

# UTAH WATERSHED RESTORATION INITIATIVE VEGETATION MONITORING 2018



PUBLICATION NUMBER 19-14  
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 2018

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Cover Photo Credit

“Docking on Dock”  
Lepidopteran and Dock (*Rumex sp.*) Jason Cox (2018)

Performance Report for Federal Aid Project W-82-R-63

Publication No. 19-14

UTAH DEPARTMENT OF NATURAL RESOURCES  
Division of Wildlife 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.

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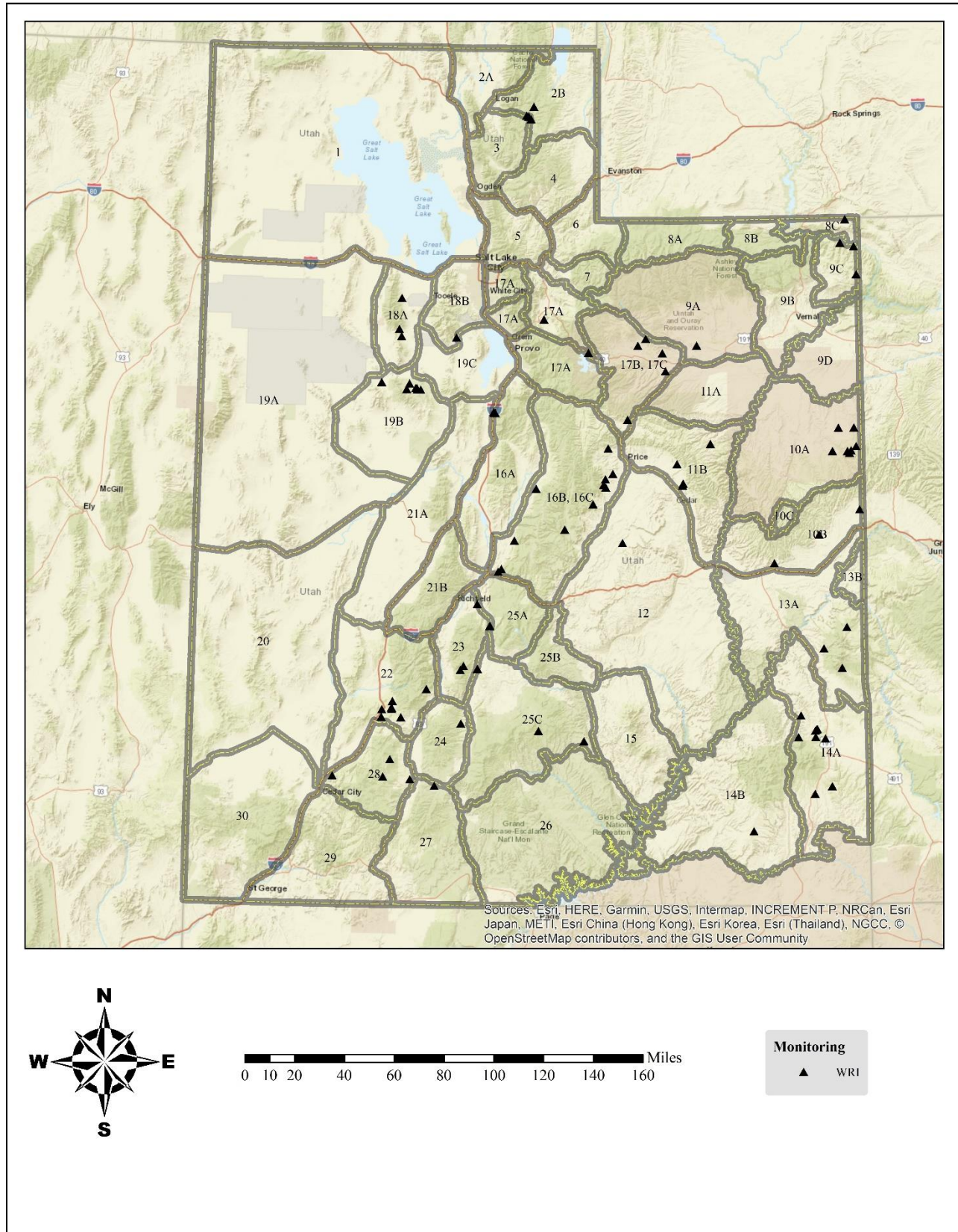
## REMARKS

The work completed during the 2018 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 2018



## RANGE TREND STUDY METHODS

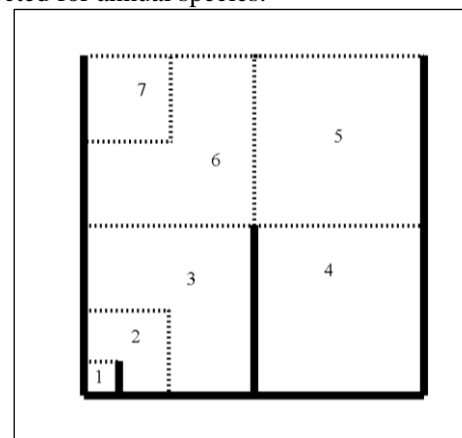
Studies monitoring range trend depend greatly on site selection, especially when dealing with large geographic areas such as wildlife management units. Since it is impossible to intensively monitor all vegetation or habitat types within a unit, it is necessary to concentrate on specific sites and/or “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 m<sup>2</sup> quadrat is centered every 5 feet along the same side of the belt, starting at the 5-foot mark. Cover and nested frequency values are determined for vegetation, litter, rock, pavement, cryptogams, and bare ground. Cover and nested frequency values are also estimated for all plant species occurring within a quadrat, including annual species. However, prior to 1992 no data was collected for annual species.

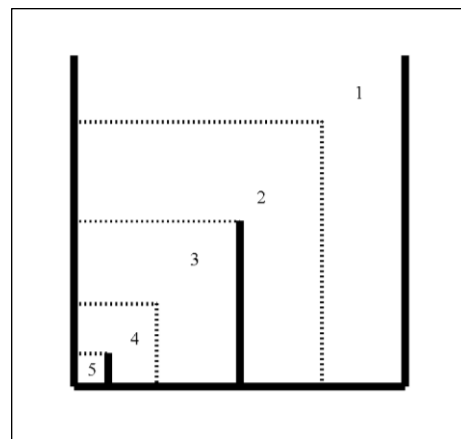
**Percent Cover:** Cover is determined using an ocular cover estimation procedure using seven cover classes (Bailey and Poulton 1968, Daubenmire 1959). The seven cover classes are: 1) .01-1%, 2) 1.1-5%, 3) 5.1-25%, 4) 25.1-50%, 5) 50.1-75%, 6) 75.1-95%, and 7) 95.1-100% (Figure 1). For example, to estimate vegetation cover with this method, an observer would visualize which cover class all the vegetation would fit into if the plants were moved together until they were touching. To quantify percent cover for bare ground, litter, rock, pavement, and cryptogams, the observer would visually estimate which cover class could accommodate all of the specified cover type within the quadrat. These numbers are then recorded. To determine percent cover for each belt, the midpoint for each cover class value observed is summed and divided by the number of sampling quadrats (20). The mean for the five belts is the percent cover for a given site.



**Figure 1** Cover classes of the 1/4 m<sup>2</sup> sampling quadrat

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

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



**Figure 2** Nested frequency sub-quadrats of the 1/4 m<sup>2</sup> 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) 100ft<sup>2</sup> 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 m<sup>2</sup> 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 1/4m<sup>2</sup> 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 100ft<sup>2</sup> 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 <sup>i</sup> (crested wheatgrass)	Bromus briziformis <sup>ai</sup> (rattlesnake brome)	Bromus tectorum <sup>ai</sup> (cheatgrass)	Elymus elymoides (squirreltail)	Elymus lanceolatus (thickspike wheatgrass)	Hesperostipa comata (needle and thread)	Poa fendleriana (nuttongrass)	Poa secunda (Sandberg bluegrass)	Sporobolus cryptandrus (sand dropseed)	Vulpia octoflora <sup>a</sup> (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 <sup>ai</sup> (pale madwort)	Androsace septentrionalis <sup>a</sup> (pygmyflower rockjasmine)	Astragalus (milkvetch)	Calochortus nuttallii (sego Lily)	Chaenactis (pincushion)	Chenopodium leptophyllum <sup>a</sup> (narrowleaf goosefoot)	Cleome serrulata <sup>a</sup> (Rocky Mountain beaplant)	Collinsia parviflora <sup>a</sup> (maiden blue eyed Mary)	Cryptantha <sup>a</sup> (annual cryptantha)	Cryptantha (cryptantha)	Descurainia pinnata <sup>a</sup> (western tansymustard)	Draba <sup>a</sup> (draba)	Erigeron pumilus (shaggy fleabane)	Eriogonum cernuum <sup>a</sup> (nodding buckwheat)	Gilia <sup>a</sup> (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 (%)			
	Artemisia tridentata ssp. wyomingensis <sup>p</sup> (Wyoming big sagebrush)	Chrysothamnus viscidiflorus ssp. viscidiflorus (yellow rabbitbrush)	Linanthus pungens (granite prickly phlox)	Opuntia (pricklypear)
year	Line Intercept Cover (%)			
1995	-	-	-	-
2000	-	-	-	-
2005	20.1	0.8	-	-
2010	17.6	0.4	-	0.2
2015	-	-	-	-
year	Quadrat Cover (%)			
1995	21.2	4.0	0.1	-
2000	20.0	2.1	-	-
2005	14.8	0.2	-	0.0
2010	16.3	0.0	-	0.2
2015	-	-	-	-

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

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

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

Year	Density		Age Class Distribution			Utilization		Poor Vigor (%)	Average Height Crown (cm)
	Plants Per Acre		Excluding Seedlings			Moderate (%)	Heavy (%)		
	Excluding	Seedling	Young	Mature (%)	Decadent (%)				
Artemisia tridentata ssp. wyomingensis <sup>p</sup> -- (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).

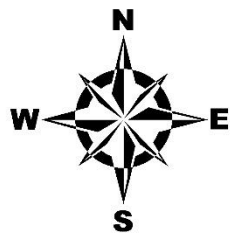
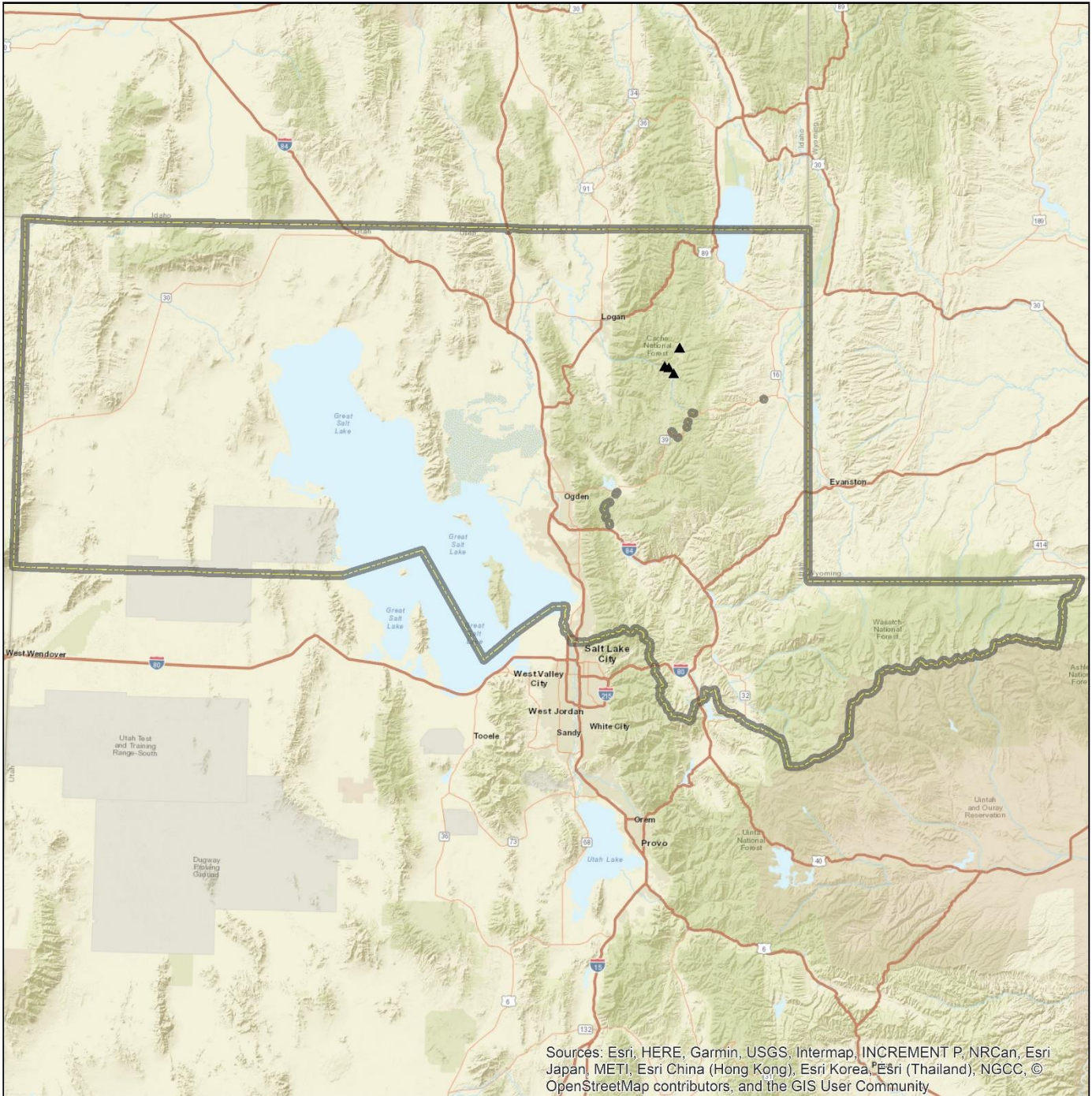
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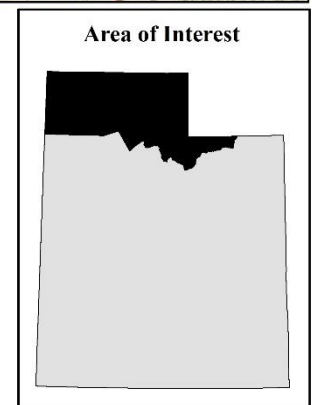
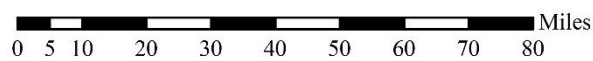


# NORTHERN REGION

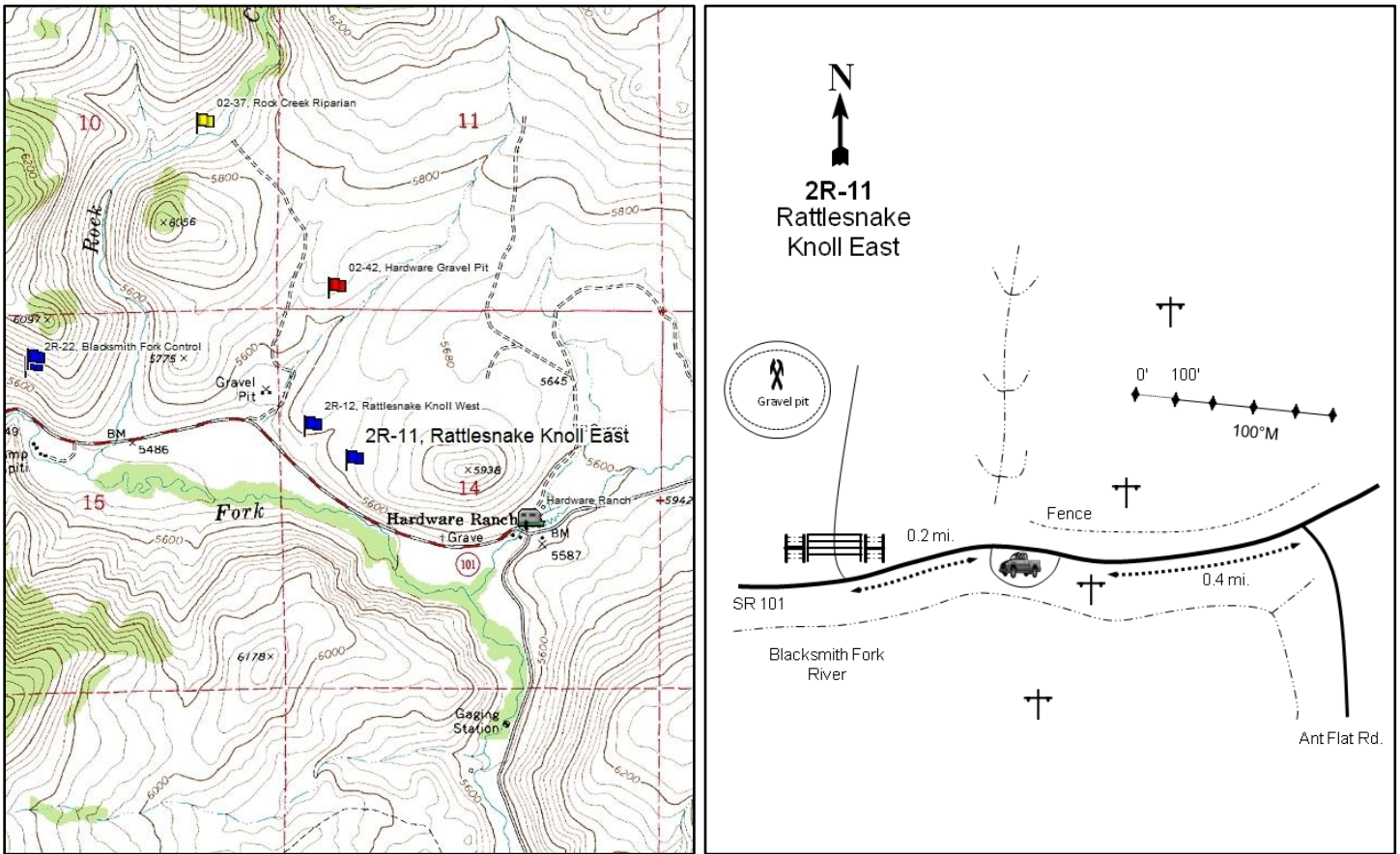


**Project**

- ▲ WRI
- ▭ Northern Region Boundaries



## RATTLESNAKE KNOLL EAST - STUDY NO. 02R-11



### Location Information

USGS 7.5 min Map Info  
GPS (0' Stake)

Hardware Ranch NW; Township 10N, Range 3E, Section 14  
NAD 83 UTM ZONE 12, 452039 East 4605999 North

### Transect Information

Browse Tag # (0' Stake)	190
Transect Bearing	85° 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 Hardware Ranch, drive west on SR-101 to where the powerlines cross the road, then park. From the powerpole on the south side of the road, walk about 400 feet at 50 degrees magnetic to the 0-foot stake, which is marked with browse tag #190.



**Site Information**

Land Ownership	State
Land Administrator	UDWR
Allotment	No data
Elevation	5,639ft (1,719m)
Aspect	Southwest
Slope	19%
Sample Dates	04/15/2005, 07/23/2013, 07/26/2018

**Table 02R-11.1 Disturbance History.** Recorded history of major disturbances.

Treatment/Disturbance	Name	WRI DB#	Date	Size (acres)
Grazing - Intensive Grazing	Hardware Grazing Project	PDB	April-September 2005	-

**Wildlife Habitat and Vegetation History****Table 02R-11.3 - Wildlife Seasonal Habitat.** UDWR wildlife habitat and seasonality.

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

**Table 02R-11.4 - Vegetation History.** The dominant vegetation type(s) and phase of woodland succession (Tausch, Miller, Roundy, & Chambers, 2009).

Year	Vegetation Type	Woodland Succession
2005	Annual-Perennial Weed/Bitterbrush	Phase I
2013	Annual-Perennial Weed/Bitterbrush	Phase I
2018	Annual-Perennial Weed/Bitterbrush	Phase I

**Site Notes**

This study was established on Hardware Ranch to monitor a prescribed grazing project; the purpose of the project was to control cheatgrass and improve shrubs and beneficial grasses. After this study site was established, an enclosure was built around it to prevent cattle grazing. The comparison site, Rattlesnake Knoll West (02R-12), was established about 750 feet northwest of this site. Both little sagebrush (*Artemisia arbuscula*) and bitterbrush (*Purshia tridentata*) received heavy utilization in 2005.

**Soils****Table 02R-11.5 - Soil Analysis Data.** List of chemical and textural soil characteristics determined by laboratory analysis.

Texture	pH	%sand	%silt	%clay	%OM	PPM P	PPM K	ds/m	Sample Date
Sandy Loam	6.7	52.2	28.0	19.8	1.4	16.5	182.4	0.5	04/15/2005

**Site Potential**

1981 - 2010 Average Annual Precipitation	20 inches
NRCS Ecological Site	Mountain Shallow Loam (Low Sagebrush)
NRCS Ecological Site #	047XA442UT
States and Transitions	No state and transition model is available for this ecological site.

Since study establishment in 2005, the site has fluctuated in an annual-perennial grass and forb state. Annual grass cover has increased steadily, with flushes of both field brome (*Bromus arvensis*) and cheatgrass (*B. tectorum*) in 2018. In addition, the introduced annual grass and noxious weed medusahead (*Taeniatherum caput-medusae*) was sampled for the first time in 2018. Perennial grass cover has shown an increasing trend. However, some of this perennial grass cover has been provided by the introduced species bulbous bluegrass (*Poa bulbosa*) (Table 02R-11.10). Perennial forbs have increased in cover, while annual forbs have generally decreased (Table 02R-11.7); the dominant perennial forb in the most recent sample year was mules-ears (*Wyethia amplexicaulis*) and the dominant annual was the undesirable species redstem stork's bill (*Erodium cicutarium*) (Table 02R-11.11). Shrub cover has remained stable or displayed slight increases. Antelope bitterbrush (*Purshia tridentata*) has increased in cover, but density has remained stable. Little sagebrush (*Artemisia arbuscula*) has fluctuated in cover, but decreased steadily in density (Table 02R-11.12, Table 02R-11.13). Both Utah juniper (*Juniperus osteosperma*) and Rocky Mountain juniper (*J. scopulorum*) are both present as mature trees in low numbers as of 2018 (Table 02R-11.14).



**Trend Summary Tables****Table 02R-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
2005	5.7	0.2	-	6.9	0.3	-
2013	4.7	0.2	-	4.7	0.2	-
2018	6.1	0.8	-	10.4	1.1	-

**Table 02R-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
2005	241	270	430	169	8.1	10.5	25.0	3.9
2013	393	311	347	161	10.5	8.7	5.8	9.3
2018	451	267	335	176	26.5	11.2	11.8	10.4

**Table 02R-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
2005	15.8	0.7	11.8	2.8	23.2	57.9
2013	11.4	-	24.4	2.1	20.6	43.7
2018	5.4	0.3	44.0	3.2	24.2	60.8

**Table 02R-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/Domestic Sheep	Rocky Mountain Elk	Rabbit
	Quadrat Frequency			
2005	-	18	4	-
2013	3	6	4	1
2018	-	4	-	1
Days Use Per Acre (ha)				
2005	-	42.2 (104.3)	3.4 (8.3)	-
2013	5.1 (12.6)	32.8 (81.1)	7.4 (18.2)	-
2018	0.7 (1.8)	4.0 (9.9)	0.7 (1.7)	-

**Table 02R-11.10 - Grass Species.** Nested frequency and modified Daubenmire average cover by year.

GRASS SPECIES	Bromus arvensis <sup>ai</sup> (field brome)	Bromus briziformis <sup>ai</sup> (rattlesnake brome)	Bromus tectorum <sup>ai</sup> (cheatgrass)	Deschampsia danthonioides <sup>a</sup> (annual hairgrass)	Leucopoa kingii (spike fescue)	Pascopyrum smithii (western wheatgrass)	Phleum pratense <sup>i</sup> (timothy)	Poa bulbosa <sup>i</sup> (bulbous bluegrass)	Poa fendleriana (muttongrass)	Poa pratensis <sup>i</sup> (Kentucky bluegrass)	Poa secunda (Sandberg bluegrass)	Pseudoroegneria spicata (bluebunch wheatgrass)	Sporobolus cryptandrus (sand dropseed)	Taeniatherum caput-medusae <sup>ai</sup> (medusahead)
year	Nested Frequency													
2005	-	-	241	-	-	1	-	-	139	-	-	179	-	-
2013	144	2	370	-	-	15	-	154	78	3	115	44	-	-
2018	259	38	327	13	11	14	4	153	15	18	108	35	4	14
year	Average Cover (%)													
2005	-	-	8.1	-	-	0.0	-	-	3.4	-	-	7.1	-	-
2013	0.7	0.0	9.7	-	-	0.1	-	4.3	1.9	0.0	1.5	0.8	-	-
2018	12.6	0.4	12.6	0.6	1.0	0.7	0.0	4.8	0.3	0.8	2.1	1.3	0.2	0.4

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

**Table 02R-11.11 - Forb Species.** Nested frequency and modified Daubenmire average cover by year.

FORB SPECIES	Achillea millefolium (Common yarrow)	Agoseris glauca (pale agoseris)	Alyssum desertorum <sup>ai</sup> (desert madwort)	Annual Forb <sup>a</sup> (null)	Artemisia ludoviciana (white sagebrush)	Astragalus (milkvetch)	Camelina microcarpa <sup>ai</sup> (littledod false flax)	Ceratocephala testiculata <sup>ai</sup> (curveseed butterwort)	Cirsium (thistle)	Collinsia parviflora <sup>a</sup> (maiden blue eyed Mary)	Collomia linearis <sup>a</sup> (tiny trumpet)	Crepis acuminata (tapertip hawksbeard)	Descurainia pinnata <sup>a</sup> (western tansymustard)	Draba <sup>a</sup> (draba)	Epilobium brachycarpum <sup>a</sup> (tall annual willowherb)	Erigeron pumilus (shaggy fleabane)	Eriogonum brevicaulle (shortstem buckwheat)
year	Nested Frequency																
2005	6	23	-	427	9	-	-	-	-	-	-	4	-	-	-	-	-
2013	5	16	44	-	10	5	1	80	2	20	19	-	3	10	84	3	9
2018	3	13	65	-	21	3	-	5	0	9	11	-	-	-	34	-	3
year	Average Cover (%)																
2005	0.0	0.2	-	24.3	0.5	-	-	-	-	-	-	0.0	-	-	-	-	-
2013	0.0	0.1	0.1	-	0.5	0.0	0.0	0.2	0.1	0.1	0.1	-	0.0	0.0	0.2	0.0	0.0
2018	0.1	0.1	0.2	-	0.3	0.0	-	0.0	0.0	0.0	0.0	-	-	-	0.1	-	0.0

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

FORB SPECIES																	
Eriogonum umbellatum (sulphur-flower buckwheat)																	
Erodium cicutarium <sup>ai</sup> (redstem stork's bill)																	
Gayophytum ramosissimum <sup>a</sup> (pinyon groundsmoke)																	
Grindelia squarrosa (curlycup gumweed)																	
Hackelia patens (spotted stickseed)																	
Lactuca serriola <sup>ai</sup> (prickly lettuce)																	
Lomatium (desertparsley)																	
Lupinus argenteus (silvery lupine)																	
Madia glomerata <sup>a</sup> (mountain tarweed)																	
Melilotus officinalis <sup>i</sup> (sweetclover)																	
Microsteris gracilis <sup>a</sup> (slender phlox)																	
Phlox longifolia (longleaf phlox)																	
Polygonum douglasii <sup>a</sup> (Douglas' knotweed)																	
Silene antirrhina <sup>a</sup> (sleepy silene)																	
Symphotrichum (aster)																	
Tragopogon dubius <sup>ai</sup> (yellow salsify)																	
Wyethia amplexicaulis (mule-ears)																	
year	Nested Frequency																
2005	1	-	-	-	-	-	99	-	-	-	-	-	-	-	-	40	60
2013	4	275	-	3	-	1	58	2	-	-	3	7	14	186	36	46	77
2018	-	308	5	3	5	3	72	-	1	4	-	-	1	6	37	16	67
year	Average Cover (%)																
2005	0.0	-	-	-	-	-	2.3	-	-	-	-	-	-	-	-	0.6	0.9
2013	0.0	3.9	-	0.0	-	0.0	1.6	0.0	-	-	0.0	0.0	0.0	0.9	0.8	0.3	6.2
2018	-	11.2	0.0	0.0	0.0	0.0	1.9	-	0.0	0.0	-	-	0.0	0.0	1.2	0.1	6.8

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

**Table 02R-11.12 - Shrub and Tree Species.** Average modified Daubenmire quadrat and line intercept cover by year.

SHRUB SPECIES				
Artemisia arbuscula <sup>p</sup> (little sagebrush)				
Chrysothamnus viscidiflorus (yellow rabbitbrush)				
Gutierrezia sarothrae (broom snakeweed)				
Purshia tridentata <sup>p</sup> (antelope bitterbrush)				
year	Line Intercept Cover (%)			
2005	0.3	0.3	-	6.6
2013	0.6	-	0.2	4.1
2018	0.2	-	1.1	10.2
year	Quadrat Cover (%)			
2005	0.9	0.2	-	4.8
2013	0.2	-	0.2	4.4
2018	0.5	-	0.8	5.6

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

**Table 02R-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.

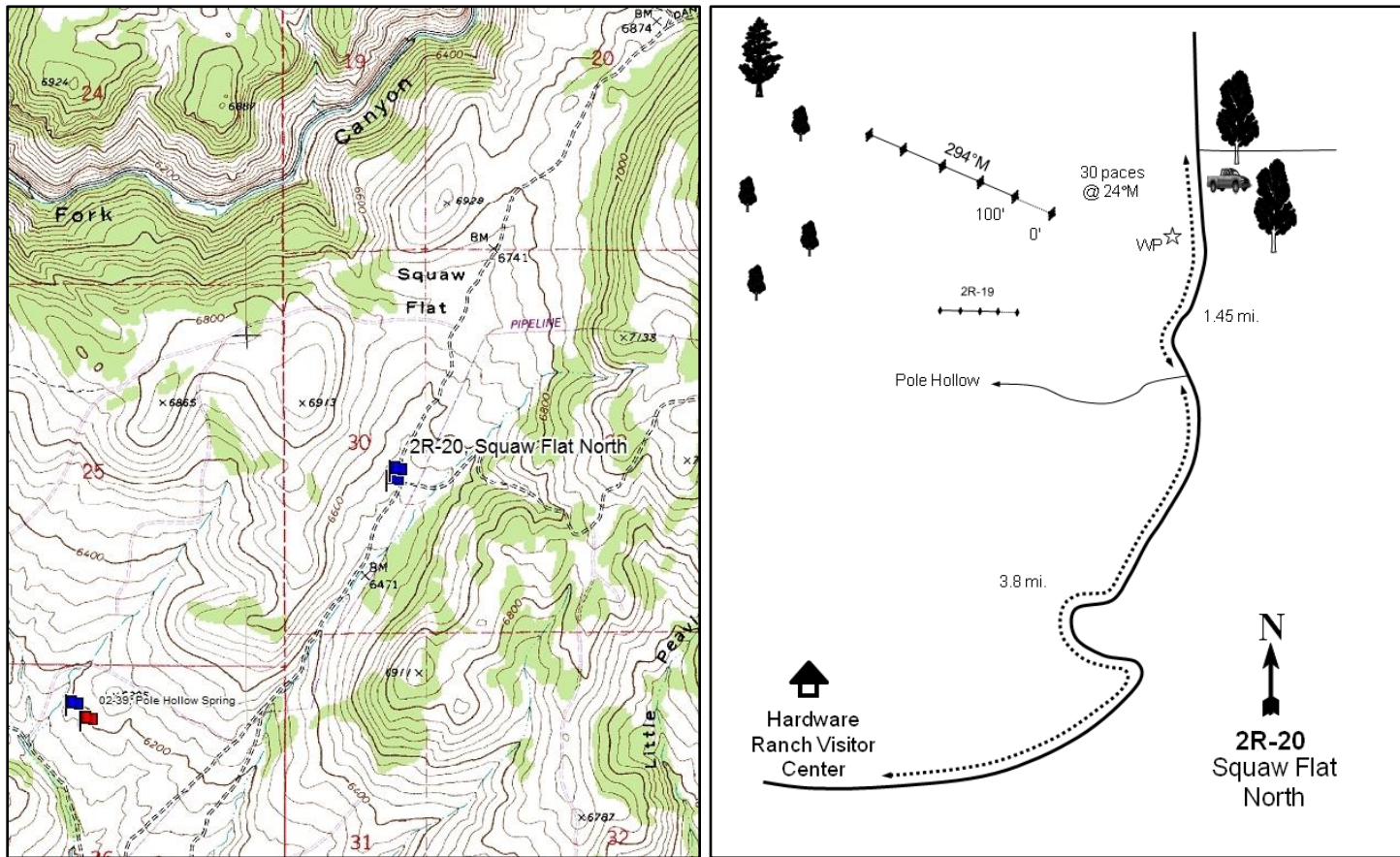
Year	Density		Age Class Distribution			Utilization		Poor Vigor (%)	Average Height Crown (cm)
	Plants Per Acre		Excluding Seedlings			Moderate (%)	Heavy (%)		
	Excluding Seedlings	Seedling	Young (%)	Mature (%)	Decadent (%)				
<b>Artemisia arbuscula<sup>p</sup> -- (little sagebrush)</b>									
2005	1400	-	6	76	19	6	94	0	13/33
2013	400	-	0	85	15	45	50	35	21/42
2018	280	-	0	71	29	0	0	0	43/81
<b>Chrysothamnus viscidiflorus -- (yellow rabbitbrush)</b>									
2005	800	-	0	85	15	0	0	5	7/17
2013	-	-	-	-	-	-	-	-	38/37
2018	-	-	-	-	-	-	-	-	44/70
<b>Gutierrezia sarothrae -- (broom snakeweed)</b>									
2005	-	-	-	-	-	-	-	-	-/-
2013	1140	-	12	88	0	2	0	2	20/23
2018	980	-	0	100	0	0	0	0	26/32
<b>Prunus virginiana<sup>p</sup> -- (chokecherry)</b>									
2005	-	-	-	-	-	-	-	-	-/-
2013	-	-	-	-	-	-	-	-	34/36
2018	-	-	-	-	-	-	-	-	-/-
<b>Purshia tridentata<sup>p</sup> -- (antelope bitterbrush)</b>									
2005	1080	-	0	100	0	0	100	0	51/105
2013	820	-	5	88	7	29	39	29	54/127
2018	1040	-	14	87	0	44	25	0	67/144

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

**Table 02R-11.14 - Tree Characteristics.** Point-quarter tree density, size class distribution, and average diameter.

Year	Density	Size Class Distribution					Average Diameter (cm)
	Trees per Acre	Seedling (%)	1-4' (%)	4-8' (%)	8-12' (%)	>12' (%)	
<b>Juniperus osteosperma (Utah juniper)</b>							
2018	4	-	-	-	-	100	48.0
<b>Juniperus scopulorum (Rocky Mountain juniper)</b>							
2018	10	-	-	-	-	100	28.0

## SQUAW FLAT NORTH - STUDY NO. 02R-20



### Location Information

USGS 7.5 min Map Info  
GPS (0' Stake)

Boulder Mountain SE; Township 11N, Range 4E, Section 30  
NAD 83 UTM ZONE 12, 455452 East 4612274 North

### Transect Information

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

158  
294° magnetic  
400ft  
Line 1 (11ft & 95ft), Line 2 (34ft), Line 3 (59ft), Line 4 (71ft)  
Standard

### Directions to Site

From Hardware Ranch, travel northeast for 3.8 miles to the Pole Hollow Road. From there, stay straight for another 1.4 miles to a witness post on the left (west) side of the road. Park next to the stand of large cottonwoods on the right (east) side of the road. From the witness post walk 30 paces at 24 degrees magnetic to the 0-foot stake which is marked with browse tag #158.

**Site Information**

Land Ownership	State
Land Administrator	UDWR
Allotment	No data
Elevation	6,563ft (2,000m)
Aspect	East
Slope	10-14%
Sample Dates	07/13/2006, 07/23/2013, 07/26/2018

**Table 02R-20.1 Disturbance History.** Recorded history of major disturbances.

Treatment/Disturbance	Name	WRI DB#	Date	Size (acres)
Grazing - Intensive Grazing	Hardware Grazing Project	PDB	April-September 2005	-

**Wildlife Habitat and Vegetation History****Table 02R-20.3 - 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 & Winter	brood-rearing
Moose	crucial	winter	

**Table 02R-20.4 - Vegetation History.** The dominant vegetation type(s) and phase of woodland succession (Tausch, Miller, Roundy, & Chambers, 2009).

Year	Vegetation Type	Woodland Succession
2006	Low Sagebrush	Phase I
2013	Low Sagebrush	Phase I
2018	Low Sagebrush	Phase I

**Site Notes**

This site was established as part of an intensive grazing project conducted on Hardware Ranch to improve browse composition. The purpose of this grazing project was to intensively graze the mule's ear (*Wyethia amplexicaulis*), grasses, and stimulate the growth of browse species. As of 2013, the enclosure fence was knocked down. There is a road below the site with additional four wheeler trails in the area.

**Site Potential**

1981 - 2010 Average Annual Precipitation	26 inches
NRCS Ecological Site	Mountain Shallow Loam (Low Sagebrush)
NRCS Ecological Site #	R047XA442UT
States and Transitions	No state and transition model is available for this ecological site.

Since the time of establishment in 2006, this study site has been a little sagebrush (*Artemisia arbuscula*) and bulbous bluegrass (*Poa bulbosa*) co-dominated site. The primary browse species has been little sagebrush (*Artemisia arbuscula*) which has exhibited very slight decreases in both cover and density since establishment. Perennial grasses have remained moderately diverse, although species besides bulbous bluegrass (*Poa bulbosa*) and bluebunch wheatgrass (*Pseudoroegneria spicata*) contribute little cover as of 2018 (Table 02R-20.10). The undesirable species bulbous bluegrass has been the dominant species in all years, with cover averaging over twenty percent throughout the duration of the study period (Table 02R-20.10). Forbs are moderately diverse as of 2018, but species other than the undesirable native mules-ears (*Wyethia amplexicaulis*) provide little cover (Table 02R-20.7, Table 02R-20.11). Rocky Mountain juniper (*Juniperus scopulorum*) has been present since site establishment in low densities (Photos, Table 02R-20.14). This site will likely remain in the current state in the absence of a future disturbance or treatment.

**Trend Summary Tables****Table 02R-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
2006	20.7	-	-	22.4	-	-
2013	15.7	-	-	21.0	-	-
2018	19.4	-	-	20.4	-	-

**Table 02R-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
2006	-	456	39	184	-	34.9	0.8	11.0
2013	-	438	39	175	-	24.9	0.2	12.8
2018	6	443	177	212	0.0	39.5	2.5	22.9

**Table 02R-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
2006	3.2	1.1	21.4	1.3	26.2	63.3
2013	0.7	0.3	25.2	0.1	26.8	58.6
2018	1.0	0.1	47.4	0.4	26.8	69.3

**Table 02R-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	Rabbit
	Quadrat Frequency			
2006	2	2	2	-
2013	1	1	1	1
2018	-	1	-	-
Year	Days Use Per Acre (ha)			
2006	5.1 (12.6)	2.0 (5.0)	5.3 (13.2)	-
2013	5.8 (14.3)	10.0 (24.8)	6.0 (14.9)	-
2018	0.7 (1.8)	4.0 (9.9)	0.7 (1.7)	-

**Table 02R-20.10 - Grass Species.** Nested frequency and modified Daubenmire average cover by year.

GRASS SPECIES													
Achnatherum (needlegrass)													
Achnatherum lettermanii (Letterman's needlegrass)													
Bromus arvensis <sup>ai</sup> (field brome)													
Elymus elymoides (squirreltail)													
Elymus trachycaulus (slender wheatgrass)													
Hordeum (barley)													
Melica bulbosa (oniongrass)													
Poa bulbosa <sup>i</sup> (bulbous bluegrass)													
Poa fendleriana (muttongrass)													
Poa pratensis <sup>i</sup> (Kentucky bluegrass)													
Poa secunda (Sandberg bluegrass)													
Pseudoroegneria spicata (bluebunch wheatgrass)													
year	Nested Frequency												
2006	-	63	-	-	0	-	47	401	2	1	139	143	
2013	-	69	-	6	-	-	1	411	-	3	61	120	
2018	38	48	6	-	10	3	19	403	15	2	69	157	
year	Average Cover (%)												
2006	-	1.7	-	-	0.0	-	1.4	24.9	0.0	0.0	4.1	2.7	
2013	-	0.9	-	0.0	-	-	0.0	20.5	-	0.0	0.9	2.6	
2018	0.7	1.7	0.0	-	0.3	0.0	0.1	27.5	0.0	0.0	0.9	8.2	

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

**Table 02R-20.11 - Forb Species.** Nested frequency and modified Daubenmire average cover by year.

FORB SPECIES																		
Achillea millefolium (Common yarrow)																		
Agoseris glauca (pale agoseris)																		
Allium (onion)																		
Collinsia parviflora <sup>a</sup> (maiden blue eyed Mary)																		
Collomia linearis <sup>a</sup> (tiny trumpet)																		
Delphinium nuttallianum (twolobe larkspur)																		
Draba <sup>a</sup> (draba)																		
Epilobium brachycarpum <sup>a</sup> (tall annual willowherb)																		
Erigeron divergens <sup>a</sup> (spreading fleabane)																		
Erodium cicutarium <sup>ai</sup> (redstem stork's bill)																		
Gayophytum ramosissimum <sup>a</sup> (pinyon groundsmoke)																		
Lactuca serriola <sup>ai</sup> (prickly lettuce)																		
Lomatium (desertparsley)																		
Madia glomerata <sup>a</sup> (mountain tarweed)																		
Phlox longifolia (longleaf phlox)																		
Polygonum douglasii <sup>a</sup> (Douglas' knotweed)																		
Silene antirrhina <sup>a</sup> (sleepy silene)																		
year	Nested Frequency																	
2006	21	20	8	-	-	3	-	16	1	-	-	-	-	24	-	-	2	
2013	14	13	-	-	1	-	7	18	7	-	-	-	-	16	-	-	-	
2018	31	20	16	2	50	3	13	28	84	3	1	11	2	30	4	4	-	
year	Average Cover (%)																	
2006	0.3	0.1	0.0	-	-	0.0	-	0.1	0.0	-	-	-	-	0.7	-	-	0.0	
2013	0.1	0.1	-	-	0.0	-	0.0	0.1	0.0	-	-	-	-	0.1	-	-	-	
2018	1.0	0.3	0.1	0.0	0.2	0.0	0.1	0.2	1.5	0.0	0.0	0.0	0.0	0.3	0.0	0.0	-	

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



FORB SPECIES				
	Symphotrichum (aster)	Symphotrichum ascendens (western aster)	Tragopogon dubius <sup>ai</sup> (yellow salsify)	Wyethia amplexicaulis (mule-ears)
year	Nested Frequency			
2006	-	20	-	146
2013	9	17	-	152
2018	3	33	9	154
year	Average Cover (%)			
2006	-	0.2	-	10.3
2013	0.0	0.1	-	12.6
2018	0.0	0.7	0.1	20.9

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

**Table 02R-20.12 - Shrub and Tree Species.** Average modified Daubenmire quadrat and line intercept cover by year.

SHRUB SPECIES		
	Amelanchier utahensis <sup>p</sup> (Utah serviceberry)	Artemisia arbuscula <sup>p</sup> (little sagebrush)
year	Line Intercept Cover (%)	
2006	0.5	21.9
2013	0.6	20.4
2018	0.7	19.7
year	Quadrat Cover (%)	
2006	0.0	20.7
2013	0.0	15.7
2018	0.0	19.4

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

**Table 02R-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.

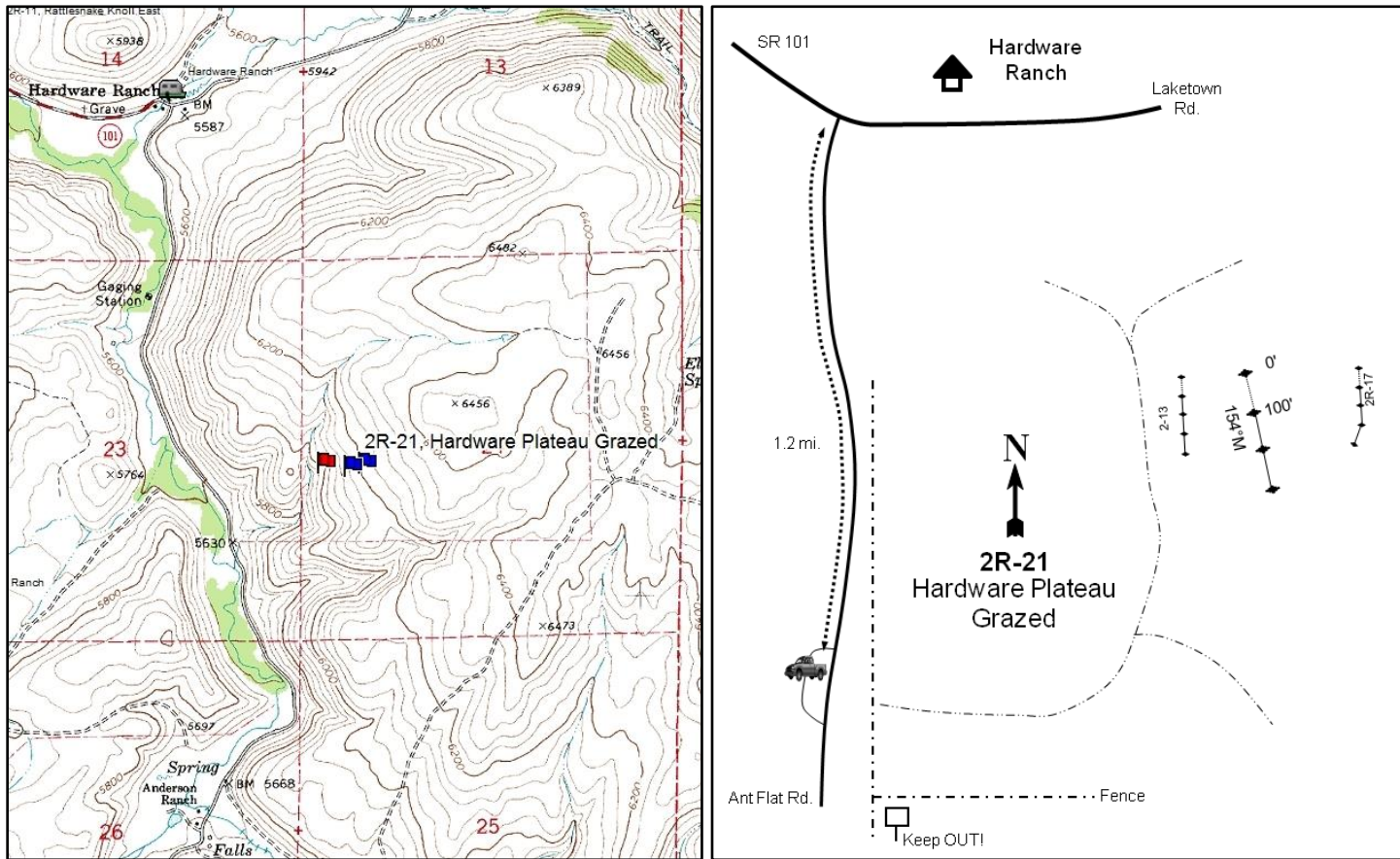
Year	Density		Age Class Distribution			Utilization		Poor Vigor (%)	Average Height Crown (cm)
	Plants Per Acre		Excluding Seedlings			Moderate (%)	Heavy (%)		
	Excluding Seedlings	Seedling	Young (%)	Mature (%)	Decadent (%)				
<b>Amelanchier utahensis<sup>p</sup> -- (Utah serviceberry)</b>									
2006	60	-	0	100	0	100	0	0	62/94
2013	20	-	0	100	0	0	100	0	69/121
2018	60	-	33	67	0	0	0	0	60/75
<b>Artemisia arbuscula<sup>p</sup> -- (little sagebrush)</b>									
2006	10980	620	3	77	20	5	0	16	25/48
2013	10020	120	2	93	5	39	8	52	24/53
2018	10040	120	5	74	21	14	0	9	30/48
<b>Chrysothamnus viscidiflorus ssp. viscidiflorus var. viscidiflorus -- (yellow rabbitbrush)</b>									
2006	-	-	-	-	-	-	-	-	23/35
2013	-	-	-	-	-	-	-	-	-/-
2018	100	-	0	100	0	0	0	0	-/-
<b>Juniperus scopulorum<sup>t</sup> -- (Rocky Mountain juniper)</b>									
2006	20	-	100	0	0	0	0	0	-/-
2013	-	-	-	-	-	-	-	-	-/-
2018	-	-	-	-	-	-	-	-	-/-
<b>Mahonia repens -- (creeping barberry)</b>									
2006	-	-	-	-	-	-	-	-	9/19
2013	-	-	-	-	-	-	-	-	-/-
2018	-	-	-	-	-	-	-	-	8/6
<b>Purshia tridentata<sup>p</sup> -- (antelope bitterbrush)</b>									
2006	-	-	-	-	-	-	-	-	45/118
2013	-	-	-	-	-	-	-	-	-/-
2018	-	-	-	-	-	-	-	-	55/179
<b>Symphoricarpos oreophilus<sup>p</sup> -- (mountain snowberry)</b>									
2006	-	-	-	-	-	-	-	-	41/79
2013	20	-	0	100	0	100	0	100	59/131
2018	-	-	-	-	-	-	-	-	47/92

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

**Table 02R-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' (%)	
<b>Juniperus scopulorum (Rocky Mountain juniper)</b>							
2018	10	-	100	-	-	-	17.0

## HARDWARE PLATEAU GRAZED - STUDY NO. 02R-21



### Location Information

USGS 7.5 min Map Info  
GPS (0' Stake)

Hardware Ranch NE; Township 10N, Range 3E, Section 24  
NAD 83 UTM ZONE 12, 453541 East 4604155 North

### Transect Information

Browse Tag # (0' Stake)	196
Transect Bearing	154° magnetic
Length	300ft
Belt Placement	Line 1 (11ft & 71ft), Line 2 (59ft), Line 3 (34ft & 95ft)
Belt Marker Placement	No Rebar

### Directions to Site

From Hardware Ranch, proceed south on the Ant Flat road for 1.2 miles. This mileage should end at a sign that reads: "Welcome to Hardware Ranch Game Management Area." Stop here. Walk up the bottom of the wash (to the east of the sign) for 365 paces, to the second very definite fork in the drainage. From the point where the wash divides, walk 32 paces at 80 degrees magnetic to the 0-foot stake for the Hardware Plateau site (02-13), marked by browse tag #7984. From there, walk approximately 175 paces at 78 degrees magnetic to the 0-foot stake for the Hardware Plateau Control site marked with a red browse tag #277. From here, the 0-foot stake is roughly 200 feet downhill and marked with browse tag #196.

