	0.0	0.0	0.6	0.0	0.3	0.0	0.0	0.0	-	0.0	-	0.0	0.0	0.0	-	-
2012	-	-	-	0.2	0.0	0.0	0.1	0.1	-	-	-	0.0	-	-	0.1	0.0	0.0
2017	-	0.0	-	0.9	-	0.5	0.1	-	-	-	-	-	-	-	0.0	-	-

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

FORB SPECIES	Crepis acuminata (tapertip hawkbeard)	Descurainia pinnata ^a (western tansymustard)	Epilobium brachycarpum ^a (tall annual willowherb)	Erigeron pumilus (shaggy fleabane)	Eriogonum brevicaulle (shortstem buckwheat)	Erodium cicutarium ^{ai} (redstem stork's bill)	Hackelia patens (spotted stickseed)	Hedysarum boreale (Utah sweetvetch)	Iva axillaris (povertyweed)	Lactuca serriola ^{ai} (prickly lettuce)	Lappula occidentalis ^a (flatspine stickseed)	Lithospermum ruderale (western stoneseed)	Lomatium (desertparsley)	Machaeranthera canescens (hoary tansyaster)	Penstemon caespitosus (mat penstemon)	Phlox hoodii (spiny phlox)	Phlox longifolia (longleaf phlox)	
year	Nested Frequency																	
1997	1	4	1	-	11	-	4	4	-	-	10	20	3	-	9	18	12	
2002	-	-	-	2	9	-	-	-	-	-	-	13	-	-	12	19	19	
2007	-	3	-	-	2	-	3	-	18	3	-	4	-	2	5	20	16	
2012	-	4	5	-	26	-	-	-	-	-	-	7	2	-	12	25	17	
2017	-	7	1	-	2	3	-	0	15	-	-	13	-	-	6	19	1	
year	Average Cover (%)																	
1997	0.0	0.0	0.0	-	0.3	-	0.0	0.2	-	-	0.2	0.5	0.0	-	0.3	0.4	0.0	
2002	-	-	-	0.0	0.5	-	-	-	-	-	-	0.3	-	-	0.0	0.4	0.1	
2007	-	0.0	-	-	0.1	-	0.0	-	0.3	0.0	-	0.0	-	0.0	0.0	0.6	0.1	
2012	-	0.0	0.3	-	0.4	-	-	-	-	-	-	0.0	0.0	-	0.2	0.8	0.0	
2017	-	0.0	0.0	-	0.0	0.0	-	0.0	0.4	-	-	0.9	-	-	0.3	0.8	0.0	

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

FORB SPECIES	Sphaeralcea coccinea (scarlet globemallow)	Symphyotrichum ascendens (western aster)	Taraxacum officinale (common dandelion)	Tragopogon dubius ^{ai} (yellow salsify)	Verbascum thapsus ^{ai} (common mullein)	Vicia americana (American vetch)	Viola (violet)
year	Nested Frequency						
1997	3	100	2	17	5	36	4
2002	6	24	1	4	-	11	-
2007	2	7	-	2	-	24	-
2012	1	5	-	3	-	-	-
2017	3	26	-	-	-	5	-
year	Average Cover (%)						
1997	0.1	1.2	0.0	0.1	0.0	0.3	0.1
2002	0.0	0.3	0.0	0.0	-	0.1	-
2007	0.0	0.1	-	0.0	-	0.2	-
2012	0.0	0.0	-	0.0	-	-	-
2017	0.0	0.6	-	-	-	0.0	-

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

Table 17-46.12 - Shrub and Tree Species. Average modified Daubenmire quadrat and line intercept cover by year.

SHRUB SPECIES	Amelanchier utahensis ^p (Utah serviceberry)	Artemisia tridentata ssp. tridentata ^p (basin big sagebrush)	Chrysothamnus depressus ^p (longflower rabbitbrush)	Chrysothamnus viscidiflorus ssp. viscidiflorus var. viscidiflorus (yellow rabbitbrush)	Ericameria nauseosa ssp. nauseosa var. speciosa ^p (rubber rabbitbrush)	Ericameria parryi var. parryi (Parry's rabbitbrush)	Gutierrezia sarothrae (broom snakeweed)	Juniperus osteosperma ^t (Utah juniper)	Opuntia (pricklypear)	Purshia tridentata ^p (antelope bitterbrush)	Rosa woodsii ^p (Woods' rose)	Symphoricarpos oreophilus (mountain snowberry)
year	Line Intercept Cover (%)											
1997	-	-	-	-	-	-	-	-	-	-	-	-
2002	1.3	1.3	0.1	1.4	-	0.5	0	5.8	-	2.4	-	0.2
2007	0.8	0.8	0.1	0.6	-	0.6	-	13.2	0.1	2.4	-	0.4
2012	1.1	1.2	0.3	1.4	0.3	0.8	0.2	3.7	-	3.5	-	1.1
2017	0.5	1	0.3	1.9	0.9	0.9	0.7	6.8	0.4	5.5	-	0.7
year	Quadrat Cover (%)											
1997	0.8	1.0	0.4	1.9	0.0	-	0.4	6.3	0.2	1.5	-	0.1
2002	0.5	1.7	0.0	1.7	-	0.4	0.1	10.6	0.0	3.2	-	0.1
2007	0.4	0.4	0.1	0.8	-	0.4	0.0	7.4	0.2	2.0	0.0	0.0
2012	0.6	0.6	0.0	1.1	0.1	0.2	0.0	1.4	0.1	2.7	0.0	0.6
2017	0.2	1.1	0.0	1.7	0.8	0.4	0.5	1.5	0.2	4.4	-	0.6

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

Table 17-46.13 - 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	100	-	40	60	0	0	60	0	63/90
2002	60	-	0	67	33	0	100	33	78/96
2007	40	-	0	100	0	50	50	0	91/100
2012	40	-	0	100	0	100	0	50	78/83
2017	20	-	0	100	0	0	100	0	75/91
Artemisia tridentata ssp. tridentata^p -- (basin big sagebrush)									
1997	420	-	24	62	14	10	5	10	102/96
2002	380	-	11	53	37	16	68	21	83/84
2007	220	-	9	36	55	46	18	64	80/71
2012	280	200	7	64	29	36	7	21	91/96
2017	440	-	32	50	18	23	9	14	77/81
Chrysothamnus depressus^p -- (longflower rabbitbrush)									
1997	860	80	9	91	0	0	0	0	15/39
2002	120	-	0	83	17	0	0	0	9/22
2007	180	-	0	100	0	0	0	0	19/30
2012	120	-	17	67	17	50	17	17	15/43
2017	120	-	0	100	0	0	0	0	- / -
Chrysothamnus viscidiflorus ssp. viscidiflorus var. viscidiflorus -- (yellow rabbitbrush)									
1997	1300	-	11	80	9	0	2	2	30/42
2002	2020	-	3	66	31	16	5	18	20/30
2007	1280	-	13	64	23	6	3	14	22/33
2012	1000	240	10	84	6	12	0	54	29/49
2017	1220	-	8	92	0	13	0	0	31/49
Ericameria nauseosa ssp. nauseosa var. speciosa^p -- (rubber rabbitbrush)									
1997	60	-	67	33	0	33	0	33	66/68
2002	20	-	0	0	100	0	0	100	67/101
2007	40	-	0	100	0	0	0	0	56/39
2012	40	-	0	100	0	100	0	0	61/64
2017	80	-	50	50	0	0	0	0	66/68

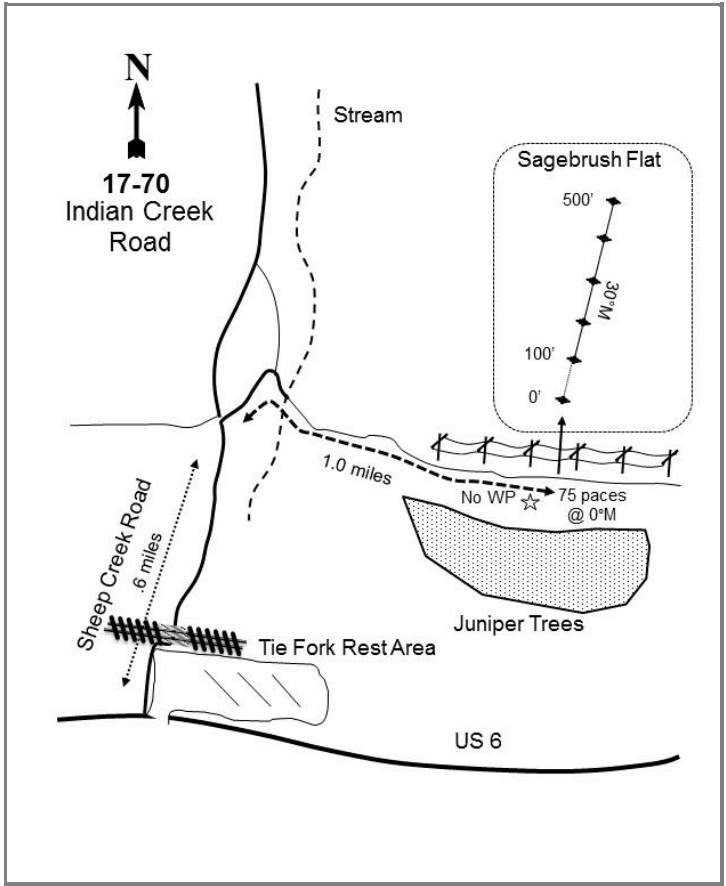
Year	Density		Age Class Distribution			Utilization		Poor Vigor (%)	Average Height Crown (cm)
	Plants Per Acre		Excluding Seedlings			Moderate (%)	Heavy (%)		
	Excluding Seedlings	Seedling	Young (%)	Mature (%)	Decadent (%)				
Ericameria parryi var. parryi -- (Parry's rabbitbrush)									
1997	-	-	-	-	-	-	-	-	-/-
2002	900	-	0	82	18	60	16	11	13/29
2007	520	-	23	77	0	23	0	0	20/28
2012	1160	20	21	79	0	35	28	0	29/47
2017	1260	-	3	97	0	0	0	0	16/34
Gutierrezia sarothrae -- (broom snakeweed)									
1997	480	60	21	75	4	0	0	0	30/29
2002	680	-	3	53	44	3	3	41	21/26
2007	160	-	0	88	13	0	0	0	23/22
2012	320	-	25	75	0	0	0	0	25/33
2017	1040	-	0	100	0	0	0	0	21/25
Juniperus osteosperma^t -- (Utah juniper)									
1997	220	40	36	64	0	0	9	0	-/-
2002	160	20	13	88	0	0	0	13	-/-
2007	200	-	20	80	0	0	0	0	-/-
2012	80	-	100	0	0	0	0	0	-/-
2017	20	20	100	0	0	0	0	0	-/-
Opuntia -- (pricklypear)									
1997	140	80	29	71	0	0	0	0	5/35
2002	160	-	13	88	0	0	0	0	10/28
2007	120	-	17	83	0	0	0	0	11/27
2012	120	-	17	83	0	0	0	0	8/25
2017	60	-	0	100	0	0	0	33	10/22
Purshia tridentata^p -- (antelope bitterbrush)									
1997	120	-	17	83	0	17	67	0	40/138
2002	260	-	0	31	69	0	92	39	39/143
2007	400	-	0	95	5	0	100	0	41/95
2012	620	-	0	100	0	23	77	13	44/98
2017	560	-	0	100	0	46	54	0	50/104
Rhus trilobata^p -- (skunkbush sumac)									
1997	-	-	-	-	-	-	-	-	-/-
2002	20	-	0	0	100	0	0	0	-/-
2007	-	-	-	-	-	-	-	-	31/16
2012	-	-	-	-	-	-	-	-	170/255
2017	-	-	-	-	-	-	-	-	44/98
Rosa woodsii^p -- (Woods' rose)									
1997	-	-	-	-	-	-	-	-	-/-
2002	20	-	100	0	0	0	0	0	-/-
2007	-	-	-	-	-	-	-	-	11/18
2012	-	20	0	0	0	0	0	0	4/5
2017	-	-	-	-	-	-	-	-	21/14
Symphoricarpos oreophilus -- (mountain snowberry)									
1997	80	-	0	100	0	0	0	0	46/79
2002	100	-	0	80	20	20	0	0	40/65
2007	100	-	20	80	0	40	0	0	31/43
2012	180	-	0	100	0	0	0	0	49/79
2017	80	-	0	100	0	0	0	0	44/70

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

Table 17-46.14 - 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'	
Juniperus osteosperma (Utah juniper)						
2002	74	-	-	-	-	16.1
2007	76	-	11	11	37	18.3
2012	25	-	33	20	13	14.7
2017	23	15	38	15	15	14.8

INDIAN CREEK ROAD - STUDY NO. 17-70



Location Information

USGS 7.5 min Map Info
GPS (0' Stake)

Tucker NW; Township 10S, Range 6E, Section 13
NAD 83 UTM ZONE 12, 483031 East 4422573 North

Transect Information

Browse Tag # (0' Stake)	705
Transect Bearing	30° magnetic
Length	500ft
Belt Placement	Line 1 (11ft), Line 2 (34ft), Line 3 (59ft), Line 4 (71ft), Line 5 (95ft)
Belt Marker Placement	Standard

Directions to Site

At the rest area at Tie Fork road, turn left and proceed up the road for 0.75 miles, then turn right at the road that crosses the creek. Proceed across the creek and drive down the powerline road for 1.0 mile. The site is in a sagebrush flat on the left side of the road. Park and walk 50 paces to the 0-foot stake, which is marked by browse tag #705.

Site Information

Land Ownership	Federal
Land Administrator	USFS
Allotment	WATERSHED CLOSURE
Elevation	6550
Aspect	South
Slope	12%
Sample Dates	07/05/2017

Table 17-70.1 Disturbance History. Recorded history of major disturbances.

Treatment/Disturbance	Name	WRI DB#	Date	Size (acres)
Mechanical - Bullhog	Sheep Creek phase 1	2629	May 2014	552

Wildlife Habitat and Vegetation History

Table 17-70.3 - Wildlife Seasonal Habitat. UDWR wildlife habitat and seasonality.

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

Table 17-70.4 - Vegetation History. The dominant vegetation type(s) and phase of woodland succession (Tausch, Miller, Roundy, & Chambers, 2009).

Year	Vegetation Type	Woodland Succession
2017	Mixed Shrub/Perennial Grass	Phase I

Site Notes

No Notes

Soils

Table 17-70.5 - 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	44.2	28.1	27.8	2.8	8.1	242.0	0.4	07/05/2017

Site Potential

1981 - 2010 Average Annual Precipitation	17 inches
NRCS Ecological Site	Upland Shallow Loam (Wyoming Big Sagebrush)
NRCS Ecological Site #	R047XA320UT
States and Transitions	No state and transition model is available for this ecological site.

As of study establishment in 2017, mixed shrubs -- mainly yellow rabbitbrush (*Chrysothamnus viscidiflorus* ssp. *viscidiflorus* var. *viscidiflorus*) and spineless horsebrush (*Tetradymia canescens*) -- dominate this study site. The preferred browse species Utah serviceberry (*Amelanchier utahensis*), mountain big sagebrush (*Artemisia tridentata* ssp. *vaseyana*), and antelope bitterbrush (*Purshia tridentata*) were also observed in lower abundance (Table 17-70.12, Table 17-70.13). A diverse number of native and introduced perennial grasses co-dominate the site (Table 17-70.7, Table 17- 70.10). Annual forbs are more abundant than perennial forbs, with desert madwort (*Alyssum desertorum*) contributing the most cover of any single species (Table 17-70.11). The presence of Utah juniper (*Juniperus osteosperma*) (Table 17- 70.14), which places this site in Phase I of woodland succession (Table 17-70.4), indicates that there is potential for this area to be infilled in the future.

Trend Summary Tables

Table 17-70.6 - 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
2017	3.6	15.2	-	4.6	19.2	-

Table 17-70.7 - 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
2017	96	377	416	81	1.2	19.3	8.6	1.2

Table 17-70.8 - 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
2017	29.6	0.8	35.9	3.2	1.4	47.0

Table 17-70.9 - 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	Rocky Mountain Elk	Rabbit
	Quadrat Frequency			
Year	Days Use Per Acre (ha)			
	2017	-	48	4
2017	4.4 (10.8)	168.2 (415.5)	6.0 (14.9)	-

Table 17-70.10 - 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 marginatus (mountain brome)	Bromus tectorum ^{ai} (cheatgrass)	Hesperosipa comata (needle and thread)	Pascopyrum smithii (western wheatgrass)	Poa bulbosa ⁱ (bulbous bluegrass)	Poa secunda (Sandberg bluegrass)	Pseudoroegneria spicata (bluebunch wheatgrass)	Thinopyrum intermedium ⁱ (intermediate wheatgrass)
year	Nested Frequency										
2017	17	51	5	84	96	1	79	5	39	201	104
year	Average Cover (%)										
2017	0.5	1.6	0.0	1.7	1.2	0.1	2.4	0.0	0.8	9.0	3.3

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

Table 17-70.11 - Forb Species. Nested frequency and modified Daubenmire average cover by year.

FORB SPECIES	Agoseris glauca (pale agoseris)	Alyssum alyssoides ^{ai} (pale madwort)	Alyssum desertorum ^{ai} (desert madwort)	Astragalus calycosus (Torrey's milkvetch)	Astragalus convallarius (lesser rushy milkvetch)	Calochortus nuttallii (sego lily)	Camelina microcarpa ^{ai} (littlepod false flax)	Castilleja (Indian paintbrush)	Ceratocephala testiculata ^{ai} (curvseed butterwort)	Cirsium undulatum ^a (wavy/leaf thistle)	Collinsia parviflora ^a (maiden blue eyed Mary)	Comandra umbellata (bastard toadflax)	Cryptantha (cryptantha)	Descurainia pinnata ^a (western tansymustard)	Eriogonum umbellatum (sulphur-flower buckwheat)	Erodium cicutarium ^{ai} (redstem stork's bill)	Linum lewisii (Lewis flax)
year	Nested Frequency																
2017	6	32	410	2	12	3	1	1	20	1	11	2	1	4	16	5	6
year	Average Cover (%)																
2017	0.0	0.6	7.6	0.0	0.2	0.0	0.0	0.0	0.1	0.1	0.1	0.0	0.0	0.0	0.5	0.0	0.0

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

FORB SPECIES	Machaeranthera canescens (hoary tansyaster)	Microsteris gracilis ^a (slender phlox)	Penstemon (beardtongue)	Phlox austromontana (mountain phlox)	Phlox longifolia (longleaf phlox)	Schoenocrambe limifolia (flaxleaf plainsmustard)
year	Nested Frequency					
2017	6	39	1	3	27	7
year	Average Cover (%)					
2017	0.1	0.2	0.0	0.0	0.1	0.1

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

Table 17-70.12 - 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)	Chrysothamnus viscidiflorus ssp. viscidiflorus var. viscidiflorus (yellow rabbitbrush)	Ericameria nauseosa (rubber rabbitbrush)	Opuntia (pricklypear)	Purshia tridentata ^p (antelope bitterbrush)	Symphoricarpos oreophilus (mountain snowberry)	Tetradymia canescens (spineless horsebrush)
year	Line Intercept Cover (%)							
2017	0.3	4	9.9	0.1	0.1	0.3	0.8	8.3
year	Quadrat Cover (%)							
2017	0.0	3.5	7.8	0.0	0.1	0.2	0.6	6.7

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

Table 17-70.13 - 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.

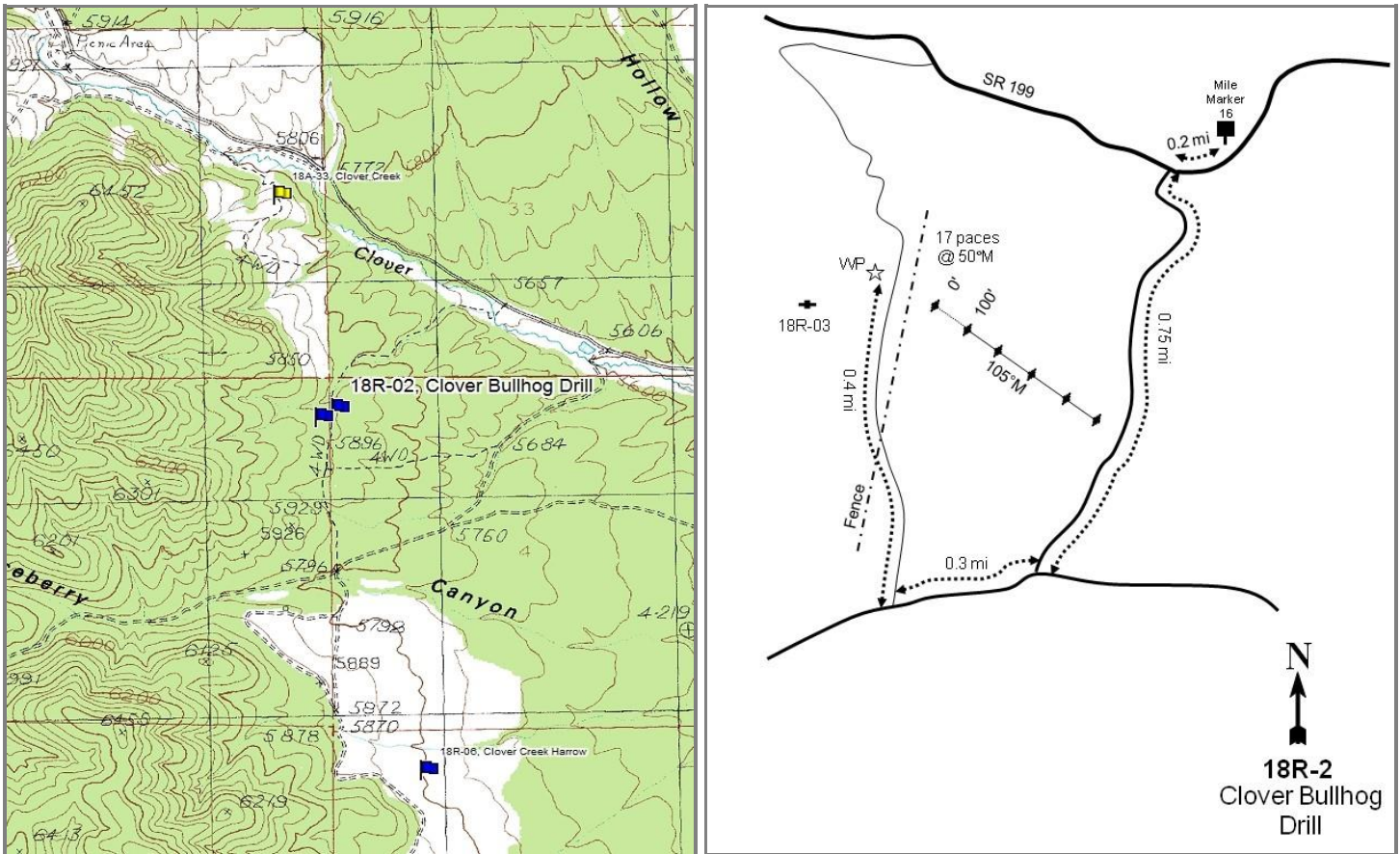
Year	Density		Age Class Distribution			Utilization		Poor Vigor (%)	Average Height Crown (cm)
	Plants Per Acre		Excluding Seedlings			Moderate (%)	Heavy (%)		
	Excluding Seedlings	Seedling	Young (%)	Mature (%)	Decadent (%)				
Amelanchier utahensis ^p -- (Utah serviceberry)									
2017	40	-	0	100	0	50	0	0	37/39
Artemisia tridentata ssp. vaseyana ^p -- (mountain big sagebrush)									
2017	640	-	6	88	6	31	59	3	61/77
Chrysothamnus viscidiflorus ssp. viscidiflorus var. viscidiflorus -- (yellow rabbitbrush)									
2017	9300	-	4	96	0	0	0	0	25/35
Ericameria nauseosa -- (rubber rabbitbrush)									
2017	80	-	0	50	50	50	0	0	43/39
Opuntia -- (pricklypear)									
2017	20	-	0	100	0	0	0	0	- / -
Purshia tridentata ^p -- (antelope bitterbrush)									
2017	160	-	0	100	0	38	63	0	40/77
Symphoricarpos oreophilus -- (mountain snowberry)									
2017	260	-	0	92	8	0	0	8	41/63
Tetradymia canescens -- (spineless horsebrush)									
2017	3340	-	4	95	1	0	0	1	28/48

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

Table 17-70.14 - 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)							
2017	44	8	85	8	-	-	4.2

CLOVER BULLHOG DRILL - STUDY NO. 18R-2

**Location Information**

USGS 7.5 min Map Info
GPS (0' Stake)

Johnson Pass NE; Township 6S, Range 6W, Section 05
NAD 83 UTM ZONE 12, 369490 East 4465574 North

Transect Information

Browse Tag # (0' Stake)	79
Transect Bearing	105° magnetic
Length	500ft
Belt Placement	line 1 (11ft), line 2 (34ft), line 3 (59 ft), line 4 (71 ft), line 5 (95 ft)
Belt Marker Placement	Standard

Directions to Site

From Lehi, drive west on SR 73 (Main st) to the junction of SR 36. Turn left (south) and drive 3.7 miles to the SR 199. Turn right on SR 199 and drive to mile marker 16. Continue 0.2 miles to a road on the left (south) near a power pole. Turn left and drive 0.75 miles to a fork. Stay right (west) and drive 0.3 miles to an intersection. Turn right (north) and drive 0.4 miles to the witness post on the left (west) side of the road. From the witness post, walk 17 paces at 50DM to the 0' stake. The 0' stake is marked with browse tag #79.

Site Information

Land Ownership	Federal
Land Administrator	BLM
Allotment	ONAQUI MOUNTAIN EAST
Elevation	5,850ft (1,783m)
Aspect	NE
Slope	10%
Sample Dates	07/20/2005, 06/30/2008, 06/05/2012, 06/06/2017

Table 18R-02.1 Disturbance History. Recorded history of major disturbances.

Treatment/Disturbance	Name	WRI DB#	Date	Size (acres)
Bullhog - Bullhog	Clover Creek Juniper Thinning and Seeding--Year 2	30	October-December 2005	420
Seeding - Rangeland Drill	Clover Creek Juniper Thinning and Seeding--Year 2	30	October-December 2005	27
Seeding - Aerial After	Clover Creek Juniper Thinning and Seeding--Year 2	30	January 2006	420

Table 18R-02.2 Seed Mix. List of known seeded plant species and rates (if available).

Mix Name			Application Type	Application Date	Acres
Clover Creek WUI - Drill Mix			Drill	Oct 2005	230
Type	Species	Common Name	Cultivar/Source ID	Bulk lbs/acre	PLS lbs/acre
G	Agropyron cristatum	Crested Wheatgrass	Hycrest	0.87	0.76
G	Agropyron fragile	Siberian Wheatgrass	Vavilov	1.09	1.00
G	Dactylis glomerata	Orchardgrass	Paiute	1.09	1.00
G	Elymus wawawaiensis	Snake River Wheatgrass	Secar	1.09	1.01
G	Pascopyrum smithii	Western Wheatgrass		0.87	0.70
G	Poa secunda	Canby Bluegrass	Canbar	0.65	0.53
G	Poa secunda	Sandberg Bluegrass	Toole MT	0.43	0.39
G	Pseudoroegneria spicata	Bluebunch Wheatgrass	P7	1.09	0.99
F	Achillea millefolium	Western Yarrow		0.17	0.16
F	Linum perenne	Blue Flax		0.65	0.59
F	Medicago sativa	Alfalfa	Ladak+	1.09	1.03
F	Medicago sativa	Alfalfa	Ranger	1.09	0.95
F	Onobrychis viciifolia	Sainfoin	Eski	2.61	2.45
F	Sanguisorba minor	Small Burnet	Delar	2.61	2.45
Mix Name			Application Type	Application Date	Acres
Clover Creek - Browse			Aerial	Jan 2006	450
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	0.21
S	Bassia prostrata	Forage Kochia	Beaver UT	0.44	0.28
S	Bassia prostrata	Forage Kochia	Millard UT	0.56	0.45

Wildlife Habitat and Vegetation History**Table 18R-02.3 - Wildlife Seasonal Habitat.** UDWR wildlife habitat and seasonality.

Species	Habitat	Season	Brood/Young Rearing
Deer	crucial	winter/spring	
Greater Sage Grouse	occupied	year-long & Winter	brood-rearing

Table 18R-02.4 - Vegetation History. The dominant vegetation type(s) and phase of woodland succession (Tausch, Miller, Roundy, & Chambers, 2009).

Year	Vegetation Type	Woodland Succession
2005	Utah Juniper	Phase III
2008	Perennial Grass/Utah Juniper	Phase I
2012	Perennial Grass/Utah Juniper	Phase I
2017	Perennial Grass/Utah Juniper	Phase I

Site Notes

No Notes

Soils**Table 18R-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
Clay Loam	7.1	33.7	38.1	28.2	4.4	13.0	185.6	0.7	07/20/2005

Site Potential

1981 - 2010 Average Annual Precipitation	16 inches
NRCS Ecological Site	Upland Loam (Mountain Big Sagebrush)
NRCS Ecological Site #	028AY310UT
States and Transitions	No state and transition model is available for the above ecological site.

At the time of establishment in 2005, this site was a Utah juniper dominated site in Phase III encroachment. The understory grasses are moderately diverse and provide good cover. The dominant perennial grass is bluebunch wheatgrass (*Pseudoroegneria spicata*) (Table 18R-02.10). Forbs are moderately diverse, though sparse and the dominant species is desert madwort (*Alyssum desertorum*) (Table 18R-02.11). The browse species on the site include mountain big sagebrush (*Artemisia tridentata* ssp. *vaseyana*), antelope bitterbrush (*Purshia tridentata*), and mountain snowberry (*Symphoricarpos oreophilus*); with mountain big sagebrush (*Artemisia tridentata* ssp. *vaseyana*) and antelope bitterbrush (*Purshia tridentata*) being co-dominant (Table 18R-02.12). Tree cover has decreased following the bullhog treatment, though cover is still high (Table 18R-02.14). Following the treatments, this site has shown a marked increase in the understory. It is possible that the site will infill in future studies considering the juniper cover that is still presence.

Trend Summary Tables**Table 18R-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
2005	0.1	0.2	12.0	0.3	0.4	29.5
2008	0.7	0.5	3.7	0.9	0.6	16.5
2012	1.3	1.6	6.3	1.4	0.6	10.7
2017	2.5	0.8	7.2	5.4	0.4	13.8

Table 18R-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
2005	29	261	326	42	0.1	7.8	1.8	0.4
2008	19	257	204	110	0.0	13.8	1.4	2.3
2012	45	322	247	160	0.4	17.9	1.3	2.8
2017	58	311	325	162	0.4	15.8	5.8	1.9

Table 18R-02.8 - 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	29.7	5.0	39.9	15.2	2.9	20.7
2008	8.1	0.6	68.4	13.0	1.0	21.5
2012	13.3	0.1	53.8	8.0	1.3	33.8
2017	15.1	0.2	57.5	15.2	1.4	34.2

Table 18R-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	Coyote	Mule Deer	Rocky Mountain Elk	Rabbit
	Quadrat Frequency				
2005	1	-	6	1	47
2008	-	-	7	3	59
2012	-	-	4	1	12
2017	5	-	12	-	26
Year	Days Use Per Acre (ha)				
2005	-	-	7.4 (18.2)	0.7 (1.7)	-
2008	-	-	11.4 (28.1)	-	-
2012	-	-	14.1 (34.8)	0.7 (1.7)	-
2017	16.0 (39.5)	8.7 (21.5)*	32.8 (81.1)	3.4 (8.3)	-

*Pellets per acre (ha)

Table 18R-02.10 - Grass Species. Nested frequency and modified Daubenmire average cover by year.

GRASS SPECIES	Achatherum hymenoides (Indian ricegrass)	Agropyron cristatum ⁱ (crested wheatgrass)	Bromus tectorum ^{ai} (cheatgrass)	Dactylis glomerata ⁱ (orchardgrass)	Elymus elymoides (squirreltail)	Koeleria macrantha (prairie Junegrass)	Pascopyrum smithii (western wheatgrass)	Poa fendleriana (muttongrass)	Poa secunda (Sandberg bluegrass)	Pseudoroegneria spicata (bluebunch wheatgrass)	Secale cereale ^{ai} (cereal rye)	Vulpia octoflora ^a (sixweeks fescue)
year	Nested Frequency											
2005	3	-	27	-	44	-	-	-	170	127	-	2
2008	8	24	19	22	73	-	12	-	144	119	-	-
2012	8	26	40	8	60	3	11	2	193	155	3	2
2017	17	31	56	3	40	1	-	20	139	189	-	2
year	Average Cover (%)											
2005	0.2	-	0.1	-	0.9	-	-	-	2.6	4.1	-	0.0
2008	0.2	0.4	0.0	0.8	3.3	-	0.1	-	3.1	6.0	-	-
2012	0.6	0.9	0.3	0.3	1.3	0.0	0.2	0.1	6.3	8.2	0.1	0.0
2017	0.7	1.2	0.4	0.0	0.7	0.0	-	0.5	3.2	9.6	-	0.0

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

Table 18R-02.11 - Forb Species. Nested frequency and modified Daubenmire average cover by year.

FORB SPECIES	Achillea millefolium (Common yarrow)	Allium acuminatum (tapertip onion)	Alyssum desertorum ^{ai} (desert madwort)	Antennaria (pussytoes)	Astragalus cibarius (browse milkvetch)	Astragalus convallarius (lesser rushy milkvetch)	Astragalus eurekaensis (Eureka milkvetch)	Calochortus nuttallii (sego lily)	Ceratocephala testiculata ^{ai} (curveseed butterwort)	Chaenactis douglasii (Douglas' dustymaiden)	Cirsium (thistle)	Crepis acuminata (tapertip hawksbeard)	Cryptantha ^a (annual cryptantha)	Cryptantha (cryptantha)	Descurainia pinnata ^a (western tansymustard)	Eriogonum ovalifolium (cushion buckwheat)	Galium aparine ^a (stickywilly)
year	Nested Frequency																
2005	-	-	302	2	-	1	-	-	86	0	-	-	-	-	23	-	6
2008	4	-	198	-	-	9	-	-	6	3	-	1	-	0	-	1	-
2012	4	-	246	2	-	9	3	-	5	5	-	2	-	-	-	-	-
2017	-	7	319	-	2	16	6	7	13	13	2	-	5	-	4	-	3
year	Average Cover (%)																
2005	-	-	1.1	0.0	-	0.0	-	-	0.2	0.0	-	-	-	-	0.1	-	0.2
2008	0.1	-	1.3	-	-	0.1	-	-	0.0	0.0	-	0.0	-	0.0	-	0.0	-
2012	0.0	-	1.2	0.0	-	0.3	0.0	-	0.0	0.0	-	0.0	-	-	-	-	-
2017	-	0.0	5.1	-	0.0	0.6	0.0	0.0	0.0	0.1	0.0	-	0.3	-	0.0	-	0.0

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

FORB SPECIES																
<i>Gilia inconspicua</i> ^a (shy gilia)	<i>Ipomopsis aggregata</i> (scarlet gilia)	<i>Lactuca serriola</i> ⁱⁱ (prickly lettuce)	<i>Linum perenne</i> ⁱ (blue flax)	<i>Medicago sativa</i> ⁱ (alfalfa)	<i>Microsteris gracilis</i> ^a (slender phlox)	<i>Onobrychis vicifolia</i> ⁱ (sainfoin)	<i>Packera multilobata</i> (lobeleaf groundsel)	<i>Phlox hoodii</i> (spiny phlox)	<i>Phlox longifolia</i> (longleaf phlox)	<i>Physaria</i> (twinpod)	<i>Sanguisorba minor</i> ⁱ (small burnet)	<i>Tragopogon dubius</i> ⁱⁱ (yellow salsify)	<i>Trifolium</i> (clover)	<i>Veronica biloba</i> ⁱⁱ (two-lobed speedwell)	<i>Zigadenus paniculatus</i> (foothill deathcamas)	
year	Nested Frequency															
2005	5	5	16	-	-	12	-	-	4	31	3	-	-	-	37	-
2008	-	-	18	49	3	1	1	1	4	36	1	13	2	12	1	-
2012	-	1	-	75	10	-	7	-	-	66	5	11	6	-	-	-
2017	-	2	-	84	1	3	9	4	4	48	5	7	27	-	6	6
year	Average Cover (%)															
2005	0.0	0.0	0.1	-	-	0.0	-	-	0.0	0.3	0.0	-	-	-	0.1	-
2008	-	-	0.1	1.6	0.0	0.0	0.0	0.0	0.0	0.2	0.0	0.1	0.0	0.1	0.0	-
2012	-	0.0	-	1.0	0.4	-	0.4	-	-	0.4	0.0	0.2	0.1	-	-	-
2017	-	0.0	-	0.3	0.0	0.0	0.2	0.0	0.0	0.3	0.0	0.3	0.3	-	0.0	0.0

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

Table 18R-02.12 - Shrub and Tree Species. Average modified Daubenmire quadrat and line intercept cover by year.

SHRUB SPECIES							
<i>Artemisia tridentata</i> ssp. <i>vaseyana</i> ^p (mountain big sagebrush)	<i>Bassia prostrata</i> ⁱⁱ (forage kochia)	<i>Eriogonum corymbosum</i> (crisp-leaf buckwheat)	<i>Gutierrezia sarothrae</i> (broom snakeweed)	<i>Juniperus osteosperma</i> ⁱ (Utah juniper)	<i>Purshia tridentata</i> ^p (antelope bitterbrush)	<i>Symphoricarpos oreophilus</i> (mountain snowberry)	
year	Line Intercept Cover (%)						
2005	-	-	-	-	29.5	0.3	0.4
2008	0.4	-	0.1	-	16.5	0.5	0.5
2012	0.7	-	-	-	10.7	0.7	0.6
2017	2.8	-	-	-	13.8	2.6	0.4
year	Quadrat Cover (%)						
2005	-	-	-	-	12.0	0.1	0.2
2008	0.4	0.0	0.0	-	3.7	0.3	0.5
2012	0.5	-	-	0.1	6.3	0.8	1.4
2017	1.7	0.0	-	0.0	7.2	0.8	0.8

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

Table 18R-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.

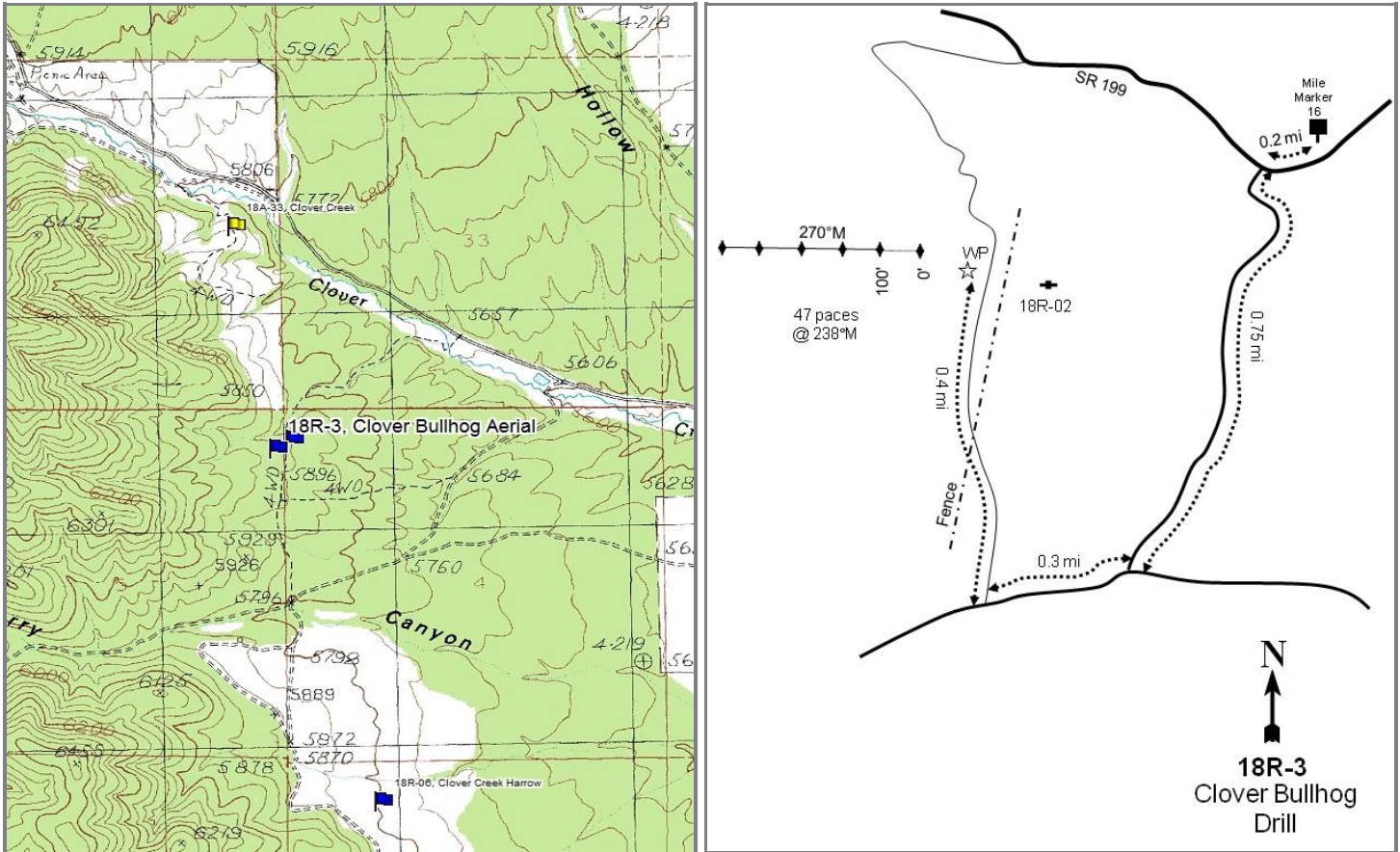
Year	Density		Age Class Distribution			Utilization		Poor Vigor (%)	Average Height Crown (cm)
	Plants Per Acre		Excluding Seedlings			Moderate (%)	Heavy (%)		
	Excluding Seedlings	Seedling	Young (%)	Mature (%)	Decadent (%)				
Artemisia tridentata ssp. vaseyana^P -- (mountain big sagebrush)									
2005	40	-	0	50	50	0	0	50	48/55
2008	640	20	59	41	0	0	0	13	36/31
2012	760	-	11	90	0	24	5	0	43/49
2017	620	20	23	74	3	19	13	0	49/67
Bassia prostrata^{Pi} -- (forage kochia)									
2005	-	-	-	-	-	-	-	-	-/-
2008	520	180	58	42	0	27	19	0	10/15
2012	-	-	-	-	-	-	-	-	17/28
2017	120	-	67	33	0	0	0	0	6/8
Eriogonum corymbosum -- (crisp-leaf buckwheat)									
2005	20	-	0	100	0	0	0	0	14/17
2008	20	-	0	100	0	0	0	0	17/24
2012	-	-	-	-	-	-	-	-	-/-
2017	-	-	-	-	-	-	-	-	-/-
Ericameria nauseosa -- (rubber rabbitbrush)									
2005	-	-	-	-	-	-	-	-	-/-
2008	-	20	0	0	0	0	0	0	-/-
2012	20	-	0	100	0	0	0	0	23/14
2017	20	-	0	100	0	0	0	100	32/26
Gutierrezia sarothrae -- (broom snakeweed)									
2005	-	-	-	-	-	-	-	-	21/17
2008	-	-	-	-	-	-	-	-	35/44
2012	20	-	0	100	0	0	0	0	20/33
2017	20	60	0	0	100	0	0	100	27/41
Juniperus osteosperma^t -- (Utah juniper)									
2005	460	20	13	78	9	0	0	13	-/-
2008	320	-	6	69	25	0	0	31	-/-
2012	280	-	43	50	7	0	0	21	-/-
2017	260	20	39	54	8	0	0	31	-/-
Purshia tridentata^P -- (antelope bitterbrush)									
2005	100	-	20	80	0	80	20	0	77/136
2008	60	-	33	67	0	0	33	0	51/107
2012	100	-	0	100	0	60	40	0	79/144
2017	260	180	39	62	0	23	0	8	97/177
Symphoricarpos oreophilus -- (mountain snowberry)									
2005	160	-	25	75	0	0	0	0	43/76
2008	180	-	22	78	0	0	0	0	35/69
2012	220	-	18	82	0	0	55	0	43/85
2017	260	-	8	92	0	0	0	0	51/100

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

Table 18R-02.14 - 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)							
2005	401	5	15	5	70	5	18.8
2008	243	35	15	5	30	15	12.1
2012	283	-	40	5	35	20	12.6
2017	220	10	25	5	10	50	16.4

CLOVER BULLHOG AERIAL - STUDY NO. 18R-3

**Location Information**

USGS 7.5 min Map Info
GPS (0' Stake)

Johnson Pass NE; Township 6S, Range 6W, Section 05
NAD 83 UTM ZONE 12, 369408 East 4465533 North

Transect Information

Browse Tag # (0' Stake)	N/A
Transect Bearing	270° magnetic
Length	500ft
Belt Placement	line 1 (11ft), line 2 (34ft), line 3 (59 ft), line 4 (71 ft), line 5 (95 ft)
Belt Marker Placement	Standard

Directions to Site

From Lehi, drive west on SR 73 (Main st) to the junction of SR 36. Turn left (south) and drive 3.7 miles to the SR 199. Turn right on SR 199 and drive to mile marker 16. Continue 0.3 miles to a road on the left (south) near a power pole. Turn left and drive 0.75 miles to a fork. Stay right (west) and drive 0.3 miles to an intersection. Turn right (north) and drive 0.4 miles to the witness post on the left (west) side of the road. From the witness post, walk 47 paces at 238DM to the 0' stake. Pass over a fence line.

Site Information

Land Ownership	Federal
Land Administrator	BLM
Allotment	ONAQUI MOUNTAIN EAST
Elevation	5,900ft (1,798m)
Aspect	NE
Slope	8%
Sample Dates	07/20/2005, 06/30/2008, 06/05/2012, 06/06/2017

Table 18R-03.1 Disturbance History. Recorded history of major disturbances.

Treatment/Disturbance	Name	WRI DB#	Date	Size (acres)
Bullhog - Bullhog	Clover Creek Juniper Thinning and Seeding--Year 2	30	October-December 2005	420
Seeding - Aerial Before	Clover Creek Juniper Thinning and Seeding--Year 2	30	October-December 2005	400
Seeding - Aerial After	Clover Creek Juniper Thinning and Seeding--Year 2	30	January 2006	400

Table 18R-03.2 Seed Mix. List of known seeded plant species and rates (if available).

Mix Name			Application Type	Application Date	Acres
Clover Creek WUI - Aerial Mix			Drill	Oct 2005	201
Type	Species	Common Name	Cultivar/Source ID	Bulk lbs/acre	PLS lbs/acre
G	Agropyron cristatum	Crested Wheatgrass	Hycrest	1.24	1.08
G	Agropyron fragile	Siberian Wheatgrass	Vavilov	1.00	0.92
G	Dactylis glomerata	Orchardgrass	Paiute	1.24	1.14
G	Elymus wawawaiensis	Snake River Wheatgrass	Secar	1.24	1.16
G	Pascopyrum smithii	Western Wheatgrass	Arriba	1.24	1.10
G	Poa secunda	Canby Bluegrass	Canbar	0.75	0.60
G	Poa secunda	Sandberg Bluegrass	Toole MT	0.50	0.45
G	Pseudoroegneria spicata	Bluebunch Wheatgrass	Anatone	1.24	1.15
F	Achillea millefolium	Western Yarrow		0.25	0.23
F	Linum perenne	Blue Flax		0.75	0.67
F	Medicago sativa	Alfalfa	Ranger	2.49	2.18
F	Onobrychis viciifolia	Sainfoin	Eski	2.74	2.57
F	Sanguisorba minor	Small Burnet	Delar	2.74	2.57
Mix Name			Application Type	Application Date	Acres
Clover Creek - Browse			Aerial	Jan 2006	450
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	0.21
S	Bassia prostrata	Forage Kochia	Beaver UT	0.44	0.28
S	Bassia prostrata	Forage Kochia	Millard UT	0.56	0.45

Wildlife Habitat and Vegetation History**Table 18R-03.3 - Wildlife Seasonal Habitat.** UDWR wildlife habitat and seasonality.

Species	Habitat	Season
Deer	crucial	winter/spring

Table 18R-03.4 - Vegetation History. The dominant vegetation type(s) and phase of woodland succession (Tausch, Miller, Roundy, & Chambers, 2009).

Year	Vegetation Type	Woodland Succession
2005	Juniper	Phase II
2008	Perennial Grass/Juniper	Phase I
2012	Perennial Grass/Juniper	Phase I
2017	Perennial Grass/Juniper	Phase I

Site Notes

No Notes

Soils**Table 18R-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
Loam	7.6	34.1	39.7	26.2	1.9	7.2	185.6	0.6	07/20/2005

Site Potential

1981 - 2010 Average Annual Precipitation	16 inches
NRCS Ecological Site	Upland Loam (Mountain Big Sagebrush)
NRCS Ecological Site #	028AY310UT
States and Transitions	No state and transition model is available for the above ecological site.

When this site was established in 2005, the site was a Utah juniper (*Juniperus osteosperma*) dominated site. It transition to being co-dominant with perennial grasses since 2008, with bluebunch wheatgrass (*Pseudoroegneria spicata*) being the dominant species (Table 18R-03.10). Forbs are modestly diverse but with cover being low. The dominant annual forb is desert madwort (*Alyssum desertorum*) and the dominant annual forb is American vetch (*Vicia americana*) (Table 18R-03.11). Browse species have increased in cover and density since treatment, with the dominant species being antelope bitterbrush (*Purshia tridentata*) (Table 18R-03.12, 18R-03.13). Juniper cover did decrease following treatment, though density has slightly increased in subsequent studies (Table 18R-03.12, Table 18R-03.14). It is likely that the opened canopy and seeding contributed to the increase of the herbaceous understory. The perennial grass and forb community on this site contribute positively to the resiliency of this site, with some mixed browse species adding cover and value to the site for wildlife.

Trend Summary Tables**Table 18R-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
2005	0.2	0.2	15.7	1.8	-	29.6
2008	0.0	0.0	5.8	0.5	-	17.4
2012	1.1	0.6	11.2	2.4	0.1	16.8
2017	2.5	0.5	9.4	3.9	1.1	20.4

Table 18R-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
2005	18	293	278	74	0.1	12.3	1.2	0.6
2008	22	293	188	121	0.1	14.0	0.5	1.1
2012	33	320	246	139	0.1	21.9	0.5	1.8
2017	21	302	346	185	0.1	18.0	3.8	4.4

Table 18R-03.8 - 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	32.4	3.8	38.4	15.8	1.7	28.4
2008	6.6	2.9	63.5	16.7	1.6	21.6
2012	13.7	2.4	48.8	11.3	3.3	40.7
2017	12.9	1.4	58.0	13.1	2.4	38.9

Table 18R-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	Coyote	Mule Deer	Rocky Mountain Elk	Rabbit
	Quadrat Frequency				
2005	-	-	4	-	43
2008	-	-	3	-	52
2012	-	-	3	-	9
2017	3	-	5	-	17
Year	Days Use Per Acre (ha)				
2005	-	-	4.0 (9.9)	2.0 (5.0)	-
2008	-	8.7 (21.5)*	4.7 (11.6)	2.7 (6.6)	-
2012	-	-	5.3 (13.2)	-	-
2017	7.2 (17.9)	-	20.1 (49.7)	0.7 (1.7)	-

*Pellets per acre (ha)

Table 18R-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 arvensis ^{ai} (field brome)	Bromus tectorum ^{ai} (cheatgrass)	Dactylis glomerata ⁱ (orchardgrass)	Elymus elymoides (squirreltail)	Hordeum jubatum (foxtail barley)	Pascopyrum smithii (western wheatgrass)	Poa bulbosa ⁱ (bulbous bluegrass)	Poa pratensis ⁱ (Kentucky bluegrass)	Poa secunda (Sandberg bluegrass)	Pseudoroegneria spicata (bluebunch wheatgrass)
year	Nested Frequency											
2005	8	-	1	18	-	3	-	7	8	1	110	252
2008	3	-	-	22	3	5	-	8	-	1	105	252
2012	10	3	-	33	-	4	-	20	-	7	171	231
2017	7	8	-	21	-	16	4	-	9	-	129	257
year	Average Cover (%)											
2005	0.2	-	0.0	0.1	-	0.0	-	0.1	0.2	0.0	1.0	10.8
2008	0.2	-	-	0.1	0.0	0.1	-	0.0	-	0.0	0.7	13.0
2012	0.2	0.0	-	0.1	-	0.2	-	0.2	-	0.3	3.5	17.4
2017	0.7	0.2	-	0.1	-	0.4	0.0	-	0.1	-	2.9	13.8

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

Table 18R-03.11 - 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 (rockress)	Astragalus convallarius (lesser nushy milkvetch)	Astragalus eurekaensis (Eureka milkvetch)	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)	Comandra umbellata (bastard toadflax)	Crepis acuminata (tapertip hawkbeard)	Cryptantha ^a (annual cryptantha)	Descurainia pinnata ^a (western tansymustard)
year	Nested Frequency																
2005	-	8	258	-	-	3	-	-	8	40	-	-	3	0	0	-	12
2008	-	-	185	1	-	4	4	0	3	13	1	-	-	3	-	-	-
2012	-	-	243	-	-	1	6	-	8	11	4	-	-	2	8	-	-
2017	2	4	342	-	1	4	16	8	17	7	1	1	-	3	1	3	-
year	Average Cover (%)																
2005	-	0.0	0.9	-	-	0.0	-	-	0.0	0.1	-	-	0.0	0.0	0.0	-	0.0
2008	-	-	0.5	0.0	-	0.1	0.1	0.0	0.0	0.0	0.0	-	-	0.0	-	-	-
2012	-	-	0.4	-	-	0.0	0.2	-	0.0	0.0	0.0	-	-	0.0	0.2	-	-
2017	0.0	0.0	3.6	-	0.0	0.1	0.1	0.0	0.1	0.0	0.0	0.0	-	0.0	0.0	0.0	-

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

FORB SPECIES	Erysimum (wallflower)	Galium aparine ^a (stickywilly)	Gilia inconspicua ^a (shy gilia)	Ipomopsis aggregata (scarlet gilia)	Lactuca serriola ⁱⁱ (prickly lettuce)	Linum perenne ⁱ (blue flax)	Medicago sativa ⁱ (alfalfa)	Microsteris gracilis ^{ia} (slender phlox)	Packera multilobata (lobeleaf groundsel)	Phlox hoodii (spiny phlox)	Phlox longifolia (longleaf phlox)	Veronica biloba ⁱⁱ (twolobe speedwell)	Vicia americana (American vetch)	Zigadenus paniculatus (foothill deathcamas)
year	Nested Frequency													
2005	-	9	3	4	10	-	-	4	-	2	12	18	55	-
2008	-	-	-	1	2	11	0	-	1	1	43	-	66	1
2012	2	4	-	-	2	28	-	3	3	5	48	-	64	-
2017	-	5	-	-	1	19	-	4	2	2	20	8	128	-
year	Average Cover (%)													
2005	-	0.0	0.0	0.0	0.0	-	-	0.0	-	0.0	0.0	0.1	0.4	-
2008	-	-	-	0.0	0.0	0.1	0.0	-	0.0	0.0	0.1	-	0.6	0.0
2012	0.0	0.0	-	-	0.0	0.2	-	0.0	0.1	0.2	0.3	-	0.6	-
2017	-	0.2	-	-	0.0	0.3	-	0.0	0.0	0.1	0.1	0.0	3.5	-

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

Table 18R-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 ⁱⁱ (forage kochia)	Chrysothamnus viscidiflorus (yellow rabbitbrush)	Eriogonum microthecum ^p (slender buckwheat)	Gutierrezia sarothrae (broom snakeweed)	Juniperus osteosperma ⁱ (Utah juniper)	Purshia stansburiana ^p (Stansbury cliffrose)	Purshia tridentata ^p (antelope bitterbrush)	Symphoricarpos oreophilus (mountain snowberry)
year	Line Intercept Cover (%)								
2005	-	-	-	-	-	29.6	-	1.8	-
2008	-	-	-	-	-	17.4	-	0.5	-
2012	-	-	-	-	0.1	16.8	0.2	2.2	-
2017	0.1	-	-	-	0.9	20.4	0.8	3	0.2
year	Quadrat Cover (%)								
2005	0.0	-	-	0.0	0.2	15.7	-	0.2	0.0
2008	-	0.0	-	-	0.0	5.8	-	0.0	0.0
2012	0.0	-	0.4	-	0.0	11.2	0.0	1.1	0.1
2017	0.6	-	-	-	0.3	9.4	0.1	1.7	0.1

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

Table 18R-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.

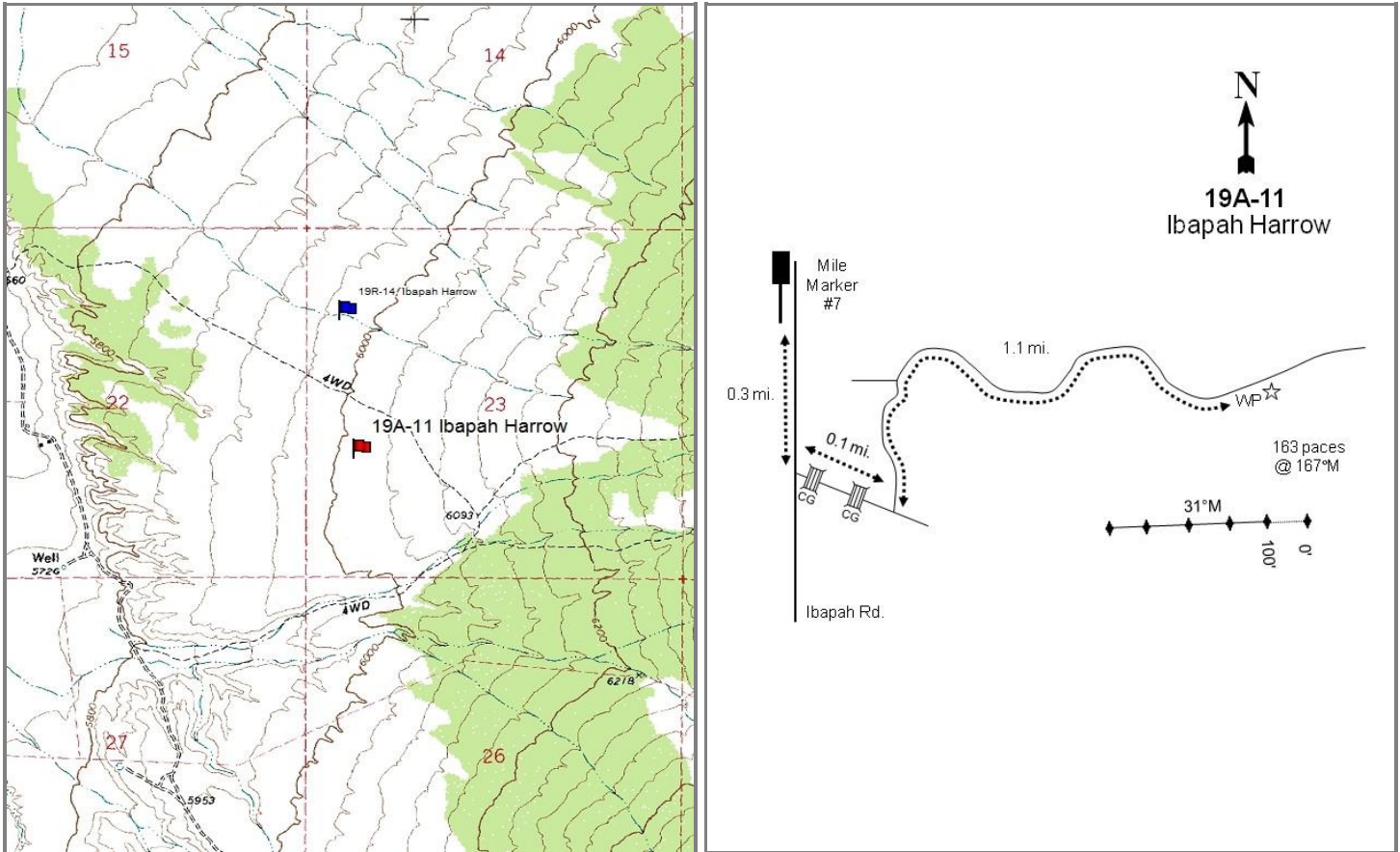
Year	Density		Age Class Distribution			Utilization		Poor Vigor (%)	Average Height Crown (cm)
	Plants Per Acre		Excluding Seedlings			Moderate (%)	Heavy (%)		
	Excluding Seedlings	Seedling	Young (%)	Mature (%)	Decadent (%)				
Artemisia tridentata ssp. vaseyana^P -- (mountain big sagebrush)									
2005	80	-	0	50	50	25	25	50	56/67
2008	40	40	0	50	50	0	0	50	53/58
2012	80	-	50	50	0	0	0	0	45/53
2017	120	-	33	67	0	0	0	0	46/55
Bassia prostrata^{Pi} -- (forage kochia)									
2005	-	-	-	-	-	-	-	-	-/-
2008	40	20	50	50	0	0	50	0	4/6
2012	-	-	-	-	-	-	-	-	-/-
2017	-	-	-	-	-	-	-	-	6/7
Chrysothamnus viscidiflorus -- (yellow rabbitbrush)									
2005	-	-	-	-	-	-	-	-	26/31
2008	20	-	0	100	0	0	0	0	20/26
2012	20	-	0	100	0	0	0	0	21/36
2017	-	-	-	-	-	-	-	-	38/21
Eriogonum microthecum^P -- (slender buckwheat)									
2005	20	-	0	100	0	0	0	0	17/18
2008	20	-	0	100	0	0	0	0	21/25
2012	-	-	-	-	-	-	-	-	-/-
2017	-	-	-	-	-	-	-	-	-/-
Ericameria nauseosa -- (rubber rabbitbrush)									
2005	-	-	-	-	-	-	-	-	-/-
2008	-	-	-	-	-	-	-	-	-/-
2012	-	-	-	-	-	-	-	-	33/53
2017	-	-	-	-	-	-	-	-	-/-
Gutierrezia sarothrae -- (broom snakeweed)									
2005	100	-	0	100	0	0	0	0	25/26
2008	200	-	50	50	0	0	0	0	25/32
2012	200	-	10	90	0	0	0	0	20/30
2017	480	40	25	71	4	0	0	4	22/24
Juniperus osteosperma^t -- (Utah juniper)									
2005	200	-	20	80	0	0	0	0	-/-
2008	100	40	20	80	0	0	0	20	-/-
2012	120	20	33	67	0	0	0	0	-/-
2017	120	20	50	50	0	0	0	0	-/-
Purshia stansburiana^P -- (Stansbury cliffrose)									
2005	-	-	-	-	-	-	-	-	-/-
2008	20	-	0	100	0	100	0	0	34/65
2012	20	-	0	100	0	100	0	0	87/110
2017	100	-	0	100	0	20	0	0	119/147
Purshia tridentata^P -- (antelope bitterbrush)									
2005	120	-	33	50	17	17	50	0	73/150
2008	140	-	14	86	0	29	14	0	53/108
2012	120	-	0	100	0	83	0	0	78/139
2017	160	20	63	38	0	13	0	13	85/146
Symphoricarpos oreophilus -- (mountain snowberry)									
2005	40	-	0	100	0	0	0	0	48/93
2008	20	-	0	100	0	0	0	0	37/62
2012	20	20	100	0	0	0	0	0	39/72
2017	40	-	0	100	0	0	0	0	43/64

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

Table 18R-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)							
2005	219	-	25	15	20	40	19.1
2008	109	10	25	-	20	45	25.3
2012	113	15	30	5	15	35	13.2
2017	124	15	25	15	10	35	15.8

IBAPAH HARROW - STUDY NO. 19A-11



Location Information

USGS 7.5 min Map Info
GPS (0' Stake)

Goshute NW; Township 10S, Range 19W, Section 23
NAD 83 UTM ZONE 12, 246912 East 4425299 North

Transect Information

Browse Tag # (0' Stake)	Not Available
Transect Bearing	269° 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 Ibabah, proceed south just past mile marker 6; turn right onto a road 0.3 miles south of mile marker 7. Drive east for 1.3 miles, crossing two cattle guards along the way. Turn left and continue for 0.1 miles. Turn right and proceed for 1.1 miles to the witness post on the right (south) side of the road. From the witness post, walk approximately 163 paces at 167 degrees magnetic to the 0-foot stake.

Site Information

Land Ownership	Federal
Land Administrator	BLM
Allotment	IBAPAH
Elevation	6,020ft (1,835m)
Aspect	West
Slope	4%
Sample Dates	07/10/2007, 07/17/2012, 06/26/2017

Table 19A-11.1 Disturbance History. Recorded history of major disturbances.

Treatment/Disturbance	Name	WRI DB#	Date	Size (acres)
Hand Crew - Lop and Scatter	Ibapah Sagebrush Improvement - Year 2	1104	October 2008-April 2009	1540
Harrow - Two-Way Dixie	Ibapah Sagebrush Improvement - Year 1	730	October-November 2007	166
Seeding - Broadcast Before	Ibapah Sagebrush Improvement - Year 1	730	October-November 2007	166

Table 19A-11.2 Seed Mix. List of known seeded plant species and rates (if available).

Mix Name		Application Type	Application Date	Acres	
Ibapah Harrow		Broadcast	Oct 2007	200	
Type	Species	Common Name	Cultivar/Source ID	Bulk lbs/acre	PLS lbs/acre
G	Achnatherum hymenoides	Indian Ricegrass	Rimrock	1.00	0.98
G	Agropyron cristatum	Crested Wheatgrass	Douglas	1.00	0.84
G	Agropyron cristatum	Crested Wheatgrass	Hycrest	0.70	0.64
G	Agropyron cristatum	Crested Wheatgrass	Hycrest	0.25	0.23
G	Elymus wawawaiensis	Snake River Wheatgrass	Secar	1.00	0.94
G	Pascopyrum smithii	Western Wheatgrass	Arriba	1.00	0.81
G	Poa secunda	Sandberg Bluegrass	Mountain Home ID	0.50	0.46
G	Psathyrostachys juncea	Russian Wildrye		1.00	0.83
G	Thinopyrum intermedium	Pubescent Wheatgrass		1.00	0.88
F	Achillea millefolium	Western Yarrow		0.10	0.10
F	Linum perenne	Blue Flax	Appar	1.00	0.92
F	Medicago sativa	Alfalfa	Ladak	1.00	0.92
F	Medicago sativa	Alfalfa	Spredor 4	1.00	0.96
F	Onobrychis viciifolia	Sainfoin	Eski	2.00	1.84
F	Sanguisorba minor	Small Burnet	Delar	2.00	1.87

Wildlife Habitat and Vegetation History**Table 19A-11.3 - Wildlife Seasonal Habitat.** UDWR wildlife habitat and seasonality.

Species	Habitat	Season	Brood/Young Rearing
Elk	crucial	winter	
Greater Sage Grouse	occupied	year-long & Winter	brood-rearing
Pronghorn	crucial	year-long	
Rocky Mountain Bighorn	substantial	year-long	

Table 19A-11.4 - 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	Phase I
2012	Wyoming Big Sagebrush/Perennial-Annual Grass	No Encroachment
2017	Wyoming Big Sagebrush/Perennial-Annual Grass	No Encroachment

Site Notes

A herd of elk was seen and an elk carcass found on site in 2012.

Soils**Table 19A-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	7.5	27.4	46.0	26.6	1.5	9.2	249.6	0.5	07/10/2007

Site Potential

1981 - 2010 Average Annual Precipitation	11 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.

Wyoming big sagebrush (*Artemisia tridentata* ssp. *wyomingensis*) has been the dominant browse species on this site throughout the duration of the study. Cover of sagebrush had decreased as of the first post-treatment sampling, but it exhibited an increase between 2012 and 2017 (Table 19A-11.13, Table 19A-11.14). Although not represented by the data, site photos reveal that Utah juniper (*Juniperus osteosperma*) trees were present in 2007, but had been removed by 2012; the study site is not currently being encroached by trees (photos, Table 19A-11.4). The herbaceous understory was not particularly abundant prior to treatment (Table 19A-11.7). However, perennial grasses -- namely the introduced species crested wheatgrass (*Agropyron cristatum*) and the native species Sandberg bluegrass (*Poa secunda*) -- and the introduced annual grass cheatgrass (*Bromus tectorum*) increased and have been co-dominant site components in 2012 and 2017. In addition, the introduced perennial grass species bulbous bluegrass (*Poa bulbosa*) was observed for the first time in 2017 (Table 19A-11.10). Forbs have remained rare (Table 19A-11.11). This study site is expected to remain in a similar state in future sample years, although sagebrush cover may continue to increase.

Trend Summary Tables**Table 19A-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
2007	19.8	2.0	-	22.9	2.2	-
2012	5.8	0.5	-	4.8	0.5	-
2017	6.9	0.6	-	7.0	0.5	-

Table 19A-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
2007	267	308	28	79	1.3	7.4	0.1	0.6
2012	357	289	-	85	20.0	14.5	-	0.7
2017	338	318	319	72	16.3	22.1	3.7	1.1

Table 19A-11.8 - 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
2007	40.1	6.7	25.8	2.5	0.9	32.0
2012	28.6	0.2	46.3	0.8	0.3	43.7
2017	36.2	1.5	44.6	1.6	1.0	48.5

Table 19A-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	Rocky Mountain Elk	Greater Sage-Grouse	Rabbit
	Quadrat Frequency				
2007	-	4	5	-	18
2012	-	1	6	-	1
2017	-	2	6	1	4
Year	Days Use Per Acre (ha)				
2007	-	0.7 (1.7)	16.1 (39.7)	-	-
2012	0.7 (1.8)	4.7 (11.6)	4.0 (9.9)	43.6 (107.6)*	-
2017	5.8 (14.3)	-	14.1 (34.8)	17.4 (43.0)*	-

*Pellets per acre (ha)

Table 19A-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)	Pascopyrum smithii (western wheatgrass)	Poa bulbosa ⁱ (bulbous bluegrass)	Poa fendleriana (muttongrass)	Poa secunda (Sandberg bluegrass)	Psathyrostachys juncea ⁱ (Russian wildrye)	Pseudoroegneria spicata (bluebunch wheatgrass)	Thinopyrum intermedium ⁱ (intermediate wheatgrass)
year	Nested Frequency									
2007	3	8	267	-	-	5	303	-	5	-
2012	15	152	357	1	-	3	226	-	6	2
2017	2	181	338	2	16	7	244	0	30	6
year	Average Cover (%)									
2007	0.0	0.4	1.3	-	-	0.0	6.9	-	0.0	-
2012	1.1	6.7	20.0	0.0	-	0.0	6.3	-	0.4	0.0
2017	0.1	12.5	16.3	0.0	0.5	0.1	6.7	0.0	2.1	0.0

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

Table 19A-11.11 - Forb Species. Nested frequency and modified Daubenmire average cover by year.

FORB SPECIES	Arabis (rockcress)	Astragalus beckwithii (Beckwith's milkvetch)	Calochortus nuttallii (sego lily)	Camelina microcarpa ^{ai} (littledod false flax)	Castilleja flava (yellow Indian paintbrush)	Castilleja linariifolia (Wyoming Indian paintbrush)	Ceratocephala testiculata ^{ai} (curveseed butterwort)	Cryptantha (cryptantha)	Cymopterus (springparsley)	Erigeron pumilus (shaggy fleabane)	Lesquerella (bladderpod)	Linum perenne ⁱ (blue flax)	Medicago sativa ⁱ (alfalfa)	Phlox hoodii (spiny phlox)	Phlox longifolia (longleaf phlox)	Sanguisorba minor ⁱ (small burnet)	Tragopogon dubius ^{ai} (yellow salsify)
year	Nested Frequency																
2007	3	-	4	-	16	1	27	-	2	6	-	-	-	21	34	-	1
2012	-	-	-	-	2	-	-	3	-	4	-	10	7	12	51	3	-
2017	1	10	6	5	14	2	319	-	-	0	1	-	8	15	28	-	-
year	Average Cover (%)																
2007	0.0	-	0.0	-	0.2	0.0	0.1	-	0.0	0.1	-	-	-	0.2	0.1	-	0.0
2012	-	-	-	-	0.0	-	-	0.0	-	0.2	-	0.1	0.0	0.2	0.2	0.0	-
2017	0.0	0.5	0.0	0.0	0.1	0.1	3.7	-	-	0.0	0.0	-	0.1	0.2	0.1	-	-

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

FORB SPECIES	Zigadenus paniculatus (foothill deathcamas)
year	Nested Frequency
2007	1
2012	-
2017	0
year	Average Cover (%)
2007	0.0
2012	-
2017	0.0

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

Table 19A-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 var. stenophyllus (yellow rabbitbrush)	Gutierrezia sarothrae (broom snakeweed)
year	Line Intercept Cover (%)		
2007	22.9	2.2	-
2012	4.8	0.5	-
2017	7	0.5	-
year	Quadrat Cover (%)		
2007	19.8	1.9	0.0
2012	5.8	0.4	0.1
2017	6.9	0.6	0.0

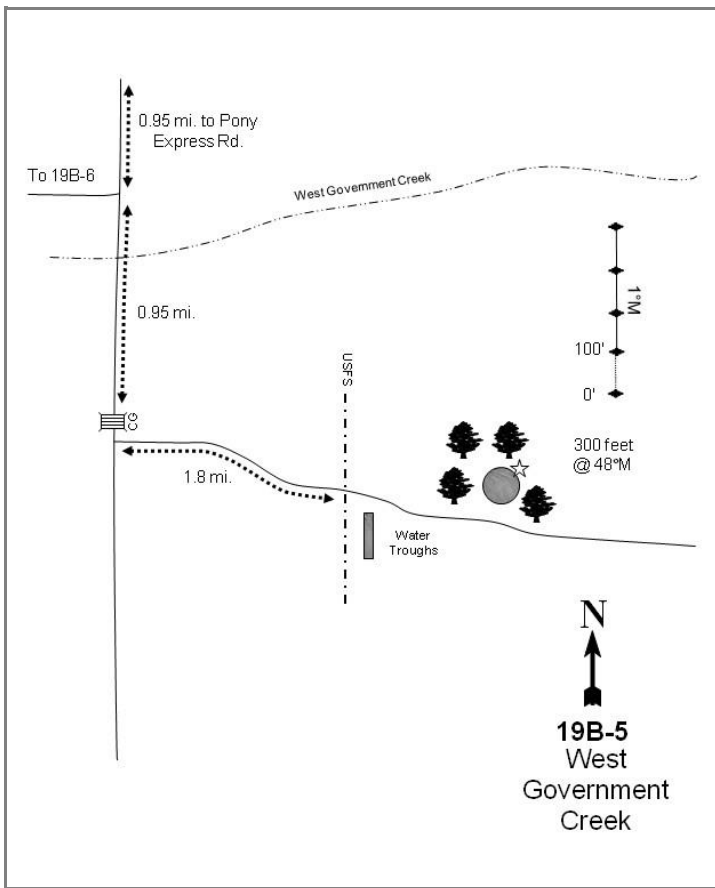
t - Tree Species; p - Preferred Browse; i - Introduced Species

Table 19A-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)									
2007	6220	380	4	41	55	36	0	28	49/78
2012	4040	100	29	64	7	7	3	6	34/49
2017	3940	-	12	78	10	0	0	20	37/52
Cercocarpus ledifolius^p -- (curl-leaf mountain mahogany)									
2007	-	-	-	-	-	-	-	-	99/136
2012	-	-	-	-	-	-	-	-	-/-
2017	-	-	-	-	-	-	-	-	-/-
Chrysothamnus viscidiflorus ssp. viscidiflorus var. stenophyllus -- (yellow rabbitbrush)									
2007	1160	-	2	53	45	2	0	19	27/42
2012	540	20	7	78	15	0	0	59	28/46
2017	960	-	0	85	15	0	0	23	27/44
Gutierrezia sarothrae -- (broom snakeweed)									
2007	-	-	-	-	-	-	-	-	19/14
2012	-	-	-	-	-	-	-	-	21/31
2017	60	-	0	33	67	0	0	67	19/20

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

WEST GOVERNMENT CREEK - STUDY NO. 19B-5



Location Information

USGS 7.5 min Map Info
GPS (0' Stake)

Lookout Pass SW; Township 9S, Range 7W, Section 22
NAD 83 UTM ZONE 12, 361722 East 4430994 North

Transect Information

Browse Tag # (0' Stake)	3975
Transect Bearing	4° magnetic
Length	400ft
Belt Placement	Line 1 (11ft & 95ft), Line 2 (34ft), Line 3 (59ft), Line 4 (95ft)
Belt Marker Placement	Standard

Directions to Site

Turn south off of Pony Express Road onto Erickson Pass Road. Go 4.6 miles to the turnoff to study 19B-6. Continue for 0.95 miles to a cattle guard, then turn left 60 yards past the cattle guard. Continue for 1.8 miles to a water trough. From the northeast side of the circular trough, the 0-foot baseline stake is 300 feet away at 48 degrees magnetic and is marked with browse tag #3975.

Site Information

Land Ownership	Federal
Land Administrator	USFS
Allotment	ONAQUI
Elevation	6,000ft (1,829m)
Aspect	Northwest
Slope	7-10%
Sample Dates	07/31/1997, 08/01/2002, 08/01/2007, 06/19/2012, 06/06/2017

Table 19B-05.1 Disturbance History. Recorded history of major disturbances.

Treatment/Disturbance	Name	WRI DB#	Date	Size (acres)
Chaining - Chain Unknown	-	-	Late 1960s	-
Seeding - Seed Unknown	-	-	Late 1960s	-
Hand Crew - Lop and Scatter	West Government	2024	July 2011-May 2012	1613

Wildlife Habitat and Vegetation History**Table 19B-05.3 - Wildlife Seasonal Habitat.** UDWR wildlife habitat and seasonality.

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

Table 19B-05.4 - 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	Phase I
1989	Mountain Big Sagebrush	Phase I
1997	Mountain Big Sagebrush	Phase I
2002	Mountain Big Sagebrush	Phase I
2007	Mountain Big Sagebrush	Phase I
2012	Mountain Big Sagebrush	Phase I
2017	Mountain Big Sagebrush	Phase I

Site Notes

This winter range study is located in the lower portion of the Lee's Creek drainage in an old juniper chaining area.

Soils**Table 19B-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
Loam	7.6	40.4	35.1	24.6	3.4	23.8	336.0	0.2	07/31/1997

Site Potential

1981 - 2010 Average Annual Precipitation	15 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.

This study site has existed as a mountain big sagebrush (*Artemisia tridentata* ssp. *vaseyana*) dominated plant community since 1983, with other shrub species such as antelope bitterbrush (*Purshia tridentata*) as subordinate community members (Table 19B-05.12). The herbaceous understory has remained abundant and moderately diverse throughout the study years; much of the herbaceous cover is contributed by the introduced perennial grass species crested wheatgrass (*Agropyron cristatum*) and intermediate wheatgrass (*Thinopyrum intermedium*) and the native species Sandberg bluegrass (*Poa secunda*). Perennial forb cover has fluctuated from year to year, but increased by nearly nine percent between 2012 and 2017 -- much of this increase is due to American vetch (*Vicia americana*) (Table 19B-05.7, Table 19B-05.10, Table 19B-05.11). Utah juniper (*Juniperus osteosperma*) trees are scattered across the site, placing it in Phase I of woodland succession (Photos, Table 19B-05.4, Table 19B-05.12, Table 19B-05.13, Table 19B-05.14).

Trend Summary Tables**Table 19B-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
1997	18.3	0.0	0.8	-	-	-
2002	21.3	0.1	1.4	31.5	0.1	2.2
2007	16.6	0.0	1.5	29.0	-	3.2
2012	20.4	-	0.3	30.1	-	-
2017	17.9	-	0.5	28.2	0.1	0.1

Table 19B-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
1997	13	367	356	222	0.0	16.2	1.8	5.4
2002	3	370	-	24	0.0	11.9	-	0.3
2007	11	385	225	185	0.1	21.2	1.0	3.0
2012	-	417	170	219	-	27.6	0.5	3.8
2017	-	434	255	288	-	39.9	1.2	12.6

Table 19B-05.8 - 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
1997	16.2	4.6	42.0	6.0	0.8	41.8
2002	40.2	1.1	36.9	5.1	1.1	35.4
2007	25.9	0.5	39.3	5.7	0.4	42.6
2012	15.3	0.0	49.7	2.6	1.7	55.4
2017	19.8	0.1	53.1	6.3	0.8	57.1

Table 19B-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	Rocky Mountain Elk	Horse	Rabbit
	Quadrat Frequency				
1997	10	3	-	-	21
2002	10	3	-	-	12
2007	6	8	1	-	54
2012	-	6	-	-	2
2017	2	8	-	-	2
Year	Days Use Per Acre (ha)				
1997	-	-	-	-	-
2002	33.4 (82.5)	14.1 (34.8)	-	0.6 (1.4)	-
2007	4.4 (10.8)	25.5 (62.9)	1.3 (3.3)	-	-
2012	-	4.0 (9.9)	-	-	-
2017	16.7 (41.2)	22.8 (56.3)	-	-	-

Table 19B-05.10 - 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)								
Poa bulbosa ⁱ (bulbous bluegrass)								
Poa fendleriana (muttongrass)								
Poa secunda (Sandberg bluegrass)								
Pseudoroegneria spicata (bluebunch wheatgrass)								
Thinopyrum intermedium ⁱ (intermediate wheatgrass)								
year	Nested Frequency							
1997	260	13	-	-	-	186	8	153
2002	195	3	4	-	-	197	10	154
2007	220	11	-	-	-	245	13	126
2012	233	-	-	-	-	290	9	159
2017	307	-	-	42	7	279	27	188
year	Average Cover (%)							
1997	8.5	0.0	-	-	-	3.9	0.2	3.6
2002	5.7	0.0	0.0	-	-	2.7	0.4	3.0
2007	8.0	0.1	-	-	-	9.1	0.5	3.6
2012	11.9	-	-	-	-	9.4	0.4	5.9
2017	18.6	-	-	1.2	0.3	12.0	1.3	6.6

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

Table 19B-05.11 - Forb Species. Nested frequency and modified Daubenmire average cover by year.

FORB SPECIES																	
Agoseris glauca (pale agoseris)																	
Alyssum desertorum ^{ai} (desert madwort)																	
Antennaria dimorpha (low pussytoes)																	
Arabis (rockcress)																	
Astragalus cibirius (browse milkvetch)																	
Astragalus convallarius (lesser rushy milkvetch)																	
Calochortus nuttallii (sego lily)																	
Castilleja angustifolia (northwestern Indian paintbrush)																	
Ceratocephala testiculata ^{ai} (curveseed butterwort)																	
Chaenactis douglasii (Douglas' dustymaiden)																	
Cirsium neomexicanum ^a (New Mexico thistle)																	
Collinsia parviflora ^a (maiden blue eyed Mary)																	
Comandra umbellata (bastard toadflax)																	
Crepis acuminata (tapertip hawksbeard)																	
Cymopterus longipes (longstalk springparsley)																	
Draba ^a (draba)																	
Erigeron pumilus (shaggy fleabane)																	
year	Nested Frequency																
1997	2	282	3	6	26	3	1	1	232	3	2	49	3	15	10	-	9
2002	3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
2007	4	77	-	-	49	2	7	-	171	-	-	68	2	15	3	5	-
2012	25	132	-	-	51	4	-	-	76	-	2	16	5	6	6	-	-
2017	35	236	-	-	72	7	28	3	41	4	1	34	10	19	32	-	3
year	Average Cover (%)																
1997	0.0	0.6	0.0	0.0	1.1	0.0	0.0	0.0	1.0	0.0	0.0	0.1	0.0	0.2	0.0	-	0.0
2002	0.0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
2007	0.1	0.2	-	-	1.7	0.0	0.0	-	0.6	-	-	0.2	0.0	0.1	0.0	0.0	-
2012	0.3	0.3	-	-	0.7	0.2	-	-	0.1	-	0.0	0.1	0.1	0.1	0.0	-	-
2017	0.5	0.9	-	-	3.6	0.1	0.1	0.0	0.1	0.0	0.0	0.2	0.1	0.4	0.3	-	0.0

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

FORB SPECIES	Eriogonum (buckwheat)	Galium boreale (northern bedstraw)	Medicago sativa ⁱ (alfalfa)	Microsteris gracilis ^a (slender phlox)	Petradoria pumila (rock goldenrod)	Phlox longifolia (longleaf phlox)	Silene antirrhina ^a (sleepy silene)	Tragopogon dubius ^{ai} (yellow salsify)	Vicia americana (American vetch)	Zigadenus paniculatus (foothill deathcamas)
year	Nested Frequency									
1997	1	4	13	25	19	73	-	-	128	-
2002	-	-	-	-	12	-	-	-	11	-
2007	-	5	-	11	10	58	5	2	84	1
2012	-	-	-	2	13	69	1	-	125	-
2017	-	-	3	5	25	33	-	-	168	-
year	Average Cover (%)									
1997	0.0	0.2	1.7	0.0	0.3	0.7	-	-	0.9	-
2002	-	-	-	-	0.3	-	-	-	0.0	-
2007	-	0.0	-	0.0	0.2	0.4	0.0	0.0	0.4	0.0
2012	-	-	-	0.0	0.5	0.4	0.0	-	1.4	-
2017	-	-	0.6	0.0	0.7	0.2	-	-	6.0	-

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

Table 19B-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)	Atriplex canescens ^p (fourwing saltbush)	Gutierrezia sarothrae (broom snakeweed)	Juniperus osteosperma ⁱ (Utah juniper)	Purshia tridentata ^p (antelope bitterbrush)
year	Line Intercept Cover (%)				
1997	-	-	-	-	-
2002	31.4	-	0.1	2.2	0.1
2007	28.7	-	-	3.2	0.3
2012	28.5	-	-	-	1.6
2017	25.1	-	0.1	0.1	3.1
year	Quadrat Cover (%)				
1997	17.5	-	0.0	0.8	0.7
2002	20.5	0.4	0.1	1.4	0.4
2007	16.3	-	0.0	1.5	0.3
2012	18.7	-	-	0.3	1.7
2017	15.5	-	0.0	0.5	2.4

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

Table 19B-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.