**Site Information**

Land Ownership	State
Land Administrator	UDWR
Allotment	No data
Elevation	6,100ft (1,859m)
Aspect	Southwest-West
Slope	30%
Sample Dates	07/09/2007, 07/24/2013, 07/25/2018

**Table 02R-21.1 Disturbance History.** Recorded history of major disturbances.

Treatment/Disturbance	Name	WRI DB#	Date	Size (acres)
Grazing - Intensive Grazing	Hardware Grazing Project	PDB	April-September 2005	-

**Wildlife Habitat and Vegetation History**

**Table 02R-21.3 - 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	winter	

**Table 02R-21.4 - 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	Phase I
2013	Perennial Grass	Phase I
2018	Perennial Grass/Annual Grass	Phase I

**Site Notes**

This study was established 200 feet from the Hardware Plateau Control study (2R-17). Both Hardware Plateau studies were established as part of an intensive grazing project conducted on Hardware Ranch to improve browse composition. This study was noted as heavily grazed, while the control study was excluded from cattle grazing by an electric fence. The closest water source is a spring approximately one-quarter mile from the study.

**Site Potential**

1981 - 2010 Average Annual Precipitation	22 inches
NRCS Ecological Site	Mountain Shallow Loam (Mountain Big Sagebrush)
NRCS Ecological Site #	R047XA446UT
States and Transitions	No state and transition model is available for this ecological site.

Since study establishment in 2007, this site has remained in a perennial grass dominated state. Flushes of annual grasses and forbs have occurred during alternate sample years (Table 02R-21.7). Grass species are not diverse, but moderate cover is provided by native species. The dominant grass species since site establishment has been bluebunch wheatgrass (*Pseudoroegneria spicata*), although the introduced and undesirable species bulbous bluegrass (*Poa bulbosa*) became co-dominant in 2018 (Table 02R-21.10). The introduced annual grass cheatgrass (*Bromus tectorum*) provided little cover in 2007 and 2013, but increased in both cover and abundance in 2018 (Table 02R-21.10). Perennial forbs have remained moderate in both diversity and abundance with common yarrow (*Achillea millefolium*) as the most abundant species (Table 02R-21.11). Annual forbs, particularly the introduced species redstem stork's bill (*Erodium cicutarium*), have contributed significant amounts of cover in most sample years (Table 02R-21.11). Shrubs have provided little cover throughout the duration of the study period, with broom snakeweed (*Gutierrezia sarothrae*) contributing a majority of that cover. Preferred browse species include Utah serviceberry (*Amelanchier utahensis*) and little sagebrush (*Artemisia arbuscula*), though they have provided very little cover and density (Table 02R-21.12, Table 02R-21.13).

**Trend Summary Tables****Table 02R-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
2007	0.0	0.1	-	0.1	0.6	-
2013	-	0.2	-	-	0.8	-
2018	0.0	2.4	-	0.1	3.0	-

**Table 02R-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
2007	268	394	464	156	2.5	18.1	19.6	2.0
2013	183	384	424	167	1.4	27.5	6.1	3.1
2018	446	377	433	163	21.3	28.1	15.7	4.2

**Table 02R-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
2007	11.1	25.3	21.6	3.6	5.3	44.3
2013	6.8	22.9	22.8	1.4	5.8	46.2
2018	1.2	9.0	52.3	1.5	5.0	69.8

**Table 02R-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/Domestic Sheep	Rocky Mountain Elk	Rabbit
	Quadrat Frequency			
2007	10	35	33	12
2013	2	31	38	12
2018	1	13	9	-
Year	Days Use Per Acre (ha)			
2007	13.1 (32.3)	42.9 (105.9)	46.2 (114.2)	-
2013	0.7 (1.8)	3.4 (8.3)	8.7 (21.5)	-
2018	-	16.1 (39.7)	4.0 (9.9)	-

**Table 02R-21.10 - Grass Species.** Nested frequency and modified Daubenmire average cover by year.

GRASS SPECIES	Nested Frequency					
Bromus arvensis <sup>ai</sup> (field brome)	1	268	-	14	263	282
Bromus tectorum <sup>ai</sup> (cheatgrass)	16	181	19	153	224	278
Melica bulbosa (oniongrass)	125	437	21	191	199	274
Poa bulbosa <sup>i</sup> (bulbous bluegrass)	Average Cover (%)					
Poa secunda (Sandberg bluegrass)	0.0	2.5	-	0.4	5.5	12.2
Pseudoroegneria spicata (bluebunch wheatgrass)	0.1	1.3	0.3	6.3	4.6	16.2
	2.7	18.6	0.2	12.1	3.3	12.4

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

**Table 02R-21.11 - Forb Species.** Nested frequency and modified Daubenmire average cover by year.

FORB SPECIES	Nested Frequency																	
Achillea millefolium (Common yarrow)	69	43	3	141	1	-	2	66	2	123	139	-	12	319	20	1	398	
Agoseris glauca (pale agoseris)	53	33	3	102	-	3	-	41	-	289	224	-	-	189	138	-	117	
Allium (onion)	50	32	-	238	-	10	-	-	-	59	217	2	3	4	59	24	357	
Alyssum desertorum <sup>ai</sup> (desert madwort)	Average Cover (%)																	
Antennaria (pussytoes)	0.9	0.2	0.0	0.5	0.0	-	0.0	0.2	0.1	0.5	0.3	-	0.1	1.8	0.1	0.0	11.7	
Artemisia ludoviciana (white sagebrush)	1.3	0.1	0.0	0.3	-	0.1	-	0.1	-	1.2	0.8	-	-	0.7	0.8	-	1.1	
Astragalus (milkvetch)	1.6	0.2	-	1.7	-	0.5	-	-	-	0.2	1.1	0.0	0.0	0.0	0.4	0.1	10.7	
Ceratocephala testiculata <sup>ai</sup> (curveseed butterwort)																		
Cirsium (thistle)																		
Collinsia parviflora <sup>a</sup> (maiden blue eyed Mary)																		
Collomia linearis <sup>a</sup> (tiny trumpet)																		
Cryptantha <sup>a</sup> (annual cryptantha)																		
Descurainia pinnata <sup>a</sup> (western tansymustard)																		
Draba <sup>a</sup> (draba)																		
Epilobium brachycarpum <sup>a</sup> (tall annual willowherb)																		
Erigeron pumilus (shaggy fleabane)																		
Erodium cicutarium <sup>ai</sup> (redstem stork's bill)																		

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



FORB SPECIES											
Gayophytum ramosissimum <sup>a</sup> (pinyon groundsmoke)											
Gilia inconspicua <sup>a</sup> (shy gilia)											
Lactuca serriola <sup>ai</sup> (prickly lettuce)											
Lappula occidentalis <sup>ai</sup> (flatspine stickseed)											
Lomatium (desertparsley)											
Microsteris gracilis <sup>a</sup> (slender phlox)											
Polygonum douglasii <sup>a</sup> (Douglas' knotweed)											
Silene antirrhina <sup>a</sup> (sleepy silene)											
Symphotrichum (aster)											
Tragopogon dubius <sup>ai</sup> (yellow salsify)											
Wyethia amplexicaulis (mule-ears)											
year	Nested Frequency										
2007	29	-	12	89	47	34	7	377	24	7	4
2013	2	57	11	-	72	32	2	185	24	12	9
2018	26	2	136	4	41	-	-	38	40	66	5
year	Average Cover (%)										
2007	0.1	-	0.1	0.4	0.4	0.1	0.0	3.7	0.4	0.1	0.0
2013	0.0	0.2	0.1	-	1.2	0.1	0.0	0.6	0.2	0.2	0.1
2018	0.1	0.0	0.8	0.0	0.8	-	-	0.1	0.9	0.6	0.1

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

**Table 02R-21.12 - Shrub and Tree Species.** Average modified Daubenmire quadrat and line intercept cover by year.

SHRUB SPECIES			
Artemisia arbuscula <sup>p</sup> (little sagebrush)			
Artemisia tridentata ssp. vaseyana <sup>p</sup> (mountain big sagebrush)			
Gutierrezia sarothrae (broom snakeweed)			
year	Line Intercept Cover (%)		
2007	0.1	-	0.6
2013	-	-	0.8
2018	0.1	-	3
year	Quadrat Cover (%)		
2007	0.0	0.0	0.1
2013	-	-	0.2
2018	0.0	-	2.4

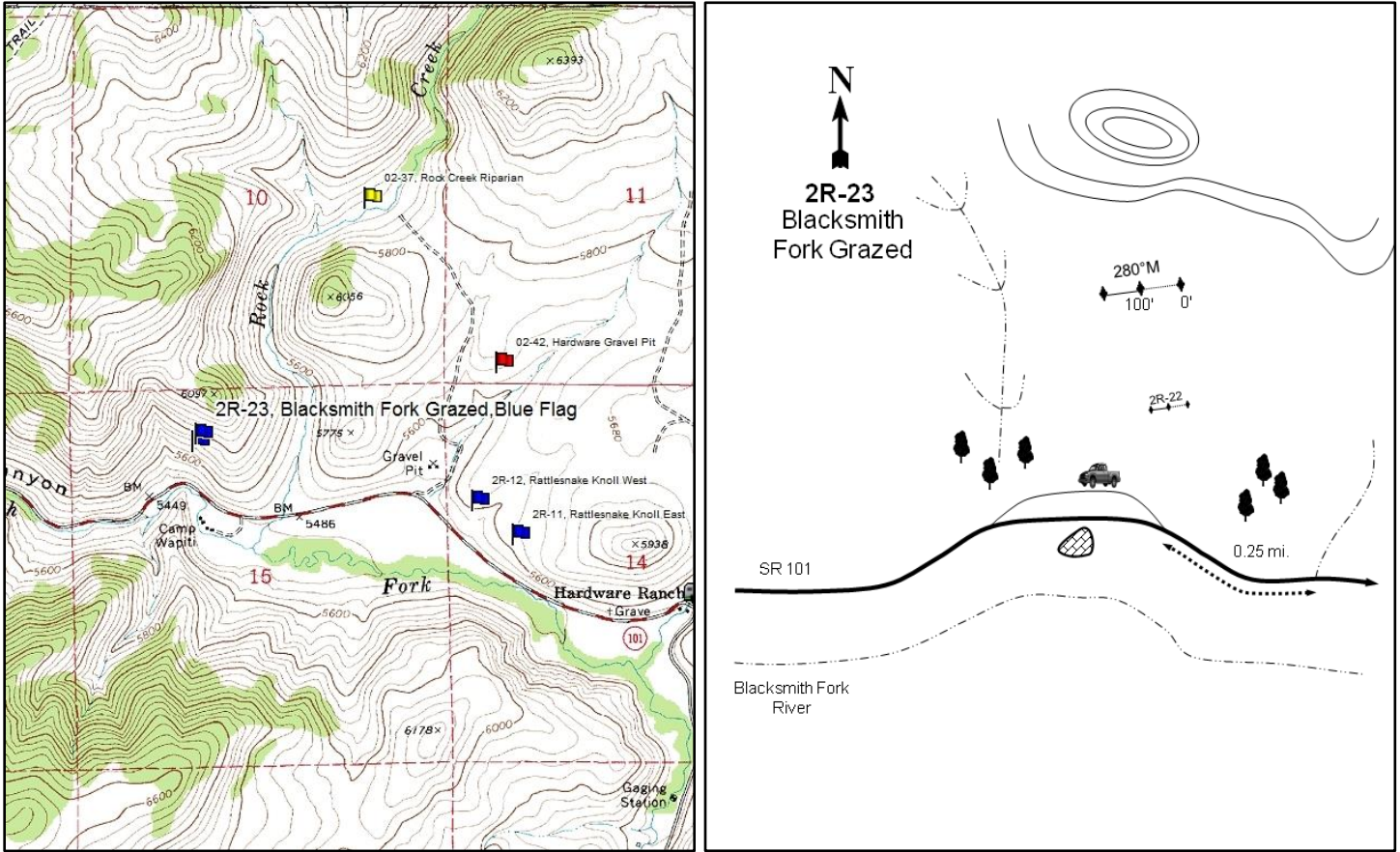
t - Tree Species; p - Preferred Browse; i - Introduced Species

**Table 02R-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 (%)				
<b>Amelanchier utahensis<sup>p</sup> -- (Utah serviceberry)</b>									
2007	20	-	0	100	0	0	100	0	43/53
2013	20	-	0	100	0	0	100	0	38/52
2018	20	-	0	100	0	100	0	0	53/72
<b>Artemisia arbuscula<sup>p</sup> -- (little sagebrush)</b>									
2007	60	-	0	100	0	100	0	0	25/53
2013	-	-	-	-	-	-	-	-	27/59
2018	40	-	0	50	50	0	0	50	27/43
<b>Artemisia tridentata ssp. vaseyana<sup>p</sup> -- (mountain big sagebrush)</b>									
2007	40	-	0	0	100	0	50	50	67/124
2013	-	-	-	-	-	-	-	-	66/73
2018	-	-	-	-	-	-	-	-	61/88
<b>Chrysothamnus viscidiflorus ssp. viscidiflorus var. viscidiflorus -- (yellow rabbitbrush)</b>									
2007	20	-	0	100	0	100	0	0	27/45
2013	20	-	0	100	0	0	0	0	19/21
2018	20	-	0	100	0	0	0	0	29/44
<b>Gutierrezia sarothrae -- (broom snakeweed)</b>									
2007	320	-	6	94	0	31	19	0	20/33
2013	1320	20	35	65	0	0	0	0	18/25
2018	2360	-	3	98	0	0	0	0	21/31
<b>Purshia tridentata<sup>p</sup> -- (antelope bitterbrush)</b>									
2007	-	-	-	-	-	-	-	-	50/104
2013	-	-	-	-	-	-	-	-	-/-
2018	-	-	-	-	-	-	-	-	109/170
<b>Sambucus racemosa<sup>p</sup> -- (red elderberry)</b>									
2007	-	-	-	-	-	-	-	-	52/111

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

## BLACKSMITH FORK GRAZED - STUDY NO. 02R-23



### Location Information

USGS 7.5 min Map Info  
GPS (0' Stake)

Hardware Ranch NW; Township 10N, Range 3E, Section 15  
NAD 83 UTM ZONE 12, 450687 East 4606438 North

### Transect Information

Browse Tag # (0' Stake)	198
Transect Bearing	280° magnetic
Length	200ft
Belt Placement	Line 1 (11ft & 95ft), Line 2 (34ft, 59ft, 71ft)
Belt Marker Placement	Standard

### Directions to Site

From Rock Creek west of Hardware Ranch at the top of Blacksmith Fork Canyon, travel west on SR-101 for 0.25 miles to a pull-off on the right side of the road. From here, walk upslope for about 82 paces at 185 degrees magnetic to the 0 foot stake of the Blacksmith Fork Control site (02R-22) which is marked with browse tag #197. From here, walk upslope for approximately 115 feet to the 0-foot stake marked with browse tag #198.

**Site Information**

Land Ownership	State
Land Administrator	UDWR
Allotment	No data
Elevation	5,660ft (1,725m)
Aspect	South
Slope	41%
Sample Dates	07/09/2007, 07/23/2013, 07/25/2018

**Table 02R-23.1 Disturbance History.** Recorded history of major disturbances.

Treatment/Disturbance	Name	WRI DB#	Date	Size (acres)
Grazing - Intensive Grazing	Hardware Grazing Project	PDB	April-September 2005	-
Seeding - Aerial	Hardware Ranch seeding	941	April 2007	474
Herbicide - Plateau	Hardware Ranch Plateau	973	August-September 2007	474
Hand Crew - Lop and Scatter	-	-	Between 2013 and 2018	-

**Table 02R-23.2 Seed Mix.** List of known seeded plant species and rates (if available).

Mix Name			Application Type	Application Date	Acres
Hardware Ranch Forbs and Browse			Aerial	Apr 2007	28
Type	Species	Common Name	Cultivar/Source ID	Bulk lbs/acre	PLS
F	<i>Achillea millefolium</i>	Western Yarrow		0.14	0.14
F	<i>Cleome serrulata</i>	Rocky Mountain Beeplant	Sevier UT	0.21	0.20
F	<i>Linum perenne</i>	Blue Flax	Appar	0.50	0.46
F	<i>Medicago sativa</i>	Alfalfa	Ladak	0.71	0.66
F	<i>Medicago sativa</i>	Alfalfa	Ranger	0.71	0.64
F	<i>Medicago sativa</i>	Alfalfa	Spreador 4	0.71	0.68
F	<i>Onobrychis viciifolia</i>	Sainfoin	Eski	3.57	3.28
F	<i>Sanguisorba minor</i>	Small Burnet	Delar	5.36	4.98
S	<i>Artemisia tridentata</i> ssp. <i>vaseyana</i>	Mountain Big Sagebrush	Sanpete UT	0.50	0.15
S	<i>Bassia prostrata</i>	Forage Kochia	Elko/Lander NV	1.00	0.64
S	<i>Purshia tridentata</i>	Bitterbrush	Elko NV	0.07	0.07

**Wildlife Habitat and Vegetation History****Table 02R-23.3 - 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
Moose	crucial	winter	

**Table 02R-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	Annual Grass-Forb	Phase I
2013	Annual Grass-Forb/Perennial Grass	Phase I
2018	Annual Grass-Forb/Perennial Grass	Phase I

**Site Notes**

The closest water source is a river approximately one-quarter mile from the study.

**Site Potential**

1981 - 2010 Average Annual Precipitation	21 inches
NRCS Ecological Site	Mountain Very Steep Stony Loam (Mountain Big Sagebrush)
NRCS Ecological Site #	R047XA474UT
States and Transitions	No state and transition model is available for this ecological site.

This site has been dominated by an annual grass-forb plant community since establishment, although the area was treated to reduce undesirable plants and increase beneficial forbs and browse. The grass community has remained depauperate with most of the cover provided by the introduced annual species cheatgrass (*Bromus tectorum*) (Table 02R-23.7, Table 02R-23.10). Forbs have been moderately diverse, although two noxious weeds have been sampled each year: Dyer's woad (*Isatis tinctoria*) and gypsyflower (*Cynoglossum officinale*). Annual forb cover has generally remained high with the dominant species being redstem stork's bill

(*Erodium cicutarium*). Perennial forb cover has been low to moderate with white sagebrush (*Artemisia ludoviciana*) contributing the most cover in most sample years (Table 02R-23.11). The overall shrub cover is moderate as of 2018. Mountain big sagebrush (*Artemisia tridentata* ssp. *vaseyana*) has been the dominant shrub species since 2013 and has increased in cover and density since site establishment. Rocky Mountain juniper (*Juniperus scopulorum*) has been observed on site. Although tree cover decreased following a lop and scatter treatment, infilling is likely to occur in the future as juniper is still present in the surrounding area as of 2018 (Photos, Table 02R-23.12, Table 02R-23.13).

### Trend Summary Tables

**Table 02R-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	1.0	0.7	-	1.3	1.3	5.6
2013	2.1	0.7	0.0	1.8	0.8	4.5
2018	4.3	2.9	-	6.6	3.7	-

**Table 02R-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	302	88	363	129	3.6	0.7	15.6	2.5
2013	413	129	257	130	24.0	7.6	6.0	4.8
2018	423	108	279	78	32.3	6.7	10.6	2.7

**Table 02R-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	22.0	0.1	15.8	3.8	40.3	26.1
2013	4.3	-	19.9	0.5	37.7	48.7
2018	4.0	0.0	43.3	2.3	37.3	56.1

**Table 02R-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	Rabbit
	Quadrat Frequency			
2007	17	7	4	-
2013	-	2	2	-
2018	-	4	-	1
Year	Days Use Per Acre (ha)			
2007	21.1 (52.0)	6.7 (16.6)	0.7 (1.7)	-
2013	-	6.0 (14.9)	4.7 (11.6)	-
2018	-	18.7 (46.3)	-	-

**Table 02R-23.10 - Grass Species.** Nested frequency and modified Daubenmire average cover by year.

GRASS SPECIES	Nested Frequency					
<i>Bromus arvensis</i> <sup>ai</sup> (field brome)	26	297	-	-	-	88
<i>Bromus tectorum</i> <sup>ai</sup> (cheatgrass)	84	396	-	2	2	125
<i>Leymus cinereus</i> (basin wildrye)	46	414	1	-	-	107
<i>Poa bulbosa</i> <sup>i</sup> (bulbous bluegrass)	Average Cover (%)					
<i>Poa secunda</i> (Sandberg bluegrass)	0.1	3.5	-	-	-	0.7
<i>Pseudoroegneria spicata</i> (bluebunch wheatgrass)	1.9	22.0	-	0.0	0.0	7.5
	1.2	31.0	0.1	-	-	6.5

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

**Table 02R-23.11 - Forb Species.** Nested frequency and modified Daubenmire average cover by year.

FORB SPECIES	Nested Frequency																	
<i>Achillea millefolium</i> (Common yarrow)	42	51	54	5	2	5	4	3	0	1	5	349	2	-	119	40	30	
<i>Alyssum desertorum</i> <sup>ai</sup> (desert madwort)	71	22	44	-	-	12	2	10	-	3	5	183	3	-	5	17	11	
<i>Artemisia ludoviciana</i> (white sagebrush)	18	4	51	-	-	1	-	8	-	-	5	242	-	0	19	48	0	
<i>Camelina microcarpa</i> <sup>ai</sup> (littlepod false flax)	Average Cover (%)																	
<i>Ceratocephala testiculata</i> <sup>ai</sup> (curveseed butterwort)	0.9	0.1	1.2	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.0	14.4	0.0	-	0.5	0.1	0.2	
<i>Cirsium</i> (thistle)	2.3	0.0	1.4	-	-	0.4	0.0	0.1	-	0.0	0.0	3.6	0.0	-	0.0	0.1	0.0	
<i>Collomia linearis</i> <sup>a</sup> (tiny trumpet)	0.3	0.0	1.6	-	-	0.0	-	0.0	-	-	0.0	7.1	-	0.0	0.6	0.6	0.0	
<i>Cynoglossum officinale</i> <sup>ami</sup> (gypsyflower)																		
<i>Descurainia pinnata</i> <sup>a</sup> (western tansymustard)																		
<i>Draba</i> <sup>a</sup> (draba)																		
<i>Epilobium brachycarpum</i> <sup>a</sup> (tall annual willowherb)																		
<i>Erodium cicutarium</i> <sup>ai</sup> (redstem stork's bill)																		
<i>Galium aparine</i> <sup>a</sup> (stickywilly)																		
<i>Grindelia squarrosa</i> (curlycup gumweed)																		
<i>Isatis tinctoria</i> <sup>ami</sup> (Dyer's woad)																		
<i>Lactuca serriola</i> <sup>ai</sup> (prickly lettuce)																		
<i>Lappula occidentalis</i> <sup>a</sup> (flatspine stickseed)																		

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



FORB SPECIES													
Lithospermum ruderale (western stone seed)													
Lomatium (desertparsley)													
Lupinus argenteus (silvery lupine)													
Microsteris gracilis <sup>a</sup> (slender phlox)													
Polemoniaceae (plox family)													
Polygonum douglasii <sup>a</sup> (Douglas' knotweed)													
Rumex crispus <sup>i</sup> (curly dock)													
Silene antirrhina <sup>a</sup> (sleepy silene)													
Solidago (goldenrod)													
Tragopogon dubius <sup>at</sup> (yellow salsify)													
Verbascum thapsus <sup>at</sup> (common mullein)													
Vicia americana (American vetch)													
year	Nested Frequency												
2007	-	5	1	2	8	2	-	10	-	5	-	31	
2013	-	-	7	-	-	-	5	143	-	11	12	14	
2018	3	-	2	-	-	-	4	-	3	14	32	15	
year	Average Cover (%)												
2007	-	0.0	0.0	0.0	0.0	0.0	-	0.0	-	0.0	-	0.3	
2013	-	-	0.5	-	-	-	0.0	1.8	-	0.1	0.1	0.2	
2018	0.0	-	0.4	-	-	-	0.0	-	0.1	0.3	1.9	0.2	

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

**Table 02R-23.12 - Shrub and Tree Species.** Average modified Daubenmire quadrat and line intercept cover by year.

SHRUB SPECIES						
Artemisia tridentata ssp. vaseyana <sup>p</sup> (mountain big sagebrush)						
Gutierrezia sarothrae (broom snakeweed)						
Juniperus scopulorum <sup>i</sup> (Rocky Mountain juniper)						
Mahonia repens (creeping barberry)						
Ribes aureum <sup>p</sup> (golden currant)						
Rosa woodsii <sup>p</sup> (Woods' rose)						
year	Line Intercept Cover (%)					
2007	0.8	-	5.6	1.3	-	0.5
2013	1.6	-	4.5	0.8	-	0.2
2018	6.5	-	-	3.7	-	0.1
year	Quadrat Cover (%)					
2007	0.5	-	0.0	0.7	-	0.5
2013	1.9	-	0.0	0.7	0.0	0.3
2018	4.1	0.6	-	2.3	0.0	0.2

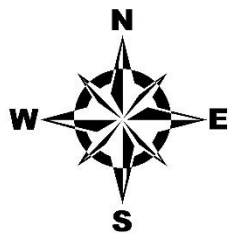
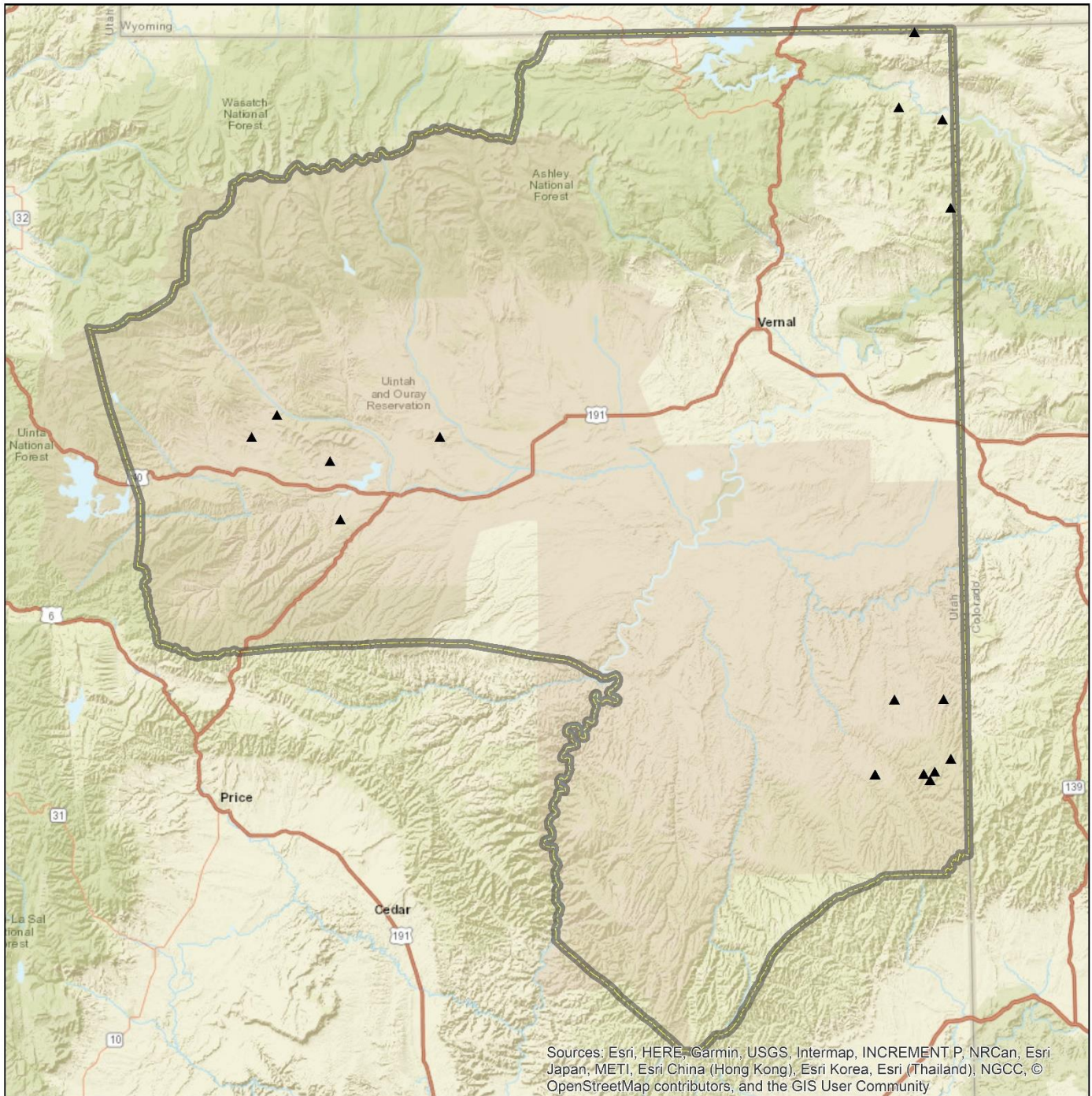
t - Tree Species; p - Preferred Browse; i - Introduced Species

**Table 02R-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 (%)				
<b>Artemisia tridentata ssp. vaseyana<sup>p</sup> -- (mountain big sagebrush)</b>									
2007	80	-	25	50	25	25	0	25	76/123
2013	620	-	7	94	0	3	0	39	38/55
2018	740	60	22	76	3	0	0	3	72/97
<b>Gutierrezia sarothrae -- (broom snakeweed)</b>									
2007	20	-	0	100	0	0	0	0	9/14
2013	-	-	-	-	-	-	-	-	-/-
2018	40	-	50	50	0	0	0	0	24/22
<b>Juniperus scopulorum<sup>t</sup> -- (Rocky Mountain juniper)</b>									
2007	20	-	0	100	0	0	0	0	-/-
2013	20	-	0	100	0	0	0	0	-/-
2018	-	-	-	-	-	-	-	-	-/-
<b>Mahonia repens -- (creeping barberry)</b>									
2007	9900	-	2	98	0	0	6	22	6/9
2013	2220	-	2	98	0	0	0	28	9/23
2018	4560	-	0	100	0	0	0	0	10/14
<b>Physocarpus malvaceus -- (mallow ninebark)</b>									
2007	-	-	-	-	-	-	-	-	-/-
2013	-	-	-	-	-	-	-	-	114/162
2018	-	-	-	-	-	-	-	-	-/-
<b>Ribes aureum<sup>p</sup> -- (golden currant)</b>									
2007	-	-	-	-	-	-	-	-	81/62
2013	20	-	100	0	0	0	0	0	-/-
2018	20	-	0	100	0	0	0	0	42/17
<b>Rosa woodsii<sup>p</sup> -- (Woods' rose)</b>									
2007	1860	-	73	27	0	33	5	0	57/39
2013	680	-	44	53	3	18	0	47	30/35
2018	620	-	19	74	7	48	0	3	31/24

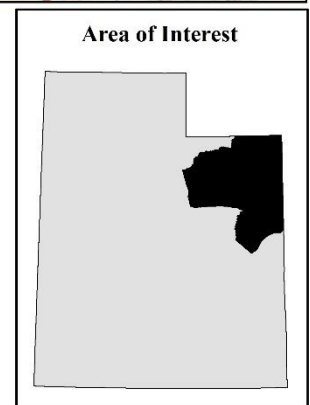
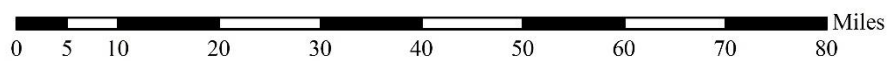
t - Tree Species; p - Preferred Browse; i - Introduced Species

# NORTHEASTERN REGION



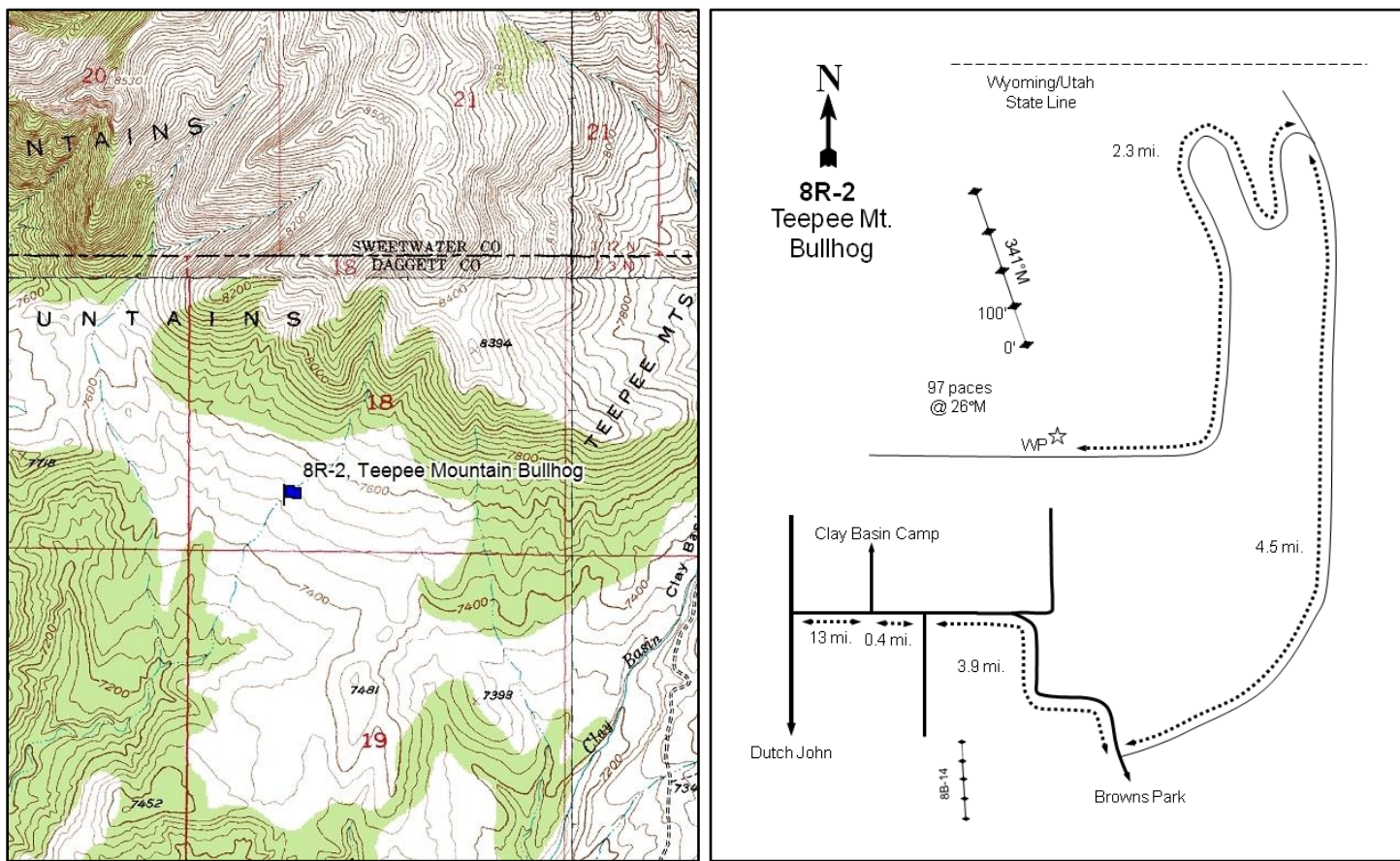
**Project**

- ▲ WRI
- ▭ Northeastern Region Boundaries





## TEEPEE MOUNTAIN BULLHOG - STUDY NO. 08R-2



### Location Information

USGS 7.5 min Map Info  
GPS (0' Stake)

Clay Basin NE; Township 3N, Range 25E, Section 18  
NAD 83 UTM ZONE 12, 656438 East 4539448 North

### Transect Information

Browse Tag # (0' Stake)	194
Transect Bearing	341° 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 toward Antelope Flat on US-191. Continue over the state line into Wyoming and turn right just after Minnies Gap onto the Clay Basin Road. Drive for approximately 13 miles towards Clay Basin to the turnoff to Clay Basin Camp. Turn right again and proceed 0.4 miles to the intersection to the Clay Basin Bench site (8B-14). Continue east for 3.9 miles to a road coming in from the left. Turn left here and go 4.5 miles to another road that comes in from the left. Turn left again and go 2.3 miles to the witness post on the right (north) side of the road. The 0-foot stake is 97 paces away at 26 degrees magnetic and is marked with browse tag #194.

**Site Information**

Land Ownership	Federal
Land Administrator	BLM
Allotment	CLAY BASIN MEADOWS
Elevation	7,500ft (2,286m)
Aspect	Southwest
Slope	10-13%
Sample Dates	07/05/2007, 07/27/2010, 07/09/2013, 07/25/2018

**Table 08R-02.1 Disturbance History.** Recorded history of major disturbances.

Treatment/Disturbance	Name	WRI DB#	Date	Size (acres)
Mechanical - Bullhog	Teepee Mountain Bullhog Project	692	June-August 2007	535

**Wildlife Habitat and Vegetation History**

**Table 08R-02.3 - 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 & Winter	brood-rearing
Pronghorn	crucial	summer	

**Table 08R-02.4 - Vegetation History.** The dominant vegetation type(s) and phase of woodland succession (Tausch, Miller, Roundy, & Chambers, 2009).

Year	Vegetation Type	Woodland Succession
2007	Mountain Big Sagebrush/Juniper	Phase I transitioning to Phase II
2010	Mountain Big Sagebrush	Phase I
2013	Mountain Big Sagebrush	Phase I
2018	Mountain Big Sagebrush	Phase I

**Site Notes**

No Notes

**Soils**

**Table 08R-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	6.9	63.1	23.4	13.5	1.9	35.3	140.8	0.6	07/03/2007

**Site Potential**

1981 - 2010 Average Annual Precipitation	14 inches
NRCS Ecological Site	Upland Stony Loam (Mountain Big Sagebrush)
NRCS Ecological Site #	R047XC336UT
States and Transitions	No state and transition model is available for this ecological site.

Upon study establishment in 2007, the plant community on this site was a mixed stand of mountain big sagebrush (*Artemisia tridentata* ssp. *vaseyana*) and Utah juniper (*Juniperus osteosperma*) that was considered to be within Phase I transitioning to Phase II of woodland succession. The 2007 bullhog treatment (Table 08R-02.1) removed a majority of the trees, and mountain big sagebrush has been the dominant vegetation component since 2010 (Table 08R-02.12, 08R-02.13). However, point-quarter data shows that density of juniper has increased each sample year following the bullhog project. The study site has been classified as being within Phase I of woodland succession since 2010, but continued tree presence indicates that there may be potential for infilling over time (Table 08R-02.4, Table 08R-02.14). Native perennial grasses and forbs have provided a majority of the herbaceous cover throughout the duration of the study. The introduced annual grass species cheatgrass (*Bromus tectorum*) has increased in cover following treatment. Although cheatgrass cover is moderate as of 2018, it could present a threat to the ecological resilience of the community if it increases in the future (Table 08R-02.7, Table 08R-02.10, Table 08R-02.11).

**Trend Summary Tables**

**Table 08R-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
2007	8.3	3.0	5.5	14.0	0.9	10.9
2010	7.9	2.7	-	12.5	2.7	-
2013	9.9	1.3	0.0	11.1	2.4	0.1
2018	10.5	2.8	0.1	13.1	2.7	-

**Table 08R-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
2007	36	366	153	238	0.4	18.9	0.5	13.6
2010	69	342	4	188	2.2	22.1	0.0	14.1
2013	78	360	31	206	1.4	15.2	0.1	11.0
2018	188	353	24	202	6.2	20.6	0.1	9.3

**Table 08R-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
2007	26.6	5.7	29.6	3.4	3.5	44.9
2010	12.2	2.9	59.2	1.8	2.5	50.6
2013	15.7	2.5	54.2	0.7	3.9	42.5
2018	13.8	2.6	58.9	2.5	3.3	42.8

**Table 08R-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				
2007	15	7	4	-	34
2010	2	2	-	-	-
2013	7	1	2	-	1
2018	5	4	1	-	1
Year	Days Use Per Acre (ha)				
2007	16.7 (41.2)	16.8 (41.4)	10.0 (24.8)	1.2 (2.9)	-
2010	3.6 (9.0)	10.7 (26.5)	2.7 (6.6)	-	-
2013	-	11.4 (28.1)	0.7 (1.7)	-	-
2018	22.5 (55.6)	10.7 (26.5)	0.7 (1.7)	-	-



**Table 08R-02.10 - Grass Species.** Nested frequency and modified Daubenmire average cover by year.

GRASS SPECIES											
Achnatherum hymenoides (Indian ricegrass)											
Bromus tectorum <sup>ai</sup> (cheatgrass)											
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)											
Thinopyrum intermedium <sup>i</sup> (intermediate wheatgrass)											
year	Nested Frequency										
2007	16	36	0	2	74	61	-	53	252	213	3
2010	3	69	5	-	81	124	26	31	159	117	40
2013	14	78	2	3	92	24	105	11	222	159	1
2018	16	188	-	-	117	49	84	62	173	141	-
year	Average Cover (%)										
2007	0.4	0.4	0.0	0.0	1.6	1.0	-	1.2	7.6	6.9	0.0
2010	0.0	2.2	0.0	-	3.2	4.7	1.1	0.9	4.1	6.3	1.7
2013	0.2	1.4	0.0	0.0	3.7	0.3	1.9	0.2	3.9	4.9	0.0
2018	0.8	6.2	-	-	4.8	1.4	3.0	1.3	3.4	5.9	-

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

**Table 08R-02.11 - Forb Species.** Nested frequency and modified Daubenmire average cover by year.

FORB SPECIES																	
Agoseris glauca (pale agoseris)																	
Alyssum desertorum <sup>ai</sup> (desert madwort)																	
Antennaria (pussytoes)																	
Arabis (rockcress)																	
Astragalus (milkvetch)																	
Astragalus convallarius (lesser rushy milkvetch)																	
Balsamorhiza sagittata (arrowleaf balsamroot)																	
Calochortus nuttallii (sego lily)																	
Castilleja flava (yellow Indian paintbrush)																	
Chaenactis douglasii (Douglas' dustymaiden)																	
Chenopodium album <sup>a</sup> (lambquarters)																	
Collinsia parviflora <sup>a</sup> (maiden blue eyed Mary)																	
Comandra umbellata (bastard toadflax)																	
Crepis acuminata (tapertip hawkbeard)																	
Cryptantha (cryptantha)																	
Cymopterus (springparsley)																	
Delphinium nuttallianum (two-lobed larkspur)																	
year	Nested Frequency																
2007	12	-	3	14	-	62	93	18	3	-	4	37	23	5	17	16	1
2010	-	-	-	-	3	69	70	6	3	-	-	-	32	0	8	-	-
2013	3	-	-	1	2	44	81	13	9	3	-	4	34	1	28	1	-
2018	9	15	-	2	3	21	80	1	-	1	-	-	45	-	15	-	-
year	Average Cover (%)																
2007	0.1	-	0.0	0.1	-	3.5	7.8	0.0	0.0	-	0.0	0.1	0.5	0.1	0.1	0.1	0.0
2010	-	-	-	-	0.0	2.5	9.5	0.0	0.0	-	-	-	0.8	0.0	0.1	-	-
2013	0.0	-	-	0.0	0.0	1.3	7.5	0.0	0.2	0.0	-	0.0	0.3	0.0	0.1	0.0	-
2018	0.0	0.0	-	0.0	0.0	0.7	5.7	0.0	-	0.0	-	-	0.7	-	0.2	-	-

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

FORB SPECIES																		
Descurainia pinnata <sup>a</sup> (western tansymustard)																		
Draba <sup>a</sup> (draba)																		
Erigeron (fleabane)																		
Erigeron pumilus (shaggy fleabane)																		
Gayophytum ramosissimum <sup>a</sup> (pinyon groundsmoke)																		
Ipomopsis aggregata (scarlet gilia)																		
Lactuca serriola <sup>ai</sup> (prickly lettuce)																		
Lappula occidentalis <sup>a</sup> (flatspine stickseed)																		
Lesquerella (bladderpod)																		
Lomatium triternatum (nineleaf biscuitroot)																		
Machaeranthera grindelioides (rayless tansyaster)																		
Mertensia (bluebells)																		
Microsteris gracilis <sup>a</sup> (slender phlox)																		
Packera multilobata (lobeleaf groundsel)																		
Penstemon (beardtongue)																		
Penstemon humilis (low beardtongue)																		
Petradoria pumila (rock goldenrod)																		
year	Nested Frequency																	
2007	8	7	5	-	3	12	-	3	1	6	0	-	120	-	6	5	4	
2010	-	-	11	5	-	4	1	-	-	1	3	5	3	-	-	4	6	
2013	5	-	2	1	-	-	-	10	4	4	-	2	12	3	-	4	-	
2018	2	4	8	15	-	-	-	-	-	-	7	3	-	7	-	5	-	
year	Average Cover (%)																	
2007	0.0	0.0	0.0	-	0.0	0.1	-	0.0	0.0	0.0	0.0	-	0.4	-	0.2	0.0	0.3	
2010	-	-	0.3	0.1	-	0.0	0.0	-	-	0.0	0.1	0.2	0.0	-	-	0.0	0.0	
2013	0.0	-	0.1	0.0	-	-	-	0.0	0.0	0.0	-	0.1	0.0	0.0	-	0.0	-	
2018	0.0	0.0	0.2	0.1	-	-	-	-	-	-	0.1	0.0	-	0.1	-	0.0	-	

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

FORB SPECIES					
Phlox hoodii (spiny phlox)					
Phlox longifolia (longleaf phlox)					
Stenotus acaulis (stemless mock goldenweed)					
Symphotrichum (aster)					
Tragopogon dubius <sup>ai</sup> (yellow salsify)					
year	Nested Frequency				
2007	46	22	17	-	2
2010	17	6	-	2	0
2013	33	29	23	-	2
2018	37	6	23	-	6
year	Average Cover (%)				
2007	0.4	0.1	0.2	-	0.0
2010	0.2	0.1	-	0.0	0.0
2013	0.3	0.1	0.7	-	0.0
2018	0.9	0.0	0.6	-	0.0

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

**Table 08R-02.12 - Shrub and Tree Species.** Average modified Daubenmire quadrat and line intercept cover by year.

SHRUB SPECIES	Line Intercept Cover (%)													
	year													
Artemisia nova <sup>p</sup> (black sagebrush)	2.7	8.9	-	0.5	0.3	2.1	-	10.9	0.3	0.1	-	-	-	-
Artemisia tridentata ssp. vaseyana <sup>p</sup> (mountain big sagebrush)	2.6	7.6	-	1.8	0.7	2.3	-	-	-	0.1	-	-	-	0.1
Cercocarpus montanus <sup>p</sup> (alderleaf mountain mahogany)	2.1	7.1	-	2.4	-	1.9	-	0.1	-	0	-	-	-	-
Chrysothamnus viscidiflorus ssp. viscidiflorus var. viscidiflorus (yellow rabbitbrush)	1.8	10	-	1.4	1.1	1.3	-	0	-	-	-	-	-	0.2
Ericameria nauseosa (rubber rabbitbrush)	Quadrat Cover (%)													
Eriogonum microthecum <sup>p</sup> (slender buckwheat)	year													
Gutierrezia sarothrae (broom snakeweed)	2007	1.4	4.7	0.0	2.2	0.1	2.1	0.0	5.5	0.0	0.5	0.0	0.1	-
Juniperus osteosperma <sup>i</sup> (Utah juniper)	2010	1.3	4.9	0.1	2.1	0.4	1.5	-	-	0.0	0.2	0.0	0.0	0.0
Krascheninnikovia lanata <sup>p</sup> (winterfat)	2013	1.2	5.7	0.4	1.1	-	2.6	-	0.0	-	0.2	-	0.0	-
Linanthus pungens (granite prickly phlox)	2018	1.9	6.8	0.4	1.9	0.8	1.4	0.0	0.1	-	0.1	-	0.0	0.1
Opuntia (pricklypear)														
Pediocactus simpsonii (mountain ball cactus)														
Tetradymia canescens (spineless horsebrush)														

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

**Table 08R-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 (%)				
<b>Amelanchier utahensis<sup>p</sup> -- (Utah serviceberry)</b>									
2007	-	-	-	-	-	-	-	-	78/112
2010	-	-	-	-	-	-	-	-	38/76
2013	-	-	-	-	-	-	-	-	-/-
2018	-	-	-	-	-	-	-	-	46/95
<b>Artemisia nova<sup>p</sup> -- (black sagebrush)</b>									
2007	1620	160	5	73	22	10	3	3	27/45
2010	560	20	4	96	0	61	0	0	20/46
2013	1020	20	14	78	8	16	8	4	18/50
2018	1120	-	4	88	9	13	45	9	19/52
<b>Artemisia tridentata ssp. vaseyana<sup>p</sup> -- (mountain big sagebrush)</b>									
2007	1640	60	5	49	46	24	33	38	61/97
2010	1160	160	12	69	19	52	9	22	61/91
2013	1360	60	13	74	13	38	28	29	54/79
2018	2200	-	19	74	7	10	1	8	54/81
<b>Cercocarpus montanus<sup>p</sup> -- (alderleaf mountain mahogany)</b>									
2007	-	-	-	-	-	-	-	-	66/86
2010	20	-	0	100	0	100	0	0	82/90
2013	20	-	0	100	0	100	0	100	79/81
2018	20	-	0	100	0	100	0	0	58/63
<b>Chrysothamnus viscidiflorus ssp. viscidiflorus var. viscidiflorus -- (yellow rabbitbrush)</b>									
2007	1460	-	4	92	4	3	0	4	25/37
2010	1180	-	10	88	2	5	0	2	33/43
2013	1600	-	15	84	1	3	4	9	36/50
2018	1120	-	0	95	5	7	0	14	30/41

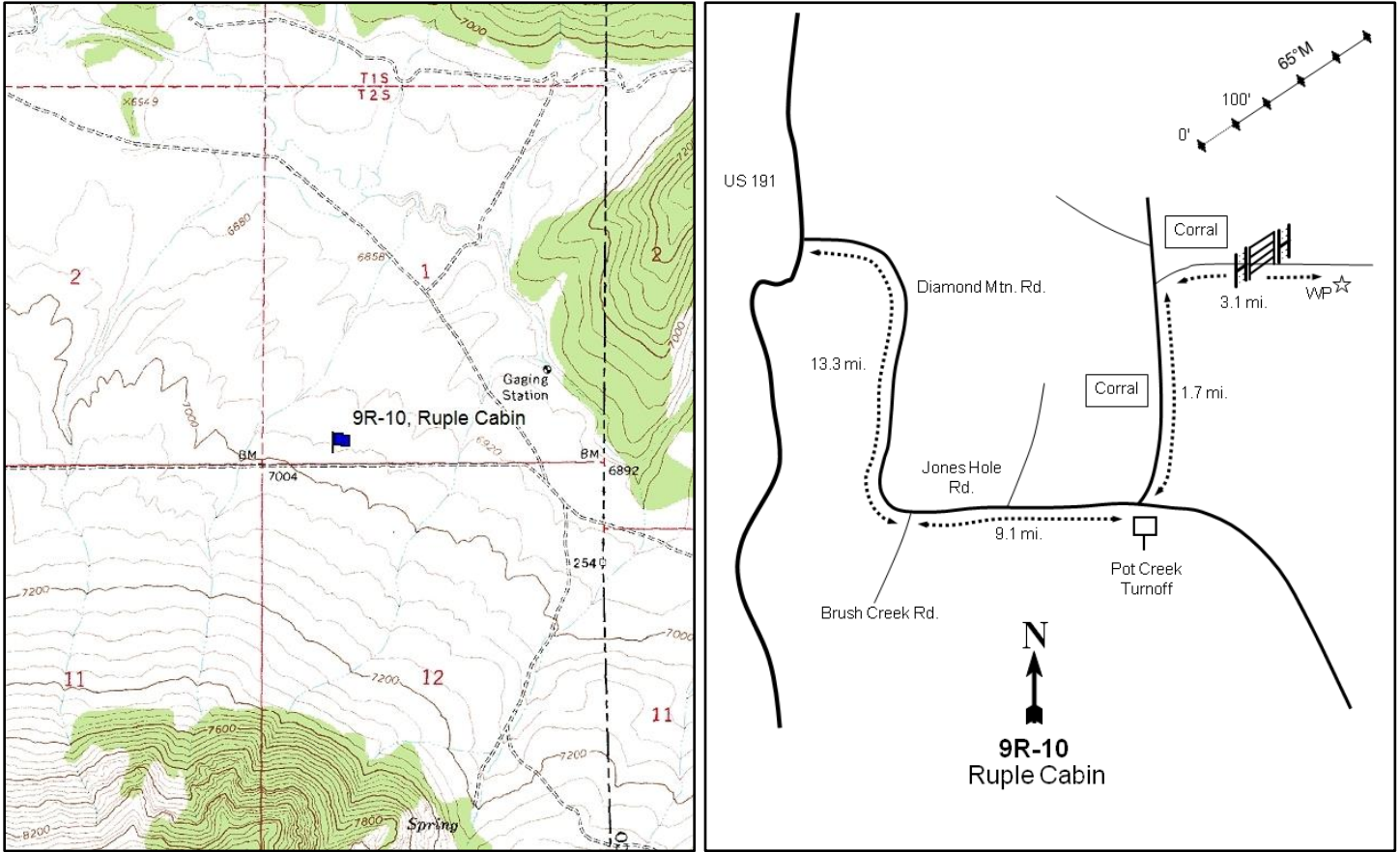
Year	Density		Age Class Distribution			Utilization		Poor Vigor (%)	Average Height Crown (cm)
	Plants Per Acre		Excluding Seedlings			Moderate (%)	Heavy (%)		
	Excluding Seedlings	Seedling	Young (%)	Mature (%)	Decadent (%)				
<b>Eriogonum microthecum<sup>p</sup> -- (slender buckwheat)</b>									
2007	4680	60	6	92	2	14	1	2	17/25
2010	2040	-	5	90	5	29	5	0	20/25
2013	3180	-	7	93	1	4	2	3	19/25
2018	2220	-	0	99	1	11	1	15	15/19
<b>Ericameria nauseosa -- (rubber rabbitbrush)</b>									
2007	60	-	0	100	0	0	0	0	58/70
2010	60	-	0	100	0	0	0	0	59/68
2013	-	-	-	-	-	-	-	-	57/83
2018	60	-	0	100	0	67	0	0	72/110
<b>Gutierrezia sarothrae -- (broom snakeweed)</b>									
2007	20	-	0	100	0	0	0	0	20/21
2010	-	-	-	-	-	-	-	-	-/-
2013	-	-	-	-	-	-	-	-	-/-
2018	120	-	0	100	0	0	0	0	17/17
<b>Juniperus osteosperma<sup>i</sup> -- (Utah juniper)</b>									
2007	120	60	50	50	0	0	0	0	-/-
2010	20	20	100	0	0	0	0	0	-/-
2013	40	-	100	0	0	0	0	0	-/-
2018	60	20	67	33	0	0	0	0	-/-
<b>Krascheninnikovia lanata<sup>p</sup> -- (winterfat)</b>									
2007	40	-	0	100	0	0	50	0	13/25
2010	40	-	0	100	0	50	0	0	17/20
2013	80	-	0	100	0	0	0	0	19/32
2018	-	-	-	-	-	-	-	-	-/-
<b>Linanthus pungens -- (granite prickly phlox)</b>									
2007	200	-	0	80	20	0	0	20	16/32
2010	200	-	0	100	0	0	0	40	23/35
2013	160	-	0	100	0	0	0	0	22/32
2018	280	-	7	71	21	0	0	21	14/20
<b>Opuntia -- (pricklypear)</b>									
2007	80	-	0	25	75	0	0	0	8/16
2010	20	-	0	100	0	0	0	0	9/37
2013	20	-	0	100	0	0	0	0	-/-
2018	20	-	0	100	0	0	0	0	9/24
<b>Pediocactus simpsonii -- (mountain ball cactus)</b>									
2007	160	-	0	100	0	0	0	0	4/8
2010	100	-	0	100	0	0	0	0	5/8
2013	80	-	0	100	0	0	0	0	5/8
2018	140	-	14	86	0	0	0	0	5/7
<b>Purshia tridentata<sup>p</sup> -- (antelope bitterbrush)</b>									
2007	-	-	-	-	-	-	-	-	15/29
2010	20	-	0	100	0	0	0	0	43/96
2013	-	-	-	-	-	-	-	-	43/150
2018	-	-	-	-	-	-	-	-	48/155
<b>Tetradymia canescens -- (spineless horsebrush)</b>									
2007	40	-	50	50	0	100	0	0	24/37
2010	60	-	0	100	0	0	0	0	27/36
2013	20	-	0	100	0	0	0	0	29/46
2018	100	-	0	100	0	20	20	0	26/48

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

**Table 08R-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)							
2007	133	15	30	35	15	5	11.8
2010	31	47	47	7	-	-	4.1
2013	42	-	100	-	-	-	3.5
2018	45	6	88	6	-	-	3.9

## RUPLE CABIN - STUDY NO. 09R-10



### Location Information

USGS 7.5 min Map Info  
GPS (0' Stake)

Hoy Mountain SW; Township 2S, Range 25E, Section 01  
NAD 83 UTM ZONE 12, 663742 East 4503958 North

### Transect Information

Browse Tag # (0' Stake)	83
Transect Bearing	65° 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 Vernal, drive north on US-191. Turn right (east) onto Diamond Mountain Road and drive for 13.3 miles to a fork. Proceed left at the fork and drive east on Jones Hole Road for 9.1 miles to a fork to the right; there is a sign that says "Pot Creek turnoff." Turn right and drive for 1.7 miles to a fork. Stay right at the fork and drive 3.1 miles, passing through a gate (gate may be locked) to the witness post on the right (south) side of the road. From the witness post, walk 35 paces at 353 degrees magnetic to the 0-foot stake, which is marked with browse tag #83.



**Site Information**

Land Ownership	Private
Land Administrator	Private
Allotment	RUPLE CABIN
Elevation	7,000ft (2,134m)
Aspect	North
Slope	5-8%
Sample Dates	07/27/2005, 07/08/2008, 07/10/2013, 07/27/2018

**Table 09R-10.1 Disturbance History.** Recorded history of major disturbances.

Treatment/Disturbance	Name	WRI DB#	Date	Size (acres)
Seeding - Aerial Before	Ruple Vegetation Treatment	178	Fall 2005	1680
Aerator - Double Drum	Ruple Vegetation Treatment	178	Fall 2005	1680
Herbicide - Spike	-	-	Between 2008 and 2013	-

**Table 09R-10.2 Seed Mix.** List of known seeded plant species and rates (if available).

Mix Name			Application Type	Application Date	Acres
Ruple Cabin Uplands			Aerial	Sep 2005	1650
Type	Species	Common Name	Cultivar/Source ID	Bulk lbs/acre	PLS
G	Agropyron cristatum	Crested Wheatgrass	Hycrest	0.48	0.45
G	Dactylis glomerata	Orchardgrass	Paiute	0.33	0.31
G	Elymus lanceolatus	Thickspike Wheatgrass	Critana	1.00	0.85
G	Elymus wawawaiensis	Snake River Wheatgrass	Secar	0.52	0.48
G	Poa secunda	Big Bluegrass	Sherman	0.27	0.24
G	Poa secunda	Canby Bluegrass	Canbar	0.27	0.22
G	Poa secunda	Sandberg Bluegrass	SID OR	0.27	0.22
G	Psathyrostachys juncea	Russian Wildrye		1.00	0.90
G	Pseudoroegneria spicata	Bluebunch Wheatgrass	Goldar	0.34	0.33
G	Pseudoroegneria spicata	Bluebunch Wheatgrass	Anatone	0.18	0.17
F	Achillea millefolium	Western Yarrow		0.11	0.10
F	Linum perenne	Blue Flax		0.27	0.24
F	Medicago sativa	Alfalfa	Ladak +	0.55	0.52
F	Medicago sativa	Alfalfa	Nomad	0.55	0.51
F	Onobrychis viciifolia	Sainfoin	Eski	3.00	2.81
F	Sanguisorba minor	Small Burnet	Delar	1.91	1.80
S	Purshia tridentata	Bitterbrush	Ada/Boise ID	0.09	0.07
S	Purshia tridentata	Bitterbrush		0.18	0.16

**Wildlife Habitat and Vegetation History****Table 09R-10.3 - 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-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	Phase I
2008	Mountain Big Sagebrush	Phase I
2013	Perennial Grass/Mountain Big Sagebrush/Bitterbrush	Phase I
2018	Perennial Grass/Bitterbrush/Mountain Big Sagebrush	Phase I

**Site Notes**

Sage-grouse sign was present on the site in 2008, 2013, and 2018.

**Soils****Table 09R-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 Clay Loam	6.7	51.1	27.1	21.8	2.5	13.1	137.6	0.7	08/02/2005

**Site Potential**

1981 - 2010 Average Annual Precipitation	13 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.

Mountain big sagebrush (*Artemisia tridentata* ssp. *vaseyana*) was the sole dominant browse species on this site from study establishment in 2005 through 2008. Sagebrush decreased following the treatments in 2008 and 2013 while antelope bitterbrush (*Purshia tridentata*) increased and became a co-dominant browse species in 2013 (Table 09R-10.1, Table 09R-10.12, Table 09R-10.13). The herbaceous understory has fluctuated, but has generally remained abundant and diverse throughout the duration of the study. Perennial grasses such as Sandberg bluegrass (*Poa secunda*) and thickspike wheatgrass (*Elymus lanceolatus*) have provided a majority of the herbaceous cover in all years, and have been a co-dominant vegetation component since 2013. The introduced annual grass species cheatgrass (*Bromus tectorum*) has increased in cover each year. Although present in moderate amounts in 2018, cheatgrass could pose a threat to the community's ecological resilience if it increases in the future (Table 09R-10.7, Table 09R-10.10, Table 09R-10.11).

**Trend Summary Tables****Table 09R-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	30.7	0.2	-	36.0	0.5	-
2008	14.8	0.3	-	17.5	0.1	-
2013	3.7	0.6	-	9.5	1.4	-
2018	9.6	4.3	-	11.4	5.5	-

**Table 09R-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	13	371	85	232	0.0	11.6	0.4	5.8
2008	73	383	120	248	1.2	17.6	0.5	7.5
2013	114	368	68	225	3.1	11.9	0.5	7.1
2018	164	393	1	136	4.5	17.1	0.0	4.6

**Table 09R-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	30.8	2.0	36.1	1.6	2.7	45.0
2008	18.6	0.2	47.9	1.0	2.9	43.7
2013	31.6	0.6	46.4	0.3	1.8	30.1
2018	12.9	0.0	70.2	0.7	1.9	35.8

**Table 09R-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	5	6	8	-	30
2008	2	9	3	3	6
2013	6	5	1	1	1
2018	3	5	4	3	4
Days Use Per Acre (ha)					
2005	10.9 (26.9)	11.4 (28.1)	10.7 (26.5)	26.2 (64.6)*	-
2008	2.9 (7.2)	8.1 (19.9)	-	8.7 (21.5)*	-
2013	25.4 (62.8)	27.5 (67.9)	6.7 (16.6)	17.4 (43.0)*	-
2018	10.2 (25.1)	12.1 (29.8)	5.3 (13.2)	26.2 (64.6)*	-

Pellets per acre (ha)

**Table 09R-10.10 - Grass Species.** Nested frequency and modified Daubenmire average cover by year.

GRASS SPECIES	Nested Frequency													
Achnatherum hymenoides (Indian ricegrass)	-	-	13	32	39	56	-	41	20	-	10	339	-	
Agropyron cristatum <sup>i</sup> (crested wheatgrass)	0	-	73	7	85	102	-	88	35	102	57	244	-	
Bromus tectorum <sup>ai</sup> (cheatgrass)	11	3	114	8	77	70	7	76	13	56	12	259	3	
Carex (sedge)	12	7	164	15	121	224	4	136	10	28	21	215	-	
Elymus elymoides (squirreltail)	Average Cover (%)													
Elymus lanceolatus (thickspike wheatgrass)	2005	-	-	0.0	0.1	0.3	0.4	-	0.7	0.2	-	0.3	9.7	-
Elymus trachycaulus (slender wheatgrass)	2008	0.0	-	1.2	0.2	1.7	1.0	-	2.9	0.9	3.9	1.1	6.0	-
Hesperostipa comata (needle and thread)	2013	0.1	0.0	3.1	0.1	0.8	0.7	0.0	1.1	0.3	1.0	0.1	7.6	0.0
Koeleria macrantha (prairie Junegrass)	2018	0.1	0.2	4.5	0.1	3.2	4.0	0.0	3.2	0.1	0.2	0.5	5.6	-
Poa fendleriana (muttongrass)														
Poa pratensis <sup>i</sup> (Kentucky bluegrass)														
Poa secunda (Sandberg bluegrass)														
Pseudoroegneria spicata (bluebunch wheatgrass)														

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

**Table 09R-10.11 - Forb Species.** Nested frequency and modified Daubenmire average cover by year.

FORB SPECIES	Nested Frequency																	
Achillea millefolium (Common yarrow)	-	3	-	17	11	30	14	-	-	1	35	20	14	2	-	6	-	
Agoseris glauca (pale agoseris)	-	8	-	19	10	32	15	-	1	27	52	39	15	3	3	18	19	
Alyssum desertorum <sup>ai</sup> (desert madwort)	0	16	4	29	-	17	3	1	-	-	27	13	10	5	-	-	-	
Antennaria (pussytoes)	-	-	-	18	-	11	2	-	-	-	1	-	10	-	-	-	-	
Arabis (rockcross)	Average Cover (%)																	
Astragalus convallarius (lesser rushy milkvetch)	2005	-	0.0	-	0.3	0.1	1.0	0.3	-	-	0.0	0.1	0.0	0.2	0.1	-	0.0	-
Astragalus tenellus (looseflower milkvetch)	2008	-	0.0	-	0.4	0.0	0.8	1.0	-	0.0	0.1	0.1	0.1	0.1	0.0	0.0	0.0	0.1
Astragalus utahensis (Utah milkvetch)	2013	0.0	0.0	0.0	0.4	-	0.1	0.0	0.0	-	-	0.1	0.1	0.0	0.0	-	-	-
Calochortus nuttallii (sego lily)	2018	-	-	-	0.9	-	0.3	0.0	-	-	-	0.0	-	0.1	-	-	-	-
Chaenactis douglasii (Douglas' dustymaiden)																		
Collinsia parviflora <sup>a</sup> (maiden blue eyed Mary)																		
Collomia linearis <sup>a</sup> (tiny trumpet)																		
Comandra umbellata (bastard toadflax)																		
Cryptantha (cryptantha)																		
Delphinium nuttallianum (twolobe larkspur)																		
Descurainia pinnata <sup>a</sup> (western tansymustard)																		
Draba <sup>a</sup> (draba)																		

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

FORB SPECIES	Erigeron eatonii (Eaton's fleabane)	Eriogonum alatum (winged buckwheat)	Eriogonum umbellatum (sulphur-flower buckwheat)	Gayophytum ramosissimum <sup>a</sup> (pinyon groundsmoke)	Grindelia squarrosa (curlycup gumweed)	Heterotheca villosa (hairy false goldenaster)	Lappula occidentalis <sup>a</sup> (flatspine stickseed)	Linum lewisii (Lewis flax)	Lithospermum ruderale (western stone seed)	Lomatium (desertparsley)	Lupinus (lupine)	Machaeranthera canescens (hoary tansyaster)	Microsteris gracilis <sup>a</sup> (slender phlox)	Orthocarpus <sup>a</sup> (owl's-clover)	Packera multilobata (lobeleaf groundsel)	Penstemon (beardtongue)	Petradorea pumila (rock goldenrod)
year	Nested Frequency																
2005	12	0	20	8	-	36	-	13	-	5	3	2	37	-	27	12	46
2008	1	-	10	5	9	11	3	47	2	8	19	-	58	0	70	19	40
2013	3	2	13	-	19	7	5	26	-	4	26	8	27	-	9	9	54
2018	-	10	10	-	-	36	-	13	-	-	0	-	-	-	19	3	22
year	Average Cover (%)																
2005	0.3	0.0	0.3	0.0	-	1.0	-	0.2	-	0.0	0.0	0.0	0.1	-	0.1	0.1	0.9
2008	0.0	-	0.5	0.0	0.0	0.9	0.0	0.6	0.0	0.0	0.4	-	0.2	0.0	0.9	0.1	0.9
2013	0.0	0.0	0.7	-	0.7	0.3	0.0	0.3	-	0.0	2.3	0.1	0.3	-	0.2	0.1	1.1
2018	-	0.2	0.1	-	-	1.1	-	0.4	-	-	0.0	-	-	-	0.1	0.0	1.0

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

FORB SPECIES	Phlox austromontana (mountain phlox)	Phlox longifolia (longleaf phlox)	Polygonum douglasii <sup>a</sup> (Douglas' knotweed)	Schoenocrambe limifolia (flaxleaf plainsmustard)	Sphaeralcea coccinea (scarlet globemallow)	Streptanthus cordatus (heartleaf twistflower)	Symphotrichum (aster)	Tragopogon dubius <sup>a,i</sup> (yellow salsify)	Trifolium (clover)	Zigadenus paniculatus (foothill deathcamas)
year	Nested Frequency									
2005	11	55	17	2	25	-	2	1	28	7
2008	7	65	9	-	22	-	-	1	29	12
2013	15	65	-	-	17	2	4	4	29	1
2018	7	-	-	-	24	-	1	-	5	12
year	Average Cover (%)									
2005	0.2	0.3	0.0	0.0	0.2	-	0.0	0.0	0.1	0.1
2008	0.0	0.4	0.0	-	0.2	-	-	0.0	0.1	0.1
2013	0.1	0.4	-	-	0.1	0.0	0.0	0.0	0.1	0.0
2018	0.1	-	-	-	0.2	-	0.0	-	0.0	0.0

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

**Table 09R-10.12 - Shrub and Tree Species.** Average modified Daubenmire quadrat and line intercept cover by year.

SHRUB SPECIES	Artemisia tridentata ssp. vaseyana <sup>p</sup> (mountain big sagebrush)	Ericameria nauseosa (rubber rabbitbrush)	Eriogonum microthecum <sup>p</sup> (slender buckwheat)	Gutierrezia sarothrae (broom snakeweed)	Opuntia (pricklypear)	Purshia tridentata <sup>p</sup> (antelope bitterbrush)	Tetradymia canescens (spineless horsebrush)
year	Line Intercept Cover (%)						
2005	34.5	-	-	0.1	-	1.5	0.4
2008	14.8	-	-	0.1	0	2.7	-
2013	4.2	0.8	0.3	0.3	0.1	5	0.2
2018	3	4.1	-	1.2	0.1	8.4	0.1
year	Quadrat Cover (%)						
2005	29.4	0.0	-	0.1	0.0	1.3	0.0
2008	12.1	0.0	0.0	0.2	0.1	2.8	-
2013	1.7	0.4	0.0	0.2	0.1	2.0	0.0
2018	2.6	2.7	-	1.6	0.0	6.9	0.0

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

**Table 09R-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.

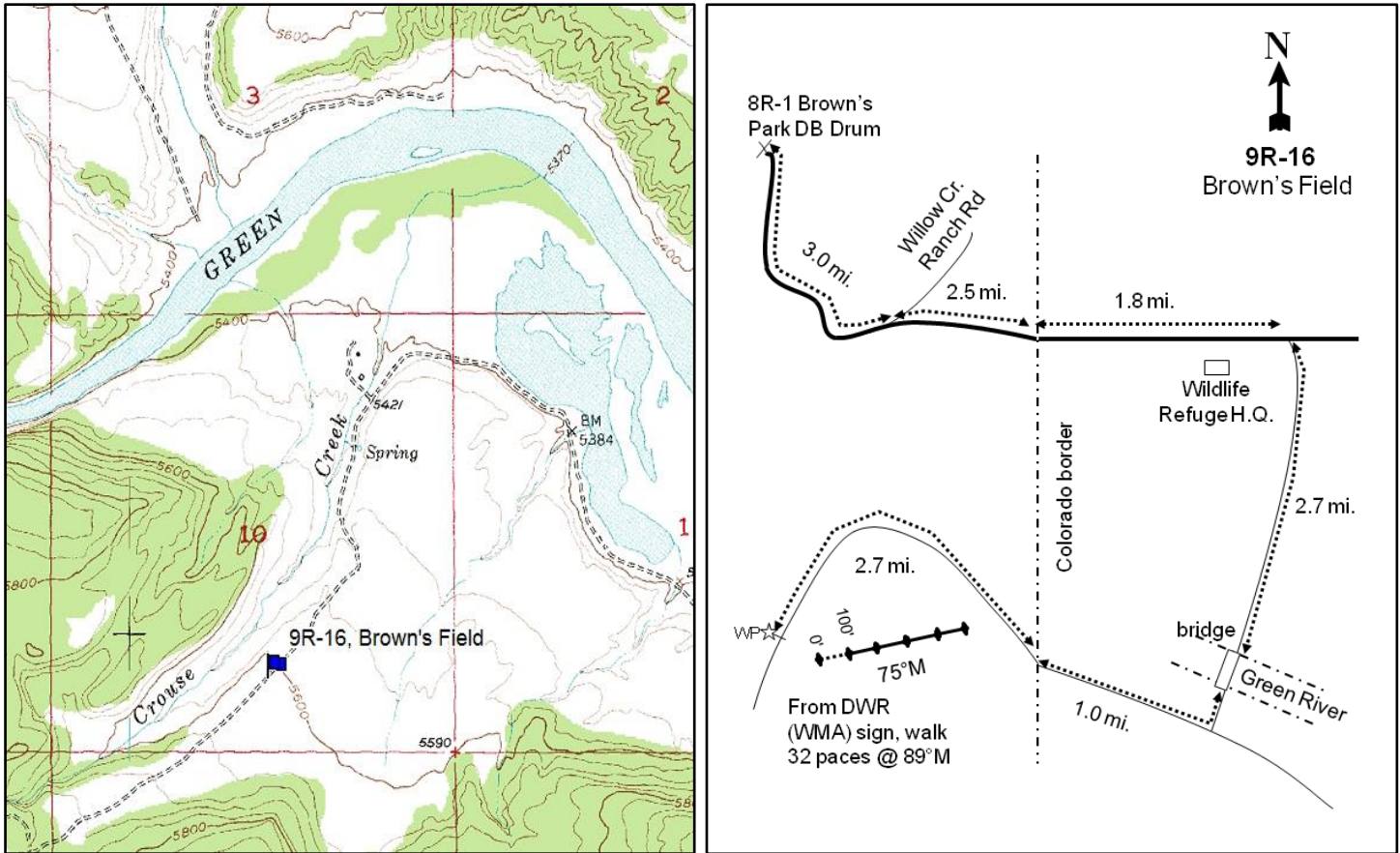
Year	Density		Age Class Distribution			Utilization		Poor Vigor (%)	Average Height Crown (cm)
	Plants Per Acre		Excluding Seedlings			Moderate (%)	Heavy (%)		
	Excluding Seedlings	Seedling	Young (%)	Mature (%)	Decadent (%)				
<b>Artemisia tridentata ssp. vaseyana<sup>p</sup> -- (mountain big sagebrush)</b>									
2005	9360	-	5	73	22	28	29	3	60/76
2008	5380	20	1	41	58	2	2	60	48/64
2013	2680	780	59	19	22	10	8	27	40/49
2018	2620	-	18	77	5	24	4	5	43/51
<b>Eriogonum microthecum<sup>p</sup> -- (slender buckwheat)</b>									
2005	20	-	0	100	0	0	0	0	17/16
2008	20	-	0	100	0	0	0	0	18/28
2013	20	-	0	100	0	0	0	0	9/13
2018	-	-	-	-	-	-	-	-	-/-
<b>Ericameria nauseosa -- (rubber rabbitbrush)</b>									
2005	60	-	33	0	67	33	0	33	50/68
2008	100	-	0	100	0	0	0	0	42/56
2013	500	-	32	68	0	8	16	8	47/70
2018	1120	-	4	84	13	23	5	11	52/71
<b>Gutierrezia sarothrae -- (broom snakeweed)</b>									
2005	260	-	8	92	0	0	0	0	22/26
2008	340	-	41	59	0	0	0	0	24/31
2013	380	-	11	90	0	11	5	5	22/27
2018	3160	-	1	99	0	0	0	0	17/19
<b>Juniperus osteosperma<sup>!</sup> -- (Utah juniper)</b>									
2005	-	-	-	-	-	-	-	-	-/-
2008	-	-	-	-	-	-	-	-	-/-
2013	-	-	-	-	-	-	-	-	-/-
2018	-	-	-	-	-	-	-	-	-/-



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 (%)				
<b>Opuntia -- (pricklypear)</b>									
2005	220	-	18	64	18	0	0	9	7/28
2008	80	-	0	25	75	0	0	0	11/29
2013	200	-	10	90	0	0	0	10	8/20
2018	160	-	0	100	0	0	0	0	11/20
<b>Pediocactus simpsonii -- (mountain ball cactus)</b>									
2005	-	-	-	-	-	-	-	-	6/7
2008	-	-	-	-	-	-	-	-	-/-
2013	-	-	-	-	-	-	-	-	-/-
2018	20	-	0	100	0	0	0	0	-/-
<b>Purshia tridentata<sup>p</sup> -- (antelope bitterbrush)</b>									
2005	780	-	15	77	8	28	44	5	26/55
2008	660	-	0	85	15	18	15	15	32/69
2013	980	-	8	88	4	27	61	29	31/77
2018	1400	-	4	91	4	33	59	1	37/89
<b>Tetradymia canescens -- (spineless horsebrush)</b>									
2005	20	-	0	100	0	100	0	0	30/58
2008	20	-	0	0	100	0	0	0	-/-
2013	40	-	0	50	50	50	50	50	19/34
2018	20	-	0	100	0	0	0	0	30/37

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

## BROWN'S FIELD - STUDY NO. 09R-16

**Location Information**

USGS 7.5 min Map Info  
GPS (0' Stake)

Swallow Canyon NW; Township 1N, Range 25E, Section 10  
NAD 83 UTM ZONE 12, 662108 East 4521861 North

**Transect Information**

Browse Tag # (0' Stake)	232
Transect Bearing	75° magnetic
Length	500ft
Belt Placement	Line 1 (11ft), Line 2 (34ft), Line 3 (59ft), Line 4 (71ft), Line 5 (95ft)
Belt Marker Placement	No Rebar

**Directions to Site**

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

**Site Information**

Land Ownership	State
Land Administrator	UDWR
Allotment	WATSON-DM
Elevation	5,617ft (1,712m)
Aspect	North-Northeast
Slope	5%
Sample Dates	07/08/2008, 08/09/2011, 08/19/2014, 07/26/2018

**Table 09R-16.1 Disturbance History.** Recorded history of major disturbances.

Treatment/Disturbance	Name	WRI DB#	Date	Size (acres)
Seeding - Truax Drill	Browns Park Ag Field Rehabilitation	26	December 2006	200
Herbicide - Plateau	Brown's Park Fields	1152	Fall 2008	143
Seeding - Rangeland Drill	Brown's Park Fields	1152	January 2009	143

**Table 09R-16.2 Seed Mix.** List of known seeded plant species and rates (if available).

Mix Name			Application Type	Application Date	Acres
Brown's Park Fields			Drill	Jan 2009	161
Type	Species	Common Name	Cultivar/Source ID	Bulk lbs/acre	PLS
G	Agropyron cristatum	Crested Wheatgrass	Douglas	0.62	0.51
G	Agropyron cristatum	Crested Wheatgrass	Hycrest	0.62	0.59
G	Agropyron cristatum	Crested Wheatgrass	Nordan	0.62	0.55
G	Agropyron fragile	Siberian Wheatgrass	Vavilov	0.93	0.79
G	Elymus elymoides	Bottlebrush Squirreltail	Toe Jam	0.31	0.27
G	Elymus wawawaiensis	Snake River Wheatgrass	Secar	0.62	0.57
G	Pascopyrum smithii	Western Wheatgrass	Arriba	1.24	1.08
G	Poa secunda	Canby Bluegrass	Canbar	0.31	0.27
G	Psathyrostachys juncea	Russian Wildrye	Bozoisky	0.93	0.88
G	Pseudoroegneria spicata	Bluebunch Wheatgrass	Anatone	0.62	0.51
G	Thinopyrum intermedium	Intermediate Wheatgrass	Oahe	1.24	1.13
F	Medicago sativa	Alfalfa	Ladak	0.93	0.85
F	Medicago sativa	Alfalfa	Ranger	1.24	1.14
S	Atriplex canescens	Fourwing Saltbush	Central UT	0.31	0.13
Mix Name			Application Type	Application Date	Acres
Brown's Park Fields - sage and kochia			Drill	Jan 2009	161
Type	Species	Common Name	Cultivar/Source ID	Bulk lbs/acre	PLS
S	Artemisia tridentata ssp. wyomingensis	Wyoming Big Sagebrush	Sanpete UT	0.99	0.19
S	Bassia prostrata	Forage Kochia	Harney OR	0.35	0.25
S	Bassia prostrata	Forage Kochia	Harney OR	0.62	0.45
Mix Name			Application Type	Application Date	Acres
Crouse Bench			Drill	Dec 2006	225
Type	Species	Common Name	Cultivar/Source ID	Bulk lbs/acre	PLS
G	Dactylis glomerata	Orchardgrass	Paiute	0.24	0.23
G	Elymus lanceolatus	Thickspike Wheatgrass	Bannock	1.00	0.92
G	Poa secunda	Canby Bluegrass	Canbar	0.24	0.18
F	Medicago sativa	Alfalfa	Nomad	2.00	1.86
F	Onobrychis viciifolia	Sainfoin	Eski	4.00	3.67
F	Sanguisorba minor	Small Burnet	Delar	3.00	2.79
Mix Name			Application Type	Application Date	Acres
Crouse Bench Shrubs			Drill	Dec 2006	225
Type	Species	Common Name	Cultivar/Source ID	Bulk lbs/acre	PLS
S	Artemisia tridentata ssp. wyomingensis	Wyoming Big Sagebrush	Utah UT	1.00	0.17
S	Bassia prostrata	Forage Kochia	Millard UT	1.00	0.76

**Wildlife Habitat and Vegetation History****Table 09R-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
Moose	crucial	summer	

Rocky Mountain Bighorn	crucial	year-long	
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**Table 09R-16.4 - Vegetation History.** The dominant vegetation type(s) and phase of woodland succession (Tausch, Miller, Roundy, & Chambers, 2009).

Year	Vegetation Type	Woodland Succession
2008	Annual-Perennial Grass	No Encroachment
2011	Annual Grass-Forb	No Encroachment
2014	Annual Grass	No Encroachment
2018	Annual Grass	No Encroachment

#### Site Notes

No Notes

#### Site Potential

1981 - 2010 Average Annual Precipitation	9 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.

Upon study establishment in 2008, this site was dominated by a mixture of annual and perennial grasses, namely cheatgrass (*Bromus tectorum*) and intermediate wheatgrass (*Thinopyrum intermedium*). Since then, the dominant vegetation component has varied, but annual grasses have been (co-)dominant in each sample year; the consistently high amounts of cheatgrass may pose a threat to the ecological resilience of the plant community. Forb cover varied from year to year with the most abundant species being burningbush (*Bassia scoparia*) in 2011. Perennial grasses increased between 2014 and 2018, and they were co-dominant with cheatgrass in the most recent sample year (Table 09R-16.7, Table 09R-16.10, Table 09R-16.11). Browse has remained rare throughout the duration of the study period (Table 09R-16.12, Table 09R-16.13).

**Trend Summary Tables****Table 09R-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
2008	0.0	0.1	-	0.1	-	-
2011	-	0.1	-	0.2	0.2	-
2014	-	0.4	-	0.1	0.5	-
2018	0.4	0.4	-	0.7	-	-

**Table 09R-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
2008	371	246	373	36	9.9	7.6	8.5	0.4
2011	202	184	151	29	9.6	7.7	16.4	1.1
2014	433	191	90	29	37.7	4.1	2.2	0.3
2018	431	330	24	47	20.1	17.9	0.2	0.6

**Table 09R-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
2008	43.2	-	32.9	0.6	0.3	35.5
2011	43.6	-	24.4	-	0.0	33.5
2014	34.2	-	47.7	0.3	0.2	46.6
2018	19.7	-	69.1	0.1	0.6	37.3

**Table 09R-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	Pronghorn	Cattle	Mule Deer	Rocky Mountain Elk	Greater Sage-Grouse	Rabbit
	Quadrat Frequency					
2008	-	-	61	31	-	69
2011	-	-	15	12	-	1
2014	3	-	39	22	2	36
2018	1	-	10	19	-	23
Year	Days Use Per Acre (ha)					
2008	-	-	99.8 (246.6)	28.1 (69.5)	-	-
2011	-	-	11.4 (28.1)	22.8 (56.3)	-	-
2014	-	-	67.0 (165.5)	11.4 (28.1)	8.7 (21.5)*	-
2018	-	2.9 (7.2)	32.2 (79.5)	13.4 (33.1)	8.7 (21.5)*	-

Pellets per acre (ha)

**Table 09R-16.10 - Grass Species.** Nested frequency and modified Daubenmire average cover by year.

GRASS SPECIES	Achnatherum hymenoides (Indian ricegrass)	Agropyron cristatum <sup>i</sup> (crested wheatgrass)	Agropyron fragile <sup>i</sup> (Siberian wheatgrass)	Bromus tectorum <sup>ai</sup> (cheatgrass)	Elymus elymoides (squirreltail)	Elymus lanceolatus (thickspike wheatgrass)	Festuca idahoensis (Idaho fescue)	Pascopyrum smithii (western wheatgrass)	Poa secunda (Sandberg bluegrass)	Psathyrostachys juncea <sup>i</sup> (Russian wildrye)	Sporobolus cryptandrus (sand dropseed)	Thinopyrum intermedium <sup>i</sup> (intermediate wheatgrass)
year	Nested Frequency											
2008	2	57	-	371	-	-	-	-	-	6	36	199
2011	-	61	1	202	0	-	-	89	-	5	-	57
2014	1	42	-	433	-	4	2	114	4	32	-	8
2018	-	122	20	431	-	-	-	104	-	46	-	118
year	Average Cover (%)											
2008	0.1	1.2	-	9.9	-	-	-	-	-	0.2	0.4	5.6
2011	-	1.5	0.1	9.6	0.0	-	-	3.3	-	0.2	-	2.5
2014	0.0	1.4	-	37.7	-	0.0	0.0	1.6	0.0	1.0	-	0.0
2018	-	5.5	1.1	20.1	-	-	-	3.5	-	1.9	-	5.8

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

**Table 09R-16.11 - Forb Species.** Nested frequency and modified Daubenmire average cover by year.

FORB SPECIES	Bassia scoparia <sup>ai</sup> (burningbush)	Chenopodium fremontii <sup>a</sup> (Fremont's goosefoot)	Chenopodium leptophyllum <sup>a</sup> (narrowleaf goosefoot)	Descurainia pinnata <sup>a</sup> (western tansymustard)	Helianthus annuus <sup>ai</sup> (common sunflower)	Iva axillaris (povertyweed)	Lactuca serriola <sup>ai</sup> (prickly lettuce)	Medicago sativa <sup>i</sup> (alfalfa)	Penstemon (beardtongue)	Salsola tragus <sup>ai</sup> (prickly Russian thistle)	Sisymbrium altissimum <sup>ai</sup> (tall tumblemustard)	Sphaeralcea coccinea (scarlet globemallow)	Tragopogon dubius <sup>ai</sup> (yellow safsify)
year	Nested Frequency												
2008	269	-	1	-	-	13	-	1	25	163	164	2	3
2011	136	2	8	-	6	26	-	-	-	8	5	3	-
2014	13	-	-	10	-	5	2	-	25	25	45	-	4
2018	-	-	-	3	-	-	-	2	38	-	20	14	1
year	Average Cover (%)												
2008	5.3	-	0.0	-	-	0.2	-	0.0	0.1	0.3	2.9	0.0	0.0
2011	14.8	0.0	0.6	-	0.2	1.1	-	-	-	0.6	0.2	0.0	-
2014	0.6	-	-	0.0	-	0.0	0.0	-	0.2	0.6	0.9	-	0.0
2018	-	-	-	0.0	-	-	-	0.0	0.4	-	0.1	0.1	0.0

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



**Table 09R-16.12 - Shrub and Tree Species.** Average modified Daubenmire quadrat and line intercept cover by year.

SHRUB SPECIES			
	<i>Bassia prostrata</i> <sup>pt</sup> (forage kochia)		
	<i>Gutierrezia sarothrae</i> (broom snakeweed)		
	<i>Opuntia</i> (pricklypear)		
year	Line Intercept Cover (%)		
2008	0.1	-	-
2011	0.2	-	0.2
2014	0.1	-	0.5
2018	0.7	-	-
year	Quadrat Cover (%)		
2008	0.0	-	0.1
2011	0.0	-	0.1
2014	0.0	0.0	0.4
2018	0.4	-	0.4

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

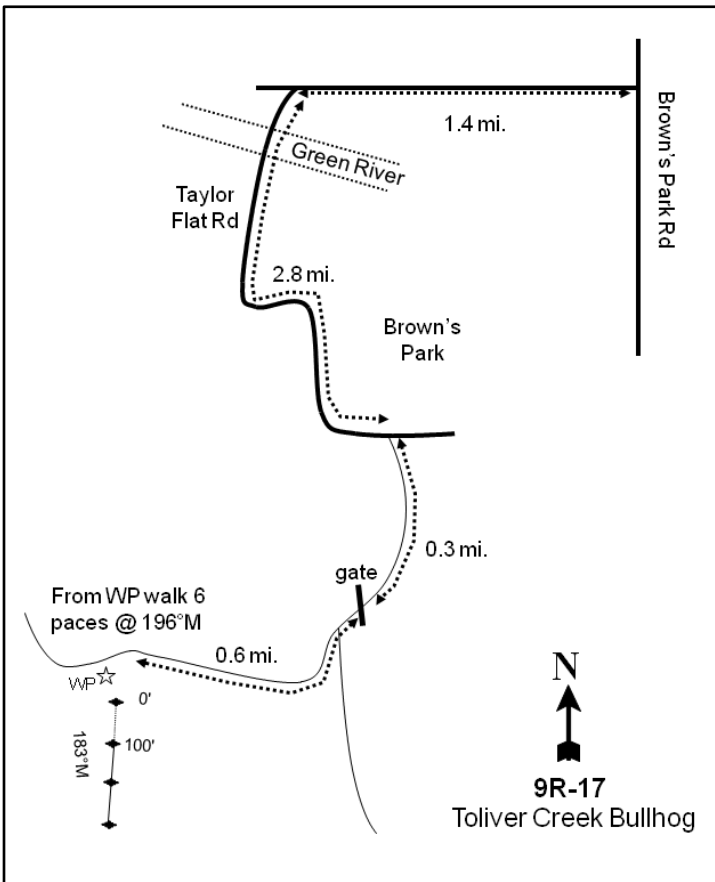
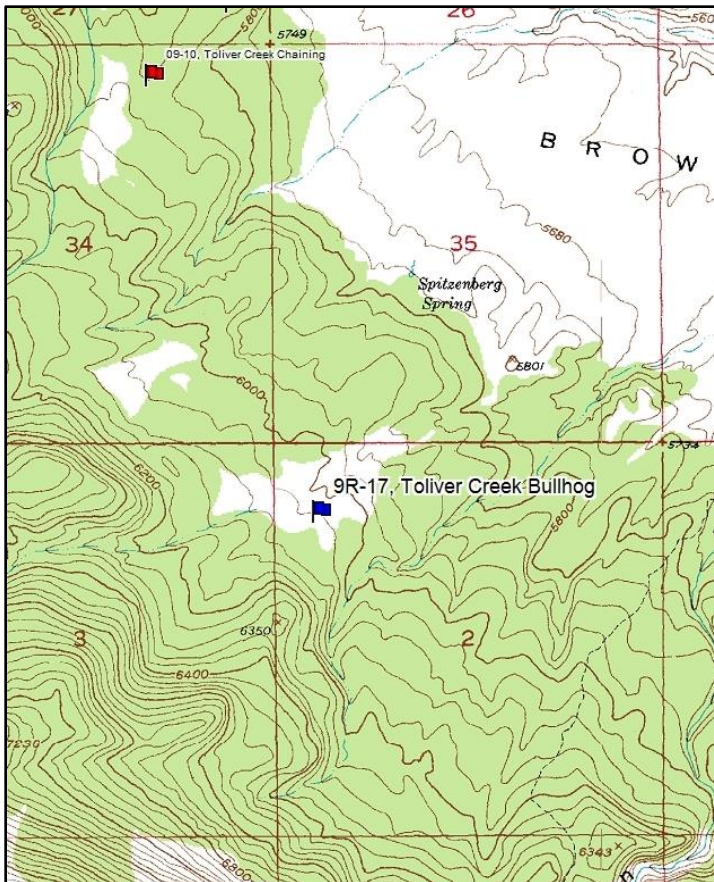
**Table 09R-16.13 - Shrub/Tree Characteristics.** Population characteristics of shrub/tree species populations including density reproduction (seedlings), age distribution, utilization, vigor and average size (height/crown) of plants.