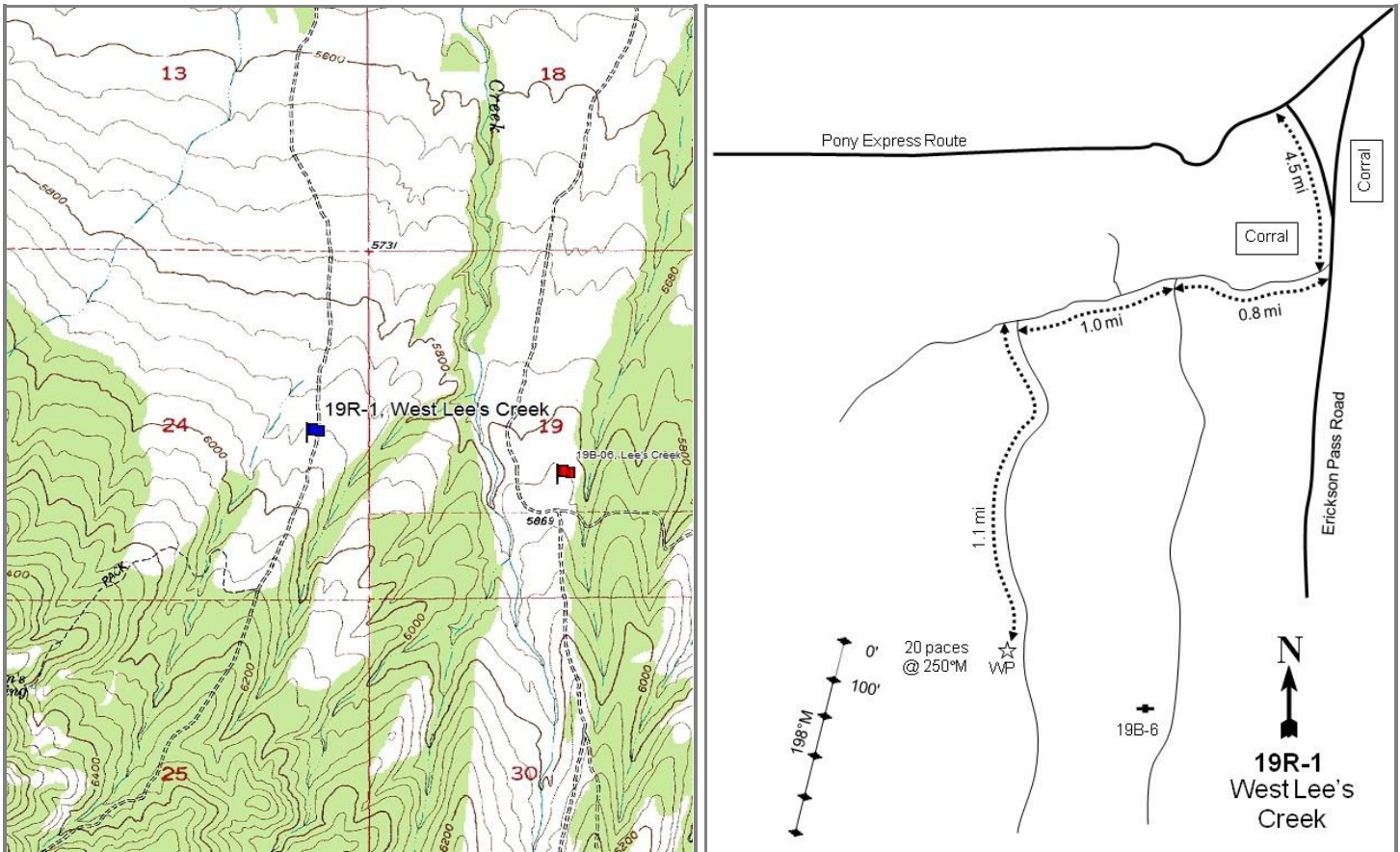
Year	Density		Age Class Distribution			Utilization		Poor Vigor (%)	Average Height Crown (cm)
	Plants Per Acre		Excluding Seedlings			Moderate (%)	Heavy (%)		
	Excluding Seedlings	Seedling	Young (%)	Mature (%)	Decadent (%)				
Artemisia tridentata ssp. vaseyana^P -- (mountain big sagebrush)									
1997	2300	20	16	76	9	40	0	12	84/136
2002	3160	-	3	73	24	30	3	6	75/119
2007	2320	-	1	60	39	30	21	29	79/124
2012	2420	-	0	76	24	37	2	27	92/116
2017	2380	-	0	66	34	25	9	37	80/119
Gutierrezia sarothrae -- (broom snakeweed)									
1997	240	20	25	75	0	0	0	0	34/27
2002	440	-	5	91	5	0	0	0	18/23
2007	140	-	0	57	43	0	0	43	13/12
2012	-	-	-	-	-	-	-	-	20/21
2017	40	-	0	100	0	0	0	0	23/20
Juniperus osteosperma^t -- (Utah juniper)									
1997	20	-	100	0	0	0	0	0	- / -
2002	60	-	33	67	0	0	0	0	- / -
2007	40	-	0	100	0	0	0	0	- / -
2012	60	-	0	33	67	0	0	0	- / -
2017	20	-	100	0	0	0	0	0	- / -
Purshia tridentata^P -- (antelope bitterbrush)									
1997	100	-	20	80	0	20	40	0	35/106
2002	120	-	17	83	0	0	83	0	48/132
2007	80	-	0	100	0	0	75	0	60/135
2012	120	20	0	100	0	50	50	0	81/145
2017	260	-	0	100	0	39	39	8	86/137

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

Table 19B-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)							
2002	20	-	-	-	-	-	9.5
2007	21	-	10	60	20	10	9.8
2012	6	-	100	-	-	-	14.6
2017	14	13	75	13	-	-	5.4

WEST LEE'S CREEK - STUDY NO. 19R-1

**Location Information**

USGS 7.5 min Map Info
GPS (0' Stake)

Indian Peaks SW; Township 9S, Range 8W, Section 24
NAD 83 UTM ZONE 12, 355941 East 4431203 North

Transect Information

Browse Tag # (0' Stake)	166
Transect Bearing	198° 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 intersection of the Erickson Pass and Pony Express Roads, proceed south on Erickson Pass Road for 4.5 miles to a road that comes in from the right (west). Turn here and proceed west for 1.8 miles to a road that comes in from the left. Turn left here and proceed south for 1.1 miles to a witness post on the right (west) side of the road. The 0-foot stake is 20 paces from the witness post at 250 degrees magnetic and is marked with browse tag #166.

Site Information

Land Ownership	Federal
Land Administrator	BLM
Allotment	GOVERNMENT CREEK
Elevation	5,960ft (1,817m)
Aspect	North
Slope	6-8%
Sample Dates	07/14/2004, 07/12/2007, 06/19/2012, 06/06/2017

Table 19R-01.1 Disturbance History. Recorded history of major disturbances.

Treatment/Disturbance	Name	WRI DB#	Date	Size (acres)
Mechanical - Bullhog	Government Creek GRSG Habitat Improvement	3635	September 2016-February 2017	5746
Chaining - Two-way Chain Unknown	James Seeding	-	Summer/Fall 1970	1500
Seeding - Aerial Before	James Seeding	-	Summer/Fall 1970	1500
Mechanical - Bullhog	Lee Canyon HFR	PDB	Fall 2004-Spring 2005	700
Seeding - Aerial Before	Lee Canyon HFR	PDB	Fall 2004	700
Mechanical - Bullhog	Lee Canyon HFR	PDB	Spring 2009	720

Table 19R-01.2 Seed Mix. List of known seeded plant species and rates (if available).

Mix Name		Application Type	Application Date	Acres	
Lee Canyon		Aerial	Nov 2004	350	
Type	Species	Common Name	Cultivar/Source ID	Bulk lbs/acre	PLS lbs/acre
G	Agropyron cristatum	Crested Wheatgrass	Hycrest	0.57	0.52
G	Agropyron fragile	Siberian Wheatgrass	Vavilov	0.57	0.52
G	Dactylis glomerata	Orchardgrass	Paiute	0.43	0.40
G	Elymus elymoides	Bottlebrush Squirreltail		0.14	0.11
G	Elymus wawawaiensis	Snake River Wheatgrass	Secar	0.43	0.38
G	Pascopyrum smithii	Western Wheatgrass	Arriba	1.00	0.91
G	Poa secunda	Canby Bluegrass		0.43	0.36
G	Psathyrostachys juncea	Russian Wildrye	Bozoisky	0.43	0.40
G	Pseudoroegneria spicata	Bluebunch Wheatgrass	Goldar	0.57	0.55
F	Achillea millefolium	Western Yarrow		0.10	0.10
F	Linum perenne	Blue Flax	Appar	0.57	0.52
F	Medicago sativa	Alfalfa	Ladak+	1.00	0.92
F	Onobrychis viciifolia	Sainfoin	Eski	2.43	2.22
F	Sanguisorba minor	Small Burnet	Delar	2.00	1.89
S	Artemisia tridentata ssp. wyomingensis	Wyoming Big Sagebrush		0.57	0.05
S	Bassia prostrata	Forage Kochia	Immigrant	0.57	0.40

Wildlife Habitat and Vegetation History**Table 19R-01.3 - Wildlife Seasonal Habitat.** UDWR wildlife habitat and seasonality.

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

Table 19R-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/Mountain Big Sagebrush	Phase II
2007	Juniper/Mountain Big Sagebrush	Phase II
2012	Perennial Grass/Mountain Big Sagebrush/Antelope Bitterbrush	Phase I
2017	Mountain Big Sagebrush/Antelope Bitterbrush	Phase I

Site Notes

The study is located approximately fifteen miles south of Dugway on the northeastern foothills of the Simpson Mountains. Cattle were seen near the site in 2017.

Soils**Table 19R-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
Clay Loam	6.9	39.3	33.2	27.5	3.3	5.8	217.6	0.8	07/14/2004

Site Potential

1981 - 2010 Average Annual Precipitation	15 inches
NRCS Ecological Site	Upland Loam (Mountain Big Sagebrush)
NRCS Ecological Site #	028AY310UT
States and Transitions	No state and transition model is available for this ecological site.

This site was a Phase II Utah juniper (*Juniperus osteosperma*) woodland with mountain big sagebrush (*Artemisia tridentata* ssp. *vaseyana*) as a co-dominant component from 2004 to 2007. The bullhog treatment between 2007 and 2012 removed most of the juniper, and the site transitioned to being dominated by sagebrush and antelope bitterbrush (*Purshia tridentata*) (Table 19R-01.4, Table 19R-01.12, Table 19R-01.13). The herbaceous understory has remained diverse and abundant following treatment. Perennial grasses -- mainly the introduced species crested wheatgrass (*Agropyron cristatum*) and native species bluebunch wheatgrass (*Pseudoroegneria spicata*) -- have contributed the most herbaceous cover and were a co-dominant site component in 2012. In addition, the introduced perennial species bulbous bluegrass (*Poa bulbosa*) was observed for the first time in 2017, but in low abundance (Table 19R-01.10). Perennial forbs have contributed more cover than annual forbs in all sample years (Table 19R-01.7, Table 19R-01.11).

Trend Summary Tables**Table 19R-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	7.8	-	18.7	6.3	0.2	25.0
2007	6.3	0.0	6.1	5.7	-	18.6
2012	6.3	0.0	1.1	9.3	-	0.9
2017	12.0	0.2	-	14.6	0.3	-

Table 19R-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	-	297	-	37	-	12.8	-	0.6
2007	14	318	214	74	0.0	10.1	1.0	1.2
2012	123	374	247	157	4.9	26.6	0.8	4.8
2017	103	394	324	204	1.9	31.0	3.0	9.0

Table 19R-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
2004	24.9	0.4	37.9	11.4	5.3	38.2
2007	21.1	0.8	43.0	15.5	4.3	28.8
2012	11.2	0.0	56.5	3.6	6.3	46.1
2017	14.7	0.1	61.3	5.7	3.8	48.8

Table 19R-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/Pronghorn	Rocky Mountain Elk	Rabbit
	Quadrat Frequency			
2004	1	13	-	31
2007	-	3	3	65
2012	-	2	-	1
2017	-	7	-	1
Year	Days Use Per Acre (ha)			
2004	3.6 (9.0)	10.0 (24.8)	-	-
2007	8.0 (19.7)	6.7 (16.6)	7.4 (18.2)	-
2012	-	3.4 (8.3)	-	-
2017	27.6 (68.1)	34.9 (86.1)	-	-

Table 19R-01.10 - Grass Species. Nested frequency and modified Daubenmire average cover by year.

GRASS SPECIES	Achatherum hymenoides (Indian ricegrass)	Agropyron cristatum ⁱ (crested wheatgrass)	Bromus tectorum ^{ai} (cheatgrass)	Elymus elymoides (squirreltail)	Poa bulbosa ⁱ (bulbous bluegrass)	Poa secunda (Sandberg bluegrass)	Pseudoroegneria spicata (bluebunch wheatgrass)
year	Nested Frequency						
2004	-	171	-	3	-	183	104
2007	1	100	14	4	-	266	97
2012	-	187	123	16	-	295	83
2017	-	244	103	12	13	279	155
year	Average Cover (%)						
2004	-	5.6	-	0.0	-	2.1	5.0
2007	0.0	1.8	0.0	0.0	-	5.5	2.7
2012	-	11.9	4.9	0.5	-	9.4	4.8
2017	-	13.9	1.9	0.7	0.7	6.8	9.0

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

Table 19R-01.11 - 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)	Antennaria dimorpha (low pussytoes)	Arabis (rockcress)	Astragalus cibirius (browse milkvetch)	Calochortus nuttallii (sego lily)	Castilleja (Indian paintbrush)	Ceratocephala testiculata ^{ai} (curvseed butterwort)	Chaenactis douglasii (Douglas' dustymaiden)	Cirsium (thistle)	Collinsia parviflora ^a (maiden blue eyed Mary)	Crepis acuminata (tapertip hawkbeard)	Cryptantha (cryptantha)	Cymopterus longipes (longstalk springparsley)	Descurainia pinnata ^a (western tansymustard)	Gilia inconspicua ^a (shy gilia)
year	Nested Frequency																
2004	-	-	-	-	-	4	-	-	-	-	-	-	-	-	-	-	-
2007	3	-	81	-	-	29	-	-	183	-	-	1	-	-	-	20	-
2012	10	3	229	-	-	40	2	-	83	3	-	-	5	3	15	2	-
2017	8	11	324	4	3	55	30	1	29	2	3	1	-	5	18	-	1
year	Average Cover (%)																
2004	-	-	-	-	-	0.0	-	-	-	-	-	-	-	-	-	-	-
2007	0.0	-	0.3	-	-	0.6	-	-	0.6	-	-	0.0	-	-	-	0.1	-
2012	0.1	0.0	0.6	-	-	1.3	0.0	-	0.2	0.0	-	-	0.2	0.0	0.1	0.0	-
2017	0.2	0.1	2.9	0.0	0.0	3.6	0.2	0.0	0.1	0.0	0.0	0.0	-	0.0	0.2	-	0.0

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

FORB SPECIES										
<i>Lactuca serriola</i> ^{ai} (prickly lettuce)										
<i>Linum perenne</i> ⁱ (blue flax)										
<i>Microsteris gracilis</i> ^a (slender phlox)										
<i>Petroradia pumila</i> (rock goldenrod)										
<i>Phlox hoodii</i> (spiny phlox)										
<i>Phlox longifolia</i> (longleaf phlox)										
<i>Silene antirrhina</i> ^a (sleepy silene)										
<i>Tragopogon dubius</i> ^{ai} (yellow salsify)										
<i>Vicia americana</i> (American vetch)										
<i>Zigadenus paniculatus</i> (foothill deathcamas)										
year	Nested Frequency									
2004	-	-	-	16	17	2	-	-	4	-
2007	-	-	-	16	11	11	-	-	14	6
2012	1	5	6	27	23	17	1	2	56	1
2017	4	1	6	23	10	6	-	-	85	4
year	Average Cover (%)									
2004	-	-	-	0.4	0.2	0.0	-	-	0.0	-
2007	-	-	-	0.3	0.1	0.0	-	-	0.1	0.0
2012	0.0	0.3	0.0	0.9	0.5	0.1	0.0	0.0	1.1	0.0
2017	0.0	0.1	0.0	0.3	0.1	0.0	-	-	4.0	0.1

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

Table 19R-01.12 - Shrub and Tree Species. Average modified Daubenmire quadrat and line intercept cover by year.

SHRUB SPECIES						
<i>Artemisia tridentata</i> ssp. <i>vaseyana</i> ^p (mountain big sagebrush)						
<i>Chrysothamnus viscidiflorus</i> ssp. <i>viscidiflorus</i> var. <i>stenophyllus</i> (yellow rabbitbrush)						
<i>Gutierrezia sarothrae</i> (broom snakeweed)						
<i>Juniperus osteosperma</i> ⁱ (Utah juniper)						
<i>Opuntia polyacantha</i> (plains pricklypear)						
<i>Purshia tridentata</i> ^p (antelope bitterbrush)						
year	Line Intercept Cover (%)					
2004	4.4	-	0.2	25	-	1.9
2007	3.8	-	-	18.6	-	1.9
2012	5.2	-	-	0.9	-	4.1
2017	9.9	0.1	0.2	-	-	4.7
year	Quadrat Cover (%)					
2004	4.8	-	0.0	18.7	-	2.9
2007	2.8	-	0.0	6.1	0.0	3.6
2012	2.9	-	0.0	1.1	-	3.3
2017	8.2	0.2	0.0	-	-	3.8

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

Table 19R-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.

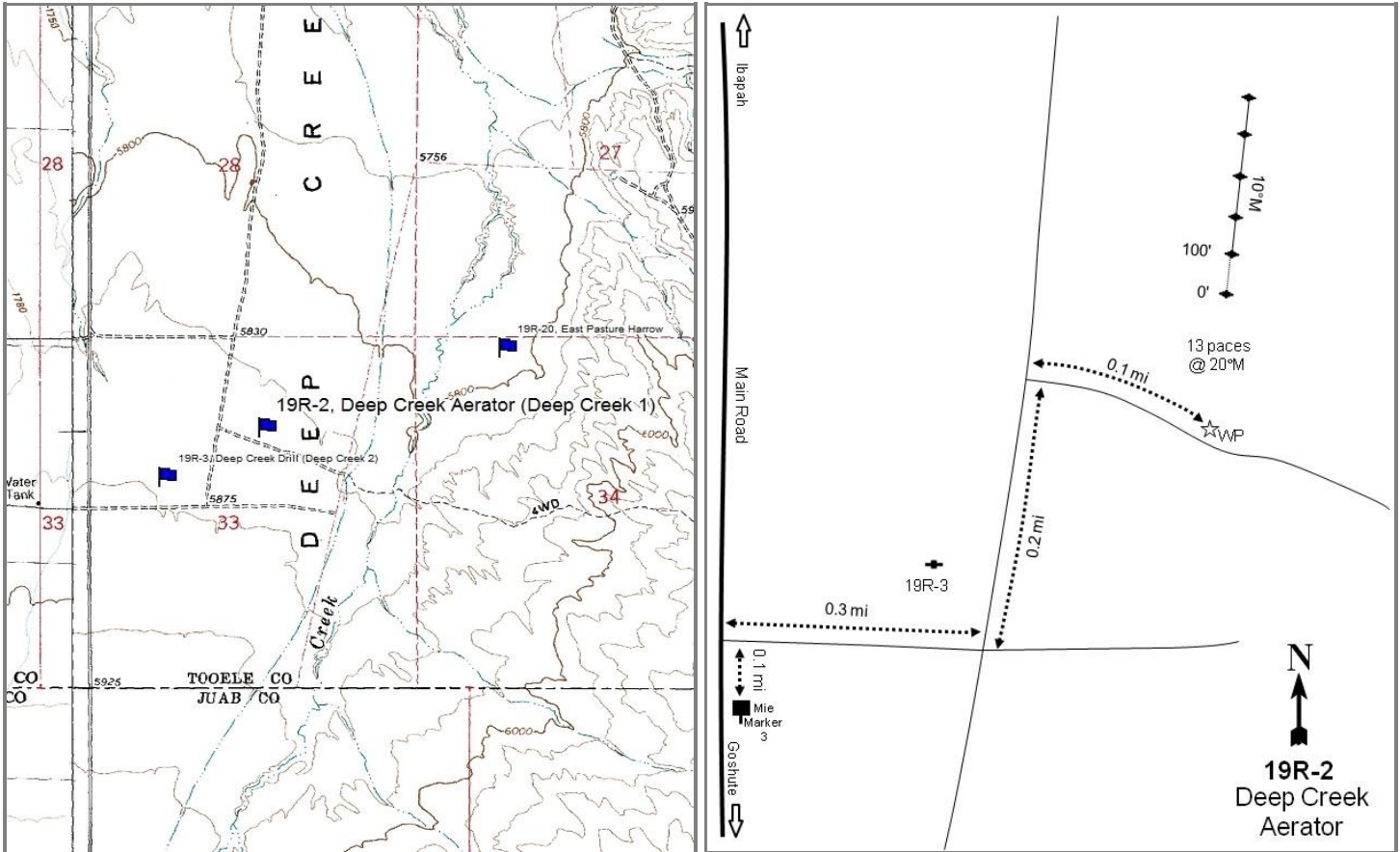
Year	Density		Age Class Distribution			Utilization		Poor Vigor (%)	Average Height Crown (cm)
	Plants Per Acre		Excluding Seedlings			Moderate (%)	Heavy (%)		
	Excluding Seedlings	Seedling	Young (%)	Mature (%)	Decadent (%)				
Artemisia tridentata ssp. vaseyana^P -- (mountain big sagebrush)									
2004	760	-	21	61	18	18	21	8	63/94
2007	500	40	4	72	24	12	20	68	62/87
2012	1880	440	37	63	0	1	0	11	48/71
2017	2200	-	24	72	5	2	0	5	51/73
Bassia prostrata^{Pi} -- (forage kochia)									
2004	-	-	-	-	-	-	-	-	-/-
2007	-	-	-	-	-	-	-	-	13/22
2012	-	-	-	-	-	-	-	-	-/-
2017	-	-	-	-	-	-	-	-	-/-
Chrysothamnus viscidiflorus ssp. viscidiflorus var. stenophyllus -- (yellow rabbitbrush)									
2004	-	-	-	-	-	-	-	-	-/-
2007	-	-	-	-	-	-	-	-	22/21
2012	-	-	-	-	-	-	-	-	26/60
2017	40	-	100	0	0	0	0	0	34/47
Ericameria nauseosa -- (rubber rabbitbrush)									
2004	-	-	-	-	-	-	-	-	64/60
2007	-	-	-	-	-	-	-	-	-/-
2012	-	-	-	-	-	-	-	-	-/-
2017	-	-	-	-	-	-	-	-	32/30
Gutierrezia sarothrae -- (broom snakeweed)									
2004	120	-	0	100	0	0	0	0	19/28
2007	40	40	0	100	0	0	0	0	17/22
2012	40	-	50	50	0	0	0	50	16/24
2017	120	-	0	100	0	0	0	0	22/25
Juniperus osteosperma^t -- (Utah juniper)									
2004	380	-	0	100	0	11	0	0	- / -
2007	180	-	0	100	0	0	0	0	- / -
2012	40	-	100	0	0	0	0	0	- / -
2017	20	-	100	0	0	0	0	0	- / -
Opuntia polyacantha -- (plains pricklypear)									
2004	-	-	-	-	-	-	-	-	22/52
2007	-	-	-	-	-	-	-	-	19/45
2012	-	-	-	-	-	-	-	-	11/32
2017	-	-	-	-	-	-	-	-	13/19
Purshia tridentata^P -- (antelope bitterbrush)									
2004	180	-	11	33	56	0	89	11	65/154
2007	140	-	0	100	0	71	29	0	63/145
2012	440	40	9	91	0	68	0	0	55/120
2017	480	-	0	100	0	4	4	0	60/120

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

Table 19R-01.14 - 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	276	-	-	35	40	25	14.2
2007	95	-	5	10	50	35	18.8
2012	28	-	38	-	25	38	15.0
2017	17	100	-	-	-	-	1.3

DEEP CREEK AERATOR - STUDY NO. 19R-2



Location Information

USGS 7.5 min Map Info	Goshute SW; Township 10S, Range 19W, Section 33
GPS (0' Stake)	NAD 83 UTM ZONE 12, 244316 East 4422759 North

Transect Information

Browse Tag # (0' Stake)	77
Transect Bearing	10° magnetic
Length	500ft
Belt Placement	Line 1 (11ft), Line 2 (34ft), Line 3 (59ft), Line 4 (71ft), Line 5 (95ft)
Belt Marker Placement	No Rebar

Directions to Site

Drive north of Goshute toward Irapah to mile marker 3. Drive north of the mile marker for 0.1 miles to a two-track road on the right (east) side of the road. Turn right and drive 0.3 miles to a four-way intersection. Turn left at the intersection and drive 0.2 miles to a road on the right. Turn right and proceed 0.1 miles to the witness post on the left (north) side of the road. From the witness post, walk 13 paces at 2 degrees magnetic to the 0-foot stake, which is marked with browse tag #77.

Site Information

Land Ownership	Federal
Land Administrator	BLM
Allotment	IBAPAH
Elevation	5,500ft (1,676m)
Aspect	Northeast
Slope	2%
Sample Dates	07/18/2005, 07/22/2008, 07/17/2012, 06/26/2017

Table 19R-02.1 Disturbance History. Recorded history of major disturbances.

Treatment/Disturbance	Name	WRI DB#	Date	Size (acres)
Aerator - Double Drum	Deep Creek Valley Sagebrush Improvement - Year 2	24	October-December 2005	194
Seeding - Truax Drill	Deep Creek Valley Sagebrush Improvement - Year 2	24	October-December 2005	444
Seeding - Aerial After	Deep Creek Valley Sagebrush Improvement - Year 2	24	December 2005	194

Wildlife Habitat and Vegetation History**Table 19R-02.3 - Wildlife Seasonal Habitat.** UDWR wildlife habitat and seasonality.

Species	Habitat	Season	Brood/Young Rearing
Greater Sage Grouse	occupied	year-long & Winter	brood-rearing
Pronghorn	crucial	year-long	

Table 19R-02.4 - 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/Annual Grass	NA
2008	Mountain Big Sagebrush	NA
2012	Mountain Big Sagebrush	NA
2017	Mountain Big Sagebrush/Annual Grass	NA

Site Notes

No Notes

Soils**Table 19R-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
Loam	7.1	37.7	39.1	23.2	1.2	9.2	198.4	0.4	07/18/2005

Site Potential

1981 - 2010 Average Annual Precipitation	10 inches
NRCS Ecological Site	Upland Loam (Mountain Big Sagebrush)
NRCS Ecological Site #	028AY310UT
States and Transitions	No state and transition model is available for this ecological site.

This site has existed as a mountain big sagebrush (*Artemisia tridentata* ssp. *vaseyana*) dominated plant community since study establishment in 2005. Although cover of sagebrush exhibited an initial decrease following a harrow treatment later that same year, it has since started to recover (Table 19R-02.12, Table 19R-02.13). The herbaceous understory is diverse and abundant, but a majority of the cover has been contributed by the introduced annual grass cheatgrass (*Bromus tectorum*) throughout the duration of the study; annual grasses were a co-dominant site component in 2005 and 2017. In addition, the introduced perennial grass bulbous bluegrass (*Poa bulbosa*) has been observed in each sample year with low cover (Table 19R-02.7, Table 19R-02.10). Forbs have remained rare (Table 19R-02.11).

Trend Summary Tables**Table 19R-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
2005	15.5	0.0	-	16.7	0.4	-
2008	8.2	0.0	-	8.9	0.4	-
2012	9.5	0.4	-	7.9	1.3	-
2017	10.8	0.4	-	11.3	0.6	-

Table 19R-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
2005	469	119	67	80	23.4	5.1	0.3	0.6
2008	433	161	20	99	9.8	2.1	0.0	0.6
2012	343	239	1	58	8.5	7.2	0.0	0.2
2017	474	251	39	122	38.8	9.0	0.1	1.6

Table 19R-02.8 - 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	17.0	2.9	45.6	4.0	0.2	44.9
2008	26.2	2.2	52.7	5.3	0.3	25.0
2012	31.5	0.8	53.2	2.3	0.0	27.6
2017	20.4	1.8	43.8	7.3	0.2	57.8

Table 19R-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	Coyote	Mule Deer/Pronghorn	Rocky Mountain Elk	Greater Sage- Grouse	Rabbit
	Quadrat Frequency					
2005	2	-	1	-	2	8
2008	-	-	1	-	3	50
2012	-	-	1	-	-	-
2017	4	-	3	-	-	8
Year	Days Use Per Acre (ha)					
2005	2.2 (5.4)	-	0.7 (1.7)	-	87.1 (215.2)*	-
2008	-	17.4 (43.0)*	8.1 (19.9)	-	104.5 (258.2)*	-
2012	5.1 (12.6)	-	9.4 (23.2)	-	-	-
2017	10.9 (26.9)	-	3.4 (8.3)	1.3 (3.3)	-	-

*Pellets per acre (ha)

Table 19R-02.10 - Grass Species. Nested frequency and modified Daubenmire average cover by year.

GRASS SPECIES	Achnatherum hymenoides (Indian ricegrass)	Achnatherum pinetorum (pine needlegrass)	Agropyron cristatum ⁱ (crested wheatgrass)	Bromus tectorum ^{ai} (cheatgrass)	Elymus elymoides (squirreltail)	Hesperostipa comata (needle and thread)	Pascopyrum smithii (western wheatgrass)	Poa bulbosa ⁱ (bulbous bluegrass)	Poa secunda (Sandberg bluegrass)	Psathyrostachys juncea ⁱ (Russian wildrye)	Pseudoroegneria spicata (bluebunch wheatgrass)	Vulpia octiflora ^a (sixweeks fescue)
year	Nested Frequency											
2005	-	-	-	469	20	8	-	5	96	-	-	21
2008	0	-	-	433	14	30	4	4	133	-	-	2
2012	20	-	3	343	-	13	4	19	189	-	31	-
2017	1	26	-	474	7	25	-	41	171	1	40	3
year	Average Cover (%)											
2005	-	-	-	23.3	0.5	0.5	-	0.4	3.7	-	-	0.0
2008	0.1	-	-	9.8	0.1	0.9	0.0	0.0	0.9	-	-	0.0
2012	1.1	-	0.1	8.5	-	0.2	0.1	0.5	4.8	-	0.5	-
2017	0.0	0.7	-	38.8	0.0	0.5	-	0.8	4.5	0.0	2.4	0.0

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

Table 19R-02.11 - Forb Species. Nested frequency and modified Daubenmire average cover by year.

FORB SPECIES	Achillea millefolium (Common yarrow)	Astragalus beckwithii (Beckwith's milkvech)	Ceratocephala testiculata ^{ai} (curvseed butterwort)	Chaenactis douglasii (Douglas' dustymaiden)	Crepis acuminata (tapertip hawk'sbeard)	Delphinium nuttallianum (twolobe larkspur)	Descurainia pinnata ^a (western tansymustard)	Erigeron pumilus (shaggy fleabane)	Erodium cicutarium ^{ai} (redstem stork's bill)	Gayophytum ramosissimum ^a (pinyon groundsmoke)	Lactuca serriola ^{ai} (prickly lettuce)	Lomatium (desertparsley)	Microsteris gracilis ^a (slender phlox)	Phlox hoodii (spiny phlox)	Phlox longifolia (longleaf phlox)	Pleiocanthus spinosus (thorn skeletonweed)	Sanguisorba minor ⁱ (small burnet)
year	Nested Frequency																
2005	-	6	11	1	3	1	-	-	-	2	1	17	55	2	64	0	-
2008	-	9	5	-	-	-	2	4	-	-	-	30	16	1	56	0	5
2012	1	3	-	-	-	-	-	-	-	-	-	3	1	-	39	5	6
2017	-	53	24	-	2	-	2	3	3	-	-	25	15	-	53	3	-
year	Average Cover (%)																
2005	-	0.1	0.0	0.0	0.0	0.0	-	-	-	0.0	0.0	0.1	0.2	0.0	0.3	0.0	-
2008	-	0.0	0.0	-	-	-	0.0	0.0	-	-	-	0.2	0.0	0.0	0.3	0.0	0.0
2012	0.0	0.0	-	-	-	-	-	-	-	-	-	0.0	0.0	-	0.1	0.0	0.0
2017	-	1.0	0.1	-	0.0	-	0.0	0.0	0.0	-	-	0.1	0.0	-	0.3	0.0	-

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

FORB SPECIES	
Zizadenus paniculatus (foothill deathcamas)	
year	Nested Frequency
2005	0
2008	7
2012	2
2017	5
year	Average Cover (%)
2005	0.0
2008	0.1
2012	0.0
2017	0.1

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

Table 19R-02.12 - 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)	Bassia prostrata ^{pi} (forage kochia)	Chrysothamnus viscidiflorus ssp. viscidiflorus var. stenophyllus (yellow rabbitbrush)	Gutierrezia sarothrae (broom snakeweed)
year	Line Intercept Cover (%)			
2005	16.7	-	0.4	-
2008	8.7	0.2	0.4	-
2012	7.6	0.3	1.3	-
2017	9.6	1.7	0.4	0.2
year	Quadrat Cover (%)			
2005	15.5	-	0.0	-
2008	8.1	0.2	0.0	-
2012	9.0	0.5	0.4	-
2017	9.5	1.2	0.4	0.0

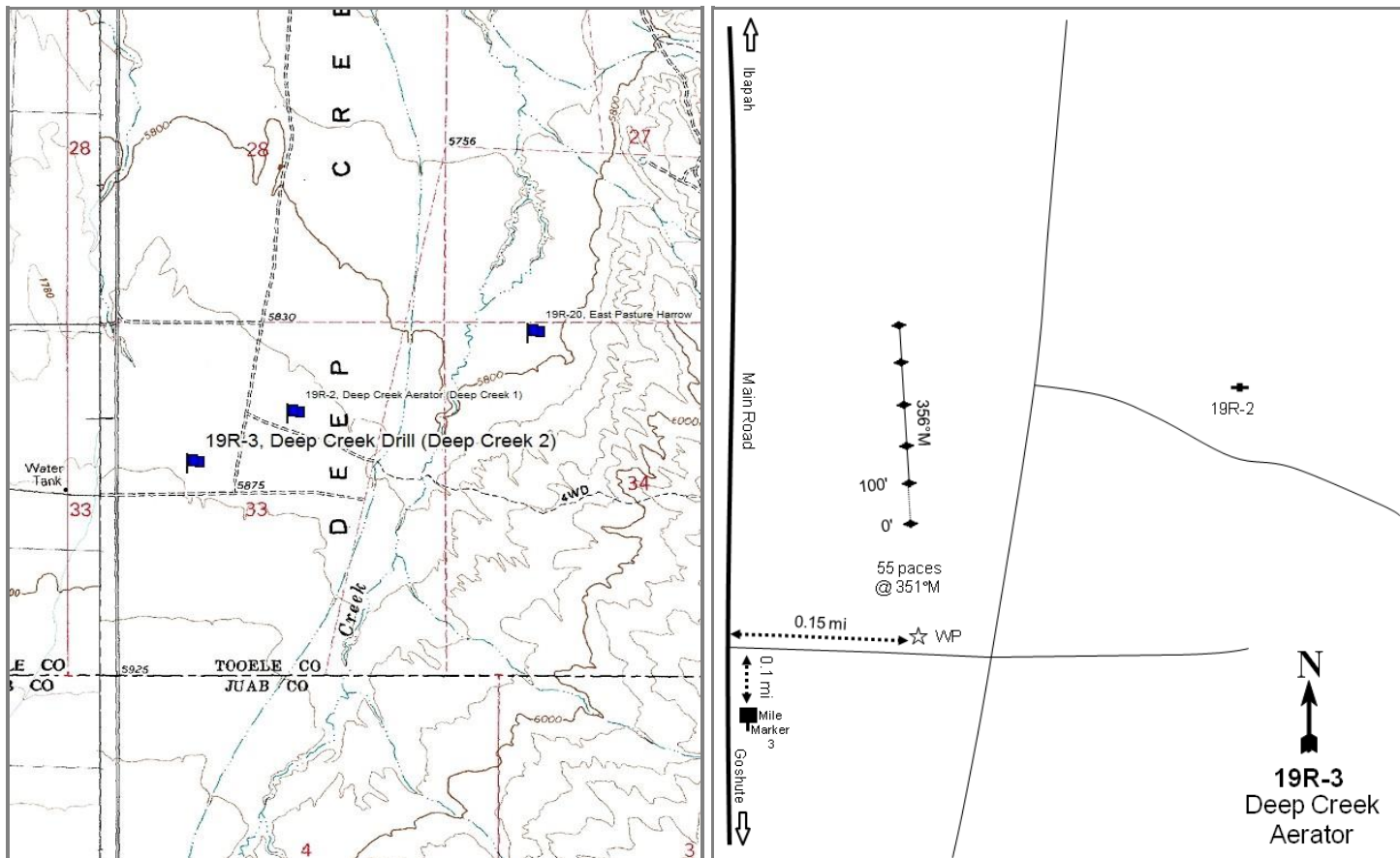
t - Tree Species; p - Preferred Browse; i - Introduced Species

Table 19R-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 (%)				
Artemisia tridentata ssp. vaseyana^P -- (mountain big sagebrush)									
2005	3780	-	1	47	53	10	1	24	65/86
2008	3620	200	6	46	48	3	0	45	44/73
2012	2880	-	13	60	27	2	0	42	42/67
2017	2720	-	7	68	25	3	0	31	48/80
Bassia prostrata^{Pi} -- (forage kochia)									
2005	-	-	-	-	-	-	-	-	-/-
2008	1040	560	60	33	8	6	14	0	13/17
2012	1500	-	4	96	0	43	39	1	6/11
2017	2040	-	5	95	0	35	36	0	13/23
Chrysothamnus viscidiflorus ssp. viscidiflorus var. stenophyllus -- (yellow rabbitbrush)									
2005	180	-	0	89	11	0	0	0	33/53
2008	240	-	0	58	42	0	0	8	32/56
2012	180	-	0	100	0	0	0	89	33/63
2017	240	-	0	67	33	0	0	8	34/58
Gutierrezia sarothrae -- (broom snakeweed)									
2005	-	-	-	-	-	-	-	-	-/-
2008	-	-	-	-	-	-	-	-	-/-
2012	-	-	-	-	-	-	-	-	13/27
2017	20	-	0	100	0	0	0	0	31/58
Opuntia -- (pricklypear)									
2005	20	-	0	100	0	0	0	0	14/36
2008	20	-	0	100	0	0	0	0	12/15
2012	-	-	-	-	-	-	-	-	11/18
2017	-	-	-	-	-	-	-	-	12/43
Pediocactus simpsonii -- (mountain ball cactus)									
2005	-	-	-	-	-	-	-	-	-/-
2008	-	-	-	-	-	-	-	-	-/-
2012	20	-	0	100	0	0	0	0	2/6

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

DEEP CREEK DRILL - STUDY NO. 19R-3



Location Information

USGS 7.5 min Map Info	Goshute SW; Township 10S, Range 19W, Section 33
GPS (0' Stake)	NAD 83 UTM ZONE 12, 243886 East 4422544 North

Transect Information

Browse Tag # (0' Stake)	78
Transect Bearing	356° 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 of Goshute toward Ibapah to mile marker 3. Drive north of the mile marker for 0.1 miles to a two-track road on the right (east) side of the road. Turn right and drive for 0.3 miles to a four-way intersection. Turn left at the intersection and continue for 0.05 miles to the witness post on the left (west) side of the road. From the witness post, walk 121 paces at 255 degrees magnetic to the 0-foot stake. The 0-foot stake is marked with browse tag #78.

Site Information

Land Ownership	Federal
Land Administrator	BLM
Allotment	IBAPAH
Elevation	5,850ft (1,783m)
Aspect	Northeast
Slope	1%
Sample Dates	07/19/2005, 07/22/2008, 07/17/2012, 06/26/2017

Table 19R-03.1 Disturbance History. Recorded history of major disturbances.

Treatment/Disturbance	Name	WRI DB#	Date	Size (acres)
Seeding - Truax Drill	Deep Creek Valley Sagebrush Improvement - Year 2	24	October-December 2005	389
Seeding - Aerial After	Deep Creek Valley Sagebrush Improvement - Year 2	24	December 2005	389

Wildlife Habitat and Vegetation History**Table 19R-03.3 - Wildlife Seasonal Habitat.** UDWR wildlife habitat and seasonality.

Species	Habitat	Season	Brood/Young Rearing
Greater Sage Grouse	occupied	year-long & Winter	brood-rearing
Pronghorn	crucial	year-long	

Table 19R-03.4 - 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	NA
2008	Mountain Big Sagebrush	NA
2012	Mountain Big Sagebrush	NA
2017	Mountain Big Sagebrush	NA

Site Notes

No Notes

Soils**Table 19R-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
Loam	6.9	44.1	37.7	18.2	2.4	10.0	249.6	0.5	07/19/2005

Site Potential

1981 - 2010 Average Annual Precipitation	10 inches
NRCS Ecological Site	Upland Loam (Mountain Big Sagebrush)
NRCS Ecological Site #	028AY310UT
States and Transitions	No state and transition model is available for this ecological site.

Since study establishment in 2005, mountain big sagebrush (*Artemisia tridentata* ssp. *vaseyana*) has been the dominant browse species on this study site, although forage kochia (*Bassia prostrata*) is present to a lesser extent. Although cover of sagebrush exhibited a decrease in the first sample year following treatment, it has since recovered and exceeded pre-treatment amounts in 2017 (Table 19R-03.12, Table 19R-03.13). The herbaceous understory has remained abundant and moderately diverse throughout the duration of the study. Perennial grasses, in particular the native species Sandberg bluegrass (*Poa secunda*) and introduced species crested wheatgrass (*Agropyron cristatum*), have been the most abundant herbaceous component in all sample years. The introduced annual species cheatgrass (*Bromus tectorum*) and perennial species bulbous bluegrass (*Poa bulbosa*) have been observed since study establishment, albeit in low amounts (Table 19R-03.7, Table 19R-03.10). Forbs have remained rare, with the introduced annual species curvseed butterwort (*Ceratocephala testiculata*) contributing the most cover in all years (Table 19R-03.11).

Trend Summary Tables

Table 19R-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
2005	11.6	-	-	12.5	-	-
2008	10.6	-	-	10.4	-	-
2012	9.1	-	-	11.8	-	-
2017	10.3	-	-	13.9	-	-

Table 19R-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
2005	207	330	318	21	1.9	15.9	4.1	0.1
2008	54	341	162	13	0.1	11.8	0.4	0.0
2012	10	367	2	12	0.0	17.5	0.0	0.3
2017	140	378	157	40	1.3	23.0	0.5	0.8

Table 19R-03.8 - 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	49.7	2.1	23.0	5.5	0.4	31.1
2008	41.6	1.7	38.7	6.3	0.4	27.3
2012	50.7	2.1	30.2	5.5	0.2	30.0
2017	47.4	6.5	31.8	6.6	0.2	35.1

Table 19R-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	Coyote	Mule Deer	Greater Sage-Grouse	Rabbit
	Quadrat Frequency				
2005	4	-	1	1	6
2008	3	-	-	-	35
2012	-	-	4	-	-
2017	3	-	-	1	5
Year	Days Use Per Acre (ha)				
2005	21.1 (52.0)	-	0.7 (1.7)	-	-
2008	2.2 (5.4)	17.4 (43.0)*	3.4 (8.3)	-	-
2012	1.5 (3.6)	-	4.7 (11.6)	8.7 (21.5)*	-
2017	16.7 (41.2)	-	2.0 (5.0)	-	-

*Pellets per acre (ha)

Table 19R-03.10 - Grass Species. Nested frequency and modified Daubenmire average cover by year.

GRASS SPECIES	<i>Achnatherum hymenoides</i> (Indian ricegrass)	<i>Agropyron cristatum</i> ⁱ (crested wheatgrass)	<i>Bromus tectorum</i> ⁱⁱ (cheatgrass)	<i>Elymus elymoides</i> (squirreltail)	<i>Poa bulbosa</i> ⁱ (bulbous bluegrass)	<i>Poa secunda</i> (Sandberg bluegrass)	<i>Pseudoroegneria spicata</i> (bluebunch wheatgrass)	<i>Vulpia octoflora</i> ^a (sixweeks fescue)
year	Nested Frequency							
2005	-	276	190	3	19	180	-	58
2008	-	261	54	-	20	241	3	2
2012	3	247	8	-	74	267	2	2
2017	-	294	128	-	82	201	6	26
year	Average Cover (%)							
2005	-	11.7	1.7	0.0	0.3	3.9	-	0.2
2008	-	9.6	0.1	-	0.1	2.0	0.0	0.0
2012	0.1	9.8	0.0	-	1.3	6.0	0.1	0.0

GRASS SPECIES									
Achnatherum hymenoides (Indian ricegrass)	-								
Agropyron cristatum ⁱ (crested wheatgrass)	15.5								
Bromus tectorum ^{ai} (cheatgrass)	1.2								
Elymus elymoides (squirreltail)	-								
Poa bulbosa ⁱ (bulbous bluegrass)	2.2								
Poa secunda (Sandberg bluegrass)	5.1								
Pseudoroegneria spicata (bluebunch wheatgrass)	0.2								
Vulpia octoflora ^a (sixweeks fescue)	0.1								

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

Table 19R-03.11 - Forb Species. Nested frequency and modified Daubenmire average cover by year.

FORB SPECIES										
Astragalus (milkvetch)										
Astragalus utahensis (Utah milkvetch)										
Castilleja (Indian paintbrush)										
Ceratocephala testiculata ^{ai} (curveseed butterwort)										
Gayophytum ramosissimum ^a (pinyon groundsmoke)										
Lomatium (desertparsley)										
Microsteris gracilis ^a (slender phlox)										
Phlox hoodii (spiny phlox)										
Phlox longifolia (longleaf phlox)										
Zigadenus paniculatus (foothill deathcamas)										
year	Nested Frequency									
2005	2	0	3	302	4	4	57	6	8	0
2008	-	-	-	159	-	-	11	1	13	-
2012	-	-	-	2	-	-	-	5	9	-
2017	-	-	3	143	-	12	37	5	18	2
year	Average Cover (%)									
2005	0.0	0.0	0.0	3.9	0.0	0.0	0.2	0.0	0.1	0.0
2008	-	-	-	0.4	-	-	0.0	0.0	0.0	-
2012	-	-	-	0.0	-	-	-	0.3	0.0	-
2017	-	-	0.0	0.3	-	0.0	0.1	0.3	0.2	0.1

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

Table 19R-03.12 - 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)	Bassia prostrata ^{pi} (forage kochia)
year	Line Intercept Cover (%)	
2005	12.5	-
2008	10.4	-
2012	11.7	0.1
2017	13.2	0.7
year	Quadrat Cover (%)	
2005	11.6	-
2008	10.5	0.0
2012	8.8	0.3
2017	9.7	0.5

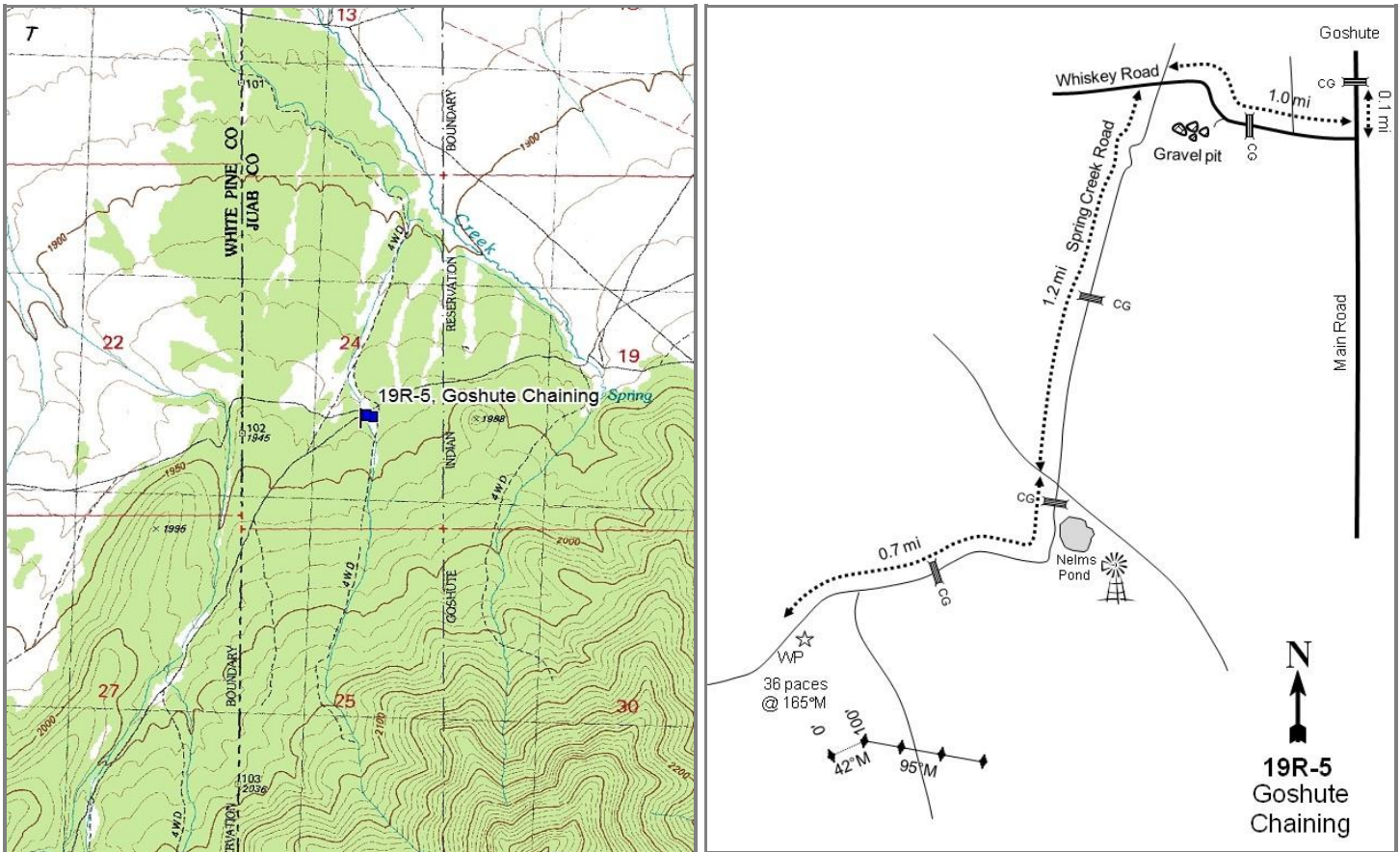
t - Tree Species; p - Preferred Browse; i - Introduced Species

Table 19R-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)									
2005	3220	1300	2	48	50	16	4	23	60/81
2008	3220	140	3	27	70	1	14	35	46/73
2012	3320	20	5	62	33	18	2	61	44/72
2017	3160	-	11	60	29	1	0	40	47/77
Bassia prostrata ^{pi} -- (forage kochia)									
2005	-	-	-	-	-	-	-	-	-/-
2008	80	220	100	0	0	0	50	0	6/8
2012	480	-	17	83	0	54	25	0	7/13
2017	740	-	14	87	0	16	51	0	12/25
Chrysothamnus viscidiflorus ssp. viscidiflorus var. stenophyllus -- (yellow rabbitbrush)									
2005	-	-	-	-	-	-	-	-	-/-
2008	-	-	-	-	-	-	-	-	-/-
2012	-	-	-	-	-	-	-	-	-/-
2017	-	-	-	-	-	-	-	-	39/70
Opuntia polyacantha -- (plains pricklypear)									
2005	-	-	-	-	-	-	-	-	-/-
2008	-	-	-	-	-	-	-	-	-/-
2012	-	-	-	-	-	-	-	-	-/-
2017	20	-	0	100	0	0	0	0	17/33

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

GOSHUTE CHAINING - STUDY NO. 19R-5



Location Information

USGS 7.5 min Map Info
GPS (0' Stake)

Weaver Canyon NE; Township 11S, Range 20W, Section 24
NAD 83 UTM ZONE 12, 239819 East 4415754 North

Transect Information

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

142
42° magnetic (Lines 2-4: 95° magnetic)
400ft
Line 1 (11ft & 71ft), Line 2 (34ft), Line 3 (95ft), Line 4 (59ft)
Standard

Directions to Site

Driving south on the main road from Ibapah, continue to the turnoff to McCurdy Road and proceed south to the first cattle guard. From the cattle guard, drive 0.6 miles to Whiskey Road. Turn right (west) onto Whiskey Road and drive for 0.1 miles to Tempi Poli Lane. Continue on Whiskey Road for approximately 0.7 miles to a gravel pit. Continue 0.2 miles to a junction. Turn left (southwest) at the junction and drive 0.7 miles to a cattle guard. From the cattle guard, drive 0.5 miles to a junction, cattle guard & sign that reads "Nelms Pond." Continue straight on the road for 0.5 miles, passing a windmill, to another cattle guard. From the cattle guard, drive 0.1 miles to a junction and continue straight for 0.1 miles to a witness post on the left (south) side of the road. Walk 36 paces from the witness post at 165 degrees magnetic to the 0-foot stake marked with browse tag #142.

Site Information

Land Ownership	Tribal
Land Administrator	Tribal
Allotment	No data
Elevation	6,400ft (1,951m)
Aspect	Northwest
Slope	2-6%
Sample Dates	06/20/2006, 07/17/2012, 06/22/2017

Table 19R-05.1 Disturbance History. Recorded history of major disturbances.

Treatment/Disturbance	Name	WRI DB#	Date	Size (acres)
Chaining - Two-Way Ely/Smooth	Discretionary Seed for Goshute Reservation Pinyon Juniper Chaining Project	354	May-December 2006	776
Seeding - Aerial Before	Discretionary Seed for Goshute Reservation Pinyon Juniper Chaining Project	354	November 2006	776
Seeding - Dribbler	Discretionary Seed for Goshute Reservation Pinyon Juniper Chaining Project	354	December 2006	776

Wildlife Habitat and Vegetation History**Table 19R-05.3 - Wildlife Seasonal Habitat.** UDWR wildlife habitat and seasonality.

Species	Habitat	Season	Brood/Young Rearing
Greater Sage Grouse	occupied	year-long & Winter	brood-rearing
Pronghorn	crucial	year-long	

Table 19R-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	Pinyon-Juniper	Phase III
2012	Perennial Grass	Phase I
2017	Perennial Grass/Black Sagebrush	Phase I

Site Notes

No Notes

Soils**Table 19R-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 Clay Loam	7.5	64.7	9.4	25.8	4.1	13.8	265.6	0.8	06/19/2006

Site Potential

1981 - 2010 Average Annual Precipitation	11 inches
NRCS Ecological Site	Upland Shallow Loam (Black Sagebrush)
NRCS Ecological Site #	028AY318UT
States and Transitions	No state and transition model is available for this ecological site.

This study site was a Phase III singleleaf pinyon (*Pinus monophylla*) and Utah juniper (*Juniperus osteosperma*) woodland with black sagebrush (*Artemisia nova*) as a minor component upon establishment in 2006 (Table 19R-05.4, Table 19R-05.12, Table 19R-05.13, Table 19R-05.14). A chaining and seeding treatment later that year removed most of the tree component, and in 2012 the site transitioned to one dominated by perennial grasses, mainly the introduced species crested wheatgrass (*Agropyron cristatum*) and the native species Sandberg bluegrass (*Poa secunda*) and bluebunch wheatgrass (*Pseudoroegneria spicata*) (Table 19R-05.7, Table 19R-05.10). Black sagebrush cover exceeded pre-treatment amounts in 2017, and it became co-dominant with perennial grasses. Although the original treatment did reduce the amount of pinyon and juniper on site, density and cover for both species increased between 2012 and 2017, indicating the potential for infilling in the future (Table 19R-05.12, Table 19R-05.14).

Trend Summary Tables

Table 19R-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	5.8	0.5	9.3	7.1	0.5	25.0
2012	3.0	0.8	0.9	4.8	1.7	1.8
2017	4.4	1.2	2.3	7.9	2.4	4.0

Table 19R-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	6	262	37	183	0.0	4.9	0.1	3.0
2012	149	266	1	110	3.2	12.9	0.0	1.3
2017	109	319	124	192	1.8	12.8	0.7	2.9

Table 19R-05.8 - 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
2006	35.6	7.8	31.3	19.8	0.6	19.9
2012	25.3	0.0	55.4	6.8	0.7	24.9
2017	20.1	0.0	47.3	10.9	1.1	30.6

Table 19R-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	Rocky Mountain Elk	Horse	Rabbit
	Quadrat Frequency				
2006	1	3	4	-	28
2012	2	-	1	2	-
2017	1	6	10	3	3
Year	Days Use Per Acre (ha)				
2006	2.2 (5.4)	2.7 (6.6)	3.4 (8.3)	-	-
2012	5.1 (12.6)	0.7 (1.7)	0.7 (1.7)	4.0 (10.0)	-
2017	47.9 (118.4)	4.0 (9.9)	12.8 (31.5)	18.0 (44.5)	-

Table 19R-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 ^{at} (field brome)	Bromus tectorum ^{at} (cheatgrass)	Dactylis glomerata ⁱ (orchardgrass)	Elymus elymoides (squirreltail)	Hesperostipa comata (needle and thread)	Leymus cinereus (basin wildrye)	Pascopyrum smithii (western wheatgrass)	Poa secunda (Sandberg bluegrass)	Psathyrostachys juncea ⁱ (Russian wildrye)	Pseudoroegneria spicata (bluebunch wheatgrass)	Thinopyrum intermedium ⁱ (intermediate wheatgrass)
year	Nested Frequency												
2006	-	-	-	6	-	-	-	-	12	259	-	25	-
2012	25	112	-	149	-	2	1	5	21	151	2	41	18
2017	33	187	7	103	3	-	6	0	4	93	7	102	42
year	Average Cover (%)												
2006	-	-	-	0.0	-	-	-	-	0.1	4.4	-	0.4	-
2012	0.8	5.5	-	3.2	-	0.0	0.0	0.1	0.4	3.3	0.0	1.4	1.2
2017	0.8	6.1	0.0	1.7	0.0	-	0.2	0.1	0.0	1.2	0.2	3.2	1.0

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

Table 19R-05.11 - Forb Species. Nested frequency and modified Daubenmire average cover by year.

FORB SPECIES	Alyssum desertorum ^{ai} (desert madwort)	Antennaria (pussytoes)	Arabis (rockcress)	Arenaria (sandwort)	Asteraceae (null)	Astragalus (milkvetch)	Astragalus calycosus (Torrey's milkvetch)	Astragalus convallarius (lesser rushy milkvetch)	Camelina microcarpa ^{ai} (littelpod false flax)	Castilleja (Indian paintbrush)	Ceratocephala testiculata ^{ai} (curveseed butterwort)	Collinsia parviflora ^a (maiden blue eyed Mary)	Comandra umbellata (bastard toadflax)	Crepis acuminata (tapertip hawksbeard)	Cryptantha (cryptantha)	Draba ^a (draba)	Erigeron (fleabane)
year	Nested Frequency																
2006	-	-	4	47	2	4	3	3	-	-	33	4	-	0	35	-	2
2012	-	6	-	15	-	-	4	-	-	-	-	1	-	-	35	-	-
2017	1	4	-	5	-	-	18	2	4	13	81	38	8	-	66	7	19
year	Average Cover (%)																
2006	-	-	0.0	0.2	0.0	0.0	0.0	0.0	-	-	0.1	0.0	-	0.0	0.3	-	0.0
2012	-	0.1	-	0.1	-	-	0.2	-	-	-	-	0.0	-	-	0.7	-	-
2017	0.0	0.0	-	0.0	-	-	0.1	0.0	0.0	0.2	0.5	0.1	0.0	-	0.7	0.0	0.1

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

FORB SPECIES	Eriogonum ovalifolium (cushion buckwheat)	Eriogonum umbellatum (sulphur-flower buckwheat)	Lappula occidentalis ^{ai} (flatspine stickseed)	Lesquerella (bladderpod)	Machaeranthera canescens (hoary tansyaster)	Medicago sativa ⁱ (alfalfa)	Packera multilobata (lobeleaf groundsel)	Phlox austromontana (mountain phlox)	Phlox longifolia (longleaf phlox)	Pleiocanthus spinosus (thorn skeletonweed)	Sanguisorba minor ⁱ (small burnet)	Townsendia (Townsend daisy)	Tragopogon dubius ^{ai} (yellow salsify)	Vicia americana (American vetch)
year	Nested Frequency													
2006	3	5	-	1	-	-	-	48	27	1	-	2	-	54
2012	6	1	-	-	-	6	8	37	20	12	-	-	-	11
2017	3	1	2	-	4	2	-	42	17	11	1	-	3	61
year	Average Cover (%)													
2006	0.0	0.0	-	0.0	-	-	-	0.3	0.1	0.0	-	0.0	-	1.8
2012	0.0	0.0	-	-	-	0.0	0.0	0.1	0.0	0.1	-	-	-	0.0
2017	0.0	0.0	0.0	-	0.0	0.0	-	0.5	0.1	0.2	0.1	-	0.0	0.6

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

Table 19R-05.12 - 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)	Chrysothamnus viscidiflorus ssp. viscidiflorus var. stenophyllus (yellow rabbitbrush)	Ericameria nauseosa (rubber rabbitbrush)	Gutierrezia sarothrae (broom snakeweed)	Juniperus osteosperma ^t (Utah juniper)	Linanthus pungens (granite prickly phlox)	Pinus monophylla ^t (singleleaf pinyon)
year	Line Intercept Cover (%)							
2006	6.3	0.8	0.2	-	-	17.1	0.3	7.9
2012	4.8	0	1.2	0.1	0.1	1.8	0.3	-
2017	7.9	-	2	0.2	0.1	3.9	0.1	0.1
year	Quadrat Cover (%)							
2006	5.3	0.5	0.2	-	-	6.9	0.3	2.3
2012	2.9	0.0	0.7	0.0	0.0	0.9	0.0	-
2017	4.4	-	0.8	0.0	0.3	2.2	0.0	0.1

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

Table 19R-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 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)									
2006	4180	120	4	65	31	0	0	23	25/42
2012	3240	3640	41	50	9	7	1	35	26/51
2017	3740	20	18	80	3	13	29	9	27/52
Artemisia tridentata ssp. vaseyana^p -- (mountain big sagebrush)									
2006	180	-	0	78	22	0	0	67	79/168
2012	60	120	33	67	0	0	0	0	33/32
2017	40	-	0	100	0	50	0	0	52/62
Chrysothamnus viscidiflorus ssp. viscidiflorus var. stenophyllus -- (yellow rabbitbrush)									
2006	200	-	20	80	0	0	0	10	26/34
2012	460	-	17	74	9	0	0	30	28/50
2017	580	-	28	72	0	0	0	0	26/51
Ericameria nauseosa -- (rubber rabbitbrush)									
2006	-	-	-	-	-	-	-	-	-/-
2012	20	-	0	100	0	0	0	0	56/73
2017	20	-	0	100	0	0	0	100	49/51
Gutierrezia sarothrae -- (broom snakeweed)									
2006	-	-	-	-	-	-	-	-	-/-
2012	40	-	0	100	0	0	0	0	24/30
2017	240	200	25	75	0	0	0	0	16/23
Juniperus osteosperma^t -- (Utah juniper)									
2006	520	400	65	35	0	0	0	8	-/-
2012	580	40	90	7	3	0	0	3	-/-
2017	860	60	49	51	0	0	0	0	-/-
Linanthus pungens -- (granite prickly phlox)									
2006	580	-	0	93	7	0	0	3	20/21
2012	540	20	7	85	7	0	0	85	21/33
2017	220	-	9	91	0	0	0	0	21/26
Pediocactus simpsonii -- (mountain ball cactus)									
2006	-	-	-	-	-	-	-	-	2/3
2012	-	-	-	-	-	-	-	-	-/-
2017	-	-	-	-	-	-	-	-	-/-

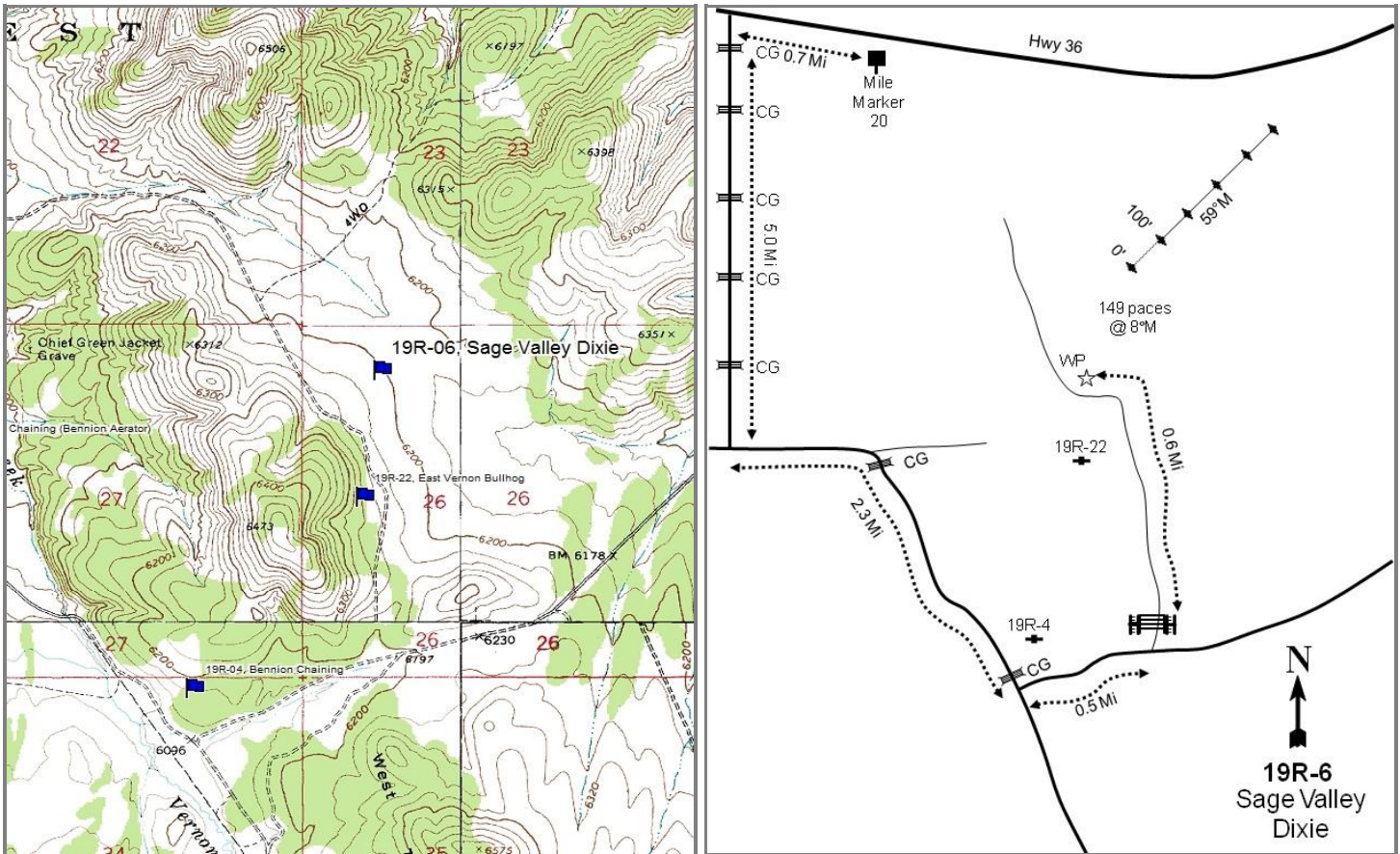
Year	Density		Age Class Distribution			Utilization		Poor Vigor (%)	Average Height Crown (cm)
	Plants Per Acre		Excluding Seedlings			Moderate (%)	Heavy (%)		
	Excluding Seedlings	Seedling	Young (%)	Mature (%)	Decadent (%)				
Pinus monophylla ^t -- (singleleaf pinyon)									
2006	180	180	67	22	11	0	0	11	- / -
2012	-	-	-	-	-	-	-	-	- / -
2017	80	80	100	0	0	0	0	0	- / -
Purshia stansburiana ^p -- (Stansbury cliffrose)									
2006	-	-	-	-	-	-	-	-	- / -
2012	-	-	-	-	-	-	-	-	30/36
2017	-	-	-	-	-	-	-	-	58/47

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

Table 19R-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)							
2006	390	5	40	30	-	25	12.3
2012	196	12	88	-	-	-	5.2
2017	397	24	71	6	-	-	7.9
Pinus monophylla (singleleaf pinyon)							
2006	218	22	56	6	-	17	5.2
2012	25	83	17	-	-	-	1.7
2017	21	29	71	-	-	-	2.1

SAGE VALLEY DIXIE - STUDY NO. 19R-6

**Location Information**

USGS 7.5 min Map Info
GPS (0' Stake)

Vernon SE; Township 9S, Range 5W, Section 26
NAD 83 UTM ZONE 12, 382215 East 4429773 North

Transect Information

Browse Tag # (0' Stake)	154
Transect Bearing	59° magnetic
Length	500ft
Belt Placement	Line 1 (11ft), Line 2 (34ft), Line 3 (59ft), Line 4 (71ft), Line 5 (95ft)
Belt Marker Placement	No Rebar

Directions to Site

From Highway 36 south of Vernon, drive to mile marker 20. From there, drive 0.7 miles to a turnoff on the left (west). Turn left and drive south for 5.0 miles, passing several (4 or 5) cattle guards, to a fork. Turn left and drive 0.7 miles to an intersection. Turn right (south), crossing a cattle guard, and drive 1.6 miles to another cattle guard. Directly after the cattle guard turn left (east) and drive 0.5 miles to a road and gate on the left. Turn and go through the gate and continue for 0.6 miles to a witness post on the right (northeast) side of the road. Walk 149 paces at 8 degrees magnetic to the 0- foot stake marked with browse tag #154.

Site Information

Land Ownership	Federal
Land Administrator	USFS
Allotment	BENNION
Elevation	6,200ft (1,890m)
Aspect	Northeast
Slope	2-5%
Sample Dates	06/21/2006, 07/02/2008, 06/04/2012, 06/29/2017

Table 19R-06.1 Disturbance History. Recorded history of major disturbances.

Treatment/Disturbance	Name	WRI DB#	Date	Size (acres)
Harrow - Two-Way Dixie	Sage Valley/Vernon sagebrush enhancement-Year 1	291	October-November 2006	162
Seeding - Broadcast Before	Sage Valley/Vernon sagebrush enhancement-Year 1	291	October-November 2006	162

Wildlife Habitat and Vegetation History**Table 19R-06.3 - Wildlife Seasonal Habitat.** UDWR wildlife habitat and seasonality.

Species	Habitat	Season	Brood/Young Rearing
Deer	crucial	spring/fall	
Greater Sage Grouse	occupied	year-long & Winter	brood-rearing

Table 19R-06.4 - 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	Phase I
2008	Perennial Grass	Phase I
2012	Yellow Rabbitbrush/Mountain Big Sagebrush	Phase I
2017	Yellow Rabbitbrush/Mountain Big Sagebrush	Phase I

Site Notes

No Notes

Soils**Table 19R-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
Silt Loam	7.3	32.2	56.0	11.8	2.5	20.3	336.0	0.8	06/19/2006

Site Potential

1981 - 2010 Average Annual Precipitation	16 inches
NRCS Ecological Site	Upland Loam (Mountain Big Sagebrush)
NRCS Ecological Site #	028AY310UT
States and Transitions	No state and transition model is available for this ecological site.

When established prior to treatment in 2006, this study site was dominated by mountain big sagebrush (*Artemisia tridentata* ssp. *vaseyana*). However, a harrow and seeding treatment later that year removed much of the sagebrush (Table 19R-06.12, Table 19R-06.13), and perennial grasses dominated the site in 2008 (Table 19R-06.7). Sagebrush began to recover in 2012, and became co-dominant with the more abundant shrub species yellow rabbitbrush (*Chrysothamnus viscidiflorus* ssp. *viscidiflorus* var. *viscidiflorus*): both species have remained co-dominant as of the 2017 sample year. The herbaceous understory has continued to remain diverse, abundant, and mainly comprised of a mixture of perennial grasses (Table 19R-06.10, Table 19R-06.11).

Trend Summary Tables

Table 19R-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
2006	14.3	5.0	0.0	21.2	5.8	-
2008	2.2	6.1	-	2.9	7.3	-
2012	4.8	8.8	-	4.5	10.7	-
2017	5.3	9.2	-	6.6	11.5	-

Table 19R-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
2006	79	324	276	120	0.5	12.2	1.4	2.1
2008	108	332	201	172	1.3	17.1	1.5	2.7
2012	119	379	271	157	1.3	22.0	1.6	4.5
2017	68	374	402	187	1.0	20.6	8.5	7.3

Table 19R-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
2006	50.1	0.1	33.9	1.0	0.1	29.0
2008	42.0	-	38.4	2.1	0.5	31.0
2012	19.7	0.0	45.7	1.0	0.2	41.0
2017	34.5	0.6	32.7	2.3	0.1	46.6

Table 19R-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	Rocky Mountain Elk	Rabbit
	Quadrat Frequency			
2006	2	-	-	76
2008	1	-	-	52
2012	5	-	-	2
2017	8	5	-	8
Year	Days Use Per Acre (ha)			
2006	4.4 (10.8)	-	-	-
2008	-	-	-	-
2012	37.7 (93.2)	0.7 (1.7)	-	-
2017	47.2 (116.6)	2.0 (5.0)	0.7 (1.7)	-

Table 19R-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 inermis ⁱ (smooth brome)	Bromus tectorum ^{ai} (cheatgrass)	Elymus elymoides (squirreltail)	Hesperotipa comata (needle and thread)	Leymus cinereus (basin wildrye)	Pascopyrum smithii (western 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												
2006	4	101	110	79	9	-	-	170	-	41	-	-	4
2008	1	68	103	108	13	7	-	173	0	84	0	3	42
2012	22	83	106	119	6	10	-	152	10	103	1	39	70
2017	-	123	122	68	8	-	0	39	53	85	3	109	45
year	Average Cover (%)												
2006	0.0	3.9	3.1	0.5	0.3	-	-	3.3	-	1.5	-	-	0.2
2008	0.0	4.2	2.2	1.3	0.4	0.2	-	7.4	0.0	1.4	0.0	0.0	1.3
2012	0.7	5.5	2.5	1.3	0.1	0.2	-	6.0	0.1	2.4	0.1	1.8	2.6
2017	-	5.3	4.4	1.0	0.4	-	0.0	1.0	2.0	1.4	0.1	3.9	2.1

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

Table 19R-06.11 - 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)	Astragalus cibirius (browse milkvetch)	Astragalus convallarius (lesser rushy milkvetch)	Carduus nutans ^{ai} (nodding plumeless thistle)	Ceratocephala testiculata ^{ai} (curvseed butterwort)	Chaenactis douglasii (Douglas' dustymaiden)	Collinsia parviflora ^a (maiden blue eyed Mary)	Crepis acuminata (tapertip hawksbeard)	Ipomopsis congesta (ballhead ipomopsis)	Linum perenne ⁱ (blue flax)	Microsteris gracilis ^a (slender phlox)	Phlox austromontana (mountain phlox)	Phlox longifolia (longleaf phlox)	Trifolium (clover)	Vicia americana (American vetch)
year	Nested Frequency																
2006	-	2	225	14	4	-	112	3	5	5	-	-	69	38	26	3	44
2008	-	-	181	-	17	-	36	1	1	19	3	10	12	30	81	-	79
2012	8	-	190	9	8	-	162	-	16	21	0	3	11	34	30	-	70
2017	4	12	361	12	24	2	201	3	23	11	-	7	29	33	61	-	95
year	Average Cover (%)																
2006	-	0.0	0.7	0.2	0.2	-	0.5	0.0	0.0	0.1	-	-	0.2	1.2	0.1	0.0	0.3
2008	-	-	1.3	-	0.3	-	0.1	0.1	0.0	0.4	0.0	0.3	0.0	0.2	0.9	-	0.6
2012	0.9	-	0.5	0.1	0.2	-	1.0	-	0.0	0.6	0.0	0.0	0.0	1.4	0.1	-	1.2
2017	0.5	0.4	6.0	0.1	0.4	0.0	2.3	0.0	0.1	0.5	-	0.2	0.1	1.0	1.1	-	3.1

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

Table 19R-06.12 - 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)	Chrysothamnus viscidiflorus ssp. viscidiflorus var. viscidiflorus (yellow rabbitbrush)	Pinus edulis ^t (twoneedle pinyon)
year	Line Intercept Cover (%)		
2006	21.2	5.8	-
2008	2.9	7.3	-
2012	4.5	10.7	-
2017	6.6	11.5	-
year	Quadrat Cover (%)		
2006	14.3	5.0	0.0
2008	2.2	6.1	-
2012	4.8	8.8	-
2017	5.3	9.2	-

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

Table 19R-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.

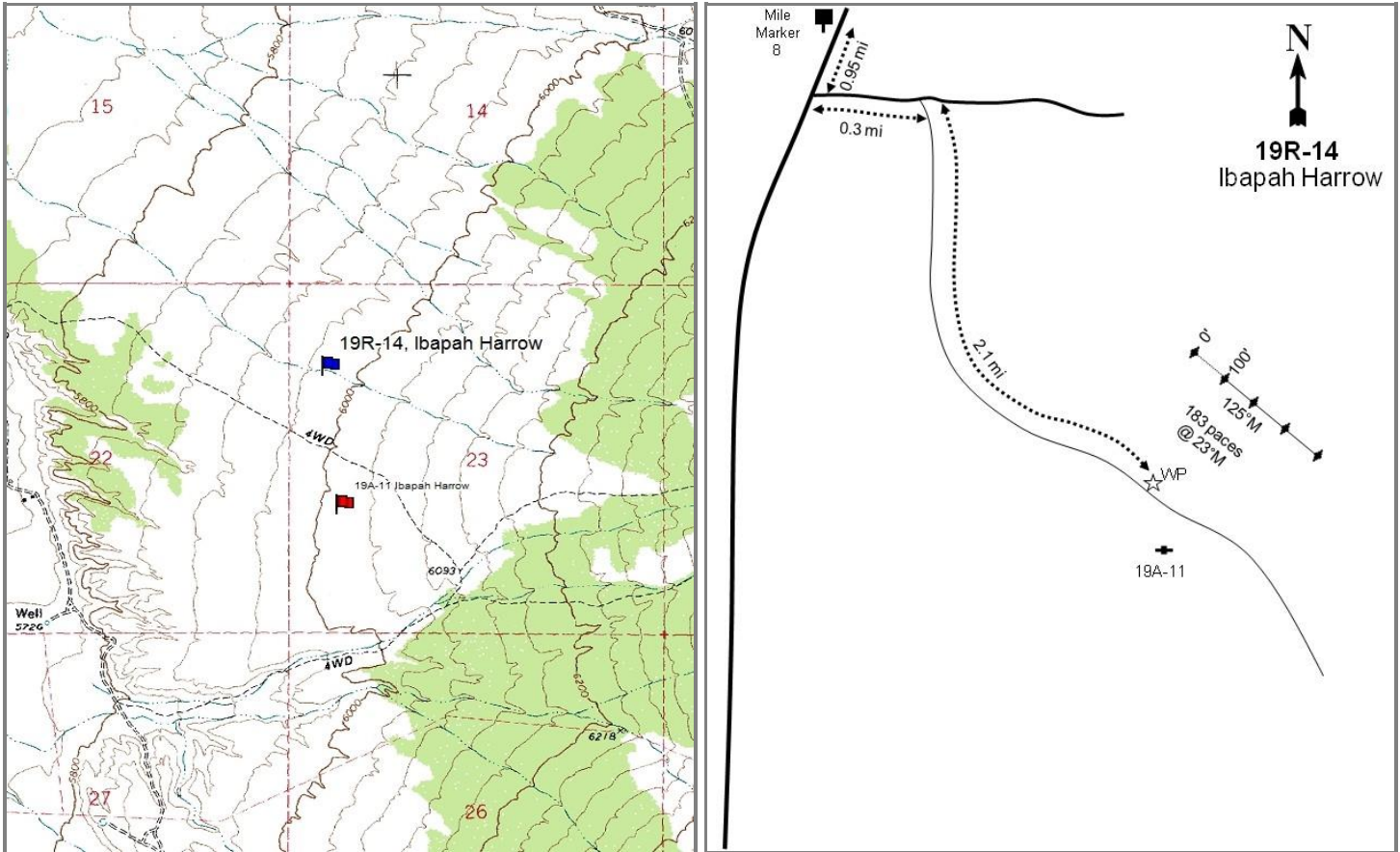
Year	Density		Age Class Distribution			Utilization		Poor Vigor (%)	Average Height Crown (cm)
	Plants Per Acre		Excluding Seedlings			Moderate (%)	Heavy (%)		
	Excluding Seedlings	Seedling	Young (%)	Mature (%)	Decadent (%)				
Artemisia tridentata ssp. vaseyana ^p -- (mountain big sagebrush)									
2006	3440	760	8	69	23	13	0	22	63/81
2008	1660	40	17	69	14	2	0	35	41/55
2012	1520	20	17	82	1	20	0	3	48/59
2017	1800	-	1	96	3	28	1	2	53/67
Chrysothamnus viscidiflorus ssp. viscidiflorus var. viscidiflorus -- (yellow rabbitbrush)									
2006	4660	-	8	90	2	1	0	1	28/40
2008	4180	80	2	95	3	0	0	0	29/47
2012	4100	-	8	90	2	1	0	0	35/62
2017	5240	-	5	89	6	1	0	3	37/61
Tetradymia canescens -- (spineless horsebrush)									
2006	-	-	-	-	-	-	-	-	30/32
2008	-	-	-	-	-	-	-	-	24/37
2012	-	-	-	-	-	-	-	-	31/57
2017	-	-	-	-	-	-	-	-	32/52

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

Table 19R-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)							
2017	6	-	33	67	-	-	8.0

IBAPAH HARROW - STUDY NO. 19R-14



Location Information

USGS 7.5 min Map Info
GPS (0' Stake)

Goshute NW; Township 10S, Range 19W, Section 23
NAD 83 UTM ZONE 12, 246872 East 4425936 North

Transect Information

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

237
125° magnetic
400ft
Line 1 (11ft & 95ft), Line 2 (34ft), Line 3 (59ft), Line 4 (71ft)
No Rebar

Directions to Site

From Ibapah, proceed south to mile marker 8 and continue 0.95 miles to a road on the left (0.05 miles before mile marker 7). Driving east, go 0.3 miles to a road on the right that follows a ridge line. Continue for 0.3 miles to a fenced pasture and drive 0.7 miles to a fork, keeping left. Proceed for 0.2 miles to another fork and stay left. Follow the road for 0.2 miles to where the road forks and then meets up again. Drive 0.3 miles to the next fork, keep left, and continue for 0.4 miles to the witness post on the left (north) side of the road. The 0-foot stake is 183 paces from the witness post at 23 degrees magnetic and is marked with browse tag #237.