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 (%)				
<i>Artemisia tridentata</i> ssp. <i>vaseyana</i> <sup>p</sup> -- (mountain big sagebrush)									
2008	-	-	-	-	-	-	-	-	-/-
2011	20	-	100	0	0	0	0	0	-/-
2014	-	-	-	-	-	-	-	-	-/-
2018	20	-	0	100	0	0	0	0	14/16
<i>Atriplex canescens</i> <sup>p</sup> -- (fourwing saltbush)									
2008	-	-	-	-	-	-	-	-	50/69
2011	-	-	-	-	-	-	-	-	84/99
2014	-	-	-	-	-	-	-	-	82/134
2018	-	-	-	-	-	-	-	-	91/141
<i>Bassia prostrata</i> <sup>pt</sup> -- (forage kochia)									
2008	-	-	-	-	-	-	-	-	8/23
2011	20	-	0	100	0	0	0	0	-/-
2014	20	-	0	100	0	0	0	0	27/40
2018	40	-	0	100	0	50	0	0	61/93
<i>Ericameria nauseosa</i> -- (rubber rabbitbrush)									
2008	-	-	-	-	-	-	-	-	43/76
2011	-	-	-	-	-	-	-	-	65/92
2014	-	-	-	-	-	-	-	-	53/71
2018	-	-	-	-	-	-	-	-	86/158
<i>Gutierrezia sarothrae</i> -- (broom snakeweed)									
2008	-	-	-	-	-	-	-	-	20/32
2011	-	-	-	-	-	-	-	-	-/-
2014	-	20	0	0	0	0	0	0	-/-
2018	20	-	0	100	0	0	0	0	16/21

Year	Density		Age Class Distribution			Utilization		Poor Vigor (%)	Average Height Crown (cm)
	Plants Per Acre		Excluding Seedlings			Moderate (%)	Heavy (%)		
	Excluding Seedlings	Seedling	Young (%)	Mature (%)	Decadent (%)				
Opuntia -- (pricklypear)									
2008	100	-	0	100	0	0	0	0	8/20
2011	80	-	0	100	0	0	0	0	9/39
2014	100	-	0	100	0	0	0	0	9/65
2018	120	-	17	83	0	0	0	0	10/65

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

## TOLIVER CREEK BULLHOG - STUDY NO. 09R-17



### Location Information

USGS 7.5 min Map Info  
GPS (0' Stake)

Warren Draw NE; Township 1N, Range 24E, Section 02  
NAD 83 UTM ZONE 12, 653277 East 4524286 North

### Transect Information

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

261  
183° magnetic  
300ft  
Line 1 (11ft & 95ft), Line 2 (54ft), Line 3 (34ft & 71ft)  
No Rebar, Line 3: 85ft Long

### Directions to Site

From Brown's Park Road, turn west and drive 1.4 miles toward Toliver Flat Road. Following Toliver Flat Road, cross the bridge over the Green River. Continue 2.8 miles to an intersection, passing Bridge Hollow campground and Brown's Park on the left. Stay right at the intersection and drive 0.3 miles to a gate. From the gate, take the road to the right (not Outlaw Trail) and drive 0.6 miles to the half-high witness post on the left (south) side of the road. The 0-foot stake is 6 paces from the witness post at 196 degrees magnetic and is marked with browse tag #261.

**Site Information**

Land Ownership	State
Land Administrator	SITLA
Allotment	TAYLOR FLAT
Elevation	6,050ft (1,844m)
Aspect	Northeast
Slope	4%
Sample Dates	07/29/2008, 08/09/2011, 08/20/2014, 07/26/2018

**Table 09R-17.1 Disturbance History.** Recorded history of major disturbances.

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

**Table 09R-17.2 Seed Mix.** List of known seeded plant species and rates (if available).

Mix Name			Application Type	Application Date	Acres
Toliver Creek Bullhog			Aerial	Oct 2008	250
Type	Species	Common Name	Cultivar/Source ID	Bulk lbs/acre	PLS
G	<i>Achnatherum hymenoides</i>	Indian Ricegrass	Rimrock	1.00	0.92
G	<i>Elymus wawawaiensis</i>	Snake River Wheatgrass	Secar	1.00	0.76
G	<i>Pascopyrum smithii</i>	Western Wheatgrass	Arriba	1.50	1.41
G	<i>Poa secunda</i>	Sandberg Bluegrass	Toole MT	0.25	0.21
G	<i>Pseudoroegneria spicata</i>	Bluebunch Wheatgrass	Anatone	1.00	0.71
G	<i>Sporobolus cryptandrus</i>	Sand Dropseed		0.05	0.04
F	<i>Medicago sativa</i>	Alfalfa	Ladak	0.70	0.66
F	<i>Medicago sativa</i>	Alfalfa	Ranger	0.80	0.73
S	<i>Artemisia tridentata</i> ssp. <i>wyomingensis</i>	Wyoming Big Sagebrush	Sanpete UT	1.00	0.19
S	<i>Atriplex canescens</i>	Fourwing Saltbush	Central UT	1.00	0.43

**Wildlife Habitat and Vegetation History****Table 09R-17.3 - Wildlife Seasonal Habitat.** UDWR wildlife habitat and seasonality.

Species	Habitat	Season
Deer	crucial	winter
Elk	crucial	winter
Rocky Mountain Bighorn	crucial	year-long

**Table 09R-17.4 - 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 II
2011	Mountain Big Sagebrush/Perennial Grass	Phase I
2014	Mountain Big Sagebrush/Perennial Grass	Phase I
2018	Mountain Big Sagebrush/Perennial Grass	Phase I

**Site Notes**

No Notes

**Site Potential**

1981 - 2010 Average Annual Precipitation	10 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.

The plant community on this site was dominated by mountain big sagebrush (*Artemisia tridentata* ssp. *vaseyana*), Utah juniper (*Juniperus osteosperma*), and twoneedle pinyon (*Pinus edulis*) and was in Phase II of woodland succession upon study establishment in 2008 (Table 09R-17.4). Most of the trees were removed by a bullhog project later that year (Table 09R-17.1), and sagebrush has been a dominant vegetation component in all post-treatment sample years (Table 09R-14.12, Table 09R-14.13). However, pinyon and juniper have been observed in low amounts in all years following the bullhog project. This continued tree presence indicates that infilling may be possible over time (Table 09R-17.14). Herbaceous cover was low prior to treatment and only perennial grasses were diverse. Cover of perennial grasses has increased following treatment, and they have been a co-dominant cover type since 2011. Cheatgrass (*Bromus tectorum*) has been present with fluctuating cover since the first reading of the study. In 2018, however,

cheatgrass was abundant (Table 09R-17.7, Table 09R-17.10, Table 09R-17.11); high amounts of annual grasses can negatively impact the ecological resilience of a plant community.

### Trend Summary Tables

**Table 09R-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
2008	10.8	1.2	11.2	12.4	1.0	10.3
2011	9.7	1.6	-	14.7	1.8	0.2
2014	9.9	1.0	0.0	9.4	1.4	0.3
2018	10.0	3.5	0.1	10.4	4.7	0.5

**Table 09R-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
2008	204	253	22	41	1.9	6.2	0.1	0.3
2011	333	304	92	87	7.9	12.6	0.4	1.7
2014	351	310	13	49	5.2	10.6	0.0	0.2
2018	341	332	19	55	12.4	16.0	0.1	0.4

**Table 09R-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
2008	42.0	2.0	42.0	6.0	0.1	28.9
2011	36.5	1.4	38.1	0.1	0.1	32.1
2014	29.8	0.9	49.2	4.4	0.4	28.6
2018	24.5	1.8	62.1	0.2	-	36.1

**Table 09R-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	Greater Sage-Grouse	Rabbit
	Quadrat Frequency				
2008	7	20	10	-	73
2011	-	25	12	-	10
2014	4	59	11	-	24
2018	-	22	1	-	21
Year	Days Use Per Acre (ha)				
2008	26.8 (66.3)	75.7 (187.0)	26.2 (64.6)	-	-
2011	-	46.2 (114.2)	12.1 (29.8)	26.2 (64.6)*	-
2014	-	4.7 (11.6)	3.4 (8.3)	-	-
2018	-	34.9 (86.1)	3.4 (8.3)	-	-

\*Pellets per acre (ha)

**Table 09R-17.10 - Grass Species.** Nested frequency and modified Daubenmire average cover by year.

GRASS SPECIES	Achnatherum hymenoides (Indian ricegrass)	Agropyron cristatum <sup>i</sup> (crested wheatgrass)	Bromus tectorum <sup>ai</sup> (cheatgrass)	Carex obtusata (obtuse sedge)	Elymus elymoides (squirreltail)	Festuca idahoensis (Idaho fescue)	Hesperostipa comata (needle and thread)	Pascopyrum smithii (western wheatgrass)	Poa fendleriana (muttongrass)	Poa secunda (Sandberg bluegrass)	Pseudoroegneria spicata (bluebunch wheatgrass)	Sporobolus airoides (alkali sacaton)	Vulpia octoflora <sup>a</sup> (sixweeks fescue)
year	Nested Frequency												
2008	14	18	172	39	2	-	94	108	2	90	-	7	104
2011	9	22	325	44	11	11	111	155	-	31	14	-	44
2014	9	43	327	26	13	16	127	91	-	85	18	21	165
2018	23	31	312	33	20	2	91	180	49	61	2	8	181
year	Average Cover (%)												
2008	0.1	0.4	1.7	0.9	0.1	-	2.2	1.3	0.0	1.2	-	0.0	0.3
2011	1.1	1.1	7.8	0.9	0.4	0.0	5.1	2.9	-	0.6	0.3	-	0.2
2014	0.5	2.1	4.2	0.1	0.1	0.1	5.6	0.6	-	1.0	0.2	0.2	1.0
2018	1.7	1.9	9.0	0.2	0.3	0.0	5.1	3.6	2.0	0.9	0.1	0.2	3.4

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

**Table 09R-17.11 - Forb Species.** Nested frequency and modified Daubenmire average cover by year.

FORB SPECIES	Alyssum desertorum <sup>ai</sup> (desert madwort)	Astragalus convallarius (lesser rushy milkvetch)	Calochortus nuttallii (sego lily)	Chenopodium leptophyllum <sup>a</sup> (narrowleaf goosefoot)	Cirsium (thistle)	Comandra umbellata (bastard toadflax)	Cymopterus (springparsley)	Descurainia pinnata <sup>a</sup> (western tansymustard)	Draba <sup>a</sup> (draba)	Erodium cicutarium <sup>ai</sup> (redstem stork's bill)	Gayophytum ramosissimum <sup>a</sup> (pinyon groundsmoke)	Gilia inconspicua <sup>a</sup> (shy gilia)	Iva axillaris (povertyweed)	Lactuca serriola <sup>ai</sup> (prickly lettuce)	Lappula occidentalis <sup>a</sup> (flatspine stickseed)	Lepidium <sup>a</sup> (pepperweed)	Mentzelia albicaulis <sup>a</sup> (whitestem blazingstar)
year	Nested Frequency																
2008	12	-	-	-	-	-	1	2	-	-	-	8	15	-	3	-	-
2011	45	9	7	8	1	-	-	4	-	-	21	20	37	2	-	-	2
2014	-	3	-	-	-	-	-	13	-	-	-	-	27	-	5	-	-
2018	1	7	3	-	4	1	-	-	7	4	-	-	32	6	-	3	-
year	Average Cover (%)																
2008	0.0	-	-	-	-	-	0.0	0.0	-	-	-	0.1	0.0	-	0.0	-	-
2011	0.2	0.6	0.0	0.0	0.0	-	-	0.0	-	-	0.1	0.0	0.6	0.0	-	-	0.0
2014	-	0.0	-	-	-	-	-	0.0	-	-	-	-	0.1	-	0.0	-	-
2018	0.0	0.1	0.0	-	0.0	0.0	-	-	0.0	0.0	-	-	0.3	0.0	-	0.0	-

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

FORB SPECIES						
Orobanche fasciculata (clustered broomrape)						
Packera multilobata (lobeleaf groundsel)						
Phlox hoodii (spiny phlox)						
Plantago patagonica <sup>a</sup> (woolly plantain)						
Sphaeralcea coccinea (scarlet globemallow)						
Tragopogon dubius <sup>ai</sup> (yellow salsify)						
year	Nested Frequency					
2008	5	-	-	-	20	-
2011	-	-	-	2	42	2
2014	-	2	3	-	17	-
2018	-	-	-	2	14	-
year	Average Cover (%)					
2008	0.0	-	-	-	0.2	-
2011	-	-	-	0.0	0.4	0.0
2014	-	0.0	0.0	-	0.0	-
2018	-	-	-	0.0	0.0	-

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

**Table 09R-17.12 - Shrub and Tree Species.** Average modified Daubenmire quadrat and line intercept cover by year.

SHRUB SPECIES						
Amelanchier utahensis <sup>p</sup> (Utah serviceberry)						
Artemisia tridentata ssp. vaseyana <sup>p</sup> (mountain big sagebrush)						
Gutierrezia sarothrae (broom snakeweed)						
Juniperus osteosperma <sup>t</sup> (Utah juniper)						
Opuntia (pricklypear)						
Pinus edulis <sup>t</sup> (twoneedle pinyon)						
year	Line Intercept Cover (%)					
2008	-	12.4	0.4	5.9	0.6	4.4
2011	-	14.7	1.2	0.2	0.6	-
2014	-	9.4	0.3	0.3	1.1	-
2018	-	10.4	3.9	0.5	0.8	-
year	Quadrat Cover (%)					
2008	-	10.8	0.5	7.6	0.8	3.6
2011	0.0	9.6	1.1	0.0	0.5	-
2014	-	9.9	0.3	0.0	0.7	-
2018	-	10.0	2.9	0.1	0.6	-

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



**Table 09R-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.

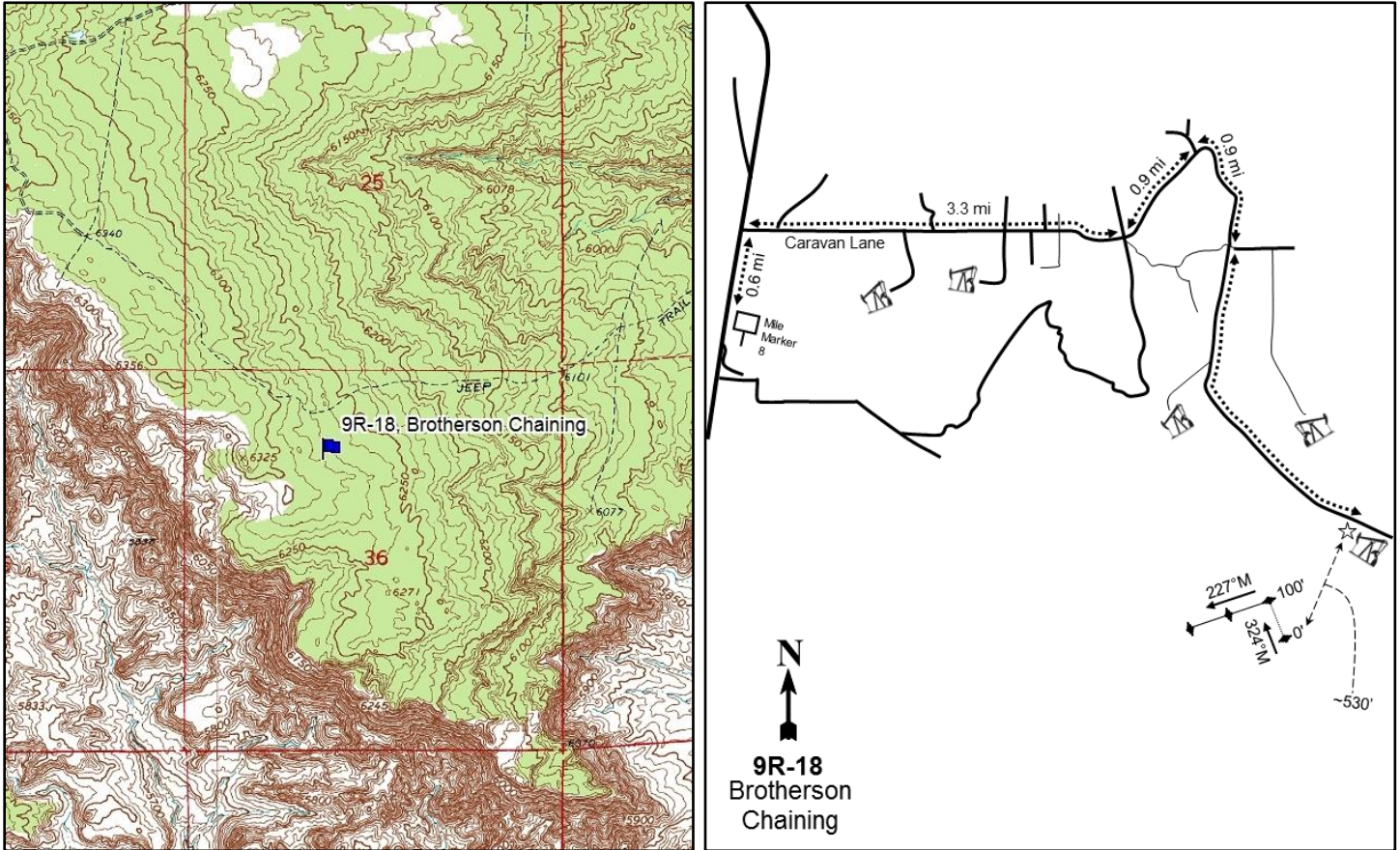
Year	Density		Age Class Distribution			Utilization		Poor Vigor (%)	Average Height Crown (cm)
	Plants Per Acre		Excluding Seedlings			Moderate (%)	Heavy (%)		
	Excluding Seedlings	Seedling	Young (%)	Mature (%)	Decadent (%)				
<b>Amelanchier utahensis<sup>p</sup> -- (Utah serviceberry)</b>									
2008	-	-	-	-	-	-	-	-	-/-
2011	20	-	100	0	0	0	0	0	72/83
2014	-	-	-	-	-	-	-	-	-/-
2018	-	-	-	-	-	-	-	-	-/-
<b>Artemisia tridentata ssp. vaseyana<sup>p</sup> -- (mountain big sagebrush)</b>									
2008	4120	160	3	63	34	21	65	17	35/57
2011	4800	240	14	80	6	27	30	6	33/58
2014	4340	80	7	77	16	32	60	15	33/61
2018	3920	40	4	82	14	36	12	20	36/61
<b>Ericameria nauseosa -- (rubber rabbitbrush)</b>									
2008	-	-	-	-	-	-	-	-	-/-
2011	-	-	-	-	-	-	-	-	35/39
2014	-	-	-	-	-	-	-	-	-/-
2018	-	-	-	-	-	-	-	-	53/56
<b>Gutierrezia sarothrae -- (broom snakeweed)</b>									
2008	420	-	0	91	10	0	5	5	18/22
2011	860	-	9	84	7	0	0	9	21/33
2014	380	-	32	68	0	0	0	0	14/23
2018	6100	-	2	98	0	0	0	3	14/24
<b>Juniperus osteosperma<sup>t</sup> -- (Utah juniper)</b>									
2008	120	-	17	67	17	0	0	33	-/-
2011	20	-	0	100	0	0	0	0	-/-
2014	20	-	100	0	0	0	0	0	-/-
2018	160	-	13	88	0	0	0	0	-/-
<b>Opuntia -- (pricklypear)</b>									
2008	660	40	6	88	6	0	0	3	10/37
2011	660	-	0	100	0	0	0	0	9/27
2014	880	20	2	96	2	0	0	5	10/36
2018	900	-	4	96	0	0	0	0	8/27
<b>Pinus edulis<sup>t</sup> -- (twoneedle pinyon)</b>									
2008	120	-	17	83	0	0	0	0	-/-
2011	20	-	100	0	0	0	0	0	-/-
2014	20	-	100	0	0	0	0	0	-/-
2018	-	-	-	-	-	-	-	-	-/-
<b>Rhus trilobata var. trilobata<sup>p</sup> -- (skunkbush sumac)</b>									
2008	-	-	-	-	-	-	-	-	-/-
2011	20	-	100	0	0	0	0	0	15/12
2014	-	-	-	-	-	-	-	-	-/-
2018	-	-	-	-	-	-	-	-	8/13
<b>Rosa woodsii<sup>p</sup> -- (Woods' rose)</b>									
2008	-	-	-	-	-	-	-	-	35/35
2011	-	-	-	-	-	-	-	-	28/24
2014	-	-	-	-	-	-	-	-	37/28
2018	-	-	-	-	-	-	-	-	38/29

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

**Table 09R-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' (%)	
<b>Juniperus osteosperma (Utah juniper)</b>							
2008	49	-	6	50	44	-	22.9
2011	15	9	82	9	-	-	9.9
2014	21	15	85	-	-	-	7.1
2018	25	21	50	29	-	-	4.7
<b>Pinus edulis (twoneedle pinyon)</b>							
2008	36	-	-	38	23	38	13.3
2011	4	67	-	33	-	-	5.3
2014	4	-	67	33	-	-	6.0
2018	8	-	100	-	-	-	3.6

## BROTHERSON CHAINING - STUDY NO. 09R-18



### Location Information

USGS 7.5 min Map Info	Altamont SE; Township 2S, Range 4W, Section 36
GPS (0' Stake)	NAD 83 UTM ZONE 12, 560616 East 4457700 North

### Transect Information

Browse Tag # (0' Stake)	253
Transect Bearing	324° magnetic (Lines 2-3: 227° magnetic)
Length	300ft
Belt Placement	Line 1 (11ft), Line 2 (54ft & 95ft), Line 3 (34ft & 71ft)
Belt Marker Placement	No Rebar

### Directions to Site

Driving from Duchesne, proceed north on State Route (SR) 87. Drive 0.6 miles past mile marker 8 to Caravan Lane on the east side of the road. Drive 4.2 miles on Caravan Lane to an intersection. Stay left and drive for another 0.9 miles to another intersection. Stay right and travel for 0.5 miles, passing some gas tanks on the left. At the fork, stay right and drive 0.3 miles, traveling south. At the next fork, stay to the right and go 0.1 miles past an oil derrick. Drive 0.3 miles to a fork while staying to the left, then drive 0.8 miles to the gas pad and half-high witness post on the right (south) side of the road. The 0-foot stake is 450 feet from the witness post at 203 degrees magnetic and is marked with browse tag #253.

**Site Information**

Land Ownership	Private
Land Administrator	Private
Allotment	No data
Elevation	6,280ft (1,914m)
Aspect	Northeast
Slope	2-4%
Sample Dates	07/30/2008, 08/10/2011, 06/17/2015, 08/01/2018

**Table 09R-18.1 Disturbance History.** Recorded history of major disturbances.

Treatment/Disturbance	Name	WRI DB#	Date	Size (acres)
Chaining - Two-Way Ely	Brotherson Chaining	1150	November 2008	347
Seeding - Aerial Before	Brotherson Chaining	1150	November 2008	347
Seeding - Aerial After	Brotherson Chaining	1150	December 2008	237

**Table 09R-18.2 Seed Mix.** List of known seeded plant species and rates (if available).

Mix Name			Application Type	Application Date	Acres
Brotherson Chaining			Aerial	Nov 2008	200
Type	Species	Common Name	Cultivar/Source ID	Bulk lbs/acre	PLS
G	Achnatherum hymenoides	Indian Ricegrass	Rimrock	1.00	0.92
G	Agropyron cristatum	Crested Wheatgrass	Nordan	1.00	0.89
G	Bouteloua gracilis	Blue Grama		0.20	0.13
G	Elymus lanceolatus	Thickspike Wheatgrass	Critana	1.00	0.87
G	Poa secunda	Sandberg Bluegrass	Toole MT	0.25	0.21
G	Psathyrostachys juncea	Russian Wildrye	Bozoisky	1.00	0.94
G	Pseudoroegneria spicata	Bluebunch Wheatgrass	Goldar	1.00	0.76
G	Sporobolus cryptandrus	Sand Dropseed		0.05	0.04
F	Achillea millefolium	Western Yarrow		0.05	0.05
F	Linum perenne	Blue Flax	Appar	0.25	0.22
Mix Name			Application Type	Application Date	Acres
Brotherson Chaining - Sagebrush/Kochia			Aerial	Dec 2008	150
Type	Species	Common Name	Cultivar/Source ID	Bulk lbs/acre	PLS
S	Artemisia tridentata ssp. wyomingensis	Wyoming Big Sagebrush	Beaver UT	0.50	0.08
S	Bassia prostrata	Forage Kochia	Lander NV	1.00	0.66

**Wildlife Habitat and Vegetation History**

**Table 09R-18.3 - Wildlife Seasonal Habitat.** UDWR wildlife habitat and seasonality.

Species	Habitat	Season
Deer	crucial	winter
Elk	substantial	winter
Greater Sage Grouse		

**Table 09R-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	Juniper	Phase II transitioning to Phase III
2011	Perennial Grass	Phase I
2015	Perennial Grass	Phase I
2018	Perennial Grass	Phase I

**Site Notes**

Property adjacent to the WRI project area had been chained in the past with successful results. Line 1 was moved in 2018 and line numbers of belts 5 and 3 were switched as a gas pad had been built over the 0-foot stake.

**Site Potential**

1981 - 2010 Average Annual Precipitation 9 inches  
 NRCS Ecological Site Upland Loam (Wyoming Big Sagebrush)  
 NRCS Ecological Site # R048AY306UT  
 States and Transitions No state and transition model is available for this ecological site.

When the study was established in 2008, the plant community was dominated by Utah juniper (*Juniperus osteosperma*) with black sagebrush (*Artemisia nova*) and Wyoming big sagebrush (*A. tridentata* ssp. *wyomingensis*) as the primary preferred browse species. Populations of both sagebrush species exhibited high amounts of decadence, however, and they were only minor components of the shrub overstory (Table 09R-18.6, Table 09R-18.12, Table 09R-18.13). The herbaceous understory was in poor condition with low diversity and abundance. However, the herbaceous component increased significantly following treatment, and perennial grasses have been the dominant vegetation component since 2011. All perennial grasses observed post-treatment have been seeded species, indicating that the seeding was successful. Crested wheatgrass (*Agropyron cristatum*) has been the most dominant species, with Indian ricegrass (*Achnatherum hymenoides*) and bluebunch wheatgrass (*Pseudoroegneria spicata*) providing lesser but still significant cover (Table 09R-18.10). Forbs have generally remained sparse with the exception of the 2011 sample year (Table 09R-18.11). Black sagebrush has increased in abundance with an increased amount of young plants, but still remains a minor component of the site with less than 2.5 percent cover observed in 2018 (Table 09R-18.12, Table 09R-18.13). Most of the juniper was removed from the site and surviving trees were either young or those that survived the chaining (Table 09R-18.13, Table 09R-18.14).

**Trend Summary Tables**

**Table 09R-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	4.1	11.5	6.4	5.3	8.8	15.8
2011	3.0	2.6	-	7.4	2.0	0.1
2015	4.4	3.4	0.1	5.9	3.6	0.4
2018	2.8	3.2	0.0	4.7	2.6	-

**Table 09R-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	20	-	188	85	0.0	-	3.0	1.5
2011	89	205	237	175	0.6	14.0	4.9	4.1
2015	29	251	97	57	0.2	15.9	2.0	0.6
2018	39	206	49	4	0.4	15.4	1.1	0.0

**Table 09R-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	45.8	2.5	39.1	0.9	-	27.1
2011	43.0	-	32.4	-	-	29.4
2015	45.4	0.4	39.0	0.0	0.0	25.0
2018	49.4	0.2	47.9	1.1	-	23.5

**Table 09R-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	Coyote	Mule Deer	Rocky Mountain Elk	Rabbit
	Quadrat Frequency				
2008	-	-	5	-	54
2011	-	-	1	1	15
2015	-	-	15	1	74
2018	-	-	11	-	38
Year	Days Use Per Acre (ha)				
2008	0.7 (1.8)	8.7 (21.5)*	37.5 (92.7)	3.4 (8.3)	-
2011	-	-	0.7 (1.7)	2.7 (6.6)	-
2015	-	-	8.1 (19.9)	6.0 (14.9)	-
2018	-	-	-	-	-

\*Pellets per acre (ha)

**Table 09R-18.10 - Grass Species.** Nested frequency and modified Daubenmire average cover by year.

GRASS SPECIES	Achnatherum hymenoides (Indian ricegrass)	Agropyron cristatum <sup>i</sup> (crested wheatgrass)	Bromus inermis <sup>i</sup> (smooth brome)	Bromus tectorum <sup>ai</sup> (cheatgrass)	Elymus elymoides (squirreltail)	Elymus lanceolatus (thickspike wheatgrass)	Psathyrostachys juncea <sup>i</sup> (Russian wildrye)	Pseudoroegneria spicata (bluebunch wheatgrass)	Vulpia octoflora <sup>a</sup> (sixweeks fescue)
year	Nested Frequency								
2008	-	-	-	15	-	-	-	-	5
2011	87	95	1	89	-	95	13	23	-
2015	57	163	-	27	-	74	32	21	5
2018	30	129	-	39	6	6	32	39	-
year	Average Cover (%)								
2008	-	-	-	0.0	-	-	-	-	0.0
2011	5.0	5.1	0.0	0.6	-	3.4	0.4	0.1	-
2015	4.8	6.8	-	0.2	-	1.5	1.7	1.2	0.0
2018	2.3	8.4	-	0.4	0.1	0.0	1.8	2.7	-

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

**Table 09R-18.11 - Forb Species.** Nested frequency and modified Daubenmire average cover by year.

FORB SPECIES	Abrotia fragrans (snowball sand verbena)	Arabis (rockcress)	Astragalus convallarius (lesser rushy milkvetch)	Chaenactis douglasii (Douglas' dustymaiden)	Chenopodium leptophyllum <sup>a</sup> (narrowleaf goosefoot)	Cryptantha <sup>a</sup> (annual cryptantha)	Descurainia pinnata <sup>a</sup> (western tansymustard)	Eriogonum cernuum <sup>a</sup> (nodding buckwheat)	Gilia inconspicua <sup>a</sup> (shy gilia)	Halogeton glomeratus <sup>ai</sup> (saltlover)	Lappula occidentalis <sup>a</sup> (flatspine stickseed)	Linum perenne <sup>i</sup> (blue flax)	Lupinus argenteus (silvery lupine)	Malacothrix sonchoides <sup>a</sup> (sowthistle desertdandelion)	Microsteris gracilis <sup>a</sup> (slender phlox)	Polygonum douglasii <sup>a</sup> (Douglas' knotweed)	Salsola tragus <sup>ai</sup> (prickly Russian thistle)
year	Nested Frequency																
2008	-	3	-	78	42	-	70	93	18	-	7	-	-	-	-	-	-
2011	7	4	4	155	129	21	16	90	-	3	-	6	-	-	2	7	88
2015	15	4	-	22	5	25	45	4	-	-	-	1	2	5	4	-	69
2018	-	-	-	-	18	4	28	-	-	-	1	-	-	2	-	-	4
year	Average Cover (%)																
2008	-	0.0	-	1.2	0.4	-	1.2	1.3	0.1	-	0.0	-	-	-	-	-	-
2011	0.3	0.0	0.0	2.5	1.8	0.2	0.1	0.5	-	0.0	-	0.0	-	-	0.0	0.0	2.1
2015	0.4	0.0	-	0.1	0.0	0.3	1.0	0.0	-	-	-	0.0	0.0	0.0	0.0	-	0.5
2018	-	-	-	-	0.0	0.0	1.0	-	-	-	0.0	-	-	0.0	-	-	0.1

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



FORB SPECIES		
Schoenocrambe linifolia (flaxleaf plainsmustard)		
Sisymbrium altissimum <sup>ai</sup> (tall tumblemustard)		
year	Nested Frequency	
2008	7	4
2011	31	4
2015	15	-
2018	4	7
year	Average Cover (%)	
2008	0.2	0.0
2011	1.2	0.2
2015	0.1	-
2018	0.0	0.0

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

**Table 09R-18.12 - Shrub and Tree Species.** Average modified Daubenmire quadrat and line intercept cover by year.

SHRUB SPECIES							
Artemisia nova <sup>p</sup> (black sagebrush)							
Artemisia tridentata ssp. wyomingensi <sup>sp</sup> (Wyoming big sagebrush)							
Bassia prostrata <sup>pi</sup> (forage kochia)							
Grayia spinosa (spiny hopsage)							
Juniperus osteosperma <sup>t</sup> (Utah juniper)							
Opuntia (pricklypear)							
Sarcobatus vermiculatus (greasewood)							
year	Line Intercept Cover (%)						
2008	2.5	2.8	-	0.8	15.8	8	-
2011	2.2	0.4	4.8	0.3	0.1	1.7	-
2015	1.8	-	4.1	0.4	0.4	3.2	-
2018	2.4	0.8	1.5	0.1	-	2.5	-
year	Quadrat Cover (%)						
2008	2.5	1.6	-	0.6	6.4	10.9	-
2011	0.6	0.1	2.3	0.8	0.0	1.8	-
2015	0.7	0.1	3.7	0.4	0.1	3.1	-
2018	2.2	0.1	0.5	0.0	0.0	3.2	0.0

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

**Table 09R-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.

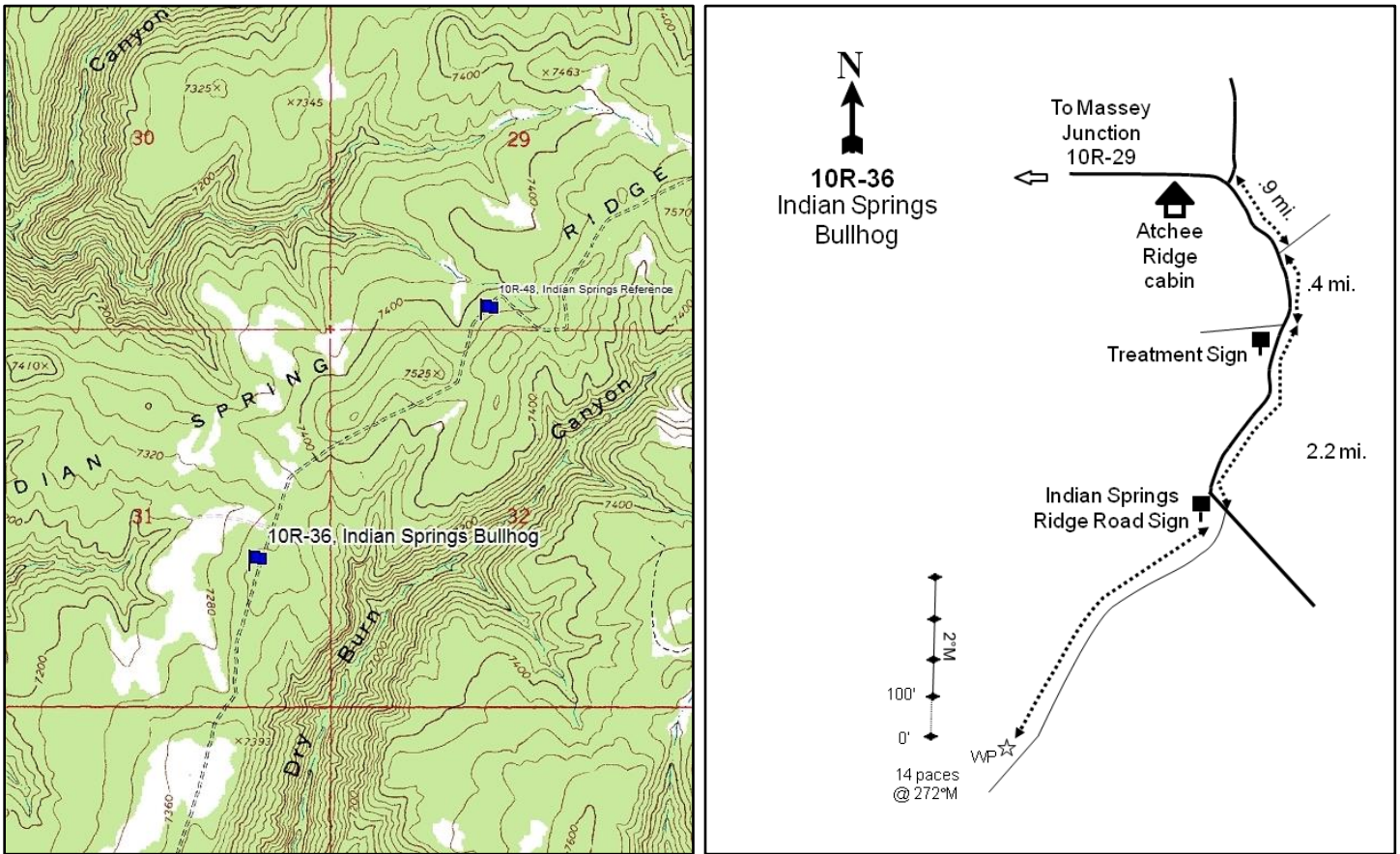
Year	Density		Age Class Distribution			Utilization		Poor Vigor (%)	Average Height Crown (cm)
	Plants Per Acre		Excluding Seedlings			Moderate (%)	Heavy (%)		
	Excluding Seedlings	Seedling	Young (%)	Mature (%)	Decadent (%)				
<b>Artemisia nova<sup>p</sup> -- (black sagebrush)</b>									
2008	920	80	2	78	20	0	0	11	21/49
2011	520	140	12	89	0	0	0	0	25/51
2015	1320	-	36	62	2	27	44	5	29/51
2018	1320	-	14	80	6	14	3	9	22/45
<b>Artemisia tridentata ssp. wyomingensis<sup>p</sup> -- (Wyoming big sagebrush)</b>									
2008	700	-	0	57	43	9	0	23	54/77
2011	560	1240	75	25	0	0	0	4	34/49
2015	20	-	0	100	0	0	100	0	23/72
2018	180	-	22	78	0	0	0	0	36/48
<b>Bassia prostrata<sup>pi</sup> -- (forage kochia)</b>									
2008	-	-	-	-	-	-	-	-	-/-
2011	900	1940	9	91	0	0	0	0	45/56
2015	2180	20	39	61	0	24	28	2	30/55
2018	820	-	12	83	5	2	2	10	30/41
<b>Chrysothamnus viscidiflorus -- (yellow rabbitbrush)</b>									
2008	-	-	-	-	-	-	-	-	-/-
2011	-	-	-	-	-	-	-	-	37/66
2015	-	-	-	-	-	-	-	-	-/-
2018	-	-	-	-	-	-	-	-	-/-
<b>Ephedra viridis<sup>p</sup> -- (mormon tea)</b>									
2008	-	-	-	-	-	-	-	-	59/74
2011	-	-	-	-	-	-	-	-	53/77
2015	-	-	-	-	-	-	-	-	58/100
2018	20	-	0	100	0	0	0	0	77/168
<b>Grayia spinosa -- (spiny hopsage)</b>									
2008	160	-	0	50	50	25	13	13	61/77
2011	40	-	0	100	0	0	0	0	46/89
2015	40	-	0	100	0	0	100	100	50/102
2018	60	-	0	67	33	0	0	100	66/106
<b>Juniperus osteosperma<sup>1</sup> -- (Utah juniper)</b>									
2008	160	-	13	88	0	0	0	0	-/-
2011	20	20	100	0	0	0	0	0	-/-
2015	40	-	50	50	0	0	0	0	-/-
2018	200	-	50	50	0	0	0	10	-/-
<b>Opuntia -- (pricklypear)</b>									
2008	3660	20	9	81	10	0	0	4	10/68
2011	4100	180	5	95	0	0	0	0	6/20
2015	6020	40	13	84	3	0	0	3	8/19
2018	5020	-	3	92	4	0	0	4	6/22
<b>Sarcobatus vermiculatus -- (greasewood)</b>									
2008	-	-	-	-	-	-	-	-	150/162
2011	-	-	-	-	-	-	-	-	66/110
2015	-	-	-	-	-	-	-	-	121/282
2018	-	-	-	-	-	-	-	-	134/250

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

**Table 09R-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)							
2008	17	-	13	13	50	25	40.6
2011	18	11	78	11	-	-	12.1
2015	25	-	100	-	-	-	10.8
2018	25	-	67	33	-	-	7.0

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



### Location Information

USGS 7.5 min Map Info  
GPS (0' Stake)

Burnt Timber Canyon ; Township 13S, Range 25E, Section 31  
NAD 83 UTM ZONE 12, 658300 East 4389574 North

### Transect Information

Browse Tag # (0' Stake)	530
Transect Bearing	2° 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 Atchee Ridge cabin, travel east on Big Park Road and take a slight right onto Atchee Ridge Road. Drive 0.9 miles to another junction, stay right, and continue for 0.4 miles to another fork and a treatment sign. From there, stay left and proceed for 2.2 miles to a junction with a sign reading "Indian Springs Ridge Road." Turn right and drive for 3.4 miles; the site is on the right (west) side of the road. The 0-foot stake is approximately 60 feet from the road and marked with browse tag #530.

**Site Information**

Land Ownership	Federal
Land Administrator	BLM
Allotment	ATCHEE RIDGE AMP
Elevation	7,350ft (2,240m)
Aspect	West
Slope	1%
Sample Dates	06/27/2006, 07/15/2009, 06/09/2010, 08/19/2014, 08/28/2018

**Table 10R-36.1 Disturbance History.** Recorded history of major disturbances.

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

**Table 10R-36.2 Seed Mix.** List of known seeded plant species and rates (if available).

Mix Name			Application Type	Application Date	Acres
Indian Springs PJ Removal			Aerial	Dec 2006	350
Type	Species	Common Name	Cultivar/Source ID	Bulk lbs/acre	PLS
G	Agropyron cristatum	Crested Wheatgrass	Douglas	0.57	0.48
G	Bouteloua gracilis	Blue Grama		0.26	0.09
G	Dactylis glomerata	Orchardgrass	Paiute	0.20	0.19
G	Elymus lanceolatus	Thickspike Wheatgrass	Bannock	0.71	0.66
G	Elymus trachycaulus	Slender Wheatgrass	San Luis	0.50	0.47
G	Pascopyrum smithii	Western Wheatgrass	Arriba	0.71	0.58
G	Poa secunda	Sandberg Bluegrass	Toole MT	0.50	0.43
G	Poa secunda	Canby Bluegrass	Canbar	0.29	0.25
G	Pseudoroegneria spicata	Bluebunch Wheatgrass	Anatone	0.50	0.43
F	Achillea millefolium	Western Yarrow	Western Yarrow	0.06	0.06
F	Linum perenne	Blue Flax	Appar	0.29	0.26
F	Medicago sativa	Alfalfa	Ladak	1.00	0.94
F	Onobrychis viciifolia	Sainfoin	Eski	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
S	Atriplex canescens	Fourwing Saltbush	Juab/Millard UT	1.00	0.38
S	Bassia prostrata	Forage Kochia	Beaver UT	0.29	0.20

**Wildlife Habitat and Vegetation History**

**Table 10R-36.3 - Wildlife Seasonal Habitat.** UDWR wildlife habitat and seasonality.

Species	Habitat	Season
Bison	potential	year-long
Deer	substantial	summer
Elk	crucial	winter

**Table 10R-36.4 - Vegetation History.** The dominant vegetation type(s) and phase of woodland succession (Tausch, Miller, Roundy, & Chambers, 2009).

Year	Vegetation Type	Woodland Succession
2006	Pinyon	Phase III
2009	Black Sagebrush/Bitterbrush	Phase I
2010	Black Sagebrush/Bitterbrush	Phase I
2014	Black Sagebrush/Bitterbrush	Phase I
2018	Black Sagebrush/Bitterbrush	Phase I

**Site Notes**

In 2009 the baseline was moved slightly south and east of the original location to keep the study within the treatment area. However, the new location makes it so that the ends of the belts cross the road.

**Soils**

**Table 10R-36.5 - 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	27.3	38.4	34.3	6.3	12.6	115.2	1.2	06/27/2006

**Site Potential**

1981 - 2010 Average Annual Precipitation 17 inches  
 NRCS Ecological Site Mountain Shallow Loam (Black Sagebrush)  
 NRCS Ecological Site # 048AY433UT  
 States and Transitions No state and transition model is available for this ecological site.

When this study was established in 2006, it was in Phase III of woodland succession with twoneedle pinyon (*Pinus edulis*) as the dominant overstory species (Table 10R-36.4). A number of other browse species were also present, but they contributed low cover. Black sagebrush (*Artemisia nova*) and bitterbrush (*Purshia tridentata*) became the dominant browse species after much of the tree component was removed by a 2007 bullhog treatment (Table 10R-36.1, Table 10R-36.12). The herbaceous understory was sparse prior to treatment. Perennial grasses exhibited an overall increase and have contributed the most cover of any herbaceous component in most post-treatment sample years. Perennial forbs have been diverse and provided moderate amounts of cover following treatment (Table 10R-36.7, Table 10R-36.10, Table 10R-36.11). Although most trees were removed by the bullhog project, point-quarter data shows that they have been present in all post-treatment sample years (Table 10R-36.14): this may indicate that the site is at risk of infilling in the future.

**Trend Summary Tables**

**Table 10R-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
2006	11.2	0.0	14.8	10.5	-	46.6
2009	10.7	0.5	0.3	12.0	0.6	0.8
2010	9.3	0.2	0.6	11.8	1.0	0.7
2014	11.3	0.9	1.1	14.6	1.0	2.2
2018	14.9	0.6	0.1	16.5	0.6	0.4

**Table 10R-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
2006	-	109	11	150	-	2.3	0.2	4.2
2009	4	253	-	253	0.0	14.4	-	10.7
2010	12	268	3	287	0.2	9.6	0.0	10.3
2014	19	327	30	266	0.1	21.3	0.3	9.7
2018	11	359	5	228	0.0	18.1	0.0	8.0

**Table 10R-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
2006	16.0	2.7	50.4	14.3	11.3	27.9
2009	19.6	0.5	42.9	12.4	1.8	37.3
2010	23.9	0.1	39.1	5.8	1.8	35.4
2014	26.9	0.1	44.1	6.4	1.8	40.7
2018	22.8	0.3	53.4	11.3	2.8	33.1

**Table 10R-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	Greater Sage-Grouse	Rabbit
	Quadrat Frequency				
2006	-	1	11	-	27
2009	1	2	10	-	9
2010	-	3	4	-	2
2014	-	10	10	1	3
2018	-	10	16	-	-
Year	Days Use Per Acre (ha)				
2006	-	10.0 (24.8)	16.8 (41.4)	-	-
2009	0.7 (1.8)	9.4 (23.2)	20.8 (51.3)	-	-
2010	2.2 (5.4)	12.8 (31.5)	12.1 (29.8)	-	-
2014	4.4 (10.8)	18.1 (44.7)	26.8 (66.2)	-	-
2018	-	33.5 (82.8)	29.5 (72.8)	-	-

**Table 10R-36.10 - Grass Species.** Nested frequency and modified Daubenmire average cover by year.



GRASS SPECIES																	
Achnatherum hymenoides (Indian ricegrass)																	
Agropyron cristatum <sup>i</sup> (crested wheatgrass)																	
Bouteloua gracilis (blue grama)																	
Bromus tectorum <sup>ai</sup> (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)																	
Pascopyrum smithii (western wheatgrass)																	
Poa fendleriana (nuttongrass)																	
Poa secunda (Sandberg bluegrass)																	
Psathyrostachys juncea <sup>i</sup> (Russian wildrye)																	
Pseudoroegneria spicata (bluebunch wheatgrass)																	
year	Nested Frequency																
2006	2	-	-	-	57	-	-	-	-	-	38	-	15	9	-	11	
2009	14	8	4	4	34	-	4	6	48	23	58	2	77	29	-	27	
2010	20	2	6	12	-	-	3	9	16	11	113	25	91	16	-	23	
2014	28	15	1	19	40	-	21	69	4	52	92	22	62	14	-	52	
2018	17	3	-	11	24	55	29	177	-	5	188	-	14	15	3	62	
year	Average Cover (%)																
2006	0.0	-	-	-	1.2	-	-	-	-	-	0.5	-	0.4	0.1	-	0.1	
2009	0.8	0.1	0.0	0.0	1.3	-	0.2	0.3	3.9	0.7	1.5	0.0	3.3	1.0	-	1.3	
2010	0.7	0.0	0.0	0.2	-	-	0.0	0.2	0.6	0.2	3.6	0.2	2.7	0.4	-	0.9	
2014	0.8	0.5	0.0	0.1	2.5	-	0.3	4.1	0.1	3.3	2.4	0.6	3.8	0.2	-	2.7	
2018	0.4	0.0	-	0.0	0.5	2.1	0.7	4.3	-	0.3	5.6	-	0.3	0.5	0.0	3.4	

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

**Table 10R-36.11 - Forb Species.** Nested frequency and modified Daubenmire average cover by year.

FORB SPECIES																	
Agoseris glauca (pale agoseris)																	
Antennaria microphylla (littleleaf pussytoes)																	
Arabis (rockcress)																	
Astragalus spatulatus (tufted milkvetch)																	
Astragalus utahensis (Utah milkvetch)																	
Castilleja linariifolia (Wyoming Indian paintbrush)																	
Collinsia parviflora <sup>a</sup> (maiden blue eyed Mary)																	
Comandra umbellata (bastard toadflax)																	
Cordylanthus <sup>a</sup> (bird's-beak)																	
Crepis acuminata (tapertip hawksbeard)																	
Delphinium nuttallianum (two-lobed larkspur)																	
Descurainia pinnata <sup>a</sup> (western tansymustard)																	
Erigeron eatonii (Eaton's fleabane)																	
Erigeron pumilus (shaggy fleabane)																	
Eriogonum alatum (winged buckwheat)																	
Ipomopsis aggregata (scarlet gilia)																	
Lepidium <sup>a</sup> (pepperweed)																	
year	Nested Frequency																
2006	-	-	7	19	-	-	2	15	9	-	-	-	-	8	11	1	-
2009	2	15	-	73	2	25	-	37	-	14	-	-	-	9	7	-	-
2010	33	25	1	99	1	54	-	44	-	2	3	-	5	24	3	-	-
2014	5	19	-	89	-	34	-	21	26	-	-	3	11	11	13	-	2
2018	3	26	8	81	-	12	-	1	-	2	-	-	2	4	10	-	-
year	Average Cover (%)																
2006	-	-	0.0	0.1	-	-	0.0	0.1	0.2	-	-	-	-	0.1	0.2	0.0	-
2009	0.0	0.2	-	0.9	0.0	0.8	-	0.3	-	0.1	-	-	-	0.1	0.1	-	-
2010	0.2	0.4	0.0	1.7	0.0	0.8	-	0.3	-	0.1	0.0	-	0.1	0.1	0.0	-	-
2014	0.0	0.1	-	1.6	-	0.3	-	0.1	0.3	-	-	0.0	0.2	0.1	0.1	-	0.0
2018	0.0	0.6	0.0	1.6	-	0.2	-	0.0	-	0.0	-	-	0.0	0.0	0.1	-	-

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

FORB SPECIES	Lesquerella (bladderpod)	Linum lewisii (Lewis flax)	Machaeranthera canescens (hoary tansyaster)	Machaeranthera grindelioides (rayless tansyaster)	Medicago sativa <sup>i</sup> (alfalfa)	Onobrychis vicifolia <sup>i</sup> (sainfoin)	Packera multilobata (lobeleaf groundsel)	Penstemon (beardtongue)	Penstemon watsonii (Watson's penstemon)	Petradioria pumila (rock goldenrod)	Phlox austromontana (mountain phlox)	Phlox longifolia (longleaf phlox)	Potentilla gracilis (slender cinquefoil)	Sanguisorba minor <sup>i</sup> (small burnet)	Sphaeralcea coccinea (scarlet globemallow)	Stenotus acaulis (stemless mock goldenweed)	Symphotrichum (aster)
year	Nested Frequency																
2006	19	-	-	1	-	-	1	6	-	41	77	-	-	-	-	-	-
2009	48	0	-	-	6	14	32	10	9	36	88	18	1	14	-	2	18
2010	64	10	-	4	13	-	29	5	14	30	92	11	-	11	-	7	-
2014	48	9	-	-	6	-	27	24	4	59	90	2	-	8	1	36	-
2018	6	6	1	-	10	-	2	2	2	55	76	-	-	2	-	27	-
year	Average Cover (%)																
2006	0.1	-	-	0.0	-	-	0.0	0.0	-	1.3	2.3	-	-	-	-	-	-
2009	0.5	0.3	-	-	0.0	0.2	0.3	0.2	0.1	1.5	3.4	0.1	0.0	0.5	-	0.0	0.6
2010	0.6	0.0	-	0.1	0.2	-	0.1	0.1	0.3	0.7	3.5	0.0	-	0.0	-	0.7	-
2014	0.3	0.0	-	-	0.4	-	0.2	0.3	0.1	1.5	3.3	0.0	-	0.2	0.0	0.9	-
2018	0.0	0.0	0.0	-	0.2	-	0.0	0.0	0.0	2.0	2.3	-	-	0.0	-	0.6	-

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

FORB SPECIES	Taraxacum officinale (common dandelion)	Tetrameuris acaulis (stemless four-nerve daisy)	Tragopogon dubius <sup>ai</sup> (yellow salsify)	Zigadenus paniculatus (foothill deathcamas)
year	Nested Frequency			
2006	-	-	-	-
2009	-	12	-	3
2010	1	7	3	8
2014	-	-	-	-
2018	7	21	5	-
year	Average Cover (%)			
2006	-	-	-	-
2009	-	0.3	-	0.0
2010	0.0	0.1	0.0	0.1
2014	-	-	-	-
2018	0.0	0.1	0.0	-

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

**Table 10R-36.12 - Shrub and Tree Species.** Average modified Daubenmire quadrat and line intercept cover by year.

SHRUB SPECIES	Line Intercept Cover (%)																	
	year																	
Amelanchier utahensis <sup>p</sup> (Utah serviceberry)	4.5	1.6	-	0.9	0.5	-	-	-	3.8	-	-	-	42.7	0.1	0.7	2	0.3	
Artemisia nova <sup>p</sup> (black sagebrush)	0.2	4.6	0.1	-	2.8	0.6	-	-	0.8	-	-	-	-	-	4.3	-	-	
Artemisia tridentata ssp. vaseyana <sup>p</sup> (mountain big sagebrush)	0.5	4.5	0.1	0.2	1.8	1	-	-	0.7	-	-	-	0	-	4.7	-	-	
Cercocarpus montanus <sup>p</sup> (alderleaf mountain mahogany)	0.4	6	-	0.1	2.2	-	-	1	2.1	0.1	-	-	-	-	5.8	-	0.1	
Chrysothamnus depressus <sup>p</sup> (longflower rabbitbrush)	0.2	7.1	-	0.4	2.5	0.1	-	0.5	0.4	-	-	-	0	-	6.3	-	-	
Chrysothamnus viscidiflorus ssp. viscidiflorus var. viscidiflorus (yellow rabbitbrush)	Quadrat Cover (%)																	
Eriogonum microthecum <sup>p</sup> (slender buckwheat)	year																	
Gutierrezia sarothrae (broom snakeweed)	2006	3.4	4.0	-	1.5	0.4	-	-	1.1	-	0.0	-	13.5	0.1	0.9	1.0	0.2	
Juniperus osteosperma <sup>i</sup> (Utah juniper)	2009	0.3	4.2	0.0	0.4	3.0	0.5	0.0	0.1	-	-	0.0	0.2	-	2.8	-	-	
Juniperus scopulorum <sup>i</sup> (Rocky Mountain juniper)	2010	0.1	2.8	1.1	0.0	2.6	0.2	-	0.5	-	-	0.0	0.1	-	2.5	-	0.1	
Linanthus pungens (granite prickly phlox)	2014	0.6	3.6	-	0.0	3.6	0.0	-	0.9	1.1	0.0	-	0.1	-	3.4	-	0.0	
Pediocactus simpsonii (mountain ball cactus)	2018	0.1	6.0	-	0.0	4.1	0.2	-	0.5	0.1	-	-	0.0	-	4.6	-	-	
Pinus edulis <sup>i</sup> (twoneedle pinyon)	Line Intercept Cover (%)																	
Pseudotsuga menziesii <sup>i</sup> (Douglas-fir)	year																	
Purshia tridentata <sup>p</sup> (antelope bitterbrush)	2006	4.5	1.6	-	0.9	0.5	-	-	3.8	-	-	-	42.7	0.1	0.7	2	0.3	
Quercus gambelii <sup>p</sup> (Gambel oak)	2009	0.2	4.6	0.1	-	2.8	0.6	-	0.8	-	-	-	-	-	4.3	-	-	
Symphoricarpos oreophilus <sup>p</sup> (mountain snowberry)	2010	0.5	4.5	0.1	0.2	1.8	1	-	0.7	-	-	-	0	-	4.7	-	-	

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

**Table 10R-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 (%)				
<b>Amelanchier utahensis<sup>p</sup> -- (Utah serviceberry)</b>									
2006	860	220	26	70	5	21	0	0	135/109
2009	-	-	-	-	-	-	-	-	38/60
2010	40	40	50	50	0	50	0	0	48/71
2014	60	-	33	67	0	33	33	33	50/67
2018	60	-	33	33	33	0	67	33	49/74
<b>Artemisia nova<sup>p</sup> -- (black sagebrush)</b>									
2006	1720	80	4	49	48	4	1	29	31/49
2009	-	-	-	-	-	-	-	-	32/47
2010	3800	840	33	62	5	10	7	4	24/52
2014	5960	120	39	54	8	31	12	7	22/41
2018	6660	160	34	61	5	3	1	5	22/46
<b>Artemisia tridentata ssp. vaseyana<sup>p</sup> -- (mountain big sagebrush)</b>									
2006	-	-	-	-	-	-	-	-	-/-
2009	-	-	-	-	-	-	-	-	16/9
2010	-	-	-	-	-	-	-	-	19/32
2014	-	-	-	-	-	-	-	-	39/52
2018	-	-	-	-	-	-	-	-	40/67
<b>Atriplex canescens<sup>p</sup> -- (fourwing saltbush)</b>									
2006	-	-	-	-	-	-	-	-	-/-
2009	-	-	-	-	-	-	-	-	-/-
2010	20	-	0	100	0	0	100	0	46/48
2014	-	-	-	-	-	-	-	-	-/-
2018	-	-	-	-	-	-	-	-	-/-

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 (%)				
<b>Bassia prostrata<sup>PI</sup> -- (forage kochia)</b>									
2006	-	-	-	-	-	-	-	-	-/-
2009	-	-	-	-	-	-	-	-	21/35
2010	-	-	-	-	-	-	-	-	-/-
2014	-	-	-	-	-	-	-	-	-/-
2018	-	-	-	-	-	-	-	-	-/-
<b>Cercocarpus montanus<sup>P</sup> -- (alderleaf mountain mahogany)</b>									
2006	280	-	7	64	29	50	14	14	93/75
2009	-	-	-	-	-	-	-	-	40/41
2010	180	-	78	22	0	44	11	0	33/39
2014	40	-	0	100	0	100	0	0	54/75
2018	120	-	0	100	0	17	67	0	46/58
<b>Chrysothamnus depressus<sup>P</sup> -- (longflower rabbitbrush)</b>									
2006	1260	-	0	86	14	16	62	10	10/20
2009	-	-	-	-	-	-	-	-	15/30
2010	3900	-	4	96	0	0	0	0	11/26
2014	4260	-	5	93	2	28	3	2	13/28
2018	5540	20	9	85	6	28	26	14	11/27
<b>Chrysothamnus viscidiflorus ssp. viscidiflorus var. viscidiflorus -- (yellow rabbitbrush)</b>									
2006	-	-	-	-	-	-	-	-	-/-
2009	-	-	-	-	-	-	-	-	25/33
2010	440	-	0	100	0	0	0	0	27/37
2014	80	-	0	100	0	0	0	0	32/39
2018	160	-	25	75	0	13	0	13	43/54
<b>Eriogonum microthecum<sup>P</sup> -- (slender buckwheat)</b>									
2006	-	-	-	-	-	-	-	-	-/-
2009	-	-	-	-	-	-	-	-	3/9
2010	-	-	-	-	-	-	-	-	-/-
2014	-	-	-	-	-	-	-	-	-/-
2018	-	-	-	-	-	-	-	-	-/-
<b>Ericameria nauseosa -- (rubber rabbitbrush)</b>									
2006	-	-	-	-	-	-	-	-	-/-
2009	-	-	-	-	-	-	-	-	-/-
2010	-	-	-	-	-	-	-	-	-/-
2014	-	-	-	-	-	-	-	-	-/-
2018	-	-	-	-	-	-	-	-	74/104
<b>Escobaria vivipara -- (spiny star)</b>									
2006	-	-	-	-	-	-	-	-	-/-
2009	-	-	-	-	-	-	-	-	-/-
2010	-	-	-	-	-	-	-	-	-/-
2014	-	-	-	-	-	-	-	-	-/-
2018	20	-	0	100	0	0	0	0	7/7
<b>Gutierrezia sarothrae -- (broom snakeweed)</b>									
2006	-	-	-	-	-	-	-	-	-/-
2009	-	-	-	-	-	-	-	-	20/27
2010	-	-	-	-	-	-	-	-	-/-
2014	1520	20	1	99	0	21	0	8	15/23
2018	2340	-	15	85	0	0	0	0	12/14
<b>Juniperus osteosperma<sup>I</sup> -- (Utah juniper)</b>									
2006	180	80	67	33	0	0	0	11	-/-
2009	-	-	-	-	-	-	-	-	-/-
2010	100	20	100	0	0	0	0	0	-/-
2014	140	20	100	0	0	14	0	14	-/-
2018	100	-	80	20	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 (%)				
<b>Krascheninnikovia lanata<sup>p</sup> -- (winterfat)</b>									
2006	-	-	-	-	-	-	-	-	-/-
2009	-	-	-	-	-	-	-	-	19/31
2010	-	-	-	-	-	-	-	-	-/-
2014	-	-	-	-	-	-	-	-	-/-
2018	-	-	-	-	-	-	-	-	-/-
<b>Linanthus pungens -- (granite prickly phlox)</b>									
2006	20	-	0	100	0	0	0	0	-/-
2009	-	-	-	-	-	-	-	-	-/-
2010	-	-	-	-	-	-	-	-	-/-
2014	-	-	-	-	-	-	-	-	-/-
2018	-	-	-	-	-	-	-	-	-/-
<b>Pediocactus simpsonii -- (mountain ball cactus)</b>									
2006	40	-	0	100	0	0	0	0	2/5
2009	-	-	-	-	-	-	-	-	-/-
2010	20	-	0	100	0	0	0	0	3/6
2014	-	-	-	-	-	-	-	-	-/-
2018	-	-	-	-	-	-	-	-	-/-
<b>Pinus edulis<sup>t</sup> -- (twoneedle pinyon)</b>									
2006	1200	980	65	32	3	0	3	2	-/-
2009	-	-	-	-	-	-	-	-	-/-
2010	80	60	100	0	0	0	0	0	-/-
2014	100	20	100	0	0	0	0	0	-/-
2018	220	-	100	0	0	0	0	0	-/-
<b>Pseudotsuga menziesii<sup>t</sup> -- (Douglas-fir)</b>									
2006	80	20	100	0	0	0	0	0	-/-
2009	-	-	-	-	-	-	-	-	-/-
2010	-	-	-	-	-	-	-	-	-/-
2014	-	-	-	-	-	-	-	-	-/-
2018	-	-	-	-	-	-	-	-	-/-
<b>Purshia tridentata<sup>p</sup> -- (antelope bitterbrush)</b>									
2006	340	-	24	47	29	47	0	18	43/92
2009	-	-	-	-	-	-	-	-	41/106
2010	460	-	0	100	0	56	22	0	46/124
2014	620	-	3	97	0	19	77	0	48/117
2018	420	-	0	100	0	5	91	5	54/171
<b>Quercus gambelii<sup>p</sup> -- (Gambel oak)</b>									
2006	780	420	49	46	5	0	0	5	70/76
2009	-	-	-	-	-	-	-	-	-/-
2010	-	-	-	-	-	-	-	-	-/-
2014	-	-	-	-	-	-	-	-	-/-
2018	-	-	-	-	-	-	-	-	34/53
<b>Symphoricarpos oreophilus<sup>p</sup> -- (mountain snowberry)</b>									
2006	40	-	0	100	0	0	0	0	28/44
2009	-	-	-	-	-	-	-	-	76/128
2010	80	-	25	75	0	0	0	0	67/127
2014	40	-	0	100	0	0	0	0	41/64
2018	-	-	-	-	-	-	-	-	57/122
<b>Tetradymia canescens -- (spineless horsebrush)</b>									
2006	-	-	-	-	-	-	-	-	-/-
2009	-	-	-	-	-	-	-	-	-/-
2010	20	-	0	100	0	0	0	0	15/37
2014	20	-	0	100	0	0	0	0	-/-
2018	20	-	0	100	0	0	0	0	17/41

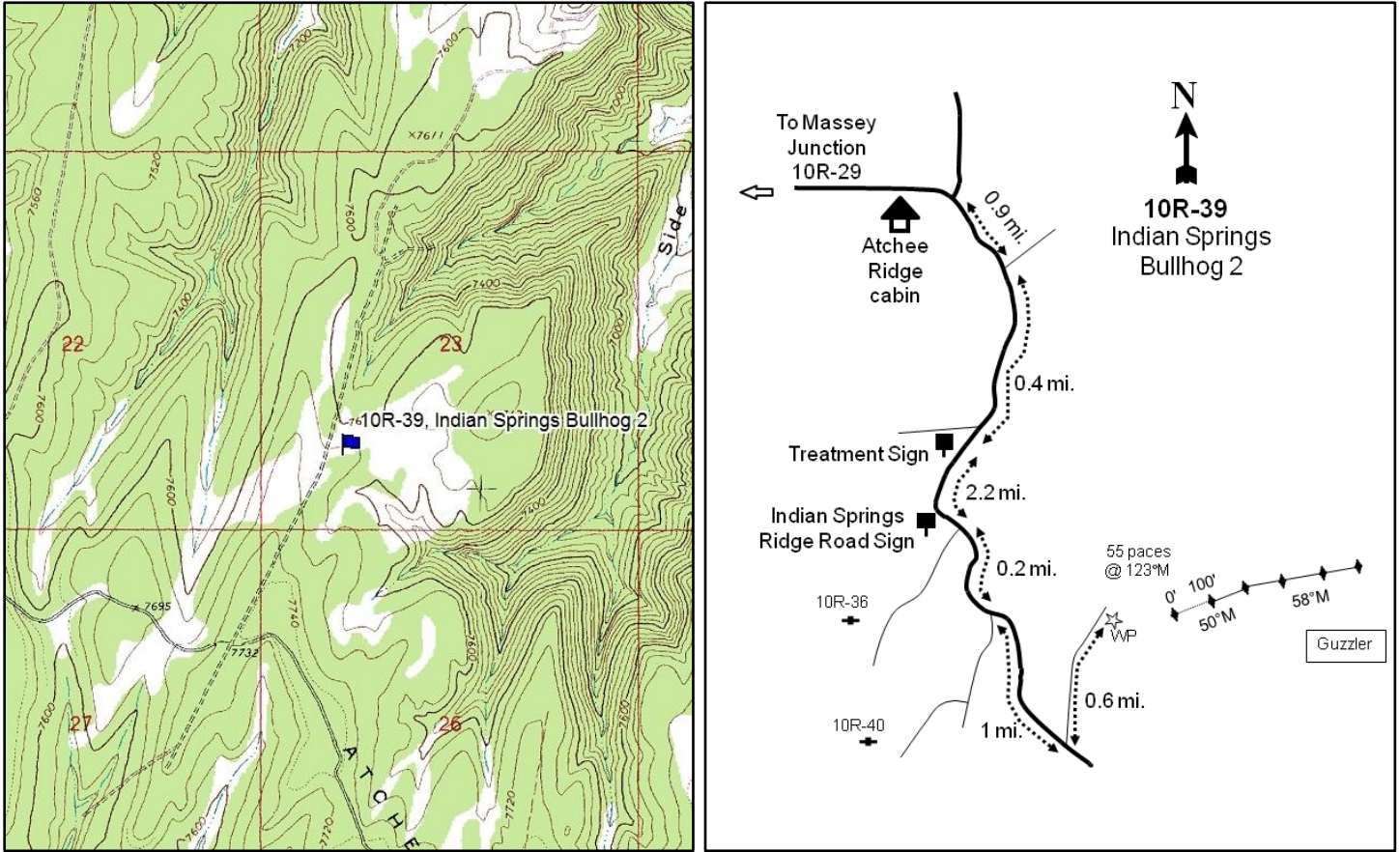
t - Tree Species; p - Preferred Browse; i - Introduced Species

**Table 10R-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' (%)	
<b>Juniperus osteosperma (Utah juniper)</b>							
2006	166	28	39	6	11	17	7.2
2009	65	81	19	-	-	-	1.9
2010	87	44	56	-	-	-	2.3
2014	151	38	54	8	-	-	3.0
2018	66	40	60	-	-	-	1.9
<b>Pinus edulis (twoneedle pinyon)</b>							
2006	608	25	35	10	20	10	8.2
2009	123	58	42	-	-	-	2.0
2010	105	53	47	-	-	-	1.8
2014	208	16	84	-	-	-	2.2
2018	41	75	25	-	-	-	1.5
<b>Pseudotsuga menziesii (Douglas-fir)</b>							
2018	17	100	-	-	-	-	1.0



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



### Location Information

USGS 7.5 min Map Info  
GPS (0' Stake)

Davis Canyon SW; Township 13S, Range 25E, Section 23  
NAD 83 UTM ZONE 12, 663761 East 4392637 North

### Transect Information

Browse Tag # (0' Stake)	200
Transect Bearing	50° magnetic (Lines 3-5: 58° magnetic)
Length	500ft
Belt Placement	Line 1 (11ft), Line 2 (34ft), Line 3 (59ft), Line 4 (71ft), Line 5 (95ft)
Belt Marker Placement	Standard

### Directions to Site

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

**Site Information**

Land Ownership	Federal
Land Administrator	BLM
Allotment	ATCHEE RIDGE AMP
Elevation	7,600ft (2,316m)
Aspect	Northeast
Slope	1-8%
Sample Dates	07/17/2007, 08/03/2011, 08/19/2014, 08/27/2018

**Table 10R-39.1 Disturbance History.** Recorded history of major disturbances.

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

**Table 10R-39.2 Seed Mix.** List of known seeded plant species and rates (if available).

Mix Name			Application Type	Application Date	Acres
Augusi Canyon Fire Rehabilitation			Aerial	Nov 2010	955
Type	Species	Common Name	Cultivar/Source ID	Bulk lbs/acre	PLS
G	Agropyron cristatum	Crested Wheatgrass	Nordan	0.99	0.84
G	Dactylis glomerata	Orchardgrass	Paiute	0.52	0.39
G	Elymus lanceolatus	Thickspike Wheatgrass	Critana	0.99	0.92
G	Elymus trachycaulus	Slender Wheatgrass	San Luis	0.73	0.61
G	Nassella viridula	Green Needlegrass	Lodorm	0.41	0.35
G	Poa secunda	Canby Bluegrass	Canbar	0.52	0.25
G	Poa secunda	Big Bluegrass	Sherman	0.52	0.46
G	Psathyrostachys juncea	Russian Wildrye	Bozoisky	0.99	0.81
G	Pseudoroegneria spicata	Bluebunch Wheatgrass	Anatone	0.99	0.90
F	Linum perenne	Blue Flax	Appar	0.52	0.47
F	Medicago sativa	Alfalfa	Ladak +	0.99	0.93
F	Medicago sativa	Alfalfa	Spreador 4	0.99	0.87
F	Onobrychis viciifolia	Sainfoin	Eski	1.99	1.89
F	Sanguisorba minor	Small Burnet	Delar	1.99	1.87

**Wildlife Habitat and Vegetation History**

**Table 10R-39.3 - Wildlife Seasonal Habitat.** UDWR wildlife habitat and seasonality.

Species	Habitat	Season
Bison	potential	year-long
Deer	crucial	summer
Elk	crucial	summer

**Table 10R-39.4 - Vegetation History.** The dominant vegetation type(s) and phase of woodland succession (Tausch, Miller, Roundy, & Chambers, 2009).

Year	Vegetation Type	Woodland Succession
2007	Pinyon	Phase II
2011	Perennial Grass-Forb	No Encroachment
2014	Perennial Grass-Forb	No Encroachment

**Site Notes**

In 2014 it was observed that a guzzler had been built near the 500-foot end of the baseline. In addition, the second half of belt 5 is almost entirely on a road constructed sometime between the 2011 and 2014 readings.

**Soils**

**Table 10R-39.5 - 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	45.1	34.4	20.5	5.5	11.1	86.4	0.8	07/17/2007

**Site Potential**

1981 - 2010 Average Annual Precipitation	18 inches
NRCS Ecological Site	Mountain Stony Loam (Browse)
NRCS Ecological Site #	R048AY451UT
States and Transitions	No state and transition model is available for this ecological site.

When established in 2007, this site was dominated by mainly twoneedle pinyon (*Pinus edulis*) and considered to be within Phase II of woodland succession (Table 10R-39.4). The shrub component was robust, mainly consisting of mountain big sagebrush (*Artemisia tridentata* ssp. *vaseyana*) and Utah serviceberry (*Amelanchier utahensis*). A number of other browse species were also present, but they provided little cover. A bullhog treatment and subsequent fire (Table 10R-39.1) removed much of the shrub and tree component, and a mixture of shrub species such as Utah serviceberry, mountain snowberry (*Symphoricarpos oreophilus*) and Gambel oak (*Quercus gambelii*) were co-dominant vegetation components in 2018 (Table 10R-39.12, Table 10R-39.13). The herbaceous understory has remained diverse throughout the study years, but cover has fluctuated. Perennial grasses and forbs provided most of the cover prior to disturbance, while post-treatment, perennial grasses increased and have been a (co-)dominant component since 2011 (Table 10R-39.7, Table 10R-39.10, Table 10R-39.11). Although density was low as of 2018, point-quarter data shows that pinyon has remained on site following disturbance (Table 10R-39.14): this continued tree presence indicates that this site may be infilled over time.

**Trend Summary Tables**

**Table 10R-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
2007	12.6	0.2	8.3	20.6	0.4	22.5
2011	3.3	0.4	-	4.9	0.6	-
2014	6.0	1.2	-	9.8	1.9	-
2018	5.5	1.6	-	8.1	1.5	-

**Table 10R-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
2007	40	238	57	250	0.5	7.6	0.2	7.4
2011	41	159	61	162	1.3	10.2	2.6	7.2
2014	182	254	145	171	8.2	16.5	3.1	6.2
2018	31	375	23	149	0.2	17.4	0.1	3.8

**Table 10R-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
2007	21.2	2.3	52.5	1.7	1.8	38.2
2011	59.2	-	9.8	12.1	2.7	27.4
2014	34.6	-	36.8	1.5	4.9	42.4
2018	40.9	0.7	37.1	6.6	4.3	25.0

**Table 10R-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	Cattle	Mule Deer	Rocky Mountain Elk	Rabbit
	Quadrat Frequency			
2007	1	9	21	24
2011	-	-	9	-
2014	1	2	20	11
2018	4	13	12	2
Year	Days Use Per Acre (ha)			
2007	1.5 (3.6)	8.1 (19.9)	84.5 (208.6)	-
2011	-	15.4 (38.1)	3.4 (8.3)	-
2014	10.2 (25.1)	5.3 (13.2)	23.4 (57.9)	-
2018	15.3 (37.7)	8.1 (19.9)	11.4 (28.1)	-

**Table 10R-39.10 - Grass Species.** Nested frequency and modified Daubenmire average cover by year.

GRASS SPECIES	Achnatherum hymenoides (Indian ricegrass)	Agropyron cristatum <sup>i</sup> (crested wheatgrass)	Bouteloua gracilis (blue grama)	Bromus arvensis <sup>ai</sup> (field brome)	Bromus tectorum <sup>ai</sup> (cheatgrass)	Carex obtusata (obtuse sedge)	Carex rossii (Ross' sedge)	Dactylis glomerata <sup>i</sup> (orchardgrass)	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 pratensis <sup>i</sup> (Kentucky bluegrass)	Poa secunda (Sandberg bluegrass)
year	Nested Frequency																
2007	4	-	23	-	40	-	66	-	22	80	-	36	21	-	71	-	38
2011	0	8	10	-	41	-	30	-	0	128	-	12	8	-	5	1	10
2014	10	56	24	4	178	-	20	4	2	88	19	29	2	8	19	-	25
2018	5	112	48	-	31	84	23	13	70	138	3	1	10	-	46	4	31
year	Average Cover (%)																
2007	0.1	-	0.5	-	0.5	-	1.1	-	0.2	1.1	-	1.6	0.8	-	1.9	-	0.3
2011	0.1	0.4	0.4	-	1.3	-	0.6	-	0.0	6.8	-	0.8	0.2	-	0.5	0.0	0.5
2014	0.4	2.8	0.9	0.0	8.2	-	0.5	0.0	0.0	4.9	0.9	2.2	0.1	0.1	0.2	-	1.2
2018	0.2	4.9	1.8	-	0.2	2.1	1.2	0.2	0.9	2.5	0.1	0.0	0.1	-	1.2	0.2	0.3

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

GRASS SPECIES	Psaithyrostachys juncea <sup>i</sup> (Russian wildrye)	Pseudoroegneria spicata (bluebunch wheatgrass)
year	Nested Frequency	
2007	-	2
2011	-	-
2014	9	33
2018	27	14
year	Average Cover (%)	
2007	-	0.0
2011	-	-
2014	0.2	2.2
2018	1.0	0.8

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

**Table 10R-39.11 - Forb Species.** Nested frequency and modified Daubenmire average cover by year.

FORB SPECIES	Agoseris glauca (pale agoseris)	Alyssum desertorum <sup>ai</sup> (desert madwort)	Androsace septentrionalis <sup>ai</sup> (pygmyflower rockjasmine)	Antennaria (pussytoes)	Arabis (rockcress)	Artemisia ludoviciana (white sagebrush)	Astragalus (milkvetch)	Astragalus utahensis (Utah milkvetch)	Balsamorhiza sagittata (arrowleaf balsamroot)	Calochortus nuttallii (sego lily)	Castilleja flava (yellow Indian paintbrush)	Castilleja linariifolia (Wyoming Indian paintbrush)	Ceratocephala testiculata <sup>ai</sup> (curvseed butterwort)	Chaenactis douglasii (Douglas' dustymaiden)	Chenopodium fremontii <sup>a</sup> (Fremont's goosefoot)	Chenopodium leptophyllum <sup>a</sup> (narrowleaf goosefoot)	Cirsium (thistle)
year	Nested Frequency																
2007	2	-	-	44	20	4	8	-	1	-	-	8	-	-	-	-	-
2011	0	-	1	27	-	-	7	10	-	1	1	-	-	2	2	15	-
2014	-	2	-	11	4	-	-	3	-	2	-	-	-	-	4	-	0
2018	-	-	-	5	-	-	4	-	-	-	-	-	5	-	2	1	-
year	Average Cover (%)																
2007	0.0	-	-	1.2	0.0	0.0	0.0	-	0.1	-	-	0.1	-	-	-	-	-
2011	0.0	-	0.0	1.0	-	-	0.5	0.1	-	0.0	0.0	-	-	0.0	0.0	1.3	-
2014	-	0.0	-	0.3	0.0	-	-	0.1	-	0.0	-	-	-	-	0.0	-	0.0
2018	-	-	-	0.1	-	-	0.0	-	-	-	-	-	0.0	-	0.0	0.0	-

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

FORB SPECIES	Collinsia parviflora <sup>a</sup> (maiden blue eyed Mary)	Comandra umbellata (bastard toadflax)	Crepis acuminata (tapertip hawkbeard)	Cryptantha (cryptantha)	Delphinium × occidentale (western larkspur)	Descurainia pinnata <sup>a</sup> (western tansymustard)	Erigeron (fleabane)	Erigeron eatonii (Eaton's fleabane)	Erigeron pumilus (shaggy fleabane)	Eriogonum alatum (winged buckwheat)	Eriogonum umbellatum (sulphur-flower buckwheat)	Gayophytum ramosissimum <sup>a</sup> (pinyon groundsmoke)	Gilia inconspicua <sup>a</sup> (shy gilia)	Grindelia squarrosa (curlycup gunweed)	Heterotheca villosa (hairy false goldenaster)	Ipomopsis aggregata (scarlet gilia)	Lappula occidentalis <sup>a</sup> (flatspine stickseed)
year	Nested Frequency																
2007	2	11	10	4	6	-	23	-	5	15	-	7	19	-	0	45	-
2011	1	16	16	-	-	-	1	1	-	-	2	26	-	0	-	-	-
2014	-	11	-	-	-	74	-	-	1	-	1	7	-	-	7	-	21
2018	-	4	-	1	-	-	-	1	1	-	-	-	-	-	14	-	15
year	Average Cover (%)																
2007	0.0	0.3	0.2	0.1	0.0	-	0.2	-	0.0	0.2	-	0.0	0.1	-	0.0	0.2	-
2011	0.0	0.1	0.2	-	-	-	0.0	0.0	-	-	0.0	0.7	-	0.1	-	-	-
2014	-	0.1	-	-	-	0.9	-	-	0.0	-	0.0	0.1	-	-	0.3	-	0.4
2018	-	0.0	-	0.0	-	-	-	0.0	0.0	-	-	-	-	-	0.5	-	0.1

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

FORB SPECIES	Linum perenne <sup>i</sup> (blue flax)	Lupinus argenteus (silvery lupine)	Machaeranthera canescens (hoary tansyaster)	Machaeranthera grindeltooides (rayless tansyaster)	Medicago sativa <sup>i</sup> (alfalfa)	Microsteris gracilis <sup>a</sup> (slender phlox)	Onobrychis vicifolia <sup>i</sup> (sainfoin)	Packera multilobata (lobeleaf groundsel)	Penstemon (beardtongue)	Penstemon caespitosus (mat penstemon)	Penstemon watsonii (Watson's penstemon)	Phlox austromontana (mountain phlox)	Phlox longifolia (longleaf phlox)	Polygonum douglasii <sup>a</sup> (Douglas' knotweed)	Sanguisorba minor <sup>i</sup> (small burnet)	Schoenocrambe linifolia (flaxleaf plainsmustard)	Sedum lanceolatum (spearleaf stonecrop)
year	Nested Frequency																
2007	-	-	4	-	-	5	-	1	83	-	11	64	65	23	-	3	5
2011	13	2	-	-	10	-	21	10	45	-	10	11	46	33	10	-	-
2014	58	-	1	3	15	38	11	1	19	-	10	25	3	-	1	20	-
2018	54	-	8	-	11	-	1	3	1	1	24	36	-	2	-	-	-
year	Average Cover (%)																
2007	-	-	0.0	-	-	0.0	-	0.0	2.2	-	0.2	1.5	0.5	0.1	-	0.0	0.0
2011	0.3	0.0	-	-	0.1	-	0.3	0.1	2.4	-	1.0	0.1	0.5	0.5	0.1	-	-
2014	0.5	-	0.0	0.0	0.8	1.0	0.3	0.0	0.3	-	0.4	2.2	0.0	-	0.0	0.5	-
2018	0.6	-	0.2	-	0.1	-	0.0	0.0	0.0	0.0	0.2	1.5	-	0.0	-	-	-

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

FORB SPECIES	Senecio integerrimus <sup>a</sup> (lambstongue ragwort)	Sisymbrium altissimum <sup>a</sup> (tall tumblemustard)	Sphaeralcea coccinea (scarlet globemallow)	Stenotus acaulis (stemless mock goldenweed)	Taraxacum officinale (common dandelion)	Tragopogon dubius <sup>a</sup> (yellow salsify)	Zigadenus paniculatus (foothill deathcamas)
year	Nested Frequency						
2007	12	-	11	2	-	-	2
2011	-	-	8	-	3	-	1
2014	2	32	25	-	3	-	-
2018	-	-	37	-	6	1	-
year	Average Cover (%)						
2007	0.0	-	0.1	0.0	-	-	0.0
2011	-	-	0.0	-	0.0	-	0.0
2014	0.0	0.8	0.5	-	0.0	-	-
2018	-	-	0.4	-	0.0	0.0	-

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

**Table 10R-39.12 - Shrub and Tree Species.** Average modified Daubenmire quadrat and line intercept cover by year.

SHRUB SPECIES	Amelanchier utahensis <sup>p</sup> (Utah serviceberry)	Artemisia tridentata ssp. vaseyana <sup>p</sup> (mountain big sagebrush)	Cercocarpus montanus <sup>p</sup> (alderleaf mountain mahogany)	Chrysothamnus depressus <sup>p</sup> (longflower rabbitbrush)	Chrysothamnus viscidiflorus ssp. viscidiflorus var. viscidiflorus (yellow rabbitbrush)	Ericameria nauseosa ssp. nauseosa var. speciosa <sup>p</sup> (rubber rabbitbrush)	Gutierrezia sarothrae (broom snakeweed)	Juniperus osteosperma <sup>t</sup> (Utah juniper)	Opuntia fragilis (brittle pricklypear)	Pediocactus simpsonii (mountain ball cactus)	Pinus edulis <sup>t</sup> (twoneedle pinyon)	Purshia tridentata <sup>p</sup> (antelope bitterbrush)	Quercus gambelii <sup>p</sup> (Gambel oak)	Symphoricarpos oreophilus <sup>p</sup> (mountain snowberry)	Tetradymia canescens (spineless horsebrush)
year	Line Intercept Cover (%)														
2007	8.1	5.6	1.4	0.1	0.2	-	0.1	0.6	0.1	0	21.9	2.9	0.7	1.8	-
2011	2.6	-	-	-	0.6	-	-	-	-	-	-	0.2	1.2	0.9	-
2014	5.2	-	-	-	1.9	-	-	-	-	-	-	0.7	2.4	1.5	-
2018	3.2	0.6	0.2	-	1.5	-	-	-	-	-	-	0.1	1.5	2.5	-
year	Quadrat Cover (%)														
2007	4.2	4.1	0.9	0.1	0.0	0.1	0.2	0.4	0.0	0.0	7.9	2.1	0.2	0.8	0.0
2011	1.8	0.0	-	-	0.4	-	-	-	-	-	-	0.2	1.3	0.1	-
2014	3.5	0.0	0.0	0.0	1.2	-	-	-	-	-	-	0.2	1.3	1.1	-
2018	2.8	0.0	0.1	0.0	1.6	-	0.0	-	-	-	-	0.1	1.4	0.9	-

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

**Table 10R-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 (%)				
<b>Amelanchier utahensis<sup>p</sup> -- (Utah serviceberry)</b>									
2007	1160	140	29	69	2	28	0	3	101/97
2011	800	400	80	20	0	3	10	3	47/75
2014	800	80	15	85	0	60	18	3	64/90
2018	540	-	4	96	0	44	44	7	60/99
<b>Artemisia frigida<sup>p</sup> -- (prairie sagewort)</b>									
2007	-	-	-	-	-	-	-	-	-/-
2011	-	-	-	-	-	-	-	-	-/-
2014	-	-	-	-	-	-	-	-	-/-
2018	20	-	0	100	0	100	0	0	7/20
<b>Artemisia tridentata ssp. vaseyana<sup>p</sup> -- (mountain big sagebrush)</b>									
2007	1920	320	2	52	46	33	4	21	55/69
2011	-	160	0	0	0	0	0	0	28/63
2014	80	-	25	75	0	25	25	0	32/49
2018	140	-	43	57	0	29	0	14	42/72
<b>Cercocarpus montanus<sup>p</sup> -- (alderleaf mountain mahogany)</b>									
2007	440	-	46	46	9	27	5	5	119/101
2011	60	20	67	33	0	33	33	0	35/51
2014	20	-	0	100	0	100	0	0	50/58
2018	60	-	0	100	0	33	67	0	60/67
<b>Chrysothamnus depressus<sup>p</sup> -- (longflower rabbitbrush)</b>									
2007	280	20	0	93	7	29	29	7	15/23
2011	-	-	-	-	-	-	-	-	15/30
2014	20	-	0	100	0	0	0	0	12/19
2018	60	-	0	100	0	0	33	33	6/17



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 (%)				
<b>Chrysothamnus viscidiflorus ssp. viscidiflorus var. viscidiflorus -- (yellow rabbitbrush)</b>									
2007	100	-	0	100	0	0	0	0	37/33
2011	100	-	0	100	0	0	0	0	37/52
2014	900	-	51	49	0	11	2	2	40/64
2018	1460	-	4	44	52	22	21	80	30/52
<b>Ericameria nauseosa -- (rubber rabbitbrush)</b>									
2007	-	-	-	-	-	-	-	-	-/-
2011	-	-	-	-	-	-	-	-	-/-
2014	-	-	-	-	-	-	-	-	67/56
2018	-	-	-	-	-	-	-	-	37/59
<b>Ericameria nauseosa ssp. nauseosa var. speciosa<sup>p</sup> -- (rubber rabbitbrush)</b>									
2007	100	-	0	100	0	0	0	0	43/60
2011	-	-	-	-	-	-	-	-	-/-
2014	-	-	-	-	-	-	-	-	80/77
2018	20	-	0	100	0	0	100	0	59/84
<b>Gutierrezia sarothrae -- (broom snakeweed)</b>									
2007	60	-	0	67	33	0	0	33	15/19
2011	-	-	-	-	-	-	-	-	23/29
2014	-	-	-	-	-	-	-	-	25/30
2018	40	-	0	50	50	0	0	50	13/25
<b>Juniperus osteosperma<sup>1</sup> -- (Utah juniper)</b>									
2007	80	-	75	25	0	0	0	0	-/-
2011	-	-	-	-	-	-	-	-	-/-
2014	-	-	-	-	-	-	-	-	-/-
2018	-	-	-	-	-	-	-	-	-/-
<b>Opuntia fragilis -- (brittle pricklypear)</b>									
2007	80	-	0	100	0	0	0	0	7/21
2011	40	-	100	0	0	0	0	0	-/-
2014	20	-	0	100	0	0	0	0	9/16
2018	-	-	-	-	-	-	-	-	11/45
<b>Pediocactus simpsonii -- (mountain ball cactus)</b>									
2007	20	-	0	100	0	0	0	0	-/-
2011	-	-	-	-	-	-	-	-	5/7
2014	-	-	-	-	-	-	-	-	-/-
2018	-	-	-	-	-	-	-	-	-/-
<b>Pinus edulis<sup>1</sup> -- (twoneedle pinyon)</b>									
2007	480	100	63	33	4	0	4	4	-/-
2011	-	-	-	-	-	-	-	-	-/-
2014	-	-	-	-	-	-	-	-	-/-
2018	-	-	-	-	-	-	-	-	-/-
<b>Purshia tridentata<sup>p</sup> -- (antelope bitterbrush)</b>									
2007	560	-	7	89	4	54	7	0	43/73
2011	60	140	33	67	0	0	0	67	44/89
2014	100	-	20	80	0	40	20	20	39/71
2018	100	-	0	100	0	0	80	20	34/88
<b>Quercus gambelii<sup>p</sup> -- (Gambel oak)</b>									
2007	660	-	94	6	0	0	0	0	133/57
2011	340	-	100	0	0	100	0	0	33/42
2014	1180	-	9	92	0	37	20	0	78/62
2018	520	-	8	92	0	0	0	0	67/56

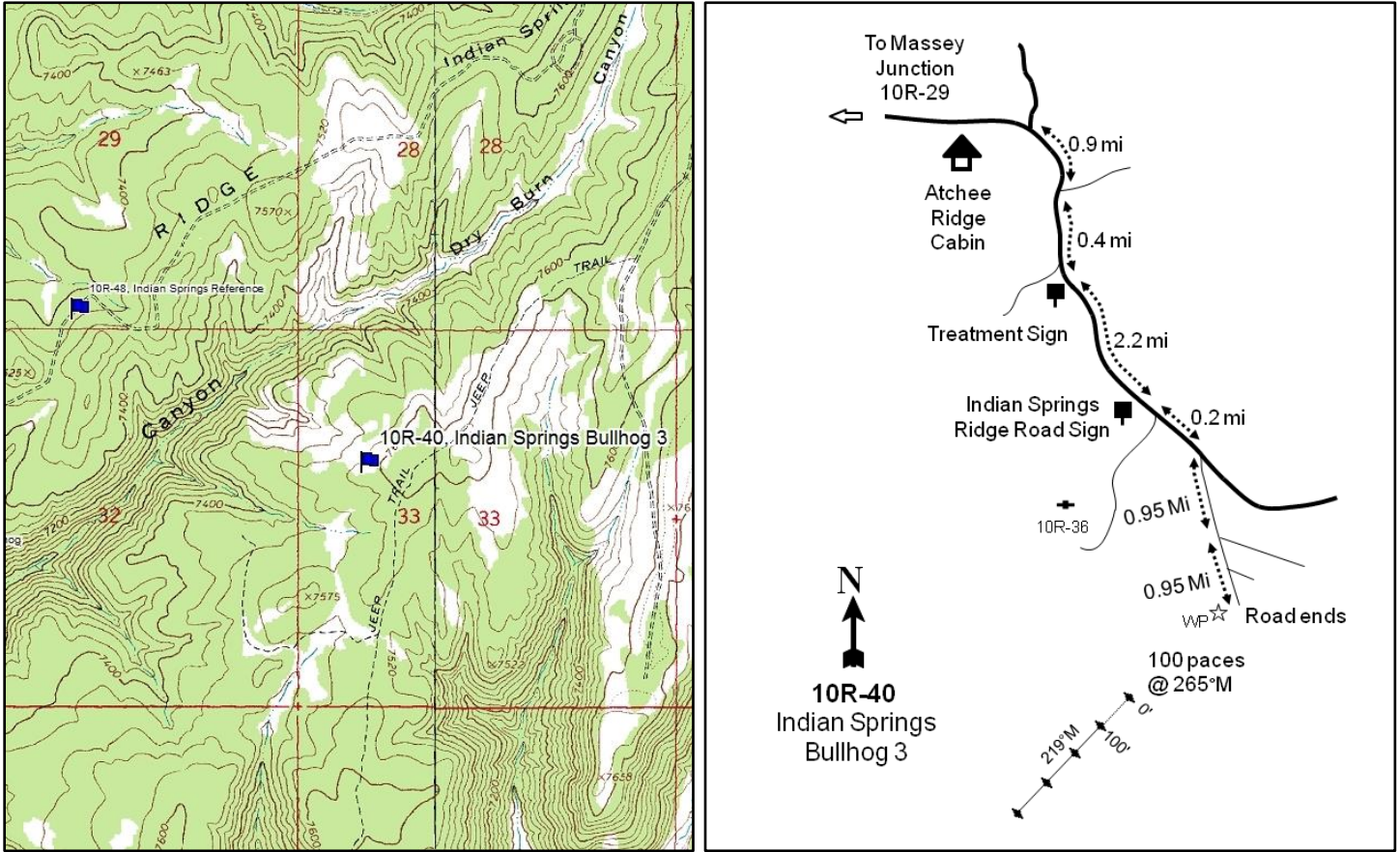
Year	Density		Age Class Distribution			Utilization		Poor Vigor (%)	Average Height Crown (cm)
	Plants Per Acre		Excluding Seedlings			Moderate (%)	Heavy (%)		
	Excluding Seedlings	Seedling	Young (%)	Mature (%)	Decadent (%)				
<b>Sambucus<sup>p</sup> -- (elderberry)</b>									
2007	-	-	-	-	-	-	-	-	-/-
2011	-	-	-	-	-	-	-	-	-/-
2014	40	-	0	100	0	50	0	0	69/71
2018	-	-	-	-	-	-	-	-	96/56
<b>Symphoricarpos oreophilus<sup>p</sup> -- (mountain snowberry)</b>									
2007	2040	40	36	64	0	0	0	0	31/54
2011	60	-	0	100	0	0	0	0	29/69
2014	440	-	5	91	5	50	14	27	31/83
2018	800	-	3	95	3	15	28	20	41/75
<b>Tetradymia canescens -- (spineless horsebrush)</b>									
2007	20	-	0	100	0	0	0	0	15/18
2011	20	-	100	0	0	0	0	0	15/23
2014	-	-	-	-	-	-	-	-	16/22

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

**Table 10R-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' (%)	
<b>Juniperus osteosperma (Utah juniper)</b>							
2007	28	-	45	27	27	-	8.6
2011	2	-	100	-	-	-	3.0
<b>Pinus edulis (twoneedle pinyon)</b>							
2007	245	6	29	6	47	12	11.7
2011	5	50	-	-	25	25	11.5
2018	4	-	-	-	100	-	19.0

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



### Location Information

USGS 7.5 min Map Info  
GPS (0' Stake)

Burnt Timber Canyon ; Township 13S, Range 25E, Section 33  
NAD 83 UTM ZONE 12, 660515 East 4390037 North

### Transect Information

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

556  
219° magnetic  
400ft  
Line 1 (11ft & 95ft), Line 2 (34ft), Line 3 (59ft), Line 4 (71ft)  
Standard

### Directions to Site

From the Atchee Ridge cabin travel east on Big Park Road and take a slight right onto Atchee Ridge Road. Drive 0.9 miles to another junction, then bear right and continue for 0.4 miles to another fork and a treatment sign. From there, stay left and proceed for 2.2 miles to a junction with a sign reading "Indian Springs Ridge Road." Stay left and continue on for 0.2 miles to another fork. Bear right and continue for 0.95 miles to a fork. Stay right and continue on for another 0.95 miles to where the road dead-ends; there is a witness post on the left side of the road. From the witness post the 0-foot stake is 100 paces away at 265 degrees magnetic and is marked with browse tag #556.