Site Information

Land Ownership	Federal
Land Administrator	BLM
Allotment	IBAPAH
Elevation	5,900ft (1,798m)
Aspect	West
Slope	4%
Sample Dates	07/21/2008, 07/17/2012, 06/27/2017

Table 19R-14.1 Disturbance History. Recorded history of major disturbances.

Treatment/Disturbance	Name	WRI DB#	Date	Size (acres)
Harrow - Two-Way Dixie	Ibapah Sagebrush Improvement - Year 2	1104	October 2008	134
Seeding - Broadcast Before	Ibapah Sagebrush Improvement - Year 2	1104	October 2008	134

Table 19R-14.2 Seed Mix. List of known seeded plant species and rates (if available).

Mix Name			Application Type	Application Date	Acres
Ibapah Harrow - Year 2			Broadcast	Oct 2008	120
Type	Species	Common Name	Cultivar/Source ID	Bulk lbs/acre	PLS lbs/acre
G	<i>Achnatherum hymenoides</i>	Indian Ricegrass	Rimrock	1.00	0.92
G	<i>Agropyron cristatum</i>	Crested Wheatgrass	Douglas	1.00	0.78
G	<i>Agropyron cristatum</i>	Crested Wheatgrass	Hycrest	1.00	0.91
G	<i>Elymus wawawaiensis</i>	Snake River Wheatgrass	Secar	1.00	0.76
G	<i>Pascopyrum smithii</i>	Western Wheatgrass	Arriba	1.00	0.94
G	<i>Psathyrostachys juncea</i>	Russian Wildrye	Bozoisky	1.00	0.85
G	<i>Pseudoroegneria spicata</i>	Bluebunch Wheatgrass	Anatone	1.00	0.71
G	<i>Thinopyrum intermedium</i>	Pubescent Wheatgrass	Luna	1.00	0.88
F	<i>Achillea millefolium</i>	Western Yarrow		0.10	0.10
F	<i>Linum perenne</i>	Blue Flax	Appar	0.50	0.45
F	<i>Medicago sativa</i>	Alfalfa	Ladak	1.00	0.95
F	<i>Medicago sativa</i>	Alfalfa	Ranger	1.00	0.92
F	<i>Onobrychis viciifolia</i>	Sainfoin	Eski	2.00	1.75
F	<i>Sanguisorba minor</i>	Small Burnet	Delar	2.00	1.85

Wildlife Habitat and Vegetation History**Table 19R-14.3 - Wildlife Seasonal Habitat.** UDWR wildlife habitat and seasonality.

Species	Habitat	Season	Brood/Young Rearing
Elk	crucial	winter	
Greater Sage Grouse	occupied	year-long & Winter	brood-rearing
Pronghorn	crucial	year-long	
Rocky Mountain Bighorn	substantial	year-long	

Table 19R-14.4 - Vegetation History. The dominant vegetation type(s) and phase of woodland succession (Tausch, Miller, Roundy, & Chambers, 2009).

Year	Vegetation Type	Woodland Succession
2008	Mountain Big Sagebrush	No Encroachment
2012	Perennial-Annual Grass/Mountain Big Sagebrush	No Encroachment
2017	Perennial Grass/Mountain Big Sagebrush	No Encroachment

Site Notes

In 2017, it was noted that some sagebrush (*Artemisia tridentata* ssp. *vaseyana*) had galls and/or were slightly chlorotic.

Site Potential

1981 - 2010 Average Annual Precipitation	11 inches
NRCS Ecological Site	Upland Loam (Mountain Big Sagebrush)
NRCS Ecological Site #	028AY310UT
States and Transitions	No state and transition model is available for this ecological site.

Mountain big sagebrush (*Artemisia tridentata* ssp. *vaseyana*) has dominated this site since study establishment prior to a harrow and seeding treatment in 2008. Cover of sagebrush had decreased as of the first post-treatment sampling, but exhibited an increase in 2017 (Table 19R-14.12, Table 19R-14.13). The herbaceous understory increased in both diversity and abundance following treatment, with perennial grasses -- namely the introduced species crested wheatgrass (*Agropyron cristatum*) and the native species Sandberg bluegrass (*Poa secunda*) -- as a co-dominant site component in 2012 and 2017. The introduced grass species cheatgrass (*Bromus tectorum*) increased following treatment, and was also co-dominant in 2012: cover was nearly equal that of perennial grasses. In addition, the introduced perennial species bulbous bluegrass (*Poa bulbosa*) was observed for the first time in 2017, but in low amounts (Table 19R-14.7, Table 19R-14.10). Forbs have remained rare in comparison to the rest of the understory (Table 19R-14.11).

Trend Summary Tables

Table 19R-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
2008	10.7	0.4	-	19.5	0.3	-
2012	3.8	1.0	-	6.2	0.8	-
2017	6.8	2.3	-	7.2	2.7	-

Table 19R-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
2008	66	210	279	112	0.2	2.9	0.9	1.5
2012	231	274	3	133	11.4	14.0	0.0	2.3
2017	250	343	350	108	5.0	20.1	3.9	1.2

Table 19R-14.8 - 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
2008	48.7	5.5	28.9	12.1	0.6	15.7
2012	39.1	0.1	36.4	4.0	2.0	30.8
2017	38.9	0.4	40.6	5.8	1.3	37.6

Table 19R-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	Rocky Mountain Elk	Rabbit
	Quadrat Frequency			
2008	-	5	3	26
2012	-	2	3	3
2017	1	-	2	10
Days Use Per Acre (ha)				
2008	2.9 (7.2)	1.3 (3.3)	4.7 (11.6)	-
2012	0.7 (1.8)	6.7 (16.6)	4.0 (9.9)	-
2017	5.1 (12.6)	1.3 (3.3)	5.3 (13.2)	-

Table 19R-14.10 - Grass Species. Nested frequency and modified Daubenmire average cover by year.

GRASS SPECIES	Achnatherum hymenoides (Indian ricegrass)	Agropyron cristatum ⁱ (crested wheatgrass)	Bromus tectorum ⁿⁱ (cheatgrass)	Elymus elymoides (squirreltail)	Hesperostipa comata (needle and thread)	Pascopyrum smithii (western wheatgrass)	Poa bulbosa ⁱ (bulbous bluegrass)	Poa fendleriana (muttongrass)	Poa secunda (Sandberg bluegrass)	Psathyrostachys juncea ^a (Russian wildrye)	Pseudoroegneria spicata (bluebunch wheatgrass)	Thinopyrum intermedium ⁱ (intermediate wheatgrass)
year	Nested Frequency											
2008	28	3	66	-	-	-	-	5	196	-	1	-
2012	49	149	231	1	-	10	-	5	181	-	26	18
2017	33	214	250	3	5	16	8	9	183	3	57	2
year	Average Cover (%)											
2008	1.1	0.0	0.2	-	-	-	-	0.1	1.6	-	0.0	-
2012	2.0	6.1	11.4	0.0	-	0.1	-	0.0	4.1	-	1.1	0.5
2017	1.2	11.2	5.0	0.0	0.1	0.3	0.4	0.1	3.2	0.0	3.5	0.0

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

Table 19R-14.11 - Forb Species. Nested frequency and modified Daubenmire average cover by year.

FORB SPECIES	Alyssum desertorum ^{ai} (desert madwort)	Astragalus (milkvetch)	Astragalus beckwithii (Beckwith's milkvetch)	Astragalus newberryi (Newberry's milkvetch)	Balsamorhiza hookeri (Hooker's balsamroot)	Camelina microcarpa ^{ai} (littlepod false flax)	Castilleja linariifolia (Wyoming Indian paintbrush)	Ceratocephala testiculata ^{ai} (curveseed butterwort)	Crepis acuminata (tapertip hawksbeard)	Cryptantha (cryptantha)	Erigeron pumilus (shaggy fleabane)	Eriogonum brevicaulis (shortstem buckwheat)	Gilia inconspicua ^a (shy gilia)	Linum perenne ⁱ (blue flax)	Machaeranthera grindelioides (rayless tansyaster)	Medicago sativa ⁱ (alfalfa)	Phlox hoodii (spiny phlox)
year	Nested Frequency																
2008	1	3	-	-	10	-	21	279	-	12	5	-	4	-	-	-	27
2012	-	-	-	-	16	-	-	3	1	11	5	2	-	19	1	3	30
2017	-	1	3	3	6	2	12	350	-	31	-	-	-	2	-	6	15
year	Average Cover (%)																
2008	0.0	0.0	-	-	0.4	-	0.2	0.9	-	0.2	0.1	-	0.0	-	-	-	0.4
2012	-	-	-	-	0.2	-	-	0.0	0.0	0.3	0.2	0.0	-	0.3	0.0	0.0	0.7
2017	-	0.0	0.1	0.0	0.2	0.0	0.2	3.9	-	0.4	-	-	-	0.0	-	0.0	0.1

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

FORB SPECIES	Phlox longifolia (longleaf phlox)	Sanguisorba minor ⁱ (small burnet)	Sphaeralcea coccinea (scarlet globemallow)	Zigadenus paniculatus (foothill deathcamas)
year	Nested Frequency			
2008	55	-	-	3
2012	60	13	5	1
2017	34	4	2	3
year	Average Cover (%)			
2008	0.2	-	-	0.0
2012	0.4	0.2	0.0	0.0
2017	0.2	0.1	0.0	0.0

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

Table 19R-14.12 - 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)	19.5	-	-	0.3
Artemisia tridentata ssp. wyomingensis ^p (Wyoming big sagebrush)	3.8	2.4	0.1	0.7	-
Chrysothamnus viscidiflorus ssp. viscidiflorus var. stenophyllus (yellow rabbitbrush)	7.2	-	0.3	2.4	-
Gutierrezia sarothrae (broom snakeweed)	Quadrat Cover (%)				
Linanthus pungens (granite prickly phlox)	10.7	-	-	0.4	0.0
	2.3	1.5	0.0	1.0	0.0
	6.8	-	0.0	2.3	-

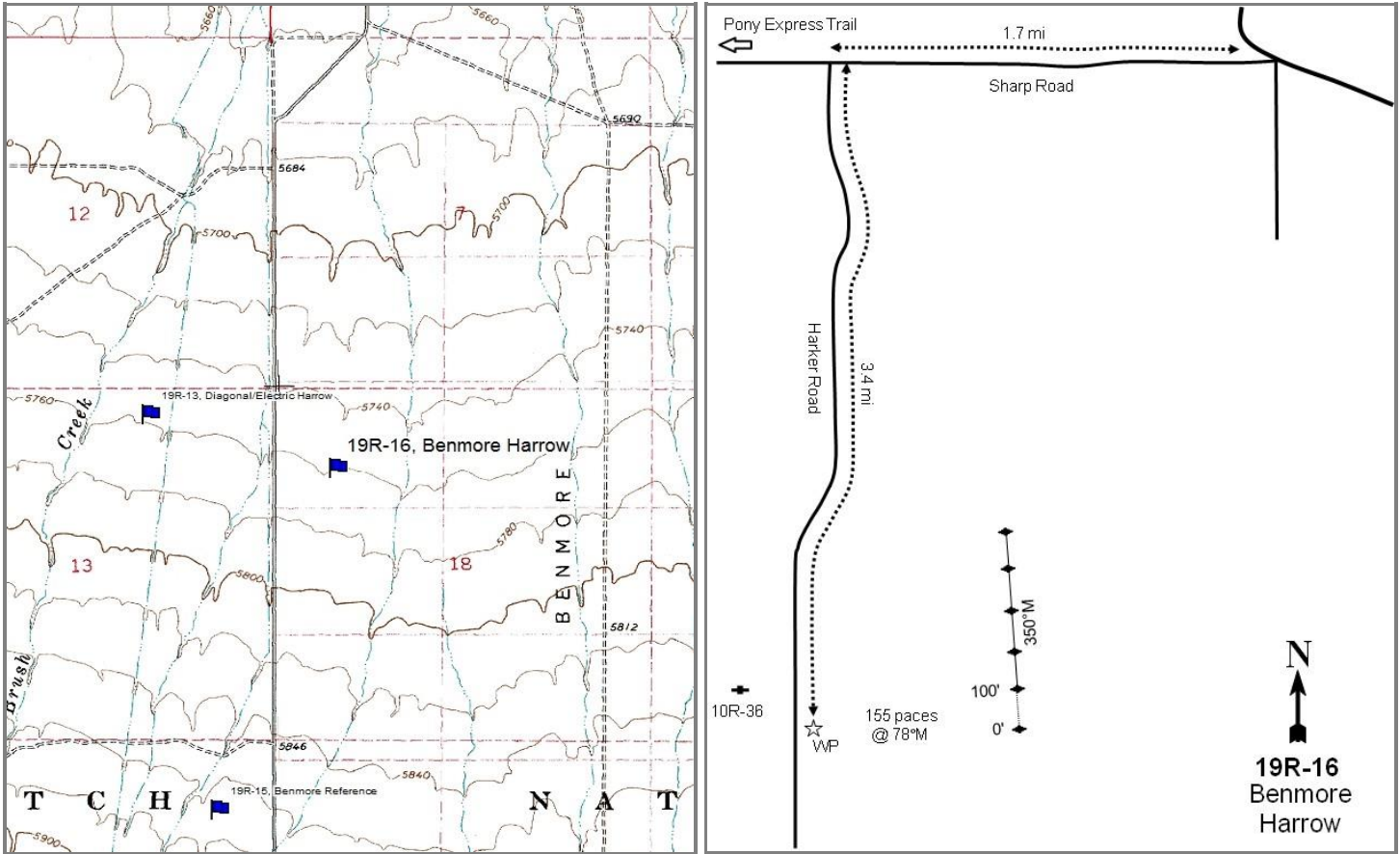
t - Tree Species; p - Preferred Browse; i - Introduced Species

Table 19R-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)									
2008	-	-	-	-	-	-	-	-	-/-
2012	20	-	0	100	0	0	0	0	-/-
2017	-	-	-	-	-	-	-	-	-/-
Artemisia tridentata ssp. vaseyana ^p -- (mountain big sagebrush)									
2008	6480	100	1	9	90	10	37	45	34/66
2012	1540	-	1	60	39	8	0	9	31/51
2017	2420	-	3	86	12	1	0	14	32/53
Artemisia tridentata ssp. wyomingensis ^p -- (Wyoming big sagebrush)									
2008	-	-	-	-	-	-	-	-	-/-
2012	1180	20	10	53	37	15	3	49	34/64
2017	-	-	-	-	-	-	-	-	-/-
Chrysothamnus viscidiflorus ssp. viscidiflorus var. stenophyllus -- (yellow rabbitbrush)									
2008	20	-	0	0	100	0	0	0	15/15
2012	40	-	0	100	0	0	0	0	20/36
2017	760	-	32	66	3	0	0	3	21/32
Gutierrezia sarothrae -- (broom snakeweed)									
2008	1520	-	4	78	18	0	0	5	17/18
2012	1340	60	9	91	0	0	0	3	17/23
2017	3180	100	22	78	0	0	0	0	20/27
Linanthus pungens -- (granite prickly phlox)									
2008	140	20	14	57	29	0	0	0	25/27
2012	100	-	20	60	20	0	0	60	16/20
2017	40	-	0	100	0	0	0	0	16/17

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

BENMORE HARROW - STUDY NO. 19R-16



Location Information

USGS 7.5 min Map Info
GPS (0' Stake)

Vernon SW; Township 9S, Range 5W, Section 18
NAD 83 UTM ZONE 12, 375744 East 4432965 North

Transect Information

Browse Tag # (0' Stake)	N/A
Transect Bearing	350° 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 Vernon, drive for 1.7 miles on Sharp Road (leads to the Pony Express Trail). Turn left onto Harker Road and continue for 1.0 miles to a fork. Stay left and drive 0.9 miles to another fork. Keep to the right and drive for 1.5 miles to the witness post on the east side of the road. From the witness post, walk 155 paces at 78 degrees magnetic to the 0-foot stake.

Site Information

Land Ownership	Federal
Land Administrator	USFS
Allotment	BENMORE
Elevation	5,699ft (1,737m)
Aspect	Northwest
Slope	2%
Sample Dates	07/21/2009, 06/04/2012, 06/06/2017

Table 19R-16.1 Disturbance History. Recorded history of major disturbances.

Treatment/Disturbance	Name	WRI DB#	Date	Size (acres)
Harrow - Two-Way Chain	Benmore Pastures Dixie Harrow Project	1361	October-December 2009	731
Seeding - Broadcast Before	Benmore Pastures Dixie Harrow Project	1361	October-December 2009	731

Wildlife Habitat and Vegetation History**Table 19R-16.3 - Wildlife Seasonal Habitat.** UDWR wildlife habitat and seasonality.

Species	Habitat	Season	Brood/Young Rearing
Greater Sage Grouse	occupied	year-long & Winter	brood-rearing
Pronghorn	crucial	year-long	

Table 19R-16.4 - 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	NA
2012	Perennial Grass	NA
2017	Perennial Grass/Mountain Big Sagebrush	NA

Site Notes

No Notes

Site Potential

1981 - 2010 Average Annual Precipitation	12 inches
NRCS Ecological Site	Upland Loam (Mountain Big Sagebrush)
NRCS Ecological Site #	028AY310UT
States and Transitions	No state and transition model is available for this ecological site.

When established in 2009, this study site was dominated by mountain big sagebrush (*Artemisia tridentata* ssp. *vaseyana*). A harrow and seeding project later that year removed much of the sagebrush cover, but by the 2017 sample year it began to recover and again became a dominant site component; recruitment of young plants has increased overall from pre-treatment levels (Table 19R-16.12, Table 19R-16.13). Perennial grasses, particularly the introduced species crested wheatgrass (*Agropyron cristatum*) and bulbous bluegrass (*Poa bulbosa*), have been abundant in all sample years and were also dominant vegetation components in 2012 and 2017 (Table 19R-16.7, Table 19R-16.10). Forbs were common in 2009 and 2017, but much of the cover was contributed by the introduced and weedy annual species curvseed butterwort (*Ceratocephala testiculata*) (Table 19R-16.11).

Trend Summary Tables

Table 19R-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
2009	6.1	0.8	-	7.9	1.6	-
2012	2.3	0.4	-	2.1	0.5	-
2017	3.7	1.7	-	4.2	0.7	-

Table 19R-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
2009	-	323	332	1	-	13.0	10.9	0.0
2012	4	422	360	81	0.0	30.5	1.7	2.4
2017	-	399	444	43	-	35.7	18.5	0.3

Table 19R-16.8 - 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
2009	52.3	3.3	25.1	1.6	0.1	29.4
2012	26.5	0.0	39.3	1.1	0.3	38.8
2017	35.2	0.0	33.4	1.2	0.1	48.5

Table 19R-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	Greater Sage-Grouse	Rabbit
	Quadrat Frequency			
2009	11	2	-	64
2012	-	4	1	7
2017	7	3	-	23
Year	Days Use Per Acre (ha)			
2009	-	-	-	-
2012	-	0.7 (1.7)	95.8 (236.7)*	-
2017	47.9 (118.4)	-	-	-

*Pellets per acre (ha)

Table 19R-16.10 - Grass Species. Nested frequency and modified Daubenmire average cover by year.

GRASS SPECIES	Agropyron cristatum ⁱ (crested wheatgrass)	Bromus tectorum ^{ai} (cheatgrass)	Elymus wawawaiensis (Snake River wheatgrass)	Pascopyrum smithii (western wheatgrass)	Poa bulbosa ⁱ (bulbous bluegrass)	Poa secunda (Sandberg bluegrass)	Pseudoroegneria spicata (bluebunch wheatgrass)	Thinopyrum intermedium ⁱ (intermediate wheatgrass)
year	Nested Frequency							
2009	307	-	-	-	-	70	-	-
2012	236	4	-	66	305	100	51	25
2017	269	-	3	117	303	-	64	5
year	Average Cover (%)							
2009	11.7	-	-	-	-	1.3	-	-
2012	15.5	0.0	-	2.7	7.2	1.8	1.7	1.6
2017	18.7	-	0.1	4.7	9.1	-	3.1	0.0

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

Table 19R-16.11 - Forb Species. Nested frequency and modified Daubenmire average cover by year.

FORB SPECIES									
Alyssum desertorum ^{ai} (desert madwort)									
Astragalus cibaricus (browse milkvetch)									
Calochortus nuttallii (sego lily)									
Ceratocephala testiculata ^{ai} (curvseed butterwort)									
Comandra umbellata (bastard toadflax)									
Linum perenne ⁱ (blue flax)									
Medicago sativa ⁱ (alfalfa)									
Onobrychis vicifolia ⁱ (sainfoin)									
Sanguisorba minor ⁱ (small burnet)									
year	Nested Frequency								
2009	56	1	-	329	-	-	-	-	-
2012	317	7	2	198	1	34	3	31	12
2017	236	2	1	431	-	30	7	5	-
year	Average Cover (%)								
2009	0.3	0.0	-	10.6	-	-	-	-	-
2012	0.7	0.2	0.0	1.0	0.0	1.1	0.0	0.7	0.3
2017	1.7	0.0	0.0	16.8	-	0.1	0.2	0.0	-

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

Table 19R-16.12 - 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 (yellow rabbitbrush)				
Ericameria nauseosa (rubber rabbitbrush)				
Gutierrezia sarothrae (broom snakeweed)				
year	Line Intercept Cover (%)			
2009	7.9	-	-	1.6
2012	2.1	-	0.1	0.4
2017	4.2	-	0.7	0
year	Quadrat Cover (%)			
2009	6.1	0.0	-	0.8
2012	2.3	-	0.3	0.1
2017	3.7	-	1.1	0.6

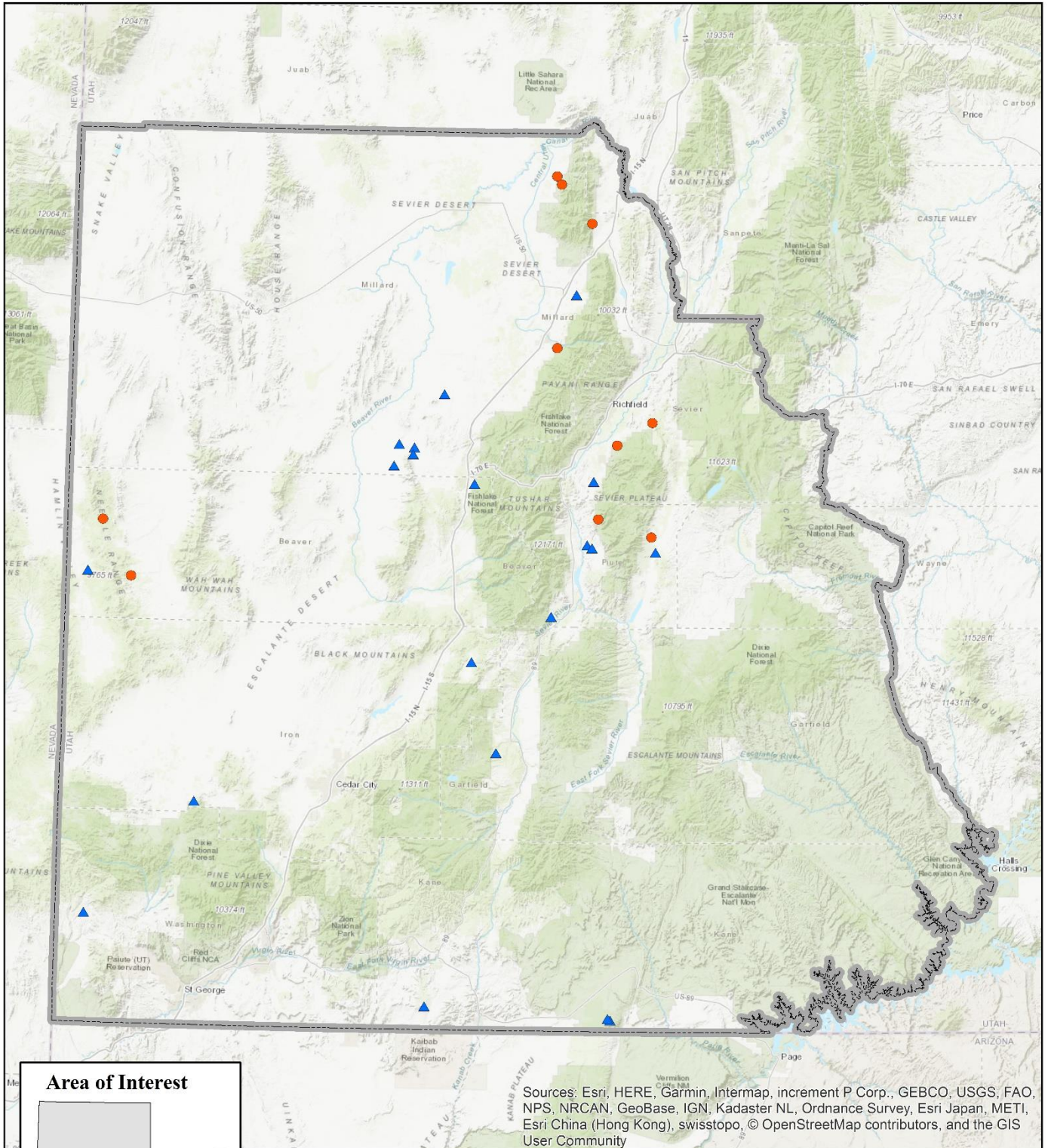
t - Tree Species; p - Preferred Browse; i - Introduced Species

Table 19R-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.

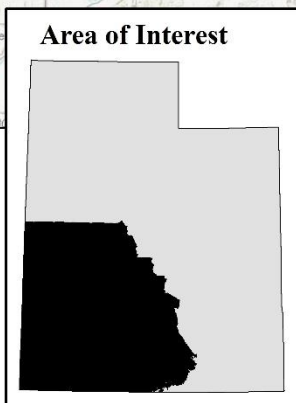
Year	Density		Age Class Distribution			Utilization		Poor Vigor (%)	Average Height Crown (cm)
	Plants Per Acre		Excluding Seedlings			Moderate (%)	Heavy (%)		
	Excluding Seedlings	Seedling	Young (%)	Mature (%)	Decadent (%)				
Artemisia tridentata ssp. vaseyana^P -- (mountain big sagebrush)									
2009	-	-	-	-	-	-	-	-	63/75
2012	2540	260	76	23	2	4	0	0	31/32
2017	2600	140	27	73	0	5	0	0	40/40
Chrysothamnus viscidiflorus -- (yellow rabbitbrush)									
2009	-	-	-	-	-	-	-	-	50/70
2012	-	-	-	-	-	-	-	-	-/-
2017	-	-	-	-	-	-	-	-	-/-
Ericameria nauseosa -- (rubber rabbitbrush)									
2009	-	-	-	-	-	-	-	-	33/34
2012	120	-	0	100	0	0	0	0	39/37
2017	200	-	10	90	0	10	10	0	48/58
Gutierrezia sarothrae -- (broom snakeweed)									
2009	-	-	-	-	-	-	-	-	23/26
2012	140	-	29	71	0	0	0	0	23/28
2017	920	-	35	65	0	0	0	0	17/19

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

SOUTHERN REGION

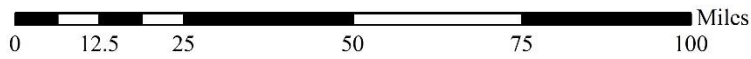
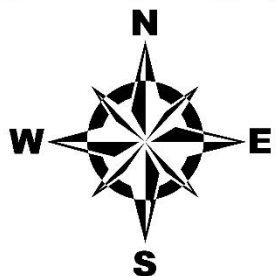


Sources: Esri, HERE, Garmin, Intermap, increment P Corp., GEBCO, USGS, FAO, NPS, NRCAN, GeoBase, IGN, Kadaster NL, Ordnance Survey, Esri Japan, METI, Esri China (Hong Kong), swisstopo, © OpenStreetMap contributors, and the GIS User Community

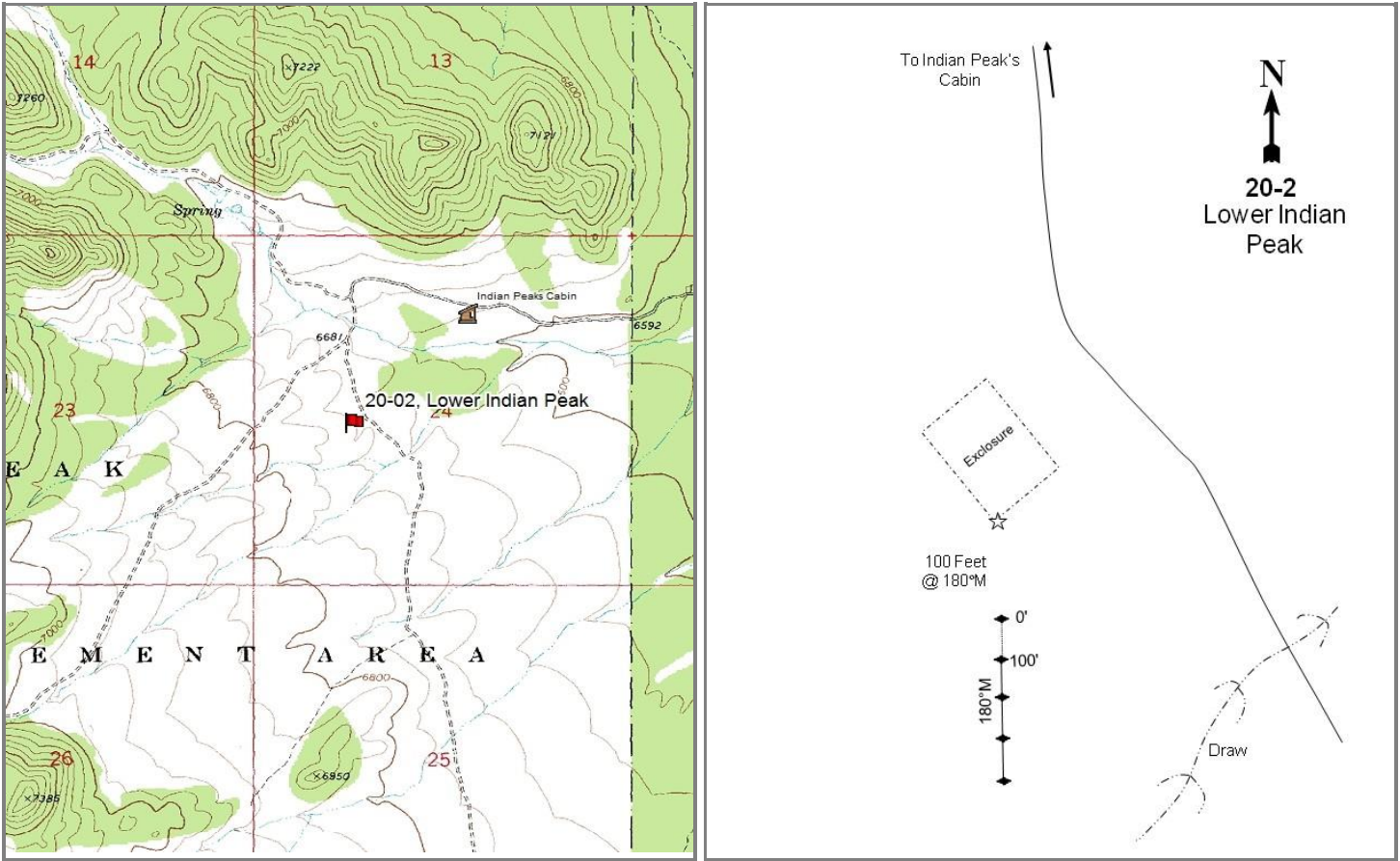


Project

- ▲ WRI
- RT
- Southern Region Boundaries



LOWER INDIAN PEAK - STUDY NO. 20-2



Location Information

USGS 7.5 min Map Info
GPS (0' Stake)

Buckhorn Spring SW; Township 29S, Range 18W, Section 24
NAD 83 UTM ZONE 12, 253679 East 4239627 North

Transect Information

Browse Tag # (0' Stake)	7076
Transect Bearing	180° magnetic
Length	400ft
Belt Placement	Line 1 (11ft & 95ft), Line 2 (71ft), Line 3 (59ft), Line 4 (59ft)
Belt Marker Placement	Belt 1: 6ft, Belt 3: 8ft, Belt 5: 1ft

Directions to Site

From the Indian Peaks state cabin, travel 0.4 miles west to a fork, then turn left and cross the stream. Continue for 0.1 miles and turn left at the fork, then go 0.3 miles to an exclosure, which is about 180 feet off the right side of the road. The 0-foot stake is 100 feet south and in line with the fence of the southwest corner of the exclosure. The 0-foot stake is a rebar with browse tag #7076.

Site Information

Land Ownership	State
Land Administrator	UDWR
Allotment	No data
Elevation	6,710ft (2,045m)
Aspect	East
Slope	8-10%
Sample Dates	06/10/1998, 07/02/2003, 06/16/2008, 06/28/2012, 06/12/2017

Table 20-02.1 Disturbance History. Recorded history of major disturbances.

Treatment/Disturbance	Name	WRI DB#	Date	Size (acres)
Chaining - Chain Unknown	-	-	1959	100
Seeding - Rangeland Drill	-	-	1959	100
Hand Crew - Lop and Scatter	Indian Peaks WMA Lop and Scatter	1784	May-June 2011	930

Wildlife Habitat and Vegetation History**Table 20-02.3 - Wildlife Seasonal Habitat.** UDWR wildlife habitat and seasonality.

Species	Habitat	Season
Deer	substantial	year-long
Elk	substantial	year-long

Table 20-02.4 - Vegetation History. The dominant vegetation type(s) and phase of woodland succession (Tausch, Miller, Roundy, & Chambers, 2009).

Year	Vegetation Type	Woodland Succession
1985	Sagebrush/Perennial Grass	Phase I
1991	Sagebrush/Perennial Grass	Phase I
1998	Sagebrush/Perennial Grass	Phase I
2003	Sagebrush/Perennial Grass	Phase I
2008	Sagebrush/Perennial Grass	Phase I
2012	Sagebrush/Perennial Grass	Phase I
2017	Sagebrush/Perennial Grass	Phase I

Site Notes

There is an ephemeral stream approximately 0.25 miles from the study site.

Soils**Table 20-02.5 - 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 Loam	6.4	64.0	17.4	18.6	2.1	12.7	99.2	0.6	06/10/1998

Site Potential

1981 - 2010 Average Annual Precipitation	16 inches
NRCS Ecological Site	Upland Shallow Loam (Black Sagebrush)
NRCS Ecological Site #	R028AY325UT
States and Transitions	No state and transition model is available for this ecological site.

When this site was established in 1985, it was a sagebrush and perennial grass plant community. Black sagebrush (*Artemisia nova*) is the dominant browse species on the site with mountain big sagebrush (*A. tridentata* ssp. *vaseyana*) and broom snakeweed (*Gutierrezia sarothrae*) as lesser components (Table 20-02.12). Black sagebrush cover has increased in the two sample years following the lop and scatter treatment (Table 20-02.1, Table 20-02.12). Perennial grasses are diverse and abundant, with crested wheatgrass (*Agropyron cristatum*) being the dominant species (Table 20- 02.10). The forb community for this site is not diverse and is fairly sparse (Table 20-02.11). Post-treatment tree cover and density of Utah juniper (*Juniperus osteosperma*) and singleleaf pinyon (*Pinus monophylla*) have decreased from pre-treatment levels (Table 20-02.12, Table 20-02.14). The site is considered to be in Phase I of woodland succession as of the 2017 sample year (Table 20-02.4), although there may be potential for infilling in future years.

Trend Summary Tables

Table 20-02.6 - 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
1998	6.6	0.4	3.9	-	-	-
2003	8.3	0.2	4.8	5.4	0.4	6.3
2008	6.9	0.5	6.9	6.8	0.5	10.4
2012	6.7	0.4	2.3	6.1	0.3	2.6
2017	7.6	1.3	2.3	7.9	1.2	3.3

Table 20-02.7 - 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
1998	202	328	55	20	2.9	16.9	0.2	0.4
2003	37	220	52	10	0.3	5.6	0.2	0.2
2008	190	243	11	10	1.3	11.6	0.0	0.2
2012	223	255	10	16	2.6	15.9	0.0	0.1
2017	247	289	39	23	5.3	16.3	0.1	0.3

Table 20-02.8 - 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
1998	21.4	1.2	36.9	10.7	13.1	34.1
2003	27.5	0.6	34.2	14.8	13.3	19.4
2008	15.8	0.2	38.2	14.6	13.7	27.8
2012	25.6	0.1	38.7	3.8	11.9	26.8
2017	25.3	0.1	37.7	7.5	13.5	34.7

Table 20-02.9 - 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	Rocky Mountain Elk	Horse	Rabbit
	Quadrat Frequency				
1998	-	3	8	-	23
2003	-	4	36	-	57
2008	-	8	16	-	87
2012	-	8	14	-	31
2017	-	14	12	-	53
Year	Days Use Per Acre (ha)				
1998	5.8 (14.3)	6.7 (16.6)	16.1 (39.7)	0.6 (1.4)	-
2003	-	10.7 (26.5)	44.2 (109.2)	-	-
2008	-	10.7 (26.5)	26.8 (66.2)	-	-
2012	1.5 (3.6)	10.0 (24.8)	9.4 (23.2)	-	-
2017	-	22.1 (54.6)	6.7 (16.6)	1.7 (4.3)	-

Table 20-02.10 - 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 inermis ⁱ (smooth brome)	Bromus tectorum ^{ai} (cheatgrass)	Elymus elymoides (squirreltail)	Elymus lanceolatus (thickspike wheatgrass)	Hesperostipa comata (needle and thread)	Pascopyrum smithii (western wheatgrass)	Poa bulbosa ⁱ (bulbous bluegrass)	Poa fendleriana (muttongrass)	Poa secunda (Sandberg bluegrass)	Psathyrostachys juncea ⁱ (Russian wildrye)	Sporobolus cryptandrus (sand dropseed)	Thinopyrum intermedium ⁱ (intermediate wheatgrass)
year	Nested Frequency															
1998	-	262	8	1	50	202	12	1	3	-	27	8	23	9	-	32
2003	1	174	15	-	6	37	-	1	7	-	44	-	4	5	-	18
2008	1	216	9	-	14	190	11	-	-	-	15	16	8	11	1	18
2012	-	174	-	7	13	223	1	-	-	-	16	3	74	3	-	74
2017	-	223	28	4	33	247	4	-	10	5	43	-	12	12	-	42
year	Average Cover (%)															
1998	-	12.7	0.1	0.0	1.3	2.9	0.7	0.0	0.0	-	0.3	0.2	0.3	0.1	-	1.3
2003	0.0	3.9	0.1	-	0.0	0.3	-	0.0	0.2	-	1.0	-	0.0	0.0	-	0.3
2008	0.0	9.4	0.3	-	0.2	1.3	0.1	-	-	-	0.2	0.1	0.1	0.8	0.0	0.4
2012	-	9.5	-	0.2	0.2	2.6	0.0	-	-	-	1.1	0.1	1.4	0.0	-	3.4
2017	-	9.6	1.1	0.1	0.9	5.3	0.0	-	0.1	0.1	1.9	-	0.1	0.3	-	2.1

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

Table 20-02.11 - Forb Species. Nested frequency and modified Daubenmire average cover by year.

FORB SPECIES	Astragalus (milkvech)	Astragalus cibaricus (browse milkvech)	Calochortus nuttallii (sego lily)	Chaetopappa ericoides (rose heath)	Collinsia parviflora ^a (maiden blue eyed Mary)	Cymopterus (springparsley)	Draba ^a (draba)	Erigeron pumilus (shaggy fleabane)	Gilia inconspicua ^a (shy gilia)	Lappula occidentalis ^a (flatspine stickseed)	Navarretia intertexta ^a (needleleaf navarretia)	Orobanche fasciculata (clustered broomrape)	Packera multilobata (lobeleaf groundsel)	Penstemon linarioides ssp. sileri (Siler's penstemon)	Phlox austromontana (mountain phlox)	Sphaeralcea coccinea (scarlet globemallow)	Streptanthus cordatus (heartleaf twistflower)
year	Nested Frequency																
1998	-	-	-	2	-	2	39	3	19	1	-	-	1	-	10	2	-
2003	-	2	-	-	-	-	-	-	50	-	2	-	-	-	4	1	3
2008	3	-	-	-	-	-	1	-	3	7	-	-	-	-	5	2	-
2012	4	-	-	-	-	4	-	-	-	10	-	-	-	-	6	2	-
2017	-	-	2	-	6	-	6	3	21	6	2	1	1	1	11	6	-
year	Average Cover (%)																
1998	-	-	-	0.0	-	0.0	0.1	0.0	0.1	0.0	-	-	0.0	-	0.4	0.0	-
2003	-	0.1	-	-	-	-	-	-	0.2	-	0.0	-	-	-	0.0	0.0	0.0
2008	0.0	-	-	-	-	-	0.0	-	0.0	0.0	-	-	-	-	0.2	0.0	-
2012	0.0	-	-	-	-	0.0	-	-	-	0.0	-	-	-	-	0.1	0.0	-
2017	-	-	0.0	-	0.0	-	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.1	0.0	-

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

Table 20-02.12 - 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)	1998	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Artemisia tridentata ssp. vaseyana ^p (mountain big sagebrush)	2003	3.5	1	0.2	-	-	0.4	-	-	0.2	5.9	-	0.4	0.5	-
Chrysothamnus viscidiflorus ssp. viscidiflorus var. viscidiflorus (yellow rabbitbrush)	2008	4.2	1.5	-	-	-	0.4	0.4	-	0.5	6.9	-	3.5	0.3	0
Cylindropuntia whipplei (Whipple cholla)	2012	4.6	1.1	-	-	-	0.2	0.1	-	0.3	2.6	-	-	0.1	-
Echinocereus (hedgehog cactus)	2017	7.1	0.2	-	-	-	0.4	-	0.8	0.4	3.3	-	-	0.2	-
Ephedra viridis ^p (mormon tea)	Quadrat Cover (%)														
Ericameria nauseosa ssp. nauseosa var. hololeuca ^p (rubber rabbitbrush)	1998	1.9	3.9	0.4	0.0	-	0.1	0.1	-	0.0	3.9	-	0.0	0.5	0.0
Ericameria parryi var. parryi (Parry's rabbitbrush)	2003	4.8	1.9	0.0	-	-	0.7	0.0	0.0	0.1	4.2	0.0	0.6	1.0	-
Gutierrezia sarothrae (broom snakeweed)	2008	5.0	1.1	0.0	-	-	0.4	0.0	-	0.4	4.5	0.0	2.4	0.4	0.0
Juniperus osteosperma ¹ (Utah juniper)	2012	5.3	0.8	-	-	-	0.1	0.0	0.0	0.4	2.3	-	-	0.4	-
Pediocactus simpsonii (mountain ball cactus)	2017	6.9	0.3	-	-	0.1	0.0	-	0.0	1.2	2.3	-	-	0.4	-
Pinus monophylla ¹ (singleleaf pinyon)															
Purshia tridentata ^p (antelope bitterbrush)															
Sclerocactus (fishhook cactus)															

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

Table 20-02.13 - 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 (%)				
Artemisia frigida^p -- (prairie sagewort)									
1998	-	-	-	-	-	-	-	-	-/-
2003	-	-	-	-	-	-	-	-	12/28
2008	-	-	-	-	-	-	-	-	-/-
2012	-	-	-	-	-	-	-	-	-/-
2017	20	-	0	100	0	0	0	0	-/-
Artemisia nova^p -- (black sagebrush)									
1998	1320	220	21	74	5	20	2	0	22/54
2003	1420	-	7	51	42	32	1	7	26/50
2008	1420	20	11	72	17	28	17	9	32/65
2012	1080	20	4	74	22	33	13	9	23/62
2017	2340	20	8	86	6	21	8	9	30/65
Artemisia tridentata ssp. vaseyana^p -- (mountain big sagebrush)									
1998	500	40	4	72	24	16	4	4	51/86
2003	240	-	25	58	17	50	0	8	57/96
2008	440	80	23	55	23	14	23	14	40/59
2012	540	120	11	70	19	11	37	30	38/70
2017	80	-	25	75	0	50	0	0	67/100
Chrysothamnus viscidiflorus ssp. viscidiflorus var. viscidiflorus -- (yellow rabbitbrush)									
1998	40	-	0	100	0	0	0	0	34/64
2003	60	-	0	67	33	0	0	33	30/54
2008	120	-	17	50	33	33	17	33	17/24
2012	20	-	0	0	100	0	0	100	-/-
2017	-	-	-	-	-	-	-	-	-/-
Cylindropuntia whipplei -- (Whipple cholla)									
1998	20	-	0	100	0	0	0	0	11/29
2003	-	-	-	-	-	-	-	-	10/29
2008	-	-	-	-	-	-	-	-	8/12
2012	-	-	-	-	-	-	-	-	-/-
2017	-	-	-	-	-	-	-	-	15/53

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 (%)				
Echinocereus -- (hedgehog cactus)									
1998	20	-	0	100	0	0	0	0	10/31
2003	60	-	0	100	0	0	0	0	9/19
2008	-	-	-	-	-	-	-	-	-/-
2012	20	-	0	100	0	0	0	0	8/20
2017	60	-	0	100	0	0	0	0	10/25
Ephedra viridis^P -- (mormon tea)									
1998	40	-	50	50	0	50	0	50	69/99
2003	20	-	0	0	100	100	0	100	65/96
2008	40	-	0	50	50	100	0	50	58/78
2012	20	-	0	0	100	0	0	0	54/94
2017	20	-	0	100	0	0	100	0	60/90
Eriogonum -- (buckwheat)									
1998	-	-	-	-	-	-	-	-	-/-
2003	-	-	-	-	-	-	-	-	-/-
2008	-	-	-	-	-	-	-	-	5/11
2012	-	-	-	-	-	-	-	-	-/-
2017	-	-	-	-	-	-	-	-	-/-
Ericameria nauseosa ssp. nauseosa var. hololeuca^P -- (rubber rabbitbrush)									
1998	100	-	0	60	40	40	0	40	50/58
2003	20	-	0	0	100	0	0	0	49/72
2008	120	-	0	83	17	0	50	17	35/51
2012	60	-	0	67	33	0	33	33	30/45
2017	20	-	0	0	100	0	100	100	56/77
Ericameria parryi var. parryi -- (Parry's rabbitbrush)									
1998	-	-	-	-	-	-	-	-	-/-
2003	20	-	100	0	0	0	0	0	-/-
2008	-	-	-	-	-	-	-	-	12/33
2012	20	20	0	100	0	0	0	0	13/25
2017	20	-	0	100	0	0	0	0	32/60
Gutierrezia sarothrae -- (broom snakeweed)									
1998	180	40	0	56	44	0	0	44	14/19
2003	420	-	0	71	29	0	0	0	19/25
2008	980	40	4	84	12	2	2	8	16/19
2012	1260	60	24	68	8	0	0	19	16/24
2017	1640	-	1	88	11	0	0	15	14/19
Juniperus osteosperma^f -- (Utah juniper)									
1998	80	-	0	100	0	0	0	0	-/-
2003	80	-	25	75	0	0	0	0	-/-
2008	40	-	0	100	0	0	0	0	-/-
2012	20	-	0	100	0	0	0	0	-/-
2017	40	20	0	100	0	0	0	0	-/-
Krascheninnikovia lanata^P -- (winterfat)									
1998	-	-	-	-	-	-	-	-	-/-
2003	-	-	-	-	-	-	-	-	-/-
2008	-	-	-	-	-	-	-	-	-/-
2012	-	-	-	-	-	-	-	-	8/28
2017	-	-	-	-	-	-	-	-	-/-
Opuntia -- (pricklypear)									
1998	20	-	0	100	0	0	0	0	-/-
2003	-	-	-	-	-	-	-	-	-/-
2008	-	-	-	-	-	-	-	-	12/18
2012	-	-	-	-	-	-	-	-	-/-
2017	40	-	0	100	0	0	0	0	9/15
Pediocactus simpsonii -- (mountain ball cactus)									
1998	-	-	-	-	-	-	-	-	-/-
2003	60	-	0	100	0	0	0	0	4/6
2008	20	-	0	100	0	0	0	0	4/7
2012	-	-	-	-	-	-	-	-	-/-
2017	-	-	-	-	-	-	-	-	-/-

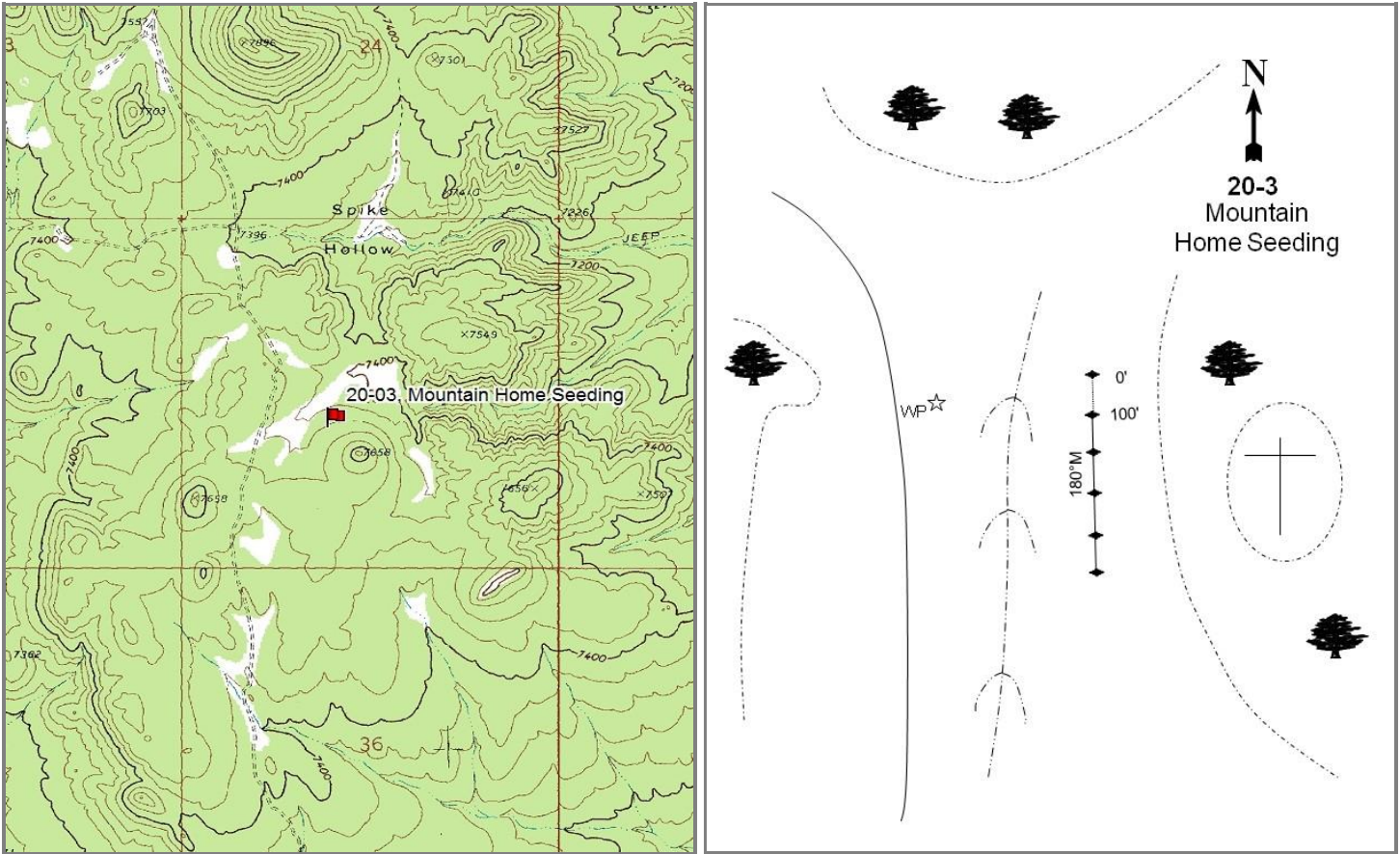
Year	Density		Age Class Distribution			Utilization		Poor Vigor (%)	Average Height Crown (cm)
	Plants Per Acre		Excluding Seedlings			Moderate (%)	Heavy (%)		
	Excluding Seedlings	Seedling	Young (%)	Mature (%)	Decadent (%)				
Pinus monophylla^t -- (singleleaf pinyon)									
1998	-	-	-	-	-	-	-	-	-/-
2003	-	-	-	-	-	-	-	-	-/-
2008	20	-	100	0	0	0	0	0	-/-
2012	-	-	-	-	-	-	-	-	-/-
2017	-	20	0	0	0	0	0	0	-/-
Purshia tridentata^P -- (antelope bitterbrush)									
1998	40	-	0	50	50	0	100	50	55/155
2003	60	-	0	0	100	0	100	0	52/182
2008	60	-	0	33	67	100	0	0	47/125
2012	20	-	0	100	0	100	0	0	45/124
2017	40	-	0	100	0	0	100	0	51/141
Rhus trilobata var. trilobata^P -- (skunkbush sumac)									
1998	-	-	-	-	-	-	-	-	-/-
2003	-	-	-	-	-	-	-	-	63/178
2008	-	-	-	-	-	-	-	-	64/199
2012	-	-	-	-	-	-	-	-	90/97
2017	-	-	-	-	-	-	-	-	-/-
Sclerocactus -- (fishhook cactus)									
1998	20	-	0	100	0	0	0	0	5/7
2003	-	-	-	-	-	-	-	-	-/-
2008	60	-	0	100	0	0	0	0	13/26

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

Table 20-02.14 - 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)							
1998	24	-	-	-	-	-	10.9
2003	22	-	-	30	40	30	22.6
2008	26	-	8	23	46	23	21.6
2012	17	55	-	-	45	-	12.0
2017	14	10	20	10	20	40	14.6
Pinus monophylla (singleleaf pinyon)							
1998	78	-	-	-	-	-	10.7
2003	80	5	11	16	47	21	14.4
2008	45	-	18	18	47	18	16.6
2012	21	30	10	20	40	-	11.1
2017	22	10	40	10	10	30	10.4

MOUNTAIN HOME SEEDING - STUDY NO. 20-3



Location Information

USGS 7.5 min Map Info
GPS (0' Stake)

Lopers Spring SE; Township 27S, Range 19W, Section 25
NAD 83 UTM ZONE 12, 244818 East 4257569 North

Transect Information

Browse Tag # (0' Stake)	143
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 the Indian Peaks cabin, drive to the main Pine Valley Road. Turn left (north) and drive about 2.0 miles to a fork which is labeled with a sign saying "Hamblin Valley Road 15 miles". Drive west on this road (avoiding side roads) for about 12.0 miles to a four-way intersection, where a sign to the north reads "Lopers Spring 6.0 miles." Turn right (north) and drive for 6.2 miles to a witness post on the right side of the road (you will pass another four-way intersection at about 3.7 miles). The 0-foot stake is 170 paces from the witness post at 113 degrees magnetic and is marked with browse tag #143.

Site Information

Land Ownership	Federal
Land Administrator	BLM
Allotment	No data
Elevation	7,500ft (2,286m)
Aspect	Northwest
Slope	5%
Sample Dates	06/09/1998, 07/01/2003, 07/06/2005, 06/17/2008, 06/27/2012, 06/14/2017

Table 20-03.1 Disturbance History. Recorded history of major disturbances.

Treatment/Disturbance	Name	WRI DB#	Date	Size (acres)
Fire - Prescribed	Mountain Home Habitat Improvement 1988	-	1989	1066
Chaining - Two-Way Chain Unknown	Mountain Home Habitat Improvement 1988	-	1989	1066
Seeding - Aerial Before	Mountain Home Habitat Improvement 1988	-	1989	1066
Harrow - One-Way Dixie	Mountain Home Habitat Improvement	226	Fall 2005	746
Seeding - Broadcast Before	Mountain Home Habitat Improvement	226	Fall 2005	746

Table 20-03.2 Seed Mix. List of known seeded plant species and rates (if available).

Mix Name		Application Type	Application Date	Acres	
Mountain Home		Broadcast	Sep 2005	1200	
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		0.05	0.00
G	Agropyron cristatum	Crested Wheatgrass	Nordan	2.79	0.00
G	Agropyron cristatum	Crested Wheatgrass	Hycrest	1.31	0.00
G	Agropyron cristatum	Crested Wheatgrass	Ephraim	1.22	0.00
G	Agropyron cristatum	Crested Wheatgrass	Douglas	0.50	0.40
G	Agropyron cristatum	Crested Wheatgrass	Hycrest	0.50	0.47
G	Bromus inermis	Smooth Brome	Lincoln	2.02	0.00
G	Dactylis glomerata	Orchardgrass	Paiute	1.00	0.00
G	Elymus wawawaiensis	Snake River Wheatgrass	Secar	1.00	0.93
G	Festuca brevipila	Hard Fescue	Durar	0.50	0.47
G	Poa secunda	Canby Bluegrass	Canbar	0.50	0.40
G	Poa secunda	Sandberg Bluegrass	SID OR	0.50	0.40
G	Thinopyrum intermedium	Pubescent Wheatgrass		0.52	0.49
G	Thinopyrum intermedium	Pubescent Wheatgrass		0.50	0.42
G	Thinopyrum intermedium	Intermediate Wheatgrass		1.13	0.00
G	Thinopyrum ponticum	Tall Wheatgrass		0.47	0.00
F	Astragalus cicer	Cicer Milkvetch	Lutana	0.12	0.10
F	Astragalus cicer	Cicer Milkvetch	Lutana	0.88	0.83
F	Linum perenne	Blue Flax	Appar	0.05	0.05
F	Medicago sativa	Alfalfa	Ladak+	0.33	0.32
F	Medicago sativa	Alfalfa	Nomad	0.33	0.31
F	Medicago sativa	Alfalfa	Spredor 4	0.33	0.31
F	Medicago sativa	Alfalfa	Ladak	1.55	0.00
F	Melilotus officinalis	Yellow Sweetclover		0.47	0.00
F	Melilotus officinalis	Yellow Sweetclover		0.33	0.24
F	Onobrychis viciifolia	Sainfoin	Eski	1.50	1.41
F	Sanguisorba minor	Small Burnet	Delar	1.00	0.94
Mix Name		Application Type	Application Date	Acres	
Mountain Home Chaining		Broadcast	Sep 1989	1066	
Type	Species	Common Name	Cultivar/Source ID	Bulk lbs/acre	PLS lbs/acre
G	Leymus cinereus	Great Basin Wildrye		0.05	0.00

Wildlife Habitat and Vegetation History**Table 20-03.3 - Wildlife Seasonal Habitat.** UDWR wildlife habitat and seasonality.

Species	Habitat	Season
Deer	substantial	year-long
Elk	substantial	year-long

Table 20-03.4 - Vegetation History. The dominant vegetation type(s) and phase of woodland succession (Tausch, Miller, Roundy, & Chambers, 2009).

Year	Vegetation Type	Woodland Succession
1998	Perennial Grass	No Encroachment
2003	Perennial Grass	No Encroachment
2005	Perennial Grass/Rubber Rabbitbrush	No Encroachment
2008	Perennial Grass/Rubber Rabbitbrush	No Encroachment
2012	Perennial Grass/Rubber Rabbitbrush	No Encroachment
2017	Mountain Big Sagebrush	No Encroachment

Site Notes

The area is occupied by deer, elk and wild horses throughout most of the year. Escape and thermal cover are available at the edge of the treatment about 200 feet east of the study site. In 2017, it was noted that most of the rubber rabbitbrush (*Ericameria nauseosa*) was defoliated.

Soils**Table 20-03.5 - 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
Sandy Loam	6.2	70.0	15.1	14.9	2.0	21.5	163.2	0.6	06/09/1998

Site Potential

1981 - 2010 Average Annual Precipitation 19 inches
 NRCS Ecological Site Mountain Loam (Mountain Big Sagebrush)
 NRCS Ecological Site # R028AY431UT
 States and Transitions No state and transition model is available for this ecological site.

At the time of study establishment in 1998, the site was a perennial grass plant community. It transitioned to a rubber rabbitbrush (*Ericameria nauseosa*) encroached site and was mechanically treated in 2005. Following this treatment, however, rabbitbrush maintained a presence. Mountain big sagebrush (*Artemisia tridentata* ssp. *vaseyana*) began establishing on the site in 2003, and in 2017 it was the dominant shrub in the community (Table 20-03.12, Table 20- 03.13). Perennial grass cover and frequency have fluctuated, but the general trend has been a decreasing one, with crested wheatgrass (*Agropyron cristatum*) expressing dominance (Table 20-03.10). Forbs are modestly diverse, but cover is low; the dominant forb is perennial cryptantha (*Cryptantha* sp.) (Table 20-03.11). No tree cover has been observed since study establishment (Table 20-03.12), but the surrounding tree community (photos) and tree presence prior to site establishment indicate potential for future encroachment on this site.

Trend Summary Tables**Table 20-03.6 - 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
1998	0.4	-	-	-	-	-
2003	1.0	0.0	-	0.3	0.5	-
2005	1.9	0.2	-	2.1	0.2	-
2008	2.7	1.0	-	3.4	1.4	-
2012	6.1	1.7	-	8.5	2.6	-
2017	12.2	2.9	-	12.5	3.9	-

Table 20-03.7 - 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
1998	84	382	61	43	0.7	29.4	0.2	0.4
2003	29	330	2	14	0.1	9.3	0.0	0.2
2005	10	364	16	12	0.0	20.3	0.1	0.3
2008	6	363	5	37	0.0	13.1	0.0	0.4
2012	15	354	12	44	0.0	12.3	0.0	0.3
2017	152	260	145	61	1.8	4.7	0.8	1.1

Table 20-03.8 - 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
1998	15.5	0.0	42.2	23.4	13.6	35.3
2003	41.4	-	18.8	24.4	11.8	10.6
2005	21.0	-	15.5	38.8	13.4	22.8
2008	13.8	0.1	25.1	35.8	16.7	17.1
2012	36.6	-	18.0	8.6	16.2	23.1
2017	44.8	-	24.3	5.9	14.8	24.1

Table 20-03.9 - 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	Rocky Mountain Elk	Horse	Rabbit
	Quadrat Frequency				
1998	-	14	27	26	4
2003	1	7	16	27	-
2005	-	9	29	21	23
2008	-	9	31	20	53
2012	1	3	38	5	6
2017	1	13	20	6	8
Year	Days Use Per Acre (ha)				
1998	-	6.7 (16.6)	26.8 (66.2)	44.1 (109.0)	-
2003	0.7 (1.8)	2.7 (6.6)	39.6 (97.7)	38.3 (94.7)	-
2005	-	0.7 (1.7)	28.1 (69.5)	33.1 (81.8)	-
2008	-	4.7 (11.6)	51.6 (127.5)	43.6 (107.6)	-
2012	-	1.3 (3.3)	42.9 (105.9)	14.5 (35.9)	-
2017	-	16.8 (41.4)	10.7 (26.5)	13.9 (34.4)	-

Table 20-03.10 - 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 inermis ⁱ (smooth brome)	Bromus rubens ^{ai} (red brome)	Bromus tectorum ^{ai} (cheatgrass)	Elymus elymoides (squirreltail)	Thinopyrum intermedium ⁱ (intermediate wheatgrass)
year	Nested Frequency							
1998	-	352	5	115	-	84	3	34
2003	-	318	-	82	-	29	-	18
2005	-	334	-	130	-	10	-	43
2008	-	337	4	92	-	6	7	57
2012	8	312	3	105	-	15	8	16
2017	-	235	-	62	86	76	-	6
year	Average Cover (%)							
1998	-	25.1	0.1	3.2	-	0.7	0.0	0.9
2003	-	8.6	-	0.7	-	0.1	-	0.1
2005	-	17.4	-	2.6	-	0.0	-	0.2
2008	-	10.9	0.0	1.8	-	0.0	0.0	0.4
2012	0.1	9.5	0.0	2.1	-	0.0	0.0	0.5
2017	-	3.9	-	0.8	1.0	0.8	-	0.0

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

Table 20-03.11 - Forb Species. Nested frequency and modified Daubenmire average cover by year.

FORB SPECIES	Astragalus (milkvech)	Chaenactis douglasii (Douglas' dusty maiden)	Collinsia parviflora ^a (maiden blue eyed Mary)	Cryptantha (cryptantha)	Cymopterus (springparsley)	Dalea (prairie clover)	Descurainia pinnata ^a (western tansymustard)	Gayophytum ramosissimum ^a (pinyon groundsmoke)	Gilia inconspicua ^a (shy gilia)	Grindelia squarrosa (curlycup gumweed)	Halogeton glomeratus ^{ai} (saltlover)	Lappula occidentalis ^a (flatspine stickseed)	Linum lewisii (Lewis flax)	Lupinus argenteus (silvery lupine)	Medicago sativa ⁱ (alfalfa)	Microsteris gracilis ^a (slender phlox)	Packera multilobata (lobeleaf groundsel)
year	Nested Frequency																
1998	1	-	11	-	34	-	2	-	25	-	-	5	-	3	7	24	-
2003	-	-	-	-	2	-	-	-	-	-	2	-	-	-	1	-	-
2005	-	1	3	-	-	-	-	7	-	-	-	1	-	0	-	5	-
2008	3	-	1	-	6	3	-	3	-	1	-	-	1	4	-	1	2
2012	6	-	6	5	1	-	-	-	-	-	-	1	-	9	-	5	-
2017	3	-	30	34	6	-	-	106	15	-	-	3	-	6	-	27	-
year	Average Cover (%)																
1998	0.0	-	0.0	-	0.1	-	0.0	-	0.1	-	-	0.0	-	0.0	0.2	0.1	-
2003	-	-	-	-	0.0	-	-	-	-	-	0.0	-	-	-	0.0	-	-
2005	-	0.0	0.0	-	-	-	-	0.0	-	-	-	0.0	-	0.0	-	0.1	-
2008	0.0	-	0.0	-	0.0	0.0	-	0.0	-	0.0	-	-	0.0	0.0	-	0.0	0.0
2012	0.1	-	0.0	0.0	0.0	-	-	-	-	-	-	0.0	-	0.1	-	0.0	-
2017	0.0	-	0.1	0.6	0.0	-	-	0.5	0.1	-	-	0.0	-	0.3	-	0.1	-

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

FORB SPECIES	Phlox longifolia (longleaf phlox)	Pleiacanthus spinosus (thorn skeletonweed)	Sanguisorba minor ⁱ (small burnet)	Sphaeralcea coccinea (scarlet globemallow)
year	Nested Frequency			
1998	1	1	-	2
2003	7	5	-	0
2005	7	3	-	1
2008	12	3	3	3
2012	22	2	-	1
2017	17	0	-	6
year	Average Cover (%)			
1998	0.0	0.0	-	0.0
2003	0.0	0.1	-	0.0
2005	0.0	0.1	-	0.1
2008	0.0	0.1	0.0	0.1
2012	0.1	0.0	-	0.0
2017	0.1	0.0	-	0.0

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

Table 20-03.12 - Shrub and Tree Species. Average modified Daubenmire quadrat and line intercept cover by year.

SHRUB SPECIES	Artemisia tridentata ssp. vaseyana ^p (mountain big sagebrush)	Chrysothamnus viscidiflorus ssp. viscidiflorus var. viscidiflorus (yellow rabbitbrush)	Ericameria nauseosa (rubber rabbitbrush)	Ericameria nauseosa ssp. nauseosa var. hololeuca ^p (rubber rabbitbrush)	Ericameria parryi var. parryi (Parry's rabbitbrush)	Gutierrezia sarothrae (broom snakeweed)
year	Line Intercept Cover (%)					
1998	-	-	-	-	-	-
2003	0.3	-	0.5	-	-	-
2005	0.5	-	0.2	1.6	-	-
2008	1	-	1.4	2.4	-	-
2012	4	-	2.6	4.5	-	-
2017	10.7	-	3.9	1.8	0	-
year	Quadrat Cover (%)					
1998	-	-	-	0.4	-	-
2003	0.0	-	0.0	1.0	-	0.0
2005	0.4	-	0.2	1.5	-	-
2008	0.3	-	1.0	2.4	-	-
2012	1.9	0.0	1.7	4.2	-	-
2017	8.7	0.0	2.8	3.5	0.0	-

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

Table 20-03.13 - 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 utahensis^P -- (Utah serviceberry)									
1998	-	-	-	-	-	-	-	-	-/-
2003	-	-	-	-	-	-	-	-	24/53
2005	-	-	-	-	-	-	-	-	-/-
2008	-	-	-	-	-	-	-	-	-/-
2012	-	-	-	-	-	-	-	-	-/-
2017	-	-	-	-	-	-	-	-	-/-
Artemisia tridentata ssp. vaseyana^P -- (mountain big sagebrush)									
1998	-	-	-	-	-	-	-	-	76/101
2003	20	-	0	100	0	0	100	0	74/112
2005	920	580	96	4	0	0	2	0	67/103
2008	1340	80	70	30	0	3	3	6	27/34
2012	4900	440	74	24	2	2	8	78	38/53
2017	7020	200	33	67	1	28	1	1	43/55
Chrysothamnus viscidiflorus ssp. viscidiflorus var. viscidiflorus -- (yellow rabbitbrush)									
1998	-	-	-	-	-	-	-	-	-/-
2003	-	-	-	-	-	-	-	-	30/54
2005	20	-	0	100	0	0	0	0	24/45
2008	40	-	0	100	0	0	0	0	21/26
2012	60	20	67	33	0	0	0	33	24/40
2017	60	-	0	100	0	0	0	33	26/39
Ericameria nauseosa -- (rubber rabbitbrush)									
1998	-	-	-	-	-	-	-	-	-/-
2003	-	40	0	0	0	0	0	0	107/161
2005	1020	1040	94	6	0	0	0	0	80/112
2008	1760	20	9	82	9	22	0	33	37/42
2012	2680	1360	32	59	9	2	0	37	49/54
2017	1720	-	31	64	5	7	0	71	56/63
Ericameria nauseosa ssp. nauseosa var. hololeuca^P -- (rubber rabbitbrush)									
1998	-	-	-	-	-	-	-	-	88/129
2003	40	-	0	100	0	50	0	0	81/123
2005	2220	1180	95	5	0	0	0	0	67/113
2008	3500	20	15	75	9	21	2	19	30/44
2012	2360	460	22	64	14	7	0	34	45/55
2017	1860	-	5	93	2	1	0	82	48/57
Ericameria parryi var. parryi -- (Parry's rabbitbrush)									
1998	-	-	-	-	-	-	-	-	-/-
2003	20	-	0	100	0	0	0	0	27/26
2005	-	-	-	-	-	-	-	-	-/-
2008	-	-	-	-	-	-	-	-	24/50
2012	-	-	-	-	-	-	-	-	-/-
2017	100	-	20	20	60	20	0	80	16/30
Gutierrezia sarothrae -- (broom snakeweed)									
1998	-	-	-	-	-	-	-	-	-/-
2003	20	-	100	0	0	0	0	0	16/12
2005	-	-	-	-	-	-	-	-	-/-
2008	-	-	-	-	-	-	-	-	31/69
2012	-	-	-	-	-	-	-	-	-/-
2017	20	-	100	0	0	0	0	0	-/-
Linanthus pungens -- (granite prickly phlox)									
1998	-	-	-	-	-	-	-	-	-/-
2003	-	-	-	-	-	-	-	-	-/-
2005	-	-	-	-	-	-	-	-	-/-
2008	-	-	-	-	-	-	-	-	-/-
2012	-	-	-	-	-	-	-	-	22/89
2017	-	-	-	-	-	-	-	-	-/-

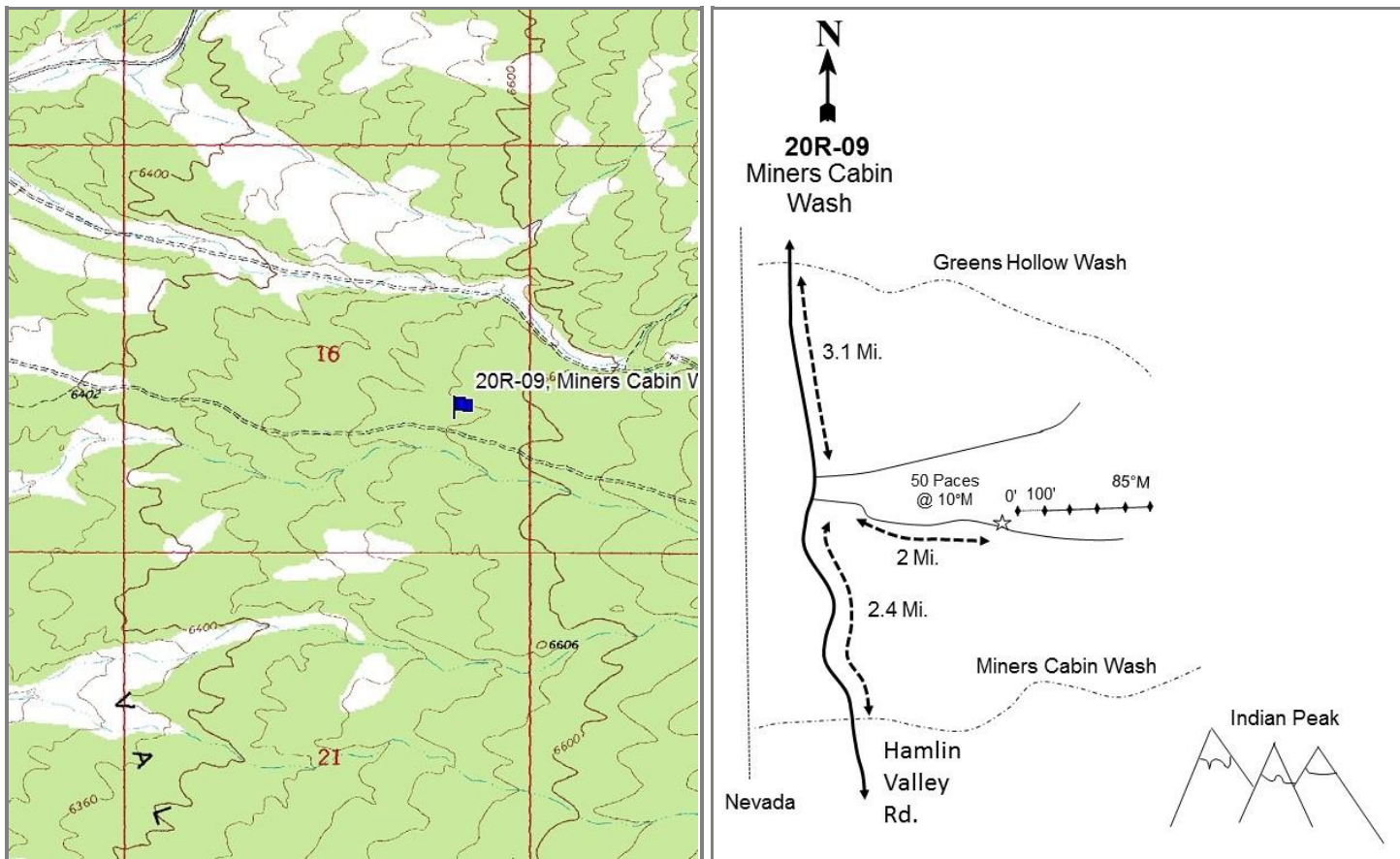
Year	Density		Age Class Distribution			Utilization		Poor Vigor (%)	Average Height Crown (cm)
	Plants Per Acre		Excluding Seedlings			Moderate (%)	Heavy (%)		
	Excluding Seedlings	Seedling	Young (%)	Mature (%)	Decadent (%)				
Opuntia -- (pricklypear)									
1998	-	-	-	-	-	-	-	-	-/-
2003	-	-	-	-	-	-	-	-	-/-
2005	-	-	-	-	-	-	-	-	-/-
2008	-	-	-	-	-	-	-	-	-/-
2012	-	-	-	-	-	-	-	-	-/-
2017	-	-	-	-	-	-	-	-	11/27
Ribes ^p -- (currant)									
1998	-	-	-	-	-	-	-	-	-/-
2003	-	-	-	-	-	-	-	-	71/57
2005	-	-	-	-	-	-	-	-	-/-
2008	-	-	-	-	-	-	-	-	83/92

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

Table 20-03.14 - 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)							
2017	1	-	100	-	-	-	6.0
Pinus monophylla (singleleaf pinyon)							
2017	1	-	100	-	-	-	2.0

MINERS CABIN WASH - STUDY NO. 20R-9



Location Information

USGS 7.5 min Map Info	Miners Cabin Wash SW; Township 29S, Range 19W, Section 16
GPS (0' Stake)	NAD 83 UTM ZONE 12, 240150 East 4241482 North

Transect Information

Browse Tag # (0' Stake)	Not Available
Transect Bearing	85° 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 Hamlin Valley Road and North Modena Canyon Road, travel north on Hamlin Valley Road for 22.25 miles to Miners Cabin Wash Road; there is a faint road before the main wash road. Turn onto and follow this faint road east for 2.25 miles. The site is to the left (north) of the road.

Site Information

Land Ownership	State
Land Administrator	SITLA
Allotment	INDIAN PEAK
Elevation	6,540ft (1,993m)
Aspect	North
Slope	5%
Sample Dates	08/09/2017

Table 20R-09.1 Disturbance History. Recorded history of major disturbances.

Treatment/Disturbance	Name	WRI DB#	Date	Size (acres)
Chaining - Chain Unknown	Indian Peak/Spanish George (Hamlin Valley Habitat Restoration Project-Sagebrush (Year 3))	3934	Fall 2017	4822

Wildlife Habitat and Vegetation History**Table 20R-09.3 - Wildlife Seasonal Habitat.** UDWR wildlife habitat and seasonality.

Species	Habitat	Season
Deer	substantial	year-long
Elk	substantial	year-long
Pronghorn	crucial	year-long

Table 20R-09.4 - Vegetation History. The dominant vegetation type(s) and phase of woodland succession (Tausch, Miller, Roundy, & Chambers, 2009).

Year	Vegetation Type	Woodland Succession
2017	Pinyon-Juniper	Phase III

Site Notes

No Notes

Site Potential

1981 - 2010 Average Annual Precipitation	15 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.

This site is dominated by Utah juniper (*Juniperus osteosperma*) and singleleaf pinyon (*Pinus monophylla*) and is in Phase III of woodland succession as of study establishment in 2017; black sagebrush (*Artemisia nova*) is a lesser but still significant component of the vegetation community (Table 20R-09.12, Table 20R-09.13, Table 20R-09.14). Grasses are present in the understory but are not abundant, with Indian ricegrass (*Achnatherum hymenoides*) and squirreltail (*Elymus elymoides*) as the dominant species (Table 20R-09.10). Forbs exhibit cover values expected of Phase III encroachment, with most cover being contributed by the perennial species cushion phlox (*Phlox pulvinata*) and stemless mock goldenweed (*Stenotus acaulis*) (Table 20R-09.11). This site is scheduled to be chained as part of the Indian Peak/Spanish George (Hamlin Valley Habitat Restoration Project - Sagebrush (Year 3)) treatment (Table 20R-09.1). If the project is completed as proposed, one can expect that the tree cover will decrease and the herbaceous understory will become more robust.

Trend Summary Tables**Table 20R-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
2017	5.0	0.2	10.0	3.2	0.1	22.7

Table 20R-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
2017	-	98	38	158	-	1.3	0.5	3.1

Table 20R-09.8 - 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
2017	15.5	2.6	41.5	40.8	3.3	17.1

Table 20R-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	Mule Deer	Rocky Mountain Elk	Rabbit
	Quadrat Frequency		
2017	4	7	13
Year	Days Use Per Acre (ha)		
	2017	2.0 (5.0)	9.4 (23.2)

Table 20R-09.10 - Grass Species. Nested frequency and modified Daubenmire average cover by year.

GRASS SPECIES	Achnatherum hymenoides (Indian ricegrass)	Achnatherum pinetorum (pine needlegrass)	Elymus elymoides (squirreltail)	Hesperostipa comata (needle and thread)	Pascopyrum smithii (western wheatgrass)
year	Nested Frequency				
2017	27	11	34	11	21
year	Average Cover (%)				
2017	0.5	0.1	0.4	0.1	0.2

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

Table 20R-09.11 - Forb Species. Nested frequency and modified Daubenmire average cover by year.

FORB SPECIES	Arabis (rockcress)	Arenaria fendleri (Fendler's sandwort)	Astragalus (milkvetch)	Astragalus calycosus (Torrey's milkvetch)	Chaetopappa ericoides (rose heath)	Cordylanthus kingii ^a (King's bird's-beak)	Cryptantha (cryptantha)	Dalea searlsiae (Searls' prairie clover)	Erigeron pumilus (shaggy fleabane)	Eriogonum caespitosum (matted buckwheat)	Gilia inconspicua ^a (shy gilia)	Hymenopappus filifolius (fineleaf hymenopappus)	Lesquerella wardii (Ward's bladderpod)	Machaeranthera grindelioides (rayless tansyaster)	Packera multilobata (lobeleaf groundsel)	Penstemon (beardtongue)	Penstemon confusus (Owens Valley beardtongue)
year	Nested Frequency																
2017	3	33	4	23	4	35	1	6	6	14	3	3	8	19	10	4	42
year	Average Cover (%)																
2017	0.0	0.3	0.0	0.1	0.0	0.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.1	0.0	0.3

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

FORB SPECIES	Penstemon linarioides ssp. sileri (Siler's penstemon)	Phlox pulvinata (cushion phlox)	Stenotus acaulis (stemless mock goldenweed)	Streptanthus cordatus (heartleaf twistflower)
year	Nested Frequency			
2017	2	36	18	5
year	Average Cover (%)			
2017	0.0	1.1	0.9	0.0

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

Table 20R-09.12 - Shrub and Tree Species. Average modified Daubenmire quadrat and line intercept cover by year.

SHRUB SPECIES	Artemisia nova ^p (black sagebrush)	Chrysothamnus viscidiflorus ssp. viscidiflorus var. stenophyllus (yellow rabbitbrush)	Eriogonum microthecum ^p (slender buckwheat)	Gutierrezia sarothrae (broom snakeweed)	Juniperus osteosperma ^t (Utah juniper)	Linanthus pungens (granite prickly phlox)	Pediocactus simpsonii (mountain ball cactus)	Pinus monophylla ^t (singleleaf pinyon)
year	Line Intercept Cover (%)							
2017	3.2	0	-	-	5.8	0.1	-	16.9
year	Quadrat Cover (%)							
2017	4.9	0.0	0.0	0.1	2.3	0.0	0.0	7.6

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

Table 20R-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.