**Site Information**

Land Ownership	Federal
Land Administrator	BLM
Allotment	ATCHEE RIDGE AMP
Elevation	7,600ft (2,316m)
Aspect	Southwest
Slope	3-7%
Sample Dates	07/17/2007, 08/02/2011, 08/19/2014, 08/29/2018

**Table 10R-40.1 Disturbance History.** Recorded history of major disturbances.

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

**Wildlife Habitat and Vegetation History**

**Table 10R-40.3 - Wildlife Seasonal Habitat.** UDWR wildlife habitat and seasonality.

Species	Habitat	Season
Bison	potential	year-long
Deer	substantial	summer
Elk	crucial	summer

**Table 10R-40.4 - Vegetation History.** The dominant vegetation type(s) and phase of woodland succession (Tausch, Miller, Roundy, & Chambers, 2009).

Year	Vegetation Type	Woodland Succession
2007	Pinyon	Phase II transitioning to Phase III
2011	Perennial Grass	Phase I
2014	Perennial Grass	Phase I
2018	Perennial Grass	Phase I

**Site Notes**

The last 100 feet of the transect was not treated, and as a result, belt five was moved to line one following the treatment.

**Soils**

**Table 10R-40.5 - 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	42.1	35.4	22.5	6.3	27.8	185.6	1.2	07/17/2007

**Site Potential**

1981 - 2010 Average Annual Precipitation	18 inches
NRCS Ecological Site	Mountain Stony Loam (Browse)
NRCS Ecological Site #	R048AY451UT
States and Transitions	No state and transition model is available for this ecological site.

When established in 2007, this site was considered to be within Phase II transitioning to Phase III of woodland succession, being dominated by mainly twoneedle pinyon (*Pinus edulis*) with a robust component of Utah juniper (*Juniperus osteosperma*) and true mountain mahogany (*Cercocarpus montanus*). Other browse species were present, but they provided little cover (Table 10R-40.4, Table 10R-40.12, Table 10R-40.13). A bullhog treatment in 2009 removed much of the shrub and tree components. Cover of shrubs has increased over the post-treatment sample years, but remains relatively low as of 2018. Prior to treatment, the herbaceous understory was diverse, but not particularly abundant. Perennial grass cover increased following the bullhog project, and it has been the dominant vegetation component since 2011. The introduced annual grass species cheatgrass (*Bromus tectorum*) has been observed in low to moderate amounts since 2011, and may pose a threat to the site's ecological resilience should it increase in the future (Table 10R-40.7, Table 10R-40.10, Table 10R-40.11). Although density is low, trees have maintained a post-treatment presence on site (Table 10R-40.14), indicating that infilling may occur over time.

**Trend Summary Tables**

**Table 10R-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
2007	3.8	-	7.4	8.0	-	33.3
2011	3.1	-	-	2.7	-	-
2014	3.6	0.3	-	4.5	0.5	-
2018	6.5	1.2	-	7.4	1.3	0.2

**Table 10R-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
2007	-	81	5	106	-	2.1	0.0	1.7
2011	10	98	20	101	0.4	7.6	0.6	3.5
2014	177	311	34	92	5.2	21.9	0.8	2.4
2018	50	349	9	111	0.4	16.3	0.1	3.1

**Table 10R-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
2007	12.8	0.4	62.9	17.6	2.0	15.3
2011	5.7	-	76.4	5.7	0.1	15.2
2014	7.4	0.0	77.7	3.4	-	32.7
2018	6.3	0.0	77.6	6.0	-	23.6

**Table 10R-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	Cattle	Mule Deer	Rocky Mountain Elk	Rabbit
	Quadrat Frequency			
2007	-	6	6	18
2011	1	5	6	-
2014	-	8	20	1
2018	3	10	22	1
Year	Days Use Per Acre (ha)			
2007	-	11.4 (28.1)	15.4 (38.1)	-
2011	-	8.7 (21.5)	2.7 (6.6)	-
2014	1.5 (3.6)	10.7 (26.5)	28.1 (69.5)	-
2018	9.4 (23.3)	20.1 (49.7)	47.6 (117.5)	-

**Table 10R-40.10 - Grass Species.** Nested frequency and modified Daubenmire average cover by year.

GRASS SPECIES	Achnatherum hymenoides (Indian ricegrass)	Bouteloua gracilis (blue grama)	Bromus tectorum <sup>ai</sup> (cheatgrass)	Carex rossii (Ross' sedge)	Elymus elymoides (squirreltail)	Hesperostipa comata (needle and thread)	Koeleria macrantha (prairie Junegrass)	Piptatheropsis micrantha (littelseed ricegrass)	Poa fendleriana (muttongrass)
year	Nested Frequency								
2007	-	-	-	44	-	-	-	-	41
2011	4	14	10	39	12	3	13	-	30
2014	17	20	177	57	212	-	5	1	94
2018	19	40	50	77	254	-	22	1	54
year	Average Cover (%)								
2007	-	-	-	1.0	-	-	-	-	1.1
2011	1.9	0.7	0.4	2.2	0.5	0.0	0.8	-	1.5
2014	3.2	2.2	5.2	5.3	7.5	-	0.6	0.1	2.9
2018	0.7	2.4	0.4	4.4	6.8	-	0.4	0.1	1.4

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

**Table 10R-40.11 - Forb Species.** Nested frequency and modified Daubenmire average cover by year.

FORB SPECIES	Amaranthus retroflexus <sup>a</sup> (redroot amaranth)	Antennaria parvifolia (small-leaf pussytoes)	Arabis holboellii <sup>a</sup> (Holboell's rockcress)	Chaenactis douglasii (Douglas' dustymaiden)	Chenopodium fremontii <sup>a</sup> (Fremont's goosefoot)	Cirsium vulgare <sup>ai</sup> (bull thistle)	Erigeron eatonii (Eaton's fleabane)	Heterotheca villosa (hairy false goldenaster)	Ipomopsis aggregata (scarlet gilia)	Lesquerella (bladderpod)	Machaeranthera grindelioides (rayless tansyaster)	Nicotiana attenuata <sup>a</sup> (coyote tobacco)	Packera multilobata (lobeleaf groundsel)	Penstemon caespitosus (mat penstemon)	Penstemon pachyphyllus (thickleaf beardtongue)	Penstemon watsonii (Watson's penstemon)	Petrorhiza pumila (rock goldenrod)
year	Nested Frequency																
2007	-	2	5	7	-	-	17	-	-	6	1	-	-	5	9	3	14
2011	-	2	14	27	3	-	7	-	-	17	-	0	5	5	9	19	-
2014	0	22	6	2	6	17	2	-	1	3	16	-	2	-	9	13	4
2018	-	22	2	25	3	4	4	4	-	4	-	-	3	3	12	8	3
year	Average Cover (%)																
2007	-	0.0	0.0	0.1	-	-	0.1	-	-	0.0	0.0	-	-	0.0	0.0	0.0	0.4
2011	-	0.0	0.3	0.4	0.0	-	0.0	-	-	0.3	-	0.0	0.1	0.2	0.5	0.6	-
2014	0.1	0.6	0.0	0.0	0.0	0.2	0.0	-	0.0	0.0	0.1	-	0.0	-	0.2	0.4	0.1
2018	-	0.7	0.0	0.2	0.0	0.0	0.0	0.0	-	0.0	-	-	0.0	0.1	0.2	0.1	0.0

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

FORB SPECIES	Phlox austromontana (mountain phlox)	Salsola tragus <sup>ai</sup> (prickly Russian thistle)	Senecio spartioides (broom-like ragwort)	Sisymbrium altissimum <sup>ai</sup> (tall tumblemustard)	Sphaeralcea coccinea (scarlet globemallow)	Sphaeralcea grossularifolia (gooseberry/leaf globemallow)	Symphotrichum (aster)	Taraxacum officinale (common dandelion)	Tetraneuris acaulis (stemless four-nerve daisy)
year	Nested Frequency								
2007	62	-	-	-	-	-	-	-	-
2011	28	-	9	3	-	-	1	-	2
2014	34	1	-	5	-	5	-	1	2
2018	35	-	-	-	3	7	4	2	5
year	Average Cover (%)								
2007	1.0	-	-	-	-	-	-	-	-
2011	0.8	-	0.7	0.2	-	-	0.0	-	0.0
2014	0.7	0.0	-	0.4	-	0.0	-	0.0	0.1
2018	1.1	-	-	-	0.0	0.0	0.1	0.0	0.2

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

**Table 10R-40.12 - Shrub and Tree Species.** Average modified Daubenmire quadrat and line intercept cover by year.

SHRUB SPECIES	Amelanchier utahensis <sup>p</sup> (Utah serviceberry)	Artemisia tridentata ssp. vaseyana <sup>p</sup> (mountain big sagebrush)	Cercocarpus montanus <sup>p</sup> (alderleaf mountain mahogany)	Ericameria nauseosa (rubber rabbitbrush)	Gutierrezia sarothrae (broom snakeweed)	Juniperus osteosperma <sup>t</sup> (Utah juniper)	Pinus edulis <sup>t</sup> (twoneedle pinyon)	Purshia tridentata <sup>p</sup> (antelope bitterbrush)	Symphoricarpos oreophilus <sup>p</sup> (mountain snowberry)
year	Line Intercept Cover (%)								
2007	1.5	-	4.8	-	-	6.9	26.4	0.9	0.8
2011	1	0.1	0.2	-	-	-	-	0.6	0.8
2014	1.1	0.2	0.6	0.5	-	-	-	0.8	1.8
2018	0.8	0.5	0.9	1.2	0.1	0	0.2	1.7	3.5
year	Quadrat Cover (%)								
2007	0.3	0.0	2.4	-	-	1.9	5.5	0.7	0.5
2011	1.2	0.0	0.4	-	-	-	-	0.5	1.0
2014	0.4	0.0	0.7	0.3	-	-	-	1.3	1.3
2018	0.1	0.2	1.0	1.1	0.0	0.0	0.0	2.3	2.9

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



**Table 10R-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 (%)				
<b>Amelanchier utahensis<sup>P</sup> -- (Utah serviceberry)</b>									
2007	80	-	50	50	0	0	25	0	201/187
2011	320	-	94	6	0	0	0	0	65/77
2014	300	20	7	93	0	7	60	0	60/76
2018	240	-	17	83	0	42	0	0	73/114
<b>Artemisia nova<sup>P</sup> -- (black sagebrush)</b>									
2007	-	-	-	-	-	-	-	-	-/-
2011	-	-	-	-	-	-	-	-	35/56
2014	40	-	100	0	0	50	0	0	18/42
2018	40	-	0	100	0	0	0	0	21/44
<b>Artemisia tridentata ssp. vaseyana<sup>P</sup> -- (mountain big sagebrush)</b>									
2007	40	20	0	0	100	0	0	0	47/59
2011	20	-	0	100	0	0	0	0	53/71
2014	40	-	0	100	0	0	0	0	51/81
2018	80	660	50	50	0	0	0	0	86/154
<b>Cercocarpus montanus<sup>P</sup> -- (alderleaf mountain mahogany)</b>									
2007	460	160	17	74	9	48	17	4	130/130
2011	220	-	91	9	0	55	9	9	66/82
2014	260	40	8	92	0	8	85	0	48/53
2018	140	-	14	86	0	29	71	0	55/64
<b>Chrysothamnus viscidiflorus ssp. viscidiflorus var. viscidiflorus -- (yellow rabbitbrush)</b>									
2007	-	-	-	-	-	-	-	-	-/-
2011	-	-	-	-	-	-	-	-	-/-
2014	-	-	-	-	-	-	-	-	24/29
2018	-	-	-	-	-	-	-	-	46/94
<b>Ericameria nauseosa -- (rubber rabbitbrush)</b>									
2007	-	-	-	-	-	-	-	-	-/-
2011	20	-	100	0	0	0	0	0	51/65
2014	80	-	25	75	0	25	0	0	72/92
2018	160	-	25	50	25	25	13	25	75/107
<b>Gutierrezia sarothrae -- (broom snakeweed)</b>									
2007	-	-	-	-	-	-	-	-	-/-
2011	-	-	-	-	-	-	-	-	-/-
2014	20	-	0	100	0	0	0	0	27/50
2018	100	-	0	100	0	0	0	0	16/28
<b>Juniperus osteosperma<sup>1</sup> -- (Utah juniper)</b>									
2007	220	60	27	64	9	0	0	9	-/-
2011	-	-	-	-	-	-	-	-	-/-
2014	-	20	0	0	0	0	0	0	-/-
2018	20	-	100	0	0	0	0	0	-/-
<b>Pinus edulis<sup>t</sup> -- (twoneedle pinyon)</b>									
2007	420	540	48	48	5	0	0	0	-/-
2011	-	-	-	-	-	-	-	-	-/-
2014	-	-	-	-	-	-	-	-	-/-
2018	40	-	100	0	0	0	0	0	-/-
<b>Purshia tridentata<sup>P</sup> -- (antelope bitterbrush)</b>									
2007	380	-	5	74	21	16	0	5	41/72
2011	160	-	88	13	0	38	0	0	35/88
2014	300	40	20	80	0	33	67	7	34/69
2018	220	-	0	100	0	0	100	0	38/105

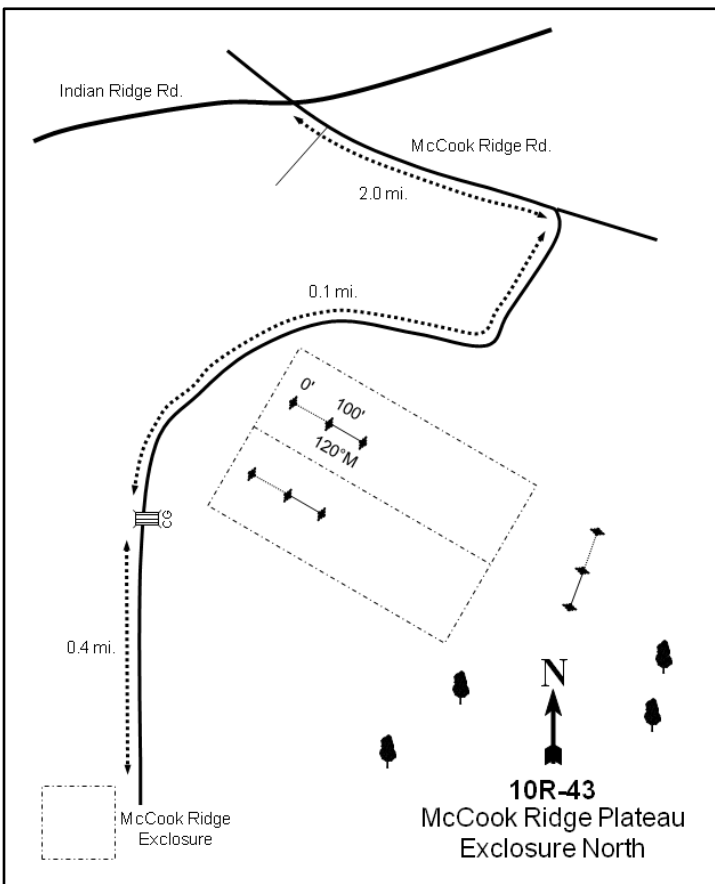
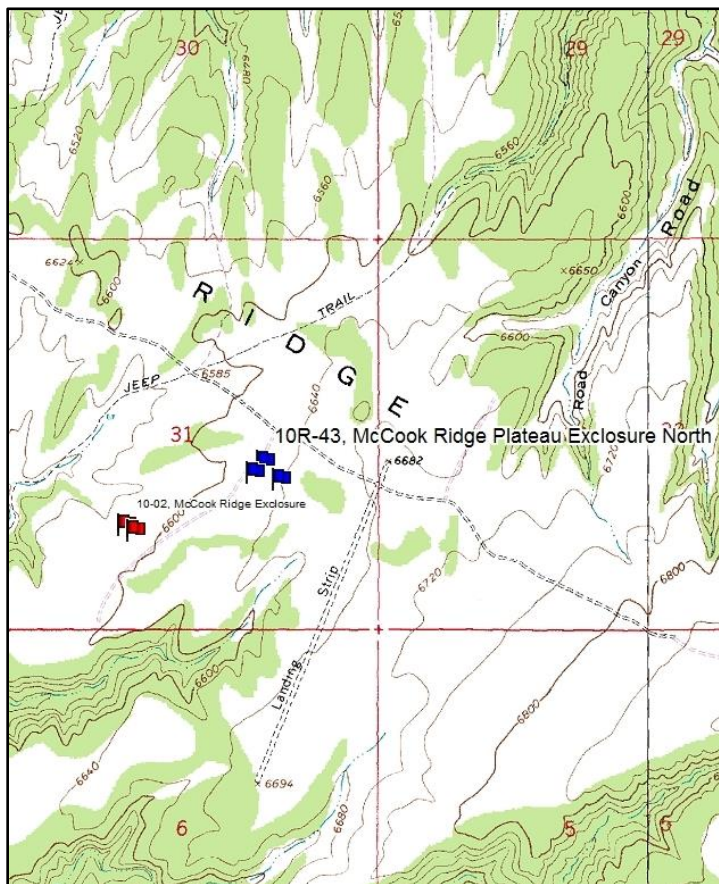
Year	Density		Age Class Distribution			Utilization		Poor Vigor (%)	Average Height Crown (cm)
	Plants Per Acre		Excluding Seedlings			Moderate (%)	Heavy (%)		
	Excluding Seedlings	Seedling	Young (%)	Mature (%)	Decadent (%)				
<b>Sambucus<sup>p</sup> -- (elderberry)</b>									
2007	-	-	-	-	-	-	-	-	-/-
2011	-	-	-	-	-	-	-	-	18/26
2014	-	-	-	-	-	-	-	-	-/-
2018	-	-	-	-	-	-	-	-	53/72
<b>Symphoricarpos oreophilus<sup>p</sup> -- (mountain snowberry)</b>									
2007	500	20	44	56	0	0	0	0	25/45
2011	100	-	0	100	0	20	0	0	41/114
2014	260	-	15	85	0	46	46	0	52/110
2018	260	-	8	92	0	31	0	0	70/138

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

**Table 10R-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' (%)	>12' (%)	
<b>Juniperus osteosperma (Utah juniper)</b>							
2007	93	5	21	21	26	26	25.2
2011	28	67	33	-	-	-	2.4
2014	16	43	43	-	-	14	7.7
2018	20	50	43	-	-	7	5.3
<b>Pinus edulis (twoneedle pinyon)</b>							
2007	403	10	10	5	20	55	23.8
2011	11	83	-	17	-	-	1.7
2014	1	-	-	100	-	-	5.5
2018	14	57	43	-	-	-	1.6

## McCOOK RIDGE PLATEAU EXCLOSURE NORTH - STUDY NO. 10R-43



### Location Information

USGS 7.5 min Map Info  
GPS (0' Stake)

Cooper Canyon SE; Township 13S, Range 24E, Section 31  
NAD 83 UTM ZONE 12, 648498 East 4389447 North

### Transect Information

Browse Tag # (0' Stake)	233
Transect Bearing	120° magnetic
Length	200ft
Belt Placement	Line 1 (11ft, 59ft, 95ft), Line 2 (34ft & 71ft)
Belt Marker Placement	Standard

### Directions to Site

From Ouray, travel south for 38 miles to the McCook Ridge-Indian Ridge turnoff. Turn left (east) and drive on the Indian Ridge road towards Sweetwater Canyon and McCook Ridge for 9.1 miles to the intersection of Cooper Canyon, Indian Ridge and McCook Ridge. From Indian Ridge Road, turn southeast and proceed up McCook Ridge for approximately 2 miles to a road on the right. Turn right and drive 0.1 miles to the exclosure on the left (east) side of the road. The 0-foot stake is marked with browse tag #233.

**Site Information**

Land Ownership	Federal
Land Administrator	BLM
Allotment	LOWER MCCOOK
Elevation	6,550ft (1,996m)
Aspect	West
Slope	4%
Sample Dates	07/09/2008, 06/08/2010, 08/28/2013, 08/27/2018

**Table 10R-43.1 Disturbance History.** Recorded history of major disturbances.

Treatment/Disturbance	Name	WRI DB#	Date	Size (acres)
Herbicide - Plateau	McCook Ridge Cheatgrass Control	1109	October 2008	400
Seeding - Rangeland Drill	McCook Ridge Cheatgrass Control	1109	September-October 2008	400

**Table 10R-43.2 Seed Mix.** List of known seeded plant species and rates (if available).

Mix Name			Application Type	Application Date	Acres
McCook Ridge Cheatgrass Control			Drill	Oct 2008	400
Type	Species	Common Name	Cultivar/Source ID	Bulk lbs/acre	PLS
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 elymoides</i>	Bottlebrush Squirreltail	Toe Jam	0.05	0.04
G	<i>Elymus elymoides</i>	Bottlebrush Squirreltail	Toe Jam	0.45	0.39
G	<i>Elymus lanceolatus</i>	Thickspike Wheatgrass	Critana	1.00	0.87
G	<i>Elymus wawawaiensis</i>	Snake River Wheatgrass	Secar	1.00	0.76
G	<i>Poa secunda</i>	Canby Bluegrass	Canbar	0.25	0.21
G	<i>Psathyrostachys juncea</i>	Russian Wildrye	Bozoisky	1.00	0.85
F	<i>Linum perenne</i>	Blue Flax	Appar	0.25	0.21
F	<i>Medicago sativa</i>	Alfalfa	Ladak	1.50	1.36
F	<i>Sphaeralcea coccinea</i>	Scarlet Globemallow	Duchesne/Uintah UT	0.05	0.04
S	<i>Atriplex canescens</i>	Fourwing Saltbush	Central UT	1.00	0.43
Mix Name			Application Type	Application Date	Acres
McCook Ridge Cheatgrass Control - Sagebrush/Kochia			Drill	Oct 2008	400
Type	Species	Common Name	Cultivar/Source ID	Bulk lbs/acre	PLS
S	<i>Artemisia tridentata</i> ssp. <i>wyomingensis</i>	Wyoming Big Sagebrush	Beaver UT	0.50	0.08
S	<i>Bassia prostrata</i>	Forage Kochia	Immigrant	1.00	0.70

**Wildlife Habitat and Vegetation History****Table 10R-43.3 - Wildlife Seasonal Habitat.** UDWR wildlife habitat and seasonality.

Species	Habitat	Season
Bison	potential	year-long
Deer	crucial	winter
Elk	crucial	winter

**Table 10R-43.4 - Vegetation History.** The dominant vegetation type(s) and phase of woodland succession (Tausch, Miller, Roundy, & Chambers, 2009).

Year	Vegetation Type	Woodland Succession
2008	Winterfat/Annual Grass	Phase I
2010	Mixed Shrub/Perennial Grass	Phase I
2013	Mixed Shrub/Perennial Grass	Phase I
2018	Mixed Shrub/Perennial Grass	Phase I

**Site Notes**

No Notes

**Site Potential**

1981 - 2010 Average Annual Precipitation	13 inches
NRCS Ecological Site	Upland Silt Loam (Fourwing Saltbush-Winterfat)
NRCS Ecological Site #	R034XY329UT
States and Transitions	No state and transition model is available for this ecological site.

Upon study establishment in 2008, the plant community on this site was dominated by winterfat (*Krascheninnikovia lanata*) and the introduced annual grass cheatgrass (*Bromus tectorum*) with little cover from other species (Table 10R-43.10, Table 10R-43.12). Cover of winterfat exhibited an initial decrease following a herbicide and seeding treatment (Table 10R-43.1), but has recovered to nearly pre-treatment levels as of 2018. Cover of other preferred browse such as prairie sagewort (*Artemisia frigida*) and fourwing saltbush (*Atriplex confertifolia*) has fluctuated, but other shrubs (including winterfat) have been a co-dominant vegetation component since 2010 (Table 10R-43.12). Cheatgrass decreased following treatment, while perennial grasses -- particularly thickspike wheatgrass (*Elymus lanceolatus*) -- increased in cover and became a co-dominant cover type in 2010. Forbs have remained rare (Table 10R-43.7, Table 10R-43.10, Table 10R-43.11).

**Trend Summary Tables**

**Table 10R-43.6 - Shrub/Tree Summary.** Average modified Daubenmire quadrat and line intercept cover by year for shrubs/trees

Year	Quadrat Cover (%)			Line-intercept Cover (%)		
	Preferred Shrub	Other Shrub	Tree	Preferred Shrub	Other Shrub	Tree
2008	14.6	0.2	-	16.2	-	-
2010	17.2	0.1	-	19.1	0.1	-
2013	13.0	0.2	-	20.0	-	-
2018	17.9	0.2	-	21.7	-	-

**Table 10R-43.7 - Herbaceous Summary.** Nested frequency and average modified Daubenmire quadrat cover by year for herbaceous functional groups

Year	Nested Frequency				Quadrat Cover (%)			
	Annual Grass	Perennial Grass	Annual/Biennial Forb	Perennial Forb	Annual Grass	Perennial Grass	Annual/Biennial Forb	Perennial Forb
2008	416	208	128	35	13.7	5.8	0.6	0.4
2010	260	263	313	31	3.8	20.0	3.8	0.4
2013	219	281	36	13	5.8	14.8	0.1	0.2
2018	161	284	9	28	4.0	23.7	0.1	0.5

**Table 10R-43.8 - 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	28.2	0.0	33.6	5.5	0.1	46.1
2010	30.1	0.0	35.6	1.6	0.0	46.9
2013	26.7	0.0	49.3	2.0	0.2	34.2
2018	18.7	0.8	67.7	1.5	0.2	39.1

**Table 10R-43.9 - Pellet Group Data.** Quadrat frequency and pellet group transect data for animal pellets. Rabbit pellet groups are not sampled in the pellet group transect.

Year	Cattle	Mule Deer	Rocky Mountain Elk	Rabbit
	Quadrat Frequency			
2008	2	52	3	74
2010	-	1	-	5
2013	1	-	-	1
2018	-	-	-	9
Year	Days Use Per Acre (ha)			
2008	2.2 (5.4)	14.7 (36.4)	2.0 (5.0)	-
2010	-	-	-	-
2013	-	-	-	-
2018	-	-	-	-

**Table 10R-43.10 - Grass Species.** Nested frequency and modified Daubenmire average cover by year.

GRASS SPECIES									
Achnatherum hymenoides (Indian ricegrass)									
Agropyron cristatum <sup>i</sup> (crested wheatgrass)									
Bromus tectorum <sup>ai</sup> (cheatgrass)									
Elymus elymoides (squirreltail)									
Elymus lanceolatus (thickspike wheatgrass)									
Poa secunda (Sandberg bluegrass)									
Psathyrostachys juncea <sup>i</sup> (Russian wildrye)									
Sporobolus cryptandrus (sand dropseed)									
unknown perennial grass (unknown grass)									
year	Nested Frequency								
2008	15	-	416	6	182	18	-	-	-
2010	8	-	260	2	232	37	-	-	18
2013	5	6	219	22	252	-	5	-	-
2018	3	10	161	20	251	3	6	2	-
year	Average Cover (%)								
2008	0.2	-	13.7	0.0	5.4	0.1	-	-	-
2010	0.2	-	3.8	0.0	18.9	0.5	-	-	0.4
2013	0.2	0.3	5.8	0.1	14.0	-	0.2	-	-
2018	0.1	0.2	4.0	1.3	21.6	0.0	0.2	0.2	-

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

**Table 10R-43.11 - Forb Species.** Nested frequency and modified Daubenmire average cover by year.

FORB SPECIES												
Ceratocephala testiculata <sup>ai</sup> (curvseed butterwort)												
Chenopodium fremontii <sup>a</sup> (Fremont's goosefoot)												
Descurainia pinnata <sup>a</sup> (western tansymustard)												
Erigeron pumilus (shaggy fleabane)												
Lactuca serriola <sup>ai</sup> (prickly lettuce)												
Lappula occidentalis <sup>ai</sup> (flatspine stickseed)												
Machaeranthera canescens (hoary tansyaster)												
Sphaeralcea coccinea (scarlet globemallow)												
Sphaeralcea grossularifolia (gooseberry/leaf globemallow)												
Townsendia (Townsend daisy)												
Tragopogon dubius <sup>ai</sup> (yellow salsify)												
Trifolium (clover)												
year	Nested Frequency											
2008	37	-	-	-	-	113	-	33	-	2	-	-
2010	38	1	2	-	-	312	-	30	-	-	-	1
2013	4	4	3	3	-	25	0	8	2	-	-	-
2018	-	-	1	-	4	-	-	24	4	-	4	-
year	Average Cover (%)											
2008	0.1	-	-	-	-	0.6	-	0.4	-	0.0	-	-
2010	0.2	0.0	0.0	-	-	3.6	-	0.4	-	-	-	0.0
2013	0.0	0.0	0.0	0.0	-	0.1	0.0	0.1	0.0	-	-	-
2018	-	-	0.0	-	0.0	-	-	0.5	0.0	-	0.0	-

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

**Table 10R-43.12 - Shrub and Tree Species.** Average modified Daubenmire quadrat and line intercept cover by year.

SHRUB SPECIES	Artemisia frigida <sup>p</sup> (prairie sagewort)	Atriplex canescens <sup>p</sup> (fourwing saltbush)	Gutierrezia sarothrae (broom snakeweed)	Krascheninnikovia lanata <sup>p</sup> (winterfat)	Opuntia (pricklypear)
year	Line Intercept Cover (%)				
2008	3.3	0.6	0	12.3	-
2010	9.3	1.1	0.1	8.7	-
2013	5.3	5.3	-	9.4	-
2018	3.3	7.8	-	10.6	-
year	Quadrat Cover (%)				
2008	4.0	0.7	0.2	10.0	-
2010	6.7	1.1	0.1	9.4	-
2013	4.8	2.1	0.1	6.1	0.0
2018	2.1	5.2	0.0	10.5	0.1

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

**Table 10R-43.13 - Shrub/Tree Characteristics.** Population characteristics of shrub/tree species populations including density reproduction (seedlings), age distribution, utilization, vigor and average size (height/crown) of plants.

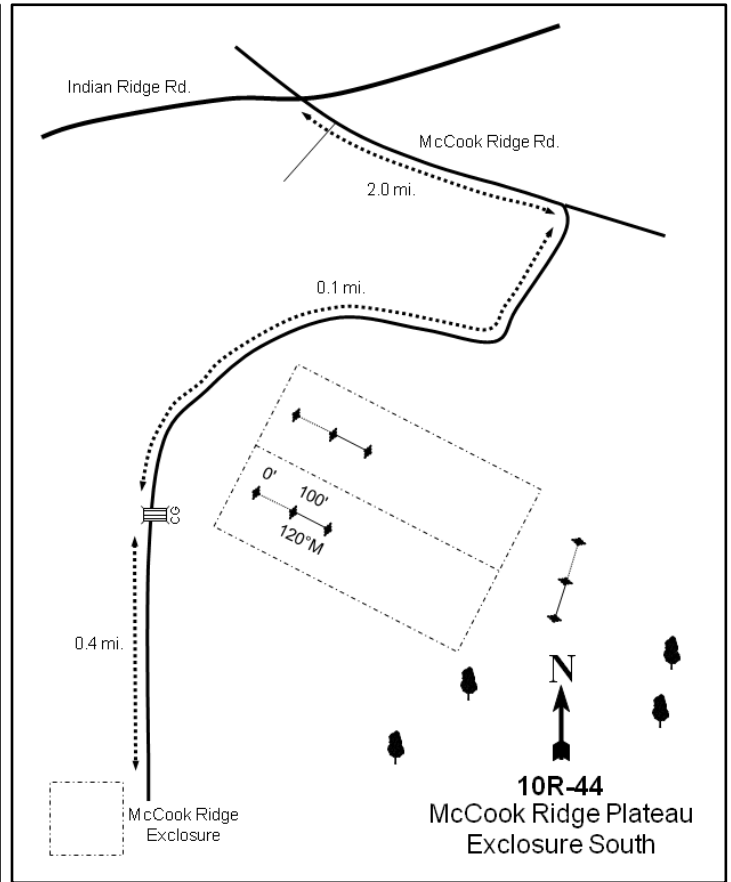
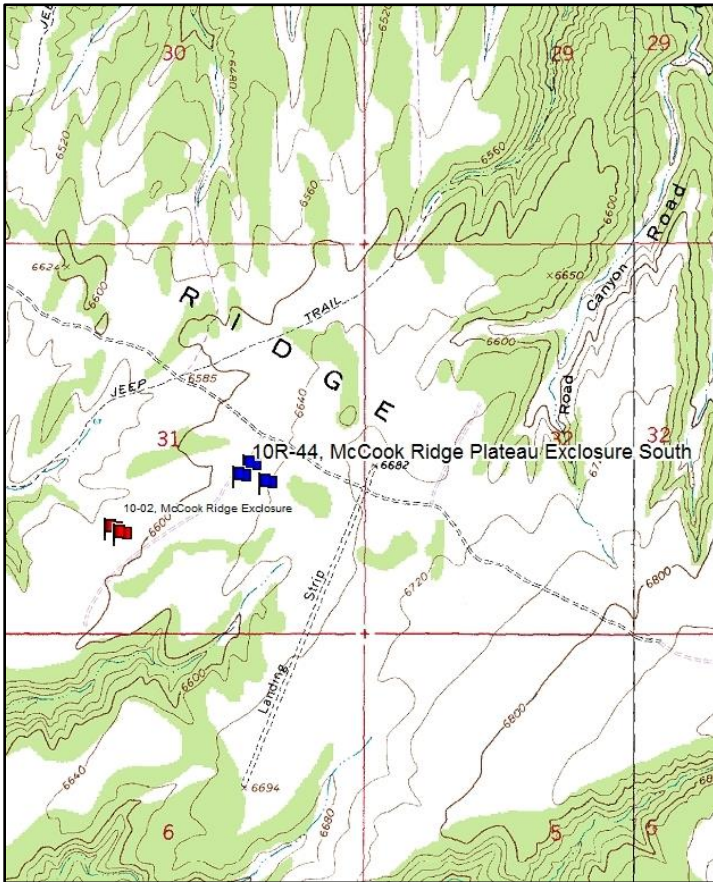
Year	Density		Age Class Distribution			Utilization		Poor Vigor (%)	Average Height Crown (cm)
	Plants Per Acre		Excluding Seedlings			Moderate (%)	Heavy (%)		
	Excluding Seedlings	Seedling	Young (%)	Mature (%)	Decadent (%)				
<b>Artemisia frigida<sup>p</sup> -- (prairie sagewort)</b>									
2008	5360	80	3	85	12	16	0	1	29/30
2010	9980	1440	8	92	0	0	0	0	23/30
2013	10040	640	25	75	0	0	0	0	18/23
2018	3840	-	4	90	6	0	0	6	14/21
<b>Artemisia tridentata ssp. vaseyana<sup>p</sup> -- (mountain big sagebrush)</b>									
2008	-	-	-	-	-	-	-	-	-/-
2010	-	-	-	-	-	-	-	-	-/-
2013	-	-	-	-	-	-	-	-	-/-
2018	-	-	-	-	-	-	-	-	64/93
<b>Atriplex canescens<sup>p</sup> -- (fourwing saltbush)</b>									
2008	300	-	7	60	33	27	0	7	84/89
2010	400	-	30	55	15	0	0	0	49/71
2013	540	-	7	93	0	11	0	4	95/130
2018	700	-	3	94	3	0	0	0	100/144
<b>Gutierrezia sarothrae -- (broom snakeweed)</b>									
2008	100	-	0	100	0	0	0	0	22/18
2010	180	-	0	100	0	0	0	0	20/31
2013	160	-	0	100	0	0	0	0	21/28
2018	40	-	0	0	100	0	0	100	18/20
<b>Krascheninnikovia lanata<sup>p</sup> -- (winterfat)</b>									
2008	23000	240	4	87	10	37	51	1	28/27
2010	20820	360	17	83	0	0	0	0	21/24
2013	14800	100	13	87	0	0	0	2	29/28
2018	13400	-	13	83	4	0	0	10	30/34



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 (%)				
Opuntia -- (pricklypear)									
2008	-	-	-	-	-	-	-	-	-/-
2010	-	-	-	-	-	-	-	-	-/-
2013	40	-	0	100	0	0	0	0	7/4
2018	100	-	0	100	0	0	0	0	12/22

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

## McCOOK RIDGE PLATEAU ENCLOSURE SOUTH - STUDY NO. 10R-44



### Location Information

USGS 7.5 min Map Info  
GPS (0' Stake)

Cooper Canyon SE; Township 13S, Range 24E, Section 31  
NAD 83 UTM ZONE 12, 648461 East 4389399 North

### Transect Information

Browse Tag # (0' Stake)	239
Transect Bearing	120° magnetic
Length	200ft
Belt Placement	Line 1 (11ft, 59ft & 95ft), Line 2 (34ft & 71ft)
Belt Marker Placement	Standard

### Directions to Site

From Ouray, travel 38 miles south to the McCook Ridge-Indian Ridge turnoff. Turn left (east) and travel on the Indian Ridge Road towards Sweetwater Canyon and McCook Ridge for 9.1 miles to the intersection of Cooper Canyon, Indian Ridge and McCook Ridge. From Indian Ridge Road, turn southeast and proceed up McCook Ridge approximately 2 miles to a road on the right. Turn right and drive 0.1 miles to the enclosure on the left (east) side of the road. The 0-foot stake is marked with browse tag #239.

**Site Information**

Land Ownership	Federal
Land Administrator	BLM
Allotment	LOWER MCCOOK
Elevation	6,550ft (1,996m)
Aspect	West
Slope	4%
Sample Dates	07/09/2008, 06/08/2010, 08/28/2013, 08/28/2018

**Table 10R-44.1 Disturbance History.** Recorded history of major disturbances.

Treatment/Disturbance	Name	WRI DB#	Date	Size (acres)
Herbicide - Plateau	McCook Ridge Cheatgrass Control	1109	October 2008	400
Seeding - Rangeland Drill	McCook Ridge Cheatgrass Control	1109	September-October 2008	400

**Table 10R-44.2 Seed Mix.** List of known seeded plant species and rates (if available).

Mix Name			Application Type	Application Date	Acres
McCook Ridge Cheatgrass Control			Drill	Oct 2008	400
Type	Species	Common Name	Cultivar/Source ID	Bulk lbs/acre	PLS
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 elymoides</i>	Bottlebrush Squirreltail	Toe Jam	0.05	0.04
G	<i>Elymus elymoides</i>	Bottlebrush Squirreltail	Toe Jam	0.45	0.39
G	<i>Elymus lanceolatus</i>	Thickspike Wheatgrass	Critana	1.00	0.87
G	<i>Elymus wawawaiensis</i>	Snake River Wheatgrass	Secar	1.00	0.76
G	<i>Poa secunda</i>	Canby Bluegrass	Canbar	0.25	0.21
G	<i>Psathyrostachys juncea</i>	Russian Wildrye	Bozoisky	1.00	0.85
F	<i>Linum perenne</i>	Blue Flax	Appar	0.25	0.21
F	<i>Medicago sativa</i>	Alfalfa	Ladak	1.50	1.36
F	<i>Sphaeralcea coccinea</i>	Scarlet Globemallow	Duchesne/Uintah UT	0.05	0.04
S	<i>Atriplex canescens</i>	Fourwing Saltbush	Central UT	1.00	0.43
Mix Name			Application Type	Application Date	Acres
McCook Ridge Cheatgrass Control - Sagebrush/Kochia			Drill	Oct 2008	400
Type	Species	Common Name	Cultivar/Source ID	Bulk lbs/acre	PLS
S	<i>Artemisia tridentata</i> ssp. <i>wyomingensis</i>	Wyoming Big Sagebrush	Beaver UT	0.50	0.08
S	<i>Bassia prostrata</i>	Forage Kochia	Immigrant	1.00	0.70

**Wildlife Habitat and Vegetation History****Table 10R-44.3 - Wildlife Seasonal Habitat.** UDWR wildlife habitat and seasonality.

Species	Habitat	Season
Bison	potential	year-long
Deer	crucial	winter
Elk	crucial	winter

**Table 10R-44.4 - Vegetation History.** The dominant vegetation type(s) and phase of woodland succession (Tausch, Miller, Roundy, & Chambers, 2009).

Year	Vegetation Type	Woodland Succession
2008	Winterfat/Annual Grass	No Encroachment
2010	Mixed Shrub/Annual-Perennial Grass	No Encroachment
2013	Mixed Shrub/Annual-Perennial Grass	No Encroachment
2018	Mixed Shrub/Annual-Perennial Grass	No Encroachment

**Site Notes**

No Notes

**Site Potential**

1981 - 2010 Average Annual Precipitation 13 inches  
 NRCS Ecological Site Upland Silt Loam (Fourwing Saltbush-Winterfat)  
 NRCS Ecological Site # R034XY329UT  
 States and Transitions No state and transition model is available for this ecological site.

This site was dominated by winterfat (*Krascheninnikovia lanata*) and cheatgrass (*Bromus tectorum*) when the study was established in 2008. Cover of other shrubs such as prairie sagewort (*Artemisia frigida*) and fourwing saltbush (*Atriplex canescens*) have fluctuated following the herbicide and seeding treatment (Table 10R-44.1, Table 10R-44.12). Mixed shrubs have been a co-dominant vegetation component in all post-treatment sample years. There was also an increase in perennial grasses following treatment and a slight overall decrease in cheatgrass cover; perennial and annual grasses have also been co-dominant cover types following treatment. Forbs have generally remained rare (Table 10R-44.7, Table 10R-44.10, Table 10R-44.11).

**Trend Summary Tables**

**Table 10R-44.6 - 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	17.0	0.0	-	18.5	-	-
2010	20.9	-	-	26.4	-	-
2013	15.9	-	-	22.3	-	-
2018	15.4	0.1	-	17.0	-	-

**Table 10R-44.7 - 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	429	142	212	4	16.5	2.8	1.5	0.0
2010	311	209	346	6	5.5	8.3	5.7	0.1
2013	321	165	42	10	9.6	6.5	0.2	0.0
2018	278	153	71	1	10.7	8.1	1.1	0.0

**Table 10R-44.8 - 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	19.3	0.0	40.0	12.2	0.1	43.4
2010	32.9	-	34.8	4.1	0.2	42.0
2013	35.8	-	33.9	4.7	1.0	31.8
2018	22.6	0.1	62.5	6.0	0.9	32.2

**Table 10R-44.9 - 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	35	3	77
2010	-	8	3	10
2013	-	21	10	3
2018	-	17	20	12
Year	Days Use Per Acre (ha)			
2008	4.4 (10.8)	24.1 (59.6)	4.0 (9.9)	-
2010	-	-	-	-
2013	-	28.1 (69.5)	25.5 (62.9)	-
2018	-	6.7 (16.6)	34.2 (84.4)	-

**Table 10R-44.10 - Grass Species.** Nested frequency and modified Daubenmire average cover by year.

GRASS SPECIES	Agropyron cristatum <sup>i</sup> (crested wheatgrass)	Bouteloua gracilis (blue grama)	Bromus tectorum <sup>ai</sup> (cheatgrass)	Elymus elymoides (squirreltail)	Elymus lanceolatus (thickspike wheatgrass)	Poa secunda (Sandberg bluegrass)	Psathyrostachys juncea <sup>i</sup> (Russian wildrye)	Sporobolus cryptandrus (sand dropseed)	unknown perennial grass (unknown grass)
year	Nested Frequency								
2008	-	-	429	-	95	52	-	-	-
2010	-	-	311	3	72	115	-	-	25
2013	28	-	321	8	108	18	3	2	-
2018	7	2	278	-	113	22	-	25	-
year	Average Cover (%)								
2008	-	-	16.5	-	2.1	0.7	-	-	-
2010	-	-	5.5	0.0	5.3	2.0	-	-	1.1
2013	0.5	-	9.6	0.1	5.5	0.2	0.1	0.0	-
2018	0.7	0.0	10.7	-	6.0	0.4	-	0.9	-

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

**Table 10R-44.11 - Forb Species.** Nested frequency and modified Daubenmire average cover by year.

FORB SPECIES	Alyssum desertorum <sup>ai</sup> (desert madwort)	Astragalus convallarius (lesser rushy milkvetch)	Ceratocephala testiculata <sup>ai</sup> (curvseed butterwort)	Chenopodium fremontii <sup>a</sup> (Fremont's goosefoot)	Descurainia pinnata <sup>a</sup> (western tansymustard)	Lactuca serriola <sup>ai</sup> (prickly lettuce)	Lappula occidentalis <sup>ai</sup> (flatspine stickseed)	Machaeranthera canescens (hoary tansyaster)	Schoenocrambe limifolia (flaxleaf plainsmustard)	Sphaeralcea coccinea (scarlet globemallow)	Townsendia (Townsend daisy)	Tragopogon dubius <sup>ai</sup> (yellow safsify)
year	Nested Frequency											
2008	29	-	18	-	-	-	184	-	-	-	4	-
2010	53	-	20	3	10	1	331	-	6	-	-	-
2013	3	4	3	-	-	4	32	6	-	-	-	-
2018	63	-	-	-	0	3	4	-	-	1	-	3
year	Average Cover (%)											
2008	0.1	-	0.0	-	-	-	1.4	-	-	-	0.0	-
2010	0.4	-	0.1	0.0	0.0	0.0	5.1	-	0.1	-	-	-
2013	0.0	0.0	0.0	-	-	0.0	0.2	0.0	-	-	-	-
2018	1.0	-	-	-	0.0	0.0	0.0	-	-	0.0	-	0.1

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

**Table 10R-44.12 - Shrub and Tree Species.** Average modified Daubenmire quadrat and line intercept cover by year.

SHRUB SPECIES	Line Intercept Cover (%)				
	Artemisia frigida <sup>p</sup> (prairie sagewort)	Atriplex canescens <sup>p</sup> (fourwing saltbush)	Gutierrezia sarothrae (broom snakeweed)	Krascheninnikovia lanata <sup>p</sup> (winterfat)	Opuntia (pricklypear)
year	Line Intercept Cover (%)				
2008	2.6	1.8	-	14.1	-
2010	14.1	1.6	-	10.7	-
2013	8.1	3.1	-	11.1	-
2018	0.9	6.1	-	10	-
year	Quadrat Cover (%)				
2008	4.7	1.7	0.0	10.6	-
2010	9.7	2.0	-	9.2	-
2013	5.3	1.4	-	9.2	-
2018	1.6	4.4	-	9.5	0.1

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

**Table 10R-44.13 - 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.

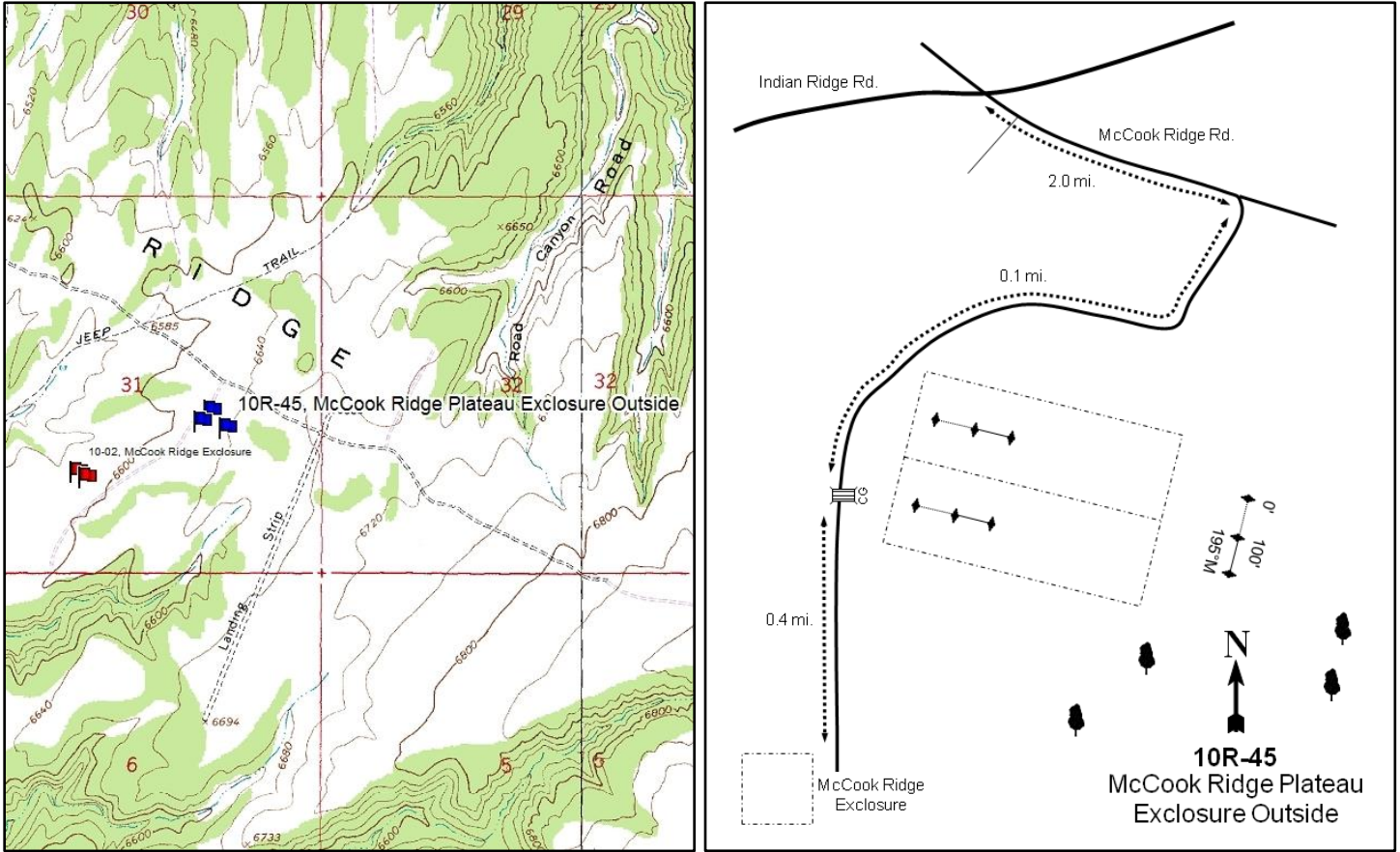
Year	Density		Age Class Distribution			Utilization		Poor Vigor (%)	Average Height Crown (cm)
	Plants Per Acre		Excluding Seedlings			Moderate (%)	Heavy (%)		
	Excluding Seedlings	Seedling	Young (%)	Mature (%)	Decadent (%)				
<b>Artemisia frigida<sup>p</sup> -- (prairie sagewort)</b>									
2008	7300	200	4	91	5	21	0	1	29/28
2010	13200	4580	5	95	0	19	6	0	24/31
2013	19860	4300	58	42	0	2	1	0	15/19
2018	2200	-	6	91	4	0	0	4	13/18
<b>Artemisia nova<sup>p</sup> -- (black sagebrush)</b>									
2008	-	-	-	-	-	-	-	-	-/-
2010	-	-	-	-	-	-	-	-	-/-
2013	160	-	100	0	0	0	0	0	- / -
2018	-	-	-	-	-	-	-	-	-/-
<b>Artemisia tridentata ssp. vaseyana<sup>p</sup> -- (mountain big sagebrush)</b>									
2008	-	-	-	-	-	-	-	-	-/-
2010	-	-	-	-	-	-	-	-	-/-
2013	-	-	-	-	-	-	-	-	49/63
2018	-	-	-	-	-	-	-	-	53/61
<b>Atriplex canescens<sup>p</sup> -- (fourwing saltbush)</b>									
2008	320	-	0	31	69	31	19	44	72/73
2010	460	-	30	70	0	26	22	0	38/60
2013	600	20	7	93	0	27	0	0	77/92
2018	740	-	8	87	5	5	8	14	90/124
<b>Gutierrezia sarothrae -- (broom snakeweed)</b>									
2008	80	20	0	75	25	0	0	0	29/30
2010	60	-	0	100	0	0	0	0	12/19
2013	40	-	0	100	0	0	0	0	24/30
2018	20	-	0	100	0	0	0	0	18/29

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 (%)				
<b>Krascheninnikovia lanata<sup>p</sup> -- (winterfat)</b>									
2008	22620	20	3	86	10	31	49	0	27/28
2010	18780	160	14	87	0	28	37	0	20/26
2013	15560	120	9	89	2	17	1	5	24/27
2018	14780	-	10	84	6	28	5	35	26/29
<b>Opuntia -- (pricklypear)</b>									
2008	-	-	-	-	-	-	-	-	-/-
2010	-	-	-	-	-	-	-	-	-/-
2013	-	-	-	-	-	-	-	-	-/-
2018	20	-	0	100	0	0	0	0	12/61
<b>Pediocactus simpsonii -- (mountain ball cactus)</b>									
2008	-	-	-	-	-	-	-	-	-/-
2010	-	-	-	-	-	-	-	-	-/-
2013	20	-	0	100	0	0	0	0	- / -
2018	40	-	0	100	0	0	0	0	4/6

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



## McCOOK RIDGE PLATEAU ENCLOSURE OUTSIDE - STUDY NO. 10R-45



### Location Information

USGS 7.5 min Map Info  
GPS (0' Stake)

Cooper Canyon SE; Township 13S, Range 24E, Section 31  
NAD 83 UTM ZONE 12, 648565 East 4389372 North

### Transect Information

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

276  
120° magnetic  
200ft  
Line 1 (11ft, 59ft & 95ft), Line 2 (34ft & 71ft)  
Standard

### Directions to Site

From Ouray, go 38 miles south to the McCook Ridge-Indian Ridge turnoff. Turn left (east) and travel on the Indian Ridge Road towards Sweetwater Canyon and McCook Ridge for 9.1 miles to the intersection of Cooper Canyon, Indian Ridge and McCook Ridge. From Indian Ridge Road, turn southeast and proceed up McCook Ridge approximately 2 miles to a road on the right. Turn right and drive 0.1 miles to the enclosure on the right (east) side of the road. The 0-foot stake is marked with browse tag #276.

**Site Information**

Land Ownership	Federal
Land Administrator	BLM
Allotment	LOWER MCCOOK
Elevation	6,550ft (1,996m)
Aspect	West
Slope	4%
Sample Dates	07/09/2008, 06/08/2010, 08/28/2013, 08/28/2018

**Table 10R-45.1 Disturbance History.** Recorded history of major disturbances.

Treatment/Disturbance	Name	WRI DB#	Date	Size (acres)
Herbicide - Plateau	McCook Ridge Cheatgrass Control	1109	October 2008	384
Seeding - Rangeland Drill	McCook Ridge Cheatgrass Control	1109	September-October 2009	384

**Table 10R-45.2 Seed Mix.** List of known seeded plant species and rates (if available).

Mix Name			Application Type	Application Date	Acres
McCook Ridge Cheatgrass Control			Drill	Oct 2008	400
Type	Species	Common Name	Cultivar/Source ID	Bulk lbs/acre	PLS
G	Achnatherum hymenoides	Indian Ricegrass	Rimrock	1.00	0.92
G	Agropyron cristatum	Crested Wheatgrass	Douglas	1.00	0.78
G	Agropyron cristatum	Crested Wheatgrass	Hycrest	1.00	0.91
G	Elymus elymoides	Bottlebrush Squirreltail	Toe Jam	0.05	0.04
G	Elymus elymoides	Bottlebrush Squirreltail	Toe Jam	0.45	0.39
G	Elymus lanceolatus	Thickspike Wheatgrass	Critana	1.00	0.87
G	Elymus wawawaiensis	Snake River Wheatgrass	Secar	1.00	0.76
G	Poa secunda	Canby Bluegrass	Canbar	0.25	0.21
G	Psathyrostachys juncea	Russian Wildrye	Bozoisky	1.00	0.85
F	Linum perenne	Blue Flax	Appar	0.25	0.21
F	Medicago sativa	Alfalfa	Ladak	1.50	1.36
F	Sphaeralcea coccinea	Scarlet Globemallow	Duchesne/Uintah UT	0.05	0.04
S	Atriplex canescens	Fourwing Saltbush	Central UT	1.00	0.43
Mix Name			Application Type	Application Date	Acres
McCook Ridge Cheatgrass Control - Sagebrush/Kochia			Drill	Oct 2008	400
Type	Species	Common Name	Cultivar/Source ID	Bulk lbs/acre	PLS
S	Artemisia tridentata ssp. wyomingensis	Wyoming Big Sagebrush	Beaver UT	0.50	0.08
S	Bassia prostrata	Forage Kochia	Immigrant	1.00	0.70

**Wildlife Habitat and Vegetation History**

**Table 10R-45.3 - Wildlife Seasonal Habitat.** UDWR wildlife habitat and seasonality.

Species	Habitat	Season
Bison	potential	year-long
Deer	crucial	winter
Elk	crucial	winter

**Table 10R-45.4 - Vegetation History.** The dominant vegetation type(s) and phase of woodland succession (Tausch, Miller, Roundy, & Chambers, 2009).

Year	Vegetation Type	Woodland Succession
2008	Winterfat/Perennial Grass	No Encroachment
2010	Winterfat/Perennial Grass	No Encroachment
2013	Winterfat/Perennial Grass	No Encroachment
2018	Winterfat/Perennial Grass	No Encroachment

**Site Notes**

No Notes

**Site Potential**

1981 - 2010 Average Annual Precipitation 13 inches  
 NRCS Ecological Site Upland Silt Loam (Fourwing Saltbush-Winterfat)  
 NRCS Ecological Site # R034XY329UT  
 States and Transitions No state and transition model is available for this ecological site.

Since study establishment in 2008, the plant community on this site has remained dominated by winterfat (*Krascheninnikovia lanata*) and perennial grasses with a lesser component of the introduced annual grass cheatgrass (*Bromus tectorum*). Winterfat and cheatgrass cover have decreased following the herbicide and seeding treatments (Table 10R-45.1, Table 10R-45.12). Perennial grass cover initially increased in the first post-treatment sample year, but has since decreased. Forbs have remained rare (Table 10R-45.7, Table 10R-45.10, Table 10R-45.11). Although no trees have been observed on the site itself, photos show that Utah juniper (*Juniperus osteosperma*) and twoneedle pinyon (*Pinus edulis*) woodlands are adjacent to the transect: this indicates that there may be the possibility of encroachment in the future.

**Trend Summary Tables**

**Table 10R-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
2008	16.9	0.2	-	22.4	0.3	-
2010	15.5	0.2	-	15.1	0.7	-
2013	15.0	0.2	-	15.5	0.4	-
2018	11.4	0.7	-	10.1	0.9	-

**Table 10R-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
2008	340	312	204	3	5.9	11.5	1.2	0.1
2010	218	341	269	2	2.0	18.1	1.9	0.0
2013	232	309	92	9	3.1	7.1	0.3	0.1
2018	65	331	3	17	0.3	9.7	0.0	0.1

**Table 10R-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
2008	25.7	0.1	33.3	9.7	0.1	43.4
2010	41.8	0.2	26.7	3.8	0.1	38.1
2013	56.0	0.1	20.7	2.2	0.0	24.8
2018	49.5	0.8	36.3	9.2	0.1	22.3

**Table 10R-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	Horse	Rabbit
	Quadrat Frequency				
2008	5	30	10	-	65
2010	1	8	11	-	13
2013	5	15	28	-	6
2018	13	15	27	-	18
Year	Days Use Per Acre (ha)				
2008	2.2 (5.4)	14.7 (36.4)	5.3 (13.2)	-	-
2010	-	-	-	-	-
2013	8.0 (19.7)	8.7 (21.5)	21.5 (53.0)	-	-
2018	3.6 (9.0)	7.4 (18.2)	23.4 (57.9)	1.7 (4.3)	-

**Table 10R-45.10 - Grass Species.** Nested frequency and modified Daubenmire average cover by year.

GRASS SPECIES	Achnatherum hymenoides (Indian ricegrass)	Agropyron cristatum <sup>i</sup> (crested wheatgrass)	Bouteloua gracilis (blue grama)	Bromus tectorum <sup>ai</sup> (cheatgrass)	Elymus elymoides (squirreltail)	Elymus lanceolatus (thickspike wheatgrass)	Poa secunda (Sandberg bluegrass)	Psathyrostachys juncea <sup>i</sup> (Russian wildrye)	Pseudoroegneria spicata (bluebunch wheatgrass)	Sporobolus cryptandrus (sand dropseed)	unknown perennial grass (unknown grass)
year	Nested Frequency										
2008	2	-	-	340	4	186	138	-	-	-	-
2010	5	5	-	218	2	128	199	-	-	-	98
2013	3	40	-	232	13	236	64	1	7	5	-
2018	-	11	1	65	7	244	107	2	-	7	-
year	Average Cover (%)										
2008	0.4	-	-	5.9	0.0	7.7	3.4	-	-	-	-
2010	0.0	0.0	-	2.0	0.0	6.9	4.1	-	-	-	7.0
2013	0.0	0.4	-	3.1	0.1	6.0	0.4	0.0	0.0	0.1	-
2018	-	0.2	0.0	0.3	0.1	8.2	0.9	0.0	-	0.2	-

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

**Table 10R-45.11 - Forb Species.** Nested frequency and modified Daubenmire average cover by year.

FORB SPECIES	Alyssum desertorum <sup>ai</sup> (desert madwort)	Ceratocephala testiculata <sup>ai</sup> (curvseed butterwort)	Collomia linearis <sup>a</sup> (tiny trumpet)	Descurainia pinnata <sup>a</sup> (western tansymustard)	Lappula occidentalis <sup>ai</sup> (flatspine stickseed)	Machaeranthera canescens (hoary tansyaster)	Phlox longifolia (longleaf phlox)	Sphaeralcea coccinea (scarlet globemallow)
year	Nested Frequency							
2008	-	19	-	-	196	-	-	3
2010	-	5	4	7	264	-	-	2
2013	-	10	-	-	82	6	3	2
2018	1	-	-	-	2	-	10	7
year	Average Cover (%)							
2008	-	0.0	-	-	1.1	-	-	0.1
2010	-	0.0	0.0	0.0	1.8	-	-	0.0
2013	-	0.0	-	-	0.3	0.1	0.0	0.0
2018	0.0	-	-	-	0.0	-	0.0	0.1

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

**Table 10R-45.12 - Shrub and Tree Species.** Average modified Daubenmire quadrat and line intercept cover by year.

SHRUB SPECIES	Line Intercept Cover (%)					
	Artemisia frigida <sup>p</sup> (prairie sagewort)	Artemisia nova <sup>p</sup> (black sagebrush)	Artemisia tridentata ssp. vaseyana <sup>p</sup> (mountain big sagebrush)	Atriplex canescens <sup>p</sup> (fourwing saltbush)	Gutierrezia sarothrae (broom snakeweed)	Krascheninnikovia lanata <sup>p</sup> (winterfat)
year	Line Intercept Cover (%)					
2008	5.1	-	0.1	-	0.3	17.2
2010	4.4	-	0.1	-	0.7	10.6
2013	5.8	-	0.2	1.5	0.4	8
2018	1.6	0.4	-	0.2	0.9	7.9
year	Quadrat Cover (%)					
2008	3.6	0.0	0.0	0.1	0.2	13.2
2010	5.3	-	0.0	0.2	0.2	10.0
2013	4.8	-	0.0	0.9	0.2	9.2
2018	2.5	0.0	-	0.2	0.7	8.7

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

**Table 10R-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.

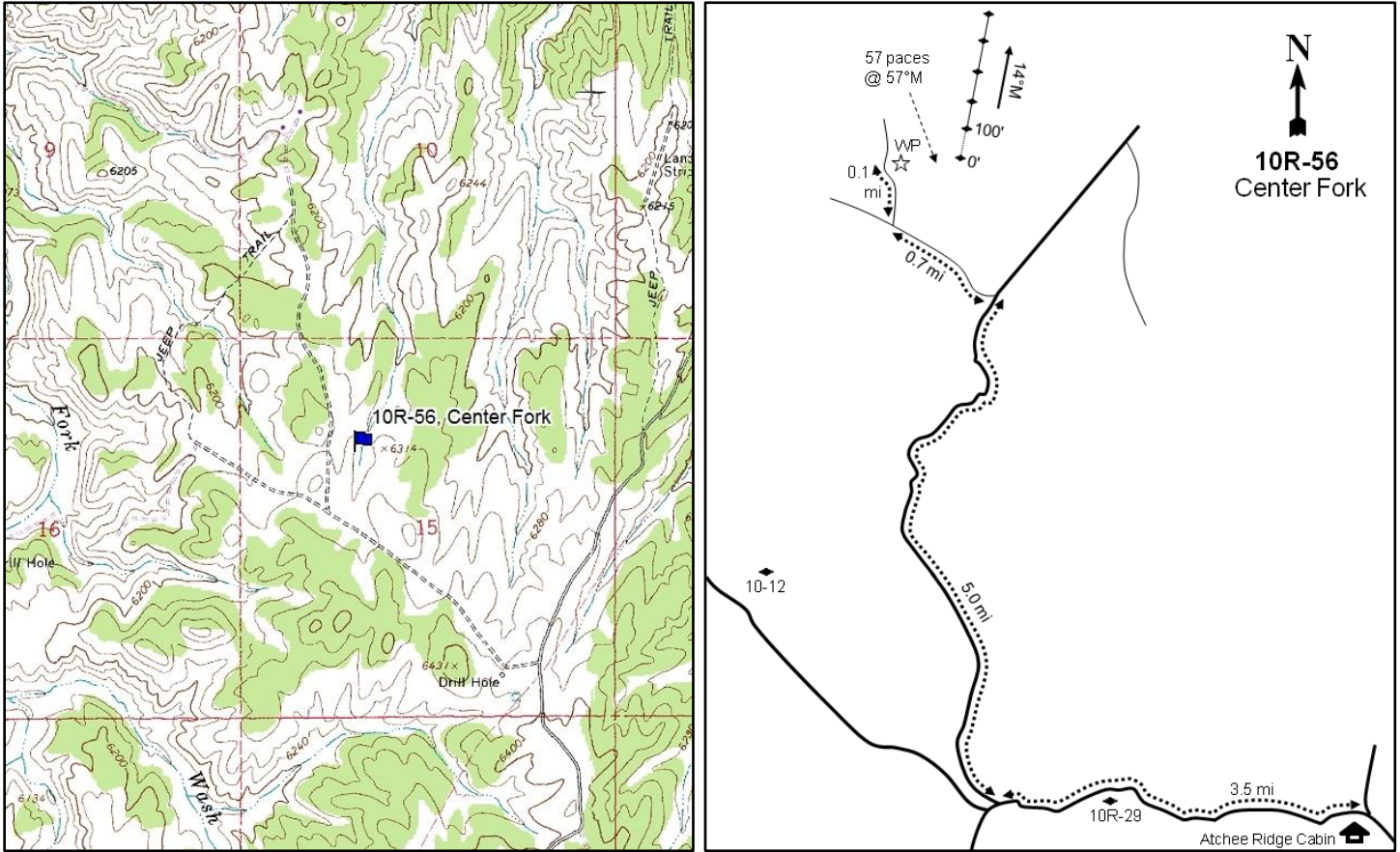
Year	Density		Age Class Distribution			Utilization		Poor Vigor (%)	Average Height Crown (cm)
	Plants Per Acre		Excluding Seedlings			Moderate (%)	Heavy (%)		
	Excluding Seedlings	Seedling	Young (%)	Mature (%)	Decadent (%)				
<b>Artemisia frigida<sup>p</sup> -- (prairie sagewort)</b>									
2008	5540	-	3	95	2	12	0	0	29/33
2010	7160	260	10	90	0	9	7	0	18/24
2013	20180	11560	66	34	0	1	0	1	16/21
2018	6420	20	20	79	1	12	2	1	10/14
<b>Artemisia nova<sup>p</sup> -- (black sagebrush)</b>									
2008	-	-	-	-	-	-	-	-	-/-
2010	-	-	-	-	-	-	-	-	-/-
2013	-	-	-	-	-	-	-	-	-/-
2018	80	-	25	50	25	25	75	0	33/55
<b>Artemisia tridentata ssp. vaseyana<sup>p</sup> -- (mountain big sagebrush)</b>									
2008	100	-	0	40	60	40	60	60	28/38
2010	140	-	57	29	14	14	14	14	31/37
2013	80	-	0	75	25	100	0	25	43/57
2018	-	-	-	-	-	-	-	-	-/-
<b>Atriplex canescens<sup>p</sup> -- (fourwing saltbush)</b>									
2008	180	-	0	67	33	44	0	22	70/77
2010	400	20	35	55	10	10	10	0	32/37
2013	280	40	21	71	7	7	0	0	74/97
2018	120	-	0	100	0	17	0	0	76/102
<b>Gutierrezia sarothrae -- (broom snakeweed)</b>									
2008	1260	-	0	89	11	0	0	0	16/17
2010	1040	-	2	98	0	0	0	0	18/21
2013	1540	20	53	47	0	0	0	0	16/18
2018	1440	-	13	88	0	0	0	0	15/20

Year	Density		Age Class Distribution			Utilization		Poor Vigor (%)	Average Height Crown (cm)
	Plants Per Acre		Excluding Seedlings			Moderate (%)	Heavy (%)		
	Excluding Seedlings	Seedling	Young (%)	Mature (%)	Decadent (%)				
Krascheninnikovia lanata <sup>p</sup> -- (winterfat)									
2008	26380	-	3	86	11	24	55	0	25/27
2010	23420	840	36	64	1	28	14	0	18/24
2013	17320	60	10	90	0	35	4	2	21/25
2018	19540	-	17	81	2	39	32	14	16/20

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



## CENTER FORK - STUDY NO. 10R-56



### Location Information

USGS 7.5 min Map Info GPS (0' Stake)	Rainbow SW; Township 12S, Range 24E, Section 15 NAD 83 UTM ZONE 12, 652379 East 4404614 North
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### Transect Information

Browse Tag # (0' Stake)	171
Transect Bearing	14° 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 Atchee Ridge cabin, travel west toward the Massey Junction study (10R-39) for 3.5 miles until you reach an intersection. Turn right (north) toward Center Fork Asphalt Wash and travel for an additional 5.0 miles. Turn left onto a two-track road and continue for 0.7 miles to a fork on the right. Proceed along the right-hand fork and travel for 0.1 miles to a large rock and witness post. The 0-foot stake is located 57 paces from the witness post at 57 degrees magnetic and is marked by browse tag #171.



**Site Information**

Land Ownership	Federal
Land Administrator	BLM
Allotment	ASPHALT DRAW
Elevation	6,300ft (1,920m)
Aspect	Northeast
Slope	10%
Sample Dates	06/02/2015, 08/28/2018

**Table 10R-56.1 Disturbance History.** Recorded history of major disturbances.

Treatment/Disturbance	Name	WRI DB#	Date	Size (acres)
Fire - Wildfire	Wolf Den	-	2012	19865
Seeding - Aerial	Wolf Den Fire-Rainbow	2517	November-December 2012	526

**Table 10R-56.2 Seed Mix.** List of known seeded plant species and rates (if available).

Mix Name			Application Type	Application Date	Acres
Wolf Den Fire Rainbow			Aerial	Dec 2012	525
Type	Species	Common Name	Cultivar/Source ID	Bulk lbs/acre	PLS
G	Achnatherum hymenoides	Indian Ricegrass	Nezpar	0.67	0.60
G	Bouteloua gracilis	Blue Grama	Alma	0.24	0.16
G	Elymus lanceolatus	Thickspike Wheatgrass	Bannock	1.05	0.97
G	Pascopyrum smithii	Western Wheatgrass	Arriba	1.43	1.28
G	Poa secunda	Sandberg Bluegrass	UP/Colorado Plateau	0.19	0.16
G	Poa secunda	Big Bluegrass	Sherman	0.29	0.23
G	Sporobolus cryptandrus	Sand Dropseed	Washington CO	0.10	0.09
F	Medicago sativa	Alfalfa	Ladak	0.83	0.79
F	Medicago sativa	Alfalfa	Ranger (NC)	0.19	0.18
S	Artemisia tridentata ssp. wyomingensis	Wyoming Big Sagebrush	Tooele UT	1.22	0.32
S	Bassia prostrata	Forage Kochia	Beaver UT	0.38	0.31

**Wildlife Habitat and Vegetation History**

**Table 10R-56.3 - Wildlife Seasonal Habitat.** UDWR wildlife habitat and seasonality.

Species	Habitat	Season
Bison	potential	year-long
Deer	crucial	winter
Elk	crucial	winter

**Table 10R-56.4 - Vegetation History.** The dominant vegetation type(s) and phase of woodland succession (Tausch, Miller, Roundy, & Chambers, 2009).

Year	Vegetation Type	Woodland Succession
2015	Annual Grass-Forb	No Encroachment
2018	Annual Grass	No Encroachment

**Site Notes**

No Notes

**Site Potential**

1981 - 2010 Average Annual Precipitation	11 inches
NRCS Ecological Site	Semidesert Loam (Wyoming Big Sagebrush)
NRCS Ecological Site #	R034XY212UT
States and Transitions	No state and transition model is available for this ecological site.

Upon study establishment in 2015, this site was an introduced annual grass/forb community type which was dominated by the annual grass cheatgrass (*Bromus tectorum*) with tall tumblemustard (*Sisymbrium altissimum*) providing much of the forb cover (Table 10R-56.7, Table 10R-56.10, Table 10R-56.11). Both annual forb and grass cover decreased following treatment, but cheatgrass has remained as the dominant vegetation component. Browse cover has exhibited a slight increase following treatment, but it has remained minimal overall with broom snakeweed (*Gutierrezia sarothrae*) as the dominant species in both sample years (Table 10R-56.12, Table 10R-56.13). Although cheatgrass cover has decreased as of 2018, it is still abundant (Table 10R-56.10): high amounts of annual grasses may threaten the ecological resilience of a plant community.

**Trend Summary Tables**

**Table 10R-56.6 - 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
2015	0.8	1.7	-	0.6	2.2	-
2018	1.8	4.6	-	1.8	3.3	-

**Table 10R-56.7 - 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
2015	444	102	406	52	28.5	5.1	18.7	0.9
2018	330	113	145	16	12.1	5.5	3.5	0.1

**Table 10R-56.8 - 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
2015	14.4	-	27.4	25.3	5.7	50.1
2018	12.8	-	49.1	28.2	5.9	24.9

**Table 10R-56.9 - 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			
2015	-	11	3	3
2018	1	2	12	13
Year	Days Use Per Acre (ha)			
2015	-	19.4 (48.0)	8.1 (19.9)	-
2018	-	13.4 (33.1)	17.4 (43.0)	-

**Table 10R-56.10 - Grass Species.** Nested frequency and modified Daubenmire average cover by year.

GRASS SPECIES	Achnatherum hymenoides (Indian ricegrass)	Agropyron cristatum <sup>1</sup> (crested wheatgrass)	Bromus tectorum <sup>aa</sup> (cheatgrass)	Elymus elymoides (squirreltail)	Elymus lanceolatus (thickspike wheatgrass)	Poa fendleriana (muttongrass)	Poa secunda (Sandberg bluegrass)	Pseudoroegneria spicata (bluebunch wheatgrass)	Sporobolus cryptandrus (sand dropseed)
year	Nested Frequency								
2015	13	3	444	2	84	2	9	0	-
2018	4	-	330	14	81	3	8	10	2
year	Average Cover (%)								
2015	1.5	0.0	28.5	0.0	3.2	0.0	0.3	0.0	-
2018	0.7	-	12.1	0.2	3.6	0.1	0.2	0.6	0.0

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

**Table 10R-56.11 - Forb Species.** Nested frequency and modified Daubenmire average cover by year.

FORB SPECIES	Nested Frequency															
Alyssum desertorum <sup>ai</sup> (desert madwort)	-	6	1	12	9	8	37	3	2	0	28	334	14	244	0	1
Astragalus convallarius (lesser rushy milkvetch)	5	5	-	4	4	-	27	-	-	-	-	85	-	46	11	-
Castilleja linariifolia (Wyoming Indian paintbrush)	Average Cover (%)															
Descurainia pinnata <sup>a</sup> (western tansymustard)	-	0.2	0.0	0.1	0.1	0.1	0.3	0.2	0.0	0.0	0.2	6.7	0.2	11.6	0.0	0.1
Halogeton glomeratus <sup>ai</sup> (saltlover)	0.0	0.1	-	0.0	0.0	-	0.3	-	-	-	-	2.3	-	0.9	0.1	-
Lactuca serriola <sup>ai</sup> (prickly lettuce)																
Lappula occidentalis <sup>a</sup> (flatspine stickseed)																
Medicago sativa <sup>i</sup> (alfalfa)																
Oenothera (evening primrose)																
Penstemon pachyphyllus (thickleaf beardtongue)																
Phlox longifolia (longleaf phlox)																
Salsola tragus <sup>ai</sup> (prickly Russian thistle)																
Schoenocrambe linifolia (flaxleaf plainsmustard)																
Sisymbrium altissimum <sup>ai</sup> (tall tumblemustard)																
Sphaeralcea coccinea (scarlet globemallow)																
Sphaeralcea grossularifolia (gooseberry/leaf globemallow)																

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

**Table 10R-56.12 - Shrub and Tree Species.** Average modified Daubenmire quadrat and line intercept cover by year.

SHRUB SPECIES	Line Intercept Cover (%)			
Artemisia frigida <sup>p</sup> (prairie sagewort)	0.1	0.3	0.2	2.2
Atriplex confertifolia <sup>p</sup> (shadscale saltbush)	-	1.4	0.4	3.3
Bassia prostrata <sup>pi</sup> (forage kochia)	Quadrat Cover (%)			
Gutierrezia sarothrae (broom snakeweed)	0.2	0.2	0.4	1.7
	0.0	1.2	0.6	4.6

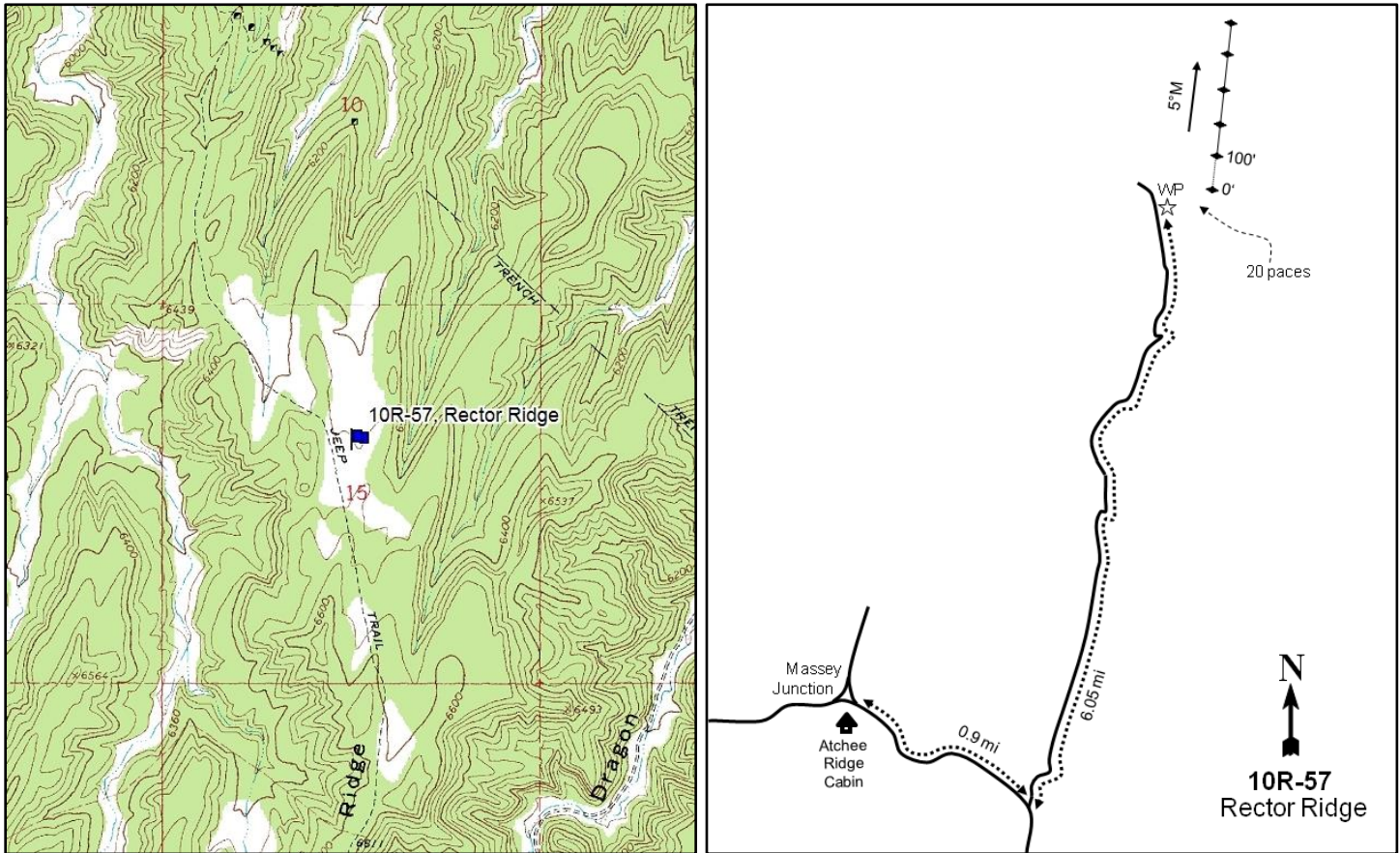
t - Tree Species; p - Preferred Browse; i - Introduced Species

**Table 10R-56.13 - 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 (%)				
<b>Artemisia frigida<sup>p</sup> -- (prairie sagewort)</b>									
2015	360	40	11	89	0	0	0	0	22/20
2018	120	-	17	17	67	0	0	67	14/24
<b>Artemisia tridentata ssp. vaseyana<sup>p</sup> -- (mountain big sagebrush)</b>									
2015	20	-	100	0	0	0	0	0	23/26
2018	-	-	-	-	-	-	-	-	27/33
<b>Atriplex confertifolia<sup>p</sup> -- (shadscale saltbush)</b>									
2015	280	-	43	57	0	7	0	0	25/34
2018	180	-	0	100	0	0	0	0	39/67
<b>Bassia prostrata<sup>pi</sup> -- (forage kochia)</b>									
2015	260	620	15	77	8	0	8	8	25/41
2018	320	-	6	94	0	13	0	0	30/46
<b>Gutierrezia sarothrae -- (broom snakeweed)</b>									
2015	3160	560	23	77	0	0	0	0	20/27
2018	5200	40	20	73	7	0	0	37	23/33
<b>Sarcobatus vermiculatus -- (greasewood)</b>									
2015	-	-	-	-	-	-	-	-	63/110
2018	-	-	-	-	-	-	-	-	91/153

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

## RECTOR RIDGE - STUDY NO. 10R-57

**Location Information**

USGS 7.5 min Map Info  
GPS (0' Stake)

Dragon SW; Township 12S, Range 25E, Section 15  
NAD 83 UTM ZONE 12, 662328 East 4404673 North

**Transect Information**

Browse Tag # (0' Stake)	593
Transect Bearing	5° magnetic
Length	500ft
Belt Placement	Line 1 (11ft), Line 2 (34ft), Line 3 (59ft), Line 4 (71ft), Line 5 (95ft)
Belt Marker Placement	Standard

**Directions to Site**

From the Atchee Ridge cabin intersection, turn right onto Atchee Ridge Road toward Rector Ridge and travel 1.0 mile to the Rector Ridge turnoff. Turn left onto Rector Ridge and travel for approximately 5.9 miles to an open flat. Park near the witness post. From the witness post the 0-foot stake is located 20 paces to the east and is marked by browse tag #593.

**Site Information**

Land Ownership	Federal
Land Administrator	BLM
Allotment	Park Canyon
Elevation	6,500ft (1,981m)
Aspect	North
Slope	5%
Sample Dates	06/02/2015, 08/28/2018

**Table 10R-57.1 Disturbance History.** Recorded history of major disturbances.

Treatment/Disturbance	Name	WRI DB#	Date	Size (acres)
Seeding - Aerial	Wolf Den - Rector Ridge Fire Rehabilitation	2453	December 2012	2229
Fire - Wildfire	Wolf Den	-	July 2012	19865

**Table 10R-57.2 Seed Mix.** List of known seeded plant species and rates (if available).

Mix Name			Application Type	Application Date	Acres
Rector Ridge Fire Rehabilitation			Aerial	Dec 2012	652
Type	Species	Common Name	Cultivar/Source ID	Bulk lbs/acre	PLS
G	Agropyron cristatum	Crested Wheatgrass	Nordan	1.00	0.90
G	Elymus lanceolatus	Thickspike Wheatgrass	Bannock	1.00	0.92
G	Elymus trachycaulus	Slender Wheatgrass	First Strike	1.00	0.93
G	Pascopyrum smithii	Western Wheatgrass	Arriba	1.99	1.78
G	Poa secunda	Big Bluegrass	Sherman	0.23	0.19
G	Poa secunda	Big Bluegrass	Sherman	0.08	0.08
G	Poa secunda	Big Bluegrass	Sherman	0.31	0.28
G	Pseudoroegneria spicata	Bluebunch Wheatgrass	P-7	1.00	0.88
F	Linum perenne	Blue Flax	Appar	1.00	0.97
F	Medicago sativa	Alfalfa	Ladak DL	1.99	1.75
F	Onobrychis viciifolia	Sainfoin		1.99	1.93
F	Sanguisorba minor	Small Burnet		1.99	1.83
F	Sphaeralcea coccinea	Scarlet Globemallow	Uintah UT	0.15	0.11
S	Artemisia tridentata ssp. wyomingensis	Wyoming Big Sagebrush	Paiute UT	0.86	0.20
S	Atriplex canescens	Fourwing Saltbush	Duchesne UT	1.00	0.60

**Wildlife Habitat and Vegetation History****Table 10R-57.3 - Wildlife Seasonal Habitat.** UDWR wildlife habitat and seasonality.

Species	Habitat	Season
Bison	potential	year-long
Deer	substantial	winter
Elk	substantial	winter

**Table 10R-57.4 - Vegetation History.** The dominant vegetation type(s) and phase of woodland succession (Tausch, Miller, Roundy, & Chambers, 2009).

Year	Vegetation Type	Woodland Succession
2015	Perennial Forb	No Encroachment
2018	Perennial Forb	No Encroachment

**Site Notes**

No Notes

**Site Potential**

1981 - 2010 Average Annual Precipitation	11 inches
NRCS Ecological Site	Upland Loam (Bonneville Big Sagebrush)
NRCS Ecological Site #	R048AY308UT
States and Transitions	No state and transition model is available for this ecological site.

Since study establishment in 2015, the plant community on this site has been dominated by perennial forbs, particularly scarlet globemallow (*Sphaeralcea coccinea*). Annual forbs such as prickly Russian thistle (*Salsola tragus*) were also abundant in 2015, but decreased significantly in 2018. The introduced species thickspike wheatgrass (*Elymus lanceolatus*) was the most abundant perennial grass in both sample years, yet cover of perennial grasses in general has remained low to moderate. Although cheatgrass has been present in moderate abundance, there remains a risk of diminished ecological resilience of the plant community (Table 10R-57.7, Table 10R-57.10, Table 10R-57.11). Shrub species have remained rare, with broom snakeweed (*Gutierrezia sarothrae*) as the most abundant species in 2018 (Table 10R-57.12, Table 10R-57.13).

**Trend Summary Tables****Table 10R-57.6 - 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
2015	0.0	-	-	-	-	-
2018	-	0.0	-	-	-	-

**Table 10R-57.7 - 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
2015	113	138	447	428	2.9	9.2	20.1	32.3
2018	331	187	26	388	7.3	5.0	0.1	16.9

**Table 10R-57.8 - 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
2015	29.5	-	9.4	19.7	0.0	59.9
2018	25.0	0.0	33.7	27.9	0.0	29.8

**Table 10R-57.9 - 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			
2015	-	1	2	1
2018	1	10	26	2
Year	Days Use Per Acre (ha)			
2015	-	6.0 (14.9)	8.1 (19.9)	-
2018	5.1 (12.6)	0.7 (1.7)	14.7 (36.4)	-



**Table 10R-57.10 - Grass Species.** Nested frequency and modified Daubenmire average cover by year.

GRASS SPECIES									
Achnatherum hymenoides (Indian ricegrass)									
Agropyron cristatum <sup>i</sup> (crested wheatgrass)									
Bromus tectorum <sup>ai</sup> (cheatgrass)									
Elymus elymoides (squirreltail)									
Elymus lanceolatus (thickspike wheatgrass)									
Poa secunda (Sandberg bluegrass)									
Psathyrostachys juncea <sup>i</sup> (Russian wildrye)									
Pseudoroegneria spicata (bluebunch wheatgrass)									
Sporobolus cryptandrus (sand dropseed)									
year	Nested Frequency								
2015	3	34	113	12	99	1	-	1	4
2018	-	32	331	1	114	5	10	12	50
year	Average Cover (%)								
2015	0.0	1.8	2.9	0.8	6.4	0.0	-	0.0	0.0
2018	-	1.0	7.3	0.0	2.9	0.1	0.2	0.2	0.6

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

**Table 10R-57.11 - Forb Species.** Nested frequency and modified Daubenmire average cover by year.

FORB SPECIES																	
Alyssum desertorum <sup>ai</sup> (desert madwort)																	
Astragalus chamaeleuce var. chamaeleuce (citcada milkvetch)																	
Chaetopappa ericoides (rose heath)																	
Chenopodium leptophyllum <sup>a</sup> (narrowleaf goosefoot)																	
Descurainia pinnata <sup>a</sup> (western tansymustard)																	
Draba <sup>a</sup> (draba)																	
Epilobium brachycarpum <sup>a</sup> (tall annual willowherb)																	
Erigeron pumilus (shaggy fleabane)																	
Ipomopsis aggregata (scarlet gilia)																	
Lappula occidentalis <sup>a</sup> (flatspine stickseed)																	
Linum lewisii (Lewis flax)																	
Medicago sativa <sup>i</sup> (alfalfa)																	
Salsola tragus <sup>ai</sup> (prickly Russian thistle)																	
Sanguisorba minor <sup>i</sup> (small burnet)																	
Schoenocrambe limifolia (flaxleaf plainsmustard)																	
Sisymbrium altissimum <sup>ai</sup> (tall tumblemustard)																	
Sphaeralcea coccinea (scarlet globemallow)																	
year	Nested Frequency																
2015	-	0	2	2	93	12	2	2	4	5	12	3	426	1	26	133	425
2018	3	-	3	-	-	-	-	1	6	4	-	1	17	-	1	2	388
year	Average Cover (%)																
2015	-	0.0	0.1	0.0	1.2	0.0	0.0	0.0	0.0	0.2	0.1	0.0	13.7	0.0	0.9	5.0	31.1
2018	0.0	-	0.0	-	-	-	-	0.0	0.1	0.0	-	0.0	0.1	-	0.0	0.0	16.8

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

FORB SPECIES		
	Townsendia (Townsend daisy)	
		Tragopogon dubius <sup>ai</sup> (yellow salsify)
year	Nested Frequency	
2015	2	1
2018	-	-
year	Average Cover (%)	
2015	0.0	0.0
2018	-	-

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

**Table 10R-57.12 - Shrub and Tree Species.** Average modified Daubenmire quadrat and line intercept cover by year.

SHRUB SPECIES		
	Atriplex canescens <sup>p</sup> (fourwing saltbush)	
		Gutierrezia sarothrae (broom snakeweed)
year	Line Intercept Cover (%)	
2015	-	-
2018	-	-
year	Quadrat Cover (%)	
2015	0.0	-
2018	-	0.0

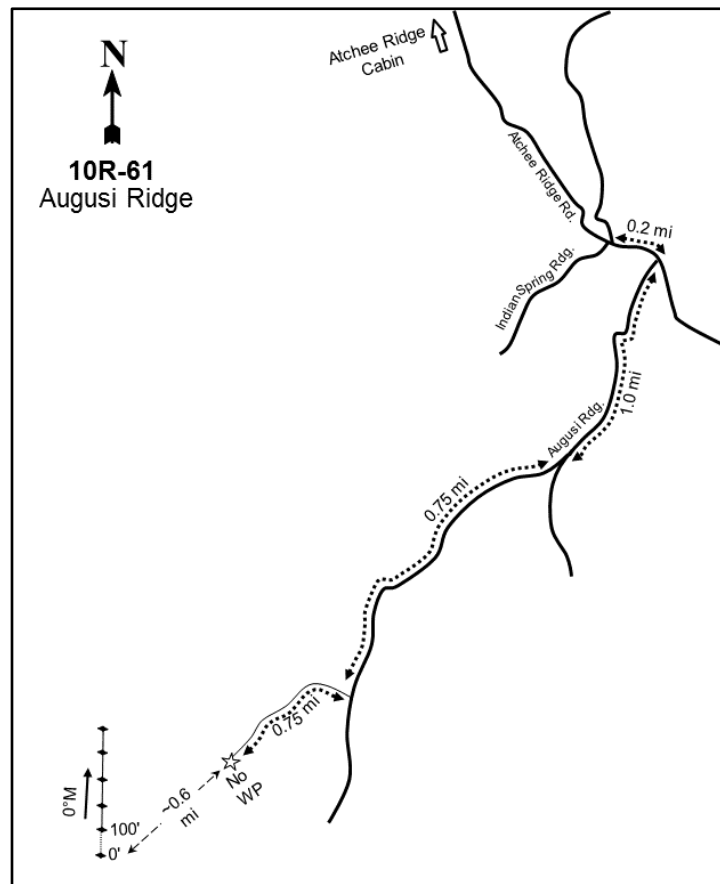
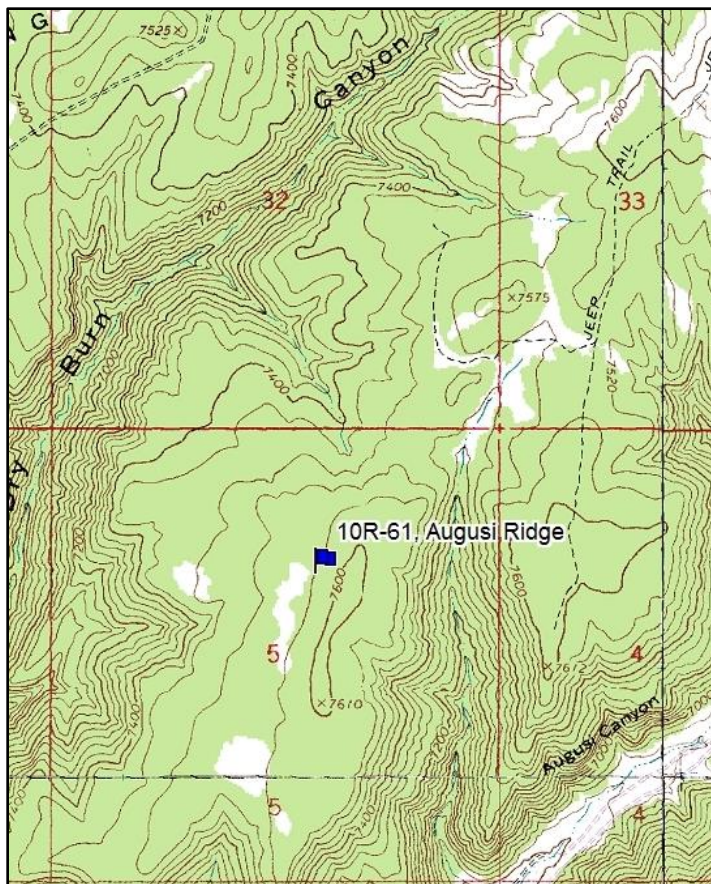
t - Tree Species; p - Preferred Browse; i - Introduced Species

**Table 10R-57.13 - 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 (%)				
<b>Artemisia tridentata ssp. vaseyana<sup>p</sup> -- (mountain big sagebrush)</b>									
2015	-	-	-	-	-	-	-	-	-/-
2018	-	-	-	-	-	-	-	-	13/14
<b>Atriplex canescens<sup>p</sup> -- (fourwing saltbush)</b>									
2015	-	60	0	0	0	0	0	0	- / -
2018	-	-	-	-	-	-	-	-	53/50
<b>Atriplex confertifolia<sup>p</sup> -- (shadscale saltbush)</b>									
2015	-	-	-	-	-	-	-	-	-/-
2018	-	-	-	-	-	-	-	-	15/21
<b>Gutierrezia sarothrae -- (broom snakeweed)</b>									
2015	-	-	-	-	-	-	-	-	-/-
2018	220	20	18	82	0	0	0	0	12/16
<b>Sarcobatus vermiculatus -- (greasewood)</b>									
2015	-	-	-	-	-	-	-	-	73/73
2018	-	-	-	-	-	-	-	-	55/92

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

## AUGUSI RIDGE - STUDY NO. 10R-61



### Location Information

USGS 7.5 min Map Info  
GPS (0' Stake)

Burnt Timber Canyon ; Township 14S, Range 25E, Section 05  
NAD 83 UTM ZONE 12, 659585 East 4388362 North

### Transect Information

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

None  
0° 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 the Atchee Ridge cabin, travel east on Big Park Road and take a slight right onto Atchee Ridge Road. Drive 0.9 miles to another junction, then stay right and travel for 0.4 miles to another fork and a treatment sign. From there, stay left and continue for 2.2 miles to a junction with a sign reading “Indian Springs Ridge Road.” Stay left and continue for 0.2 miles to another fork. Bear right onto Augusi Ridge Road and continue 1 mile to a fork. Bear right again, go 0.75 miles to a fork, and proceed to the left. Continue another 0.75 miles to an opening and bear right, following the road to the south edge of a clearing: park here. A GPS is recommended to navigate to the site from here. An old ATV road may be followed for roughly 0.6 miles south to the general area of the site, which is located in a basin near a small sagebrush flat.