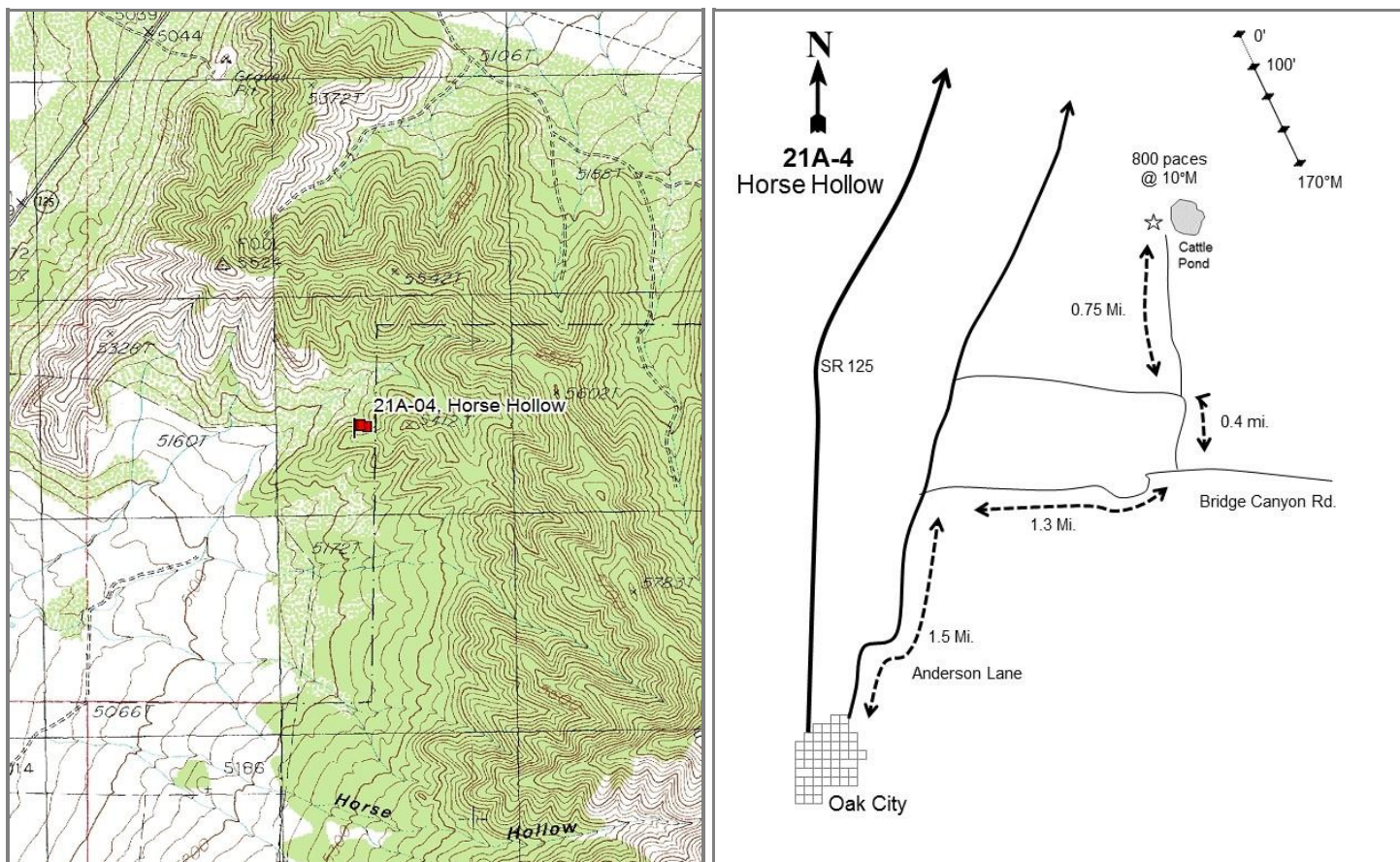
Year	Density		Age Class Distribution			Utilization		Poor Vigor (%)	Average Height Crown (cm)
	Plants Per Acre		Excluding Seedlings			Moderate (%)	Heavy (%)		
	Excluding Seedlings	Seedling	Young (%)	Mature (%)	Decadent (%)				
Artemisia nova ^p -- (black sagebrush)									
2017	2760	20	17	59	24	12	0	7	26/54
Chrysothamnus viscidiflorus ssp. viscidiflorus var. stenophyllus -- (yellow rabbitbrush)									
2017	80	-	25	75	0	0	25	0	12/20
Gutierrezia sarothrae -- (broom snakeweed)									
2017	60	-	0	100	0	0	0	0	15/15
Juniperus osteosperma ^t -- (Utah juniper)									
2017	220	60	55	46	0	0	0	0	- / -
Linanthus pungens -- (granite prickly phlox)									
2017	20	-	0	100	0	0	0	0	13/21
Opuntia polyacantha -- (plains pricklypear)									
2017	20	-	0	100	0	0	0	0	9/19
Pediocactus simpsonii -- (mountain ball cactus)									
2017	20	-	0	100	0	0	0	0	1/2
Pinus monophylla ^t -- (singleleaf pinyon)									
2017	500	160	36	60	4	0	0	4	- / -

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

Table 20R-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)							
2017	95	13	40	27	7	13	11.0
Pinus monophylla (singleleaf pinyon)							
2017	274	-	5	45	25	25	18.1

HORSE HOLLOW - STUDY NO. 21A-4

**Location Information**

USGS 7.5 min Map Info
GPS (0' Stake)

Oak City North SE; Township 16S, Range 4W, Section 16
NAD 83 UTM ZONE 12, 388269 East 436557 North

Transect Information

Browse Tag # (0' Stake)	7067
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

Proceed north from Oak City on Anderson Lane. Drive north for 1.5 miles to Bridge Canyon Road and turn right. Proceed on this road for 1.30 miles, then cross a wash and turn left at a fork. Proceed 0.4 miles to a cattle watering hole and follow a faint road right (north) for 0.75 miles to a water pond. Park here and hike north for 0.6 miles to the site; the 0-foot stake is located at the top of the hill.

Site Information

Land Ownership	Federal
Land Administrator	BLM
Allotment	Fool Creek Allotment
Elevation	5,300ft (1,615m)
Aspect	South
Slope	25-30%
Sample Dates	08/26/1998, 05/13/2003, 05/22/2007, 06/14/2017

Table 21A-04.1 Disturbance History. Recorded history of major disturbances.

Treatment/Disturbance	Name	WRI DB#	Date	Size (acres)
Fire - Wildfire	Clay Springs Fire	-	June-August 2012	107847
Fire - Wildfire	Devils Den Fire	-	August 2006	14371
Seeding - Aerial After	Devils Den	660	December 2006	7852

Table 21A-04.2 Seed Mix. List of known seeded plant species and rates (if available).

Mix Name			Application Type	Application Date	Acres
Devil's Den			Aerial	Dec 2006	3976
Type	Species	Common Name	Cultivar/Source ID	Bulk lbs/acre	PLS lbs/acre
G	Agropyron cristatum	Crested Wheatgrass	CDII	1.01	0.88
G	Agropyron cristatum	Crested Wheatgrass	Hycrest	0.99	0.81
G	Dactylis glomerata	Orchardgrass	Paiute	0.12	0.11
G	Dactylis glomerata	Orchardgrass	Paiute	0.13	0.11
G	Poa secunda	Canby Bluegrass	Canbar	0.25	0.22
G	Poa secunda	Sandberg Bluegrass	Toole MT	0.25	0.21
F	Achillea millefolium	Western Yarrow		0.10	0.10
F	Medicago sativa	Alfalfa	Ladak	0.38	0.36
F	Medicago sativa	Alfalfa	Ladak	0.28	0.25
F	Medicago sativa	Alfalfa	Ranger	0.67	0.58
F	Medicago sativa	Alfalfa	Spredor 4	0.65	0.62
S	Artemisia tridentata ssp. wyomingensis	Wyoming Big Sagebrush	Sanpete UT	0.44	0.10
S	Artemisia tridentata ssp. wyomingensis	Wyoming Big Sagebrush	Beaver UT	0.55	0.15
Mix Name			Application Type	Application Date	Acres
Devil's Den Sagebrush			Aerial	Dec 2006	3876
Type	Species	Common Name	Cultivar/Source ID	Bulk lbs/acre	PLS lbs/acre
		Rice Hulls		0.10	0.00
S	Artemisia tridentata ssp. wyomingensis	Wyoming Big Sagebrush	Beaver UT	0.55	0.15
S	Artemisia tridentata ssp. wyomingensis	Wyoming Big Sagebrush	Beaver UT	0.45	0.10

Wildlife Habitat and Vegetation History**Table 21A-04.3 - Wildlife Seasonal Habitat.** UDWR wildlife habitat and seasonality.

Species	Habitat	Season
Deer	substantial	winter

Table 21A-04.4 - Vegetation History. The dominant vegetation type(s) and phase of woodland succession (Tausch, Miller, Roundy, & Chambers, 2009).

Year	Vegetation Type	Woodland Succession
1985	Wyoming Big Sagebrush/Juniper	Phase I transitioning to Phase II
1991	Wyoming Big Sagebrush/Juniper	Phase I transitioning to Phase II
1998	Wyoming Big Sagebrush/Juniper	Phase I transitioning to Phase II
2003	Wyoming Big Sagebrush/Juniper	Phase I transitioning to Phase II
2007	Annual Grass/Juniper	Phase I
2012	Perennial Grass/Juniper	Phase I
2017	Annual-Perennial Grass/Juniper	Phase I

Site Notes

No Notes

Soils**Table 21A-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	7.1	54.9	25.8	19.3	1.3	3.3	105.6	0.5	08/26/1998

Site Potential

1981 - 2010 Average Annual Precipitation	12 inches
NRCS Ecological Site	Upland Gravelly Loam (Wyoming Big Sagebrush)
NRCS Ecological Site #	028AY307UT
States and Transitions	A defined state and transition model is available.

When this site was established in 1985, it was a Utah juniper (*Juniperus osteosperma*) and Wyoming big sagebrush (*Artemisia tridentata* ssp. *wyomingensis*) mixed community. In 2006, the site burned and when it was read in 2007 it had transitioned to a juniper and annual grass community (Community State 3, Table 2-39.6, NRCS-2017). The site burned again in 2012 during the Clay Springs Fire and was treated with anchor chaining and seed. The perennial grass community is presently co-dominant with annual grasses (Table 21A-4.10). Forbs are relatively diverse, but sparse in distribution (Table 21A-4.11). Juniper is still present on the site and was diminished in the fires, although tree cover has increased since the last fire in 2012 (21A-4.6).

Trend Summary Tables**Table 21A-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
1998	3.0	1.7	6.2	-	-	1.2
2003	5.0	0.9	8.5	5.4	1.0	8.0
2007	0.4	0.2	4.7	1.0	-	1.4
2017	1.2	1.8	4.5	2.0	1.0	7.7

Table 21A-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
1998	418	123	-	15	12.6	3.0	-	0.1
2003	274	156	12	21	3.5	5.2	0.0	0.1
2007	388	91	58	11	13.8	1.8	1.1	0.0
2017	348	169	221	36	10.4	9.6	3.4	0.5

Table 21A-04.8 - 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
1998	14.6	3.9	34.3	30.2	12.6	25.1
2003	20.0	6.8	28.1	25.9	14.6	22.6
2007	21.8	3.9	24.0	25.1	17.1	21.2
2017	30.2	2.2	28.2	20.9	18.9	30.1

Table 21A-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		
1998	-	19	23
2003	-	6	34
2007	-	8	43
2017	1	1	8
Year	Days Use Per Acre (ha)		
1998	2.2 (5.4)	7.4 (18.2)	-
2003	-	2.7 (6.6)	-
2007	-	4.0 (9.9)	-
2017	5.1 (12.6)	4.7 (11.6)	-

Table 21A-04.10 - 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)	Pleuraphis jamesii (James' galleta)	Poa secunda (Sandberg bluegrass)	Pseudoroegneria spicata (bluebunch wheatgrass)	Secale cereale ^{ai} (cereal rye)	Sporobolus cryptandrus (sand dropseed)	Thinopyrum intermedium ⁱ (intermediate wheatgrass)
year	Nested Frequency									
1998	14	-	417	2	6	85	19	5	-	-
2003	21	-	274	-	9	113	40	-	-	-
2007	11	-	388	-	10	43	33	-	-	-
2017	15	24	348	3	23	17	54	-	17	43
year	Average Cover (%)									
1998	0.1	-	12.6	0.1	0.1	2.1	0.7	0.0	-	-
2003	0.6	-	3.5	-	0.0	3.4	1.2	-	-	-
2007	0.1	-	13.8	-	0.3	0.3	1.1	-	-	-
2017	0.5	0.9	10.4	0.0	1.2	0.2	3.0	-	0.7	3.1

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

Table 21A-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 drummondii (Drummond's rockcress)	Astragalus (milkvetch)	Astragalus utahensis (Utah milkvetch)	Calochortus nuttallii (sego lily)	Cirsium (thistle)	Collinsia parviflora ^a (maiden blue eyed Mary)	Cryptantha (cryptantha)	Descurainia pinnata ^a (western tansymustard)	Draba ^a (draba)	Eriogonum cernuum ^a (nodding buckwheat)	Erodium cicutarium ^{ai} (redstem stork's bill)	Gilia inconspicua ^a (shy gilia)	Hymenopappus filifolius (fineleaf hymenopappus)	Lactuca serriola ^{ai} (prickly lettuce)	Lomatium (desertparsley)
year	Nested Frequency																
1998	-	-	-	5	-	-	7	-	-	-	-	-	-	-	-	-	-
2003	-	-	2	-	3	4	1	-	-	2	-	6	-	5	5	-	1
2007	-	3	-	-	-	3	5	-	-	2	14	31	4	2	-	-	-
2017	4	1	2	-	-	-	17	2	2	6	3	64	144	-	-	23	-
year	Average Cover (%)																
1998	-	-	-	0.0	-	-	0.0	-	-	-	-	-	-	-	-	-	-
2003	-	-	0.0	-	0.0	0.0	0.0	-	-	0.0	-	0.0	-	0.0	0.0	-	0.0
2007	-	0.0	-	-	-	0.0	0.0	-	-	0.4	0.6	0.1	0.0	0.0	-	-	-
2017	0.0	0.0	0.0	-	-	-	0.1	0.0	0.0	0.0	0.0	0.6	2.0	-	-	0.1	-

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

FORB SPECIES						
<i>Oenothera caespitosa</i> (tufted evening primrose)						
<i>Phlox longifolia</i> (longleaf phlox)						
<i>Sisymbrium altissimum</i> ^{ai} (tall tumblemustard)						
<i>Sphaeralcea munroana</i> (Munro's globemallow)						
<i>Tragopogon dubius</i> ^{ai} (yellow salsify)						
<i>Zigadenus paniculatus</i> (foothill deathcamas)						
year	Nested Frequency					
1998	-	3	-	-	-	-
2003	-	4	-	-	-	1
2007	-	2	3	-	-	1
2017	4	-	22	7	3	2
year	Average Cover (%)					
1998	-	0.0	-	-	-	-
2003	-	0.0	-	-	-	0.0
2007	-	0.0	0.0	-	-	0.0
2017	0.0	-	0.7	0.3	0.0	0.0

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

Table 21A-04.12 - Shrub and Tree Species. Average modified Daubenmire quadrat and line intercept cover by year.

SHRUB SPECIES						
<i>Artemisia tridentata</i> ssp. <i>wyomingensis</i> ^p (Wyoming big sagebrush)						
<i>Chrysothamnus viscidiflorus</i> ssp. <i>viscidiflorus</i> var. <i>stenophyllus</i> (yellow rabbitbrush)						
<i>Ephedra nevadensis</i> ^p (Nevada jointfir)						
<i>Gutierrezia sarothrae</i> (broom snakeweed)						
<i>Juniperus osteosperma</i> ^t (Utah juniper)						
<i>Purshia stansburiana</i> ^p (Stansbury cliffrose)						
year	Line Intercept Cover (%)					
1998	-	-	-	-	-	-
2003	3.9	0.2	0.7	0.8	8	0.8
2007	-	0	1	0	1.4	-
2017	-	-	2	1	7.7	-
year	Quadrat Cover (%)					
1998	2.1	0.2	0.9	1.5	6.2	-
2003	3.8	0.3	0.7	0.6	8.5	0.5
2007	-	0.0	0.4	0.2	4.7	-
2017	-	-	1.2	1.8	4.5	-

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

Table 21A-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.

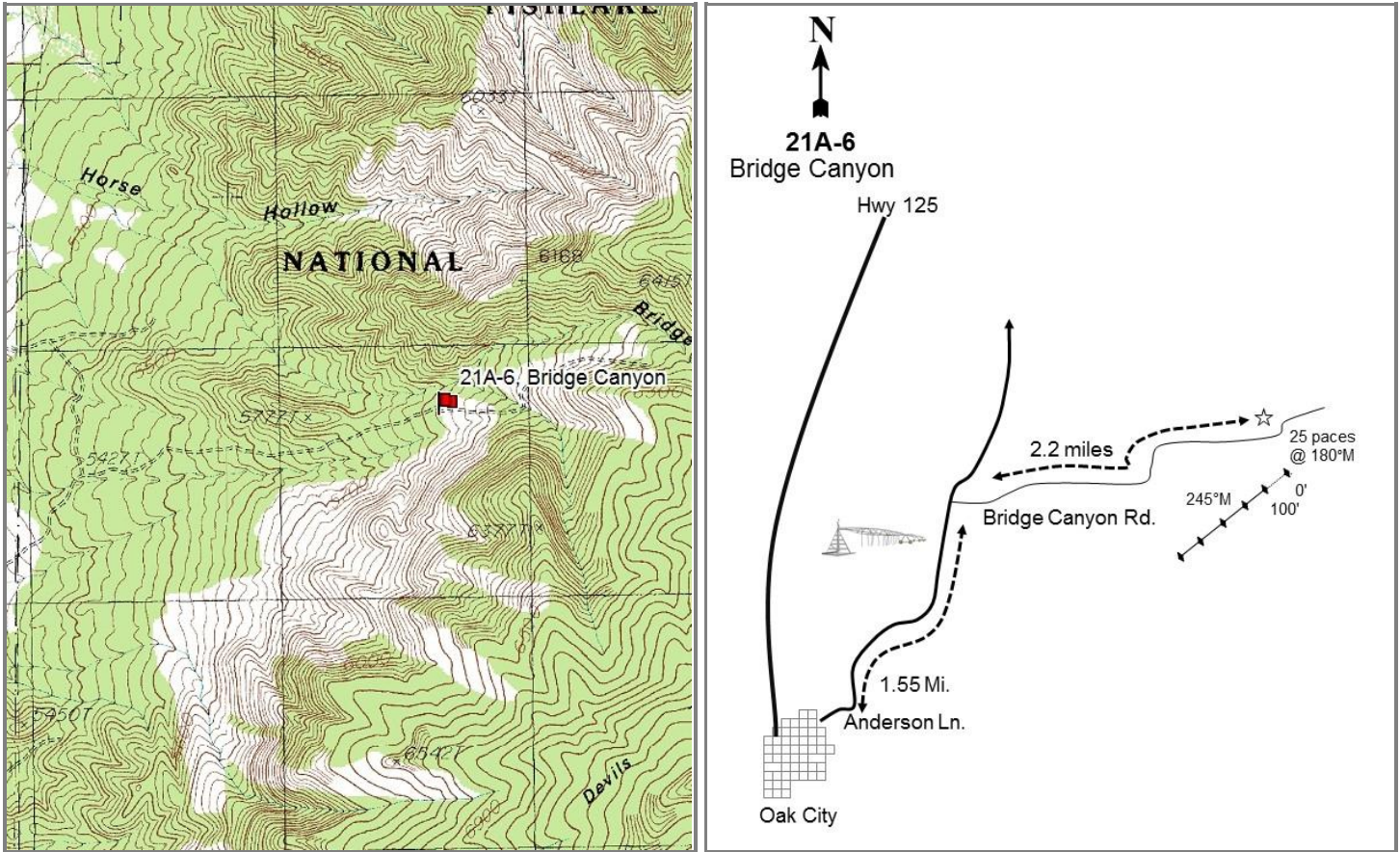
Year	Density		Age Class Distribution			Utilization		Poor Vigor (%)	Average Height Crown (cm)
	Plants Per Acre		Excluding Seedlings			Moderate (%)	Heavy (%)		
	Excluding Seedlings	Seedling	Young (%)	Mature (%)	Decadent (%)				
Artemisia tridentata ssp. wyomingensis^p -- (Wyoming big sagebrush)									
1998	920	-	4	56	39	44	4	48	53/84
2003	640	-	0	53	47	3	3	19	60/94
2007	-	-	-	-	-	-	-	-	59/67
2017	-	-	-	-	-	-	-	-	-/-
Chrysothamnus viscidiflorus ssp. viscidiflorus var. stenophyllus -- (yellow rabbitbrush)									
1998	560	-	0	89	11	25	18	100	25/45
2003	280	-	0	57	43	0	0	14	18/30
2007	40	-	0	0	100	0	0	100	11/17
2017	20	-	100	0	0	0	0	0	42/47
Ephedra nevadensis^p -- (Nevada jointfir)									
1998	100	-	0	100	0	100	0	0	41/89
2003	420	-	0	29	71	29	19	19	38/50
2007	40	-	100	0	0	0	0	0	31/123
2017	620	-	3	94	3	45	55	3	39/62
Ericameria nauseosa -- (rubber rabbitbrush)									
1998	-	-	-	-	-	-	-	-	46/83
2003	-	-	-	-	-	-	-	-	-/-
2007	-	-	-	-	-	-	-	-	-/-
2017	-	-	-	-	-	-	-	-	-/-
Gutierrezia sarothrae -- (broom snakeweed)									
1998	2500	-	3	93	4	7	3	98	19/27
2003	600	-	3	90	7	0	0	7	15/24
2007	100	700	40	60	0	0	0	20	14/17
2017	1020	-	14	86	0	0	0	0	26/41
Juniperus osteosperma^t -- (Utah juniper)									
1998	80	40	50	50	0	0	0	0	- / -
2003	120	-	17	83	0	0	0	0	- / -
2007	40	-	0	50	50	0	0	50	- / -
2017	20	-	0	100	0	0	0	0	- / -
Opuntia polyacantha -- (plains pricklypear)									
1998	20	-	0	100	0	0	0	0	25/56
2003	20	-	0	100	0	0	0	0	11/41
2007	-	-	-	-	-	-	-	-	4/9
2017	-	-	-	-	-	-	-	-	18/60
Purshia stansburiana^p -- (Stansbury cliffrose)									
1998	20	-	0	100	0	0	0	0	44/50
2003	40	-	0	50	50	50	50	0	57/50
2007	-	-	-	-	-	-	-	-	-/-
2017	-	-	-	-	-	-	-	-	-/-
Tetradymia spinosa -- (shortspine horsebrush)									
1998	-	-	-	-	-	-	-	-	-/-
2003	-	-	-	-	-	-	-	-	46/94

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

Table 21A-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)							
1998	85	-	-	-	-	-	21.1
2003	81	5	21	26	5	42	20.2
2007	23	-	18	27	36	18	32.3
2017	13	-	11	11	33	44	32.0

BRIDGE CANYON - STUDY NO. 21A-6

**Location Information**

USGS 7.5 min Map Info
GPS (0' Stake)

Oak City North SE; Township 16S, Range 4W, Section 22
NAD 83 UTM ZONE 12, 389709 East 4362923 North

Transect Information

Browse Tag # (0' Stake)	139
Transect Bearing	245° 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 Highway 125 to Oak City. From W 100 N, proceed east for 1 block to N 100 E. Follow this road out of town until it turns into N Anderson Lane. From the north edge of town, drive for 2.2 miles to Bridge Canyon Road. Turn right and drive for 1.6 miles up to the site, which is approximately 75 feet away on the south side of the road.

Site Information

Land Ownership	Federal
Land Administrator	USFS
Allotment	Oak Creek Allotment
Elevation	5,826ft (1,776m)
Aspect	Southwest
Slope	10%
Sample Dates	06/20/2017

Table 21A-06.1 Disturbance History. Recorded history of major disturbances.

Treatment/Disturbance	Name	WRI DB#	Date	Size (acres)
Fire - Wildfire	Clay Springs Fire	-	June-August 2012	107847
Fire - Wildfire	Devils Den Fire	-	August 2006	14371
Fire - Wildfire	Clay Springs Fire	-	1981	15840
Seeding - Aerial After	Devils Den Fire Rehab	660	December 2006	3976

Table 21A-06.2 Seed Mix. List of known seeded plant species and rates (if available).

Mix Name			Application Type	Application Date	Acres
Devil's Den			Aerial	Dec 2006	3976
Type	Species	Common Name	Cultivar/Source ID	Bulk lbs/acre	PLS lbs/acre
G	Agropyron cristatum	Crested Wheatgrass	CDII	1.01	0.88
G	Agropyron cristatum	Crested Wheatgrass	Hycrest	0.99	0.81
G	Dactylis glomerata	Orchardgrass	Paiute	0.12	0.11
G	Dactylis glomerata	Orchardgrass	Paiute	0.13	0.11
G	Poa secunda	Canby Bluegrass	Canbar	0.25	0.22
G	Poa secunda	Sandberg Bluegrass	Toole MT	0.25	0.21
F	Achillea millefolium	Western Yarrow		0.10	0.10
F	Medicago sativa	Alfalfa	Ladak	0.38	0.36
F	Medicago sativa	Alfalfa	Ladak	0.28	0.25
F	Medicago sativa	Alfalfa	Ranger	0.67	0.58
F	Medicago sativa	Alfalfa	Spredor 4	0.65	0.62
S	Artemisia tridentata ssp. wyomingensis	Wyoming Big Sagebrush	Sanpete UT	0.44	0.10
S	Artemisia tridentata ssp. wyomingensis	Wyoming Big Sagebrush	Beaver UT	0.55	0.15
Mix Name			Application Type	Application Date	Acres
Devil's Den Sagebrush			Aerial	Dec 2006	3876
Type	Species	Common Name	Cultivar/Source ID	Bulk lbs/acre	PLS lbs/acre
		Rice Hulls		0.10	0.00
S	Artemisia tridentata ssp. wyomingensis	Wyoming Big Sagebrush	Beaver UT	0.55	0.15
S	Artemisia tridentata ssp. wyomingensis	Wyoming Big Sagebrush	Beaver UT	0.45	0.10

Wildlife Habitat and Vegetation History**Table 21A-06.3 - Wildlife Seasonal Habitat.** UDWR wildlife habitat and seasonality.

Species	Habitat	Season
California Bighorn	substantial	year-long
Deer	substantial	winter

Table 21A-06.4 - Vegetation History. The dominant vegetation type(s) and phase of woodland succession (Tausch, Miller, Roundy, & Chambers, 2009).

Year	Vegetation Type	Woodland Succession
2017	Perennial Grass	No Encroachment

Site Notes

No Notes

Soils**Table 21A-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	6.8	46.2	33.1	20.8	3.3	24.0	392.0	0.5	06/20/2017

Site Potential

1981 - 2010 Average Annual Precipitation 14 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.

Established in 2017, this site is an Upland Gravelly Loam (Wyoming Big Sagebrush) ecological site. It is currently in a perennial grass/broom snakeweed (*Gutierrezia sarothrae*) ecological state. Wildfires have occurred on the site in 1981, 2006 and 2012, all prior to establishment. It is likely that the site existed in Community Phase 2 prior to the wildfires, which is a sagebrush/perennial grass state. The site is currently in Community Phase 2.1 (Shrubs/Invasive Plants/Native Perennials), which is likely to continue unless there is an event to move the site back to Community State 2 (USDA- NRCS, 2017). The site is now dominated by both native and introduced perennial grasses. Most of the perennial grass cover is provided by bluebunch wheatgrass (*Pseudoroegneria spicata*), bulbous bluegrass (*Poa bulbosa*), and purple threeawn (*Aristida purpurea*) (Table 21A-06.10). Forbs are not diverse, but the cover is high and primarily driven by redstem storksbill (*Erodium cicutarium*) (Table 21A-06.11).

Trend Summary Tables

Table 21A-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
2017	-	1.4	-	-	3.6	-

Table 21A-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
2017	183	385	418	10	2.9	28.8	15.5	0.1

Table 21A-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
2017	15.8	0.4	27.1	23.3	10.3	50.3

Table 21A-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	Rabbit
	2017	12	4
Year	Days Use Per Acre (ha)		
2017	15.3 (37.7)	-	-

Table 21A-06.10 - Grass Species. Nested frequency and modified Daubenmire average cover by year.

GRASS SPECIES	Agropyron cristatum ⁱ (crested wheatgrass)	Aristida purpurea (purple threeawn)	Bromus tectorum ⁱⁱ (cheatgrass)	Pleuraphis jamesii (James' galleta)	Poa bulbosa ⁱ (bulbous bluegrass)	Poa secunda (Sandberg bluegrass)	Pseudoroegneria spicata (bluebunch wheatgrass)	Thinopyrum intermedium ⁱ (intermediate wheatgrass)
year	Nested Frequency							
2017	66	163	183	40	196	12	174	44
year	Average Cover (%)							
2017	1.8	6.5	2.9	1.6	4.3	0.1	13.1	1.5

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

Table 21A-06.11 - Forb Species. Nested frequency and modified Daubenmire average cover by year.

FORB SPECIES	Collinsia parviflora ^a (maiden blue eyed Mary)	Draba ^a (draba)	Eriogonum racemosum (redroot buckwheat)	Erodium cicutarium ⁱⁱ (redstem stork's bill)	Helianthus annuus ^a (common sunflower)	Lactuca serriola ⁱⁱ (prickly lettuce)	Lomatium (desertparsley)	Phlox longifolia (longleaf phlox)	Tragopogon dubius ⁱⁱ (yellow salsify)
year	Nested Frequency								
2017	11	34	2	415	1	10	7	1	24
year	Average Cover (%)								
2017	0.1	0.1	0.0	15.2	0.0	0.0	0.0	0.0	0.1

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

Table 21A-06.12 - Shrub and Tree Species. Average modified Daubenmire quadrat and line intercept cover by year.

SHRUB SPECIES	Gutierrezia sarothrae (broom snakeweed)	Opuntia polyacantha (plains pricklypear)
year	Line Intercept Cover (%)	
2017	3.6	-
year	Quadrat Cover (%)	
2017	1.4	0.0

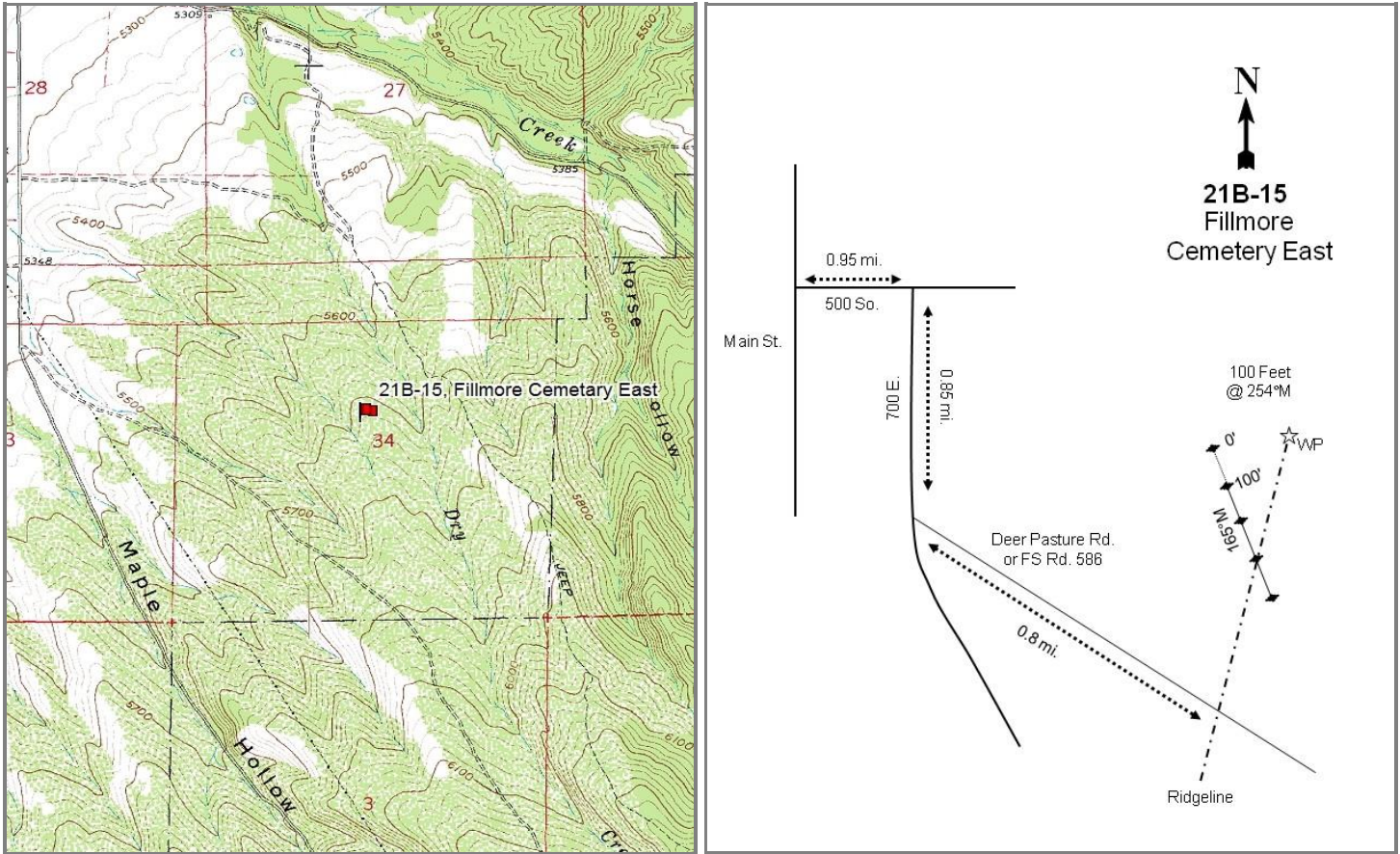
t - Tree Species; p - Preferred Browse; i - Introduced Species

Table 21A-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 (%)				
Gutierrezia sarothrae -- (broom snakeweed)									
2017	1320	80	15	85	0	0	0	0	26/48
Opuntia polyacantha -- (plains pricklypear)									
2017	20	-	0	100	0	0	0	0	21/72

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

FILLMORE CEMETERY EAST - STUDY NO. 21B-15



Location Information

USGS 7.5 min Map Info	Fillmore NE; Township 21S, Range 4W, Section 34
GPS (0' Stake)	NAD 83 UTM ZONE 12, 388216 East 4311293 North

Transect Information

Browse Tag # (0' Stake)	7073
Transect Bearing	165° 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 500 South and Main in Fillmore (the bend in the road), go east for 0.95 miles past the LDS Church and the cemetery to an intersection. Turn right (south) and go 0.85 miles to F.S. Road #386. Turn left and follow this road for 0.8 miles to the ridgeline. From the ridgeline, walk north about 1/3 of a mile to a witness post (full-high rebar). The frequency baseline starts 100 feet west (254 degrees magnetic) of the cairn. The 0-foot stake is a rebar tagged #7073.

Site Information

Land Ownership	State
Land Administrator	UDWR
Allotment	No data
Elevation	5,720ft (1,743m)
Aspect	Northwest
Slope	5-10%
Sample Dates	06/23/1998, 06/09/2003, 07/22/2008, 08/15/2012, 06/20/2017

Table 21B-15.1 Disturbance History. Recorded history of major disturbances.

Treatment/Disturbance	Name	WRI DB#	Date	Size (acres)
Herbicide - Plateau	Fillmore WMA Juniper Thinning	408	November-December 2008	156
Chaining - Chain Unknown	-	-	1973	-
Seeding - Seed Unknown	-	-	1973	-
Harrow - One-Way Dixie	Fillmore WMA Juniper Thinning	408	November 2008	156
Seeding - Broadcast Before	Fillmore WMA Juniper Thinning	408	November 2008	156

Table 21B-15.2 Seed Mix. List of known seeded plant species and rates (if available).

Mix Name		Application Type	Application Date	Acres	
Fillmore WMA		Broadcast	Nov 2008	315	
Type	Species	Common Name	Cultivar/Source ID	Bulk lbs/acre	PLS lbs/acre
G	Agropyron cristatum	Crested Wheatgrass	Douglas	0.48	0.40
G	Agropyron fragile	Siberian Wheatgrass	Vavilov	0.48	0.42
G	Dactylis glomerata	Orchardgrass	Paiute	0.10	0.09
G	Elymus wawawaiensis	Snake River Wheatgrass	Secar	0.48	0.36
G	Pascopyrum smithii	Western Wheatgrass	Arriba	0.48	0.39
G	Poa secunda	Canby Bluegrass	Canbar	0.10	0.09
G	Pseudoroegneria spicata	Bluebunch Wheatgrass	Anatone	0.79	0.68
F	Achillea millefolium	Western Yarrow		0.05	0.05
F	Linum lewisii	Lewis Flax	Maple Grove	0.24	0.22
F	Medicago sativa	Alfalfa	Ladak	0.32	0.29
F	Medicago sativa	Alfalfa	Ranger	0.32	0.28
F	Medicago sativa	Alfalfa	Spredor 4	0.32	0.30
F	Onobrychis viciifolia	Sainfoin	Eski	1.90	1.75
F	Sanguisorba minor	Small Burnet	Delar	1.90	1.77
S	Artemisia tridentata ssp. wyomingensis	Wyoming Big Sagebrush	Beaver UT	0.48	0.11
S	Purshia stansburiana	Stansbury Cliffrose		0.10	0.06

Wildlife Habitat and Vegetation History

Table 21B-15.3 - Wildlife Seasonal Habitat. UDWR wildlife habitat and seasonality.

Species	Habitat	Season
Deer	crucial	winter
Elk	substantial	winter

Table 21B-15.4 - Vegetation History. The dominant vegetation type(s) and phase of woodland succession (Tausch, Miller, Roundy, & Chambers, 2009).

Year	Vegetation Type	Woodland Succession
1985	Mountain Big Sagebrush/Gambel Oak	Phase I
1991	Mountain Big Sagebrush/Gambel Oak	Phase I
1998	Mountain Big Sagebrush/Gambel Oak	Phase I
2003	Mountain Big Sagebrush/Gambel Oak	Phase I
2008	Mountain Big Sagebrush/Gambel Oak	Phase I
2012	Gambel Oak/Mountain Big Sagebrush	Phase I
2017	Gambel Oak/Mountain Big Sagebrush	Phase I

Site Notes

No Notes

Soils

Table 21B-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	6.5	46.0	27.4	26.6	2.8	23.4	169.6	0.8	06/23/1998

Site Potential

1981 - 2010 Average Annual Precipitation 17 inches
 NRCS Ecological Site Mountain Loam (Oak)
 NRCS Ecological Site # R047XA432UT
 States and Transitions No state and transition model is available for this ecological site.

When the site was established in 1985, it was a mountain big sagebrush (*Artemisia tridentata* ssp. *vaseyana*) and Gambel oak (*Quercus gambelii*) dominated plant community. Following a harrow treatment in the Fall of 2008, sagebrush cover decreased significantly and oak cover increased (Table 21B-15.1, Table 21B-15.12). As for the herbaceous understory, the forbs are diverse but cover is low (Table 21B-15.11). The graminoid component of the understory mainly consists of undesirable introduced species, with the perennial species bulbous bluegrass (*Poa bulbosa*) and annual species cheatgrass (*Bromus tectorum*) being the primary grasses: their presence detracts from the overall ecological health of the site (Table 21B-15.10). There has been some encroachment by Utah juniper (*Juniperus osteosperma*) and the site is considered to be within Phase I of woodland succession (Table 21B-15.4, Table 21B-15.14).

Trend Summary Tables

Table 21B-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
1998	25.3	2.4	-	-	-	-
2003	26.7	0.5	1.2	27.2	0.5	2.7
2008	18.5	0.4	1.6	31.5	0.8	3.7
2012	13.3	0.6	0.8	20.8	1.6	3.1
2017	16.3	5.0	1.9	26.5	7.6	3.3

Table 21B-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
1998	374	159	257	38	6.8	4.5	2.5	0.4
2003	367	214	107	34	10.6	6.9	0.7	0.6
2008	384	214	174	31	9.9	5.7	0.8	0.7
2012	348	302	291	57	7.9	20.1	3.2	0.5
2017	286	329	373	73	10.8	20.2	9.7	1.5

Table 21B-15.8 - 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
1998	15.6	1.1	54.0	16.2	6.2	39.4
2003	16.6	0.6	43.2	9.5	5.7	44.4
2008	4.3	1.3	50.7	9.2	5.8	41.6
2012	8.0	0.0	54.8	8.9	5.4	50.4
2017	15.1	0.3	44.0	6.2	4.8	54.5

Table 21B-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	Rocky Mountain Elk	Horse	Rabbit
	Quadrat Frequency				
1998	-	49	-	1	14
2003	-	35	-	-	6
2008	-	51	3	-	21
2012	-	28	-	-	18
2017	1	24	2	-	27
Days Use Per Acre (ha)					
1998	0.7 (1.8)	79.8 (197.0)	-	0.6 (1.4)	-
2003	-	61.7 (152.3)	1.3 (3.3)	-	-
2008	-	111.3 (274.8)	0.7 (1.7)	-	-
2012	-	44.2 (109.2)	-	-	-
2017	-	22.1 (54.6)	-	-	-

Table 21B-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 arvensis ^{ai} (field brome)	Bromus briziformis ^{ai} (rattlesnake 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)	Vulpia octoflora ^a (sixweeks fescue)
year	Nested Frequency											
1998	-	32	183	-	313	52	32	3	-	61	5	8
2003	-	26	145	-	350	84	77	-	-	58	12	-
2008	-	28	172	-	359	80	83	3	-	85	0	-
2012	3	22	232	-	229	41	238	-	1	45	33	-
2017	-	38	118	72	202	55	278	-	-	5	47	7
year	Average Cover (%)											
1998	-	1.0	3.0	-	3.8	1.4	1.2	0.0	-	0.9	0.0	0.0
2003	-	1.0	1.0	-	9.6	2.0	2.1	-	-	0.9	0.9	-
2008	-	1.7	2.3	-	7.6	1.1	1.2	0.0	-	1.7	0.0	-
2012	0.2	1.6	3.4	-	4.6	0.6	15.0	-	0.0	1.0	1.5	-
2017	-	2.1	0.8	2.5	7.3	1.0	14.7	-	-	0.0	2.4	0.2

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

Table 21B-15.11 - Forb Species. Nested frequency and modified Daubenmire average cover by year.

FORB SPECIES	Alyssum alyssoides ^{ai} (pale madwort)	Alyssum desertorum ^{ai} (desert madwort)	Arabis (rockcress)	Asclepias (milkweed)	Astragalus argophyllus (silverleaf milkvetch)	Astragalus cibirarius (browse milkvetch)	Astragalus lentiginosus (freckled milkvetch)	Calochortus nuttallii (sego lily)	Ceratocephala testiculata ^{ai} (curveseed butterwort)	Cirsium calceareum ^a (Cainville thistle)	Collinsia parviflora ^a (maiden blue eyed Mary)	Collomia linearis ^a (tiny trumpet)	Crepis acuminata (tapertip hawkbeard)	Cymopterus (springparsley)	Descurainia pinnata ^a (western tansymustard)	Draba ^a (draba)	Epilobium brachycarpum ^a (tall annual willowherb)
year	Nested Frequency																
1998	-	175	3	8	3	3	-	-	56	16	9	-	1	-	14	46	3
2003	-	95	-	-	-	-	-	-	11	5	6	-	-	-	1	-	-
2008	-	162	-	-	-	2	1	4	3	8	3	1	-	-	3	-	-
2012	-	253	-	-	-	1	-	1	-	84	14	-	2	-	6	4	19
2017	4	335	-	-	0	3	-	11	5	101	25	4	-	2	-	-	19
year	Average Cover (%)																
1998	-	1.0	0.0	0.2	0.0	0.0	-	-	0.1	0.7	0.0	-	0.0	-	0.0	0.4	0.0
2003	-	0.5	-	-	-	-	-	-	0.0	0.2	0.0	-	-	-	0.0	-	-
2008	-	0.6	-	-	-	0.0	0.0	0.0	0.0	0.1	0.0	0.0	-	-	0.0	-	-
2012	-	1.5	-	-	-	0.0	-	0.0	-	1.5	0.0	-	0.0	-	0.0	0.0	0.0
2017	0.0	6.0	-	-	0.0	0.1	-	0.1	0.0	3.4	0.1	0.0	-	0.0	-	-	0.0

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

FORB SPECIES	Eriogonum racemosum (redroot buckwheat)	Galium boreale (northern bedstraw)	Lactuca serriola ^{ai} (prickly lettuce)	Linum lewisii (Lewis flax)	Lithospermum ruderale (western stoneseed)	Lotus utahensis (Utah bird's-foot trefoil)	Machaeranthera canescens (hoary tansyaster)	Microsteris gracilis ^{ai} (slender phlox)	Phlox longifolia (longleaf phlox)	Polygonum douglasii ^{ai} (Douglas' knotweed)	Silene antirrhina ^a (sleepy silene)	Sphaeralcea coccinea (scarlet globemallow)	Streptanthus cordatus (heartleaf twistflower)	Tragopogon dubius ^{ai} (yellow salsify)	Zigadenus paniculatus (foothill deathcamas)
year	Nested Frequency														
1998	-	4	-	6	0	-	4	6	2	-	29	2	1	-	6
2003	-	8	-	6	6	-	-	-	1	-	3	-	3	-	10
2008	4	-	1	1	5	2	-	-	-	16	-	3	-	-	12
2012	-	29	10	9	3	-	-	1	4	14	10	4	-	3	6
2017	3	29	-	2	2	4	-	2	3	10	-	5	-	23	11
year	Average Cover (%)														
1998	-	0.0	-	0.0	0.0	-	0.0	0.0	0.0	-	0.1	0.0	0.0	-	0.1
2003	-	0.3	-	0.0	0.2	-	-	-	0.0	-	0.0	-	0.0	-	0.1
2008	0.0	-	0.0	0.1	0.2	0.0	-	-	-	0.0	-	0.1	-	-	0.3
2012	-	0.1	0.0	0.0	0.1	-	-	0.0	0.0	0.1	0.0	0.2	-	0.0	0.0
2017	0.0	0.3	-	0.0	0.3	0.3	-	0.0	0.0	0.0	-	0.1	-	0.2	0.4

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

Table 21B-15.12 - Shrub and Tree Species. Average modified Daubenmire quadrat and line intercept cover by year.

SHRUB SPECIES	Artemisia tridentata ssp. vaseyana ^p (mountain big sagebrush)	Gutierrezia sarothrae (broom snakeweed)	Juniperus osteosperma ^t (Utah juniper)	Opuntia (pricklypear)	Purshia stansburiana ^p (Stansbury cliffrose)	Purshia tridentata ^p (antelope bitterbrush)	Quercus gambelii ^p (Gambel oak)
year	Line Intercept Cover (%)						
1998	-	-	-	-	-	-	-
2003	13.7	0.5	2.7	-	-	6.6	6.9
2008	12.9	0.8	3.7	-	-	8.5	10.1
2012	4.7	1.6	3.1	0	-	4.2	11.9
2017	7.2	7.5	3.3	0.1	-	7.8	11.5
year	Quadrat Cover (%)						
1998	16.7	2.2	-	0.1	-	6.0	2.7
2003	17.2	0.5	1.2	-	-	5.6	3.8
2008	7.8	0.3	1.6	0.1	-	5.8	4.8
2012	3.5	0.5	0.8	0.0	-	3.1	6.7
2017	4.0	4.9	1.9	0.0	0.4	4.9	7.1

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

Table 21B-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. vaseyana^P -- (mountain big sagebrush)									
1998	2680	80	7	60	33	15	0	7	66/93
2003	2440	-	0	59	41	16	7	19	66/87
2008	2420	-	6	34	60	41	5	28	71/93
2012	3120	400	64	30	6	10	4	6	46/72
2017	2940	-	21	71	8	24	12	10	37/52
Ceanothus fendleri -- (Fendler's ceanothus)									
1998	-	-	-	-	-	-	-	-	-/-
2003	-	-	-	-	-	-	-	-	-/-
2008	-	-	-	-	-	-	-	-	42/141
2012	-	-	-	-	-	-	-	-	-/-
2017	-	-	-	-	-	-	-	-	-/-
Cercocarpus ledifolius^P -- (curl-leaf mountain mahogany)									
1998	-	-	-	-	-	-	-	-	-/-
2003	-	-	-	-	-	-	-	-	-/-
2008	-	-	-	-	-	-	-	-	-/-
2012	-	-	-	-	-	-	-	-	66/58
2017	-	-	-	-	-	-	-	-	51/72
Cercocarpus montanus^P -- (alderleaf mountain mahogany)									
1998	-	-	-	-	-	-	-	-	-/-
2003	-	-	-	-	-	-	-	-	-/-
2008	-	-	-	-	-	-	-	-	66/113
2012	-	-	-	-	-	-	-	-	-/-
2017	20	-	0	100	0	0	0	0	- / -
Gutierrezia sarothrae -- (broom snakeweed)									
1998	5100	60	13	88	0	0	0	0	18/23
2003	980	-	6	90	4	0	0	2	18/22
2008	1000	80	12	78	10	2	0	8	20/34
2012	1440	380	21	74	6	0	0	3	21/36
2017	5100	-	11	88	2	0	0	2	25/37
Juniperus osteosperma^I -- (Utah juniper)									
1998	-	-	-	-	-	-	-	-	-/-
2003	-	20	0	0	0	0	0	0	- / -
2008	-	-	-	-	-	-	-	-	-/-
2012	20	-	0	100	0	0	0	0	- / -
2017	60	-	67	0	33	0	0	33	- / -
Opuntia -- (pricklypear)									
1998	40	-	0	100	0	0	0	0	18/41
2003	40	-	0	100	0	0	0	0	16/48
2008	60	-	0	100	0	0	0	33	16/58
2012	80	-	25	75	0	0	0	0	13/45
2017	100	-	0	100	0	0	0	20	13/25
Purshia stansburiana^P -- (Stansbury cliffrose)									
1998	-	-	-	-	-	-	-	-	-/-
2003	-	-	-	-	-	-	-	-	-/-
2008	-	-	-	-	-	-	-	-	-/-
2012	-	-	-	-	-	-	-	-	-/-
2017	80	-	0	100	0	100	0	0	136/164
Purshia tridentata^P -- (antelope bitterbrush)									
1998	360	-	17	83	0	67	17	0	53/132
2003	340	-	0	100	0	0	100	0	60/206
2008	360	-	0	100	0	67	6	6	61/166
2012	460	-	0	91	9	78	0	9	46/135
2017	320	-	6	94	0	75	19	0	50/159
Quercus gambelii^P -- (Gambel oak)									
1998	1500	180	47	53	0	0	0	0	144/94
2003	2280	60	34	54	11	10	1	5	91/73
2008	3780	80	26	69	5	5	0	5	113/120
2012	2500	20	36	63	1	8	0	1	74/66
2017	3360	-	5	89	7	23	10	7	87/84

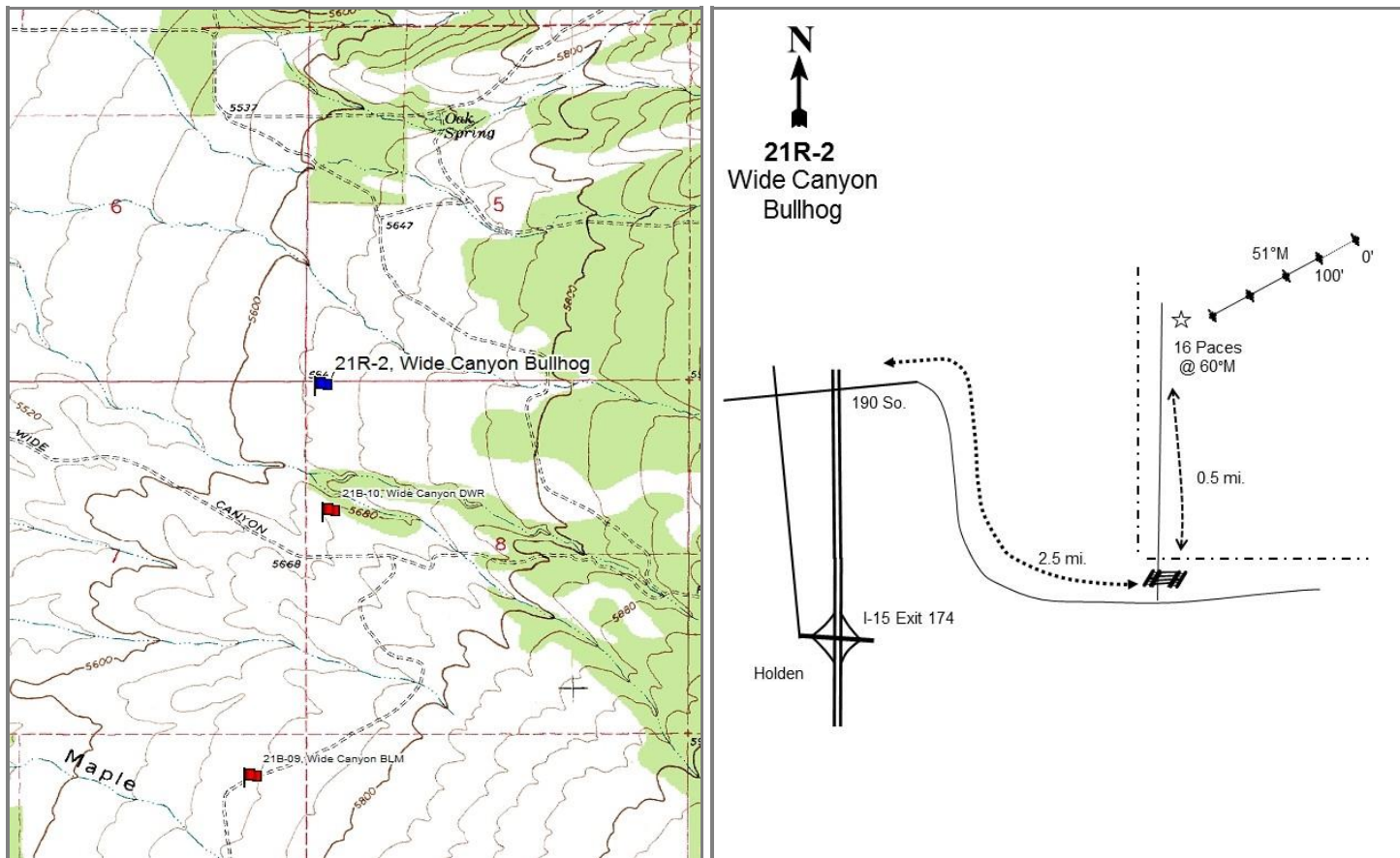
Year	Density		Age Class Distribution			Utilization		Poor Vigor (%)	Average Height Crown (cm)
	Plants Per Acre		Excluding Seedlings			Moderate (%)	Heavy (%)		
	Excluding Seedlings	Seedling	Young (%)	Mature (%)	Decadent (%)				
Rhus trilobata ^P -- (skunkbush sumac)									
1998	-	-	-	-	-	-	-	-	-/-
2003	-	-	-	-	-	-	-	-	-/-
2008	-	-	-	-	-	-	-	-	-/-
2012	-	-	-	-	-	-	-	-	-/-
2017	-	-	-	-	-	-	-	-	173/479

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

Table 21B-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)							
1998	2	-	-	-	-	-	23.0
2008	5	-	-	20	-	80	17.6
2012	6	-	-	20	20	60	32.8
2017	6	-	-	40	60	-	23.6

WIDE CANYON BULLHOG - STUDY NO. 21R-2



Location Information

USGS 7.5 min Map Info	Coffee Peak NW; Township 20S, Range 3W, Section 08
GPS (0' Stake)	NAD 83 UTM ZONE 12, 394351 East 4328066 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

From the south Holden exit off of I-15 (174), go north into town and turn right at 200 South. Follow the road one block east, then north a few yards, then immediately east again up the hill to an overpass. From the overpass, travel 2.4 miles east to the fence corner of DWR property. Turn left, passing through the gate, and travel 0.45 miles to a witness post on the right side of the road. The 0-foot stake is 16 paces from the witness post at 60 degrees magnetic.

Site Information

Land Ownership	State
Land Administrator	UDWR
Allotment	No data
Elevation	5,680ft (1,731m)
Aspect	West
Slope	5%
Sample Dates	07/13/2004, 06/25/2008, 07/22/2013, 07/31/2017

Table 21R-02.1 Disturbance History. Recorded history of major disturbances.

Treatment/Disturbance	Name	WRI DB#	Date	Size (acres)
Chaining - Chain Unknown	-	-	Late 1950s	-
Seeding - Seed Unknown	-	-	Historic	-
Mechanical - Bullhog	Fillmore WMA Bullhog	85	March-April 2005	488

Wildlife Habitat and Vegetation History

Table 21R-02.3 - Wildlife Seasonal Habitat. UDWR wildlife habitat and seasonality.

Species	Habitat	Season
Deer	crucial	winter
Elk	substantial	winter

Table 21R-02.4 - Vegetation History. The dominant vegetation type(s) and phase of woodland succession (Tausch, Miller, Roundy, & Chambers, 2009).

Year	Vegetation Type	Woodland Succession
2004	Juniper/Wyoming Big Sagebrush/ Stansbury Cliffrose	Phase II
2008	Stansbury Cliffrose/Wyoming Big Sagebrush	Phase I
2013	Stansbury Cliffrose/Wyoming Big Sagebrush	Phase I
2017	Stansbury Cliffrose/Wyoming Big Sagebrush	Phase I

Site Notes

The study is located on land managed by the Utah Division of Wildlife Resources (UDWR) for wintering mule deer and elk. Over the years, juniper encroachment has begun to crowd out important forage species for wintering mule deer. The objectives of the project are to improve crucial elk and mule deer winter range habitat by removing juniper trees to promote herbaceous understory growth, and increase preferred browse species on the site. The land to the west is managed by the Bureau of Land Management and was bullhogged during the fall of 2003 (WRI Database 2017). Pellet groups were sampled in high abundance for deer in 2004 and 2008 (Table 21B-19.9).

Soils

Table 21R-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
Loam	7.2	36.4	41.2	22.5	2.7	9.4	188.8	0.6	07/13/2004

Site Potential

1981 - 2010 Average Annual Precipitation	15 inches
NRCS Ecological Site	Upland Loam (Wyoming Big Sagebrush)
NRCS Ecological Site #	R028AY309UT
States and Transitions	No state and transition model is available for this ecological site.

When established in 2004, this site was a mixture of Utah juniper (*Juniperus osteosperma*), Stansbury cliffrose (*Purshia stansburiana*) and Wyoming big sagebrush (*Artemisia tridentata* ssp. *wyomingensis*) with other browse species that contributed minimal cover (Table 21R-2.12). With the exception of bulbous bluegrass (*Poa bulbosa*), herbaceous cover was relatively low, especially forb cover (Table 21R-02.10, Table 21R-02.11). After treatment, Stansbury cliffrose and Wyoming big sagebrush remained the dominant browse species (Table 21R-2.12). While bulbous bluegrass (*Poa bulbosa*) has decreased it continues to be the largest component of the herbaceous understory (Table 21R-2.7, Table 21R-2.10).

Trend Summary Tables

Table 21R-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
2004	6.4	1.1	10.4	9.8	2.0	14.4
2008	5.7	5.9	-	7.7	5.5	-
2013	4.5	4.3	-	11.0	3.7	-
2017	4.3	4.1	-	9.8	5.3	-

Table 21R-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
2004	98	428	40	30	2.9	35.8	0.1	0.7
2008	149	432	68	54	4.5	39.9	0.8	1.0
2013	72	445	76	45	0.8	25.9	0.6	1.7
2017	45	453	94	56	1.5	40.1	1.1	1.8

Table 21R-02.8 - 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	18.8	1.1	32.4	3.2	1.6	56.4
2008	9.1	2.4	42.8	3.0	1.1	56.0
2013	10.2	0.3	62.4	1.0	0.6	38.6
2017	10.4	1.0	54.1	2.0	0.6	53.2

Table 21R-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	Rocky Mountain Elk	Rabbit
	Quadrat Frequency			
2004	5	51	-	42
2008	2	42	2	52
2013	3	23	2	14
2017	5	19	2	38
Year	Days Use Per Acre (ha)			
2004	10.9 (26.9)	191.0 (471.8)	4.7 (11.6)	-
2008	3.6 (9.0)	65.7 (162.2)	0.7 (1.7)	-
2013	6.5 (16.1)	18.1 (44.7)	3.4 (8.3)	-
2017	10.2 (25.1)	28.8 (71.2)	4.0 (9.9)	-

Table 21R-02.10 - 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)	Pascopyrum smithii (western wheatgrass)	Poa bulbosa ⁱ (bulbous bluegrass)	Poa secunda (Sandberg bluegrass)	Pseudoroegneria spicata (bluebunch wheatgrass)	Thinopyrum intermedium ⁱ (intermediate wheatgrass)
year	Nested Frequency							
2004	38	98	-	-	403	10	81	82
2008	9	149	1	-	378	34	148	150
2013	18	72	-	11	379	5	62	229
2017	-	45	2	-	429	9	64	186
year	Average Cover (%)							
2004	1.1	2.9	-	-	29.5	0.2	2.9	2.1
2008	0.3	4.5	0.0	-	26.5	0.4	7.3	5.3
2013	0.5	0.8	-	0.0	17.4	0.0	1.8	6.1
2017	-	1.5	0.0	-	30.0	0.2	1.4	8.5

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

Table 21R-02.11 - Forb Species. Nested frequency and modified Daubenmire average cover by year.

FORB SPECIES	Alyssum alyssoides ^{ai} (pale madwort)	Astragalus beckwithii (Beckwith's milkvetch)	Calochortus nuttallii (sego lily)	Ceratocephala testiculata ^{ai} (curvseed butterwort)	Cirsium (thistle)	Collinsia parviflora ^a (maiden blue eyed Mary)	Convolvulus arvensis ^{ai} (field bindweed)	Cryptantha (cryptantha)	Descurainia pinnata ^a (western tansymustard)	Erodium cicutarium ^{ai} (redstem stork's bill)	Lactuca serriola ^{ai} (prickly lettuce)	Petradoria pumila (rock goldenrod)	Phlox austromontana (mountain phlox)	Silene antirrhina ^a (sleepy silene)	Sphaeralcea coccinea (scarlet globemallow)	Streptanthus cordatus (heartleaf twistflower)	Tragopogon dubius ^{ai} (yellow salsify)
year	Nested Frequency																
2004	16	-	-	18	-	5	-	0	-	4	-	20	12	5	-	1	-
2008	17	1	8	7	-	-	7	3	4	33	4	20	15	-	3	-	11
2013	20	8	5	-	1	5	-	5	-	44	5	17	8	6	-	-	7
2017	18	3	4	1	7	5	-	9	-	65	5	20	4	-	-	-	3
year	Average Cover (%)																
2004	0.1	-	-	0.0	-	0.0	-	0.0	-	0.0	-	0.6	0.1	0.0	-	0.0	-
2008	0.0	0.0	0.0	0.0	-	-	0.1	0.0	0.0	0.3	0.2	0.7	0.1	-	0.0	-	0.3
2013	0.0	0.0	0.0	-	0.0	0.0	-	0.0	-	0.5	0.0	1.5	0.1	0.0	-	-	0.0
2017	0.1	0.0	0.0	0.0	0.2	0.1	-	0.2	-	0.9	0.0	1.1	0.1	-	-	-	0.0

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

FORB SPECIES	Vicia americana (American vetch)
year	Nested Frequency
2004	2
2008	4
2013	5
2017	16
year	Average Cover (%)
2004	0.0
2008	0.0
2013	0.0
2017	0.1

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

Table 21R-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 var. viscidiflorus (yellow rabbitbrush)	Gutierrezia sarothrae (broom snakeweed)	Juniperus osteosperma ⁱ (Utah juniper)	Linanthus pungens (granite prickly phlox)	Purshia stansburiana ^p (Stansbury cliffrose)	Purshia tridentata ^p (antelope bitterbrush)
year	Line Intercept Cover (%)						
2004	4.5	1.3	0.4	14.4	0.3	5	0.3
2008	2.8	1.4	3.8	-	0.3	4.7	0.2
2013	4	1.6	1.7	-	0.4	6.6	0.4
2017	4.6	1.8	2.7	-	0.8	4.2	1
year	Quadrat Cover (%)						
2004	3.3	0.4	0.3	10.4	0.4	2.8	0.4
2008	2.9	0.9	4.3	-	0.7	2.7	0.1
2013	2.7	1.1	2.3	-	1.0	1.8	0.0
2017	2.4	1.7	1.6	-	0.8	1.3	0.5

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

Table 21R-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.

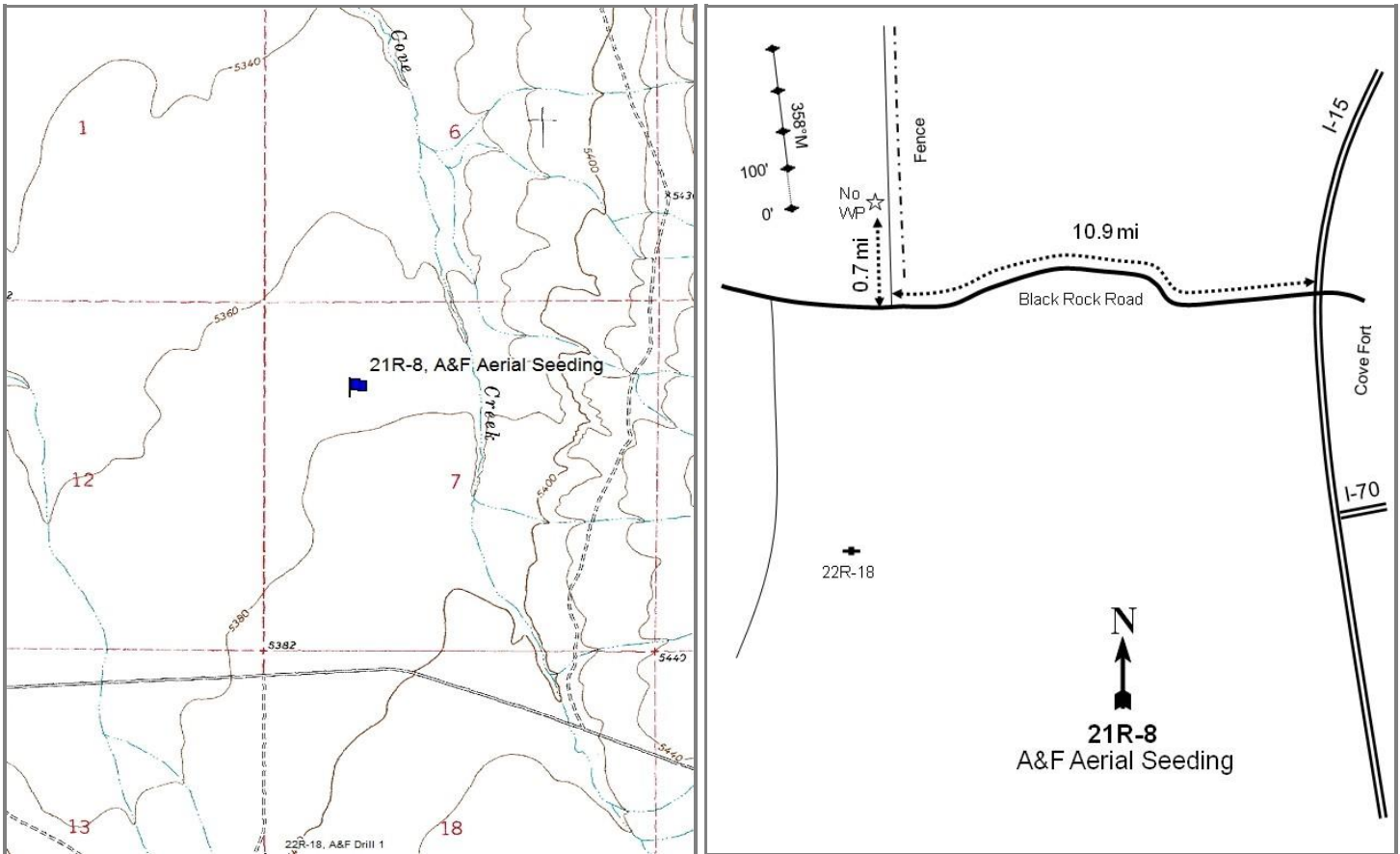
Year	Density		Age Class Distribution			Utilization		Poor Vigor (%)	Average Height Crown (cm)
	Plants Per Acre		Excluding Seedlings			Moderate (%)	Heavy (%)		
	Excluding Seedlings	Seedling	Young (%)	Mature (%)	Decadent (%)				
Artemisia tridentata ssp. wyomingensis^P -- (Wyoming big sagebrush)									
2004	1060	-	4	57	40	34	49	32	71/86
2008	840	140	12	48	41	10	38	36	60/77
2013	840	-	7	67	26	26	10	17	64/90
2017	720	40	6	81	14	33	8	8	75/106
Bassia prostrata^{Pi} -- (forage kochia)									
2004	-	-	-	-	-	-	-	-	-/-
2008	-	-	-	-	-	-	-	-	-/-
2013	-	-	-	-	-	-	-	-	32/62
2017	-	-	-	-	-	-	-	-	-/-
Cercocarpus montanus^P -- (alderleaf mountain mahogany)									
2004	-	-	-	-	-	-	-	-	-/-
2008	20	-	100	0	0	0	0	0	-/-
2013	-	-	-	-	-	-	-	-	-/-
2017	-	-	-	-	-	-	-	-	-/-
Chrysothamnus viscidiflorus ssp. viscidiflorus var. viscidiflorus -- (yellow rabbitbrush)									
2004	420	-	0	95	5	10	5	0	33/50
2008	460	40	9	87	4	26	17	0	36/56
2013	360	-	6	94	0	0	0	0	41/64
2017	440	-	5	96	0	0	0	0	49/83
Ephedra nevadensis^P -- (Nevada jointfir)									
2004	-	-	-	-	-	-	-	-	-/-
2008	-	-	-	-	-	-	-	-	254/245
2013	-	-	-	-	-	-	-	-	65/105
2017	-	-	-	-	-	-	-	-	-/-
Gutierrezia sarothrae -- (broom snakeweed)									
2004	620	-	39	61	0	0	0	0	19/21
2008	4360	220	3	94	3	0	0	1	23/36
2013	1840	100	2	94	4	2	0	4	24/35
2017	2340	-	27	73	0	0	0	0	25/33
Juniperus osteosperma^t -- (Utah juniper)									
2004	80	-	0	100	0	25	0	0	-/-
2008	-	-	-	-	-	-	-	-	-/-
2013	-	-	-	-	-	-	-	-	-/-
2017	20	-	100	0	0	0	0	0	-/-
Linanthus pungens -- (granite prickly phlox)									
2004	540	-	0	100	0	0	0	0	16/27
2008	660	-	0	100	0	0	0	0	19/31
2013	460	-	4	96	0	0	0	17	21/33
2017	640	-	0	100	0	16	0	0	27/34
Purshia stansburiana^P -- (Stansbury cliffrose)									
2004	220	-	18	82	0	0	100	0	185/201
2008	200	40	10	90	0	10	50	0	193/247
2013	120	40	17	67	17	17	0	0	181/172
2017	120	40	17	67	17	17	0	17	207/171
Purshia tridentata^P -- (antelope bitterbrush)									
2004	20	-	0	100	0	0	100	0	101/151
2008	20	-	0	100	0	0	100	0	82/176
2013	40	-	50	50	0	50	0	0	53/87
2017	40	-	0	100	0	0	50	0	64/99

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

Table 21R-02.14 - 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	77	-	18	18	41	24	14.5
2008	33	-	70	30	-	-	7.1
2013	33	-	83	17	-	-	5.0
2017	33	-	9	91	-	-	9.0

A&F AERIAL SEEDING - STUDY NO. 21R-8



Location Information

USGS 7.5 min Map Info
GPS (0' Stake)

Antelope Spring SE; Township 25S, Range 8W, Section 07
NAD 83 UTM ZONE 12, 343214 East 4280041 North

Transect Information

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

667
358° magnetic
400ft
Line 1 (11ft & 95ft), Line 2 (34ft), Line 3 (59ft), Line 4 (71ft)
Standard

Directions to Site

Take the Cove Fort exit on I-15 and proceed west on Black Rock Road for 0.9 miles to a cattle guard, then continue 2.8 miles to the next cattle guard. Drive 3.8 miles, 0.9 miles, 0.7 miles, and 0.5 miles to the next cattle guards (10.9 miles in total). From here, drive 1.3 miles to a fence line on the right. Take the faint road along the fence line for 0.7 miles to the site. There is no witness post, so go 200 feet to the 0-foot stake on the left side of the road. There is no browse tag; go to the southern most white post.

Site Information

Land Ownership	Private
Land Administrator	Private
Allotment	TWIN PEAKS
Elevation	5,381ft (1,640m)
Aspect	Flat
Slope	0%
Sample Dates	08/21/2008, 06/21/2011, 06/20/2017

Table 21R-08.1 Disturbance History. Recorded history of major disturbances.

Treatment/Disturbance	Name	WRI DB#	Date	Size (acres)
Fire - Wildfire	Milford Flat	-	July 2007	363052
Seeding - Rangeland Drill	Milford Flat Fire Rehabilitation - Missouri Flat	1007	Fall 2007	7925

Table 21R-08.2 Seed Mix. List of known seeded plant species and rates (if available).

Mix Name			Application Type	Application Date	Acres
Missouri Flat Black Rock Road 1			Drill	Jan 2008	1400
Type	Species	Common Name	Cultivar/Source ID	Bulk lbs/acre	PLS lbs/acre
G	Achnatherum hymenoides	Indian Ricegrass	Rimrock	0.50	0.49
G	Agropyron cristatum	Crested Wheatgrass	Ephraim	0.82	0.73
G	Agropyron cristatum	Crested Wheatgrass	Hycrest	0.71	0.63
G	Agropyron cristatum	Crested Wheatgrass	Hycrest	1.19	1.12
G	Agropyron cristatum	Crested Wheatgrass	Hycrest	0.86	0.80
G	Psathyrostachys juncea	Russian Wildrye		1.54	1.30
G	Psathyrostachys juncea	Russian Wildrye		1.82	1.54
G	Thinopyrum intermedium	Pubescent Wheatgrass		2.27	2.07
G	Thinopyrum intermedium	Pubescent Wheatgrass		1.21	1.11
S	Atriplex canescens	Fourwing Saltbush	Millard/Sanpete/Juab UT	0.29	0.11
S	Bassia prostrata	Forage Kochia	Humbolt/Lander NV	0.11	0.07
S	Bassia prostrata	Forage Kochia	Harney OR	0.11	0.09
Mix Name			Application Type	Application Date	Acres
Missouri Flat Black Rock Road 2			Drill	Jan 2008	1100
Type	Species	Common Name	Cultivar/Source ID	Bulk lbs/acre	PLS lbs/acre
G	Agropyron cristatum	Crested Wheatgrass	Hycrest	1.27	0.98
G	Agropyron fragile	Siberian Wheatgrass	Vavilov	1.73	1.35
G	Psathyrostachys juncea	Russian Wildrye		0.89	0.74
G	Psathyrostachys juncea	Russian Wildrye		1.82	1.47
G	Thinopyrum intermedium	Intermediate Wheatgrass	Rush	2.50	2.30
G	Thinopyrum intermedium	Pubescent Wheatgrass		2.50	2.19
S	Atriplex canescens	Fourwing Saltbush	Millard/Sanpete/Juab UT	0.27	0.11
S	Bassia prostrata	Forage Kochia	Elmore ID	0.36	0.25

Wildlife Habitat and Vegetation History**Table 21R-08.3 - Wildlife Seasonal Habitat.** UDWR wildlife habitat and seasonality.

Species	Habitat	Season
Pronghorn	crucial	year-long

Table 21R-08.4 - Vegetation History. The dominant vegetation type(s) and phase of woodland succession (Tausch, Miller, Roundy, & Chambers, 2009).

Year	Vegetation Type	Woodland Succession
2008	Barren/Perennial Grass	NA
2011	Perennial Grass/Annual Grass	NA
2017	Broom Snakeweed/Perennial Grass/Annual Grass	NA

Site Notes

No Notes

Site Potential

1981 - 2010 Average Annual Precipitation	12 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.

At the time of establishment in 2008 following the Milford Flat fire, the primary vegetation on the site was perennial grasses, namely James' galleta (*Pleuraphis jamesii*) and Indian ricegrass (*Achnatherum hymenoides*) (Table 21R-8.7, Table 21R-8.10). In subsequent years, the introduced annual grass species cheatgrass (*Bromus tectorum*) became a co-dominant species on the site (Table 21R-8.10). In the most recent sample year, broom snakeweed (*Gutierrezia sarothrae*) increased and also became a co-dominant component of the plant community with significant cover (Table 21R-8.12). Rubber rabbitbrush (*Ericameria nauseosa*) has increased in the years following the fire, although it is still a minor component of the overall community (Table 21R-08.13). It is likely that this site will remain in this altered vegetative state in the future as the scope and intensity of the fire severely altered the community both on the site and across the treatment area.

Trend Summary Tables**Table 21R-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
2008	-	-	-	-	-	-
2011	-	3.3	-	-	5.5	-
2017	-	13.3	-	-	22.8	-

Table 21R-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
2008	4	41	1	91	0.0	2.1	0.0	0.4
2011	421	126	353	144	11.4	8.5	2.8	4.3
2017	345	242	137	28	11.5	11.3	1.5	0.8

Table 21R-08.8 - 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
2008	3.3	1.0	0.8	94.2	0.6	2.9
2011	9.1	0.0	19.5	44.8	1.5	32.1
2017	35.8	0.0	19.1	26.2	0.5	34.8

Table 21R-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	Rabbit
	Quadrat Frequency	
2011	1	-
2017	3	1
Year	Days Use Per Acre (ha)	
	2011	10.2 (25.1)
2017	13.8 (34.1)	-

Table 21R-08.10 - 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)	Hesperostipa comata (needle and thread)	Pleuraphis jamesii (James' galleta)	Psathyrostachys juncea ⁱ (Russian wildrye)	Thinopyrum intermedium ⁱ (intermediate wheatgrass)
year	Nested Frequency								
2008	5	-	1	4	-	-	35	-	-
2011	17	13	-	421	44	1	61	1	0
2017	63	15	5	345	89	16	41	54	-
year	Average Cover (%)								
2008	0.3	-	0.0	0.0	-	-	1.8	-	-
2011	2.7	0.4	-	11.4	1.1	0.0	4.1	0.1	0.0
2017	1.2	0.5	0.2	11.5	1.8	0.6	3.1	3.9	-

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

Table 21R-08.11 - Forb Species. Nested frequency and modified Daubenmire average cover by year.

FORB SPECIES	Alyssum desertorum ^{ai} (desert madwort)	Astragalus argophyllus (silverleaf milkvetch)	Astragalus lentiginosus (freckled milkvetch)	Chaetopappa ericoides (rose heath)	Collinsia parviflora ^a (maiden blue eyed Mary)	Descurainia pinnata ^a (western tansymustard)	Erodium cicutarium ^{ai} (redstem stork's bill)	Gilia inconspicua ^a (shy gilia)	Lactuca serriola ^{ai} (prickly lettuce)	Machaeranthera canescens (hoary tansyaster)	Phlox longifolia (longleaf phlox)	Salsola tragus ^{ai} (prickly Russian thistle)	Sisymbrium altissimum ^{ai} (tall tumblemustard)	Sphaeralcea grossularifolia (gooseberry/leaf globemallow)
year	Nested Frequency													
2008	-	-	-	7	-	-	1	-	-	-	84	-	-	3
2011	212	5	62	7	-	7	26	-	9	2	78	301	21	5
2017	93	5	4	10	2	-	77	3	-	3	-	3	-	6
year	Average Cover (%)													
2008	-	-	-	0.0	-	-	0.0	-	-	-	0.2	-	-	0.2
2011	0.5	0.0	2.8	0.4	-	0.0	0.1	-	0.0	0.0	0.4	2.1	0.1	0.5
2017	0.3	0.0	0.0	0.5	0.0	-	1.3	0.0	-	0.1	-	0.0	-	0.0

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

Table 21R-08.12 - Shrub and Tree Species. Average modified Daubenmire quadrat and line intercept cover by year.

SHRUB SPECIES	Line Intercept Cover (%)	
	Ericameria nauseosa (rubber rabbitbrush)	Gutierrezia sarothrae (broom snakeweed)
year	Line Intercept Cover (%)	
2008	-	-
2011	0.3	5.2
2017	0.9	21.9
year	Quadrat Cover (%)	
2008	-	-
2011	0.0	3.3
2017	0.0	13.2

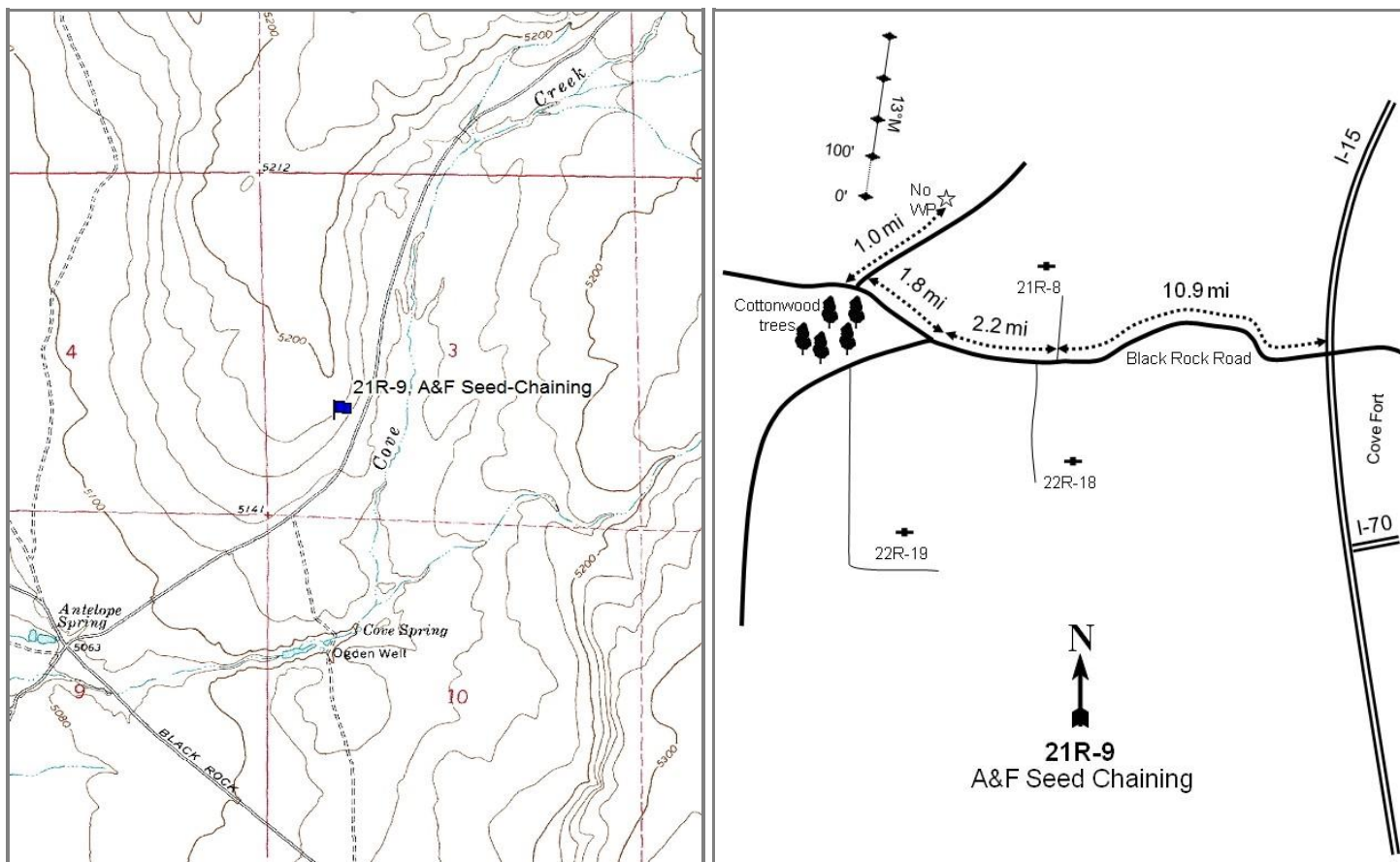
t - Tree Species; p - Preferred Browse; i - Introduced Species

Table 21R-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 (%)				
Atriplex canescens ^p -- (fourwing saltbush)									
2011	-	-	-	-	-	-	-	-	45/47
2017	-	-	-	-	-	-	-	-	-/-
Ericameria nauseosa -- (rubber rabbitbrush)									
2011	20	-	100	0	0	0	0	0	32/45
2017	1360	60	22	78	0	9	0	0	50/75
Gutierrezia sarothrae -- (broom snakeweed)									
2011	2740	20	24	75	1	1	0	0	23/39
2017	15740	300	9	86	6	0	0	6	16/31

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

A&F AERIAL SEEDING 2 - STUDY NO. 21R-9

**Location Information**

USGS 7.5 min Map Info
GPS (0' Stake)

Antelope Spring SW; Township 25S, Range 9W, Section 03
NAD 83 UTM ZONE 12, 338402 East 4281120 North

Transect Information

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

242
13° magnetic
400ft
Line 1 (11ft & 95ft), Line 2 (34ft), Line 3 (59ft), Line 4 (71ft)
No Rebar

Directions to Site

Take the Cove Fort exit on I-15 and proceed west on Black Rock Road for 0.9 miles to a cattle guard, then continue 2.8 miles to the next cattle guard. Drive 3.8 miles, 0.9 miles, 0.7 miles, and 0.5 miles to the next cattle guards. From here, drive 1.3 miles to a fence line on the right (the turnoff to 21R-8) (10.9 miles total from Cove Fort). Drive 0.7 miles to a cattle guard, proceed 1.8 miles to a fork, and go right to another cattle guard. From here, drive 1.8 miles to a fork with some cottonwood trees, go right, and proceed for 1.0 miles to the site. There is no witness post; go 200 feet to the 0-foot stake on the left (north) side of the road. The 0-foot stake is marked with browse tag #242.

Site Information

Land Ownership	Private
Land Administrator	Private
Allotment	TWIN PEAKS
Elevation	5,172ft (1,576m)
Aspect	East-Northeast
Slope	4-9%
Sample Dates	08/21/2008, 06/21/2011, 06/20/2017

Table 21R-09.1 Disturbance History. Recorded history of major disturbances.

Treatment/Disturbance	Name	WRI DB#	Date	Size (acres)
Fire - Wildfire	Milford Flat	-	2007	363052
Seeding - Aerial	Milford Flat Fire Rehabilitation - JK	1010	Fall 2007	265

Table 21R-09.2 Seed Mix. List of known seeded plant species and rates (if available).

Mix Name			Application Type	Application Date	Acres
Milford Fire James Kaufman AERIAL			Aerial	Feb 2008	270
Type	Species	Common Name	Cultivar/Source ID	Bulk lbs/acre	PLS lbs/acre
G	<i>Agropyron cristatum</i>	Crested Wheatgrass	Hycrest	0.74	0.57
G	<i>Agropyron fragile</i>	Siberian Wheatgrass	Vavilov	0.37	0.29
G	<i>Pascopyrum smithii</i>	Western Wheatgrass	Arriba	2.22	2.08
G	<i>Poa secunda</i>	Canby Bluegrass	Canbar	0.37	0.32
G	<i>Psathyrostachys juncea</i>	Russian Wildrye		0.93	0.69
G	<i>Thinopyrum intermedium</i>	Intermediate Wheatgrass	Oahe	1.67	1.54
G	<i>Thinopyrum intermedium</i>	Pubescent Wheatgrass	Luna	2.22	2.04
F	<i>Melilotus officinalis</i>	Yellow Sweetclover		0.56	0.51
S	<i>Atriplex canescens</i>	Fourwing Saltbush	Millard/Sanpete/Juab UT	0.37	0.15
S	<i>Bassia prostrata</i>	Forage Kochia	Humbolt/Lander NV	0.74	0.49

Wildlife Habitat and Vegetation History**Table 21R-09.3 - Wildlife Seasonal Habitat.** UDWR wildlife habitat and seasonality.

Species	Habitat	Season
Pronghorn	crucial	year-long

Table 21R-09.4 - Vegetation History. The dominant vegetation type(s) and phase of woodland succession (Tausch, Miller, Roundy, & Chambers, 2009).

Year	Vegetation Type	Woodland Succession
2008	Barren/Perennial Grass	No Encroachment
2011	Annual Grass/Annual Forb	No Encroachment
2017	Annual Grass/Perennial Grass	No Encroachment

Site Notes

No Notes

Site Potential

1981 - 2010 Average Annual Precipitation	10 inches
NRCS Ecological Site	Semidesert Shallow Hardpan (10-14"ppt)
NRCS Ecological Site #	R028AY230UT
States and Transitions	No state and transition model is available for this ecological site.

When this site was established in 2007 following the Milford Flat fire, it was a barren/perennial grass community that has since transitioned into a perennial/annual grass dominated community. The primary species of the perennial grass community is needle and thread (*Hesperostipa comata*) and the primary annual grass is cheatgrass (*Bromus tectorum*) (Table 21R-09.10). The forb community mostly consists of the co-dominant weedy annual forbs curvseed butterwort (*Ceratocephala testiculata*), tall tumbledustard (*Sisymbrium altissimum*), and prickly Russian thistle (*Salsola tragus*) (Table 21R-09.11); the cover of these weedy annual forbs has decreased since the initial study (Table 21R-09.7). Cover of shrubs is low, with the most cover provided by Nevada jointfir (*Ephedra nevadensis*). It is possible that through time and barring a future disturbance, this site will move towards a perennial grass dominated community with decreased annual grass.

Trend Summary Tables**Table 21R-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
2008	0.2	0.0	-	0.4	-	-
2011	0.2	-	-	0.5	-	-
2017	0.4	0.1	-	0.7	2.2	-

Table 21R-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
2008	275	82	245	9	1.5	2.1	6.4	0.3
2011	371	167	405	28	12.1	7.2	11.7	1.4
2017	284	228	245	36	12.4	10.0	3.9	0.4

Table 21R-09.8 - 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
2008	35.0	-	10.7	48.5	5.8	12.8
2011	22.0	0.4	21.9	16.3	10.2	34.7
2017	49.8	0.1	19.3	8.0	8.2	24.9

Table 21R-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	Pronghorn	Cattle	Rabbit
	Quadrat Frequency		
2008	-	-	68
2011	-	1	7
2017	-	1	31
Year	Days Use Per Acre (ha)		
2008	-	-	-
2011	0.7 (1.7)	-	-
2017	-	21.1 (52.0)	-

Table 21R-09.10 - 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)	Hesperostipa comata (needle and thread)	Pleuraphis jamesii (James' galleta)	Poa secunda (Sandberg bluegrass)	Sporobolus cryptandrus (sand dropseed)	unknown perennial grass (unknown grass)
year	Nested Frequency									
2008	8	-	4	275	13	43	16	-	-	1
2011	36	2	10	371	52	41	34	3	14	-
2017	34	3	93	284	26	84	28	-	16	-
year	Average Cover (%)									
2008	0.2	-	0.0	1.5	0.1	1.3	0.5	-	-	0.0
2011	1.2	0.2	0.5	12.1	0.7	3.1	0.9	0.0	0.6	-
2017	0.9	0.0	1.8	12.4	0.7	4.5	1.3	-	0.6	-

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

Table 21R-09.11 - Forb Species. Nested frequency and modified Daubenmire average cover by year.

FORB SPECIES	Alyssum desertorum ^{ai} (desert madwort)	Astragalus lentiginosus (freckled milkvetch)	Ceratocephala testiculata ^{ai} (curveseed butterwort)	Cryptantha gracilis ^{ai} (narrowstem cryptantha)	Eriogonum cernuum ^a (nodding buckwheat)	Erodium cicutarium ^{ai} (redstem stork's bill)	Halogeton glomeratus ^{ai} (saltlover)	Lactuca serriola ^{ai} (prickly lettuce)	Lappula occidentalis ^a (flatspine stickseed)	Lygodesmia (skeletonplant)	Mentzelia albicaulis ^a (whitestem blazingstar)	Phlox longifolia (longleaf phlox)	Salsola tragus ^{ai} (prickly Russian thistle)	Sisymbrium altissimum ^{ai} (tall tumblemustard)	Sphaeralcea grossularifolia (gooseberry/leaf globemallow)
year	Nested Frequency														
2008	8	-	3	-	23	127	3	-	4	1	125	-	24	28	8
2011	174	2	122	19	134	33	-	1	76	6	132	7	274	201	14
2017	26	-	29	10	4	165	3	-	-	-	39	-	40	35	36
year	Average Cover (%)														
2008	0.1	-	0.0	-	0.5	1.7	0.0	-	0.0	0.0	2.1	-	1.7	0.3	0.2
2011	1.1	0.0	1.1	0.3	0.6	0.5	-	0.0	0.4	0.1	0.5	0.0	1.2	5.9	1.3
2017	0.1	-	0.2	0.0	0.0	2.8	0.0	-	-	-	0.2	-	0.1	0.4	0.4

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

Table 21R-09.12 - Shrub and Tree Species. Average modified Daubenmire quadrat and line intercept cover by year.

SHRUB SPECIES	Chrysothamnus viscidiflorus (yellow rabbitbrush)	Ephedra nevadensis ^p (Nevada jointfir)	Gutierrezia sarothrae (broom snakeweed)	Opuntia (pricklypear)
year	Line Intercept Cover (%)			
2008	-	0.4	-	-
2011	-	0.5	-	-
2017	-	0.7	-	2.2
year	Quadrat Cover (%)			
2008	0.0	0.2	-	-
2011	-	0.2	-	-
2017	-	0.4	0.1	0.0

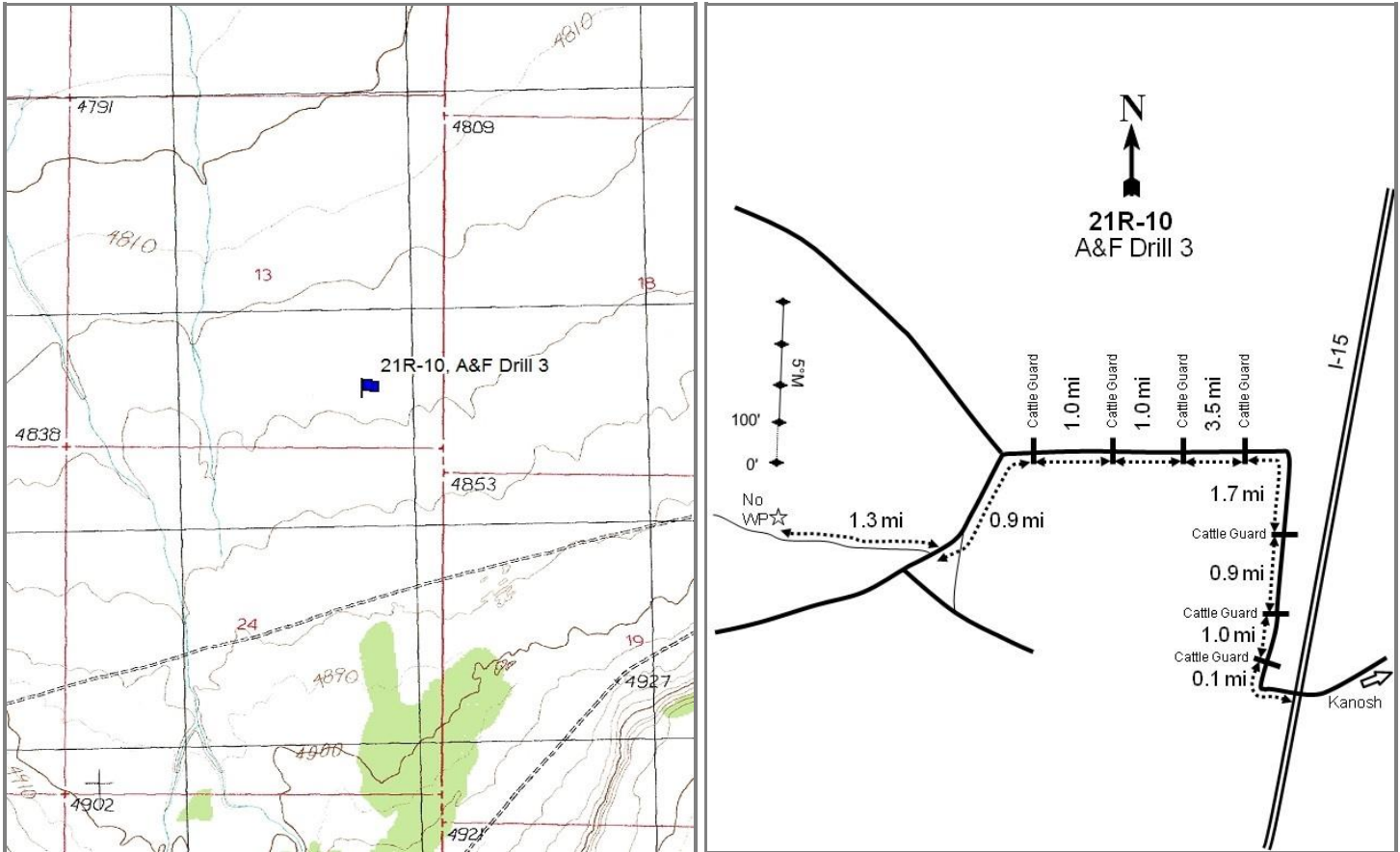
t - Tree Species; p - Preferred Browse; i - Introduced Species

Table 21R-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 (%)				
Chrysothamnus viscidiflorus -- (yellow rabbitbrush)									
2008	40	-	100	0	0	0	0	100	- / -
2011	-	-	-	-	-	-	-	-	24/32
2017	-	-	-	-	-	-	-	-	15/38
Ephedra nevadensis^P -- (Nevada jointfir)									
2008	480	-	0	100	0	0	0	75	24/40
2011	140	-	0	100	0	100	0	0	38/60
2017	120	-	17	83	0	0	67	17	44/89
Gutierrezia sarothrae -- (broom snakeweed)									
2008	-	-	-	-	-	-	-	-	- / -
2011	-	-	-	-	-	-	-	-	27/43
2017	40	-	0	100	0	0	0	0	31/73
Krascheninnikovia lanata^P -- (winterfat)									
2008	-	-	-	-	-	-	-	-	22/41
2011	-	-	-	-	-	-	-	-	- / -
2017	-	-	-	-	-	-	-	-	- / -
Opuntia -- (pricklypear)									
2008	-	-	-	-	-	-	-	-	- / -
2011	20	-	0	100	0	0	0	0	14/29
2017	20	-	0	100	0	0	0	0	19/45
Sarcobatus vermiculatus -- (greasewood)									
2008	-	-	-	-	-	-	-	-	- / -
2011	-	-	-	-	-	-	-	-	- / -
2017	-	-	-	-	-	-	-	-	71/157

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

A&F DRILL 3 - STUDY NO. 21R-10

**Location Information**

USGS 7.5 min Map Info
GPS (0' Stake)

Black Point SW; Township 23S, Range 8W, Section 13
NAD 83 UTM ZONE 12, 352719 East 4296790 North

Transect Information

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

273
5° magnetic
400ft
Line 1 (11ft & 95ft), Line 2 (34ft), Line 3 (59ft), Line 4 (71ft)
Standard

Directions to Site

Proceed south from Kanosh on the main road. Drive under the I-15 overpass and turn right at the cattle guard (pavement ends). Go 1.0 mile to a cattle guard, then continue for 0.9 miles and 0.4 miles to the next cattle guards. Drive 1.2 miles to a fork and turn left, driving 0.5 miles to another cattle guard. Continue on this road 3.5 miles, 1.0 mile, and 1.0 mile to each of the next cattle guards. Go left at the fork and drive 0.9 miles to another fork, keeping right. Drive 0.4 miles to a faint two-track on the right. Follow the two-track for 1.3 miles to the site. There is no witness post; go 15 feet to the 0-foot stake on the right (north) side of the road. The 0-foot stake is marked with browse tag #273.

Site Information

Land Ownership	Private
Land Administrator	Private
Allotment	BLACK POINT
Elevation	4,842ft (1,476m)
Aspect	Northeast
Slope	0-2%
Sample Dates	08/21/2008, 06/22/2011, 06/22/2017

Table 21R-10.1 Disturbance History. Recorded history of major disturbances.

Treatment/Disturbance	Name	WRI DB#	Date	Size (acres)
Fire - Wildfire	Milford Flat	-	July 2007	363052
Seeding - Rangeland Drill	Milford Flat Fire Rehabilitation - BG	1006	November 2007	2896

Table 21R-10.2 Seed Mix. List of known seeded plant species and rates (if available).

Mix Name			Application Type	Application Date	Acres
Milford Flat Fire B. George (Mix A)			Drill	Nov 2007	1520
Type	Species	Common Name	Cultivar/Source ID	Bulk lbs/acre	PLS lbs/acre
G	<i>Achnatherum hymenoides</i>	Indian Ricegrass	Rimrock	0.69	0.63
G	<i>Agropyron cristatum</i>	Crested Wheatgrass	Douglas	1.58	1.32
G	<i>Agropyron cristatum</i>	Crested Wheatgrass	Nordan	0.26	0.23
G	<i>Agropyron cristatum</i>	Crested Wheatgrass	Nordan	1.28	1.17
G	<i>Agropyron fragile</i>	Siberian Wheatgrass	Vavilov	1.37	1.01
G	<i>Agropyron fragile</i>	Siberian Wheatgrass	Vavilov	0.10	0.09
G	<i>Elymus lanceolatus</i>	Thickspike Wheatgrass	Critana	0.99	0.88
G	<i>Pascopyrum smithii</i>	Western Wheatgrass	Arriba	1.48	1.38
G	<i>Poa secunda</i>	Canby Bluegrass	Canbar	0.16	0.14
G	<i>Psathyrostachys juncea</i>	Russian Wildrye		1.38	1.25
G	<i>Psathyrostachys juncea</i>	Russian Wildrye		0.56	0.47
S	<i>Atriplex canescens</i>	Fourwing Saltbush	Beaver UT	0.43	0.22
S	<i>Bassia prostrata</i>	Forage Kochia	Immigrant	0.26	0.25
Mix Name			Application Type	Application Date	Acres
Milford Flat Fire B. George (Mix B)			Drill	Nov 2007	1377
Type	Species	Common Name	Cultivar/Source ID	Bulk lbs/acre	PLS lbs/acre
G	<i>Achnatherum hymenoides</i>	Indian Ricegrass	Rimrock	0.65	0.60
G	<i>Agropyron cristatum</i>	Crested Wheatgrass	Douglas	1.02	0.85
G	<i>Agropyron cristatum</i>	Crested Wheatgrass	Hycrest	1.02	0.78
G	<i>Agropyron cristatum</i>	Crested Wheatgrass	Nordan	1.02	0.97
G	<i>Agropyron fragile</i>	Siberian Wheatgrass	Vavilov	1.53	1.39
G	<i>Elymus lanceolatus</i>	Thickspike Wheatgrass	Critana	0.98	0.91
G	<i>Pascopyrum smithii</i>	Western Wheatgrass	Arriba	1.89	1.77
G	<i>Poa secunda</i>	Canby Bluegrass	Canbar	0.22	0.16
G	<i>Psathyrostachys juncea</i>	Russian Wildrye		1.92	1.62
S	<i>Atriplex canescens</i>	Fourwing Saltbush	Lincoln NV	0.24	0.09
S	<i>Bassia prostrata</i>	Forage Kochia	Immigrant	0.36	0.21

Wildlife Habitat and Vegetation History**Table 21R-10.3 - Wildlife Seasonal Habitat.** UDWR wildlife habitat and seasonality.

Species	Habitat	Season	Brood/Young Rearing
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Table 21R-10.4 - Vegetation History. The dominant vegetation type(s) and phase of woodland succession (Tausch, Miller, Roundy, & Chambers, 2009).

Year	Vegetation Type	Woodland Succession
2008	Weedy Annual Forb	No Encroachment
2011	Weedy Annual Forb/Annual Grass	No Encroachment
2017	Annual Grass/Weedy Annual Forb	No Encroachment

Site Notes

No Notes

Site Potential

1981 - 2010 Average Annual Precipitation	10 inches
NRCS Ecological Site	Desert Loam (Shadscale)
NRCS Ecological Site #	R028AY124UT
States and Transitions	No state and transition model is available for this ecological site.

Following the Milford Flat fire in 2007, this site has been dominated by weedy annual forbs and annual grasses. In the first post-fire sample year, the primary species on the site was prickly Russian thistle (*Salsola tragus*); in subsequent years other weedy annual species such as desert madwort (*Alyssum desertorum*), tall tumbled mustard (*Sisymbrium altissimum*), and western tansymustard (*Descurainia pinnata*) have been co-dominant on the site (Table 21R-10.11). Annual grass, namely cheatgrass (*Bromus tectorum*), was present in very low numbers immediately post-fire, but has steadily increased to become the dominant species on the site (Table 21R-10.10). The primary shrub on the site is forage kochia (*Bassia prostrata*), which was introduced during the fire rehabilitation project (Table 21R-10.13). Overall, it is likely that this site will continue to exist as an introduced plant community due to the severity and size of the fire and subsequent loss of native plant communities.

Trend Summary Tables**Table 21R-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
2008	-	-	-	-	-	-
2011	0.3	-	-	0.2	-	-
2017	2.2	-	-	2.9	-	-

Table 21R-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
2008	11	13	123	-	0.0	0.0	15.5	-
2011	253	17	464	-	7.7	0.9	34.2	-
2017	468	22	436	-	37.0	0.9	14.3	-

Table 21R-10.8 - 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
2008	89.1	-	2.1	0.9	-	17.1
2011	46.5	0.0	19.0	0.0	-	40.2
2017	38.4	0.4	22.6	0.5	0.2	53.2

Table 21R-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	Rabbit
	Quadrat Frequency	
2011	-	1
2017	3	-
Year	Days Use Per Acre (ha)	
	2011	0.7 (1.8)
2017	13.1 (32.3)	-

Table 21R-10.10 - 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)	Hesperostipa comata (needle and thread)	Pascopyrum smithii (western wheatgrass)	unknown perennial grass (unknown grass)
year	Nested Frequency						
2008	-	-	11	-	1	-	12
2011	4	7	253	8	-	-	-
2017	-	-	468	3	18	1	-
year	Average Cover (%)						
2008	-	-	0.0	-	0.0	-	0.0
2011	0.2	0.7	7.7	0.0	-	-	-
2017	-	-	37.0	0.3	0.6	0.0	-

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

Table 21R-10.11 - Forb Species. Nested frequency and modified Daubenmire average cover by year.

FORB SPECIES	Alyssum desertorum ^{ai} (desert madwort)	Amaranthus albus ^{ai} (prostrate pigweed)	Ceratocephala testiculata ^{ai} (curvseed butterwort)	Descurainia pinnata ^a (western tansymustard)	Erodium cicutarium ^{ai} (redstem stork's bill)	Halogeton glomeratus ^{ai} (saltlover)	Malcolmia africana ^{ai} (African mustard)	Mentzelia albicaulis ^a (whitestem blazingstar)	Salsola tragus ^{ai} (prickly Russian thistle)	Sisymbrium altissimum ^{ai} (tall tumblemustard)
year	Nested Frequency									
2008	75	2	-	-	-	18	-	-	62	-
2011	370	-	161	149	5	15	17	65	313	238
2017	405	-	148	-	79	43	57	3	122	24
year	Average Cover (%)									
2008	0.3	0.0	-	-	-	0.4	-	-	14.7	-
2011	14.9	-	1.9	2.9	0.0	0.1	0.1	0.7	3.3	10.2
2017	4.7	-	1.1	-	3.1	0.5	2.9	0.0	1.7	0.3

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

Table 21R-10.12 - Shrub and Tree Species. Average modified Daubenmire quadrat and line intercept cover by year.

SHRUB SPECIES	
Bassia prostrata ^{pi} (forage kochia)	
year	Line Intercept Cover (%)
2008	-
2011	0.2
2017	2.9
year	Quadrat Cover (%)
2008	-
2011	0.3
2017	2.2

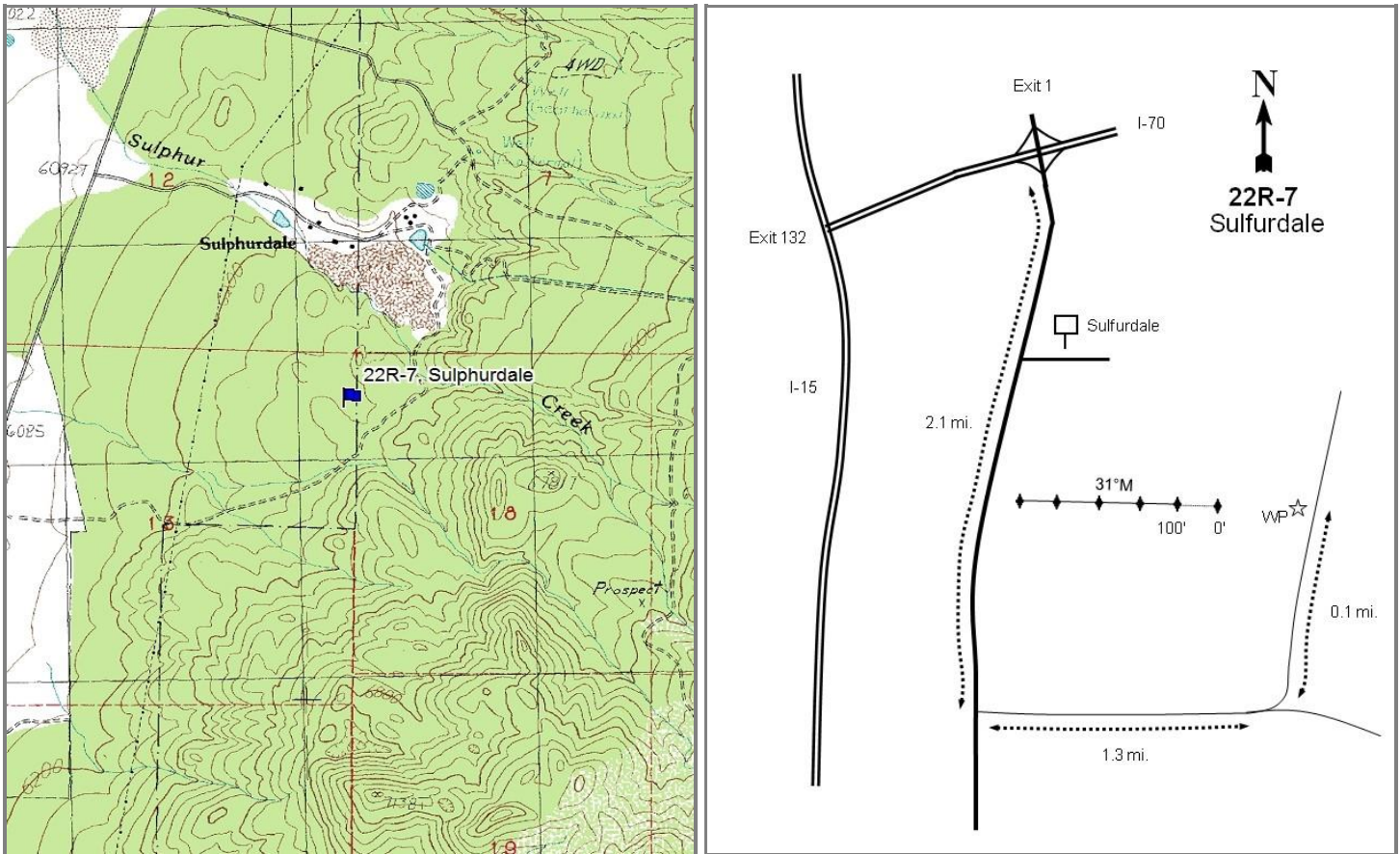
t - Tree Species; p - Preferred Browse; i - Introduced Species

Table 21R-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 (%)				
Atriplex confertifolia ^P -- (shadscale saltbush)									
2008	-	-	-	-	-	-	-	-	-/-
2011	-	-	-	-	-	-	-	-	8/15
2017	-	-	-	-	-	-	-	-	17/33
Bassia prostrata ^{pi} -- (forage kochia)									
2008	60	-	67	33	0	0	0	0	13/29
2011	720	5620	64	36	0	3	0	0	31/40
2017	1640	-	0	100	0	4	0	1	30/47
Chrysothamnus viscidiflorus ssp. viscidiflorus var. viscidiflorus -- (yellow rabbitbrush)									
2008	-	-	-	-	-	-	-	-	-/-
2011	-	-	-	-	-	-	-	-	-/-
2017	-	-	-	-	-	-	-	-	26/34

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

SULPHURDALE - STUDY NO. 22R-7

**Location Information**

USGS 7.5 min Map Info
GPS (0' Stake)

Cove Fort SW; Township 26S, Range 7W, Section 13
NAD 83 UTM ZONE 12, 362125 East 4268439 North

Transect Information

Browse Tag # (0' Stake)	71
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	No Rebar

Directions to Site

From Exit 1 off of I-70, proceed south on Highway 161 for 2.1 miles to a road on the left (east). Turn left and drive 1.3 miles to a fork. Take the left fork and drive for 0.1 miles to the witness post on the left (west) side of the road. From the witness post, walk 15 paces at 233 degrees magnetic to the 0-foot stake, marked with browse tag #71.

Site Information

Land Ownership	Federal
Land Administrator	BLM
Allotment	PINE CREEK/INDIAN CREEK
Elevation	6,300ft (1,920m)
Aspect	West
Slope	10-15%
Sample Dates	07/11/2005, 06/26/2008, 06/03/2013, 08/02/2017

Table 22R-07.1 Disturbance History. Recorded history of major disturbances.

Treatment/Disturbance	Name	WRI DB#	Date	Size (acres)
Chaining - Chain Unknown	Pine Creek Chaining	-	1983-1984	2800
Seeding - Seed Unknown	Pine Creek Chaining	-	1983-1984	2800
Hand Crew - Lop and Scatter	Sulphurdale	-	Fall 2005	-

Table 22R-07.2 Seed Mix. List of known seeded plant species and rates (if available).

Mix Name		Application Type	Application Date	Acres	
Pine Creek Chaining		Aerial	Sep 1983	2800	
Type	Species	Common Name	Cultivar/Source ID	Bulk lbs/acre	PLS lbs/acre
G	Agropyron cristatum	Crested Wheatgrass	Nordan	2.30	0.00
G	Bromus inermis	Smooth Brome		0.77	0.00
G	Psathyrostachys juncea	Russian Wildrye		0.77	0.00
G	Thinopyrum intermedium	Pubescent Wheatgrass		0.09	0.00
G	Thinopyrum intermedium	Intermediate Wheatgrass		0.77	0.00
F	Medicago sativa	Alfalfa		1.18	0.00
F	Melilotus officinalis	Yellow Sweetclover		0.07	0.00
F	Sanguisorba minor	Small Burnett		0.25	0.00

Wildlife Habitat and Vegetation History**Table 22R-07.3 - Wildlife Seasonal Habitat.** UDWR wildlife habitat and seasonality.

Species	Habitat	Season
Deer	crucial	winter
Elk	substantial	winter

Table 22R-07.4 - Vegetation History. The dominant vegetation type(s) and phase of woodland succession (Tausch, Miller, Roundy, & Chambers, 2009).

Year	Vegetation Type	Woodland Succession
2005	Juniper/Antelope Bitterbrush	Phase I transitioning to Phase II
2008	Antelope Bitterbrush/Mountain Big Sagebrush	Phase I
2013	Antelope Bitterbrush/Mountain Big Sagebrush	Phase I
2017	Antelope Bitterbrush/Mountain Big Sagebrush	Phase I

Site Notes

The project area was chained in the 50s and 60s and over time, pinyon and juniper encroached back into the area, reducing the forage available to the wintering mule deer and elk. Originally this area was part of the Sulphurdale PJ Thin and Seed WRI project #105, but the project was cancelled and the BLM completed the project without WRI funding. In 2008 and 2013, high pellet group abundance was estimated for deer (Table 22R-07.9).

Soils**Table 22R-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	7.0	49.4	28.4	22.2	3.6	15.2	374.4	0.7	07/11/2005

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.

When this study site was established in 2005, the shrub component was composed mainly of Utah juniper (*Juniperus osteosperma*) and antelope bitterbrush (*Purshia tridentata*) with a number of other shrubs contributing small amounts of cover (Table 22R-07.12). Annual grasses and forbs were a major component of the herbaceous understory, of which cheatgrass (*Bromus tectorum*) was a substantial part (Table 22R-07.10, Table 22R-07.11). After treatment, antelope bitterbrush and mountain big sagebrush (*Artemisia tridentata* ssp. *vaseyana*) were the main browse species, with sagebrush increasing in both cover and density over the duration of the study. Other shrub species contributed little cover over the same period (Table 22R-07.12, Table 22R-07.13). Perennial grasses have increased in post-treatment sample years while annual grasses have decreased, although they are still prevalent on the site (Table 22R-07.7). Tree cover decreased significantly and the remaining Utah juniper trees have become more mature following treatment (22R-07.14). The site is at a high risk for tree infilling in the future, which would likely reduce the potential of the site for shrub growth and understory productivity.

Trend Summary Tables**Table 22R-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
2005	5.2	1.3	9.7	8.4	0.6	15.3
2008	8.2	1.9	0.0	9.5	2.2	-
2013	11.6	1.8	0.4	15.6	1.8	0.6
2017	11.4	1.5	0.3	17.4	1.1	-

Table 22R-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
2005	283	239	371	118	7.9	7.5	5.7	3.3
2008	299	266	213	99	6.8	13.6	2.0	4.0
2013	308	302	358	133	4.2	11.8	4.3	3.4
2017	265	316	343	97	9.5	16.4	9.1	3.2

Table 22R-07.8 - 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	19.8	0.1	34.0	16.9	4.9	34.7
2008	11.8	0.1	51.5	12.5	4.4	32.2
2013	9.9	-	50.8	10.4	4.7	39.4
2017	9.7	0.1	50.0	15.7	7.6	44.5

Table 22R-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	Rocky Mountain Elk	Rabbit
	Quadrat Frequency			
2005	2	19	12	59
2008	6	24	8	59
2013	-	33	7	28
2017	4	18	1	26
Year	Days Use Per Acre (ha)			
2005	8.0 (19.7)	21.5 (53.0)	6.0 (14.9)	-
2008	6.5 (16.1)	57.0 (140.7)	16.8 (41.4)	-
2013	1.5 (3.6)	53.0 (130.8)	12.1 (29.8)	-
2017	5.1 (12.6)	30.8 (76.1)	12.8 (31.5)	-

Table 22R-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 arvensis ^{ai} (field brome)	Bromus inermis ⁱ (smooth brome)	Bromus tectorum ^{ai} (cheatgrass)	Elymus elymoides (squirreltail)	Elymus lanceolatus (thickspike 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											
2005	5	93	3	147	282	53	9	-	49	-	3	24
2008	0	62	-	160	299	67	-	2	62	2	0	42
2013	2	55	-	216	308	46	-	4	70	10	-	48
2017	1	62	-	244	265	9	-	5	113	10	-	16
year	Average Cover (%)											
2005	0.0	1.7	0.0	3.9	7.9	0.6	0.1	-	0.7	-	0.0	0.4
2008	0.0	1.3	-	7.8	6.8	1.9	-	0.1	1.3	0.2	0.0	0.9
2013	0.0	1.6	-	6.6	4.2	1.0	-	0.0	1.1	0.4	-	1.0
2017	0.0	1.7	-	10.4	9.5	0.1	-	0.0	3.3	0.4	-	0.4

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

Table 22R-07.11 - Forb Species. Nested frequency and modified Daubenmire average cover by year.

FORB SPECIES	Agoseris glauca (pale agoseris)	Allium (onion)	Alyssum alyssoides ^{ai} (pale madwort)	Alyssum desertorum ^{ai} (desert madwort)	Antennaria (pussytoes)	Arabis (rockcress)	Astragalus cibarius (browse milkvetch)	Astragalus convallarius (lesser nashy milkvetch)	Astragalus newberryi (Newberry's milkvetch)	Ceratocephala testiculata ^{ai} (curvseed butterwort)	Collinsia parviflora ^a (maiden blue eyed Mary)	Cryptantha (cryptantha)	Descurainia pinnata ^a (western tansymustard)	Epilobium brachycarpum ^a (tall annual willowherb)	Eriogonum caespitosum (matted buckwheat)	Eriogonum umbellatum (sulphur-flower buckwheat)	Erodium cicutarium ^{ai} (redstem stork's bill)
year	Nested Frequency																
2005	-	-	-	359	1	-	-	10	-	69	8	33	18	-	31	4	-
2008	1	-	-	195	-	-	-	8	3	60	-	24	-	-	11	-	6
2013	16	7	-	342	-	5	27	5	15	60	13	33	16	2	5	-	7
2017	2	-	21	328	-	-	-	-	-	20	7	26	9	-	10	-	12
year	Average Cover (%)																
2005	-	-	-	4.4	0.0	-	-	0.4	-	0.6	0.0	0.3	0.4	-	0.3	0.0	-
2008	0.0	-	-	1.1	-	-	-	0.3	0.0	0.8	-	0.7	-	-	0.1	-	0.0
2013	0.1	0.0	-	3.5	-	0.0	0.4	0.0	0.2	0.2	0.0	0.7	0.1	0.0	0.2	-	0.0
2017	0.0	-	0.1	7.8	-	-	-	-	-	0.1	0.0	0.4	0.0	-	0.5	-	0.4

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

FORB SPECIES																
Galium aparine ^a (stickywilly)	Gayophytum ramosissimum ^a (pinyon groundsmoke)	Gilia inconspicua ^a (shy gilia)	Hedysarum boreale (Utah sweetvetch)	Lactuca serriola ⁱⁱⁱ (prickly lettuce)	Lomatium (desertparsley)	Machaeranthera canescens (hoary tansyaster)	Microsteris gracilis ^a (slender phlox)	Packera multilobata (lobeleaf groundsel)	Petradoria pumila (rock goldenrod)	Phlox austromontana (mountain phlox)	Phlox longifolia (longleaf phlox)	Polygonum douglasii ^a (Douglas' knotweed)	Sphaeralcea coccinea (scarlet globemallow)	Streptanthus cordatus (heartleaf twistflower)	Tragopogon dubius ⁱⁱⁱ (yellow salsify)	
year	Nested Frequency															
2005	-	4	37	8	2	-	3	41	2	11	83	1	3	4	-	-
2008	-	1	-	32	1	1	1	-	4	4	58	-	-	1	-	2
2013	5	-	-	8	10	9	-	50	-	1	60	-	-	-	3	2
2017	6	-	-	4	4	-	-	4	7	2	60	3	-	2	-	-
year	Average Cover (%)															
2005	-	0.0	0.1	0.1	0.0	-	0.0	0.1	0.0	0.6	1.6	0.0	0.0	0.0	-	-
2008	-	0.0	-	0.7	0.0	0.0	0.0	-	0.0	0.5	1.6	-	-	0.0	-	0.0
2013	0.3	-	-	0.2	0.0	0.0	-	0.1	-	0.0	1.5	-	-	-	0.0	0.0
2017	0.5	-	-	0.0	0.1	-	-	0.0	0.1	0.2	2.0	0.0	-	0.0	-	-

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

Table 22R-07.12 - 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 depressus ^p (longflower rabbitbrush)	Chrysothamnus viscidiflorus (yellow rabbitbrush)	Ericameria nauseosa (rubber rabbitbrush)	Ericameria nauseosa ssp. nauseosa var. hololeuca ^p (rubber rabbitbrush)	Eriogonum microthecum ^p (slender buckwheat)	Gutierrezia sarothrae (broom snakeweed)	Juniperus osteosperma ⁱ (Utah juniper)	Opuntia (pricklypear)	Pinus edulis ⁱ (twoneedle pinyon)	Purshia tridentata ^p (antelope bitterbrush)	
year	Line Intercept Cover (%)										
2005	2.5	-	-	0.5	0.3	-	0.1	15.2	-	0.1	5.6
2008	3.3	-	1.6	-	0.7	-	0.6	-	-	-	5.5
2013	6.8	-	0.4	-	0.6	-	1.3	0.6	0.1	-	8.2
2017	8.3	-	-	-	0.3	-	1.1	-	-	-	8.8
year	Quadrat Cover (%)										
2005	2.1	-	-	0.8	0.0	-	0.5	9.7	-	0.0	3.1
2008	3.2	-	1.5	-	0.9	-	0.4	0.0	0.0	-	4.1
2013	6.9	0.0	0.8	-	1.0	0.0	0.9	0.4	0.0	-	3.7
2017	5.4	0.2	0.2	-	0.1	-	1.3	0.3	-	-	5.8

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

Table 22R-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. vaseyana^P -- (mountain big sagebrush)									
2005	860	100	30	65	5	40	0	2	73/100
2008	740	160	35	62	3	24	8	5	62/91
2013	940	20	32	66	2	6	0	0	55/90
2017	940	40	15	83	2	40	6	9	58/95
Chrysothamnus depressus^P -- (longflower rabbitbrush)									
2005	-	-	-	-	-	-	-	-	-/-
2008	-	-	-	-	-	-	-	-	-/-
2013	20	-	0	100	0	0	0	0	25/49
2017	120	-	0	100	0	0	0	0	13/27
Chrysothamnus viscidiflorus -- (yellow rabbitbrush)									
2005	-	-	-	-	-	-	-	-	-/-
2008	200	-	0	100	0	40	40	0	43/77
2013	40	-	0	100	0	0	0	0	47/87
2017	120	-	0	100	0	0	0	0	66/105
Eriogonum microthecum^P -- (slender buckwheat)									
2005	-	-	-	-	-	-	-	-	-/-
2008	-	-	-	-	-	-	-	-	-/-
2013	20	-	100	0	0	0	0	0	4/13
2017	140	-	0	100	0	0	0	0	22/45
Ericameria nauseosa -- (rubber rabbitbrush)									
2005	140	-	0	100	0	0	0	0	67/89
2008	20	-	100	0	0	100	0	0	100/88
2013	20	-	0	100	0	0	0	0	49/78
2017	-	-	-	-	-	-	-	-	70/91
Ericameria nauseosa ssp. nauseosa var. hololeuca^P -- (rubber rabbitbrush)									
2005	40	20	0	100	0	0	0	0	62/84
2008	60	40	0	100	0	33	33	0	67/91
2013	20	-	0	100	0	0	0	0	62/81
2017	40	-	0	50	50	50	0	0	66/86
Gutierrezia sarothrae -- (broom snakeweed)									
2005	620	-	7	94	0	0	0	0	25/25
2008	720	20	8	89	3	0	0	3	32/41
2013	1120	-	34	66	0	0	0	0	22/30
2017	1700	-	29	71	0	0	0	0	21/27
Juniperus osteosperma¹ -- (Utah juniper)									
2005	400	-	30	70	0	0	0	0	-/-
2008	20	40	100	0	0	0	0	0	-/-
2013	40	-	100	0	0	0	0	0	-/-
2017	20	-	0	100	0	0	0	0	-/-
Linanthus pungens -- (granite prickly phlox)									
2005	-	-	-	-	-	-	-	-	19/17
2008	-	-	-	-	-	-	-	-	-/-
2013	-	-	-	-	-	-	-	-	-/-
2017	-	-	-	-	-	-	-	-	-/-
Opuntia -- (pricklypear)									
2005	80	-	0	100	0	0	0	0	13/28
2008	60	-	0	100	0	0	0	0	19/28
2013	20	-	0	100	0	0	0	0	11/18
2017	-	-	-	-	-	-	-	-	11/26
Pinus edulis¹ -- (twoneedle pinyon)									
2005	40	20	100	0	0	0	0	0	-/-
2008	-	-	-	-	-	-	-	-	-/-
2013	-	-	-	-	-	-	-	-	-/-
2017	-	-	-	-	-	-	-	-	-/-
Purshia tridentata^P -- (antelope bitterbrush)									
2005	400	-	15	80	5	20	65	0	75/148
2008	360	-	17	78	6	6	50	6	93/175
2013	360	60	28	72	0	28	11	6	84/150
2017	620	-	19	77	3	26	52	7	84/164

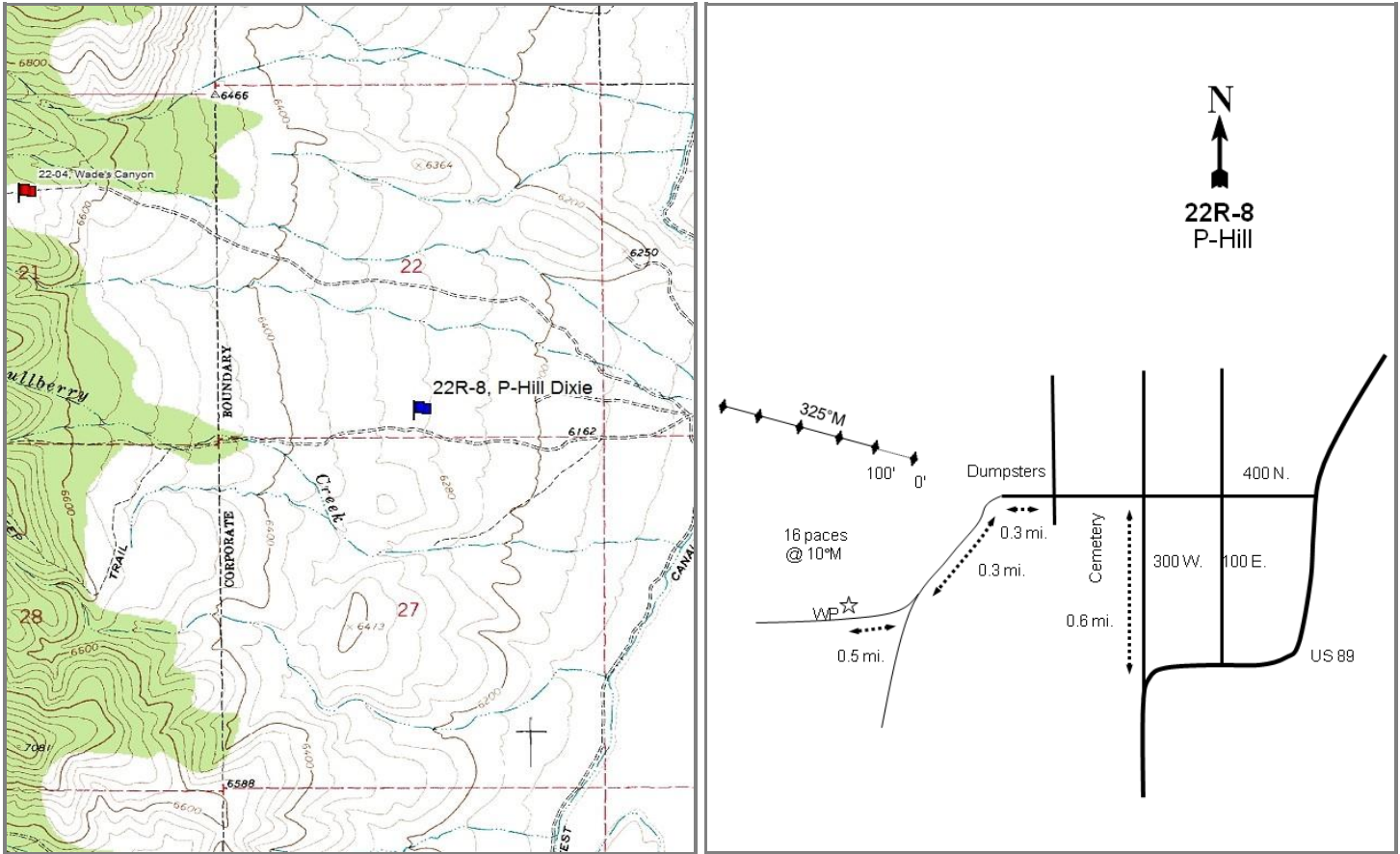
Year	Density		Age Class Distribution			Utilization		Poor Vigor (%)	Average Height Crown (cm)
	Plants Per Acre		Excluding Seedlings			Moderate (%)	Heavy (%)		
	Excluding Seedlings	Seedling	Young (%)	Mature (%)	Decadent (%)				
Quercus gambelii ^P -- (Gambel oak)									
2005	-	-	-	-	-	-	-	-	-/-
2008	-	-	-	-	-	-	-	-	74/45
2013	-	-	-	-	-	-	-	-	104/107
2017	-	-	-	-	-	-	-	-	63/57

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

Table 22R-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)							
2008	20	33	67	-	-	-	4.2
2013	24	-	64	36	-	-	3.5
2017	24	8	83	8	-	-	5.2
Pinus edulis (twoneedle pinyon)							
2017	1	100	-	-	-	-	2.0

P-HILL DIXIE - STUDY NO. 22R-8



Location Information

USGS 7.5 min Map Info Circleville SE; Township 30S, Range 4W, Section 22
 GPS (0' Stake) NAD 83 UTM ZONE 12, 386309 East 4226532 North

Transect Information

Browse Tag # (0' Stake)	73
Transect Bearing	325° 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 north into Circleville, UT on US-89, continue north on 300 West when US-89 bends east (just past 300 South). Drive north on 300 West for 0.6 miles to an intersection. Turn left (west) and drive past the cemetery. On the northwest corner of the cemetery is an intersection; continue straight for 0.3 miles to a two-track road on the right (west). Turn right onto the two-track road and drive 0.5 miles to the half-high witness post on the right (north) side of the road. From the half-high witness post, walk 16 paces at 10 degrees magnetic to the 0-foot stake which is marked with browse tag #73.

Site Information

Land Ownership	Federal
Land Administrator	BLM
Allotment	No data
Elevation	6,300ft (1,920m)
Aspect	East
Slope	6%
Sample Dates	07/12/2005, 06/11/2008, 05/30/2013, 08/01/2017

Table 22R-08.1 Disturbance History. Recorded history of major disturbances.

Treatment/Disturbance	Name	WRI DB#	Date	Size (acres)
Harrow - Two-Way Dixie	P-Hill One-way Harrow	119	Winter 2005-2006	1784
Seeding - Broadcast After	P-Hill One-way Harrow	119	Winter 2005-2006	1784

Table 22R-08.2 Seed Mix. List of known seeded plant species and rates (if available).

Mix Name			Application Type	Application Date	Acres
P-Hill			Broadcast	Oct 2005	3500
Type	Species	Common Name	Cultivar/Source ID	Bulk lbs/acre	PLS lbs/acre
G	Agropyron cristatum	Crested Wheatgrass	Hycrest	1.00	0.00
G	Festuca ovina	Sheep Fescue	Covar	1.00	0.00
G	Leymus cinereus	Great Basin Wildrye	Magnar	1.00	0.00
G	Poa secunda	Sandberg Bluegrass	Blue Mt.	1.50	0.00
G	Psathyrostachys juncea	Russian Wildrye	Bozoisky	1.00	0.00
G	Thinopyrum intermedium	Pubescent Wheatgrass	Luna	2.00	0.00
F	Helianthus annuus	Annual Sunflower		1.00	0.00
F	Linum perenne	Blue Flax	Appar	1.50	0.00
F	Medicago sativa	Alfalfa	Ladak	0.50	0.00
F	Melilotus officinalis	Yellow Sweetclover	Madrid	1.00	0.00
F	Onobrychis viciifolia	Sainfoin	Eski	1.00	0.00
F	Sanguisorba minor	Small Burnet	Delar	2.00	0.00
S	Atriplex canescens	Fourwing Saltbush		1.00	0.00
S	Bassia prostrata	Forage Kochia	Immigrant	1.50	0.00
Mix Name			Application Type	Application Date	Acres
P-Hill One-way Harrow			Broadcast	Oct 2005	3500
Type	Species	Common Name	Cultivar/Source ID	Bulk lbs/acre	PLS lbs/acre
F	Helianthus annuus	Annual Sunflower		0.29	0.00
F	Helianthus annuus	Annual Sunflower		0.26	0.00

Wildlife Habitat and Vegetation History**Table 22R-08.3 - Wildlife Seasonal Habitat.** UDWR wildlife habitat and seasonality.

Species	Habitat	Season
Deer	crucial	winter

Table 22R-08.4 - 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	Phase I
2008	Mountain Big Sagebrush	Phase I
2013	Mountain Big Sagebrush	Phase I
2017	Mountain Big Sagebrush/Annual Grass	Phase I

Site Notes

Years of drought and pressure from both wildlife and livestock left the project area in need of active restoration. Sagebrush die-off, combined with a decadent population and little to no understory, decreased this area's value to wintering populations of both mule deer and elk. The project was completed in a mosaic pattern over the entire project area, and as a result, part of the study transect was not treated by the harrow or was only one-way harrowed (WRI Database 2017).

Soils**Table 22R-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 Loam	6.7	64.4	23.7	11.8	0.3	17.2	240.0	0.4	07/12/2005

Site Potential

1981 - 2010 Average Annual Precipitation	10 inches
NRCS Ecological Site	Semidesert Gravelly Loam (Mountain Big Sagebrush) South
NRCS Ecological Site #	R028AY214UT
States and Transitions	No state and transition model is available for this ecological site.

This site has existed as a mountain big sagebrush (*Artemisia tridentata* ssp. *vaseyana*) dominated plant community since its establishment in 2005. Sagebrush cover decreased following treatment, but the age class distribution has diversified (Table 22R-08.12, Table 22R-08.13). Annual forbs contributed a majority of the herbaceous cover from 2005 to 2013. Annual grass cover remained low until 2017, when cheatgrass (*Bromus tectorum*) became the dominant herbaceous component (Table 22R-08.7, Table 22R-08.10, Table 22R-08.11). If high cover of annual grasses persists, the site is at risk for a modified fire regime and reduced resiliency.

Trend Summary Tables**Table 22R-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
2005	25.3	0.1	-	29.2	-	-
2008	6.4	-	-	8.0	-	-
2013	11.3	0.0	-	12.1	0.1	-
2017	9.3	0.1	-	13.6	-	-

Table 22R-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
2005	3	9	105	20	0.0	0.1	1.0	0.1
2008	-	14	54	1	-	0.1	1.4	0.0
2013	56	18	176	27	0.3	0.1	7.2	0.1
2017	253	46	51	30	15.8	0.8	1.2	0.6

Table 22R-08.8 - 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	33.3	0.5	26.7	23.4	9.8	25.5
2008	42.2	0.2	30.2	16.5	13.3	8.2
2013	33.8	1.0	41.0	4.0	9.0	19.0
2017	31.8	0.2	36.2	10.9	12.9	27.8

Table 22R-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	Mule Deer	Rocky Mountain Elk	Rabbit
	Quadrat Frequency		
2005	14	2	36
2008	20	-	93
2013	21	-	21
2017	13	-	59
Year	Days Use Per Acre (ha)		
2005	28.1 (69.5)	0.7 (1.7)	-
2008	43.6 (107.6)	0.7 (1.7)	-
2013	30.8 (76.1)	3.4 (8.3)	-
2017	7.4 (18.2)	-	-

Table 22R-08.10 - Grass Species. Nested frequency and modified Daubenmire average cover by year.

GRASS SPECIES							
Aristida purpurea (purple threeawn)							
Bouteloua gracilis (blue grama)							
Bromus tectorum ^{ai} (cheatgrass)							
Elymus elymoides (squirreltail)							
Festuca idahoensis (Idaho fescue)							
Hesperostipa comata (needle and thread)							
Vulpia octiflora ^a (sixweeks fescue)							
year	Nested Frequency						
2005	9	-	-	-	-	0	3
2008	11	3	-	0	-	-	-
2013	7	-	56	9	3	0	-
2017	17	7	253	23	-	-	-
year	Average Cover (%)						
2005	0.1	-	-	-	-	0.0	0.0
2008	0.1	0.0	-	0.0	-	-	-
2013	0.1	-	0.3	0.0	0.0	0.0	-
2017	0.3	0.0	15.8	0.5	-	-	-

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

Table 22R-08.11 - Forb Species. Nested frequency and modified Daubenmire average cover by year.

FORB SPECIES														
Astragalus lentiginosus (freckled milkvetch)														
Descurainia pinnata ^a (western tansymustard)														
Eriogonum cernuum ^a (nodding buckwheat)														
Gayophytum ramosissimum ^a (pinyon groundsmoke)														
Gilia inconspicua ^a (shy gilia)														
Helianthus annuus ^a (common sunflower)														
Lappula occidentalis ^a (flatspine stickseed)														
Linum perenne ⁱ (blue flax)														
Lygodesmia (skeletonplant)														
Salsola tragus ^{ai} (prickly Russian thistle)														
Sisymbrium altissimum ^{ai} (tall tumbledustard)														
Solanum (nightshade)														
Sphaeralcea grossularifolia (gooseberry/leaf globemallow)														
Verbascum thapsus ^{ai} (common mullein)														
year	Nested Frequency													
2005	20	80	5	17	6	-	4	-	0	-	-	-	-	-
2008	-	-	-	-	-	5	11	1	-	37	6	0	-	-
2013	22	3	-	8	-	-	136	-	5	36	110	-	2	3
2017	28	-	-	-	-	-	39	-	-	-	26	-	2	-
year	Average Cover (%)													
2005	0.1	0.9	0.0	0.1	0.0	-	0.0	-	0.0	-	-	-	-	-
2008	-	-	-	-	-	0.2	0.4	0.0	-	0.3	0.6	0.0	-	-
2013	0.0	0.0	-	0.0	-	-	3.6	-	0.0	0.1	3.5	-	0.0	0.0
2017	0.6	-	-	-	-	-	0.4	-	-	-	0.8	-	0.0	-

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

Table 22R-08.12 - 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)	Opuntia polyacantha (plains pricklypear)
year	Line Intercept Cover (%)	
2005	29.2	0
2008	8	-
2013	12.1	0.1
2017	13.6	-
year	Quadrat Cover (%)	
2005	25.3	0.1
2008	6.4	-
2013	11.3	0.0
2017	9.3	0.1

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

Table 22R-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.

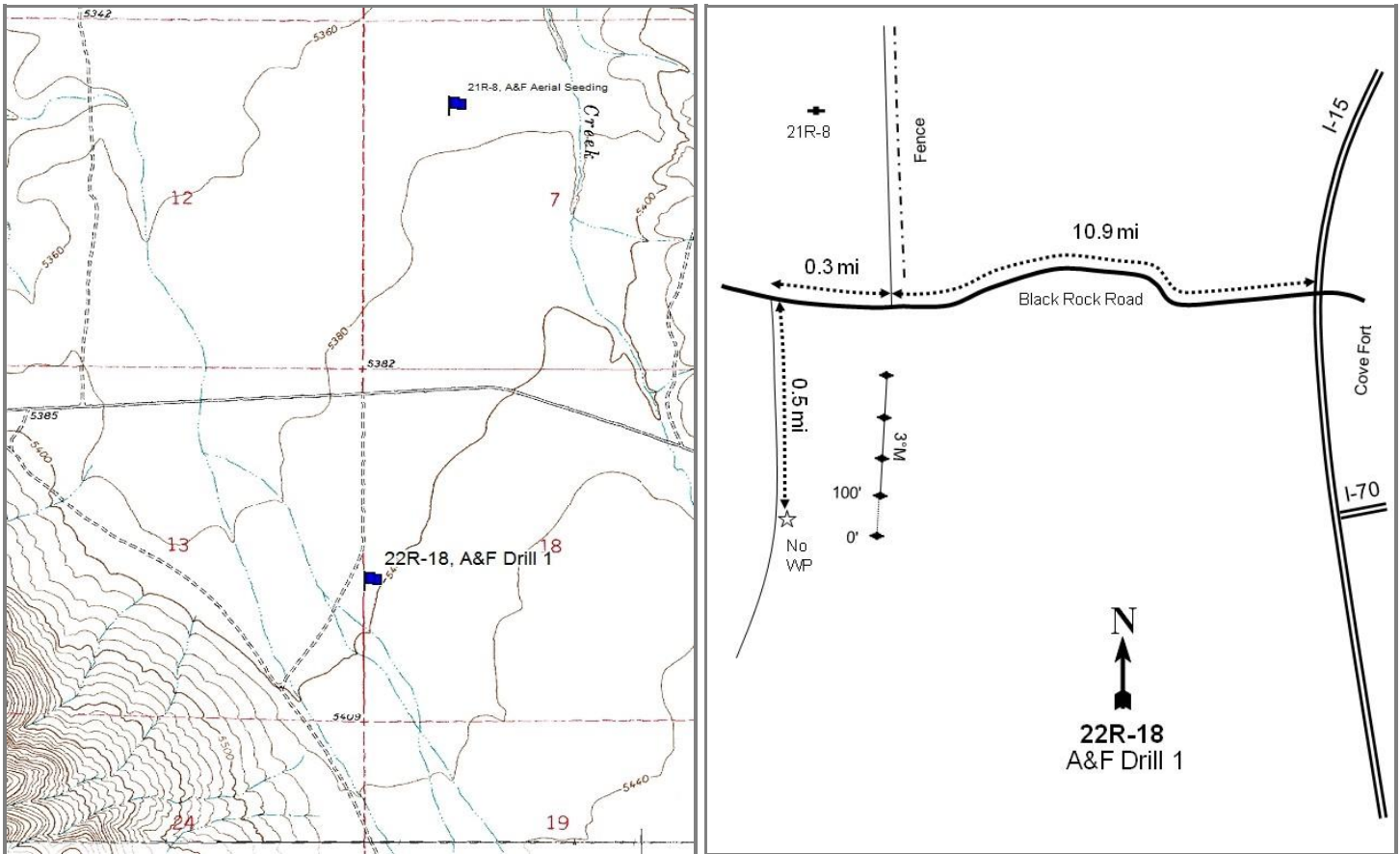
Year	Density		Age Class Distribution			Utilization		Poor Vigor (%)	Average Height Crown (cm)
	Plants Per Acre		Excluding Seedlings			Moderate (%)	Heavy (%)		
	Excluding Seedlings	Seedling	Young (%)	Mature (%)	Decadent (%)				
Artemisia tridentata ssp. vaseyana ^p -- (mountain big sagebrush)									
2005	5340	200	0	58	42	14	25	14	64/88
2008	2420	20	6	42	52	36	23	39	43/64
2013	5480	40	68	27	5	25	4	16	49/82
2017	3960	-	37	54	9	37	6	5	53/78
Opuntia polyacantha -- (plains pricklypear)									
2005	80	-	0	100	0	0	0	25	13/42
2008	-	-	-	-	-	-	-	-	12/34
2013	40	-	0	100	0	0	0	0	13/46
2017	60	-	0	100	0	0	0	0	11/32
Pinus edulis ^t -- (twoneedle pinyon)									
2005	-	-	-	-	-	-	-	-	-/-
2008	-	-	-	-	-	-	-	-	-/-
2013	-	-	-	-	-	-	-	-	-/-
2017	-	20	0	0	0	0	0	0	-/-

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

Table 22R-08.14 - 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' (%)	
Pinus edulis (twoneedle pinyon)							
2017	1	100	-	-	-	-	1.0

A&F DRILL 1 - STUDY NO. 22R-18



Location Information

USGS 7.5 min Map Info
GPS (0' Stake)

Antelope Spring SE; Township 25S, Range 8W, Section 18
NAD 83 UTM ZONE 12, 342809 East 4277860 North

Transect Information

Browse Tag # (0' Stake)	258
Transect Bearing	3° magnetic
Length	400ft
Belt Placement	Line 1 (11ft & 95ft), Line 2 (34ft), Line 3 (59ft), Line 4 (71ft)
Belt Marker Placement	Standard

Directions to Site

Take the Cove Fort exit on I-15 and proceed west on Black Rock Road 0.9 miles to a cattle guard, then continue 2.8 miles to the next cattle guard. Drive 3.8 miles, 0.9 miles, 0.7 miles, and 0.5 miles to the next cattle guards. From here, drive 1.3 miles to a fence line on the right (turn-off to 21R-8) (a total of 10.9 miles from I-15). Continue 0.3 miles to a road on the left (south). Turn left and drive for 0.5 miles to the site. There is no witness post; go 200 feet to the 0-foot stake on the left (east) side of the road. The 0-foot stake is marked with browse tag #258.

Site Information

Land Ownership	Private
Land Administrator	Private
Allotment	TWIN PEAKS
Elevation	5,330ft (1,625m)
Aspect	Northwest
Slope	2-3%
Sample Dates	08/21/2008, 06/21/2011, 06/20/2017

Table 22R-18.1 Disturbance History. Recorded history of major disturbances.

Treatment/Disturbance	Name	WRI DB#	Date	Size (acres)
Fire - Wildfire	Milford Flat	-	July 2007	363052
Seeding - Rangeland Drill	Milford Flat Fire Rehabilitation - Missouri Flat	1007	November 2007	7925

Table 22R-18.2 Seed Mix. List of known seeded plant species and rates (if available).

Mix Name			Application Type	Application Date	Acres
Missouri Flat Black Rock Road 1			Drill	Jan 2008	1400
Type	Species	Common Name	Cultivar/Source ID	Bulk lbs/acre	PLS lbs/acre
G	Achnatherum hymenoides	Indian Ricegrass	Rimrock	0.50	0.49
G	Agropyron cristatum	Crested Wheatgrass	Ephraim	0.82	0.73
G	Agropyron cristatum	Crested Wheatgrass	Hycrest	0.71	0.63
G	Agropyron cristatum	Crested Wheatgrass	Hycrest	1.19	1.12
G	Agropyron cristatum	Crested Wheatgrass	Hycrest	0.86	0.80
G	Psathyrostachys juncea	Russian Wildrye		1.54	1.30
G	Psathyrostachys juncea	Russian Wildrye		1.82	1.54
G	Thinopyrum intermedium	Pubescent Wheatgrass		2.27	2.07
G	Thinopyrum intermedium	Pubescent Wheatgrass		1.21	1.11
S	Atriplex canescens	Fourwing Saltbush	Millard/Sanpete/Juab UT	0.29	0.11
S	Bassia prostrata	Forage Kochia	Humbolt/Lander NV	0.11	0.07
S	Bassia prostrata	Forage Kochia	Harney OR	0.11	0.09
Mix Name			Application Type	Application Date	Acres
Missouri Flat Black Rock Road 2			Drill	Jan 2008	1100
Type	Species	Common Name	Cultivar/Source ID	Bulk lbs/acre	PLS lbs/acre
G	Agropyron cristatum	Crested Wheatgrass	Hycrest	1.27	0.98
G	Agropyron fragile	Siberian Wheatgrass	Vavilov	1.73	1.35
G	Psathyrostachys juncea	Russian Wildrye		0.89	0.74
G	Psathyrostachys juncea	Russian Wildrye		1.82	1.47
G	Thinopyrum intermedium	Intermediate Wheatgrass	Rush	2.50	2.30
G	Thinopyrum intermedium	Pubescent Wheatgrass		2.50	2.19
S	Atriplex canescens	Fourwing Saltbush	Millard/Sanpete/Juab UT	0.27	0.11
S	Bassia prostrata	Forage Kochia	Elmore ID	0.36	0.25

Wildlife Habitat and Vegetation History**Table 22R-18.3 - Wildlife Seasonal Habitat.** UDWR wildlife habitat and seasonality.

Species	Habitat	Season
Deer	crucial	winter
Pronghorn	crucial	year-long

Table 22R-18.4 - Vegetation History. The dominant vegetation type(s) and phase of woodland succession (Tausch, Miller, Roundy, & Chambers, 2009).

Year	Vegetation Type	Woodland Succession
2008	Perennial Grass	NA
2011	Perennial Grass	NA
2017	Perennial Grass	NA

Site Notes

No Notes

Site Potential

1981 - 2010 Average Annual Precipitation	13 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.

This area was a part of the Milford Flat Fire Rehabilitation project following the Milford Flat fire in 2007. In 2008 and subsequent sample years, this site has been a perennial grass dominated plant community, with crested wheatgrass (*Agropyron cristatum*) as the most abundant species (Table 22R-18.10). Forbs are sparse, and the annual species desert madwort (*Alyssum desertorum*) and redstem stork's bill (*Erodium cicutarium*) are the dominant species (Table 22R- 18.11). At the time of site establishment, shrub species were particularly rare. As of the most recent sampling in 2017, a majority of the shrub cover is contributed by forage kochia (*Bassia prostrata*) with other species being present but sparse (Table 22R-18.12). It is likely that this site will remain in the current introduced perennial grass/shrub state unless a significant disturbance happens to initiate a transition into another state.

Trend Summary Tables**Table 22R-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
2008	0.1	-	-	0.8	-	-
2011	2.4	-	-	10.5	-	-
2017	8.2	0.6	-	9.0	0.1	-

Table 22R-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
2008	109	191	52	13	1.0	4.4	1.9	0.2
2011	402	290	379	46	6.2	24.2	1.4	0.5
2017	366	269	374	6	6.5	13.5	4.3	0.1

Table 22R-18.8 - 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
2008	10.0	-	0.8	86.6	2.9	7.6
2011	4.1	0.2	20.9	40.7	1.8	34.5
2017	45.7	0.0	17.0	24.1	0.9	28.3

Table 22R-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	Rabbit
	Quadrat Frequency	
2008	-	5
2011	7	1
2017	7	22
Year	Days Use Per Acre (ha)	
2008	-	-
2011	10.2 (25.1)	-
2017	22.5 (55.6)	-

Table 22R-18.10 - Grass Species. Nested frequency and modified Daubenmire average cover by year.

GRASS SPECIES	Achnatherum hymenoides (Indian ricegrass)	Agropyron cristatum ⁱ (crested wheatgrass)	Agropyron fragile ⁱ (Siberian wheatgrass)	Bromus tectorum ^{ai} (cheatgrass)	Elymus elymoides (squirreltail)	Leymus cinereus (basin wildrye)	Pascopyrum smithii (western wheatgrass)	Psathyrostachys juncea ⁱ (Russian wildrye)	Sporobolus cryptandrus (sand dropseed)	Thinopyrum intermedium ⁱ (intermediate wheatgrass)	unknown perennial grass (unknown grass)
year	Nested Frequency										
2008	3	11	-	109	3	-	-	-	-	-	187
2011	32	200	4	402	1	26	40	43	0	141	-
2017	9	119	35	366	7	-	97	15	3	71	-
year	Average Cover (%)										
2008	0.1	0.1	-	1.0	0.0	-	-	-	-	-	4.1
2011	1.9	10.7	0.2	6.2	0.0	1.0	1.6	1.6	0.0	7.0	-
2017	0.3	5.1	1.4	6.5	0.1	-	3.7	0.9	0.1	1.9	-

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

Table 22R-18.11 - Forb Species. Nested frequency and modified Daubenmire average cover by year.

FORB SPECIES	Alyssum desertorum ^{ai} (desert madwort)	Amaranthus albus ^{ai} (prostrate pigweed)	Astragalus lentiginosus (freckled milkvetch)	Draba ^a (draba)	Erodium cicutarium ^{ai} (redstem stork's bill)	Melilotus officinalis ⁱ (sweetclover)	Phlox hoodii (spiny phlox)	Phlox longifolia (longleaf phlox)	Solanum triflorum ^a (cutleaf nightshade)	Sphaeralcea grossularifolia (gooseberry/leaf globemallow)	Verbena bracteata (bigbract verbena)
year	Nested Frequency										
2008	52	0	3	-	-	0	-	10	1	-	2
2011	379	-	7	5	7	-	1	37	-	3	-
2017	362	-	-	-	146	-	2	2	-	2	-
year	Average Cover (%)										
2008	1.1	0.4	0.0	-	-	0.0	-	0.0	0.4	-	0.1
2011	1.4	-	0.2	0.0	0.0	-	0.0	0.3	-	0.0	-
2017	2.1	-	-	-	2.3	-	0.0	0.0	-	0.1	-

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

Table 22R-18.12 - Shrub and Tree Species. Average modified Daubenmire quadrat and line intercept cover by year.

SHRUB SPECIES			
Atriplex canescens ^p (fourwing saltbush)			
Bassia prostrata ^{pi} (forage kochia)			
Gutierrezia sarothrae (broom snakeweed)			
year	Line Intercept Cover (%)		
2008	-	0.8	-
2011	0.4	10.1	-
2017	0.5	8.5	0.1
year	Quadrat Cover (%)		
2008	-	0.1	-
2011	0.0	2.4	-
2017	0.4	7.8	0.6

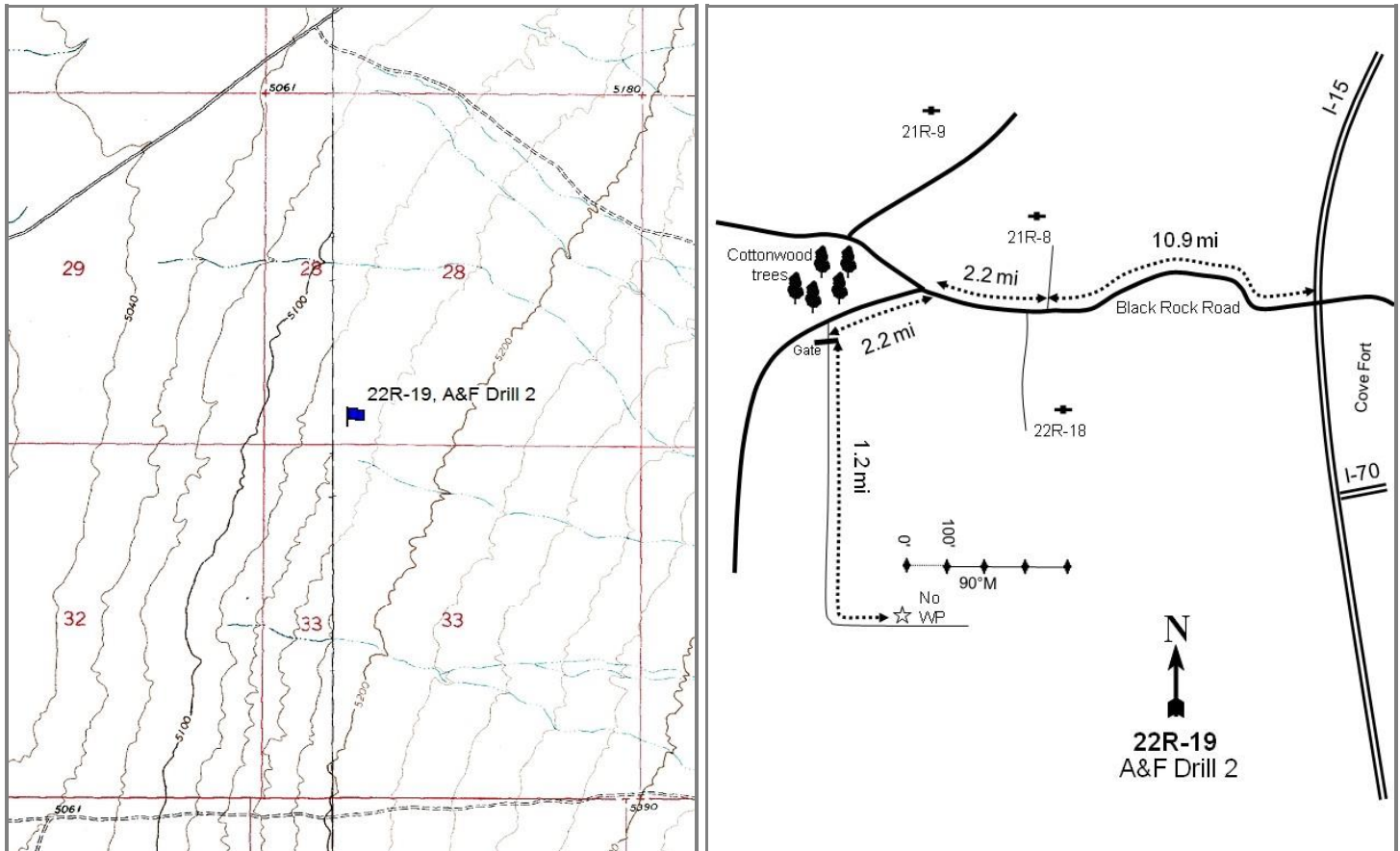
t - Tree Species; p - Preferred Browse; i - Introduced Species

Table 22R-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 (%)				
Atriplex canescens^p -- (fourwing saltbush)									
2008	20	20	100	0	0	0	0	0	- / -
2011	60	-	33	33	33	33	0	0	61/85
2017	60	-	0	100	0	67	0	0	82/106
Bassia prostrata^{pi} -- (forage kochia)									
2008	440	-	0	100	0	5	0	0	24/47
2011	15860	298760	95	5	0	2	0	3	34/75
2017	31460	40	31	69	0	10	33	0	9/22
Gutierrezia sarothrae -- (broom snakeweed)									
2008	-	-	-	-	-	-	-	-	- / -
2011	-	-	-	-	-	-	-	-	20/30
2017	1060	-	11	89	0	55	0	0	18/30

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

A&F DRILL 2 - STUDY NO. 22R-19

**Location Information**

USGS 7.5 min Map Info
GPS (0' Stake)

Read NE; Township 25S, Range 9W, Section 28
NAD 83 UTM ZONE 12, 336724 East 4274322 North

Transect Information

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

227
90° magnetic
400ft
Line 1 (11ft & 95ft), Line 2 (34ft), Line 3 (59ft), Line 4 (71ft)
Standard

Directions to Site

Take the Cove Fort exit on I-15 and proceed west on Black Rock Road for 0.9 miles to a cattle guard, then continue 2.8 miles to the next cattle guard. Drive 3.8 miles, 0.9 miles, 0.7 miles, and 0.5 miles to the next cattle guards. From here, drive 1.3 miles to a fence line on the right (the turn-off to 21R-8) (10.9 miles total from I-15). Drive for 0.7 miles to another cattle guard; proceed 1.8 miles to a fork, and go left (the right fork leads to 21R-9). Drive 2.2 miles to a road on the left, and then drive for 0.1 miles to a gate. From the gate, drive 1.0 mile to a road on the left, and go 0.2 miles to the site. There is no witness post; walk 250 feet to the 0-foot stake on the left side of the road. The 0-foot stake is marked with browse tag #227.

Site Information

Land Ownership	Private
Land Administrator	Private
Allotment	BLACK ROCK SUMMER
Elevation	5,146ft (1,569m)
Aspect	West
Slope	3%
Sample Dates	08/21/2008, 06/21/2011, 07/31/2017

Table 22R-19.1 Disturbance History. Recorded history of major disturbances.

Treatment/Disturbance	Name	WRI DB#	Date	Size (acres)
Fire - Wildfire	Milford Flat	-	July 2007	363052
Seeding - Rangeland Drill	Milford Flat Fire Rehabilitation - JK	1010	Fall 2007	520

Table 22R-19.2 Seed Mix. List of known seeded plant species and rates (if available).

Mix Name			Application Type	Application Date	Acres
Milford Fire James Kaufman DRILL			Drill	Nov 2007	530
Type	Species	Common Name	Cultivar/Source ID	Bulk lbs/acre	PLS lbs/acre
G	<i>Achnatherum hymenoides</i>	Indian Ricegrass	Rimrock	0.47	0.43
G	<i>Agropyron cristatum</i>	Crested Wheatgrass	Hycrest	1.51	1.15
G	<i>Agropyron cristatum</i>	Crested Wheatgrass	Nordan	1.51	1.44
G	<i>Agropyron fragile</i>	Siberian Wheatgrass	Vavilov	1.42	1.29
G	<i>Elymus lanceolatus</i>	Thickspike Wheatgrass	Critana	0.94	0.87
G	<i>Pascopyrum smithii</i>	Western Wheatgrass	Arriba	1.32	1.24
G	<i>Poa secunda</i>	Canby Bluegrass	Canbar	0.19	0.16
G	<i>Psathyrostachys juncea</i>	Russian Wildrye		1.98	1.67
F	<i>Melilotus officinalis</i>	Yellow Sweetclover		0.57	0.46
S	<i>Atriplex canescens</i>	Fourwing Saltbush	Juab/Sanpete/Millard UT	0.15	0.05
S	<i>Atriplex canescens</i>	Fourwing Saltbush	Lincoln NV	0.28	0.10
S	<i>Bassia prostrata</i>	Forage Kochia	Elko/Lander NV	0.38	0.24

Wildlife Habitat and Vegetation History**Table 22R-19.3 - Wildlife Seasonal Habitat.** UDWR wildlife habitat and seasonality.

Species	Habitat	Season
Pronghorn	crucial	year-long

Table 22R-19.4 - Vegetation History. The dominant vegetation type(s) and phase of woodland succession (Tausch, Miller, Roundy, & Chambers, 2009).

Year	Vegetation Type	Woodland Succession
2008	Annual Grass-Forb	NA
2011	Annual Grass-Forb	NA
2017	Annual Grass-Forb	NA

Site Notes

No Notes

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.

This site was established to monitor the rehabilitation effort following the Milford Flat Fire in 2007. The site has been an annual grass and annual forb community since establishment. The dominant grass species has been the introduced annual species cheatgrass (*Bromus tectorum*) throughout the duration of the study. There are some perennial grasses, but cover is low (Table 22R-19.10); the seeded species generally failed to establish and thrive. The forb community is sparse and primarily composed of annual species, with redstem stork's bill (*Erodium cicutarium*) contributing the most cover (Table 22R-19.11). Shrubs are not a significant component of the plant community. It is likely that this site will continue to exist in this state in future sample years without a disturbance or rehabilitation effort.

Trend Summary Tables

Table 22R-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
2008	-	-	-	-	-	-
2011	-	-	-	-	-	-
2017	-	0.0	-	-	0.2	-

Table 22R-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
2008	242	11	133	23	5.6	0.3	6.5	0.7
2011	471	21	454	70	28.7	1.1	18.4	8.6
2017	346	67	393	17	7.1	3.2	19.6	0.4

Table 22R-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
2008	15.7	-	2.8	73.9	0.4	15.4
2011	8.0	-	18.8	24.8	0.3	51.4
2017	45.1	0.0	11.8	23.1	0.7	31.2

Table 22R-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	Rabbit
	Quadrat Frequency		
2008	1	4	9
2011	-	-	2
2017	1	2	3
Year	Days Use Per Acre (ha)		
2008	-	0.7 (1.7)	-
2011	0.7 (1.8)	-	-
2017	2.9 (7.2)	7.4 (18.2)	-

Table 22R-19.10 - Grass Species. Nested frequency and modified Daubenmire average cover by year.

GRASS SPECIES	Achnatherum hymenoides (Indian ricegrass)	Agropyron cristatum ⁱ (crested wheatgrass)	Agropyron fragile ⁱ (Siberian wheatgrass)	Aristida purpurea (purple threeawn)	Bromus tectorum ^{ai} (cheatgrass)	Hesperostipa comata (needle and thread)	Pleuraphis jamesii (James' galleta)	Poa secunda (Sandberg bluegrass)	Sporobolus cryptandrus (sand dropseed)
year	Nested Frequency								
2008	-	-	-	5	242	2	4	-	-
2011	10	1	0	5	471	-	5	1	-
2017	4	2	-	32	346	16	12	-	2
year	Average Cover (%)								
2008	-	-	-	0.2	5.6	0.0	0.1	-	-
2011	0.9	0.0	0.0	0.0	28.7	-	0.1	0.0	-
2017	0.1	0.1	-	1.4	7.1	0.8	0.6	-	0.2

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

Table 22R-19.11 - Forb Species. Nested frequency and modified Daubenmire average cover by year.

FORB SPECIES	Alyssum desertorum ^{ai} (desert madwort)	Argemone munita (flatbud pricklypoppy)	Astragalus lentiginosus (freckled milkvetch)	Eriogonum cernuum ^a (nodding buckwheat)	Erodium cicutarium ^{ai} (redstem stork's bill)	Lactuca serriola ^{ai} (prickly lettuce)	Lappula occidentalis ^a (flatspine stickseed)	Lygodesmia (skeletonplant)	Mentzelia albicaulis ^a (whitestem blazingstar)	Mirabilis linearis (narrowleaf four o'clock)	Oenothera (evening primrose)	Penstemon (beardtongue)	Salsola tragus ^{ai} (prickly Russian thistle)	Sisymbrium altissimum ^{ai} (tall tumblemustard)	Sphaeralcea grossulariifolia (gooseberry/leaf globemallow)
year	Nested Frequency														
2008	3	5	11	46	77	-	3	1	3	-	3	-	3	11	3
2011	25	0	66	36	402	2	-	-	-	-	2	1	336	96	2
2017	-	2	1	15	368	-	-	-	19	10	-	-	41	6	4
year	Average Cover (%)														
2008	0.0	0.1	0.1	3.6	2.8	-	0.0	0.2	0.0	-	0.1	-	0.0	0.1	0.2
2011	0.0	0.0	8.1	0.1	11.8	0.0	-	-	-	-	0.1	0.0	4.1	2.4	0.4
2017	-	0.1	0.0	0.1	15.5	-	-	-	0.3	0.2	-	-	3.6	0.1	0.0

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

Table 22R-19.12 - Shrub and Tree Species. Average modified Daubenmire quadrat and line intercept cover by year.

SHRUB SPECIES	Chrysothamnus viscidiflorus (yellow rabbitbrush)
year	Line Intercept Cover (%)
2008	-
2011	-
2017	0.2
year	Quadrat Cover (%)
2008	-
2011	-
2017	0.0

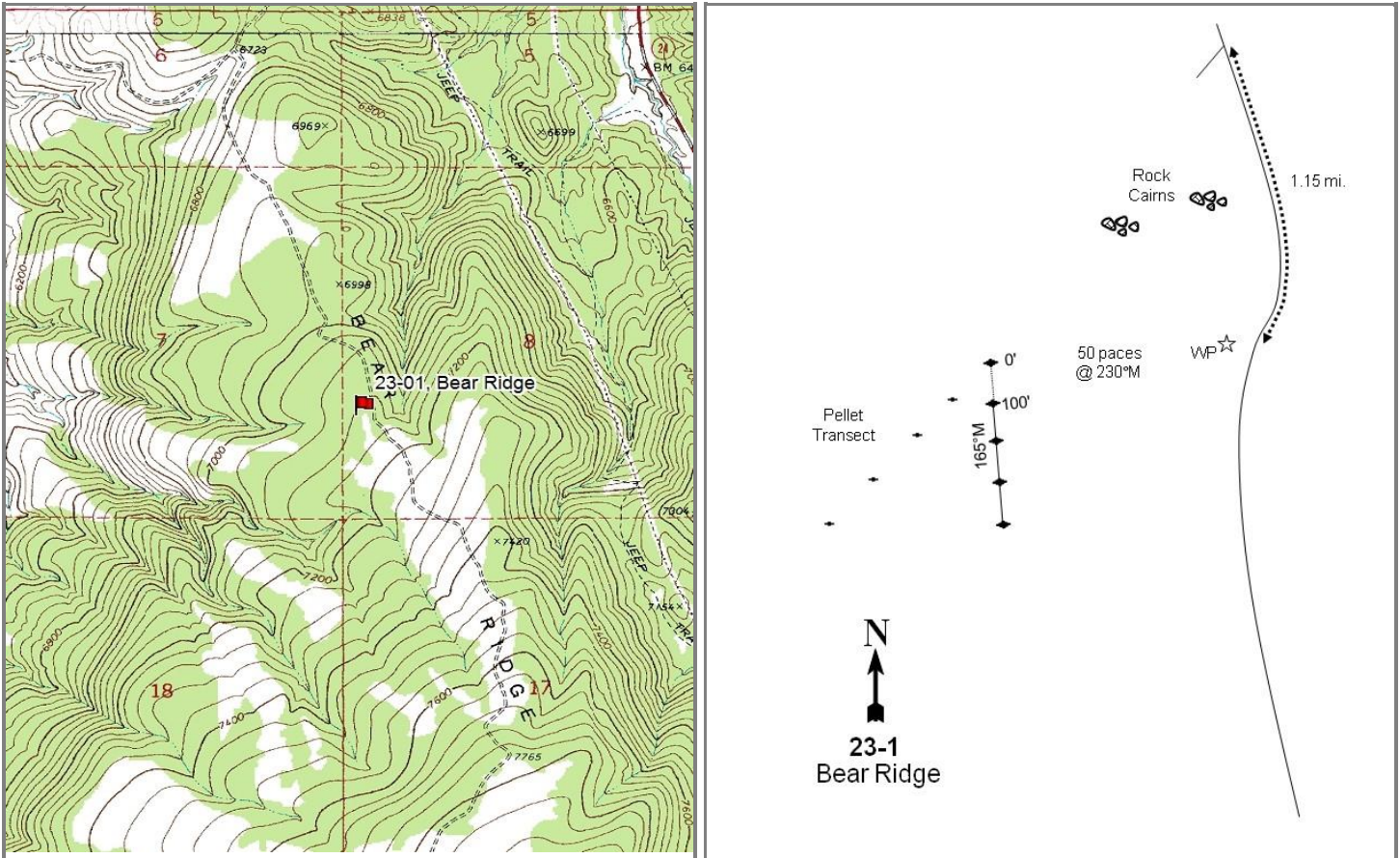
t - Tree Species; p - Preferred Browse; i - Introduced Species

Table 22R-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 (%)				
Chrysothamnus viscidiflorus -- (yellow rabbitbrush)									
2011	-	-	-	-	-	-	-	-	-/-
2017	20	-	0	100	0	0	0	0	36/88
Ephedra nevadensis ^P -- (Nevada jointfir)									
2011	-	-	-	-	-	-	-	-	-/-
2017	-	-	-	-	-	-	-	-	51/88
Gutierrezia sarothrae -- (broom snakeweed)									
2011	20	-	0	100	0	0	0	0	35/39
2017	-	-	-	-	-	-	-	-	23/33
Opuntia -- (pricklypear)									
2011	-	-	-	-	-	-	-	-	16/31
2017	-	-	-	-	-	-	-	-	14/48

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

BEAR RIDGE - STUDY NO. 23-1



Location Information

USGS 7.5 min Map Info Water Creek Canyon N; Township 24S, Range 1W, Section 08
 GPS (0' Stake) NAD 83 UTM ZONE 12, 418271 East 4287692 North

Transect Information

Browse Tag # (0' Stake) 7038
 Transect Bearing 165° magnetic
 Length 400ft
 Belt Placement Line 1 (11ft & 95ft), Line 2 (34ft), Line 3 (59ft), Line 4 (71ft)
 Belt Marker Placement Belt 1: 1ft, Belt 2: 7ft, Belt 5: No Rebar

Directions to Site

From Richfield, go east on Highway 119 to the junction of U-24. One hundred yards before the intersection of Highway 119 and U-24, turn south onto a dirt road. Follow this road for 1.5 miles to a hairpin turn and keep right. Go 0.55 miles to a fork, bear left and continue for 1.15 miles more to a witness post on the west side of the road. Walk 50 paces at 230 degrees magnetic to the 0-foot baseline stake. The trend study stakes are rebar 2-1/2 feet tall, and the 0-foot stake is marked by browse tag #7038.

Site Information

Land Ownership	Federal
Land Administrator	BLM
Allotment	NORTH COVE MOUNTAIN
Elevation	7,140ft (2,176m)
Aspect	Southwest
Slope	10%
Sample Dates	07/20/1998, 08/22/2003, 08/19/2008, 08/06/2012, 06/15/2017

Table 23-01.1 Disturbance History. Recorded history of major disturbances.

Treatment/Disturbance	Name	WRI DB#	Date	Size (acres)
Hand Crew - Lop and Scatter	North Cove Maintenance and Guzzlers	3150	October 2016	1500
Chaining - Two-Way Ely	North Cove Vegetation Treatment	1880	October-November 2010	3000
Seeding - Aerial Before	North Cove Vegetation Treatment	1880	October-November 2010	1500

Table 23-01.2 Seed Mix. List of known seeded plant species and rates (if available).

Mix Name			Application Type	Application Date	Acres
North Cove Vegetation Treatment			Aerial	Oct 2010	1500
Type	Species	Common Name	Cultivar/Source ID	Bulk lbs/acre	PLS lbs/acre
G	Festuca ovina	Sheep Fescue	Covar	0.50	0.40
G	Leymus cinereus	Great Basin Wildrye	Trailhead	1.50	1.47
G	Poa fendleriana	Muttongrass		0.20	0.18
G	Poa secunda	Sandberg Bluegrass	Mountain Home	0.50	0.45
G	Psathyrostachys juncea	Russian Wildrye	Bozoisky	2.00	1.62
G	Pseudoroegneria spicata	Bluebunch Wheatgrass	Anatone	1.00	0.91
G	Thinopyrum intermedium	Pubescent Wheatgrass	Luna	1.00	0.92
F	Helianthus annuus	Annual Sunflower	Sunflower	1.00	0.97
F	Linum perenne	Blue Flax	Appar	1.00	0.89
F	Medicago sativa	Alfalfa	Ranger	1.00	0.94
F	Melilotus officinalis	Yellow Sweetclover		1.00	0.88
F	Penstemon palmeri	Palmer Penstemon	Elko NV	0.00	0.00
F	Penstemon palmeri	Palmer Penstemon	Iron UT	0.19	0.18
F	Penstemon palmeri	Palmer Penstemon	Pine NV	0.30	0.28
F	Sanguisorba minor	Small Burnet	Delar	4.00	3.80

Wildlife Habitat and Vegetation History**Table 23-01.3 - Wildlife Seasonal Habitat.** UDWR wildlife habitat and seasonality.

Species	Habitat	Season
Deer	crucial	winter
Elk	substantial	winter

Table 23-01.4 - Vegetation History. The dominant vegetation type(s) and phase of woodland succession (Tausch, Miller, Roundy, & Chambers, 2009).

Year	Vegetation Type	Woodland Succession
1985	Sagebrush/Pinyon-Juniper	Phase I transitioning to Phase II
1991	Sagebrush/Pinyon-Juniper	Phase I transitioning to Phase II
1998	Sagebrush/Pinyon-Juniper	Phase II
2003	Sagebrush/Pinyon-Juniper	Phase II
2008	Pinyon-Juniper/Sagebrush	Phase II transitioning to Phase III
2012	Perennial Grass	Phase I
2017	Perennial Grass/Antelope Bitterbrush	Phase I

Site Notes

No Notes

Soils**Table 23-01.5 - 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	7.4	40.0	33.4	26.6	3.3	9.0	124.8	0.7	07/20/1998

Site Potential

1981 - 2010 Average Annual Precipitation 14 inches
 NRCS Ecological Site Upland Shallow Loam (Black Sagebrush)
 NRCS Ecological Site # R028AY325UT
 States and Transitions No state and transition model is available for this ecological site.

This site existed as a mountain big sagebrush (*Artemisia tridentata* ssp. *vaseyana*) and black sagebrush (*A. nova*) plant community with twoneedle pinyon (*Pinus edulis*) and Utah juniper (*Juniperus osteosperma*) trees co-dominant from study establishment in 1985 through 2008. The cover of pinyon and juniper continued to increase through the sample years and the study site progressed through phases of woodland succession: the study was considered to be in Phase II transitioning to Phase III in 2008 (photos, Table 23-01.4, Table 23-01.12, Table 23-01.13, Table 23-01.14). The herbaceous understory was somewhat abundant between 1985 and 2008 (Table 23-01.7), but was not considered a dominant vegetation component of the site. However, a chaining and seeding treatment in 2010 removed much of the pinyon-juniper and amplified the understory (Table 23-01.1). As a result, the site transitioned to one dominated by perennial grasses -- primarily the native species bluebunch wheatgrass (*Pseudoroegneria spicata*) -- in 2012 (Table 23- 01.10). Cover of browse species also increased following the treatment, and antelope bitterbrush (*Purshia tridentata*) became a co-dominant component in 2017 (Table 23-01.12, Table 23-01.13). Forbs have remained rare throughout the study years, although they have increased in diversity after treatment (Table 23-01.11).

Trend Summary Tables

Table 23-01.6 - 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
1998	7.9	0.3	11.4	-	-	-
2003	7.4	-	18.0	6.4	-	32.3
2008	4.2	0.0	7.9	7.7	-	31.8
2012	2.7	0.0	0.4	5.6	-	0.7
2017	9.3	0.1	0.2	11.1	0.3	-

Table 23-01.7 - 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
1998	49	276	4	53	0.4	10.9	0.0	0.8
2003	15	229	-	24	0.0	7.0	-	0.4
2008	25	248	-	42	0.1	6.7	-	0.5
2012	25	258	47	154	0.1	9.8	0.4	3.8
2017	61	319	25	130	0.8	27.4	0.1	3.1

Table 23-01.8 - 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
1998	21.2	0.9	42.3	26.1	11.1	29.9
2003	13.0	3.4	37.3	19.6	13.1	32.3
2008	12.4	2.7	43.8	29.8	10.0	21.0
2012	32.5	0.5	44.9	8.2	7.3	18.9
2017	28.8	-	49.2	6.7	5.9	38.4

Table 23-01.9 - 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	Rocky Mountain Elk	Rabbit
	Quadrat Frequency				
1998	-	-	35	4	24
2003	-	-	20	-	32
2008	-	-	20	1	64
2012	-	-	4	1	5
2017	-	-	20	13	36
Year	Days Use Per Acre (ha)				
1998	-	-	50.9 (125.8)	7.4 (18.2)	-
2003	0.7 (1.8)	-	54.3 (134.1)	1.3 (3.3)	-
2008	0.7 (1.8)	8.7 (21.5)*	33.5 (82.8)	1.3 (3.3)	-
2012	-	-	21.5 (53.0)	4.0 (9.9)	-
2017	-	-	16.1 (39.7)	6.7 (16.6)	-

*Pellets per acre (ha)

Table 23-01.10 - Grass Species. Nested frequency and modified Daubenmire average cover by year.

GRASS SPECIES	Achnatherum hymenoides (Indian ricegrass)	Bromus tectorum ^{ai} (cheatgrass)	Dactylis glomerata ⁱ (orchardgrass)	Elymus elymoides (squirreltail)	Festuca idahoensis (Idaho fescue)	Leymus cinereus (basin wildrye)	Poa fendleriana (muttongrass)	Poa secunda (Sandberg bluegrass)	Psathyrostachys juncea ⁱ (Russian wildrye)	Pseudoroegneria spicata (bluebunch wheatgrass)	Thinopyrum intermedium ⁱ (intermediate wheatgrass)
year	Nested Frequency										
1998	13	49	-	7	-	-	54	103	-	207	-
2003	5	15	-	2	-	-	28	88	-	177	-
2008	-	25	-	2	-	-	9	122	-	194	-
2012	6	25	-	4	28	12	7	70	5	182	50
2017	12	61	2	5	89	19	7	48	5	240	45
year	Average Cover (%)										
1998	0.2	0.4	-	0.0	-	-	1.0	2.0	-	7.7	-
2003	0.0	0.0	-	0.0	-	-	0.5	0.9	-	5.6	-
2008	-	0.1	-	0.0	-	-	0.1	0.7	-	6.0	-
2012	0.2	0.1	-	0.0	0.1	0.3	0.2	0.9	0.1	6.3	1.7
2017	0.5	0.8	0.0	0.1	5.9	2.3	0.7	0.6	0.6	15.7	1.2

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

Table 23-01.11 - Forb Species. Nested frequency and modified Daubenmire average cover by year.

FORB SPECIES	Agoseris glauca (pale agoseris)	Alyssum desertorum ^{ai} (desert madwort)	Arabis (rockcress)	Astragalus cicer ⁱ (chickpea milkvetch)	Astragalus convallarius (lesser rushy milkvetch)	Calochortus nuttallii (sego lily)	Castilleja (Indian paintbrush)	Chaenactis douglasii (Douglas' dustymaiden)	Collinsia parviflora ^a (maiden blue eyed Mary)	Comandra umbellata (bastard toadflax)	Crepis acuminata (tapertip hawkbeard)	Eriogonum racemosum (redroot buckwheat)	Eriogonum umbellatum (sulphur-flower buckwheat)	Gayophytum ramosissimum ^a (pinyon groundsmoke)	Helianthus annuus ^a (common sunflower)	Lactuca serriola ^{ai} (prickly lettuce)	Linum perenne ⁱ (blue flax)
year	Nested Frequency																
1998	1	-	1	-	6	-	-	1	4	3	8	5	9	-	-	-	-
2003	-	-	1	-	6	-	-	-	-	-	-	-	6	-	-	-	-
2008	-	-	4	-	9	-	-	-	-	-	-	1	7	-	-	-	-
2012	7	-	4	-	4	-	-	3	-	-	-	4	19	5	36	10	80
2017	24	6	2	1	5	2	0	6	1	-	11	4	3	6	2	8	41
year	Average Cover (%)																
1998	0.0	-	0.0	-	0.1	-	-	0.0	0.0	0.0	0.1	0.0	0.2	-	-	-	-
2003	-	-	0.0	-	0.1	-	-	-	-	-	-	-	0.1	-	-	-	-
2008	-	-	0.0	-	0.1	-	-	-	-	-	-	0.0	0.2	-	-	-	-
2012	0.1	-	0.0	-	0.0	-	-	0.0	-	-	-	0.0	0.4	0.0	0.3	0.1	2.3
2017	0.2	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.0	-	0.4	0.0	0.0	0.0	0.0	0.0	0.7

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

FORB SPECIES	Lithospermum incisum (narrowleaf stoneseed)	Lomatium (desertparsley)	Medicago sativa ⁱ (alfalfa)	Melilotus officinalis ⁱ (sweetclover)	Penstemon palmeri (Palmer's penstemon)	Phlox austromontana (mountain phlox)	Phlox longifolia (longleaf phlox)	Sanguisorba minor ⁱ (small burnet)	Tragopogon dubius ^{ai} (yellow salsify)
year	Nested Frequency								
1998	-	1	-	-	-	4	17	-	-
2003	-	-	-	-	-	7	7	-	-
2008	-	-	-	-	-	7	20	-	-
2012	0	-	0	1	23	8	5	38	-
2017	-	3	-	-	13	15	2	25	4
year	Average Cover (%)								
1998	-	0.0	-	-	-	0.2	0.2	-	-
2003	-	-	-	-	-	0.2	0.0	-	-
2008	-	-	-	-	-	0.0	0.1	-	-
2012	0.0	-	0.0	0.0	0.3	0.1	0.0	0.5	-
2017	-	0.0	-	-	0.9	0.2	0.0	0.6	0.0

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

Table 23-01.12 - 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)	Chrysothamnus viscidiflorus ssp. viscidiflorus var. viscidiflorus (yellow rabbitbrush)	Ericameria nauseosa ssp. nauseosa (rubber rabbitbrush)	Eriogonum microthecum ^p (slender buckwheat)	Gutierrezia sarothrae (broom snakeweed)	Juniperus osteosperma ⁱ (Utah juniper)	Mahonia repens (creeping barberry)	Opuntia (pricklypear)	Pinus edulis ⁱ (twoneedle pinyon)	Purshia tridentata ^p (antelope bitterbrush)
year	Line Intercept Cover (%)										
1998	-	-	-	-	-	-	-	-	-	-	-
2003	1.9	0.6	-	-	-	-	23.3	-	-	9	3.9
2008	2.2	0.3	-	-	-	-	21.4	-	-	10.4	5.2
2012	0.9	0.3	-	-	-	-	0.5	-	-	0.2	4.4
2017	2.1	0.6	-	0.3	0.1	-	-	-	-	-	8.3
year	Quadrat Cover (%)										
1998	2.2	2.5	0.1	-	-	-	5.5	-	0.1	6.0	3.2
2003	2.4	0.8	-	-	-	-	9.2	-	-	8.8	4.3
2008	1.4	0.1	-	-	-	-	3.1	0.0	0.0	4.8	2.7
2012	1.1	0.2	-	-	-	-	0.4	-	0.0	0.0	1.4
2017	2.8	0.7	-	0.0	0.1	0.0	0.2	-	-	-	5.6

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

Table 23-01.13 - 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 (%)				
Amelanchier utahensis^P -- (Utah serviceberry)									
1998	-	-	-	-	-	-	-	-	-/-
2003	-	-	-	-	-	-	-	-	-/-
2008	-	-	-	-	-	-	-	-	-/-
2012	-	-	-	-	-	-	-	-	54/59
2017	-	-	-	-	-	-	-	-	39/67
Artemisia nova^P -- (black sagebrush)									
1998	1300	-	6	60	34	49	0	9	40/58
2003	1140	-	2	46	53	9	0	18	37/61
2008	740	-	0	51	49	8	19	30	36/56
2012	680	-	29	65	6	12	3	3	25/44
2017	1260	-	0	100	0	19	0	10	27/46
Artemisia tridentata ssp. vaseyana^P -- (mountain big sagebrush)									
1998	1100	-	9	24	67	56	2	40	38/56
2003	840	-	14	17	69	29	0	41	37/54
2008	520	-	0	0	100	23	54	81	32/49
2012	340	-	29	65	6	18	0	0	32/51
2017	580	900	41	59	0	17	14	0	38/60
Cercocarpus ledifolius^P -- (curl-leaf mountain mahogany)									
1998	-	-	-	-	-	-	-	-	-/-
2003	-	-	-	-	-	-	-	-	-/-
2008	-	-	-	-	-	-	-	-	-/-
2012	-	-	-	-	-	-	-	-	23/42
2017	-	-	-	-	-	-	-	-	-/-
Chrysothamnus depressus^P -- (longflower rabbitbrush)									
1998	20	-	0	100	0	0	0	0	- / -
2003	-	-	-	-	-	-	-	-	-/-
2008	-	-	-	-	-	-	-	-	-/-
2012	20	-	0	100	0	0	0	0	28/35
2017	-	-	-	-	-	-	-	-	-/-
Chrysothamnus viscidiflorus ssp. viscidiflorus var. viscidiflorus -- (yellow rabbitbrush)									
1998	20	-	0	100	0	0	0	0	25/30
2003	-	-	-	-	-	-	-	-	-/-
2008	-	-	-	-	-	-	-	-	-/-
2012	-	-	-	-	-	-	-	-	-/-
2017	-	-	-	-	-	-	-	-	-/-
Eriogonum microthecum^P -- (slender buckwheat)									
1998	-	-	-	-	-	-	-	-	-/-
2003	-	-	-	-	-	-	-	-	-/-
2008	-	-	-	-	-	-	-	-	-/-
2012	-	-	-	-	-	-	-	-	21/57
2017	320	-	0	100	0	13	0	0	15/10
Ericameria nauseosa ssp. nauseosa -- (rubber rabbitbrush)									
1998	-	-	-	-	-	-	-	-	-/-
2003	-	-	-	-	-	-	-	-	-/-
2008	-	-	-	-	-	-	-	-	-/-
2012	-	-	-	-	-	-	-	-	-/-
2017	20	-	0	100	0	0	0	0	66/74
Gutierrezia sarothrae -- (broom snakeweed)									
1998	40	-	0	100	0	0	0	0	24/24
2003	-	-	-	-	-	-	-	-	16/13
2008	-	-	-	-	-	-	-	-	17/26
2012	-	-	-	-	-	-	-	-	21/30
2017	80	-	0	100	0	0	0	0	32/45
Juniperus osteosperma¹ -- (Utah juniper)									
1998	80	40	50	50	0	0	0	0	- / -
2003	100	-	60	40	0	0	0	0	- / -
2008	140	-	43	57	0	0	14	14	- / -
2012	80	20	75	25	0	0	0	0	- / -
2017	60	-	100	0	0	0	0	0	- / -

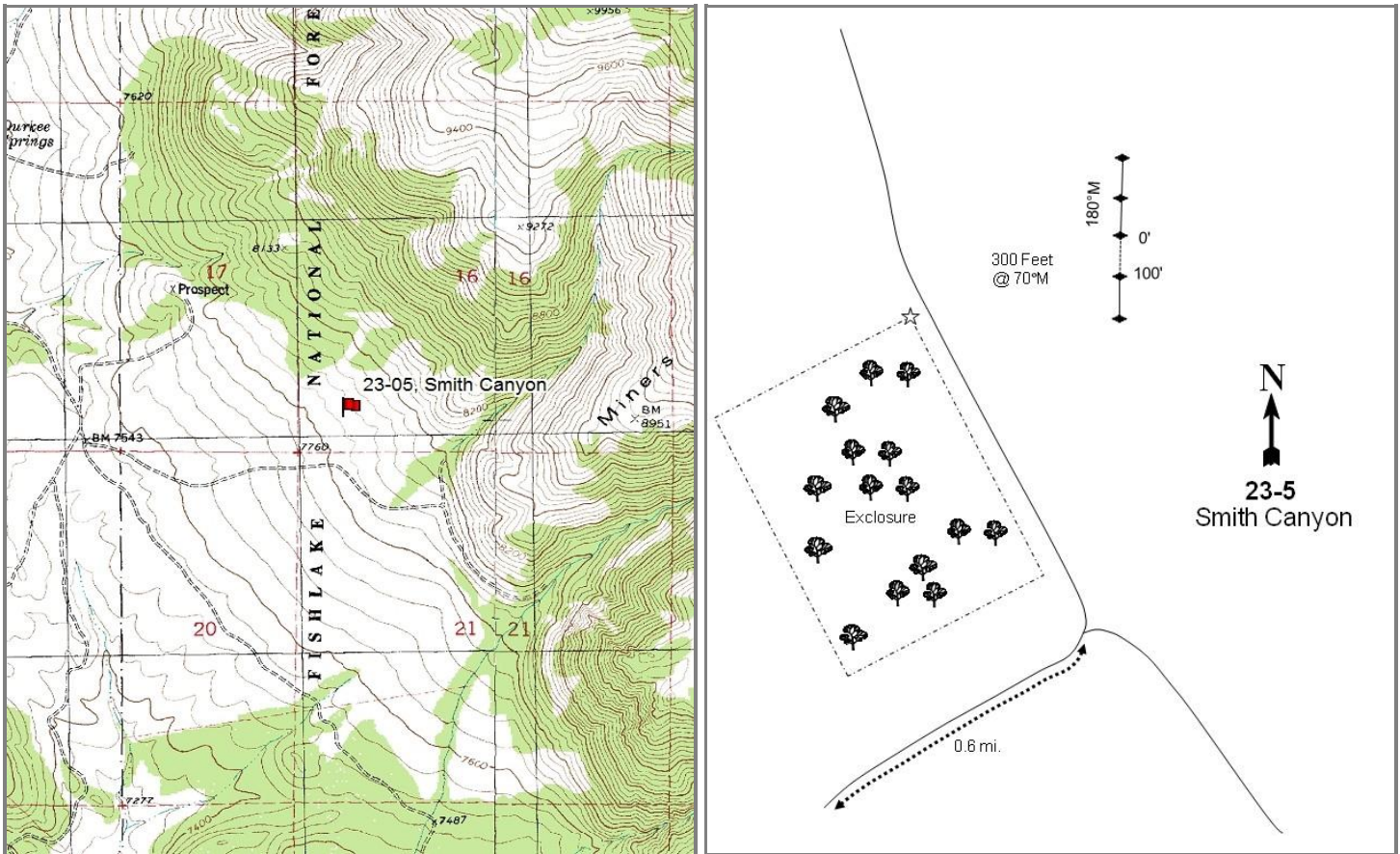
Year	Density		Age Class Distribution			Utilization		Poor Vigor (%)	Average Height Crown (cm)
	Plants Per Acre		Excluding Seedlings			Moderate (%)	Heavy (%)		
	Excluding Seedlings	Seedling	Young (%)	Mature (%)	Decadent (%)				
Opuntia -- (pricklypear)									
1998	60	20	67	33	0	0	0	0	20/30
2003	40	-	0	100	0	0	0	0	14/36
2008	60	-	0	100	0	0	0	0	16/68
2012	40	-	0	100	0	0	0	0	12/25
2017	40	-	0	100	0	0	0	0	11/19
Pinus edulis ^t -- (twoneedle pinyon)									
1998	80	20	0	100	0	0	0	0	- / -
2003	120	20	33	67	0	0	0	0	- / -
2008	160	40	38	63	0	0	0	0	- / -
2012	60	-	67	33	0	0	0	33	- / -
2017	-	-	-	-	-	-	-	-	- / -
Purshia tridentata ^p -- (antelope bitterbrush)									
1998	760	40	5	87	8	37	0	5	56/110
2003	420	-	5	71	24	43	48	0	67/151
2008	420	-	0	76	24	24	76	57	63/129
2012	580	20	17	83	0	62	14	0	44/83
2017	1040	-	4	96	0	14	56	0	50/87

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

Table 23-01.14 - 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)							
1998	213	-	-	-	-	-	22.4
2003	197	-	15	20	20	45	17.8
2008	165	10	5	25	30	30	30.9
2012	86	30	50	20	-	-	12.3
2017	36	53	47	-	-	-	3.0
Pinus edulis (twoneedle pinyon)							
1998	144	-	-	-	-	-	12.1
2003	119	5	15	35	25	20	13.6
2008	124	6	11	39	22	22	18.4
2012	41	50	36	14	-	-	3.0
2017	11	50	50	-	-	-	1.8

SMITH CANYON - STUDY NO. 23-5

**Location Information**

USGS 7.5 min Map Info
GPS (0' Stake)

Marysville NE; Township 27S, Range 2W, Section 16
NAD 83 UTM ZONE 12, 401130 East 4257287 North

Transect Information

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

7043
180° magnetic
400ft
Line 1 (11ft & 95ft), Line 2 (34ft), Line 3 (59ft), Line 4 (71ft)
No Rebar

Directions to Site

From the intersection of Main Street (SR-89) and Center Street in Marysville, turn east and proceed for 0.7 miles, crossing a bridge. At a three-way split in the road, stay left and continue for 1.9 miles. Keep right and drive for 0.8 miles. Keep right at the split, then go immediately right again. Proceed for another 0.8 miles and make a left turn: continue for 2.75 miles up this road to a "T" intersection. Turn right and go 1.0 miles to a cattle guard. Make a hard left turn here and drive 0.1 miles, then turn right and continue for 0.6 miles to an enclosure. Turn north (left) and go along the east side of a cattle enclosure. From the northeast corner of the enclosure, walk 300 feet at 70 degrees (in line with the north side fence) to the start of the baseline. The 0-foot end is marked by a fencepost with browse tag #7043 attached.

Site Information

Land Ownership	Federal
Land Administrator	USFS
Allotment	Marysville Peak Allotment
Elevation	7,850ft (2,393m)
Aspect	Southwest
Slope	5-10%
Sample Dates	07/13/1998, 07/21/2003, 08/15/2008, 08/07/2012, 06/12/2017

Table 23-05.1 Disturbance History. Recorded history of major disturbances.

Treatment/Disturbance	Name	WRI DB#	Date	Size (acres)
Chaining - Chain Unknown	-	-	Historic	-
Seeding - Seed Unknown	-	-	Historic	-
Fire - Wildfire	Blackbird Mine WFU	-	June 2006	1464
Seeding - Aerial Unknown	Monroe Mountain Burn Stabilization	598	July 2006	1468

Wildlife Habitat and Vegetation History**Table 23-05.3 - Wildlife Seasonal Habitat.** UDWR wildlife habitat and seasonality.

Species	Habitat	Season
Deer	crucial	winter
Elk	crucial	winter

Table 23-05.4 - Vegetation History. The dominant vegetation type(s) and phase of woodland succession (Tausch, Miller, Roundy, & Chambers, 2009).

Year	Vegetation Type	Woodland Succession
1985	Mountain Big Sagebrush	Phase I
1991	Mountain Big Sagebrush	Phase I
1998	Mountain Big Sagebrush/Annual Grass	Phase I
2003	Mountain Big Sagebrush/Annual Grass	Phase I
2008	Annual Grass	No Encroachment
2012	Mountain Big Sagebrush/Annual Grass	No Encroachment
2017	Mountain Big Sagebrush/Annual Grass	No Encroachment

Site Notes

Wildlife use the area in the winter, but tracks and sightings indicate that use is common year-round.

Soils**Table 23-05.5 - 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	5.9	54.0	29.4	16.6	3.5	21.9	281.6	0.4	07/13/1998

Site Potential

1981 - 2010 Average Annual Precipitation	18 inches
NRCS Ecological Site	Mountain Loam (Mountain Big Sagebrush)
NRCS Ecological Site #	R028AY431UT
States and Transitions	No state and transition model is available for this ecological site.

From 1985 through the 2003 sample year, this site was dominated by mountain big sagebrush (*Artemisia tridentata* ssp. *vaseyana*) with a minor component of other shrub species. Twoneedle pinyon (*Pinus edulis*) trees, although rare, were present during this time period, placing the site in Phase I of woodland succession (Table 23-05.4, Table 23-05.12, Table 23-05.13). A wildfire in 2006 removed the trees and nearly all of the browse. The introduced annual grass cheatgrass (*Bromus tectorum*) was a co-dominant site component prior to the burn, and was the dominant vegetation in the 2008 sample year. Sagebrush began to recover following rehabilitation efforts (Table 23-05.12), and in both 2012 and 2017 it was co-dominant with cheatgrass. Although diverse, herbaceous species other than cheatgrass have generally remained rare (Table 23-05.7, Table 23-05.10, Table 23-05.11). The high cover of annual grasses puts the resiliency of the site at risk and has potential to increase the fire regime of the site.

Trend Summary Tables**Table 23-05.6 - 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
1998	31.0	-	-	-	-	-
2003	28.1	-	-	34.4	0.1	-
2008	0.8	0.0	-	1.1	-	-
2012	11.5	-	-	15.8	-	-
2017	36.9	0.1	-	37.2	-	-

Table 23-05.7 - 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
1998	372	252	16	94	10.5	5.0	0.0	2.5
2003	417	132	270	59	17.2	1.5	3.4	1.2
2008	370	40	159	63	18.0	1.2	3.8	5.1
2012	458	45	250	64	30.5	0.7	4.3	0.8
2017	417	59	127	90	27.0	1.2	0.6	1.9

Table 23-05.8 - 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
1998	13.6	0.1	53.9	12.9	2.7	40.5
2003	10.3	0.0	45.4	16.2	2.2	48.9
2008	7.8	-	29.7	36.6	4.0	35.6
2012	5.1	0.0	39.5	18.0	1.0	49.6
2017	18.0	-	56.6	12.7	1.4	59.5

Table 23-05.9 - 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	Rocky Mountain Elk	Rabbit	Domestic Sheep
	Quadrat Frequency				
1998	3	34	-	24	-
2003	-	27	-	3	-
2008	3	25	4	16	-
2012	5	12	3	1	-
2017	4	10	-	47	-
Year	Days Use Per Acre (ha)				
1998	13.8 (34.1)	105.9 (261.5)	0.7 (1.7)	-	1.3 (3.3)
2003	2.9 (7.2)	139.4 (344.3)	6.7 (16.6)	-	-
2008	12.3 (30.5)	24.8 (61.2)	8.7 (21.5)	-	-
2012	18.1 (44.8)	23.4 (57.9)	8.1 (19.9)	-	-
2017	-	10.7 (26.5)	4.7 (11.6)	-	-

Table 23-05.10 - Grass Species. Nested frequency and modified Daubenmire average cover by year.

GRASS SPECIES	Nested Frequency						
Bromus tectorum ^{ai} (cheatgrass)	372	29	5	4	30	7	223
Elymus elymoides (squirreltail)	417	38	1	-	34	8	78
Hesperostipa comata (needle and thread)	370	6	-	-	5	-	31
Pleuraphis jamesii (James' galleta)	458	1	-	-	6	-	39
Poa fendleriana (muttongrass)	417	29	-	-	3	-	27
Poa secunda (Sandberg bluegrass)							
Pseudoroegneria spicata (bluebunch wheatgrass)							
year	Average Cover (%)						
1998	10.5	0.2	0.2	0.1	0.3	0.0	4.2
2003	17.2	0.4	0.0	-	0.3	0.2	0.6
2008	18.0	0.2	-	-	0.1	-	0.9
2012	30.5	0.0	-	-	0.0	-	0.6
2017	27.0	0.7	-	-	0.0	-	0.5

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

Table 23-05.11 - Forb Species. Nested frequency and modified Daubenmire average cover by year.

FORB SPECIES	Nested Frequency																
Agoseris glauca (pale agoseris)	0	3	3	3	-	9	-	-	2	1	5	-	2	1	-	-	-
Alyssum desertorum ^{ai} (desert madwort)	7	11	-	2	-	11	-	-	-	-	-	-	96	5	-	-	-
Arabis (rockcress)	-	43	-	4	-	1	-	-	0	5	-	-	57	-	-	-	7
Astragalus (milkvetch)	-	193	-	3	-	12	-	-	1	-	-	-	7	-	-	1	17
Astragalus cibaricus (browse milkvetch)	13	100	-	-	7	11	6	1	1	12	-	2	2	-	4	-	-
Astragalus convallarius (lesser rushy milkvetch)																	
Astragalus lentiginosus (freckled milkvetch)																	
Astragalus purshii (woollypod milkvetch)																	
Balsamorhiza sagittata (arrow/leaf balsamroot)																	
Calochortus nuttallii (sego lily)																	
Chaenactis douglasii (Douglas' dustymaiden)																	
Cirsium (thistle)																	
Collinsia parviflora ^a (maiden blue eyed Mary)																	
Comandra umbellata (bastard toadflax)																	
Crepis acuminata (tapertip hawksbeard)																	
Cryptantha humilis (roundspike cryptantha)																	
Descurainia pinnata ^a (western tansymustard)																	
year	Average Cover (%)																
1998	0.0	0.0	0.0	0.0	-	0.2	-	-	0.0	0.0	0.0	-	0.0	0.0	-	-	-
2003	0.0	0.1	-	0.0	-	0.2	-	-	-	-	-	-	0.7	0.0	-	-	-
2008	-	0.4	-	0.0	-	0.0	-	-	0.0	0.0	-	-	0.1	-	-	-	0.3
2012	-	4.1	-	0.0	-	0.1	-	-	0.0	-	-	-	0.0	-	-	0.0	0.0
2017	0.1	0.4	-	-	0.2	0.4	0.0	0.0	0.2	0.0	-	0.0	0.0	-	0.1	-	-

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

FORB SPECIES	Erigeron eatonii (Eatons fleabane)	Eriogonum racemosum (redroot buckwheat)	Eriogonum umbellatum (sulphur-flower buckwheat)	Gayophytum ramosissimum ^a (pinyon groundsmoke)	Lactuca serriola ^{ai} (prickly lettuce)	Lappula occidentalis ^a (flatspine stickseed)	Linum lewisii (Lewis flax)	Lithospermum ruderale (western stone seed)	Lotus utahensis (Utah bird's-foot trefoil)	Lupinus argenteus (silvery lupine)	Microsteris gracilis ^a (slender phlox)	Phlox longifolia (longleaf phlox)	Polygonum douglasii ^a (Douglas' knotweed)	Sisymbrium altissimum ^{ai} (tall tumblemustard)	Streptanthus cordatus (heartleaf twistflower)	Tragopogon dubius ^{ai} (yellow salsify)
year	Nested Frequency															
1998	-	22	4	-	-	-	-	-	17	19	11	22	-	-	1	-
2003	-	9	13	-	-	-	-	-	1	6	202	3	-	-	2	-
2008	-	45	-	3	-	74	0	4	0	8	-	-	-	14	1	-
2012	1	46	2	3	1	46	-	4	-	0	-	2	1	19	-	1
2017	-	35	-	3	-	25	5	4	2	-	14	11	4	5	-	-
year	Average Cover (%)															
1998	-	0.3	0.0	-	-	-	-	-	0.3	1.5	0.0	0.1	-	-	0.0	-
2003	-	0.1	0.1	-	-	-	-	-	0.0	0.8	2.6	0.0	-	-	0.0	-
2008	-	1.9	-	0.0	-	1.1	0.0	0.3	0.0	2.8	-	-	-	1.9	0.0	-
2012	0.0	0.5	0.0	0.0	0.0	0.1	-	0.0	-	0.0	-	0.0	0.0	0.1	-	0.0
2017	-	0.6	-	0.0	-	0.1	0.0	0.2	0.0	-	0.0	0.0	0.0	0.0	-	-

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

Table 23-05.12 - 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)	Eriogonum microthecum ^p (slender buckwheat)	Purshia tridentata ^p (antelope bitterbrush)	Symphoricarpos oreophilus (mountain snowberry)
year	Line Intercept Cover (%)				
1998	-	-	-	-	-
2003	28.9	-	-	5.5	0.1
2008	1	0.1	-	0	-
2012	14.8	0.4	-	0.6	-
2017	36.4	0.4	-	0.4	-
year	Quadrat Cover (%)				
1998	24.4	-	-	6.6	-
2003	24.4	-	-	3.7	0.0
2008	0.8	0.0	-	0.0	0.0
2012	11.4	0.0	0.0	0.1	-
2017	36.4	0.1	-	0.4	0.1

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

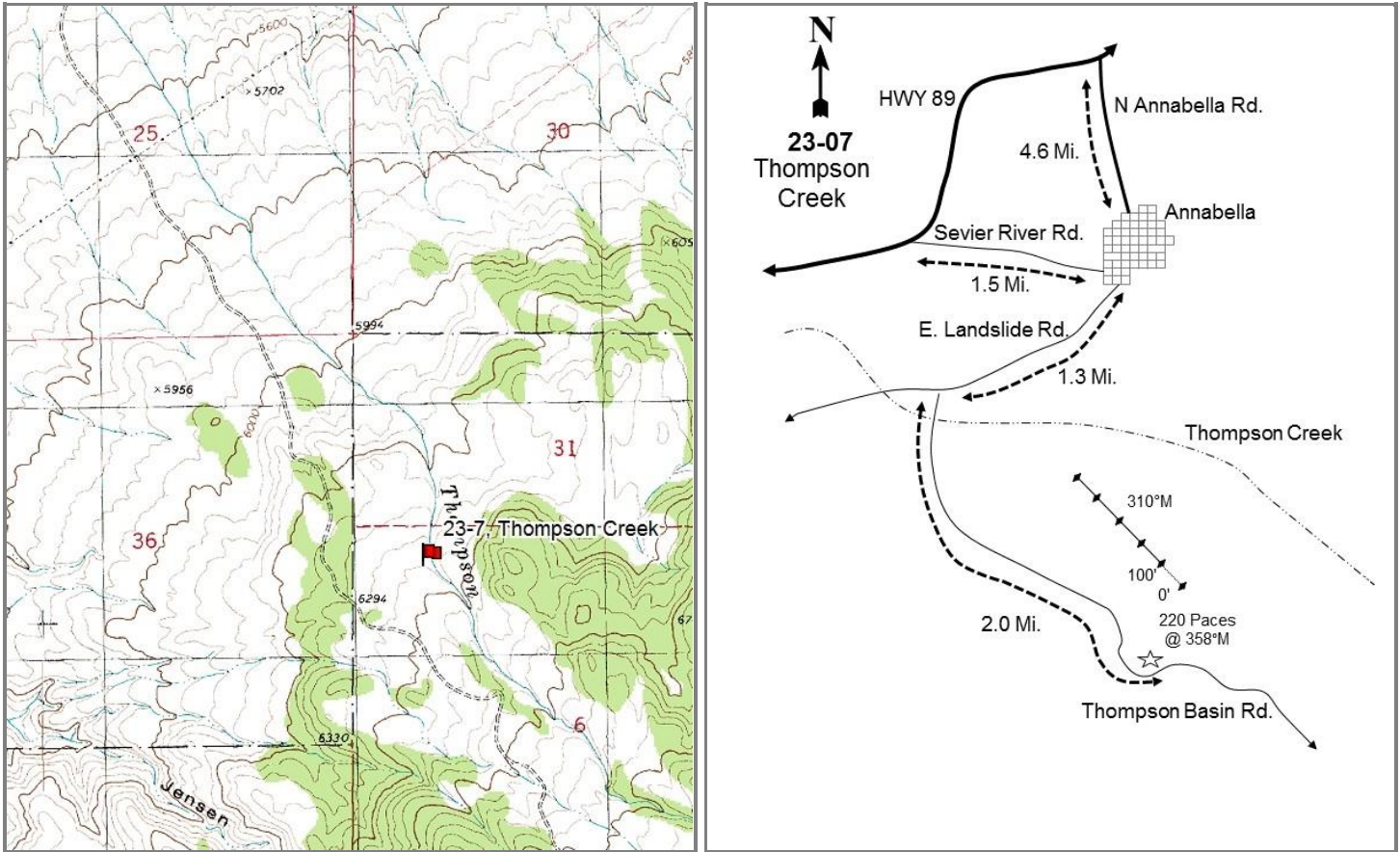
Table 23-05.13 - Shrub/Tree Characteristics. Population characteristics of shrub/tree species populations including density reproduction (seedlings), age distribution, utilization, vigor and average size (height/crown) of plants.

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 (%)				
Amelanchier utahensis^P -- (Utah serviceberry)									
1998	-	-	-	-	-	-	-	-	60/44
2003	-	-	-	-	-	-	-	-	22/23
2008	-	-	-	-	-	-	-	-	-/-
2012	-	-	-	-	-	-	-	-	18/33
2017	-	-	-	-	-	-	-	-	-/-
Artemisia tridentata ssp. vaseyana^P -- (mountain big sagebrush)									
1998	3860	-	4	79	18	46	7	6	83/112
2003	3400	-	1	58	41	27	5	7	78/99
2008	1100	-	33	67	0	0	0	0	33/38
2012	17240	5260	91	9	0	0	0	0	49/82
2017	16360	-	27	73	0	6	0	0	54/86
Chrysothamnus viscidiflorus ssp. viscidiflorus var. viscidiflorus -- (yellow rabbitbrush)									
1998	40	-	0	100	0	0	50	0	- / -
2003	-	-	-	-	-	-	-	-	-/-
2008	-	-	-	-	-	-	-	-	41/60
2012	-	-	-	-	-	-	-	-	34/67
2017	20	-	0	100	0	0	0	0	24/14
Eriogonum microthecum^P -- (slender buckwheat)									
1998	60	-	67	33	0	0	33	0	- / -
2003	-	-	-	-	-	-	-	-	-/-
2008	-	-	-	-	-	-	-	-	-/-
2012	100	20	60	40	0	60	20	0	10/30
2017	-	-	-	-	-	-	-	-	60/54
Ericameria nauseosa ssp. nauseosa var. speciosa^P -- (rubber rabbitbrush)									
1998	20	-	0	0	100	0	0	0	- / -
2003	-	-	-	-	-	-	-	-	-/-
2008	20	-	0	100	0	0	0	0	38/53
2012	60	-	33	67	0	0	0	0	48/69
2017	100	-	0	100	0	0	0	0	80/82
Opuntia -- (pricklypear)									
1998	-	-	-	-	-	-	-	-	12/29
2003	-	-	-	-	-	-	-	-	-/-
2008	-	-	-	-	-	-	-	-	-/-
2012	-	-	-	-	-	-	-	-	12/29
2017	-	-	-	-	-	-	-	-	8/60
Pinus edulis^t -- (twoneedle pinyon)									
1998	20	-	100	0	0	0	0	0	- / -
2003	20	-	0	100	0	0	0	0	- / -
2008	-	-	-	-	-	-	-	-	-/-
2012	-	-	-	-	-	-	-	-	-/-
2017	-	-	-	-	-	-	-	-	-/-
Purshia tridentata^P -- (antelope bitterbrush)									
1998	1220	-	15	77	8	26	67	0	55/103
2003	1040	-	0	42	58	15	79	37	47/96
2008	120	-	17	83	0	33	17	0	24/63
2012	120	-	0	100	0	0	100	0	25/76
2017	120	-	0	100	0	0	50	0	30/89
Quercus gambelii^P -- (Gambel oak)									
1998	-	-	-	-	-	-	-	-	-/-
2003	-	-	-	-	-	-	-	-	-/-
2008	-	-	-	-	-	-	-	-	71/66
2012	-	-	-	-	-	-	-	-	-/-
2017	-	-	-	-	-	-	-	-	-/-
Sclerocactus -- (fishhook cactus)									
1998	80	-	0	25	75	0	75	0	- / -
2003	-	-	-	-	-	-	-	-	-/-
2008	-	-	-	-	-	-	-	-	-/-
2012	-	-	-	-	-	-	-	-	-/-
2017	-	-	-	-	-	-	-	-	-/-

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)									
1998	20	-	0	100	0	0	0	0	32/71
2003	60	-	0	67	33	0	0	33	21/40
2008	20	-	0	100	0	0	0	0	34/64
2012	20	-	0	100	0	100	0	0	32/76
2017	40	-	0	100	0	0	0	50	26/72
Tetradymia canescens -- (spineless horsebrush)									
1998	-	-	-	-	-	-	-	-	-/-
2003	20	-	0	100	0	0	0	0	27/33
2008	20	-	0	100	0	0	0	0	34/42
2012	20	-	0	100	0	0	100	0	20/77
2017	20	-	0	0	100	0	0	100	30/72

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

THOMPSON CREEK - STUDY NO. 23-7



Location Information

USGS 7.5 min Map Info Annabella SW; Township 25S, Range 2W, Section 06
 GPS (0' Stake) NAD 83 UTM ZONE 12, 407159 East 4280581 North

Transect Information

Browse Tag # (0' Stake) 514
 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

From the town of Annabella, continue for 1.3 miles on East Landslide (may be named Omni Point) Road. Turn left (south) onto Thompson Basin Road and continue for 2.0 miles, passing Thompson Creek, then park. The study site is on the right-hand (north) side of the road, and the 0-foot stake is approximately 220 paces away at 358 degrees magnetic.

Site Information

Land Ownership	Federal
Land Administrator	USFS
Allotment	No data
Elevation	No data
Aspect	West
Slope	8-12%
Sample Dates	06/12/2017

Table 23-07.1 Disturbance History. Recorded history of major disturbances.

Treatment/Disturbance	Name	WRI DB#	Date	Size (acres)
Harrow - Dixie	Fishlake NF PJ Maintenance-Sagebrush Enhancement - Year 1	216	2005	1115
Chaining - Chain Unknown	-	-	Historic	-

Wildlife Habitat and Vegetation History**Table 23-07.3 - Wildlife Seasonal Habitat.** UDWR wildlife habitat and seasonality.

Species	Habitat	Season
Deer	crucial	winter
Elk	substantial	winter

Table 23-07.4 - Vegetation History. The dominant vegetation type(s) and phase of woodland succession (Tausch, Miller, Roundy, & Chambers, 2009).

Year	Vegetation Type	Woodland Succession
2017	Mountain Big Sagebrush/Annual Grass	Phase I

Site Notes

A white spike shed was found on site in 2017.

Soils**Table 23-07.5 - 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	7.1	60.2	20.7	19.1	2.9	8.3	427.0	0.5	06/12/2017

Site Potential

1981 - 2010 Average Annual Precipitation	10 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.

The dominant browse species on this study site is mountain big sagebrush (*Artemisia tridentata* ssp. *vaseyana*), and few other shrub species are present (Table 23-07.12, Table 23-07.13). Utah juniper (*Juniperus osteosperma*) trees were observed with low density, and the study is considered to be within Phase I of woodland succession (Table 23-07.4, Table 23-07.14). A majority of the herbaceous cover is provided by the introduced annual species cheatgrass (*Bromus tectorum*), which is a co-dominant site vegetation component. Although a number of other grass species are present, they are rare in comparison. Forbs are depauperate in both species composition and quantity (Table 23-07.7, Table 23-07.10, Table 23-07.11).

Trend Summary Tables

Table 23-07.6 - 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
2017	10.5	1.9	-	13.5	0.9	-

Table 23-07.7 - 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
2017	457	289	70	1	41.0	14.9	1.9	0.1

Table 23-07.8 - 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
2017	2.2	-	60.2	8.3	14.2	65.0

Table 23-07.9 - 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	Rocky Mountain Elk	Rabbit
	Quadrat Frequency			
Year	Days Use Per Acre (ha)			
	2017	3	18	22
2017	-	16.8 (41.4)	21.5 (53.0)	-

Table 23-07.10 - Grass Species. Nested frequency and modified Daubenmire average cover by year.

GRASS SPECIES	Achmatherum hymenoides (Indian ricegrass)	Agropyron cristatum ⁱ (crested wheatgrass)	Aristida purpurea (purple threeawn)	Bromus tectorum ^{ai} (cheatgrass)	Elymus elymoides (squirreltail)	Hesperostipa comata (needle and thread)	Poa bulbosa ⁱ (bulbous bluegrass)	Poa secunda (Sandberg bluegrass)	Sporobolus cryptandrus (sand dropseed)	Thinopyrum intermedium ⁱ (intermediate wheatgrass)
year	Nested Frequency									
2017	9	9	6	457	25	61	1	3	57	199
year	Average Cover (%)									
2017	0.0	0.1	0.2	41.0	0.9	2.4	0.0	0.0	1.5	9.9

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

Table 23-07.11 - Forb Species. Nested frequency and modified Daubenmire average cover by year.

FORB SPECIES	Erodium cicutarium ^{ai} (redstem stork's bill)	Hymenopappus (hymenopappus)	Lactuca serriola ^{ai} (prickly lettuce)	Sisymbrium altissimum ^{ai} (tall tumblemustard)
year	Nested Frequency			
2017	64	1	2	6
year	Average Cover (%)			
2017	1.8	0.1	0.0	0.0

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

Table 23-07.12 - Shrub and Tree Species. Average modified Daubenmire quadrat and line intercept cover by year.

SHRUB SPECIES	Artemisia tridentata ssp. vaseyana ^p (mountain big sagebrush)	Opuntia polyacantha (plains pricklypear)
year	Line Intercept	
2017	13.5	0.9
year	Quadrat Cover (%)	
2017	10.5	1.9

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

Table 23-07.13 - 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.

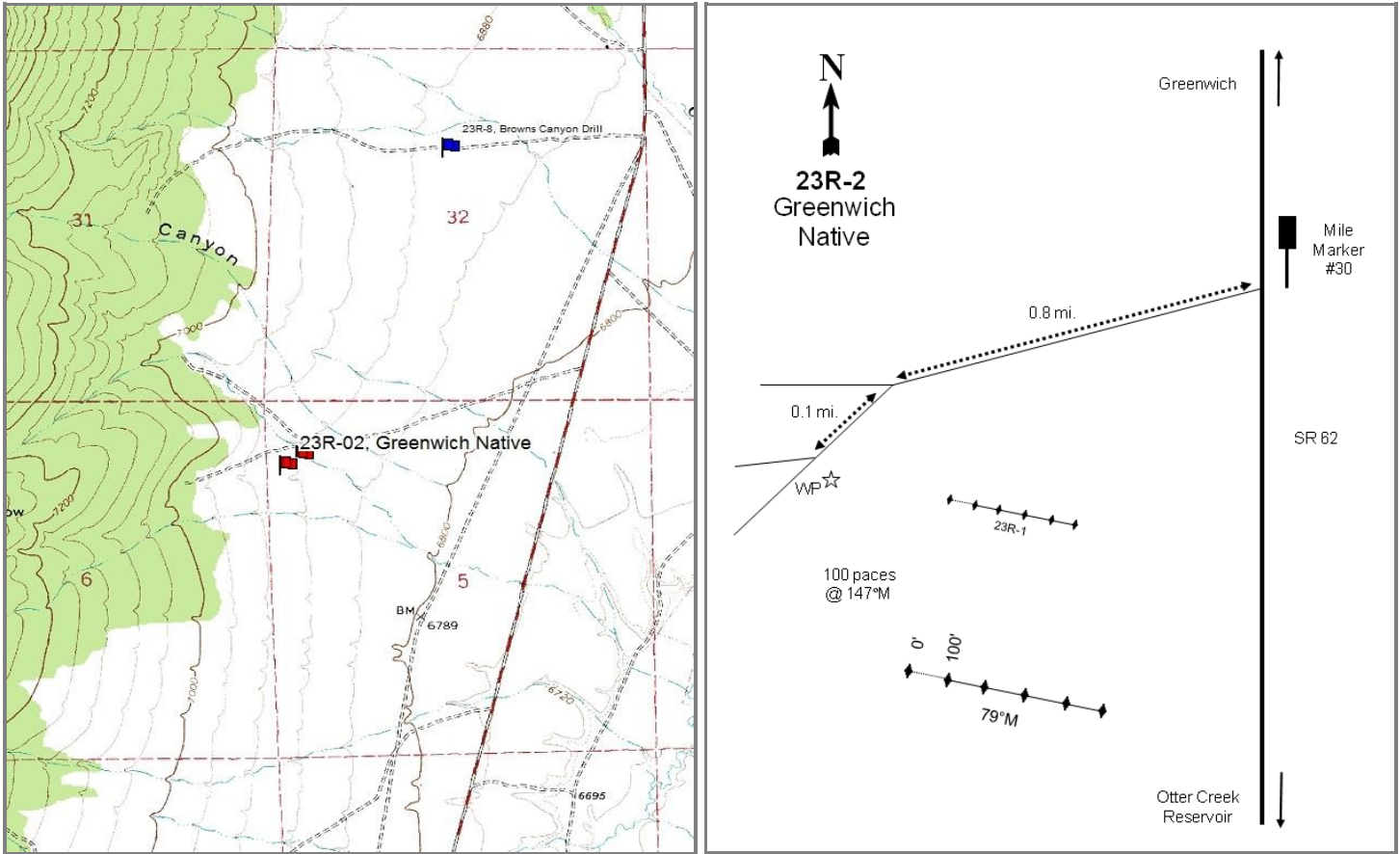
Year	Density		Age Class Distribution			Utilization		Poor Vigor (%)	Average Height Crown (cm)
	Plants Per Acre		Excluding Seedlings			Moderate (%)	Heavy (%)		
	Excluding Seedlings	Seedling	Young (%)	Mature (%)	Decadent (%)				
Artemisia tridentata ssp. vaseyana ^p -- (mountain big sagebrush)									
2017	1740	200	1	75	24	31	23	16	55/91
Ericameria nauseosa ssp. nauseosa var. speciosa ^p -- (rubber rabbitbrush)									
2017	-	-	-	-	-	-	-	-	96/155
Opuntia polyacantha -- (plains pricklypear)									
2017	1380	-	0	99	1	0	0	1	12/27

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

Table 23-07.14 - 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'	
Juniperus osteosperma (Utah juniper)						
2017	8	-	67	33	-	14.7

GREENWICH NATIVE - STUDY NO. 23R-2



Location Information

USGS 7.5 min Map Info Greenwich SW; Township 28S, Range 1W, Section 05
 GPS (0' Stake) NAD 83 UTM ZONE 12, 417908 East 4251535 North

Transect Information

Browse Tag # (0' Stake) 102
 Transect Bearing 79° 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

Start on Highway 62 between Greenwich and Otter Creek Reservoir. At mile marker 30 there is a road going west: take this road for 0.8 miles to a fork. Stay right and continue for 0.1 mile to a witness post on the left (south) side of the road. From the witness post, walk 100 paces at 147 degrees magnetic to the 0-foot stake which is marked with browse tag #102. The study is marked with green, steel fenceposts approximately 12-18 inches in height.

Site Information

Land Ownership	Federal
Land Administrator	BLM
Allotment	NORTH NARROWS
Elevation	6,870ft (2,094m)
Aspect	Northeast
Slope	6-7%
Sample Dates	08/13/1997, 08/21/2003, 08/10/2004, 06/19/2008, 08/07/2012, 06/12/2017

Table 23R-02.1 Disturbance History. Recorded history of major disturbances.

Treatment/Disturbance	Name	WRI DB#	Date	Size (acres)
Harrow - Two-Way Dixie	Narrows Project	PDB	November 2004	3600
Seeding - Broadcast Before	Narrows Project	PDB	November 2004	3600

Wildlife Habitat and Vegetation History**Table 23R-02.3 - Wildlife Seasonal Habitat.** UDWR wildlife habitat and seasonality.

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

Table 23R-02.4 - Vegetation History. The dominant vegetation type(s) and phase of woodland succession (Tausch, Miller, Roundy, & Chambers, 2009).

Year	Vegetation Type	Woodland Succession
1997	Wyoming Big Sagebrush	No Encroachment
2003	Wyoming Big Sagebrush	No Encroachment
2004	Wyoming Big Sagebrush	No Encroachment
2008	Wyoming Big Sagebrush	No Encroachment
2012	Wyoming Big Sagebrush	No Encroachment
2017	Wyoming Big Sagebrush	No Encroachment

Site Notes

This study was established as a reference site to the Greenwich Disking trend study (23R-1) in 1997.

Soils**Table 23R-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 Loam	6.3	55.3	26.2	18.6	1.2	17.7	147.2	0.4	08/13/1997

Site Potential

1981 - 2010 Average Annual Precipitation	9 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 remained in a stable state as a Wyoming big sagebrush (*Artemisia tridentata* ssp. *wyomingensis*) plant community type since establishment in 1997, and other shrubs are rare (Table 23R-02.12, Table 23R-02.13). The herbaceous understory, while somewhat diverse, has never been abundant; the introduced perennial grass species Russian wildrye (*Psathrostachys juncea*) and annual forb western tansymustard (*Descurainia pinnata*) provided the most cover in 2017. In addition, the introduced annual grass cheatgrass (*Bromus tectorum*) was observed for the first time in 2017, but in very low abundance (Table 23R-02.7, Table 23R-02.10, Table 23R-02.11). Finally, pinyon (*Pinus* sp.) and Utah juniper (*Juniperus osteosperma*) trees have been visible near the transect in site photos in all sample years, but encroachment is not actively occurring.

Trend Summary Tables**Table 23R-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
1997	17.9	0.0	-	-	-	-
2003	20.9	-	-	16.6	-	-
2004	19.7	-	-	21.4	0.1	-
2008	14.3	0.0	-	11.9	-	-
2012	17.5	-	-	21.0	-	-
2017	16.3	-	-	16.8	0.1	-

Table 23R-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
1997	-	44	-	2	-	0.6	-	0.0
2003	-	20	1	-	-	0.1	0.0	-
2004	-	10	14	0	-	0.0	0.1	0.0
2008	-	86	25	42	-	1.6	0.1	3.3
2012	-	85	71	9	-	2.5	0.3	0.0
2017	2	102	143	20	0.0	2.7	2.0	0.4

Table 23R-02.8 - 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
1997	21.4	9.6	19.6	31.3	19.0	19.0
2003	21.7	7.3	22.1	18.0	19.8	21.1
2004	26.9	2.5	27.5	30.8	9.3	19.7
2008	30.0	2.5	39.2	14.9	10.7	18.9
2012	27.0	1.4	39.7	16.7	6.0	19.6
2017	41.6	1.5	33.0	16.6	10.4	19.7

Table 23R-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	Rocky Mountain Elk	Rabbit
	Quadrat Frequency			
1997	-	3	-	1
2003	-	-	-	64
2004	-	1	-	42
2008	-	-	1	87
2012	1	3	-	22
2017	4	4	1	68
Year	Days Use Per Acre (ha)			
1997	-	-	-	-
2003	-	-	1.3 (3.3)	-
2004	-	0.7 (1.7)	4.7 (11.6)	-
2008	0.7 (1.8)	-	3.4 (8.3)	-
2012	4.4 (10.8)	0.7 (1.7)	4.7 (11.6)	-
2017	3.6 (9.0)	1.3 (3.3)	3.4 (8.3)	-

Table 23R-02.10 - 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)	Festuca idahoensis (Idaho fescue)	Poa secunda (Sandberg bluegrass)	Psathyrostachys juncea ⁱ (Russian wildrye)
year	Nested Frequency							
1997	-	-	17	-	27	-	-	-
2003	-	-	9	-	11	-	-	-
2004	-	-	10	-	-	-	-	-
2008	1	-	3	-	38	24	-	41
2012	7	23	2	-	29	15	7	20
2017	-	7	2	2	46	17	11	45
year	Average Cover (%)							
1997	-	-	0.3	-	0.3	-	-	-
2003	-	-	0.1	-	0.1	-	-	-
2004	-	-	0.0	-	-	-	-	-
2008	0.0	-	0.0	-	0.5	0.1	-	0.9
2012	0.0	0.7	0.0	-	0.3	0.6	0.1	0.8
2017	-	0.0	0.0	0.0	0.6	0.1	0.1	1.8

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

Table 23R-02.11 - Forb Species. Nested frequency and modified Daubenmire average cover by year.

FORB SPECIES	Astragalus lentiginosus (freckled milkvetch)	Cryptantha (cryptantha)	Descurainia pinnata ^a (western tansymustard)	Epilobium brachycarpum ^a (tall annual willowherb)	Gayophytum ramosissimum ^a (pinyon groundsmoke)	Ipomopsis aggregata (scarlet gilia)	Lappula occidentalis ^a (flatspine stickseed)	Linum perenne ⁱ (blue flax)	Oenothera caespitosa (tufted evening primrose)	Orobanche fasciculata (clustered broomrape)	Phlox longifolia (longleaf phlox)	Salsola tragus ^{ai} (prickly Russian thistle)	Sisymbrium altissimum ^{ai} (tall tumbledmustard)	Solanum triflorum ^a (cutleaf nightshade)	unknown perennial forb (unknown forb)	
year	Nested Frequency															
1997	2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
2003	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-
2004	-	0	14	-	-	-	-	-	-	-	-	-	-	-	0	-
2008	-	-	1	-	-	-	6	41	-	-	1	19	-	-	-	-
2012	2	2	50	2	-	-	17	2	-	3	-	3	6	2	-	-
2017	7	7	127	-	10	2	46	-	4	-	-	-	2	-	-	-
year	Average Cover (%)															
1997	0.0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
2003	-	-	-	-	-	-	-	-	-	-	-	-	-	0.0	-	-
2004	-	0.0	0.1	-	-	-	-	-	-	-	-	-	-	-	0.0	-
2008	-	-	0.0	-	-	-	0.0	3.3	-	-	0.0	0.0	-	-	-	-
2012	0.0	0.0	0.2	0.0	-	-	0.0	0.0	-	0.0	-	0.0	0.0	0.0	-	-
2017	0.3	0.2	1.6	-	0.0	0.0	0.3	-	0.0	-	-	-	0.0	-	-	-

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

Table 23R-02.12 - 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)	Opuntia polyacantha (plains pricklypear)
year	Line Intercept Cover (%)	
1997	-	-
2003	16.6	-
2004	21.4	0.1
2008	11.9	-
2012	21	-
2017	16.8	0.1
year	Quadrat Cover (%)	
1997	17.9	0.0
2003	20.9	-
2004	19.7	0.0
2008	14.3	0.0
2012	17.5	-
2017	16.3	0.0

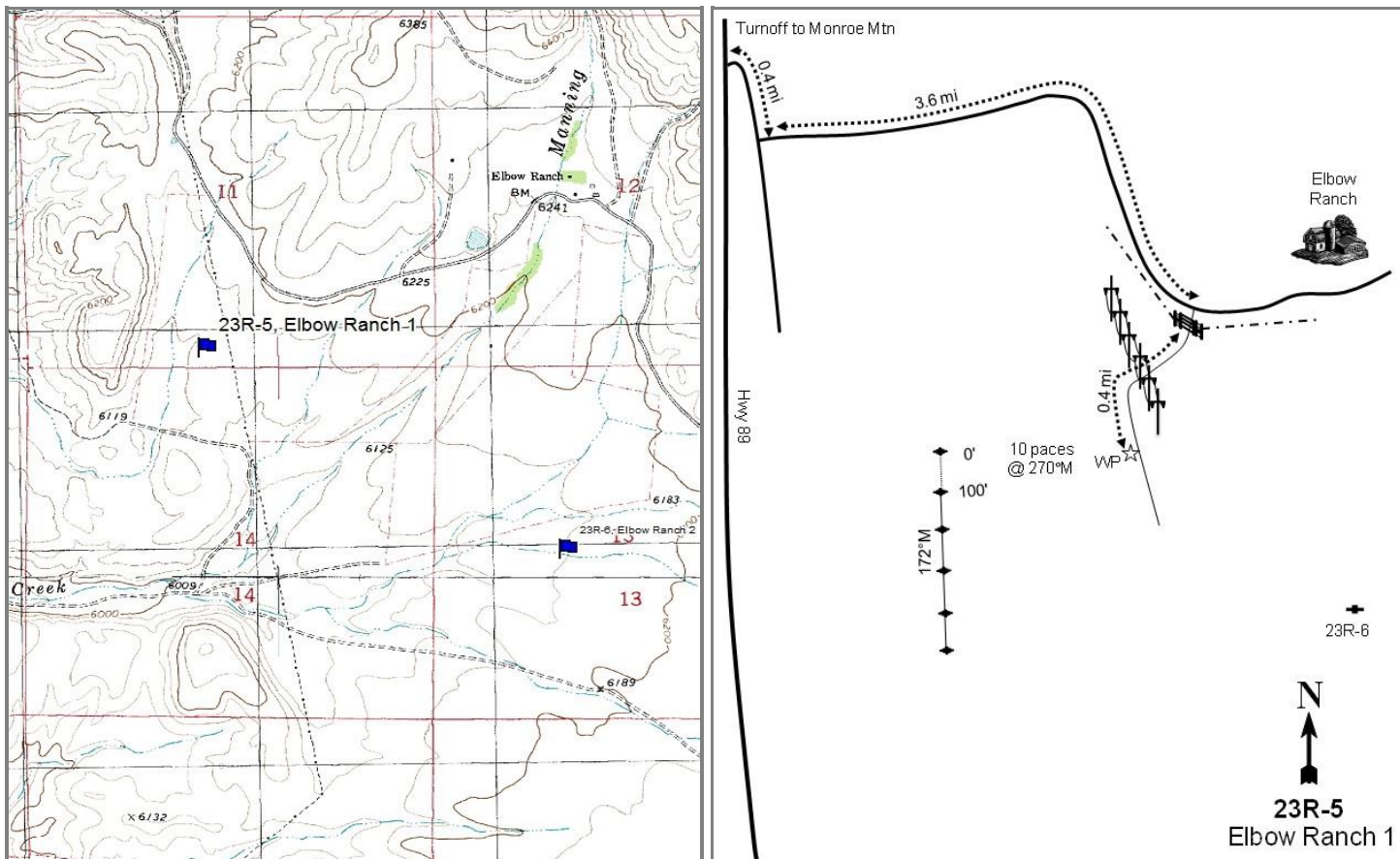
t - Tree Species; p - Preferred Browse; i - Introduced Species

Table 23R-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 (%)				
Artemisia tridentata ssp. wyomingensis ^p -- (Wyoming big sagebrush)									
1997	3800	160	6	76	18	45	1	8	67/102
2003	4220	-	4	14	82	11	1	40	61/78
2004	4280	5500	4	40	56	2	1	29	62/86
2008	6160	4940	31	40	30	17	17	16	50/67
2012	5400	2400	24	55	21	23	29	34	61/88
2017	5200	160	14	67	19	17	12	20	55/73
Gutierrezia sarothrae -- (broom snakeweed)									
1997	-	-	-	-	-	-	-	-	-/-
2003	-	-	-	-	-	-	-	-	20/17
2004	-	-	-	-	-	-	-	-	25/16
2008	-	-	-	-	-	-	-	-	-/-
2012	-	-	-	-	-	-	-	-	-/-
2017	-	-	-	-	-	-	-	-	-/-
Opuntia polyacantha -- (plains pricklypear)									
1997	20	-	0	100	0	0	0	0	-/-
2003	-	-	-	-	-	-	-	-	13/33
2004	20	-	0	100	0	0	0	0	13/39
2008	20	20	0	0	100	0	0	100	12/32
2012	20	-	0	100	0	0	0	0	10/34
2017	60	-	0	100	0	0	0	0	11/19

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

ELBOW RANCH 1 - STUDY NO. 23R-5



Location Information

USGS 7.5 min Map Info GPS (0' Stake)	Marysvale SE; Township 28S, Range 3W, Section 11 NAD 83 UTM ZONE 12, 397703 East 4249077 North
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Transect Information

Browse Tag # (0' Stake) Transect Bearing Length Belt Placement Belt Marker Placement	Not Available 172° magnetic 500ft Line 1 (11ft), Line 2 (34ft), Line 3 (59ft), Line 4 (71ft), Line 5 (95ft) Standard
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Directions to Site

From US-89 just south of Marysvale, take the turnoff to Monroe Mountain. Travel 0.4 miles to a road that will come in from the east (left). Turn onto this road and travel 3.6 miles to the WMA gate before Elbow Ranch. From here, drive 0.4 miles at 176 degrees magnetic to the 0-foot stake of the baseline.

Site Information

Land Ownership	State
Land Administrator	UDWR
Allotment	No data
Elevation	6,130ft (1,868m)
Aspect	West
Slope	2%
Sample Dates	07/22/2004, 07/02/2012, 08/01/2017

Table 23R-05.1 Disturbance History. Recorded history of major disturbances.

Treatment/Disturbance	Name	WRI DB#	Date	Size (acres)
Agriculture - Cropland	-	-	Historic	-
Harrow - One-Way Dixie	Elbow Ranch Drill	2835	November 2005	170
Seeding - Rangeland Drill	Elbow Ranch Drill	2835	November 2005	170
Seeding - Broadcast	Elbow Ranch Drill	2835	November 2005	170
Seeding - Rangeland Drill	Elbow Ranch Drill	800	Fall 2007	42

Table 23R-05.2 Seed Mix. List of known seeded plant species and rates (if available).

Mix Name			Application Type	Application Date	Acres
Elbow Ranch Drill			Drill	Nov 2005	300
Type	Species	Common Name	Cultivar/Source ID	Bulk lbs/acre	PLS lbs/acre
	Achnatherum hymenoides	Indian Ricegrass	Rimrock	1.50	1.45
	Agropyron cristatum	Crested Wheatgrass	Hycrest	1.50	1.30
	Agropyron fragile	Siberian Wheatgrass	Vavilov	0.67	0.61
	Agropyron fragile	Siberian Wheatgrass	Vavilov	0.83	0.78
	Elymus elymoides	Bottlebrush Squirreltail		0.33	0.29
	Elymus wawawaiensis	Snake River Wheatgrass	Secar	1.50	1.40
	Festuca ovina	Hard Fescue	Durar	1.00	0.94
	Poa secunda	Sandberg Bluegrass	Toole MT	0.50	0.45
	Psathyrostachys juncea	Russian Wildrye		1.50	1.27
	Thinopyrum intermedium	Pubescent Wheatgrass		0.67	0.56
	Thinopyrum intermedium	Pubescent Wheatgrass		0.83	0.70
Mix Name			Application Type	Application Date	Acres
Elbow Ranch Broadcast			Broadcast	Nov 2005	300
Type	Species	Common Name	Cultivar/Source ID	Bulk lbs/acre	PLS lbs/acre
S	Artemisia tridentata ssp. wyomingensis	Wyoming Big Sagebrush	Sanpete UT	0.67	0.20
S	Bassia prostrata	Forage Kochia	Millard UT	1.00	0.76
Mix Name			Application Type	Application Date	Acres
Elbow Ranch			Drill	Nov 2007	200
Type	Species	Common Name	Cultivar/Source ID	Bulk lbs/acre	PLS lbs/acre
G	Achnatherum hymenoides	Indian Ricegrass	Rimrock	1.50	1.47
G	Agropyron cristatum	Crested Wheatgrass	Douglas	1.00	0.84
G	Agropyron cristatum	Crested Wheatgrass	Hycrest	1.00	0.93
G	Agropyron fragile	Siberian Wheatgrass	Vavilov	2.00	1.72
G	Elymus lanceolatus	Thickspike Wheatgrass	Bannock	1.00	0.93
G	Elymus wawawaiensis	Snake River Wheatgrass	Secar	1.75	1.64
G	Festuca ovina	Hard Fescue	Durar	0.90	0.82
G	Pascopyrum smithii	Western Wheatgrass	Arriba	1.00	0.81
G	Poa secunda	Big Bluegrass	Sherman	0.50	0.35
G	Poa secunda	Canby Bluegrass	Canbar	0.27	0.24
G	Psathyrostachys juncea	Russian Wildrye		2.25	1.88
F	Melilotus officinalis	Yellow Sweetclover		0.50	0.46
S	Artemisia tridentata ssp. wyomingensis	Wyoming Big Sagebrush	Beaver UT	0.50	0.11
S	Atriplex canescens	Fourwing Saltbush	Beaver UT	1.00	0.52
S	Bassia prostrata	Forage Kochia	Immigrant	2.00	1.88

Wildlife Habitat and Vegetation History

Table 23R-05.3 - Wildlife Seasonal Habitat. UDWR wildlife habitat and seasonality.

Species	Habitat	Season
Deer	crucial	winter
Elk	substantial	winter

Table 23R-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	Annual Forb	NA
2012	Annual Forb	NA
2017	Annual Forb	NA

Site Notes

This study is located approximately five and a half miles southeast of Marysvale within an abandoned cropland flat.

Soils**Table 23R-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	7.7	65.1	17.4	17.5	1.3	16.5	985.6	0.8	07/22/2004

Site Potential

1981 - 2010 Average Annual Precipitation 9 inches
 NRCS Ecological Site Semidesert Gravelly Loam (Wyoming Big Sagebrush) south
 NRCS Ecological Site # R028AY214UT
 States and Transitions No state and transition model is available for this ecological site.

This site has remained dominated by annual forbs, particularly the introduced species prickly Russian thistle (*Salsola tragus*) and saltlover (*Halogeton glomeratus*), since the study period began in 2005 (Table 23R-05.7, Table 23R-05.11). The introduced perennial species Russian wildrye (*Psathrostachys juncea*) was the only grass species sampled in 2017, and it contributed almost no cover (Table 23R-05.10). The browse component on this study site includes only forage kochia (*Bassia prostrata*) which is very low in abundance, although density did exhibit an increase between 2012 and 2017 (Table 23R-05.12, Table 23R-05.13). This study site is expected to remain in a degraded state in future sample years.

Trend Summary Tables**Table 23R-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	-	-	-	-	-	-
2012	-	-	-	-	-	-
2017	0.1	-	-	0.1	-	-

Table 23R-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	-	-	377	-	-	-	35.4	-
2012	-	-	97	-	-	-	5.5	-
2017	-	0	233	-	-	0.0	20.3	-

Table 23R-05.8 - 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	40.9	-	4.9	25.7	3.2	35.0
2012	57.4	-	23.0	13.4	5.0	5.5
2017	31.8	-	19.2	39.5	6.2	21.0

Table 23R-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	Mule Deer	Rabbit
	Quadrat Frequency	
2004	-	11
2012	-	2
2017	-	34
Year	Days Use Per Acre (ha)	
2004	-	-
2012	1.3 (3.3)	-
2017	3.4 (8.3)	-

Table 23R-05.10 - Grass Species. Nested frequency and modified Daubenmire average cover by year.

GRASS SPECIES	
Psathyrostachys juncea ⁱ (Russian wildrye)	
year	Nested Frequency
2004	-
2012	-
2017	0
year	Average Cover (%)
2004	-
2012	-
2017	0.0

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

Table 23R-05.11 - Forb Species. Nested frequency and modified Daubenmire average cover by year.

FORB SPECIES							
Amaranthus ^{ai} (pigweed)							
Chenopodium album ^a (lambsquarters)							
Descurainia sophia ^{ai} (herb sophia)							
Halogeton glomeratus ^{ai} (saltlover)							
Lappula occidentalis ^a (flatspine stickseed)							
Mentzelia albicaulis ^a (whitestem blazingstar)							
Salsola tragus ^{ai} (prickly Russian thistle)							
year	Nested Frequency						
2004	-	7	5	150	-	155	291
2012	-	-	2	42	3	-	91
2017	3	-	84	58	-	-	143
year	Average Cover (%)						
2004	-	0.0	0.0	10.7	-	3.1	21.5
2012	-	-	0.0	0.7	0.0	-	4.7
2017	0.4	-	2.0	5.7	-	-	12.2

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

Table 23R-05.12 - Shrub and Tree Species. Average modified Daubenmire quadrat and line intercept cover by year.

SHRUB SPECIES	Bassia prostrata ^{pt} (forage kochia)
year	Line Intercept Cover (%)
2004	-
2012	-
2017	0.1
year	Quadrat Cover (%)
2004	-
2012	-
2017	0.1

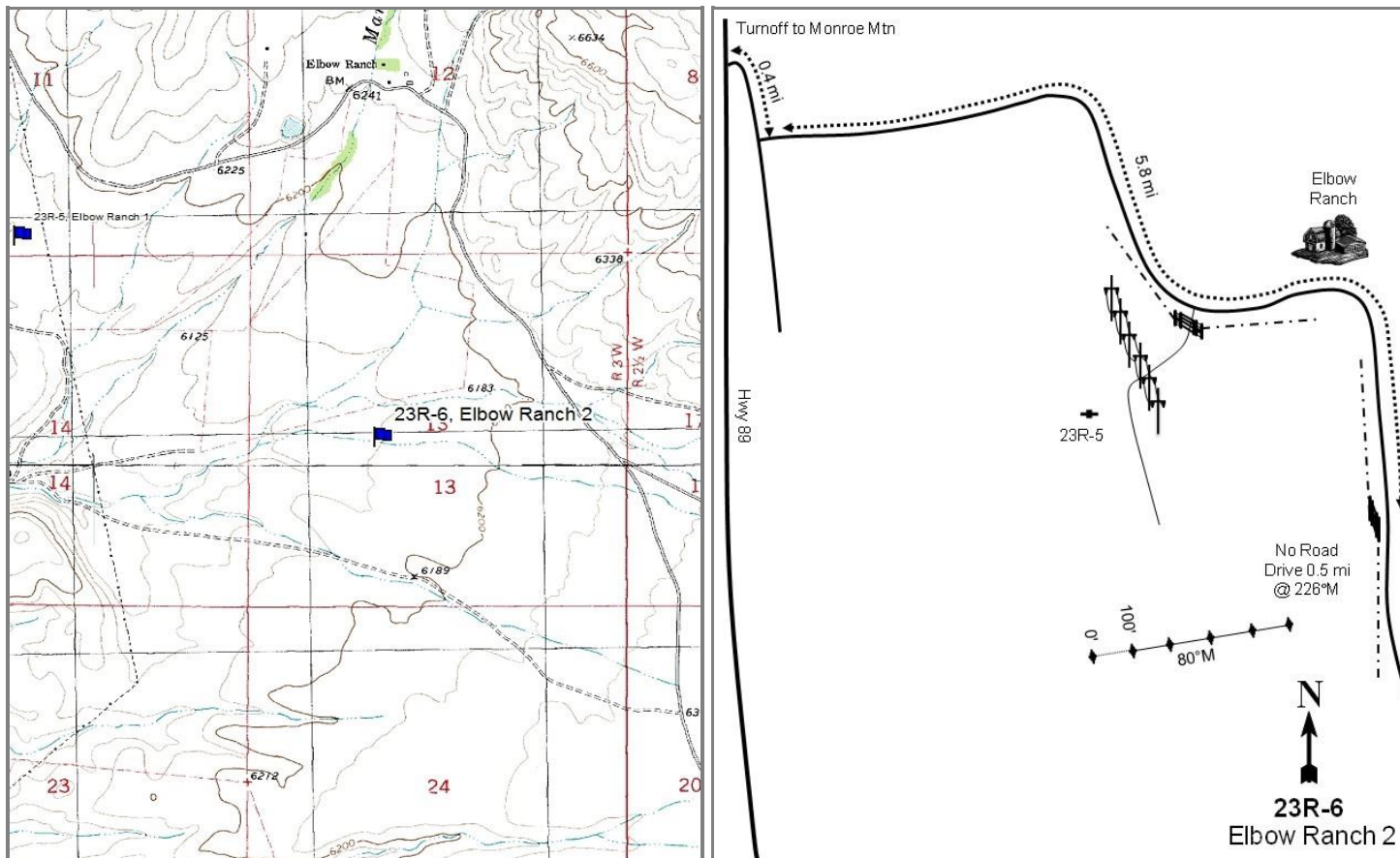
t - Tree Species; p - Preferred Browse; i - Introduced Species

Table 23R-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 (%)				
Bassia prostrata ^{pt} -- (forage kochia)									
2012	40	-	0	100	0	0	50	0	18/33
2017	220	-	0	100	0	0	0	0	25/31

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

ELBOW RANCH 2 - STUDY NO. 23R-6



Location Information

USGS 7.5 min Map Info Marysvale SE; Township 28S, Range 3W, Section 13
 GPS (0' Stake) NAD 83 UTM ZONE 12, 399218 East 4248131 North

Transect Information

Browse Tag # (0' Stake) Not Available
 Transect Bearing 80° 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-89 just south of Marysvale, take the turnoff to Monroe Mountain. Travel for 0.4 miles to a road that will come in from the east (left): turn onto this road and travel 5.8 miles, past Elbow Ranch, to the WMA gate. From here, drive 0.5 miles at 166 degrees magnetic to the 0-foot stake of the baseline.

Site Information

Land Ownership	State
Land Administrator	UDWR
Allotment	No data
Elevation	6,160ft (1,878m)
Aspect	West
Slope	4%
Sample Dates	07/22/2004, 07/02/2012, 08/02/2017

Table 23R-06.1 Disturbance History. Recorded history of major disturbances.

Treatment/Disturbance	Name	WRI DB#	Date	Size (acres)
Agriculture - Cropland	-	-	Historic	-

Wildlife Habitat and Vegetation History**Table 23R-06.3 - Wildlife Seasonal Habitat.** UDWR wildlife habitat and seasonality.

Species	Habitat	Season
Deer	crucial	winter
Elk	substantial	winter

Table 23R-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	Forage Kochia	NA
2012	Forage Kochia	NA
2017	Forage Kochia	NA

Site Notes

This study is located approximately six and a half miles southeast of Marysville within an abandoned cropland flat. The area was proposed to be one-way harrowed and broadcast seeded in November of 2005, but was not treated.

Soils**Table 23R-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	7.8	49.0	30.5	20.5	0.8	9.5	809.6	0.8	07/22/2004

Site Potential

1981 - 2010 Average Annual Precipitation	9 inches
NRCS Ecological Site	Semidesert Gravelly Loam (Wyoming Big Sagebrush) South
NRCS Ecological Site #	R028AY214UT
States and Transitions	No state and transition model is available for this ecological site.

Since study establishment in 2004, this site has been dominated by forage kochia (*Bassia prostrata*) with Wyoming big sagebrush (*Artemisia tridentata* ssp. *wyomingensis*) and fourwing saltbush (*Atriplex canescens*) as minor components (Table 23R-06.12, Table 23R-06.13). The herbaceous understory was abundant in 2004, but was mainly composed of the weedy introduced annual species prickly Russian thistle (*Salsola tragus*) and saltlover (*Halogeton glomeratus*); herbaceous species have remained rare since the 2012 sample year (Table 23R-06.7, Table 23R-06.10, Table 23R-06.11). Barring a major disturbance, this study site is expected to remain in a similar state in future sample years.

Trend Summary Tables

Table 23R-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	6.0	-	-	11.7	-	-
2012	18.1	-	-	26.3	-	-
2017	11.7	-	-	14.2	-	-

Table 23R-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	-	6	237	37	-	1.1	13.4	2.6
2012	-	-	13	8	-	-	0.7	0.0
2017	-	-	63	48	-	-	1.0	0.6

Table 23R-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	48.2	-	4.8	27.9	5.7	22.4
2012	55.3	-	12.2	11.1	7.1	19.5
2017	45.8	-	11.0	31.5	7.3	12.6

Table 23R-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	Rocky Mountain Elk	Rabbit
	Quadrat Frequency		
2004	-	-	49
2012	2	-	59
2017	-	-	83
Year	Days Use Per Acre (ha)		
	2004	-	-
2012	-	0.7 (1.7)	-
2017	-	-	-

Table 23R-06.10 - Grass Species. Nested frequency and modified Daubenmire average cover by year.

GRASS SPECIES	unknown perennial grass (unknown grass)
year	Nested Frequency
2004	6
2012	-
2017	-
year	Average Cover (%)
2004	1.1
2012	-
2017	-

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

Table 23R-06.11 - Forb Species. Nested frequency and modified Daubenmire average cover by year.

FORB SPECIES	Astragalus lentiginosus (freckled milkvetch)	Chenopodium album ^a (lambsquarters)	Chorispota tenella ⁱⁱ (crossflower)	Convolvulus arvensis ⁱⁱ (field bindweed)	Cryptantha (cryptantha)	Descurainia sophia ⁱⁱ (herb sophia)	Draba ^a (draba)	Halogeton glomeratus ⁱⁱ (saltlover)	Lappula occidentalis ^a (flatspine stickseed)	Navarretia intertexta ^a (needleleaf navarretia)	Phlox longifolia (longleaf phlox)	Salsola tragus ⁱⁱ (prickly Russian thistle)	Sisymbrium altissimum ⁱⁱ (tall tumblemustard)	Sphaeralcea coccinea (scarlet globemallow)
year	Nested Frequency													
2004	8	23	-	1	-	10	-	96	36	1	3	163	-	26
2012	4	-	9	-	-	1	1	-	-	-	-	2	-	4
2017	14	12	-	-	2	24	-	3	-	-	-	13	14	32
year	Average Cover (%)													
2004	0.1	0.6	-	0.0	-	0.1	-	4.4	0.4	0.0	0.0	7.8	-	2.5
2012	0.0	-	0.7	-	-	0.0	0.0	-	-	-	-	0.0	-	0.0
2017	0.2	0.3	-	-	0.0	0.2	-	0.0	-	-	-	0.3	0.2	0.5

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

Table 23R-06.12 - Shrub and Tree Species. Average modified Daubenmire quadrat and line intercept cover by year.

SHRUB SPECIES	Bassia prostrata ⁱⁱ (forage kochia)
year	Line Intercept Cover (%)
2004	11.7
2012	26.3
2017	14.2
year	Quadrat Cover (%)
2004	6.0
2012	18.1
2017	11.7

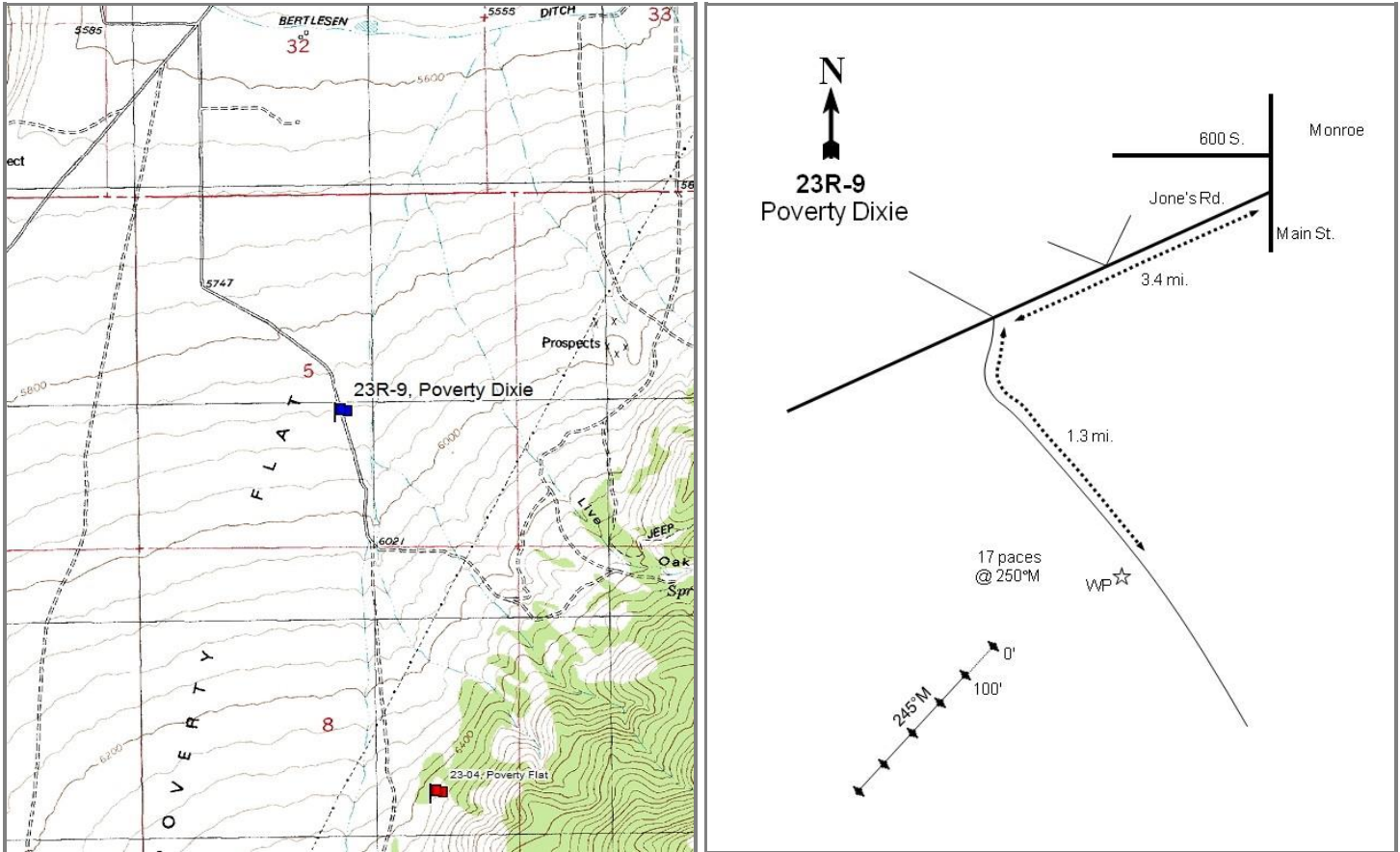
t - Tree Species; p - Preferred Browse; i - Introduced Species

Table 23R-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	-	-	-	-	-	-	-	-	-/-
2012	40	-	50	50	0	0	0	0	55/67
2017	20	-	0	100	0	0	0	0	86/68
Atriplex canescens^P -- (fourwing saltbush)									
2004	-	-	-	-	-	-	-	-	63/98
2012	-	-	-	-	-	-	-	-	-/-
2017	-	-	-	-	-	-	-	-	106/209
Bassia prostrata^{Pi} -- (forage kochia)									
2004	2640	20	25	75	0	0	0	0	52/88
2012	124320	27220	89	11	0	1	0	69	22/43
2017	9580	-	23	77	0	23	1	0	38/56

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

POVERTY DIXIE - STUDY NO. 23R-9



Location Information

USGS 7.5 min Map Info GPS (0' Stake)	Antelope Range NE; Township 26S, Range 3W, Section 05 NAD 83 UTM ZONE 12, 399782 East 4269106 North
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Transect Information

Browse Tag # (0' Stake)	76
Transect Bearing	245° magnetic
Length	500ft
Belt Placement	Line 1 (11ft), Line 2 (34ft), Line 3 (59ft), Line 4 (71ft), Line 5 (95ft)
Belt Marker Placement	Belt 4: No Rebar

Directions to Site

From 600 South and Main Street in Monroe, turn southwest onto Jones Road, which is a gravel road coming in at a 45 degree angle. Proceed for 3.4 miles to a junction and stay left. Continue on this road for 1.3 miles to a half-high witness post on the right (west). From the half-high witness post, walk 17 paces at 250 degrees magnetic to the 0-foot stake. The 0-foot stake is marked with browse tag #76.

Site Information

Land Ownership	Federal
Land Administrator	BLM
Allotment	MONROE CO-OP
Elevation	5,900ft (1,798m)
Aspect	North
Slope	5%
Sample Dates	07/14/2005, 08/12/2010, 08/05/2013, 08/02/2017

Table 23R-09.1 Disturbance History. Recorded history of major disturbances.

Treatment/Disturbance	Name	WRI DB#	Date	Size (acres)
Seeding - Aerial After	Poverty Flat	139	December 2005	2108
Fire - Wildfire	Flat	-	July 1997	5425
Seeding - Rangeland Drill	Flat Fire Rehabilitation	-	November-December 1997	3400
Seeding - Aerial	Flat Fire Rehabilitation	-	November 1997	3000
Harrow - One-Way Dixie	Poverty Flat	139	November 2005	2108
Seeding - Broadcast Before	Poverty Flat	139	November 2005	2108
Seeding - Aerial	Flat Fire Rehabilitation	-	November 1997	400

Table 23R-09.2 Seed Mix. List of known seeded plant species and rates (if available).

Mix Name			Application Type	Application Date	Acres
Poverty Flat			Broadcast	Nov 2005	2000
Type	Species	Common Name	Cultivar/Source ID	Bulk lbs/acre	PLS lbs/acre
	Agropyron cristatum	Crested Wheatgrass	Hycrest	1.00	0.94
	Helianthus annuus	Annual Sunflower		0.02	0.02
	Helianthus annuus	Annual Sunflower		0.50	0.48
	Helianthus annuus	Annual Sunflower		0.13	0.08
	Leymus cinereus	Great Basin Wildrye	Trailhead	0.17	0.15
	Leymus cinereus	Great Basin Wildrye	Trailhead	0.50	0.39
	Leymus cinereus	Great Basin Wildrye	Trailhead	0.17	0.16
	Linum perenne	Blue Flax		0.33	0.28
	Linum perenne	Blue Flax		0.50	0.42
	Medicago sativa	Alfalfa	Ladak+	0.15	0.14
	Medicago sativa	Alfalfa	Nomad	0.17	0.16
	Medicago sativa	Alfalfa	Spredor 4	0.17	0.16
	Onobrychis viciifolia	Sainfoin	Eski	2.50	2.34
	Poa secunda	Sandberg Bluegrass	SID OR	0.75	0.60
	Psathyrostachys juncea	Russian Wildrye		1.00	0.90
	Sanguisorba minor	Small Burnet	Delar	2.00	1.89
	Thinopyrum intermedium	Pubescent Wheatgrass		2.00	1.67
G	Achnatherum hymenoides	Indian Ricegrass	Nezpar	0.50	0.00
G	Agropyron cristatum	Crested Wheatgrass	Ephraim	1.00	0.00
G	Agropyron cristatum	Crested Wheatgrass	Hycrest	2.00	0.00
G	Leymus cinereus	Great Basin Wildrye	Magnar	1.00	0.00
G	Leymus cinereus	Great Basin Wildrye	Trailhead	0.14	0.12
G	Thinopyrum intermedium	Pubescent Wheatgrass	Luna	1.00	0.00
F	Medicago sativa	Alfalfa	Ladak	2.00	0.00
F	Melilotus officinalis	Yellow Sweetclover		0.70	0.00
F	Melilotus officinalis	Yellow Sweetclover		0.25	0.18
F	Sanguisorba minor	Small Burnet		2.50	0.00
S	Atriplex canescens	Fourwing Saltbush	Wayne UT	0.63	0.16
Mix Name			Application Type	Application Date	Acres
Flat Fire First Aerial			Aerial	Nov 1997	3000
Type	Species	Common Name	Cultivar/Source ID	Bulk lbs/acre	PLS lbs/acre
F	Helianthus annuus	Annual Sunflower		0.10	0.00
S	Artemisia tridentata ssp. wyomingensis	Wyoming Big Sagebrush		1.00	0.00
S	Artemisia tridentata ssp. wyomingensis	Wyoming Big Sagebrush	Utah UT	0.15	0.02
S	Artemisia tridentata ssp. wyomingensis	Wyoming Big Sagebrush	Utah UT	0.35	0.08
S	Artemisia tridentata ssp. wyomingensis	Wyoming Big Sagebrush	Utah UT	0.50	0.09
S	Atriplex canescens	Fourwing Saltbush		3.00	0.00
S	Bassia prostrata	Forage Kochia	Millard UT	1.25	0.75
S	Bassia prostrata	Forage Kochia	Millard UT	0.25	0.16

Mix Name			Application Type	Application Date	Acres
Flat Fire Second Aerial			Aerial	Nov 1997	400
Type	Species	Common Name	Cultivar/Source ID	Bulk lbs/acre	PLS lbs/acre
S	Bassia prostrata	Forage Kochia		1.20	0.00

Wildlife Habitat and Vegetation History

Table 23R-09.3 - Wildlife Seasonal Habitat. UDWR wildlife habitat and seasonality.

Species	Habitat	Season
Deer	crucial	winter

Table 23R-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	Annual Grass	NA
2010	Annual-Perennial Grass	NA
2013	Annual-Perennial Grass	NA
2017	Annual-Perennial Grass	NA

Site Notes

A wildfire occurred in this area in July of 1997 and removed the Wyoming big sagebrush (*Artemisia tridentata* ssp. *wyomingensis*) component. The original seeding process failed due to lack of spring precipitation and extreme competition with existing cheatgrass (*Bromus tectorum*) (WRI Database 2017).

Soils

Table 23R-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
Sandy Loam	6.8	60.4	24.7	14.8	2.4	16.1	204.8	0.5	07/14/2005

Site Potential

1981 - 2010 Average Annual Precipitation 9 inches
 NRCS Ecological Site Semidesert Gravelly Loam (Wyoming Big Sagebrush) South
 NRCS Ecological Site # R028AY214UT
 States and Transitions No state and transition model is available for this ecological site.

When this site was established prior to treatment in 2005, the introduced annual grass species cheatgrass (*Bromus tectorum*) was the dominant plant species, and it has been co-dominant with the introduced perennial species crested wheatgrass (*Agropyron cristatum*) since treatment. Annual forbs were moderately abundant on the site before the treatment, but have remained rare in post-treatment samplings (Table 23R-09.7, Table 23R-09.10, Table 23R-09.11). The shrub layer consists mainly of two species, forage kochia (*Bassia prostrata*) and fourwing saltbush (*Atriplex canescens*), the density and cover of which have exhibited an overall post-treatment increase (Table 23R-09.12, Table 23R-09.13).

Trend Summary Tables

Table 23R-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	1.2	-	-	2.1	-	-
2010	7.2	-	-	11.7	0.2	-
2013	6.8	0.0	-	7.7	-	-
2017	7.1	-	-	9.8	-	-

Table 23R-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	413	209	366	22	15.3	6.8	8.6	0.4
2010	363	172	62	5	14.2	11.2	0.7	0.1
2013	414	215	4	-	15.3	10.6	0.0	-
2017	378	250	28	2	16.9	12.7	0.2	0.0

Table 23R-09.8 - 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	22.8	-	32.9	13.1	9.4	29.9
2010	24.6	0.1	23.3	20.8	10.2	33.3
2013	18.0	0.0	39.4	9.3	11.3	38.4
2017	14.8	0.1	32.4	24.9	12.4	35.9

Table 23R-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	Rocky Mountain Elk	Rabbit
	Quadrat Frequency			
2005	4	-	2	14
2010	7	-	-	2
2013	9	-	13	5
2017	8	1	-	6
Year	Days Use Per Acre (ha)			
2005	16.0 (39.5)	2.0 (5.0)	2.7 (6.6)	-
2010	29.0 (71.7)	0.7 (1.7)	-	-
2013	25.4 (62.8)	-	17.4 (43.0)	-
2017	11.6 (28.7)	-	0.7 (1.7)	-

Table 23R-09.10 - 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 ^{ai} (cheatgrass)	Elymus elymoides (squirreltail)	Poa secunda (Sandberg bluegrass)	Thinopyrum intermedium ⁱ (intermediate wheatgrass)
year	Nested Frequency							
2005	0	135	-	3	413	82	-	16
2010	-	157	-	-	363	24	3	4
2013	-	205	-	-	414	4	2	5
2017	-	247	1	-	378	1	1	4
year	Average Cover (%)							
2005	0.0	4.8	-	0.0	15.3	1.3	-	0.7
2010	-	10.4	-	-	14.2	0.7	0.0	0.2
2013	-	9.8	-	-	15.3	0.4	0.0	0.4
2017	-	12.4	0.0	-	16.9	0.0	0.0	0.1

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

Table 23R-09.11 - Forb Species. Nested frequency and modified Daubenmire average cover by year.

FORB SPECIES	Amaranthus blitoides ^{ai} (mat amaranth)	Ceratocephala testiculata ^{ai} (curvseed butterwort)	Chamaesyce (sandmat)	Collinsia parviflora ^a (maiden blue eyed Mary)	Cryptantha (cryptantha)	Descurainia pinnata ^a (western tansymustard)	Draba ^a (draba)	Erodium cicutarium ^{ai} (redstem stork's bill)	Lactuca serriola ^{ai} (prickly lettuce)	Medicago sativa ^a (alfalfa)	Salsola tragus ^{ai} (prickly Russian thistle)	Sisymbrium altissimum ^{ai} (tall tumblemustard)	unknown annual forb ^a (unknown forb)
year	Nested Frequency												
2005	34	22	16	21	3	39	9	-	-	3	279	205	-
2010	-	-	5	-	-	5	-	-	2	-	34	0	32
2013	-	-	-	-	-	-	-	-	-	-	-	4	-
2017	-	-	-	-	2	-	2	26	-	-	-	-	-
year	Average Cover (%)												
2005	0.2	0.1	0.0	0.1	0.0	0.1	0.0	-	-	0.4	1.5	6.6	-
2010	-	-	0.1	-	-	0.1	-	-	0.0	-	0.5	0.0	0.1
2013	-	-	-	-	-	-	-	-	-	-	-	0.0	-
2017	-	-	-	-	0.0	-	0.0	0.2	-	-	-	-	-

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

Table 23R-09.12 - Shrub and Tree Species. Average modified Daubenmire quadrat and line intercept cover by year.

SHRUB SPECIES	Atriplex canescens ^p (fourwing saltbush)	Bassia prostrata ^{pi} (forage kochia)	Opuntia (pricklypear)
year	Line Intercept Cover (%)		
2005	0.9	1.2	-
2010	2.9	8.8	0.2
2013	3.7	4	-
2017	1.9	7.9	-
year	Quadrat Cover (%)		
2005	0.6	0.6	-
2010	2.6	4.6	0.0
2013	1.9	4.9	0.0
2017	0.3	6.8	-

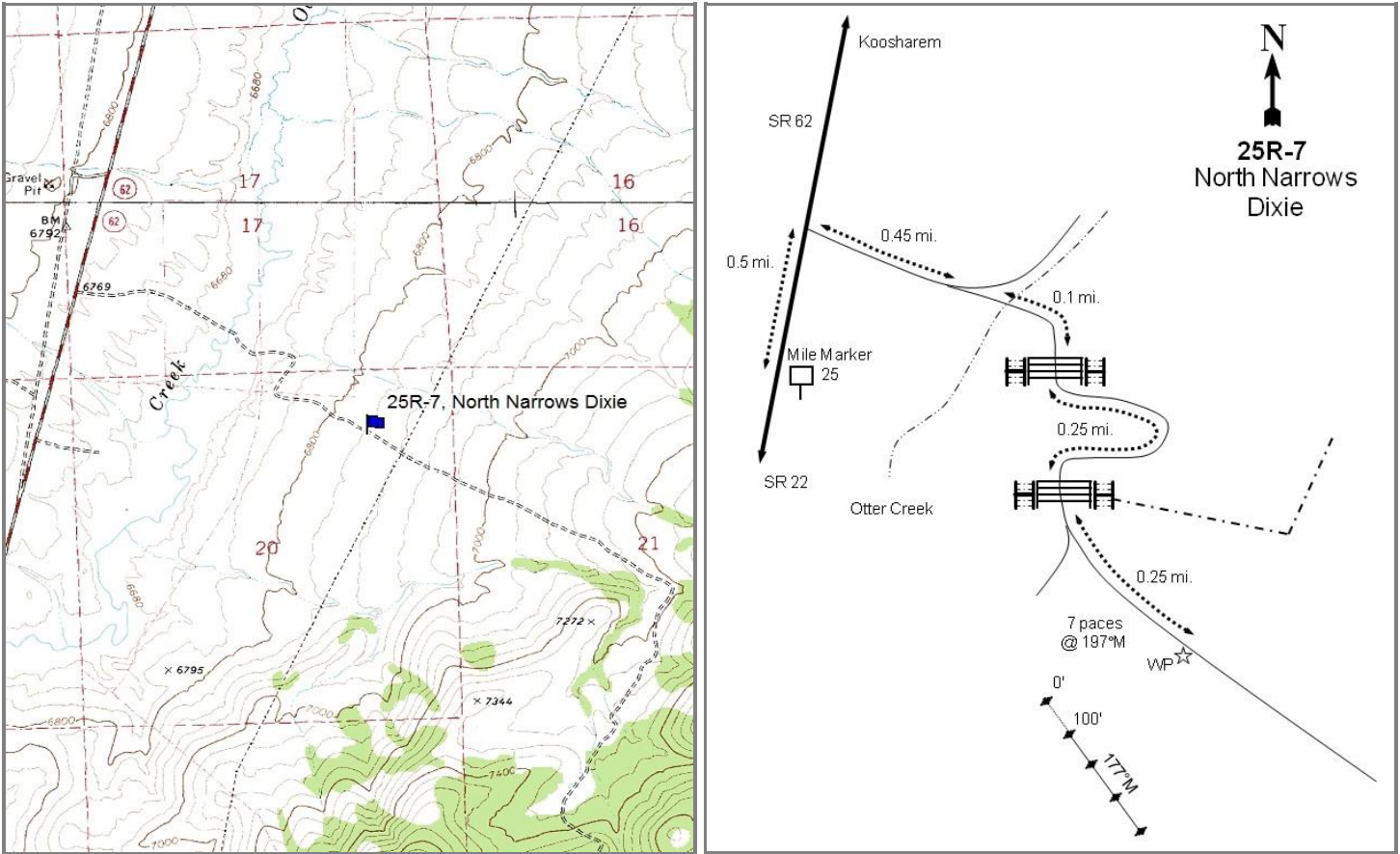
t - Tree Species; p - Preferred Browse; i - Introduced Species

Table 23R-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. wyomingensis^p -- (Wyoming big sagebrush)									
2005	-	-	-	-	-	-	-	-	27/38
2010	-	-	-	-	-	-	-	-	44/59
2013	-	-	-	-	-	-	-	-	-/-
2017	-	-	-	-	-	-	-	-	34/86
Atriplex canescens^p -- (fourwing saltbush)									
2005	20	-	0	100	0	0	0	0	87/120
2010	60	20	0	100	0	0	0	0	97/164
2013	40	-	0	100	0	0	0	0	115/198
2017	40	-	0	100	0	0	0	0	77/143
Bassia prostrata^{pi} -- (forage kochia)									
2005	4000	11320	81	17	3	0	0	0	44/48
2010	3140	6720	14	86	0	0	0	0	57/86
2013	10100	540	41	59	0	25	0	42	28/47
2017	15080	400	51	49	1	39	12	0	23/37
Opuntia -- (pricklypear)									
2005	20	20	0	100	0	0	0	100	16/56
2010	80	-	0	100	0	0	0	0	16/67
2013	40	-	0	50	50	0	0	50	10/30
2017	-	-	-	-	-	-	-	-	11/15

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

NORTH NARROWS DIXIE - STUDY NO. 25R-7



Location Information

USGS 7.5 min Map Info	Parker Knoll NE; Township 28S, Range 1W, Section 20
GPS (0' Stake)	NAD 83 UTM ZONE 12, 419225 East 4246756 North

Transect Information

Browse Tag # (0' Stake)	110
Transect Bearing	177° 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

Proceed south of Koosharem on SR-62 and turn left (east) 0.5 miles before mile marker 27. Drive 0.45 miles to Otter Creek and continue for 0.1 miles to a gate. Drive 0.25 miles to another gate, then proceed 0.25 miles to the witness post on the right (southwest) side of the road. The 0-foot stake is 7 paces from the witness post at 197 degrees magnetic and is marked with browse tag #110.

Site Information

Land Ownership	Federal
Land Administrator	BLM
Allotment	NORTH NARROWS
Elevation	6,775ft (2,065m)
Aspect	West
Slope	8%
Sample Dates	06/11/2008, 06/25/2009, 08/19/2010, 08/05/2013, 08/30/2017

Table 25R-07.1 Disturbance History. Recorded history of major disturbances.

Treatment/Disturbance	Name	WRI DB#	Date	Size (acres)
Harrow - Two-Way Dixie	North Narrows Year 1	1155	October-December 2008	1369
Seeding - Broadcast Before	North Narrows Year 1	1155	October 2008	1369
Seeding - Broadcast After	North Narrows Year 1	1155	December 2008	1369

Table 25R-07.2 Seed Mix. List of known seeded plant species and rates (if available).

Mix Name			Application Type	Application Date	Acres
North Narrows East			Broadcast	Oct 2008	2050
Type	Species	Common Name	Cultivar/Source ID	Bulk lbs/acre	PLS lbs/acre
G	Agropyron cristatum	Crested Wheatgrass	Douglas	0.12	0.10
G	Agropyron cristatum	Crested Wheatgrass	Hycrest	0.12	0.11
G	Elymus wawawaiensis	Snake River Wheatgrass	Secar	0.50	0.38
G	Festuca ovina	Sheep Fescue		0.24	0.23
G	Leymus cinereus	Great Basin Wildrye	Trailhead	0.73	0.66
G	Psathyrostachys juncea	Russian Wildrye	Bozoisky	1.20	1.02
G	Thinopyrum intermedium	Pubescent Wheatgrass	Luna	1.22	1.07
G	Thinopyrum intermedium	Pubescent Wheatgrass	Luna	0.27	0.24
F	Astragalus cicer	Cicer Milkvetch	Lutana	0.39	0.38
F	Helianthus annuus	Annual Sunflower		0.26	0.24
F	Helianthus annuus	Annual Sunflower		0.20	0.18
F	Linum perenne	Blue Flax	Appar	0.05	0.05
F	Linum perenne	Blue Flax	Appar	0.20	0.16
F	Medicago sativa	Alfalfa	Ladak	0.24	0.23
F	Medicago sativa	Alfalfa	Ranger	0.24	0.22
F	Melilotus officinalis	Yellow Sweetclover		1.00	0.90
F	Sanguisorba minor	Small Burnet	Delar	2.10	1.94
F	Sanguisorba minor	Small Burnet	Delar	0.90	0.77
S	Atriplex canescens	Fourwing Saltbush	Central UT	0.24	0.10
Mix Name			Application Type	Application Date	Acres
North Narrows East Kochia			Broadcast	Dec 2008	2050
Type	Species	Common Name	Cultivar/Source ID	Bulk lbs/acre	PLS lbs/acre
		Rice Hulls		0.32	0.00
S	Bassia prostrata	Forage Kochia	Humbolt/Lander NV	0.61	0.41

Wildlife Habitat and Vegetation History**Table 25R-07.3 - Wildlife Seasonal Habitat.** UDWR wildlife habitat and seasonality.

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

Table 25R-07.4 - Vegetation History. The dominant vegetation type(s) and phase of woodland succession (Tausch, Miller, Roundy, & Chambers, 2009).

Year	Vegetation Type	Woodland Succession
2008	Mountain Big Sagebrush	Phase I
2009	Mountain Big Sagebrush	Phase I
2010	Mountain Big Sagebrush	Phase I
2013	Mountain Big Sagebrush	Phase I
2017	Mountain Big Sagebrush	Phase I

Site Notes

Pellet group data estimated heavy deer presence in 2008 prior to treatment (Table 25R-07.9). In 2008, a deer shed and carcass were found on the site, as well as dead rabbit remains. Coyote scat, elk pellets, sage grouse pellets, and horse droppings were also on the site in 2008, but did not fall within the sample area.

Site Potential

1981 - 2010 Average Annual Precipitation	9 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 site has existed as a mountain big sagebrush (*Artemisia tridentata* ssp. *vaseyana*) plant community since establishment in 2008. While mountain big sagebrush is the dominant browse species, there are other shrub species that provide some cover (Table 25R-07.12). Following the treatment, sagebrush age class distribution has diversified and density has increased (Table 25R-07.13). The herbaceous understory has been chiefly comprised of perennial grasses which have generally increased in abundance since treatment. Forbs have remained sparse, except for the 2010 sample year when there was an increase in annual forb cover (Table 25R-07.10, 25R-07.11). This site will likely remain in this state in the future without a major disturbance.

Trend Summary Tables**Table 25R-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
2008	24.8	0.9	-	22.7	0.4	-
2009	5.1	0.3	-	5.7	0.3	-
2010	10.2	0.8	-	12.5	0.2	-
2013	7.3	1.2	-	9.8	1.3	-
2017	8.0	1.1	-	11.2	1.2	-

Table 25R-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
2008	-	270	9	45	-	8.5	0.0	0.4
2009	3	212	50	91	0.0	5.3	1.8	0.7
2010	2	270	166	67	0.0	13.6	8.9	2.0
2013	100	330	3	12	0.4	12.5	0.0	0.1
2017	302	343	7	11	5.7	16.3	0.0	0.1

Table 25R-07.8 - 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
2008	23.2	0.4	24.4	18.2	12.7	31.8
2009	38.4	0.3	24.5	8.0	15.0	14.9
2010	30.5	0.1	23.5	9.4	18.6	32.5
2013	20.9	0.0	32.4	7.2	14.7	25.6
2017	22.8	0.1	31.9	13.0	18.8	32.7

Table 25R-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	Rocky Mountain Elk	Greater Sage- Grouse	Horse	Rabbit
	Quadrat Frequency					
2008	1	20	3	1	-	72
2009	-	12	2	-	-	24
2010	1	1	-	-	-	2
2013	9	13	7	-	-	24
2017	6	6	2	-	-	45
Year	Days Use Per Acre (ha)					
2008	4.4 (10.8)	59.0 (145.7)	2.0 (5.0)	-	-	-
2009	0.7 (1.8)	10.7 (26.5)	-	-	-	-
2010	0.7 (1.8)	4.0 (9.9)	-	-	-	-
2013	9.4 (23.3)	13.4 (33.1)	2.7 (6.6)	8.7 (21.5)*	0.6 (1.4)	-
2017	13.8 (34.1)	15.4 (38.1)	8.1 (19.9)	34.9 (86.1)*	-	-

*Pellets per acre (ha)

Table 25R-07.10 - 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)	Festuca idahoensis (Idaho fescue)	Hesperostipa comata (needle and thread)	Leymus cinereus (basin wildrye)	Pleuraphis jamesii (James' galleta)	Psathyrostachys juncea ⁱ (Russian wildrye)	Sporobolus cryptandrus (sand dropseed)	Thinopyrum intermedium ⁱ (intermediate wheatgrass)
year	Nested Frequency											
2008	89	-	79	-	126	-	53	-	-	-	-	-
2009	72	58	33	3	40	-	29	31	-	6	4	3
2010	118	45	63	2	72	-	32	-	-	0	10	32
2013	200	66	69	100	71	-	54	-	1	16	8	10
2017	160	23	66	302	42	0	140	-	6	21	13	3
year	Average Cover (%)											
2008	3.3	-	2.3	-	1.9	-	1.1	-	-	-	-	-
2009	1.9	0.7	0.9	0.0	0.8	-	0.5	0.4	-	0.1	0.0	0.0
2010	5.5	2.2	1.8	0.0	1.9	-	1.2	-	-	0.2	0.0	0.9
2013	6.3	1.6	2.0	0.4	1.0	-	0.9	-	0.0	0.5	0.1	0.1
2017	6.2	0.5	2.0	5.7	0.6	0.0	6.4	-	0.0	0.4	0.2	0.0

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

Table 25R-07.11 - Forb Species. Nested frequency and modified Daubenmire average cover by year.

FORB SPECIES	Astragalus (milkvetch)	Astragalus cibaricus (browse milkvetch)	Astragalus lentiginosus (freckled milkvetch)	Chenopodium album ^a (lambquarters)	Chenopodium leptophyllum ^a (narrowleaf goosefoot)	Cleome serrulata ^a (Rocky Mountain beeplant)	Cryptantha (cryptantha)	Cymopterus (springparsley)	Descurainia pinnata ^a (western tansymustard)	Erigeron (fleabane)	Erigeron pumilus (shaggy fleabane)	Eriogonum ovalifolium (cushion buckwheat)	Eriogonum umbellatum (sulphur-flower buckwheat)	Gayophytum ramosissimum ^a (pinyon groundsmoke)	Helianthus annuus ^a (common sunflower)	Lappula occidentalis ^a (flatspine stickseed)	Linum perenne ⁱ (blue flax)
year	Nested Frequency																
2008	-	-	-	-	-	-	-	2	-	6	-	4	-	-	-	6	-
2009	1	3	-	15	-	-	-	-	-	4	2	-	1	-	14	5	5
2010	-	10	-	-	60	10	-	-	24	-	6	12	12	2	20	49	6
2013	-	-	-	-	-	1	-	-	-	-	9	-	1	-	-	-	-
2017	-	-	1	-	-	-	2	-	1	2	1	-	-	-	-	6	2
year	Average Cover (%)																
2008	-	-	-	-	-	-	-	0.0	-	0.0	-	0.2	-	-	-	0.0	-
2009	0.0	0.1	-	0.4	-	-	-	-	-	0.1	0.0	-	0.0	-	0.6	0.1	0.1
2010	-	0.1	-	-	2.4	0.3	-	-	0.2	-	0.0	0.6	0.7	0.3	0.6	1.1	0.0
2013	-	-	-	-	-	0.0	-	-	-	-	0.0	-	0.0	-	-	-	-
2017	-	-	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	Medicago sativa ⁱ (alfalfa)	Melilotus officinalis ⁱ (sweetclover)	Phlox longifolia (longleaf phlox)	Salsola tragus ^{ai} (prickly Russian thistle)	Sanguisorba minor ⁱ (small burnet)	Sphaeralcea grossularifolia (gooseberry/leaf globemallow)	Trifolium (clover)	unknown annual forb ^a (unknown forb)
year	Nested Frequency							
2008	-	-	32	3	-	-	2	-
2009	27	24	30	15	20	0	4	7
2010	10	2	16	76	-	0	-	-
2013	-	-	2	2	-	-	-	-
2017	-	-	5	-	-	-	-	-
year	Average Cover (%)							
2008	-	-	0.1	0.0	-	-	0.0	-
2009	0.1	0.2	0.1	0.7	0.0	0.0	0.0	0.1
2010	0.1	0.2	0.2	3.9	-	0.0	-	-
2013	-	-	0.0	0.0	-	-	-	-
2017	-	-	0.0	-	-	-	-	-

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

Table 25R-07.12 - 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 ^{pt} (forage kochia)	Chrysothamnus viscidiflorus (yellow rabbitbrush)	Gutierrezia sarothrae (broom snakeweed)	Opuntia (pricklypear)
year	Line Intercept Cover (%)				
2008	22.7	-	0.2	0.1	0.1
2009	5.3	0.4	0.3	0	-
2010	8.8	3.7	0.1	0.1	-
2013	8.5	1.3	0.8	0.5	-
2017	9.6	1.6	0.5	0.7	-
year	Quadrat Cover (%)				
2008	24.8	-	0.3	0.1	0.5
2009	4.9	0.1	0.3	0.0	0.0
2010	8.4	1.8	0.8	0.0	0.0
2013	6.2	1.1	0.6	0.5	0.1
2017	6.6	1.4	0.4	0.7	-

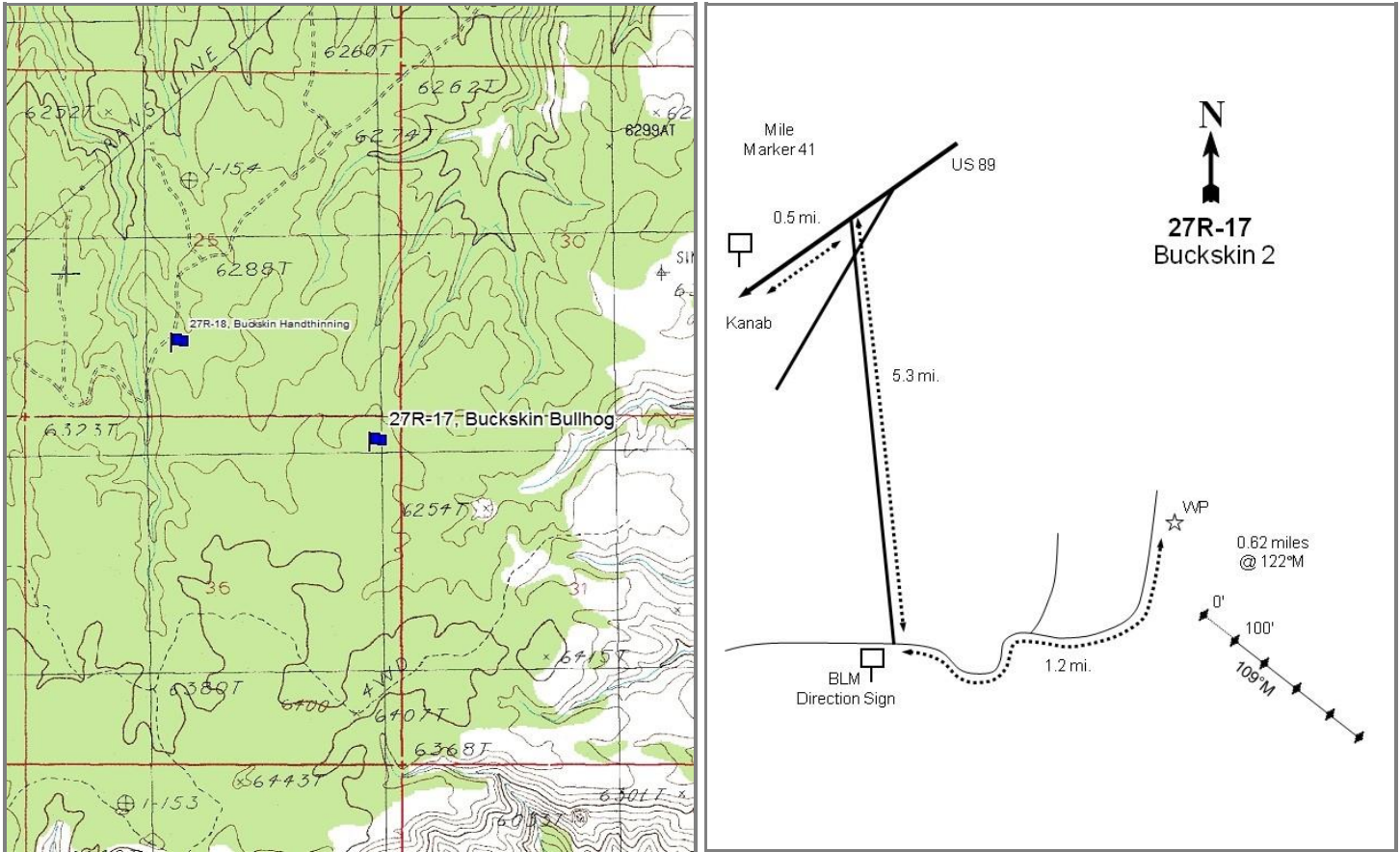
t - Tree Species; p - Preferred Browse; i - Introduced Species

Table 25R-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. vaseyana^P -- (mountain big sagebrush)									
2008	7100	540	6	48	46	30	18	20	36/57
2009	-	-	-	-	-	-	-	-	23/33
2010	2880	280	19	68	13	2	0	12	37/57
2013	3200	1880	21	71	8	50	21	15	34/56
2017	3200	20	18	77	6	28	6	3	33/58
Atriplex canescens^P -- (fourwing saltbush)									
2008	-	-	-	-	-	-	-	-	-/-
2009	-	-	-	-	-	-	-	-	-/-
2010	-	-	-	-	-	-	-	-	-/-
2013	20	-	0	100	0	0	100	0	41/58
2017	-	-	-	-	-	-	-	-	44/49
Bassia prostrata^{Pi} -- (forage kochia)									
2008	-	-	-	-	-	-	-	-	-/-
2009	-	-	-	-	-	-	-	-	15/21
2010	1340	320	13	87	0	0	0	0	41/48
2013	8500	2040	80	20	0	22	1	0	15/27
2017	7500	-	17	83	0	5	5	0	8/17
Chrysothamnus viscidiflorus -- (yellow rabbitbrush)									
2008	340	-	0	88	12	53	18	12	11/18
2009	-	-	-	-	-	-	-	-	14/18
2010	260	380	0	100	0	0	0	0	21/34
2013	400	280	20	80	0	0	0	0	22/41
2017	720	-	14	81	6	0	0	6	15/23
Echinocereus -- (hedgehog cactus)									
2008	-	-	-	-	-	-	-	-	-/-
2009	-	-	-	-	-	-	-	-	2/6
2010	-	-	-	-	-	-	-	-	-/-
2013	-	-	-	-	-	-	-	-	-/-
2017	-	-	-	-	-	-	-	-	-/-
Ericameria nauseosa -- (rubber rabbitbrush)									
2008	-	-	-	-	-	-	-	-	-/-
2009	-	-	-	-	-	-	-	-	17/22
2010	20	-	0	100	0	0	0	0	32/33
2013	-	-	-	-	-	-	-	-	-/-
2017	-	-	-	-	-	-	-	-	-/-
Gutierrezia sarothrae -- (broom snakeweed)									
2008	700	80	0	74	26	29	34	20	12/15
2009	-	-	-	-	-	-	-	-	15/17
2010	-	-	-	-	-	-	-	-	23/26
2013	1420	460	25	75	0	0	0	1	14/17
2017	1660	-	2	98	0	0	0	0	16/18
Opuntia -- (pricklypear)									
2008	320	-	0	81	19	0	0	6	9/23
2009	-	-	-	-	-	-	-	-	7/15
2010	80	-	0	100	0	0	0	0	9/20
2013	200	-	50	40	10	0	0	10	8/21
2017	60	-	0	100	0	0	0	0	9/22
Pediocactus simpsonii -- (mountain ball cactus)									
2008	20	-	0	100	0	0	0	0	2/5

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

BUCKSKIN 2 - STUDY NO. 27R-17



Location Information

USGS 7.5 min Map Info
GPS (0' Stake)

Pine Hollow Canyon S; Township 43S, Range 3W, Section 36
NAD 83 UTM ZONE 12, 404886 East 4099205 North

Transect Information

Browse Tag # (0' Stake)	90
Transect Bearing	109° 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 west from Kanab on US-89 to mile marker 41. Continue past the mile marker for 0.5 miles to a road on the right (south). Turn right and drive for 0.1 miles to another road. Continue on the main road for 5.2 miles to a three-way intersection. Turn left and then drive 1.2 miles to the witness post on the right (east) side of the road. From the witness post, walk 0.62 miles at 122 degrees magnetic to the 0-foot stake (use GPS) which is marked with browse tag #90.

Site Information

Land Ownership	Federal
Land Administrator	BLM
Allotment	No data
Elevation	6,367ft (1,941m)
Aspect	West
Slope	2%
Sample Dates	08/09/2005, 06/17/2008, 08/06/2013, 08/28/2017

Table 27R-17.1 Disturbance History. Recorded history of major disturbances.

Treatment/Disturbance	Name	WRI DB#	Date	Size (acres)
Hand Crew - Lop and Scatter	Buckskin P-J Thinning 2005	112	November 2005	882
Seeding - Aerial	Buckskin P-J Thinning 2005	112	November 2005	418
Fire - Wildfire	Buckskin	-	June 2006	1437
Chaining - One-Way Ely	Lower Buckskin Telephone Wash Sagebrush Restoration Year 1	453	Fall 2006	1437
Seeding - Aerial Before	Lower Buckskin Telephone Wash Sagebrush Restoration Year 1	453	Fall 2006	1437
Seeding - Aerial After	Lower Buckskin Telephone Wash Sagebrush Restoration Year 1	453	Fall 2006	1437

Wildlife Habitat and Vegetation History**Table 27R-17.3 - Wildlife Seasonal Habitat.** UDWR wildlife habitat and seasonality.

Species	Habitat	Season
Deer	crucial	winter

Table 27R-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	Pinyon-Juniper	Phase II transitioning to Phase III
2008	Forage Kochia/Annual Grass	Phase I
2013	Forage Kochia/Annual Grass	Phase I
2017	Forage Kochia/Annual Grass	Phase I

Site Notes

The study was originally established in 2005, prior to treatment, to monitor the effects of a lop and scatter and seeding project completed in November of 2005. A wildfire (Buckskin Fire) burned 1,437 acres, which included the study site, in the summer of 2006. A chaining and seeding project was implemented following the Buckskin Fire. The entire study site was burned, but only half of the study site was chained during the post-fire treatment (Table 27R-17.1). Pellet groups were sampled in high abundance for elk in 2005 and deer in 2013 (Table 27R-17.9).

Soils**Table 27R-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	7.5	36.4	46.7	16.8	3.4	13.0	92.8	0.6	08/09/2005

Site Potential

1981 - 2010 Average Annual Precipitation	12 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 the study was established in 2005, the site was dominated by encroaching twoneedle pinyon (*Pinus edulis*) and Utah juniper (*Juniperus osteosperma*). There were a diverse number of other browse species, but they provided limited cover (Table 27R-17.12). Forb diversity was also high, though cover was low. The introduced annual grass species cheatgrass (*Bromus tectorum*) and browse species forage kochia (*Kochia prostrata*) increased in cover and have become co-dominant following the treatments and wildfire (Table 27R-17.1, Table 27R-17.12, Table 27R-17.10). The high abundance of cheatgrass on this study could potentially diminish the resilience of this site and lead to the increased risk of future wildfire.

Trend Summary Tables

Table 27R-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	2.4	1.1	10.5	3.3	0.5	38.6
2008	1.6	0.0	-	2.1	0.3	-
2013	10.5	0.3	-	13.5	1.0	0.4
2017	12.1	3.7	0.6	14.3	7.5	2.2

Table 27R-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	169	13	296	76	1.6	0.0	6.0	0.9
2008	30	9	93	16	0.2	0.0	1.6	0.1
2013	314	11	157	48	9.4	0.3	3.9	0.8
2017	416	38	37	77	19.8	1.1	0.8	1.9

Table 27R-17.8 - 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	16.2	5.3	45.2	22.0	9.5	20.8
2008	31.8	0.5	13.6	42.5	17.4	3.3
2013	21.5	-	38.8	18.7	16.1	25.9
2017	13.9	0.1	42.3	16.7	12.7	36.7

Table 27R-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	Rocky Mountain Elk	Rabbit
	Quadrat Frequency			
2005	-	15	-	32
2008	1	3	-	68
2013	4	31	-	23
2017	6	15	-	39
Year	Days Use Per Acre (ha)			
2005	0.7 (1.8)	12.1 (29.8)	47.6 (117.5)	-
2008	2.9 (7.2)	6.7 (16.6)	0.7 (1.7)	-
2013	23.2 (57.4)	63.7 (157.3)	-	-
2017	8.7 (21.5)	37.5 (92.7)	-	-

Table 27R-17.10 - 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 lanceolatus (thickspike wheatgrass)	Elymus wawawaiensis (Snake River wheatgrass)	Hesperostipa comata (needle and thread)	Poa fendleriana (muttongrass)	Psathyrostachys juncea ⁱ (Russian wildrye)	Thinopyrum intermedium ⁱ (intermediate wheatgrass)	Vulpia octiflora ^a (sixweeks fescue)
year	Nested Frequency											
2005	-	-	-	169	6	-	-	4	3	-	-	12
2008	-	-	-	30	2	-	-	2	-	-	5	3
2013	1	1	-	314	3	-	1	-	-	2	3	-
2017	3	5	2	416	18	9	0	-	-	4	1	-
year	Average Cover (%)											
2005	-	-	-	1.6	0.0	-	-	0.0	0.0	-	-	0.1
2008	-	-	-	0.1	0.0	-	-	0.0	-	-	0.0	0.0
2013	0.1	0.0	-	9.4	0.1	-	0.0	-	-	0.0	0.0	-
2017	0.2	0.2	0.1	19.8	0.2	0.2	0.0	-	-	0.1	0.0	-

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

Table 27R-17.11 - Forb Species. Nested frequency and modified Daubenmire average cover by year.

FORB SPECIES	Arabis (rockcress)	Astragalus utahensis (Utah milkvetch)	Ceratocephala testiculata ^{ai} (curvseed butterwort)	Chaenactis douglasii (Douglas' dustymaiden)	Chamaesyce (sandmat)	Chenopodium fremontii ^a (Fremont's goosefoot)	Collinsia parviflora ^a (maiden blue eyed Mary)	Cordylanthus ^a (bird's-beak)	Cryptantha ^a (annual cryptantha)	Dalea scariisae (Searls' prairie clover)	Descurainia pinnata ^a (western tansymustard)	Draba ^a (draba)	Eriogonum (buckwheat)	Eriogonum cernuum ^a (nodding buckwheat)	Erodium cicutarium ^a (redstem stork's bill)	Frasera albomarginata (desert fraseria)	Gayophytum ramosissimum ^a (pinyon groundsmoke)
year	Nested Frequency																
2005	-	1	-	1	5	1	25	96	-	-	-	144	9	5	4	-	11
2008	-	1	-	-	0	2	-	1	5	-	17	20	-	4	-	-	1
2013	6	2	3	-	17	1	-	-	-	3	-	-	-	8	4	-	-
2017	-	-	-	-	37	-	-	10	-	4	-	-	-	1	4	31	-
year	Average Cover (%)																
2005	-	0.0	-	0.0	0.1	0.0	0.0	3.9	-	-	-	0.7	0.0	0.0	0.0	-	0.0
2008	-	0.0	-	-	0.0	0.0	-	0.0	0.0	-	0.3	0.1	-	0.0	-	-	0.0
2013	0.0	0.0	0.0	-	0.3	0.0	-	-	-	0.0	-	-	-	0.0	0.0	-	-
2017	-	-	-	-	0.8	-	-	0.4	-	0.0	-	-	-	0.0	0.0	0.3	-

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

FORB SPECIES																		
<i>Gilia inconspicua</i> ^a (shy gilia)																		
<i>Ipomopsis aggregata</i> (scarlet gilia)																		
<i>Lappula occidentalis</i> ^a (flatspine stickseed)																		
<i>Lesquerella</i> (bladderpod)																		
<i>Mentzelia albicaulis</i> ^a (whitestem blazingstar)																		
<i>Microsteris gracilis</i> ^a (slender phlox)																		
<i>Nicotiana attenuata</i> ^a (coyote tobacco)																		
<i>Packera multilobata</i> (lobeleaf groundsel)																		
<i>Penstemon palmeri</i> (Palmer's penstemon)																		
<i>Penstemon thompsoniae</i> (Thompson's beardtongue)																		
<i>Petradoria pumila</i> (rock goldenrod)																		
<i>Phacelia</i> ^a (phacelia)																		
<i>Phlox longifolia</i> (longleaf phlox)																		
<i>Salsola tragus</i> ^{ai} (prickly Russian thistle)																		
<i>Sisymbrium altissimum</i> ^{ai} (tall tumblemustard)																		
<i>Sphaeralcea parvifolia</i> (smallflower globemallow)																		
<i>Streptanthus cordatus</i> (heartleaf twistflower)																		
year	Nested Frequency																	
2005	178	3	62	4	-	4	-	3	-	19	19	-	18	-	-	-	2	
2008	6	-	-	-	7	3	8	-	-	2	-	8	8	33	-	-	5	
2013	-	-	-	-	-	-	-	-	9	9	-	3	6	142	24	3	-	
2017	-	-	-	8	-	-	-	4	5	6	3	-	-	11	13	2	-	
year	Average Cover (%)																	
2005	1.0	0.0	0.2	0.0	-	0.0	-	0.0	-	0.1	0.6	-	0.0	-	-	-	0.0	
2008	0.0	-	-	-	0.1	0.0	0.1	-	-	0.0	-	0.1	0.0	1.0	-	-	0.0	
2013	-	-	-	-	-	-	-	-	0.4	0.1	-	0.2	0.0	2.7	1.0	0.0	-	
2017	-	-	-	0.0	-	-	-	0.0	0.5	0.1	0.0	-	-	0.1	0.3	0.1	-	

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

FORB SPECIES																		
<i>Tragopogon dubius</i> ^{ai} (yellow salsify)																		
year	Nested Frequency																	
2005	-																	
2008	-																	
2013	-																	
2017	4																	
year	Average Cover (%)																	
2005	-																	
2008	-																	
2013	-																	
2017	0.0																	

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

Table 27R-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 (%)				
Amelanchier utahensis^P -- (Utah serviceberry)									
2005	-	-	-	-	-	-	-	-	110/89
2008	-	-	-	-	-	-	-	-	-/-
2013	-	-	-	-	-	-	-	-	74/116
2017	-	-	-	-	-	-	-	-	111/127
Artemisia tridentata ssp. vaseyana^P -- (mountain big sagebrush)									
2005	580	40	7	41	52	14	0	35	70/82
2008	60	160	67	0	33	33	33	0	-/-
2013	260	20	39	62	0	0	8	0	36/51
2017	1020	160	77	22	2	8	0	0	54/86
Bassia prostrata^{PI} -- (forage kochia)									
2005	-	-	-	-	-	-	-	-	-/-
2008	3200	3120	25	74	1	8	57	1	13/23
2013	24120	9220	51	49	0	19	1	0	26/39
2017	21600	180	23	77	0	7	3	0	20/35
Cercocarpus montanus^P -- (alderleaf mountain mahogany)									
2005	20	-	0	0	100	100	0	0	-/-
2008	-	-	-	-	-	-	-	-	-/-
2013	-	-	-	-	-	-	-	-	-/-
2017	-	-	-	-	-	-	-	-	87/182
Cylindropuntia whipplei -- (Whipple cholla)									
2005	-	-	-	-	-	-	-	-	-/-
2008	-	-	-	-	-	-	-	-	-/-
2013	40	-	50	50	0	0	0	0	18/56
2017	40	-	0	100	0	0	0	0	27/83
Echinocereus -- (hedgehog cactus)									
2005	20	-	0	100	0	0	0	0	18/36
2008	-	-	-	-	-	-	-	-	-/-
2013	-	-	-	-	-	-	-	-	-/-
2017	-	-	-	-	-	-	-	-	-/-
Ephedra viridis^P -- (mormon tea)									
2005	260	40	23	77	0	54	0	0	69/79
2008	100	-	40	40	20	0	40	20	24/53
2013	20	-	0	100	0	0	0	0	50/58
2017	120	-	0	100	0	0	100	100	55/87
Ericameria parryi var. parryi -- (Parry's rabbitbrush)									
2005	-	-	-	-	-	-	-	-	-/-
2008	20	-	0	100	0	0	0	0	-/-
2013	-	-	-	-	-	-	-	-	-/-
2017	-	-	-	-	-	-	-	-	30/94
Escobaria -- (foxtail cactus)									
2005	-	-	-	-	-	-	-	-	4/6
2008	-	-	-	-	-	-	-	-	-/-
2013	-	-	-	-	-	-	-	-	-/-
2017	-	-	-	-	-	-	-	-	-/-
Gutierrezia sarothrae -- (broom snakeweed)									
2005	140	-	0	100	0	0	0	0	22/28
2008	220	40	0	100	0	0	0	0	19/23
2013	880	-	27	71	2	0	0	2	25/37
2017	5820	140	13	86	1	0	0	1	23/39
Juniperus osteosperma^I -- (Utah juniper)									
2005	180	80	22	78	0	0	0	0	-/-
2008	-	-	-	-	-	-	-	-	-/-
2013	-	-	-	-	-	-	-	-	-/-
2017	-	-	-	-	-	-	-	-	-/-
Opuntia -- (pricklypear)									
2005	680	-	0	94	6	0	0	3	15/46
2008	20	-	0	100	0	0	0	0	19/50
2013	-	-	-	-	-	-	-	-	10/20
2017	-	-	-	-	-	-	-	-	11/47

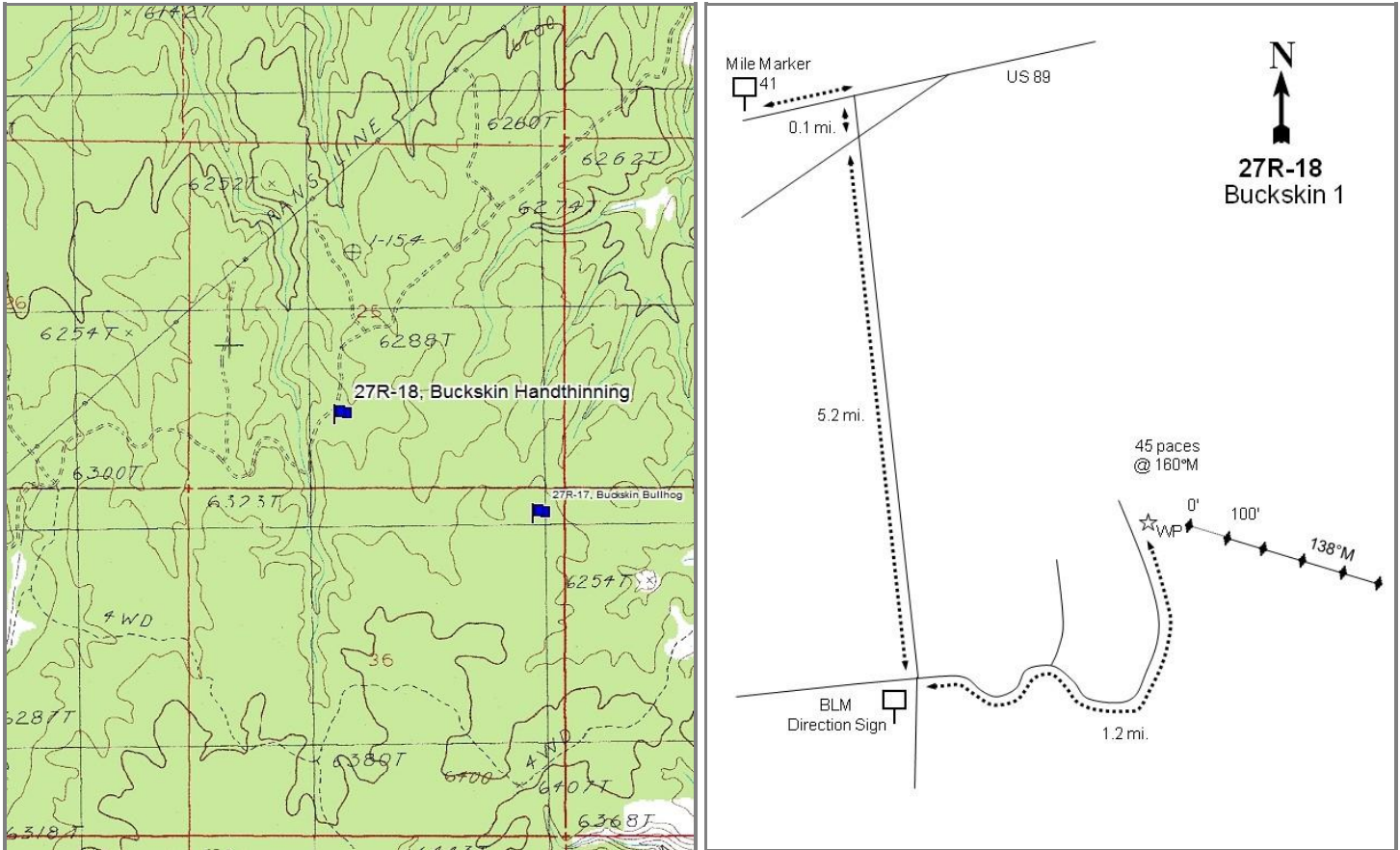
Year	Density		Age Class Distribution			Utilization		Poor Vigor (%)	Average Height Crown (cm)
	Plants Per Acre		Excluding Seedlings			Moderate (%)	Heavy (%)		
	Excluding Seedlings	Seedling	Young (%)	Mature (%)	Decadent (%)				
Pediocactus simpsonii -- (mountain ball cactus)									
2005	-	-	-	-	-	-	-	-	-/-
2008	-	-	-	-	-	-	-	-	-/-
2013	-	-	-	-	-	-	-	-	25/44
2017	-	-	-	-	-	-	-	-	-/-
Pinus edulis ^t -- (twoneedle pinyon)									
2005	260	200	46	46	8	0	0	0	- / -
2008	-	-	-	-	-	-	-	-	-/-
2013	-	-	-	-	-	-	-	-	-/-
2017	-	-	-	-	-	-	-	-	-/-
Purshia stansburiana ^p -- (Stansbury cliffrose)									
2005	140	-	14	43	43	29	57	14	139/117
2008	40	20	0	50	50	50	50	50	17/24
2013	20	-	100	0	0	100	0	0	52/51
2017	40	-	50	50	0	0	0	0	94/108
Quercus gambelii ^p -- (Gambel oak)									
2005	-	-	-	-	-	-	-	-	-/-
2008	-	-	-	-	-	-	-	-	-/-
2013	-	-	-	-	-	-	-	-	-/-
2017	-	-	-	-	-	-	-	-	230/155
Yucca baccata -- (banana yucca)									
2005	20	-	0	100	0	0	0	0	40/73
2008	-	-	-	-	-	-	-	-	-/-
2013	20	-	0	100	0	0	0	0	37/57
2017	20	-	0	100	0	0	0	0	37/75

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

Table 27R-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)							
2005	156	10	20	10	-	60	25.9
2017	8	50	50	-	-	-	5.0
Pinus edulis (twoneedle pinyon)							
2005	272	30	20	25	10	15	6.9

BUCKSKIN 1 - STUDY NO. 27R-18



Location Information

USGS 7.5 min Map Info
GPS (0' Stake)

Pine Hollow Canyon S; Township 43S, Range 3W, Section 25
NAD 83 UTM ZONE 12, 404046 East 4099673 North

Transect Information

Browse Tag # (0' Stake)	91
Transect Bearing	138° 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 west from Kanab on US-89 to mile marker 41. Continue past the mile marker for 0.5 miles to a road on the right (south). Turn right and drive for 0.1 miles to another road. Continue on the main road for 5.2 miles to a three-way intersection. Turn left and then drive 1.2 miles to the witness post on the right (east) side of the road. From the witness post, walk 45 paces at 160 degrees magnetic to the 0-foot stake. The 0-foot stake is marked with browse tag #91.

Site Information

Land Ownership	Federal
Land Administrator	BLM
Allotment	MOLLIES NIPPLE
Elevation	6,315ft (1,925m)
Aspect	North
Slope	5%
Sample Dates	08/09/2005, 06/17/2008, 08/06/2013, 08/29/2017

Table 27R-18.1 Disturbance History. Recorded history of major disturbances.

Treatment/Disturbance	Name	WRI DB#	Date	Size (acres)
Fire - Wildfire	Buckskin	-	June 2006	1437
Chaining - One-Way Ely	Lower Buckskin Telephone Wash Sagebrush Restoration Year 1	453	Fall 2006	1437
Seeding - Aerial Before	Lower Buckskin Telephone Wash Sagebrush Restoration Year 1	453	Fall 2006	1437
Seeding - Aerial After	Lower Buckskin Telephone Wash Sagebrush Restoration Year 1	453	Fall 2006	1437

Table 27R-18.2 Seed Mix. List of known seeded plant species and rates (if available).

Mix Name		Application Type	Application Date	Acres	
Buckskin Fire Aerial #1		Aerial	Nov 2006	1400	
Type	Species	Common Name	Cultivar/Source ID	Bulk lbs/acre	PLS lbs/acre
G	<i>Achnatherum hymenoides</i>	Indian Ricegrass	Rimrock	1.00	0.99
G	<i>Agropyron cristatum</i>	Crested Wheatgrass	Douglas	1.00	0.84
G	<i>Agropyron cristatum</i>	Crested Wheatgrass	CDII	0.50	0.44
G	<i>Agropyron cristatum</i>	Crested Wheatgrass	Hycrest	0.50	0.44
G	<i>Agropyron fragile</i>	Siberian Wheatgrass	Vavilov	0.06	0.06
G	<i>Agropyron fragile</i>	Siberian Wheatgrass	Vavilov	0.93	0.81
G	<i>Bouteloua curtipendula</i>	Sideoats Grama	Pierre	0.10	0.09
G	<i>Elymus hoffmannii</i>	Newhy Wheatgrass		0.63	0.54
G	<i>Elymus lanceolatus</i>	Thickspike Wheatgrass	Bannock	0.41	0.37
G	<i>Elymus lanceolatus</i>	Thickspike Wheatgrass	Bannock	0.57	0.52
G	<i>Elymus wawawaiensis</i>	Snake River Wheatgrass	Secar	0.56	0.49
G	<i>Elymus wawawaiensis</i>	Snake River Wheatgrass	Secar	1.43	1.08
G	<i>Pascopyrum smithii</i>	Western Wheatgrass	Arriba	1.00	0.81
G	<i>Poa secunda</i>	Canby Bluegrass	Canbar	0.50	0.45
G	<i>Psathyrostachys juncea</i>	Russian Wildrye		0.68	0.63
G	<i>Psathyrostachys juncea</i>	Russian Wildrye	Bozoisky	1.32	1.24
G	<i>Thinopyrum intermedium</i>	Pubescent Wheatgrass		1.00	0.84
F	<i>Medicago sativa</i>	Alfalfa	Ladak	0.50	0.47
F	<i>Penstemon palmeri</i>	Palmer Penstemon	Washington UT	0.14	0.10
F	<i>Sanguisorba minor</i>	Small Burnet	Delar	0.50	0.46
Mix Name		Application Type	Application Date	Acres	
Buckskin Fire Aerial #2		Aerial	Feb 2007	1400	
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	1.00	0.22
S	<i>Bassia prostrata</i>	Forage Kochia	Elko/Lander NV	1.00	0.64

Wildlife Habitat and Vegetation History**Table 27R-18.3 - Wildlife Seasonal Habitat.** UDWR wildlife habitat and seasonality.

Species	Habitat	Season
Deer	crucial	winter

Table 27R-18.4 - Vegetation History. The dominant vegetation type(s) and phase of woodland succession (Tausch, Miller, Roundy, & Chambers, 2009).

Year	Vegetation Type	Woodland Succession
2005	Pinyon-Juniper	Phase II transitioning to Phase III
2008	Annual Grass	Phase I
2013	Forage Kochia/Perennial Grass	Phase I
2017	Forage Kochia/Perennial Grass	Phase I

Site Notes

The study was originally established in 2005 as a reference site to the Buckskin 2 (27R-17) study site. In the summer of 2006 a wildfire (Buckskin Fire) burned 1,437 acres including the study site; a chaining and seeding project was implemented following the fire. In 2005, pellet groups were sampled in high abundance for elk, and in 2008 and 2013 pellet group abundance was estimated to be high for deer (Table 27R-18.9).

Soils**Table 27R-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
Sandy Clay	7.2	45.1	18.1	36.8	1.4	17.9	108.8	0.5	08/09/2005

Site Potential

1981 - 2010 Average Annual Precipitation 12 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 2005, this site was dominated by encroaching twoneedle pinyon (*Pinus edulis*) and Utah juniper (*Juniperus osteosperma*) trees (Table 27R-18.14). There were other browse species present, but they contributed little cover (Table 27R-18.12). The herbaceous understory consisted mainly of annual forbs with sparse grass cover. Annual grass was the dominant component in the first sample year following treatment, but has since decreased in abundance (Table 27R-18.10). In 2013, the community shifted to one dominated by forage kochia (*Bassia prostrata*) and perennial grasses with very little annual grass cover; cover and diversity of other browse species has been low. Forbs have remained diverse, although cover has been low (Table 27R-18.10, Table 27R-18.11, Table 27R-18.12, Table 27R- 18.13).

Trend Summary Tables**Table 27R-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
2005	0.6	2.6	2.9	1.2	1.8	33.6
2008	1.5	0.8	0.0	1.5	0.7	-
2013	5.3	1.0	0.4	6.9	0.5	-
2017	9.5	2.9	0.5	14.3	4.1	0.8

Table 27R-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
2005	193	26	316	90	1.3	0.3	8.8	1.6
2008	307	142	46	144	8.2	1.7	0.1	2.7
2013	60	256	-	111	0.5	7.7	-	2.4
2017	109	292	26	110	1.9	16.6	0.5	5.7

Table 27R-18.8 - 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	18.7	2.7	45.8	21.6	9.6	14.7
2008	12.1	0.1	66.4	6.2	7.9	15.6
2013	20.6	0.0	57.6	7.9	7.6	20.6
2017	20.8	0.1	46.2	10.0	8.2	34.2

Table 27R-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	Rocky Mountain Elk	Rabbit
	Quadrat Frequency			
2005	1	23	2	69
2008	1	18	5	54
2013	5	32	-	19
2017	3	10	1	25
Year	Days Use Per Acre (ha)			
2005	2.9 (7.2)	3.4 (8.3)	53.6 (132.4)	-
2008	6.5 (16.1)	44.2 (109.2)	-	-
2013	16.0 (39.5)	53.6 (132.4)	-	-
2017	10.2 (25.1)	46.2 (114.2)	-	-

Table 27R-18.10 - Grass Species. Nested frequency and modified Daubenmire average cover by year.

GRASS SPECIES	Achmatherum hymenoides (Indian ricegrass)	Agropyron cristatum ⁱ (crested wheatgrass)	Bouteloua gracilis (blue grama)	Bromus tectorum ^{ai} (cheatgrass)	Elymus elymoides (squirreltail)	Elymus lanceolatus (thickspike wheatgrass)	Elymus wawawaiensis (Snake River wheatgrass)	Hesperostipa comata (needle and thread)	Pascopyrum smithii (western wheatgrass)	Poa secunda (Sandberg bluegrass)	Psathyrostachys juncea ⁱ (Russian wildrye)	Pseudoroegneria spicata (bluebunch wheatgrass)	Thinopyrum intermedium ⁱ (intermediate wheatgrass)	Vulpia octoflora ^a (sixweeks fescue)
year	Nested Frequency													
2005	-	-	-	179	24	-	-	-	-	2	-	-	-	34
2008	12	46	-	306	45	9	41	-	-	-	-	4	36	16
2013	0	85	-	60	44	133	16	1	-	12	22	-	23	-
2017	-	149	3	109	34	29	14	-	89	9	17	8	81	3
year	Average Cover (%)													
2005	-	-	-	1.1	0.3	-	-	-	-	0.0	-	-	-	0.1
2008	0.1	0.3	-	8.2	0.4	0.1	0.4	-	-	-	-	0.0	0.4	0.0
2013	0.0	2.4	-	0.5	0.4	3.3	0.2	0.0	-	0.0	0.9	-	0.4	-
2017	-	7.0	0.1	1.9	1.0	0.8	0.2	-	3.7	0.0	0.6	0.2	2.8	0.0

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

Table 27R-18.11 - Forb Species. Nested frequency and modified Daubenmire average cover by year.

FORB SPECIES	Arabis (rockcress)	Astragalus megacarpus (great bladder milkvetch)	Calochortus nuttallii (sego lily)	Ceratocephala testiculata ^{ai} (curvseed butterwort)	Chaenactis douglasii (Douglas' dustymaiden)	Cordylanthus kingii ^a (King's bird's-beak)	Cryptantha (cryptantha)	Cymopterus (springparsley)	Dalea searlsiae (Searl's prairie clover)	Descurainia pinnata ^a (western tansymustard)	Draba ^a (draba)	Eriogonum (buckwheat)	Eriogonum umbellatum (sulphur-flower buckwheat)	Erodium cicutarium ^{ai} (redstem stork's bill)	Frasera albomarginata (desert fraseria)	Gayophytum ramosissimum ^a (pinyon groundsmoke)	Gilia inconspicua ^a (shy gilia)
year	Nested Frequency																
2005	31	19	3	5	13	128	-	8	-	4	126	10	12	16	-	13	124
2008	8	7	2	5	25	4	29	22	25	2	3	-	40	-	-	7	11
2013	-	7	4	-	6	-	-	6	22	-	-	-	61	-	-	-	-
2017	5	7	-	-	7	17	-	-	23	5	5	-	48	-	3	-	-
year	Average Cover (%)																
2005	0.1	0.4	0.0	0.0	0.1	6.7	-	0.0	-	0.0	0.5	0.2	0.5	0.5	-	0.0	0.5
2008	0.0	0.1	0.0	0.0	0.4	0.0	0.2	0.3	0.7	0.0	0.0	-	0.6	-	-	0.0	0.0
2013	-	0.3	0.0	-	0.1	-	-	0.0	0.9	-	-	-	0.5	-	-	-	-
2017	0.0	0.4	-	-	0.0	0.5	-	-	1.7	0.0	0.0	-	1.1	-	0.0	-	-

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

FORB SPECIES	Hymenopappus filifolius (fineleaf hymenopappus)	Ipomopsis aggregata (scarlet gilia)	Lappula occidentalis ^a (flatspine stickseed)	Lesquerella (bladderpod)	Medicago sativa ⁱ (alfalfa)	Mentzelia albicaulis ^a (whitestem blazingstar)	Microsteris gracilis ^a (slender phlox)	Packera multilobata (lobeleaf groundsel)	Penstemon (beardtongue)	Penstemon palmeri (Palmer's penstemon)	Penstemon thompsoniae (Thompson's beardtongue)	Petradoria pumila (rock goldenrod)	Phlox hoodii (spiny phlox)	Polygonum douglasii ^a (Douglas' knotweed)	Salsola tragus ⁱⁱ (prickly Russian thistle)	Sanguisorba minor ⁱ (small burnet)	Sphaeralcea parvifolia (smallflower globemallow)
year	Nested Frequency																
2005	-	2	99	3	-	-	7	0	1	-	7	7	0	2	-	-	-
2008	-	-	6	-	5	4	6	5	-	4	2	6	0	-	2	2	11
2013	-	-	-	-	-	-	-	-	-	1	3	24	-	-	-	2	11
2017	7	-	-	2	-	-	-	0	3	-	9	32	-	-	-	-	2
year	Average Cover (%)																
2005	-	0.0	0.3	0.0	-	-	0.0	0.0	0.0	-	0.1	0.2	0.0	0.0	-	-	-
2008	-	-	0.0	-	0.0	0.0	0.0	0.0	-	0.1	0.0	0.1	0.0	-	0.0	0.0	0.2
2013	-	-	-	-	-	-	-	-	-	0.0	0.0	0.3	-	-	-	0.0	0.1
2017	0.1	-	-	0.0	-	-	-	0.0	0.0	-	0.1	2.3	-	-	-	-	0.0

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

FORB SPECIES	unknown annual forb ^a (unknown forb)
year	Nested Frequency
2005	33
2008	-
2013	-
2017	-
year	Average Cover (%)
2005	0.2
2008	-
2013	-
2017	-

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

Table 27R-18.12 - 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 ^{pi} (forage kochia)	Cercocarpus montanus ^p (alderleaf mountain mahogany)	Chrysothamnus viscidiflorus ssp. viscidiflorus var. viscidiflorus (yellow rabbitbrush)	Cylindropuntia whipplei (Whipple cholla)	Ephedra viridis ^p (mormon tea)	Escobaria (foxtail cactus)	Gutierrezia sarothrae (broom snakeweed)	Juniperus osteosperma ^t (Utah juniper)	Opuntia (pricklypear)	Pediocactus simpsonii (mountain ball cactus)	Pinus edulis ^t (twoneedle pinyon)	Purshia stansburiana ^p (Stansbury cliffrose)	Yucca baccata (banana yucca)
year	Line Intercept Cover (%)													
2005	1.1	-	-	-	-	-	-	0.6	21.1	0.5	-	12.5	0.1	0.7
2008	0.3	1.1	-	-	0	0	-	0.2	-	-	-	-	0.1	0.5
2013	1.6	5.2	-	-	-	-	-	0.5	-	-	-	-	0.1	-
2017	6.1	7.9	-	-	0	-	-	4.1	0.8	-	-	-	0.3	-
year	Quadrat Cover (%)													
2005	0.5	-	-	-	0.6	-	0.0	0.5	2.0	1.0	0.0	0.9	0.2	0.5
2008	0.0	1.4	0.0	0.0	0.3	0.0	-	0.4	0.0	0.1	-	-	0.0	0.0
2013	1.2	4.1	-	-	0.2	0.0	-	0.8	0.0	-	0.0	0.4	0.0	-
2017	2.2	7.0	-	-	0.0	0.0	-	2.7	0.5	-	0.0	-	0.3	0.1

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

Table 27R-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 (%)				
Amelanchier utahensis ^p -- (Utah serviceberry)									
2005	-	-	-	-	-	-	-	-	141/123
2008	-	-	-	-	-	-	-	-	14/37
2013	-	-	-	-	-	-	-	-	-/-
2017	-	-	-	-	-	-	-	-	75/84
Artemisia tridentata ssp. vaseyana ^p -- (mountain big sagebrush)									
2005	340	80	12	59	29	18	0	24	48/63
2008	1220	120	93	5	2	3	2	0	35/49
2013	720	-	31	69	0	3	0	0	36/58
2017	1180	140	37	61	2	20	10	2	49/78
Bassia prostrata ^{pi} -- (forage kochia)									
2005	-	-	-	-	-	-	-	-	-/-
2008	9220	940	48	52	0	3	55	0	10/16
2013	16920	11300	53	48	0	6	2	1	23/35
2017	18100	820	22	78	0	3	0	0	15/27
Cercocarpus montanus ^p -- (alderleaf mountain mahogany)									
2005	-	-	-	-	-	-	-	-	23/31
2008	60	-	100	0	0	0	0	0	7/6
2013	-	-	-	-	-	-	-	-	-/-
2017	-	-	-	-	-	-	-	-	100/61
Chrysothamnus viscidiflorus ssp. viscidiflorus var. viscidiflorus -- (yellow rabbitbrush)									
2005	-	-	-	-	-	-	-	-	-/-
2008	20	-	0	100	0	0	0	0	23/30
2013	-	-	-	-	-	-	-	-	-/-
2017	-	-	-	-	-	-	-	-	-/-
Cylindropuntia whipplei -- (Whipple cholla)									
2005	180	-	11	89	0	0	0	0	19/60
2008	180	-	22	44	33	0	0	11	14/52
2013	160	-	13	75	13	0	0	13	14/53
2017	100	-	20	80	0	0	0	0	10/44

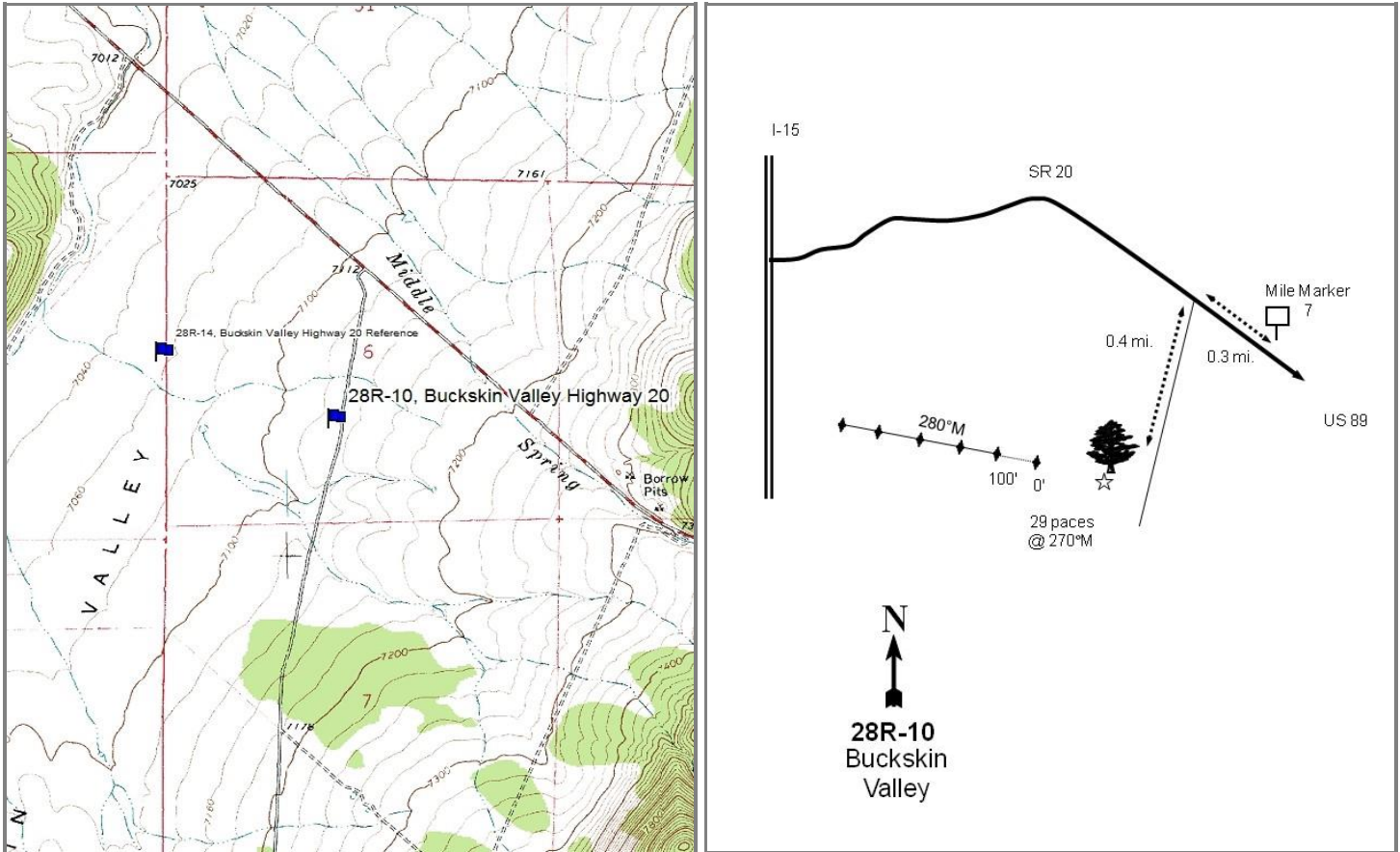
Year	Density		Age Class Distribution			Utilization		Poor Vigor (%)	Average Height Crown (cm)
	Plants Per Acre		Excluding Seedlings			Moderate (%)	Heavy (%)		
	Excluding Seedlings	Seedling	Young (%)	Mature (%)	Decadent (%)				
Ephedra viridis^p -- (mormon tea)									
2005	20	-	0	100	0	100	0	0	65/78
2008	80	-	0	50	50	0	100	0	33/40
2013	40	-	100	0	0	0	0	0	37/45
2017	40	-	0	100	0	100	0	0	50/51
Escobaria -- (foxtail cactus)									
2005	60	-	0	100	0	0	0	0	3/5
2008	-	-	-	-	-	-	-	-	-/-
2013	-	-	-	-	-	-	-	-	-/-
2017	-	-	-	-	-	-	-	-	-/-
Gutierrezia sarothrae -- (broom snakeweed)									
2005	600	60	0	100	0	0	0	0	17/25
2008	940	20	4	96	0	0	0	0	15/15
2013	1240	-	2	94	5	0	0	3	14/24
2017	5600	-	10	90	0	0	0	0	21/32
Juniperus osteosperma^t -- (Utah juniper)									
2005	240	60	25	67	8	0	0	0	-/-
2008	60	60	67	0	33	0	0	67	-/-
2013	100	20	100	0	0	0	0	0	-/-
2017	160	-	38	63	0	0	0	0	-/-
Opuntia -- (pricklypear)									
2005	680	20	3	91	6	0	0	6	15/46
2008	40	-	0	100	0	0	0	0	15/57
2013	20	-	0	100	0	0	0	0	-/-
2017	-	-	-	-	-	-	-	-	-/-
Pediocactus simpsonii -- (mountain ball cactus)									
2005	20	-	100	0	0	0	0	0	-/-
2008	-	-	-	-	-	-	-	-	-/-
2013	60	-	0	100	0	0	0	0	5/6
2017	40	-	0	100	0	0	0	0	2/7
Pinus edulis^t -- (twoneedle pinyon)									
2005	40	80	0	100	0	0	0	0	-/-
2008	-	-	-	-	-	-	-	-	-/-
2013	-	-	-	-	-	-	-	-	-/-
2017	-	-	-	-	-	-	-	-	-/-
Purshia stansburiana^p -- (Stansbury cliffrose)									
2005	100	-	0	80	20	0	100	0	103/97
2008	40	20	100	0	0	0	0	0	14/18
2013	80	-	25	75	0	50	0	0	57/71
2017	60	-	0	100	0	0	33	0	93/104
Yucca baccata -- (banana yucca)									
2005	120	-	17	83	0	0	0	0	46/77
2008	20	-	0	100	0	0	0	0	32/53
2013	120	-	0	100	0	0	0	0	27/52
2017	60	-	67	33	0	0	0	0	37/55

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

Table 27R-18.14 - 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)							
2005	127	5	15	5	10	65	33.5
2008	19	-	100	-	-	-	17.9
2013	22	27	73	-	-	-	9.8
2017	36	33	67	-	-	-	3.3
Pinus edulis (twoneedle pinyon)							
2005	89	17	28	11	22	22	11.2

BUCKSKIN VALLEY HIGHWAY 20 - STUDY NO. 28R-10

**Location Information**

USGS 7.5 min Map Info
GPS (0' Stake)

Burnt Peak SW; Township 32S, Range 6W, Section 06
NAD 83 UTM ZONE 12, 361181 East 4212201 North

Transect Information

Browse Tag # (0' Stake)	74
Transect Bearing	280° magnetic
Length	500ft
Belt Placement	Line 1 (11ft), Line 2 (34ft), Line 3 (59ft), Line 4 (71ft), Line 5 (95ft)
Belt Marker Placement	No Rebar

Directions to Site

Drive north on US-89 from Panguitch to the junction of SR-20. Turn left (west) on SR-20 and drive to mile marker 7. Continue west for 0.3 miles to a dirt road on the left (south). Turn left and drive for 0.4 miles to the only big juniper on the right (west) side of the road. From the big juniper, walk 29 paces at 270 degrees magnetic to the 0-foot stake which is marked with browse tag #74.

Site Information

Land Ownership	Federal
Land Administrator	BLM
Allotment	FREMONT
Elevation	7,125ft (2,172m)
Aspect	West
Slope	4%
Sample Dates	07/13/2005, 06/10/2008, 06/24/2009, 06/04/2013, 08/01/2017

Table 28R-10.1 Disturbance History. Recorded history of major disturbances.

Treatment/Disturbance	Name	WRI DB#	Date	Size (acres)
Seeding - Seeding Unknown	Middle Buckskin Seeding	-	Historic	-
Harrow - Two-Way Dixie	Buckskin Valley Hwy 20	242	September 2005	270
Seeding - Broadcast Before	Buckskin Valley Hwy 20	242	September 2005	270

Table 28R-10.2 Seed Mix. List of known seeded plant species and rates (if available).

Mix Name		Application Type	Application Date	Acres	
Buckskin Highway 20		Broadcast	Sep 2005	270	
Type	Species	Common Name	Cultivar/Source ID	Bulk lbs/acre	PLS lbs/acre
G	<i>Achnatherum hymenoides</i>	Indian Ricegrass	Nezpar	1.48	1.33
G	<i>Bouteloua gracilis</i>	Blue Grama	Alma	0.74	0.31
G	<i>Elymus elymoides</i>	Bottlebrush Squirreltail		0.19	0.12
G	<i>Elymus elymoides</i>	Bottlebrush Squirreltail		0.37	0.31
G	<i>Elymus wawawaiensis</i>	Snake River Wheatgrass	Secar	0.74	0.56
G	<i>Elymus wawawaiensis</i>	Snake River Wheatgrass	Secar	0.19	0.16
G	<i>Pascopyrum smithii</i>	Western Wheatgrass	Rosana	0.56	0.48
G	<i>Pleuraphis jamesii</i>	Galleta		0.52	0.30
G	<i>Poa secunda</i>	Sandberg Bluegrass		0.37	0.28
G	<i>Poa secunda</i>	Canby Bluegrass	Canbar	0.37	0.30
G	<i>Sporobolus cryptandrus</i>	Sand Dropseed		0.19	0.18
F	<i>Achillea millefolium</i>	Western Yarrow		0.11	0.10
F	<i>Linum perenne</i>	Blue Flax	Appar	0.93	0.81
F	<i>Medicago sativa</i>	Alfalfa	Ladak	0.74	0.68
F	<i>Onobrychis viciifolia</i>	Sainfoin	Eski	1.85	1.47
F	<i>Penstemon palmeri</i>	Palmer Penstemon	Washington UT	0.19	0.15
F	<i>Penstemon strictus</i>	Rocky Mtn. Penstemon		0.19	0.00
F	<i>Sanguisorba minor</i>	Small Burnet		0.56	0.00
F	<i>Sanguisorba minor</i>	Small Burnet	Delar	0.37	0.35
S	<i>Atriplex canescens</i>	Winterfat	Duchesne UT	0.46	0.18

Wildlife Habitat and Vegetation History**Table 28R-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	occupied	year-long & Winter	brood-rearing

Table 28R-10.4 - 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	Phase I
2008	Mountain Big Sagebrush/Perennial Grass	Phase I
2009	Mountain Big Sagebrush/Perennial Grass	Phase I
2013	Mountain Big Sagebrush/Perennial Grass	Phase I
2017	Mountain Big Sagebrush/Perennial Grass	Phase I

Site Notes

Several sage grouse pellet groups were observed on site in 2017, but were not recorded in quadrat or pellet group data.

Soils**Table 28R-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
Loam	6.9	47.1	31.1	21.8	2.2	11.3	131.2	0.6	07/13/2005

Site Potential

1981 - 2010 Average Annual Precipitation	16 inches
NRCS Ecological Site	Upland (Mountain Big Sagebrush-Indian Ricegrass)
NRCS Ecological Site #	R047XB308UT
States and Transitions	No state and transition model is available for this ecological site.

Since establishment in 2005, this site has existed as a mountain big sagebrush (*Artemisia tridentata* ssp. *vaseyana*) dominated plant community; perennial grass has been a co-dominant vegetation component since 2008 (Table 28R- 10.7). Sagebrush cover initially decreased after treatment but has steadily increased over the sample years, and post- treatment age class distribution has diversified (Table 28R-10.12, Table 28R-10.13). The herbaceous understory is primarily composed of the perennial grass species crested wheatgrass (*Agropyron cristatum*) with a diverse forb assemblage that is low in cover (Table 28R-10.10, Table 28R-10.11).

Trend Summary Tables**Table 28R-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
2005	18.2	0.1	-	20.5	0.1	-
2008	5.2	0.0	-	3.3	-	-
2009	5.8	0.0	-	3.9	-	-
2013	8.2	0.3	-	6.1	-	-
2017	3.3	0.3	-	5.9	0.6	-

Table 28R-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
2005	-	352	29	188	-	14.9	0.1	1.5
2008	-	353	23	253	-	22.1	0.1	2.6
2009	-	362	39	174	-	17.3	0.2	2.5
2013	2	393	-	233	0.0	32.6	-	3.3
2017	1	373	71	235	0.0	25.2	0.3	4.5

Table 28R-10.8 - 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	39.8	0.6	18.9	22.0	1.1	31.0
2008	33.0	-	32.0	13.9	4.1	26.5
2009	40.6	0.0	24.3	9.5	2.8	24.7
2013	25.7	-	30.6	11.7	2.7	46.5
2017	28.5	-	27.6	17.9	4.0	35.1

Table 28R-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	Rocky Mountain Elk	Greater Sage-Grouse	Rabbit
	Quadrat Frequency				
2005	6	2	-	-	46
2008	5	7	1	-	89
2009	9	10	-	-	65
2013	1	1	-	4	9
2017	5	2	2	1	52
Year	Days Use Per Acre (ha)				
2005	36.3 (89.7)	0.7 (1.7)	-	-	-
2008	29.0 (71.7)	-	-	-	-
2009	14.5 (35.9)	36.8 (91.0)	-	-	-
2013	11.6 (28.7)	0.7 (1.7)	-	-	-
2017	10.9 (26.9)	8.7 (21.5)	2.0 (5.0)	-	-

Table 28R-10.10 - 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)	Poa fendleriana (muttongrass)	Poa secunda (Sandberg bluegrass)	Sporobolus cryptandrus (sand dropseed)
year	Nested Frequency							
2005	-	350	6	-	-	-	-	-
2008	2	353	3	-	2	6	3	-
2009	-	361	2	-	-	-	2	2
2013	-	391	3	2	-	-	8	1
2017	-	373	4	1	-	-	-	-
year	Average Cover (%)							
2005	-	14.9	0.1	-	-	-	-	-
2008	0.0	22.1	0.0	-	0.0	0.0	0.0	-
2009	-	17.2	0.1	-	-	-	0.0	0.0
2013	-	32.3	0.1	0.0	-	-	0.2	0.0
2017	-	25.2	0.1	0.0	-	-	-	-

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

Table 28R-10.11 - Forb Species. Nested frequency and modified Daubenmire average cover by year.

FORB SPECIES	Achillea millefolium (Common yarrow)	Alyssum desertorum ^{ai} (desert madwort)	Astragalus convallarius (lesser rushy milkvetch)	Astragalus utahensis (Utah milkvetch)	Calochortus nuttallii (sego lily)	Ceratocephala testiculata ^{ai} (curvseed butterwort)	Collinsia parviflora ^a (maiden blue eyed Mary)	Comandra umbellata (bastard toadflax)	Cryptantha (cryptantha)	Cymopterus (springparsley)	Eriogonum alatum (winged buckwheat)	Eriogonum racemosum (redroot buckwheat)	Gayophytum ramosissimum ^a (pinyon groundsmoke)	Ipomopsis aggregata (scarlet gilia)	Lappula occidentalis ^a (flatspine stickseed)	Linum perenne ⁱ (blue flax)	Lotus utahensis (Utah bird's-foot trefoil)
year	Nested Frequency																
2005	-	-	4	-	-	3	-	6	9	8	4	16	20	-	1	-	11
2008	5	-	0	2	4	1	-	-	3	35	-	24	7	-	5	83	14
2009	5	-	-	-	-	14	3	1	19	-	-	13	5	-	8	57	-
2013	1	-	5	3	-	-	-	-	13	49	1	9	-	14	-	2	41
2017	8	18	1	-	-	-	-	-	-	-	1	13	34	-	-	8	43
year	Average Cover (%)																
2005	-	-	0.1	-	-	0.0	-	0.0	0.0	0.0	0.0	0.1	0.1	-	0.0	-	0.0
2008	0.0	-	0.0	0.0	0.0	0.0	-	-	0.0	0.2	-	0.1	0.0	-	0.0	0.6	0.1
2009	0.0	-	-	-	-	0.1	0.0	0.0	0.7	-	-	0.2	0.0	-	0.0	0.5	-
2013	0.0	-	0.1	0.0	-	-	-	-	0.1	0.4	0.0	0.1	-	0.1	-	0.0	0.2
2017	0.0	0.0	0.0	-	-	-	-	-	-	-	0.0	0.2	0.1	-	-	0.0	1.2

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

FORB SPECIES	Lupinus argenteus (silvery lupine)	Medicago sativa ⁱ (alfalfa)	Onobrychis vicifolia ⁱ (sainfoin)	Penstemon palmeri (Palmer's penstemon)	Penstemon strictus (Rocky Mountain penstemon)	Phlox longifolia (longleaf phlox)	Polygonum douglasii ^a (Douglas' knotweed)	Salsola tragus ^{ai} (prickly Russian thistle)	Sanguisorba minor ⁱ (small burnet)	Sphaeralcea coccinea (scarlet globemallow)	Streptanthus cordatus (heartleaf twistflower)	Taraxacum officinale (common dandelion)	Tragopogon dubius ^{ai} (yellow salsify)	Trifolium (clover)	unknown annual forb ^a (unknown forb)	Zigadenus paniculatus (foothill deathcamas)
year	Nested Frequency															
2005	8	-	-	-	-	80	8	-	-	96	-	-	-	8	-	2
2008	11	6	8	0	16	97	15	-	5	118	-	-	-	10	-	1
2009	14	2	-	-	2	-	-	3	-	104	3	-	1	5	8	2
2013	19	1	-	-	16	81	-	-	3	75	28	-	-	4	-	1
2017	14	2	-	8	3	-	27	-	27	160	5	6	-	-	-	-
year	Average Cover (%)															
2005	0.2	-	-	-	-	0.3	0.0	-	-	0.7	-	-	-	0.0	-	0.0
2008	0.1	0.0	0.0	0.0	0.1	0.3	0.0	-	0.0	0.9	-	-	-	0.1	-	0.0
2009	0.2	0.0	-	-	0.0	-	-	0.0	-	0.9	0.0	-	0.0	0.0	0.0	0.0
2013	0.9	0.0	-	-	0.1	0.2	-	-	0.0	0.8	0.2	-	-	0.0	-	0.0
2017	0.8	0.0	-	0.1	0.0	-	0.2	-	0.5	1.5	0.1	0.0	-	-	-	-

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

Table 28R-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)	Gutierrezia sarothrae (broom snakeweed)	Linanthus pungens (granite prickly phlox)	Opuntia (pricklypear)
year	Line Intercept Cover (%)			
2005	20.5	0.1	-	-
2008	3.3	-	-	-
2009	3.9	-	0	-
2013	6.1	-	-	-
2017	5.9	0.6	-	-
year	Quadrat Cover (%)			
2005	18.2	0.1	0.0	-
2008	5.2	0.0	-	-
2009	5.8	0.0	0.0	-
2013	8.2	0.3	0.0	-
2017	3.3	0.3	-	0.0

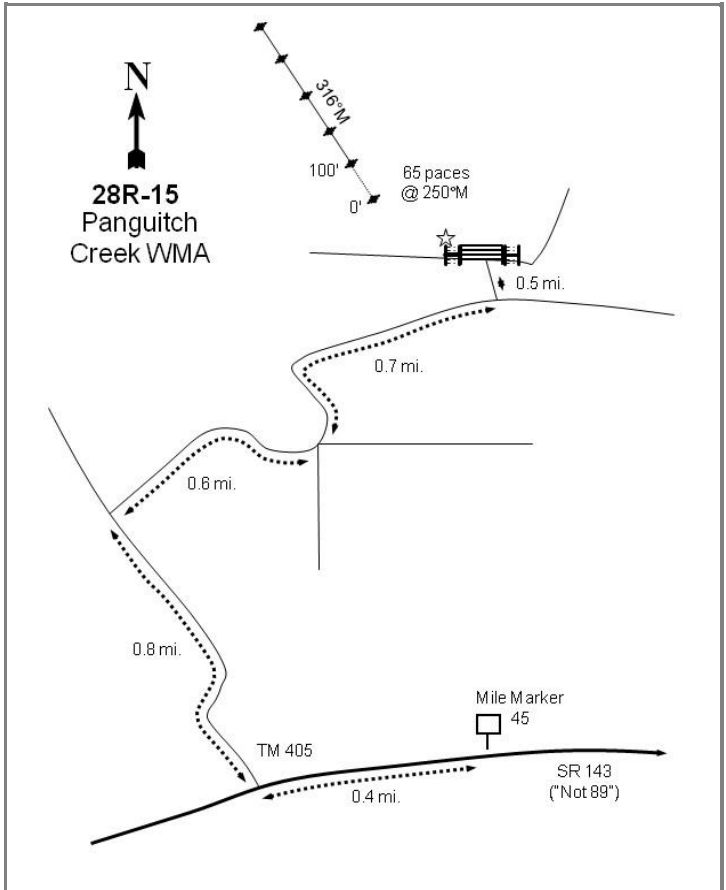
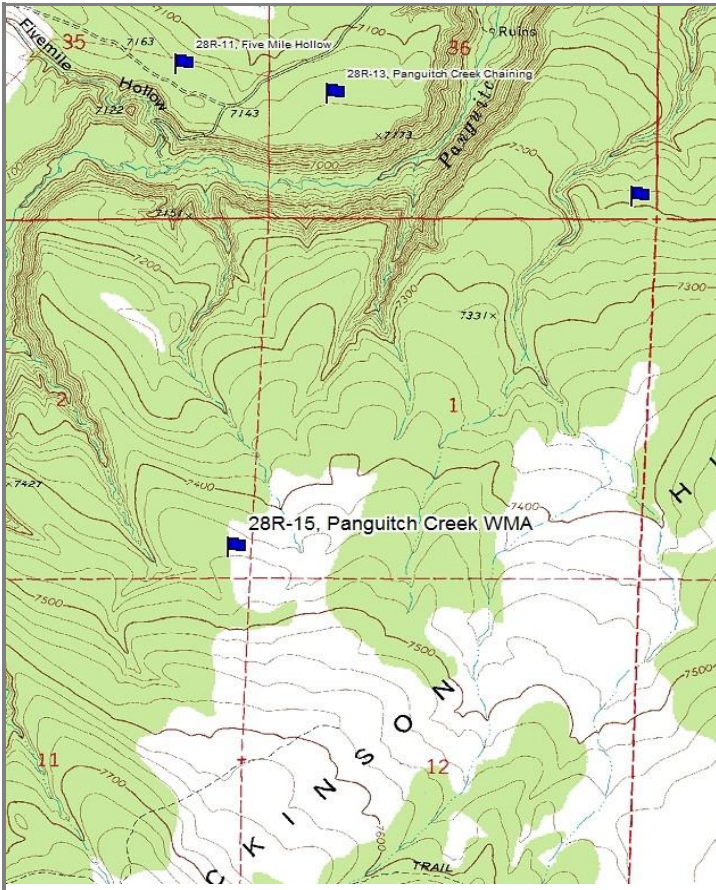
t - Tree Species; p - Preferred Browse; i - Introduced Species

Table 28R-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)									
2005	6640	20	6	74	20	22	39	8	53/71
2008	2180	140	13	40	47	3	0	76	33/40
2009	-	-	-	-	-	-	-	-	39/47
2013	3680	2040	35	61	3	20	0	8	46/62
2017	3140	80	54	42	5	20	10	3	40/60
Atriplex canescens^P -- (fourwing saltbush)									
2005	-	-	-	-	-	-	-	-	-/-
2008	-	-	-	-	-	-	-	-	-/-
2009	-	-	-	-	-	-	-	-	-/-
2013	-	20	0	0	0	0	0	0	- / -
2017	-	-	-	-	-	-	-	-	-/-
Gutierrezia sarothrae -- (broom snakeweed)									
2005	300	-	7	93	0	0	0	0	22/15
2008	60	-	0	67	33	0	33	0	9/12
2009	-	-	-	-	-	-	-	-	6/3
2013	220	-	18	82	0	9	0	18	17/18
2017	1000	-	4	96	0	0	0	0	20/28
Juniperus osteosperma^t -- (Utah juniper)									
2005	-	20	0	0	0	0	0	0	- / -
2008	-	-	-	-	-	-	-	-	-/-
2009	-	-	-	-	-	-	-	-	-/-
2013	-	-	-	-	-	-	-	-	-/-
2017	-	-	-	-	-	-	-	-	-/-
Linanthus pungens -- (granite prickly phlox)									
2005	20	-	0	100	0	0	0	0	11/8
2008	60	-	33	0	67	0	0	0	13/14
2009	-	-	-	-	-	-	-	-	4/10
2013	40	-	0	100	0	0	0	0	16/23
2017	20	-	0	100	0	0	0	0	16/34
Opuntia -- (pricklypear)									
2005	-	-	-	-	-	-	-	-	19/33
2008	-	-	-	-	-	-	-	-	8/21
2009	-	-	-	-	-	-	-	-	-/-
2013	-	-	-	-	-	-	-	-	-/-
2017	-	20	0	0	0	0	0	0	9/28

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

PANGUITCH CREEK WMA - STUDY NO. 28R-15



Location Information

USGS 7.5 min Map Info GPS (0' Stake)	Panguitch SW; Township 35S, Range 6W, Section 02 NAD 83 UTM ZONE 12, 368890 East 4183562 North
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Transect Information

Browse Tag # (0' Stake)	Not Available
Transect Bearing	316° 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 stoplight in Panguitch, travel on Highway 143 (also known as "Not 89"). Turn right (north) 0.4 miles west from mile marker 45. From trail marker 405 go through the gate and continue for 0.8 miles. Turn right and drove for 0.6 miles, turn left and go 0.7 miles, and then turn left again and proceed for 0.1 miles. Walk down the trail to the WMA fence. From the east gate post, walk 65 paces at 250 degrees magnetic to the 0-foot stake.

Site Information

Land Ownership	State
Land Administrator	UDWR
Allotment	SOUTH CANYON
Elevation	7,400ft (2,256m)
Aspect	W-NW
Slope	1-3%
Sample Dates	06/23/2009, 07/15/2010, 08/05/2013, 08/29/2017

Table 28R-15.1 Disturbance History. Recorded history of major disturbances.

Treatment/Disturbance	Name	WRI DB#	Date	Size (acres)
Chaining - Two-Way Ely/Smooth	Panguitch Creek WMA PJ Thinning	1206	November 2008	383
Seeding - Aerial Before	Panguitch Creek WMA PJ Thinning	1206	November 2008	383
Seeding - Dribbler	Panguitch Creek WMA PJ Thinning	1206	November 2008	383
Hand Crew - Lop and Scatter	Annual Habitat Restoration Project Maintenance	1998	August 2013	1274

Table 28R-15.2 Seed Mix. List of known seeded plant species and rates (if available).

Mix Name			Application Type	Application Date	Acres
Panguitch Creek WMA PJ Chain/Bullhog			Aerial	Nov 2008	383
Type	Species	Common Name	Cultivar/Source ID	Bulk lbs/acre	PLS lbs/acre
G	Achnatherum hymenoides	Indian Ricegrass	Rimrock	0.91	0.84
G	Elymus elymoides	Bottlebrush Squirreltail	Toe Jam	0.13	0.11
G	Elymus wawawaiensis	Snake River Wheatgrass	Secar	1.04	0.80
G	Poa secunda	Canby Bluegrass	Canbar	0.39	0.34
G	Psathyrostachys juncea	Russian Wildrye	Bozoisky	1.04	0.89
G	Thinopyrum intermedium	Intermediate Wheatgrass	Oahe	1.57	1.42
F	Linum perenne	Blue Flax	Appar	0.39	0.33
F	Medicago sativa	Alfalfa	Ladak	0.52	0.47
F	Medicago sativa	Alfalfa	Ranger	0.52	0.48
F	Penstemon palmeri	Palmer Penstemon	White Pine NV	0.26	0.20
F	Sanguisorba minor	Small Burnet	Delar	1.17	1.01
S	Artemisia tridentata ssp. vaseyana	Mountain Big Sagebrush	Sanpete UT	0.52	0.09
S	Bassia prostrata	Forage Kochia	Immigrant	0.52	0.36
Mix Name			Application Type	Application Date	Acres
Panguitch Creek Chaining Dribbler			Dribbler	Nov 2008	332
Type	Species	Common Name	Cultivar/Source ID	Bulk lbs/acre	PLS lbs/acre
S	Bassia prostrata	Forage Kochia	Immigrant	0.30	0.21
S	Cercocarpus ledifolius	Curleaf Mountain Mahogany	Sevier UT	0.15	0.10
S	Purshia stansburiana	Stansbury Cliffrose	Millard UT	0.11	0.09
S	Purshia stansburiana	Stansbury Cliffrose	Millard UT	0.08	0.05
S	Purshia tridentata	Bitterbrush	Lincoln NV	0.45	0.36

Wildlife Habitat and Vegetation History

Table 28R-15.3 - Wildlife Seasonal Habitat. UDWR wildlife habitat and seasonality.

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

Table 28R-15.4 - Vegetation History. The dominant vegetation type(s) and phase of woodland succession (Tausch, Miller, Roundy, & Chambers, 2009).

Year	Vegetation Type	Woodland Succession
2009	Black Sagebrush	Phase I
2010	Black Sagebrush	Phase I
2013	Black Sagebrush/Perennial Grass	Phase I
2017	Black Sagebrush/Perennial Grass	Phase I

Site Notes

In 2009, data was collected along the baseline and belt transects were not used. In 2010, the study was converted to the normal methodology with belts intersecting the baseline at randomized intervals. Pellet group data estimated a heavy presence by deer in 2013 (Table 28R-15.8).

Site Potential

1981 - 2010 Average Annual Precipitation 15 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 has existed as a black sagebrush (*Artemisia nova*) dominated plant community since study establishment in 2009, with a few other shrubs that contribute little average cover (Table 28R-15.12). The herbaceous understory consists of a diverse mixture of perennial grasses and forbs, although forbs provide minimal cover (Table 28R-15.10, Table 28R-15.11). The perennial species blue grama (*Bouteloua gracilis*) has been the most abundant grass in all sample years, and was a co-dominant vegetation component in 2013 and 2017 (Table 28R-15.10). Although a majority of twoneedle pinyon (*Pinus edulis*) trees were removed prior to study establishment, remaining trees indicate that there is potential for future infilling to occur (Table 28R-15.14).

Trend Summary Tables

Table 28R-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
2009	7.0	0.3	1.2	7.3	0.1	2.9
2010	7.8	0.6	1.0	10.5	0.1	1.4
2013	7.7	1.0	0.5	10.1	0.7	0.7
2017	10.3	2.2	-	13.4	1.8	-

Table 28R-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
2009	-	123	1	21	-	3.6	0.0	0.1
2010	2	133	36	52	0.0	4.0	1.4	1.5
2013	-	336	7	79	-	14.7	0.0	0.9
2017	-	396	8	82	-	27.3	0.0	1.2

Table 28R-15.8 - 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
2009	18.9	0.3	52.2	6.3	11.1	15.1
2010	16.4	0.0	56.8	8.1	11.9	17.1
2013	10.3	0.0	47.5	3.4	16.9	27.0
2017	8.7	-	46.6	7.3	10.9	40.6

Table 28R-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	Rocky Mountain Elk	Rabbit
	Quadrat Frequency			
2009	-	5	1	6
2010	-	6	1	7
2013	1	24	10	13
2017	-	32	2	19
Year	Days Use Per Acre (ha)			
2009	-	-	-	-
2010	-	2.7 (6.6)	0.7 (1.7)	-
2013	-	46.2 (114.2)	10.0 (24.8)	-
2017	-	64.3 (158.9)	10.0 (24.8)	-

Table 28R-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)	Bromus tectorum ^{ai} (cheatgrass)	Carex (sedge)	Elymus elymoides (squirreltail)	Hesperostipa comata (needle and thread)	Poa fendleriana (muttongrass)	Psathyrostachys juncea ⁱ (Russian wildrye)	Pseudoroegneria spicata (bluebunch wheatgrass)	Thinopyrum intermedium ⁱ (intermediate wheatgrass)
year	Nested Frequency										
2009	16	11	88	-	-	4	10	-	-	-	6
2010	6	2	67	2	-	48	3	9	2	-	13
2013	13	7	233	-	7	81	14	32	14	15	43
2017	16	4	298	-	20	72	4	38	14	19	95
year	Average Cover (%)										
2009	0.1	0.0	3.3	-	-	0.0	0.1	-	-	-	0.0
2010	0.1	0.0	2.3	0.0	-	1.0	0.0	0.1	0.0	-	0.3
2013	0.5	0.1	8.4	-	0.2	2.0	0.1	1.2	0.7	0.5	0.9
2017	0.4	0.1	16.4	-	0.4	3.1	0.0	2.7	0.3	0.6	3.2

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

Table 28R-15.11 - Forb Species. Nested frequency and modified Daubenmire average cover by year.

FORB SPECIES	Arabis (rockcress)	Astragalus argophyllus (silverleaf milkvetch)	Astragalus calycosus (Torrey's milkvetch)	Astragalus lentiginosus (freckled milkvetch)	Chenopodium album ^a (lambsquarters)	Chenopodium leptophyllum ^a (narrowleaf goosefoot)	Cryptantha (cryptantha)	Descurainia pinnata ^a (western tansymustard)	Draba ^a (draba)	Erigeron pumilus (shaggy fleabane)	Gayophytum ramosissimum ^a (pinyon groundsmoke)	Gilia inconspicua ^a (shy gilia)	Lactuca serriola ^{ai} (prickly lettuce)	Lesquerella (bladderpod)	Linum kingii (King's flax)	Linum perenne ⁱ (blue flax)	Medicago sativa ⁱ (alfalfa)
year	Nested Frequency																
2009	-	-	-	-	1	-	1	-	-	2	-	-	-	-	-	-	2
2010	-	-	2	-	3	17	3	6	3	3	7	2	3	2	-	4	2
2013	-	-	-	-	-	-	21	-	-	3	-	-	-	-	6	32	-
2017	2	1	-	7	-	2	14	-	-	9	-	3	-	8	19	13	-
year	Average Cover (%)																
2009	-	-	-	-	0.0	-	0.0	-	-	0.0	-	-	-	-	-	-	0.0
2010	-	-	0.3	-	0.2	0.2	0.2	0.0	0.2	0.0	0.8	0.0	0.0	0.1	-	0.1	0.0
2013	-	-	-	-	-	-	0.3	-	-	0.0	-	-	-	-	0.0	0.2	-
2017	0.0	0.0	-	0.3	-	0.0	0.3	-	-	0.1	-	0.0	-	0.1	0.1	0.0	-

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

FORB SPECIES	Packera multilobata (lobeleaf groundsel)	Penstemon (beardtongue)	Penstemon palmeri (Palmer's penstemon)	Phlox longifolia (longleaf phlox)	Pleiacanthus spinosus (thorn skeletonweed)	Sisymbrium altissimum ^{ai} (tall tumblemustard)	Sphaeralcea coccinea (scarlet globemallow)	Tragopogon dubius ^{ai} (yellow salsify)	Trifolium (clover)
year	Nested Frequency								
2009	9	-	-	7	-	-	-	-	-
2010	27	2	-	7	2	-	2	-	2
2013	16	-	3	3	1	7	4	-	-
2017	11	-	-	7	1	-	7	3	-
year	Average Cover (%)								
2009	0.1	-	-	0.0	-	-	-	-	-
2010	0.4	0.2	-	0.0	0.1	-	0.0	-	0.0
2013	0.1	-	0.1	0.0	0.1	0.0	0.0	-	-
2017	0.1	-	-	0.0	0.1	-	0.1	0.0	-

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

Table 28R-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)	Chrysothamnus viscidiflorus (yellow rabbitbrush)	Gutierrezia sarothrae (broom snakeweed)	Opuntia (pricklypear)	Pediocactus simpsonii (mountain ball cactus)	Pinus edulis ⁱ (twoneedle pinyon)	Sclerocactus (fishhook cactus)
year	Line Intercept Cover (%)							
2009	7.3	-	-	0.1	-	-	2.9	-
2010	10.5	-	-	-	0.1	-	1.4	-
2013	10.1	-	-	0.6	0.1	-	0.7	-
2017	13.2	0.2	-	1.7	0.1	-	-	-
year	Quadrat Cover (%)							
2009	7.0	-	0.0	0.1	0.1	-	1.2	0.0
2010	7.8	-	-	0.2	0.3	-	1.0	-
2013	7.7	-	-	0.8	0.2	-	0.5	-
2017	10.3	0.0	-	2.1	0.0	0.0	-	-

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

Table 28R-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.

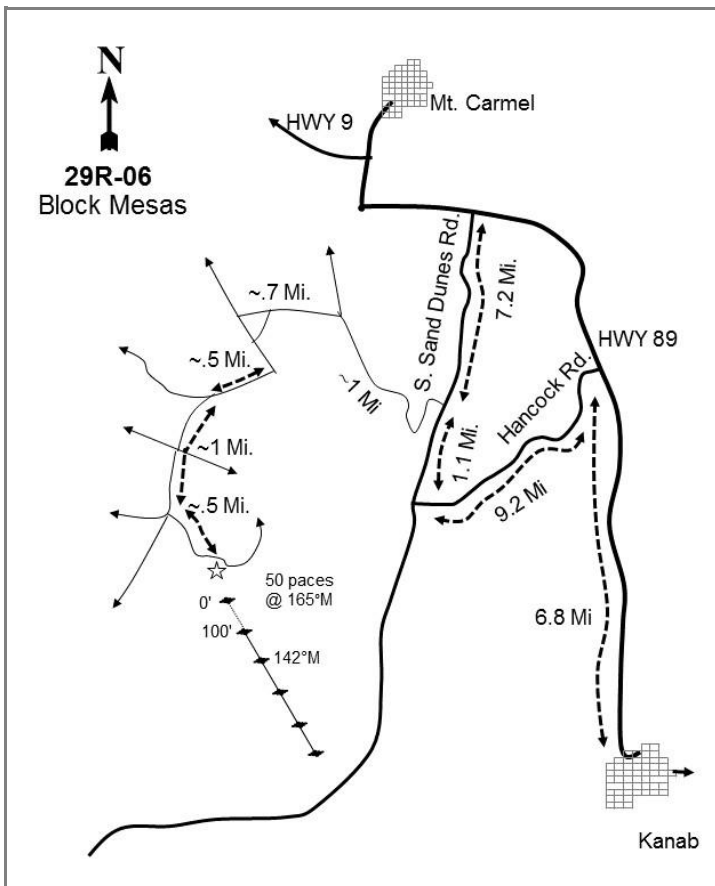
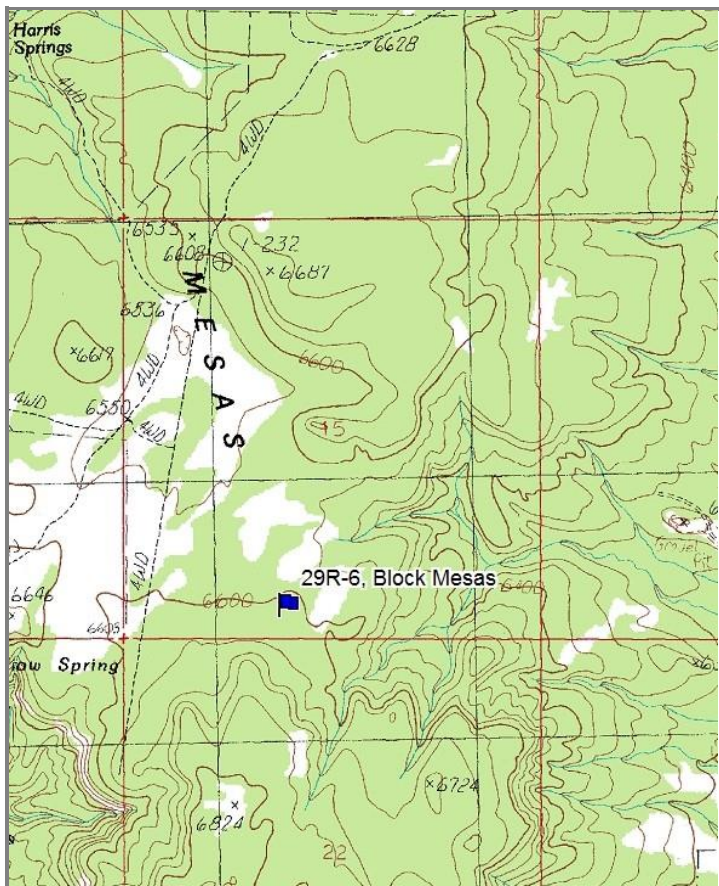
Year	Density		Age Class Distribution			Utilization		Poor Vigor (%)	Average Height Crown (cm)
	Plants Per Acre		Excluding Seedlings			Moderate (%)	Heavy (%)		
	Excluding Seedlings	Seedling	Young (%)	Mature (%)	Decadent (%)				
Amelanchier utahensis^P -- (Utah serviceberry)									
2009	-	-	-	-	-	-	-	-	-/-
2010	-	-	-	-	-	-	-	-	-/-
2013	-	-	-	-	-	-	-	-	-/-
2017	-	-	-	-	-	-	-	-	37/54
Artemisia nova^P -- (black sagebrush)									
2009	-	-	-	-	-	-	-	-	26/47
2010	3800	80	9	87	4	1	0	5	37/54
2013	7580	5440	45	52	2	25	13	7	23/49
2017	13140	180	53	45	2	8	8	1	26/55
Artemisia tridentata ssp. wyomingensis^P -- (Wyoming big sagebrush)									
2009	-	-	-	-	-	-	-	-	-/-
2010	-	-	-	-	-	-	-	-	-/-
2013	-	-	-	-	-	-	-	-	-/-
2017	20	-	100	0	0	0	0	0	-/-
Bassia prostrata^{Pi} -- (forage kochia)									
2009	-	-	-	-	-	-	-	-	-/-
2010	-	-	-	-	-	-	-	-	38/32
2013	-	-	-	-	-	-	-	-	-/-
2017	-	-	-	-	-	-	-	-	-/-
Gutierrezia sarothrae -- (broom snakeweed)									
2009	-	-	-	-	-	-	-	-	16/13
2010	220	-	9	91	0	0	0	0	23/25
2013	2020	300	36	63	1	0	0	1	16/20
2017	5020	-	2	98	0	0	0	0	17/20
Juniperus osteosperma^t -- (Utah juniper)									
2009	-	-	-	-	-	-	-	-	-/-
2010	-	-	-	-	-	-	-	-	-/-
2013	20	-	100	0	0	0	0	0	-/-
2017	-	-	-	-	-	-	-	-	-/-
Opuntia -- (pricklypear)									
2009	-	-	-	-	-	-	-	-	20/31
2010	160	-	25	75	0	0	0	0	13/28
2013	140	-	0	100	0	0	0	14	12/40
2017	60	-	0	100	0	0	0	0	11/31
Pediocactus simpsonii -- (mountain ball cactus)									
2009	-	-	-	-	-	-	-	-	-/-
2010	-	-	-	-	-	-	-	-	-/-
2013	-	-	-	-	-	-	-	-	-/-
2017	20	40	0	100	0	0	0	0	2/4
Pinus edulis^t -- (twoneedle pinyon)									
2009	-	-	-	-	-	-	-	-	-/-
2010	80	-	75	25	0	0	0	0	-/-
2013	200	-	70	10	20	10	10	20	-/-
2017	20	-	100	0	0	0	0	0	-/-
Purshia tridentata^P -- (antelope bitterbrush)									
2009	-	-	-	-	-	-	-	-	-/-
2010	-	-	-	-	-	-	-	-	-/-
2013	-	-	-	-	-	-	-	-	-/-
2017	-	-	-	-	-	-	-	-	15/16
Sclerocactus -- (fishhook cactus)									
2009	-	-	-	-	-	-	-	-	-/-
2010	-	-	-	-	-	-	-	-	-/-
2013	-	-	-	-	-	-	-	-	-/-
2017	20	-	0	100	0	0	0	0	3/5

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

Table 28R-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' (%)
Pinus edulis (twoneedle pinyon)							
2009	31	-	81	19	-	-	4.0
2010	109	11	74	16	-	-	4.7
2013	78	-	79	21	-	-	4.6
2017	9	40	60	-	-	-	1.8

BLOCK MESAS - STUDY NO. 29R-6



Location Information

USGS 7.5 min Map Info Yellowjacket Canyon ; Township 43S, Range 8W, Section 15
 GPS (0' Stake) NAD 83 UTM ZONE 12, 346193 East 4103656 North

Transect Information

Browse Tag # (0' Stake) Not Available
 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 No Rebar or Stakes

Directions to Site

From Kanab, travel on Highway 89 for 6.8 miles to Hancock Road. Turn left and drive west on Hancock Road for 9.2 miles. Turn right on South Sand Dunes Road and continue north for 1.1 miles to a road on the left. Turn left onto this road and travel east for approximately 1.1 miles to a fork in the road and bear left. Take this road for 0.7 miles to a "T" junction. Turn left (south), then drive for approximately 0.5 miles to a "Y". Bear left and continue for 1 mile through an opening and ponderosa pine patch. In this patch there is a small road that turns left: continue for for 0.5 miles up this road to the top of a hill, park on the side of the road, and walk 50 paces to the study site.

NOTE: The access road is very sandy, and as such, experienced drivers are recommended.

Site Information

Land Ownership	Federal
Land Administrator	BLM
Allotment	BUCK PASTURE
Elevation	6,614ft (2,016m)
Aspect	North
Slope	5%
Sample Dates	08/29/2017

Table 29R-06.1 Disturbance History. Recorded history of major disturbances.

Treatment/Disturbance	Name	WRI DB#	Date	Size (acres)
Seeding - Aerial Unknown	Yellow Jacket (Buck Pasture)	3977	Fall 2017	3500
Mechanical - Bullhog	Yellow Jacket (Buck Pasture)	3977	Fall 2017	1599

Table 29R-06.2 Seed Mix. List of known seeded plant species and rates (if available).

Mix Name			Application Type	Application Date	Acres
Yellowjacket Buck Pasture			Aerial	Nov 2017	3126
Type	Species	Common Name	Cultivar/Source ID	Bulk lbs/acre	PLS lbs/acre
G	<i>Achnatherum hymenoides</i>	Indian Ricegrass	Rimrock	3.01	2.75
G	<i>Agropyron cristatum</i>	Crested Wheatgrass	Nordan	1.50	1.30
G	<i>Elymus wawawaiensis</i>	Snake River Wheatgrass	Secar	0.70	0.60
G	<i>Elymus wawawaiensis</i>	Snake River Wheatgrass	Discovery	0.80	0.70
G	<i>Pascopyrum smithii</i>	Western Wheatgrass	Recovery	0.83	0.76
G	<i>Pascopyrum smithii</i>	Western Wheatgrass	Recovery	0.18	0.16
G	<i>Poa fendleriana</i>	Muttongrass	Montezuma CO	0.26	0.22
G	<i>Sporobolus cryptandrus</i>	Sand Dropseed		0.01	0.01
G	<i>Sporobolus cryptandrus</i>	Sand Dropseed		0.09	0.08
G	<i>Thinopyrum intermedium</i>	Intermediate Wheatgrass		0.50	0.46
F	<i>Cleome serrulata</i>	Rocky Mountain Beeplant	Kane UT	0.13	0.13
F	<i>Linum perenne</i>	Blue Flax	Appar	0.78	0.69
F	<i>Linum perenne</i>	Blue Flax	Appar	0.22	0.19
F	<i>Medicago sativa</i>	Alfalfa	Ladak DL	0.80	0.77
F	<i>Medicago sativa</i>	Alfalfa, Yellow	Don	0.19	0.19
F	<i>Onobrychis viciifolia</i>	Sainfoin	Eski	0.51	0.44
F	<i>Penstemon palmeri</i>	Palmer Penstemon	Duchesne UT	0.16	0.13
F	<i>Sanguisorba minor</i>	Small Burnet	Delar	0.51	0.50
F	<i>Sphaeralcea munroana</i>	Munro Globemallow	Washington UT	0.10	0.09

Wildlife Habitat and Vegetation History**Table 29R-06.3 - Wildlife Seasonal Habitat.** UDWR wildlife habitat and seasonality.

Species	Habitat	Season
Deer	crucial	winter

Table 29R-06.4 - Vegetation History. The dominant vegetation type(s) and phase of woodland succession (Tausch, Miller, Roundy, & Chambers, 2009).

Year	Vegetation Type	Woodland Succession
2017	Pinyon-Juniper/Mountain Big Sagebrush	Phase II transitioning to Phase III

Site Notes

This site is a part of the Yellowjacket (Buck Pasture) treatment which is expected to improve winter habitat and reduce hazardous fuels near Coral Pink Sand Dunes State Park.

Site Potential

1981 - 2010 Average Annual Precipitation	18 inches
NRCS Ecological Site	Upland Sand (Mountain big sagebrush)
NRCS Ecological Site #	035XY307UT
States and Transitions	No state and transition model is available for this ecological site.

As of study establishment in 2017, this site is a twoneedle pinyon (*Pinus edulis*) and Utah juniper (*Juniperus osteosperma*) encroached mountain big sagebrush (*Artemisia tridentata* ssp. *vaseyana*) plant community. Perennial grass cover is moderate, with blue grama (*Bouteloua gracilis*) being the dominant species (Table 29R-06.10). Perennial forb cover is also moderate, with sandmat (*Chamaesyce* sp.) contributing the most cover. Trees provide a significant amount of cover, and the site is considered to be within Phase II transitioning to Phase III of woodland succession. A chaining and seeding project is proposed for the area (Table 29R-06.1), and if completed as planned, one could expect the site to exhibit a decrease in tree cover and an increase in the diversity and abundance of the understory.

Trend Summary Tables

Table 29R-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
2017	1.7	1.9	13.1	2.5	2.5	35.5

Table 29R-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
2017	189	166	28	136	2.1	5.7	0.1	3.1

Table 29R-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
2017	40.8	1.8	49.2	0.1	0.0	25.4

Table 29R-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	Rabbit
	Quadrat Frequency		
Year	Days Use Per Acre (ha)		
	2017	-	32
2017	5.1 (12.6)	36.8 (91.0)	-

Table 29R-06.10 - Grass Species. Nested frequency and modified Daubenmire average cover by year.

GRASS SPECIES	Achmatherum hymenoides (Indian ricegrass)	Aristida purpurea (purple threeawn)	Bouteloua gracilis (blue grama)	Bromus tectorum ^{ai} (cheatgrass)	Elymus elymoides (squirreltail)	Munroa squarrosa ^a (false buffalograss)	Pascopyrum smithii (western wheatgrass)	Sporobolus cryptandrus (sand dropseed)	Vulpia octoflora ^a (sixweeks fescue)
year	Nested Frequency								
2017	53	4	84	111	30	3	16	20	84
year	Average Cover (%)								
2017	0.8	0.1	3.7	1.9	0.5	0.0	0.6	0.2	0.2

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

Table 29R-06.11 - Forb Species. Nested frequency and modified Daubenmire average cover by year.

FORB SPECIES	Abronia fragrans (snowball sand verbena)	Arabis (rockcress)	Castilleja linariifolia (Wyoming Indian paintbrush)	Chamaesyce (sandmat)	Chenopodium atrovirens ^a (pinyon goosefoot)	Comandra umbellata (bastard toadflax)	Cryptantha (cryptantha)	Descurainia pinnata ^a (western tansymustard)	Eriogonum cernuum ^a (nodding buckwheat)	Gilia inconspicua ^a (shy gilia)	Lappula occidentalis ^a (flatspine stickseed)	Microsteris gracilis ^a (slender phlox)	Packera multilobata (lobeleaf groundsel)	Polygonum douglasii ^a (Douglas' knotweed)	Senecio spartioides (broom-like ragwort)	Sphaeralcea parvifolia (smallflower globemallow)	Townsendia (Townsend daisy)
year	Nested Frequency																
2017	5	4	2	88	2	6	6	5	19	1	1	1	7	4	7	7	3
year	Average Cover (%)																
2017	0.0	0.1	0.1	1.5	0.0	0.3	0.2	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.4	0.1	0.1

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

FORB SPECIES	Vicia americana (American vetch)
year	Nested
2017	30
year	Average Cover (%)
2017	0.4

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

Table 29R-06.12 - 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)	Chrysothamnus viscidiflorus ssp. viscidiflorus var. viscidiflorus (yellow rabbitbrush)	Ephedra viridis ^p (mormon tea)	Ericameria nauseosa (rubber rabbitbrush)	Juniperus osteosperma ^t (Utah juniper)	Opuntia (pricklypear)	Pinus edulis ^t (twoneedle pinyon)
year	Line Intercept Cover (%)							
2017	0.8	1.7	0.2	0	1.6	19.2	0.7	16.3
year	Quadrat Cover (%)							
2017	0.3	1.4	0.0	0.0	0.9	6.2	0.9	6.9

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

Table 29R-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.

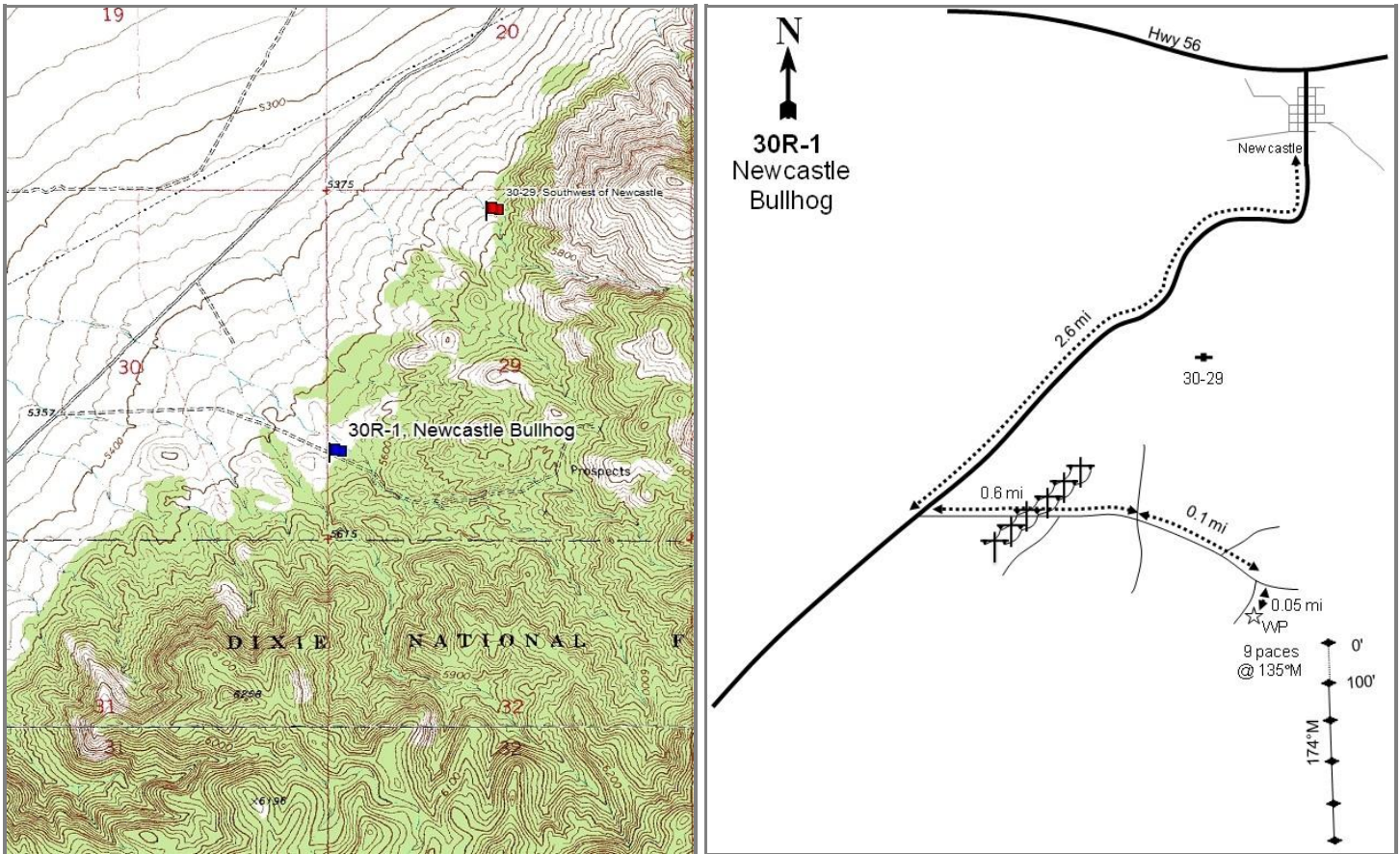
Year	Density		Age Class Distribution			Utilization		Poor Vigor (%)	Average Height Crown (cm)
	Plants Per Acre		Excluding Seedlings			Moderate (%)	Heavy (%)		
	Excluding Seedlings	Seedling	Young (%)	Mature (%)	Decadent (%)				
Amelanchier utahensis ^P -- (Utah serviceberry)									
2017	60	40	0	67	33	0	0	0	148/227
Artemisia tridentata ssp. vaseyana ^P -- (mountain big sagebrush)									
2017	780	-	18	46	36	28	36	33	64/71
Cercocarpus montanus var. montanus ^P -- (alderleaf mountain mahogany)									
2017	-	-	-	-	-	-	-	-	157/117
Chrysothamnus viscidiflorus ssp. viscidiflorus var. viscidiflorus -- (yellow rabbitbrush)									
2017	40	-	50	50	0	0	50	0	58/52
Ephedra viridis ^P -- (mormon tea)									
2017	120	-	50	50	0	67	0	0	66/79
Eriogonum microthecum ^P -- (slender buckwheat)									
2017	40	-	0	100	0	0	0	0	10/16
Ericameria nauseosa -- (rubber rabbitbrush)									
2017	160	-	0	100	0	50	13	25	65/133
Gutierrezia sarothrae -- (broom snakeweed)									
2017	-	-	-	-	-	-	-	-	31/41
Juniperus osteosperma ^t -- (Utah juniper)									
2017	100	60	60	40	0	0	0	20	- / -
Opuntia -- (pricklypear)									
2017	1260	-	0	100	0	10	0	11	9/31
Pinus edulis ^t -- (twoneedle pinyon)									
2017	260	240	46	46	8	0	0	8	- / -
Purshia tridentata ^P -- (antelope bitterbrush)									
2017	-	-	-	-	-	-	-	-	36/81
Tetradymia canescens -- (spineless horsebrush)									
2017	20	-	0	100	0	0	100	0	98/145
Yucca angustissima -- (narrowleaf yucca)									
2017	-	-	-	-	-	-	-	-	52/97
Yucca -- (yucca)									
2017	-	-	-	-	-	-	-	-	88/126

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

Table 29R-06.14 - 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)							
2017	31	7	13	13	7	60	31.7
Pinus edulis (twoneedle pinyon)							
2017	287	32	21	32	5	11	6.2

NEWCASTLE BULLHOG - STUDY NO. 30R-1

**Location Information**

USGS 7.5 min Map Info	Newcastle SW; Township 36S, Range 15W, Section 29
GPS (0' Stake)	NAD 83 UTM ZONE 12, 273527 East 4168514 North

Transect Information

Browse Tag # (0' Stake)	44
Transect Bearing	174° 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 Pinto Canyon Road in Newcastle travel south on Main Street, which turns into Bench Road, for 2.6 miles to a road that comes in from the left (east). Turn onto this road and drive for 0.6 miles to an intersection. Continue through the intersection to a road that comes in from the right (south). Turn onto this road and drive 150 feet to a witness post on the left (east) side of the road. From the witness post, walk 9 paces at 135 degrees magnetic to the 0-foot stake that is marked with browse tag #44.

Site Information

Land Ownership	Federal
Land Administrator	BLM
Allotment	PINTO CREEK
Elevation	5,550ft (1,692m)
Aspect	Northwest
Slope	5-10%
Sample Dates	07/21/2004, 06/18/2007, 06/26/2012, 08/28/2017

Table 30R-01.1 Disturbance History. Recorded history of major disturbances.

Treatment/Disturbance	Name	WRI DB#	Date	Size (acres)
Mechanical - Bullhog	-	PDB	October 2004	900

Wildlife Habitat and Vegetation History**Table 30R-01.3 - Wildlife Seasonal Habitat.** UDWR wildlife habitat and seasonality.

Species	Habitat	Season
Deer	crucial	winter

Table 30R-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	Wyoming Big Sagebrush	Phase II
2007	Wyoming Big Sagebrush	Phase I
2012	Wyoming Big Sagebrush	Phase I
2017	Wyoming Big Sagebrush	Phase I

Site Notes

No Notes

Soils**Table 30R-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	7.3	63.0	18.8	18.2	2.3	7.8	182.4	0.8	07/21/2004

Site Potential

1981 - 2010 Average Annual Precipitation	15 inches
NRCS Ecological Site	Upland Loam (Wyoming Big Sagebrush)
NRCS Ecological Site #	R028XY309UT
States and Transitions	No state and transition model is available for this ecological site.

At the time of study establishment in 2004, this site was a Wyoming big sagebrush (*Artemisia tridentata* ssp. *wyomingensis*) plant community in Phase II of encroachment by Utah juniper (*Juniperus osteosperma*) and twoneedle pinyon (*Pinus edulis*) (Table 30R-01.4, Table 30R-01.6, Table 30R-01.14). Annual grasses, namely cheatgrass (*Bromus tectorum*), exhibited a significant post-treatment increase in 2007 and 2012, but decreased in 2017. Perennial grasses are present in moderate amounts, with James' galleta (*Pleuraphis jamesii*) contributing a majority of the cover (Table 30R-01.10). Both perennial and annual forbs are rare, with little cover and diversity provided (Table 30R-01.11). The browse component is dominated by Wyoming big sagebrush, with Mormon tea (*Ephedra viridis*) and Stansbury cliffrose (*Purshia stansburiana*) also present to a lesser extent (Table 30R-01.12, Table 30R-01.13). Overall, the bullhog treatment effectively reduced tree cover to allow for increased sagebrush cover.

Trend Summary Tables**Table 30R-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	6.1	0.6	10.1	4.5	0.1	23.1
2007	7.9	-	0.7	8.8	-	5.3
2012	13.3	-	2.1	9.2	0.1	5.4
2017	11.5	0.5	1.2	12.7	1.1	5.6

Table 30R-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	33	148	5	15	0.1	5.5	0.0	0.0
2007	416	187	46	36	16.3	8.8	0.3	0.2
2012	456	173	19	44	34.0	4.4	0.0	0.5
2017	248	226	4	41	5.1	5.3	0.0	0.2

Table 30R-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
2004	18.1	0.7	32.5	38.1	3.1	21.5
2007	12.8	0.1	41.2	17.7	2.5	35.4
2012	12.3	0.0	55.3	8.6	2.8	50.8
2017	19.6	0.6	41.5	26.1	3.6	25.2

Table 30R-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	Rabbit
	Quadrat Frequency		
2004	-	23	47
2007	-	12	80
2012	1	9	9
2017	2	21	43
Year	Days Use Per Acre (ha)		
2004	-	71.7 (177.1)	-
2007	-	22.8 (56.3)	-
2012	-	3.4 (8.3)	-
2017	2.2 (5.4)	16.8 (41.4)	-

Table 30R-01.10 - 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)	Pleuraphis jamesii (James' galleta)	Poa secunda (Sandberg bluegrass)	Sporobolus cryptandrus (sand dropseed)	Vulpia octoflora ^a (sixweeks fescue)
year	Nested Frequency							
2004	35	33	8	3	112	-	2	-
2007	58	415	26	3	135	-	-	59
2012	47	456	26	5	120	-	3	2
2017	32	248	39	46	148	1	-	-
year	Average Cover (%)							
2004	1.6	0.1	0.0	0.0	3.9	-	0.0	-
2007	2.0	16.0	0.5	0.0	6.3	-	-	0.3
2012	1.7	34.0	0.7	0.0	2.0	-	0.0	0.0
2017	0.3	5.1	0.6	0.9	3.4	0.0	-	-

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

Table 30R-01.11 - Forb Species. Nested frequency and modified Daubenmire average cover by year.

FORB SPECIES	Arabis (rockcress)	Astragalus (milkvetch)	Castilleja (Indian paintbrush)	Ceratocephala testiculata ^{ai} (curvseed butterwort)	Chaenactis douglasii (Douglas' dustymaiden)	Chamaesyce (sandmat)	Collinsia parviflora ^a (maiden blue eyed Mary)	Cordylanthus ^a (bird s-beak)	Cryptantha (cryptantha)	Descurainia pinnata ^a (western tansymustard)	Draba ^a (draba)	Eriogonum cernuum ^a (nodding buckwheat)	Frasera albomarginata (desert fraseria)	Gilia inconspicua ^a (shy gilia)	Lupinus (lupine)	Penstemon (beardtongue)	Penstemon confusus (Owens Valley beardtongue)
year	Nested Frequency																
2004	1	-	-	-	-	-	-	-	-	-	-	5	-	-	2	1	-
2007	3	4	1	-	-	-	-	17	5	10	16	2	-	2	-	3	-
2012	-	1	-	4	2	1	3	4	7	-	-	-	26	-	-	-	-
2017	-	4	2	-	3	9	-	-	6	-	-	2	5	2	-	-	6
year	Average Cover (%)																
2004	0.0	-	-	-	-	-	-	-	-	-	-	0.0	-	-	0.0	0.0	-
2007	0.0	0.0	0.0	-	-	-	-	0.1	0.0	0.1	0.0	0.0	-	0.0	-	0.0	-
2012	-	0.1	-	0.0	0.0	0.0	0.0	0.0	0.1	-	-	-	0.1	-	-	-	-
2017	-	0.0	0.0	-	0.0	0.0	-	-	0.0	-	-	0.0	0.0	0.0	-	-	0.1

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

FORB SPECIES	Penstemon leiophyllus (smoothleaf beardtongue)	Penstemon pachyphyllus (thickleaf beardtongue)	Phlox longifolia (longleaf phlox)	Silene antirrhina ^a (sleepy silene)	Sisymbrium altissimum ^{ai} (tall tumbleweed)	Streptanthus cordatus (heartleaf twistflower)
year	Nested Frequency					
2004	-	1	3	-	-	7
2007	-	-	7	1	4	14
2012	3	-	2	8	-	7
2017	-	-	3	-	-	9
year	Average Cover (%)					
2004	-	0.0	0.0	-	-	0.0
2007	-	-	0.0	0.0	0.0	0.1
2012	0.1	-	0.0	0.0	-	0.0
2017	-	-	0.0	-	-	0.0

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

Table 30R-01.12 - 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)	Ephedra viridis ^p (mormon tea)	Gutierrezia sarothrae (broom snakeweed)	Juniperus osteosperma ^t (Utah juniper)	Opuntia (pricklypear)	Pinus edulis ^t (twoneedle pinyon)	Purshia stansburiana ^p (Stansbury cliffrose)
year	Line Intercept Cover (%)								
2004	-	4.4	-	-	-	15.9	0.1	7.2	0.1
2007	-	8.3	-	0.3	-	4.4	-	0.9	0.2
2012	-	8.5	-	0.1	0.1	4.3	-	1.1	0.6
2017	-	12.1	-	0.2	1.1	4.5	-	1.1	0.4
year	Quadrat Cover (%)								
2004	-	5.9	0.4	-	-	6.8	0.2	3.4	0.2
2007	-	7.2	-	0.5	-	0.1	-	0.6	0.2
2012	-	11.9	-	0.5	0.0	1.3	-	0.8	0.9
2017	0.0	10.6	-	0.8	0.5	0.2	-	1.0	0.2

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

Table 30R-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 nova ^p -- (black sagebrush)									
2004	-	-	-	-	-	-	-	-	-/-
2007	-	-	-	-	-	-	-	-	-/-
2012	-	-	-	-	-	-	-	-	-/-
2017	100	-	20	80	0	20	80	0	18/56

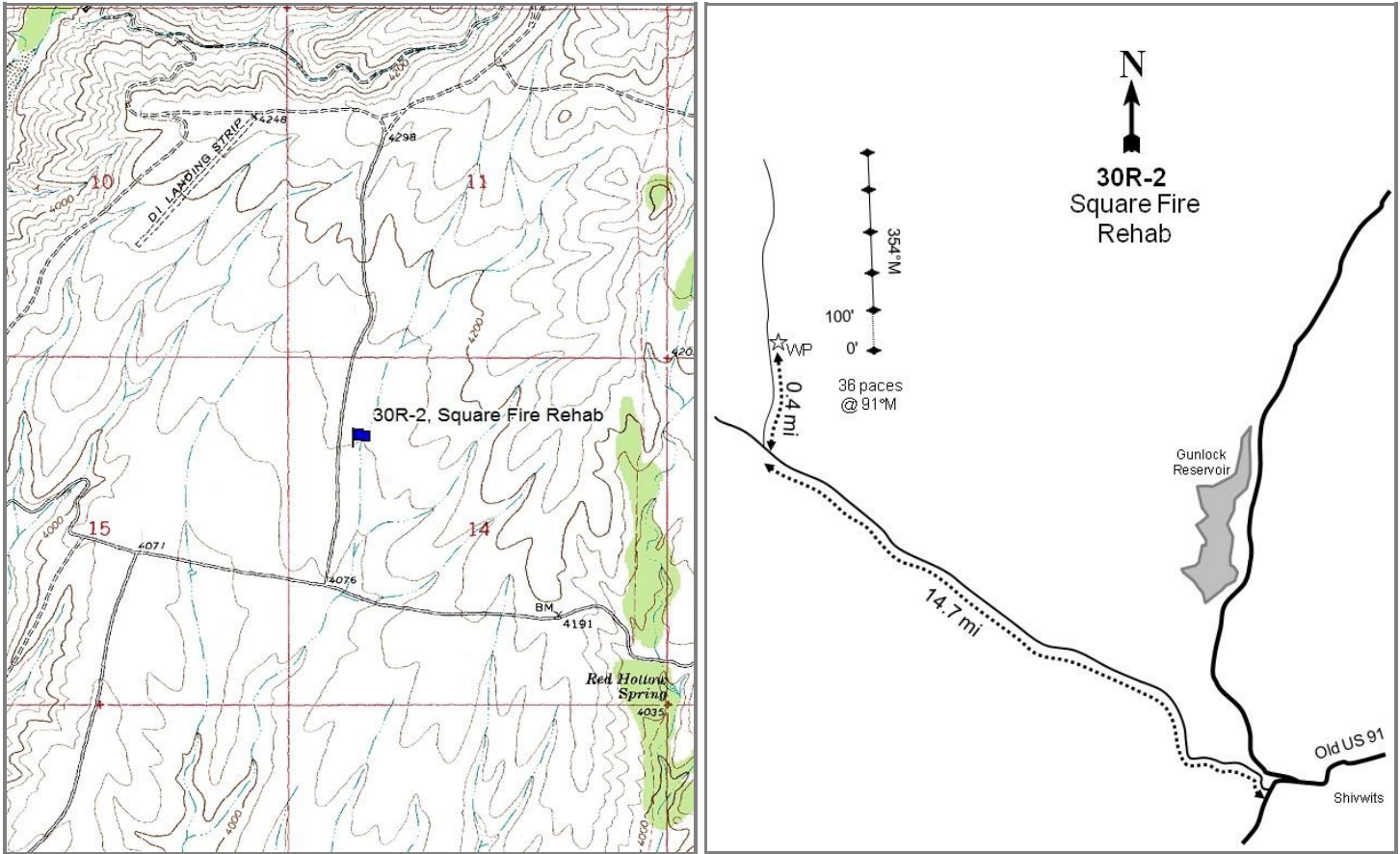
Year	Density		Age Class Distribution			Utilization		Poor Vigor (%)	Average Height Crown (cm)
	Plants Per Acre		Excluding Seedlings			Moderate (%)	Heavy (%)		
	Excluding Seedlings	Seedling	Young (%)	Mature (%)	Decadent (%)				
Artemisia tridentata ssp. wyomingensis^p -- (Wyoming big sagebrush)									
2004	2580	-	0	61	40	41	26	29	41/62
2007	2480	1480	12	65	23	23	27	17	40/61
2012	3200	380	36	58	6	45	10	34	47/89
2017	3880	40	33	58	9	50	16	6	48/77
Chrysothamnus viscidiflorus ssp. viscidiflorus var. stenophyllus -- (yellow rabbitbrush)									
2004	120	-	0	100	0	17	33	0	23/26
2007	60	-	0	67	33	67	33	67	26/36
2012	60	-	0	100	0	0	0	33	24/33
2017	120	-	0	67	33	0	83	50	25/31
Ephedra viridis^p -- (mormon tea)									
2004	100	-	0	80	20	0	100	0	51/66
2007	160	-	13	63	25	13	13	25	40/65
2012	140	-	0	57	43	29	29	43	60/82
2017	140	-	0	100	0	0	100	57	44/68
Gutierrezia sarothrae -- (broom snakeweed)									
2004	-	-	-	-	-	-	-	-	22/23
2007	40	-	0	100	0	0	0	0	30/45
2012	180	-	0	100	0	0	0	11	19/31
2017	860	-	2	98	0	0	0	0	20/32
Juniperus osteosperma^t -- (Utah juniper)									
2004	140	-	29	71	0	0	0	0	- / -
2007	40	40	50	50	0	0	0	0	- / -
2012	100	-	60	40	0	0	0	0	- / -
2017	120	-	100	0	0	0	0	0	- / -
Opuntia -- (pricklypear)									
2004	80	-	0	100	0	0	0	0	11/25
2007	-	-	-	-	-	-	-	-	- / -
2012	-	-	-	-	-	-	-	-	- / -
2017	-	-	-	-	-	-	-	-	13/35
Pinus edulis^t -- (twoneedle pinyon)									
2004	140	-	57	43	0	0	0	0	- / -
2007	20	40	100	0	0	0	0	0	- / -
2012	-	-	-	-	-	-	-	-	- / -
2017	40	40	100	0	0	0	0	0	- / -
Polygala subspinoso -- (spiny milkwort)									
2004	-	-	-	-	-	-	-	-	- / -
2007	-	-	-	-	-	-	-	-	- / -
2012	-	-	-	-	-	-	-	-	9/12
2017	-	-	-	-	-	-	-	-	- / -
Purshia stansburiana^p -- (Stansbury cliffrose)									
2004	20	-	0	0	100	0	100	0	180/192
2007	40	-	0	100	0	0	100	0	102/108
2012	40	-	0	100	0	0	0	0	98/117
2017	60	-	33	67	0	0	67	0	134/188

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

Table 30R-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	122	16	32	11	21	21	21.7
2007	14	20	70	10	-	-	2.1
2012	16	18	82	-	-	-	3.1
2017	26	20	60	20	-	-	3.3
Pinus edulis (twoneedle pinyon)							
2004	81	41	12	12	24	12	7.2
2007	15	10	80	10	-	-	2.5
2012	15	-	91	9	-	-	4.2
2017	21	8	67	25	-	-	4.3

SQUARE FIRE REHAB - STUDY NO. 30R-2



Location Information

USGS 7.5 min Map Info	Motoqua SW; Township 40S, Range 19W, Section 14
GPS (0' Stake)	NAD 83 UTM ZONE 12, 238660 East 4133535 North

Transect Information

Browse Tag # (0' Stake)	171
Transect Bearing	354° 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 20 on Old US-91, drive west for 4.3 miles to a fork. Turn left and continue for 0.9 miles to another fork. Proceed right and drive 14.7 miles to a road on the right. Turn here and drive 0.4 miles to a witness post on the right (east) side of the road. From the witness post, walk 36 paces at 91 degrees magnetic to the 0-foot stake marked with browse tag #171.

Site Information

Land Ownership	Federal
Land Administrator	BLM
Allotment	DESERT INN
Elevation	4,100ft (1,250m)
Aspect	Southeast
Slope	2%
Sample Dates	07/19/2006, 06/13/2011, 08/07/2017

Table 30R-02.1 Disturbance History. Recorded history of major disturbances.

Treatment/Disturbance	Name	WRI DB#	Date	Size (acres)
Fire - Wildfire	Square	-	2004	17146
Chaining - One-Way Unknown	Square Fire Rehab	PDB	Fall 2004	-
Seeding - Aerial Before	Square Fire Rehab	PDB	Fall 2004	6287
Seeding - Aerial After	Square Fire Rehab	PDB	February 2005	3000

Table 30R-02.2 Seed Mix. List of known seeded plant species and rates (if available).

Mix Name			Application Type	Application Date	Acres
Square Fire Rehab			Aerial	Oct 2004	6287
Type	Species	Common Name	Cultivar/Source ID	Bulk lbs/acre	PLS lbs/acre
G	Achnatherum hymenoides	Indian Ricegrass	Rimrock	0.50	0.00
G	Agropyron cristatum	Crested Wheatgrass	Hycrest	2.50	0.00
G	Bouteloua curtipendula	Sideoats Grama		0.62	0.00
G	Bouteloua gracilis	Blue Grama		0.50	0.00
G	Elymus elymoides	Squirrel Tail		0.25	0.00
G	Pleuraphis jamesii	Galleta		0.50	0.00
G	Thinopyrum intermedium	Pubescent Wheatgrass		2.50	0.00
F	Cleome serrulata	Bee Plant		0.13	0.00
F	Linum perenne	Blue Flax		0.50	0.00
F	Medicago sativa	Alfalfa		0.50	0.00
F	Melilotus officinalis	Yellow Sweetclover		0.50	0.00
F	Sanguisorba minor	Small Burnet		0.50	0.00
S	Atriplex canescens	Fourwing Saltbush		0.25	0.00
S	Bassia prostrata	Forage Kochia		1.00	0.00
S	Krascheninnikovia lanata	Winterfat		0.25	0.00
Mix Name			Application Type	Application Date	Acres
Square Fire			Aerial	Feb 2005	3000
Type	Species	Common Name	Cultivar/Source ID	Bulk lbs/acre	PLS lbs/acre
S	Bassia prostrata	Forage Kochia	Beaver UT	0.83	0.62
S	Bassia prostrata	Forage Kochia	Beaver UT	0.17	0.12

Wildlife Habitat and Vegetation History**Table 30R-02.3 - Wildlife Seasonal Habitat.** UDWR wildlife habitat and seasonality.

Species	Habitat	Season
Deer	crucial	winter

Table 30R-02.4 - Vegetation History. The dominant vegetation type(s) and phase of woodland succession (Tausch, Miller, Roundy, & Chambers, 2009).

Year	Vegetation Type	Woodland Succession
2006	Forage Kochia/Annual Grass	Phase I
2011	Forage Kochia	Phase I
2017	Broom Snakeweed	Phase I

Site Notes

No Notes

Soils**Table 30R-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
Loam	7.5	49.0	28.1	22.9	0.7	19.1	236.8	0.5	07/19/2006

Site Potential

1981 - 2010 Average Annual Precipitation 11 inches
 NRCS Ecological Site Semidesert Shallow Hardpan (Blackbrush)
 NRCS Ecological Site # R030XY230UT
 States and Transitions No state and transition model is available for this ecological site.

This study site was established in 2006 following the 2004 Square Fire to monitor a rehabilitation effort in the area. In the first two samplings following the fire, the site was a forage kochia (*Bassia prostrata*) dominated plant community. In the 2017 sampling, however, the site transitioned to one dominated by broom snakeweed (*Gutierrezia sarothrae*); other browse species present include desert almond (*Prunus fasciculata*), blackbrush (*Coleogyne ramosissima*) and Nevada jointfir (*Ephedra nevadensis*) (Table 30R-08.12, Table 30R-08.13). The primary grasses are the annual species red brome (*Bromus rubens*) and cheatgrass (*B. tectorum*). Perennial grasses are fairly sparse in cover, but purple threeawn (*Aristida purpurea*) is the most common of the perennial species. Forbs are rare and not diverse, but the introduced annual redstem stork's bill (*Erodium cicutarium*) is the dominant species (Table 30R-02.7, 30R-02.10, Table 30R-02.11). The Utah juniper (*Juniperus osteosperma*) is present in low amounts; the site is currently considered to be within Phase I of woodland succession and it is possible that it will infill in the future. Overall, this site seems to be showing recovery from the fire and appears to be transitioning from an early seral to mid-seral state based on the species composition.

Trend Summary Tables

Table 30R-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
2006	8.5	2.0	-	10.1	4.7	-
2011	13.1	7.4	-	12.4	9.7	-
2017	3.0	16.2	-	2.1	22.9	-

Table 30R-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
2006	406	38	378	116	7.4	0.2	4.3	1.1
2011	365	20	363	95	5.0	0.7	4.5	1.7
2017	226	82	55	19	4.2	1.9	1.2	0.3

Table 30R-02.8 - 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
2006	40.3	0.0	28.8	13.9	4.6	22.8
2011	23.2	-	14.1	17.9	3.9	34.7
2017	47.7	0.4	20.9	18.2	4.3	24.3

Table 30R-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	Rabbit
	Quadrat Frequency		
2006	1	8	78
2011	-	2	11
2017	4	1	47
Year	Days Use Per Acre (ha)		
2006	-	3.4 (8.3)	-
2011	2.2 (5.4)	-	-
2017	-	0.7 (1.7)	-

Table 30R-02.10 - Grass Species. Nested frequency and modified Daubenmire average cover by year.

GRASS SPECIES	Agropyron cristatum ⁱ (crested wheatgrass)	Aristida purpurea (purple threeawn)	Bouteloua curtipendula (sideoats grama)	Bouteloua gracilis (blue grama)	Bromus rubens ^{ai} (red brome)	Bromus tectorum ^{ai} (cheatgrass)	Pascopyrum smithii (western wheatgrass)	Pleuraphis jamesii (James' galleta)	Sporobolus cryptandrus (sand dropseed)	Thinopyrum intermedium ⁱ (intermediate wheatgrass)	Vulpia octoflora ^a (sixweeks fescue)
year	Nested Frequency										
2006	-	-	36	-	113	399	-	-	3	-	11
2011	2	-	8	-	340	133	7	3	-	-	75
2017	1	46	4	16	159	124	4	4	5	3	-
year	Average Cover (%)										
2006	-	-	0.2	-	0.4	7.0	-	-	0.0	-	0.0
2011	0.0	-	0.5	-	3.6	1.1	0.1	0.0	-	-	0.3
2017	0.0	0.9	0.2	0.4	2.3	1.9	0.2	0.2	0.0	0.0	-

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

Table 30R-02.11 - Forb Species. Nested frequency and modified Daubenmire average cover by year.

FORB SPECIES	Alyssum desertorum ^{ai} (desert madwort)	Antheropeas wallacet ⁱ (woolly easterbonnets)	Astragalus (milkvetch)	Astragalus ophorus (egg milkvetch)	Calochortus flexuosus (winding mariposa lily)	Ceratocephala testiculata ^{ai} (curveseed butterwort)	Chamaesyce albomarginata (whitemargin sandmat)	Collinsia parviflora ^a (maiden blue eyed Mary)	Collomia linearis ^a (tiny trumpet)	Convolvulus arvensis ^{ai} (field bindweed)	Descurainia pinnata ^a (western tansymustard)	Draba ^a (draba)	Eriastrum sparsiflorum ^a (Great Basin woollystar)	Eriogonum cernuum ^a (nodding buckwheat)	Erodium cicutarium ^{ai} (redstem stork's bill)	Lappula occidentalis ^a (flatspine stickseed)	Layia glandulosa ^a (whitedaisy tidy/tips)	
year	Nested Frequency																	
2006	1	-	3	-	-	2	29	-	50	3	5	6	-	3	42	1	-	
2011	12	5	68	1	10	-	4	4	-	-	-	49	98	-	304	-	1	
2017	-	-	-	1	7	-	-	-	3	-	-	-	20	6	28	-	-	
year	Average Cover (%)																	
2006	0.0	-	0.0	-	-	0.0	0.1	-	0.1	0.0	0.0	0.0	-	0.0	0.8	0.0	-	
2011	0.0	0.0	1.0	0.0	0.0	-	0.2	0.0	-	-	-	0.1	0.4	-	2.8	-	0.0	
2017	-	-	-	0.0	0.0	-	-	-	0.0	-	-	-	0.1	0.2	0.9	-	-	

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

FORB SPECIES										
Lepidium ^a (pepperweed)										
Linum lewisii (Lewis flax)										
Lupinus brevicaulis ^a (shortstem lupine)										
Phlox (phlox)										
Plantago patagonica ^a (woolly plantain)										
Salsola tragus ^{ai} (prickly Russian thistle)										
Sanguisorba minor ⁱ (small burnet)										
Sphaeralcea grossularifolia (gooseberry/leaf globemallow)										
unknown annual forb ^a (unknown forb)										
Verbena bracteata (bigbract verbena)										
year	Nested Frequency									
2006	78	60	-	-	372	4	32	5	3	0
2011	1	-	1	1	213	9	-	16	-	-
2017	1	-	-	-	1	-	-	11	-	-
year	Average Cover (%)									
2006	0.2	0.3	-	-	3.0	0.0	0.4	0.2	0.0	0.0
2011	0.0	-	0.0	0.0	1.1	0.0	-	0.4	-	-
2017	0.0	-	-	-	0.0	-	-	0.2	-	-

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

Table 30R-02.12 - Shrub and Tree Species. Average modified Daubenmire quadrat and line intercept cover by year.

SHRUB SPECIES						
Bassia prostrata ^{pt} (forage kochia)						
Coleogyne ramosissima ^p (blackbrush)						
Ephedra nevadensis ^p (Nevada jointfir)						
Gutierrezia microcephala (threadleaf snakeweed)						
Prunus fasciculata (desert almond)						
Yucca baccata (banana yucca)						
year	Line Intercept Cover (%)					
2006	9.8	-	0.3	1.9	2.8	-
2011	12	0	0.4	6.9	2.8	-
2017	2	0.1	-	19.5	3.4	-
year	Quadrat Cover (%)					
2006	8.4	0.0	0.0	0.9	1.1	-
2011	12.7	0.0	0.4	5.9	1.4	0.0
2017	2.4	0.3	0.4	13.6	2.5	0.1

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

Table 30R-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 (%)				
Bassia prostrata^{Pi} -- (forage kochia)									
2006	60680	6140	81	19	0	0	0	0	19/24
2011	29060	960	9	90	0	23	0	0	12/20
2017	4700	-	7	93	0	25	9	3	12/17
Coleogyne ramosissima^P -- (blackbrush)									
2006	20	40	0	0	100	0	0	100	66/102
2011	20	-	100	0	0	0	0	0	60/93
2017	120	-	50	50	0	0	0	0	64/98
Ephedra nevadensis^P -- (Nevada jointfir)									
2006	140	-	29	71	0	0	0	86	48/67
2011	60	-	0	100	0	0	0	33	49/68
2017	-	-	-	-	-	-	-	-	41/47
Ericameria nauseosa -- (rubber rabbitbrush)									
2006	-	-	-	-	-	-	-	-	-/-
2011	-	-	-	-	-	-	-	-	51/77
2017	-	-	-	-	-	-	-	-	-/-
Gutierrezia microcephala -- (threadleaf snakeweed)									
2006	1680	100	7	93	0	4	0	0	25/29
2011	1840	860	24	76	0	0	0	1	36/56
2017	12080	-	6	93	1	1	0	4	32/42
Opuntia -- (pricklypear)									
2006	-	-	-	-	-	-	-	-	23/64
2011	-	-	-	-	-	-	-	-	23/64
2017	-	-	-	-	-	-	-	-	26/61
Prunus fasciculata -- (desert almond)									
2006	380	-	32	68	0	5	0	5	61/97
2011	500	-	12	88	0	8	0	8	60/99
2017	360	-	6	83	11	17	0	11	75/110
Purshia glandulosa -- (desert bitterbrush)									
2006	-	-	-	-	-	-	-	-	31/56
2011	-	-	-	-	-	-	-	-	66/143
2017	-	-	-	-	-	-	-	-	110/175
Ribes^P -- (currant)									
2006	60	-	0	100	0	0	0	0	- / -
2011	-	-	-	-	-	-	-	-	-/-
2017	-	-	-	-	-	-	-	-	-/-
Yucca baccata -- (banana yucca)									
2006	20	-	0	100	0	0	0	0	34/69
2011	20	-	0	100	0	0	0	0	43/49
2017	20	-	0	100	0	0	0	0	69/94

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

Table 30R-02.14 - 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)							
2017	7	-	100	-	-	-	2.5

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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).
EPHED	Ephedra	Major component of the site (typically >5% cover).
QUGA	Gambel Oak	Major component of the site (typically >5% cover).

Vegetation Type Code	Vegetation Community Type Name*	Description
QUTU	Live Oak	Major component of the site (typically >5% cover).
SYOR	Snowberry	Major component of the site (typically >5% cover).
AMAL	Serviceberry	Major component of the site (typically >5% cover).
PUTR	Bitterbrush	Major component of the site (typically >5% cover).
PUGL	Desert Bitterbrush	Major component of the site (typically >5% cover).
ARCT2	Manzanita	Major component of the site (typically >5% cover).
CEMOM	True Mountain Mahogany	Major component of the site (typically >5% cover).
CELEL	Curleaf Mountain Mahogany	Major component of the site (typically >5% cover).
COMES	Stansbury Cliffrose	Major component of the site (typically >5% cover).
KOPR	Forage Kochia	Major component of the site (typically >5% cover).
TAMARIX	Tamarix	Major component of the site (typically >5% cover).
MMB	Mixed Mountain Brush	Mixture of one or more Mountain brush species (ARTRV, AMAL, CEMOM, etc.) with no one species expressing dominance.
MB	Mixed Shrub	Mixture of various shrub species with none expressing dominance.
CHAPARRAL	Chaparral	Mixture of fire tolerant shrub species.
JUNIPER	Juniper	Major component of the site (Phase III ¹). No pinyon present.
PINYON	Pinyon	Major component of the site (Phase III ¹). No juniper present.
PJ	Pinyon-Juniper	Major components of the site (Phase III ¹). Pinyon and Juniper present.
POTR	Quaking Aspen	POTR provides the dominant overstory (typically >5% cover).
POTR-CE	Quaking Aspen-Conifer Encroached	Mixture of QUGA and Conifers (conifers typically provide >5% cover).
PIPO	Ponderosa Pine	PIPO provides the dominant overstory (typically >5% cover).
PSMEM	Douglas Fir	Major component of the site (typically >5% cover).
ABCO	White Fir	Major component of the site (typically >5% cover).
PIFL	Limber Pine	Major component of the site (typically >5% cover).
PICO	Lodgepole Pine	Major component of the site (typically >5% cover).
PILO	Bristlecone Pine	Major component of the site (typically >5% cover).
PIEN	Engelmann Spruce	Major component of the site (typically >5% cover).
ABLA	Subalpine Fir	Major component of the site (typically >5% cover).
SUBALP	Subalpine Forest	Mixture of PIEN and ABLA provide the dominant vegetation cover
MIX CON	Mixed Conifer Forest	Mixture of conifer tree species provide the dominant vegetation cover
AG-PAST	Agricultural-Pasture	Active or abandoned agricultural pasture
AG-CL	Agricultural-Cropland	Active or abandoned agricultural cropland
*Vegetation types can be co-dominant on the study site and when more than one vegetation community types are co-dominant and are major components of the site a (/) is used to separate vegetation community types.		
¹ Phase of woodland succession		