**Site Information**

Land Ownership	Federal
Land Administrator	BLM
Allotment	ATCHEE RIDGE AMP
Elevation	No data
Aspect	West
Slope	5-10%
Sample Dates	08/29/2018

**Table 10R-61.1 Disturbance History.** Recorded history of major disturbances.

Treatment/Disturbance	Name	WRI DB#	Date	Size (acres)
Mechanical - Bullhog	Augusi Ridge Bullhog (Cancelled)	679	2018	357

**Wildlife Habitat and Vegetation History**

**Table 10R-61.3 - Wildlife Seasonal Habitat.** UDWR wildlife habitat and seasonality.

Species	Habitat	Season
Bison	potential	year-long
Deer	substantial	summer
Elk	crucial	summer

**Site Notes**

No Notes

**Site Potential**

1981 - 2010 Average Annual Precipitation	18 inches
NRCS Ecological Site	Mountain Shallow Loam (Black Sagebrush)
NRCS Ecological Site #	048AY433UT
States and Transitions	No state and transition model is available for this ecological site.

At the time of study establishment in 2018, this site was a mixed conifer encroached plant community with a sparse understory and remnant shrub layer. The preferred browse component was dominated by Utah serviceberry (*Amelanchier utahensis*) which provided 3.6 percent cover; small amounts of black sagebrush (*Artemisia nova*), longflower rabbitbrush (*Chrysothamnus depressus*) and mountain snowberry (*Symphoricarpos oreophilus*) were also sampled. The graminoids sampled were all native perennial species: the dominant species was muttongrass (*Poa fendleriana*), with very small amounts of blue grama (*Bouteloua gracilis*), Ross' sedge (*Carex rossii*), squirreltail (*Elymus elymoides*), and thickspike wheatgrass (*E. lanceolatus*) also being sampled (Table 10R-61.10). All forbs observed were native species. Overall forb diversity and cover was low, with the dominant species being mountain phlox (*Phlox austromontana*) (Table 10R-61.11). Tree cover was primarily contributed by twoneedle pinyon (*Pinus edulis*) with lesser amounts offered by Utah juniper (*Juniperus osteosperma*), Rocky Mountain juniper (*J. scopulorum*) and Douglas fir (*Pseudotsuga menziesii*) (Table 10R-61.12, Table 10R-61.13, Table 10R-61.14). Considering the browse and herbaceous species still present, the site would likely improve in both understory condition and forage production with a treatment to remove encroaching conifer trees.

**Trend Summary Tables**

**Table 10R-61.6 - 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
2018	2.1	0.0	12.0	3.9	-	83.0

**Table 10R-61.7 - 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
2018	-	141	3	103	-	4.1	0.0	3.0

**Table 10R-61.8 - 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
2018	7.9	0.7	89.5	0.0	0.1	19.6

**Table 10R-61.9 - 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	Coyote	Mule Deer	Rocky Mountain Elk	Rabbit
	Quadrat Frequency			
2018	1	3	2	8
Year	Days Use Per Acre (ha)			
2018	-	10.7 (26.5)	10.7 (26.5)	-

**Table 10R-61.10 - Grass Species.** Nested frequency and modified Daubenmire average cover by year.

GRASS SPECIES	Bouteloua gracilis (blue grama)	Carex rossii (Ross' sedge)	Elymus elymoides (squirreltail)	Elymus lanceolatus (thickspike wheatgrass)	Poa fendleriana (muttongrass)
year	Nested Frequency				
2018	4	4	3	15	132
year	Average Cover (%)				
2018	0.1	0.0	0.0	0.1	3.9

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

**Table 10R-61.11 - Forb Species.** Nested frequency and modified Daubenmire average cover by year.

FORB SPECIES	Nested Frequency							
Antennaria parvifolia (small-leaf pussytoes)	10	3	18	3	83	3	3	3
Arabis (rockcress)								
Erigeron eatonii (Eaton's fleabane)								
Penstemon watsonii (Watson's penstemon)								
Phlox austromontana (mountain phlox)								
Polygonum douglasii <sup>a</sup> (Douglas' knotweed)								
Sphaeralcea coccinea (scarlet globemallow)								
Symphotrichum ascendens (western aster)								
year	Average Cover (%)							
2018	0.1	0.0	0.1	0.0	2.8	0.0	0.0	0.0

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

**Table 10R-61.12 - Shrub and Tree Species.** Average modified Daubenmire quadrat and line intercept cover by year.

SHRUB SPECIES	Line Intercept Cover (%)								
Amelanchier utahensis <sup>p</sup> (Utah serviceberry)	3.6	0.2	0.1	-	7.9	3.4	67.3	4.4	0
Artemisia nova <sup>p</sup> (black sagebrush)									
Chrysothamnus depressus <sup>p</sup> (longflower rabbitbrush)									
Chrysothamnus viscidiflorus ssp. viscidiflorus var. viscidiflorus									
Juniperus osteosperma <sup>i</sup> (Utah juniper)									
Juniperus scopulorum <sup>i</sup> (Rocky Mountain juniper)									
Pinus edulis <sup>i</sup> (twoneedle pinyon)									
Pseudotsuga menziesii <sup>i</sup> (Douglas-fir)									
Symphoricarpos oreophilus <sup>p</sup> (mountain snowberry)									
year	Quadrat Cover (%)								
2018	1.7	0.3	0.1	0.0	1.9	0.8	9.3	0.0	0.0

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



**Table 10R-61.13 - 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.

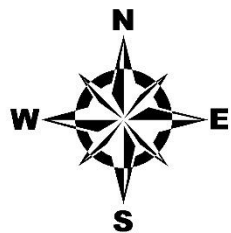
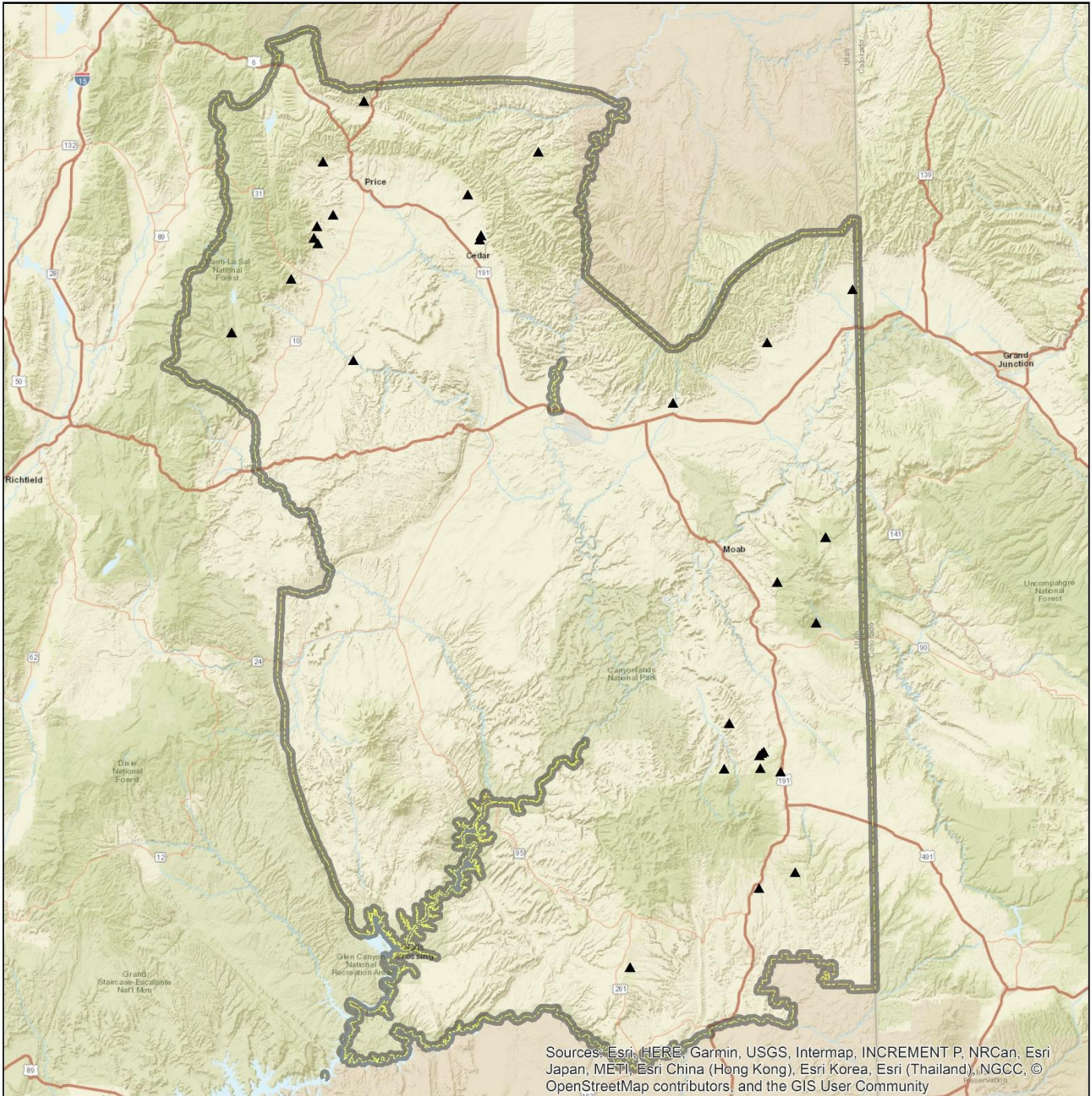
Year	Density		Age Class Distribution			Utilization		Poor Vigor (%)	Average Height Crown (cm)
	Plants Per Acre		Excluding Seedlings			Moderate (%)	Heavy (%)		
	Excluding Seedlings	Seedling	Young (%)	Mature (%)	Decadent (%)				
<b>Amelanchier utahensis<sup>p</sup> -- (Utah serviceberry)</b>									
2018	540	-	15	74	11	7	0	33	135/105
<b>Artemisia nova<sup>p</sup> -- (black sagebrush)</b>									
2018	320	-	13	75	13	0	0	6	23/35
<b>Artemisia tridentata ssp. vaseyana<sup>p</sup> -- (mountain big sagebrush)</b>									
2018	40	-	0	0	100	0	0	0	30/53
<b>Chrysothamnus depressus<sup>p</sup> -- (longflower rabbitbrush)</b>									
2018	140	-	0	100	0	0	0	0	10/17
<b>Chrysothamnus viscidiflorus ssp. viscidiflorus -- (yellow rabbitbrush)</b>									
2018	40	-	0	50	50	0	0	50	12/7
<b>Chrysothamnus viscidiflorus ssp. viscidiflorus var. viscidiflorus -- (yellow rabbitbrush)</b>									
2018	20	-	100	0	0	0	0	100	- / -
<b>Juniperus osteosperma<sup>t</sup> -- (Utah juniper)</b>									
2018	280	-	29	71	0	0	0	14	- / -
<b>Juniperus scopulorum<sup>t</sup> -- (Rocky Mountain juniper)</b>									
2018	40	-	0	100	0	0	0	0	- / -
<b>Pinus edulis<sup>t</sup> -- (twoneedle pinyon)</b>									
2018	1060	320	28	70	2	0	0	2	- / -
<b>Pseudotsuga menziesii<sup>i</sup> -- (Douglas-fir)</b>									
2018	20	-	100	0	0	0	0	0	- / -
<b>Symphoricarpos oreophilus<sup>p</sup> -- (mountain snowberry)</b>									
2018	120	-	100	0	0	0	0	0	27/51

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

**Table 10R-61.14 - Tree Characteristics.** Point-quarter tree density, size class distribution, and average diameter.

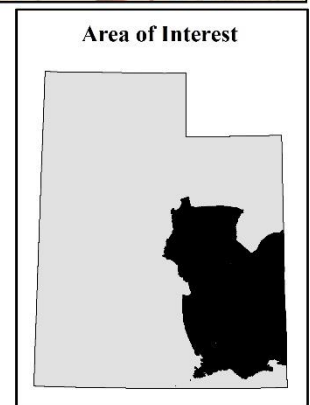
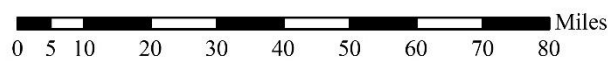
Year	Density	Size Class Distribution					Average Diameter (cm)
	Trees per Acre	Seedling (%)	1-4' (%)	4-8' (%)	8-12' (%)	>12' (%)	
<b>Juniperus osteosperma (Utah juniper)</b>							
2018	97	21	26	16	16	21	6.9
<b>Juniperus scopulorum (Rocky Mountain juniper)</b>							
2018	15	14	43	-	43	-	5.0
<b>Pinus edulis (twoneedle pinyon)</b>							
2018	683	5	15	5	15	60	12.3
<b>Pseudotsuga menziesii (Douglas-fir)</b>							
2018	28	-	-	33	33	33	10.3

# SOUTHEASTERN REGION



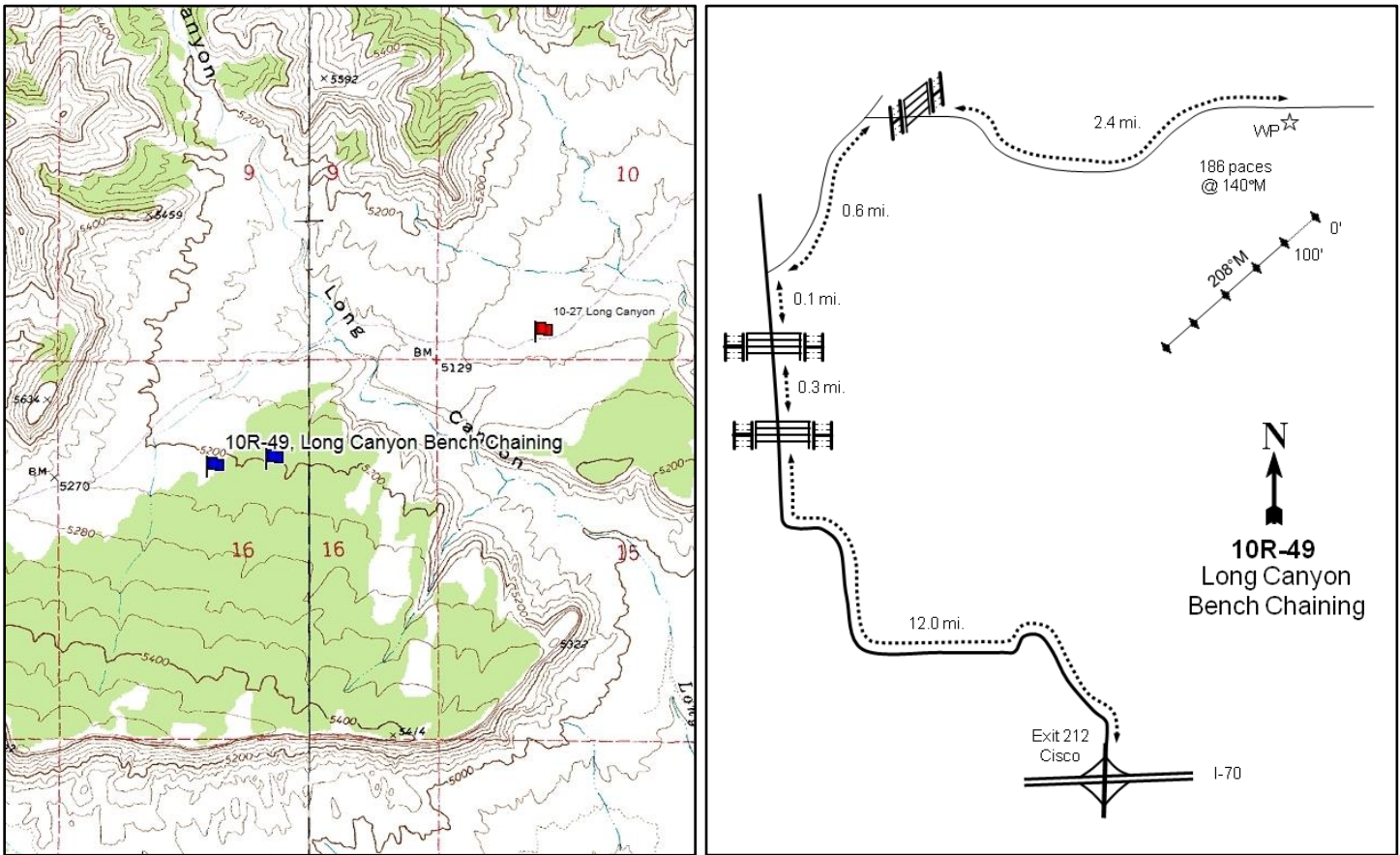
**Project**

- ▲ WRI
- ▭ Southeastern Region Boundaries





## LONG CANYON BENCH CHAINING - STUDY NO. 10R-49

**Location Information**

USGS 7.5 min Map Info  
GPS (0' Stake)

Flume Canyon SE; Township 19S, Range 23E, Section 16  
NAD 83 UTM ZONE 12, 639911 East 4335426 North

**Transect Information**

Browse Tag # (0' Stake)	226
Transect Bearing	208° magnetic
Length	500ft
Belt Placement	Line 1 (11ft), Line 2 (34ft), Line 3 (59ft), Line 4 (71ft), Line (95ft)
Belt Marker Placement	Belt 5: No Rebar

**Directions to Site**

From I-70, take exit #212 and continue north for 12 miles to a gate. Pass through the gate and proceed for another 0.3 miles to another gate. Continue through and then turn right after 0.1 miles. Drive for another 0.6 miles, turn right, and go through a gate just after the turn. Continue for 2.4 miles to a witness post on the south side of the road. From the witness post walk 186 paces at 140 degrees magnetic to the 0-foot post which is marked with browse tag #226.

**Site Information**

Land Ownership	State
Land Administrator	SITLA
Allotment	CISCO MESA
Elevation	5,156ft (1,572m)
Aspect	North
Slope	5%
Sample Dates	06/02/2010, 06/27/2013, 08/20/2018

**Table 10R-49.1 Disturbance History.** Recorded history of major disturbances.

Treatment/Disturbance	Name	WRI DB#	Date	Size (acres)
Chaining - Two-Way Smooth	Long Canyon Bench Pinyon-Juniper Chaining	29	October 2006	305
Seeding - Aerial After	Long Canyon Bench Pinyon-Juniper Chaining	29	October 2006	305
Herbicide - Plateau	Long Canyon Bench Pinyon-Juniper Chaining	29	November 2006	305

**Table 10R-49.2 Seed Mix.** List of known seeded plant species and rates (if available).

Mix Name			Application Type	Application Date	Acres
Long Canyon Bench			Aerial	Oct 2006	350
Type	Species	Common Name	Cultivar/Source ID	Bulk lbs/acre	PLS
G	<i>Achnatherum hymenoides</i>	Indian Ricegrass	Rimrock	0.57	0.57
G	<i>Agropyron cristatum</i>	Crested Wheatgrass	Douglas	0.43	0.36
G	<i>Agropyron cristatum</i>	Crested Wheatgrass	CDII	0.43	0.37
G	<i>Agropyron cristatum</i>	Crested Wheatgrass	Hycrest	0.18	0.16
G	<i>Agropyron cristatum</i>	Crested Wheatgrass	Hycrest	0.43	0.39
G	<i>Agropyron fragile</i>	Siberian Wheatgrass	Vavilov	1.00	0.92
G	<i>Elymus lanceolatus</i>	Thickspike Wheatgrass	Bannock	1.00	0.92
G	<i>Leymus cinereus</i>	Great Basin Wildrye	Trailhead	1.43	1.17
G	<i>Psathyrostachys juncea</i>	Russian Wildrye		1.00	0.93
G	<i>Thinopyrum intermedium</i>	Pubescent Wheatgrass		1.00	0.84
G	<i>Thinopyrum ponticum</i>	Tall Wheatgrass	Alkar	1.00	0.96
F	<i>Cleome serrulata</i>	Rocky Mountain Beeplant	Piute UT	0.38	0.35
F	<i>Linum perenne</i>	Blue Flax		0.29	0.25
F	<i>Medicago sativa</i>	Alfalfa	Ranger	1.00	0.88
F	<i>Medicago sativa</i>	Alfalfa	Spreader 4	1.00	0.95
F	<i>Sanguisorba minor</i>	Small Burnet	Delar	2.57	2.39
S	<i>Artemisia tridentata</i> ssp. <i>wyomingensis</i>	Wyoming Big Sagebrush	Sanpete UT	0.57	0.12
S	<i>Atriplex canescens</i>	Fourwing Saltbush	Lincoln NV	1.00	0.36
S	<i>Bassia prostrata</i>	Forage Kochia	Beaver UT	0.29	0.20
S	<i>Krascheninnikovia lanata</i>	Winterfat	Tooele UT	0.83	0.36

**Wildlife Habitat and Vegetation History****Table 10R-49.3 - Wildlife Seasonal Habitat.** UDWR wildlife habitat and seasonality.

Species	Habitat	Season
Deer	crucial	winter
Elk	substantial	winter
Pronghorn	crucial	year-long
Rocky Mountain Bighorn	substantial	year-long

**Table 10R-49.4 - Vegetation History.** The dominant vegetation type(s) and phase of woodland succession (Tausch, Miller, Roundy, & Chambers, 2009).

Year	Vegetation Type	Woodland Succession
2010	Mountain Big Sagebrush	Phase I
2013	Mountain Big Sagebrush	Phase I
2018	Mountain Big Sagebrush	Phase I

**Site Notes**

Study 10R-38 was established in 2006 prior to treatment, but the study area wasn't included in the final treatment. As a result, study 10R-38 can now be used as a pretreatment reference area. Deer in this area rely heavily on private hay meadows and a narrow sagebrush strip near the mouth of Cottonwood Canyon for winter range (WRI Database 2019).

**Site Potential**

1981 - 2010 Average Annual Precipitation	10 inches
NRCS Ecological Site	Semidesert Loam (Wyoming Big Sagebrush)
NRCS Ecological Site #	R034XY212UT
States and Transitions	No state and transition model is available for this ecological site.

Since study establishment in 2010, the plant community on this site has been dominated by mountain big sagebrush (*Artemisia tridentata* ssp. *vaseyana*) (Table 10R-49.12, Table 10R-49.13). The herbaceous understory has remained dominated by a mixture of native and introduced perennial grass species throughout the duration of the study. Forbs have been moderately diverse, but have remained rare. Cheatgrass (*Bromus tectorum*) has been observed in all years, but has decreased in cover and abundance over time (Table 10R-49.7, Table 10R-49.10, Table 10R-49.11). Although the study site is considered to be within Phase I of woodland succession as of 2018, continued presence of Utah juniper (*Juniperus osteosperma*) indicates that infilling may be possible in future sample years (Table 10R-49.4, Table 10R-49.14).

### Trend Summary Tables

**Table 10R-49.6 - Shrub/Tree Summary.** Average modified Daubenmire quadrat and line intercept cover by year for shrubs/trees

Year	Quadrat Cover (%)			Line-intercept Cover (%)		
	Preferred Shrub	Other Shrub	Tree	Preferred Shrub	Other Shrub	Tree
2010	7.1	1.4	0.5	5.5	1.8	0.2
2013	5.9	0.2	0.8	5.4	0.2	0.3
2018	6.6	3.0	0.5	5.5	2.3	0.4

**Table 10R-49.7 - Herbaceous Summary.** Nested frequency and average modified Daubenmire quadrat cover by year for herbaceous functional groups

Year	Nested Frequency				Quadrat Cover (%)			
	Annual Grass	Perennial Grass	Annual/Biennial Forb	Perennial Forb	Annual Grass	Perennial Grass	Annual/Biennial Forb	Perennial Forb
2010	289	135	300	72	4.1	10.5	3.3	1.1
2013	84	169	68	11	0.4	11.4	1.1	0.1
2018	9	264	0	5	0.1	17.7	0.1	0.0

**Table 10R-49.8 - 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	29.3	0.7	41.4	5.4	3.3	29.1
2013	40.7	0.0	37.5	1.9	3.5	22.3
2018	43.1	0.1	44.8	5.5	5.3	26.1

**Table 10R-49.9 - Pellet Group Data.** Quadrat frequency and pellet group transect data for animal pellets. Rabbit pellet groups are not sampled in the pellet group transect.

Year	Cattle	Mule Deer	Rocky Mountain Elk	Horse	Rabbit
	Quadrat Frequency				
2010	-	16	7	-	13
2013	-	27	14	-	13
2018	-	35	9	1	34
Year	Days Use Per Acre (ha)				
2010	-	22.1 (54.6)	4.0 (9.9)	-	-
2013	-	18.7 (46.3)	38.9 (96.0)	-	-
2018	4.4 (10.8)	11.4 (28.1)	29.5 (72.8)	-	-

**Table 10R-49.10 - Grass Species.** Nested frequency and modified Daubenmire average cover by year.

GRASS SPECIES										
Achnatherum hymenoides (Indian ricegrass)										
Agropyron cristatum <sup>i</sup> (crested wheatgrass)										
Bromus tectorum <sup>ai</sup> (cheatgrass)										
Elymus elymoides (squirreltail)										
Leymus cinereus (basin wildrye)										
Pascopyrum smithii (western wheatgrass)										
Psathyrostachys juncea <sup>i</sup> (Russian wildrye)										
Thinopyrum intermedium <sup>i</sup> (intermediate wheatgrass)										
Thinopyrum ponticum <sup>i</sup> (tall wheatgrass)										
Vulpia octiflora <sup>a</sup> (sixweeks fescue)										
year	Nested Frequency									
2010	27	83	288	3	0	15	7	17	-	12
2013	38	115	84	17	6	15	6	6	3	-
2018	33	209	9	5	6	19	14	2	8	-
year	Average Cover (%)									
2010	2.6	4.8	4.0	0.2	0.4	0.6	0.5	1.4	-	0.0
2013	2.9	7.1	0.4	0.4	0.4	0.4	0.2	0.1	0.0	-
2018	1.7	13.3	0.1	0.3	0.8	0.4	0.8	0.0	0.6	-

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

**Table 10R-49.11 - Forb Species.** Nested frequency and modified Daubenmire average cover by year.

FORB SPECIES																	
Arabis (rockcross)																	
Chamaesyce (sandmat)																	
Chenopodium fremontii <sup>a</sup> (Fremont's goosefoot)																	
Collinsia parviflora <sup>a</sup> (maiden blue eyed Mary)																	
Cryptantha (cryptantha)																	
Descurainia pinnata <sup>a</sup> (western tansymustard)																	
Eriogonum cernuum <sup>a</sup> (nodding buckwheat)																	
Eriogonum ovalifolium (cushion buckwheat)																	
Gilia inconspicua <sup>a</sup> (shy gilia)																	
Helianthus annuus <sup>a</sup> (common sunflower)																	
Lactuca scariola <sup>ai</sup> (prickly lettuce)																	
Lappula occidentalis <sup>a</sup> (flatspine stickseed)																	
Lupinus (lupine)																	
Mentzelia albicaulis <sup>a</sup> (whitestem blazingstar)																	
Phlox longifolia (longleaf phlox)																	
Plantago patagonica <sup>a</sup> (woolly plantain)																	
Salsola tragus <sup>ai</sup> (prickly Russian thistle)																	
year	Nested Frequency																
2010	10	0	-	-	46	13	142	-	50	-	1	147	3	39	1	3	121
2013	-	4	2	2	-	2	34	2	8	2	-	3	-	4	5	-	26
2018	-	5	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0
year	Average Cover (%)																
2010	0.0	0.0	-	-	0.1	0.0	0.9	-	0.2	-	0.0	0.6	0.0	0.4	0.0	0.0	1.1
2013	-	0.1	0.0	0.0	-	0.0	0.6	0.0	0.0	0.0	-	0.0	-	0.2	0.0	-	0.3
2018	-	0.0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.1

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

FORB SPECIES	Nested Frequency	
Schoenocrambe linifolia (flaxleaf plainsmustard)	13	6
Symphotrichum (aster)	-	-
2018	-	-
year	Average Cover (%)	
2010	0.9	0.0
2013	-	-
2018	-	-

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

**Table 10R-49.12 - Shrub and Tree Species.** Average modified Daubenmire quadrat and line intercept cover by year.

SHRUB SPECIES	Line Intercept Cover (%)				
Artemisia tridentata ssp. vaseyana <sup>p</sup> (mountain big sagebrush)	5.5	-	1.8	0.2	-
Eriogonum microthecum <sup>p</sup> (slender buckwheat)	5.4	-	0.1	0.3	0.1
Gutierrezia sarothrae (broom snakeweed)	5.5	-	2	0.4	0.3
Juniperus osteosperma <sup>t</sup> (Utah juniper)	7.1	-	1.4	0.5	-
Opuntia (pricklypear)	5.9	0.0	0.2	0.8	0.0
2018	6.6	-	2.9	0.5	0.0
year	Quadrat Cover (%)				
2010	7.1	-	1.4	0.5	-
2013	5.9	0.0	0.2	0.8	0.0
2018	6.6	-	2.9	0.5	0.0

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

**Table 10R-49.13 - Shrub/Tree Characteristics.** Population characteristics of shrub/tree species populations including density reproduction (seedlings), age distribution, utilization, vigor and average size (height/crown) of plants.

Year	Density		Age Class Distribution			Utilization		Poor Vigor (%)	Average Height Crown (cm)
	Plants Per Acre		Excluding Seedlings			Moderate (%)	Heavy (%)		
	Excluding Seedlings	Seedling	Young (%)	Mature (%)	Decadent (%)				
<b>Artemisia nova<sup>p</sup> -- (black sagebrush)</b>									
2010	-	-	-	-	-	-	-	-	-/-
2013	-	-	-	-	-	-	-	-	36/89
2018	-	-	-	-	-	-	-	-	31/81
<b>Artemisia tridentata ssp. vaseyana<sup>p</sup> -- (mountain big sagebrush)</b>									
2010	6380	35080	79	19	1	7	0	1	42/63
2013	4020	560	63	35	3	14	10	13	38/56
2018	5280	-	50	25	25	13	83	30	43/75



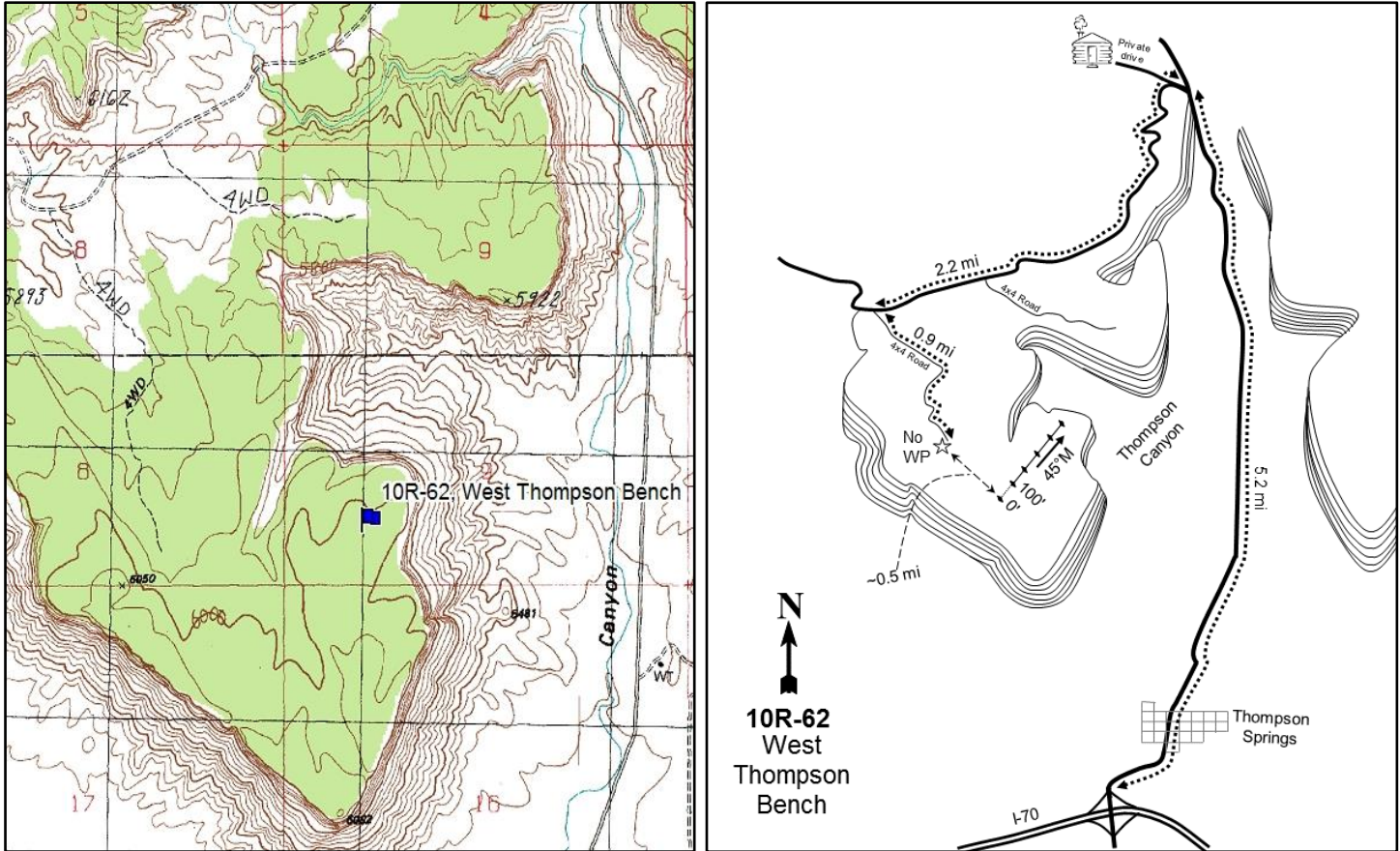
Year	Density		Age Class Distribution			Utilization		Poor Vigor (%)	Average Height Crown (cm)
	Plants Per Acre		Excluding Seedlings			Moderate (%)	Heavy (%)		
	Excluding Seedlings	Seedling	Young (%)	Mature (%)	Decadent (%)				
<b>Ephedra viridis<sup>p</sup> -- (mormon tea)</b>									
2010	20	-	0	100	0	0	0	0	51/47
2013	-	-	-	-	-	-	-	-	47/87
2018	60	-	33	33	33	0	67	0	42/54
<b>Eriogonum microthecum<sup>p</sup> -- (slender buckwheat)</b>									
2010	-	-	-	-	-	-	-	-	-/-
2013	-	-	-	-	-	-	-	-	-/-
2018	20	-	0	100	0	100	0	0	9/15
<b>Ericameria nauseosa -- (rubber rabbitbrush)</b>									
2010	-	-	-	-	-	-	-	-	-/-
2013	-	-	-	-	-	-	-	-	73/104
2018	-	-	-	-	-	-	-	-	60/79
<b>Gutierrezia sarothrae -- (broom snakeweed)</b>									
2010	700	20	14	80	6	0	0	6	32/49
2013	300	-	7	87	7	0	0	7	25/31
2018	5040	-	6	91	3	0	0	3	18/25
<b>Juniperus osteosperma<sup>i</sup> -- (Utah juniper)</b>									
2010	40	20	100	0	0	0	0	0	-/-
2013	80	-	100	0	0	0	0	0	-/-
2018	60	-	100	0	0	0	0	33	-/-
<b>Krascheninnikovia lanata<sup>p</sup> -- (winterfat)</b>									
2010	20	-	0	0	100	0	0	100	-/-
2013	-	-	-	-	-	-	-	-	-/-
2018	-	-	-	-	-	-	-	-	-/-
<b>Opuntia -- (pricklypear)</b>									
2010	120	-	0	100	0	0	0	0	11/46
2013	120	-	33	67	0	0	0	0	13/40
2018	100	-	0	100	0	0	0	0	12/45

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

**Table 10R-49.14 - Tree Characteristics.** Point-quarter tree density, size class distribution, and average diameter.

Year	Density	Size Class Distribution					Average Diameter (cm)
	Trees per Acre	Seedling (%)	1-4' (%)	4-8' (%)	8-12' (%)	>12' (%)	
<b>Juniperus osteosperma (Utah juniper)</b>							
2010	50	12	12	29	29	18	10.8
2013	45	40	53	7	-	-	10.5
2018	55	18	59	24	-	-	13.8

## WEST THOMPSON BENCH - STUDY NO. 10R-62

**Location Information**

USGS 7.5 min Map Info  
GPS (0' Stake)

Thompson Springs NW; Township 21S, Range 20E, Section 09  
NAD 83 UTM ZONE 12, 610945 East 4316902 North

**Transect Information**

Browse Tag # (0' Stake)	Not Available
Transect Bearing	45° 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 Thompson Springs, head north on Thompson Canyon road for approximately 5.2 miles, crossing through the wash/dry creek bed 4 times. After the 4th crossing, you will come to a 4-way split in the road. Turn left and cross the wash. Immediately after the wash you will come to a fork: bear left again and follow this road south. After 2.2 miles, you will come to a two-track road on the left. Turn left and follow this two-track for roughly 0.9 miles, at which point the road will fade away. Park here and walk roughly 0.5 miles east to where the site is located on the bench.

**Site Information**

Land Ownership	Federal
Land Administrator	BLM
Allotment	CRESCENT CANYON
Elevation	No data
Aspect	North
Slope	10-15%
Sample Dates	08/20/2018

**Table 10R-62.1 Disturbance History.** Recorded history of major disturbances.

Treatment/Disturbance	Name	WRI DB#	Date	Size (acres)
Seeding - Aerial Before	South Bookcliffs Phase 5 (Bryson)	3961	October 2017	255
Mechanical - Bullhog	South Bookcliffs Phase 5 (Bryson)	3961	October 2017-February 2018	255
Seeding - Aerial After	South Bookcliffs Phase 5 (Bryson)	3961	January 2018	255
Seeding - Broadcast After	South Bookcliffs Phase 5 (Bryson)	3961	February 2018	4

**Table 10R-62.2 Seed Mix.** List of known seeded plant species and rates (if available).

Mix Name			Application Type	Application Date	Acres
South Bookcliffs Bryson			Aerial	Jan 2018	325
Type	Species	Common Name	Cultivar/Source ID	Bulk lbs/acre	PLS
G	<i>Achnatherum hymenoides</i>	Indian Ricegrass	Emery UT	0.46	0.44
G	<i>Elymus lanceolatus</i>	Thickspike Wheatgrass	Bannock	0.46	0.42
G	<i>Poa secunda</i>	Sandberg Bluegrass	UP Colorado Plateau	0.46	0.35
G	<i>Poa secunda</i>	Sandberg Bluegrass	UP Colorado Plateau	0.46	0.40
G	<i>Pseudoroegneria spicata</i>	Bluebunch Wheatgrass	Anatone	0.46	0.43
F	<i>Achillea millefolium</i>	Western Yarrow	Eagle	0.46	0.38
F	<i>Achillea millefolium</i>	Western Yarrow	Eagle	0.46	0.43
F	<i>Cleome serrulata</i>	Rocky Mountain Beeplant	Davis UT	0.46	0.42
F	<i>Cleome serrulata</i>	Rocky Mountain Beeplant	Sanpete UT	0.46	0.39
F	<i>Dalea purpurea</i>	Purple Prairie Clover	Bismark	0.46	0.46
F	<i>Dalea purpurea</i>	Purple Prairie Clover	Bismark	0.46	0.37
F	<i>Helianthus annuus</i>	Annual Sunflower	Montezuma CO	0.46	0.41
F	<i>Linum perenne</i>	Blue Flax	Appar	0.46	0.37
F	<i>Medicago sativa</i>	Alfalfa	Ladak	0.46	0.45
F	<i>Medicago sativa</i>	Alfalfa, Yellow	Don	0.46	0.46
F	<i>Onobrychis viciifolia</i>	Sainfoin	Eski	0.46	0.40
F	<i>Penstemon palmeri</i>	Palmer Penstemon	Carbon UT	0.46	0.30
F	<i>Ratibida columnifera</i>	Prairie Coneflower	Stillwater	0.46	0.38
F	<i>Sanguisorba minor</i>	Small Burnet		0.46	0.41
F	<i>Sphaeralcea coccinea</i>	Scarlet Globemallow	Uintah UT	0.46	0.16
F	<i>Sphaeralcea munroana</i>	Munro Globemallow	Tooele UT	0.46	0.31
F	<i>Sphaeralcea munroana</i>	Munro Globemallow	Uintah UT	0.46	0.12
S	<i>Atriplex canescens</i>	Fourwing Saltbush	Carbon UT	0.46	0.22
Mix Name			Application Type	Application Date	Acres
South Bookcliffs Bryson 2			Broadcast	Feb 2018	4
Type	Species	Common Name	Cultivar/Source ID	Bulk lbs/acre	PLS
G	<i>Achnatherum hymenoides</i>	Indian Ricegrass	Emery UT	37.50	35.98
G	<i>Elymus lanceolatus</i>	Thickspike Wheatgrass	Bannock II	37.50	32.43
G	<i>Poa secunda</i>	Sandberg Bluegrass	UP Colorado Plateau	37.50	32.68
G	<i>Pseudoroegneria spicata</i>	Bluebunch Wheatgrass	Anatone	37.50	35.16
F	<i>Achillea millefolium</i>	Western Yarrow	Eagle	37.50	32.19
F	<i>Cleome serrulata</i>	Rocky Mountain Beeplant	Carbon UT	37.50	33.74
F	<i>Dalea purpurea</i>	Purple Prairie Clover	Bismark	37.50	29.97
F	<i>Helianthus annuus</i>	Annual Sunflower		37.50	33.40
F	<i>Linum perenne</i>	Blue Flax	Appar	37.50	31.90
F	<i>Medicago sativa</i>	Alfalfa	Ladak	37.50	35.54
F	<i>Medicago sativa</i>	Alfalfa, Yellow	Don	37.50	36.18
F	<i>Onobrychis viciifolia</i>	Sainfoin	Eski	37.50	32.59
F	<i>Penstemon palmeri</i>	Palmer Penstemon	Carbon UT	37.50	24.19

F	Ratibida columnifera	Prairie Coneflower	Stillwater	37.50	35.91
F	Sanguisorba minor	Small Burnet	Delar	37.50	35.22
F	Sphaeralcea coccinea	Scarlet Globemallow	Uintah/Duchesne, UT	37.50	15.04
F	Sphaeralcea munroana	Munro Globemallow	Uintah UT	37.50	31.97
S	Artemisia tridentata ssp. wyomingensis	Wyoming Big Sagebrush	Juab UT	37.50	8.76
S	Atriplex canescens	Fourwing Saltbush	Carbon UT	37.50	18.18
Mix Name			Application Type	Application Date	Acres
South Bookcliffs Bryson Shrub			Aerial	Jan 2018	325
Type	Species	Common Name	Cultivar/Source ID	Bulk lbs/acre	PLS
F	Medicago sativa	Alfalfa	Ladak	0.46	0.44
S	Artemisia tridentata ssp. wyomingensis	Wyoming Big Sagebrush	Duchesne UT	0.46	0.09

### Wildlife Habitat and Vegetation History

**Table 10R-62.3 - Wildlife Seasonal Habitat.** UDWR wildlife habitat and seasonality.

Species	Habitat	Season
Deer	substantial	year-long
Rocky Mountain Bighorn	crucial	year-long

**Table 10R-62.4 - 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	11 inches
NRCS Ecological Site	Upland Shallow Loam (Cliffrose)
NRCS Ecological Site #	035XY313UT
States and Transitions	No state and transition model is available for this ecological site.

At the time of study establishment in 2018, this site existed as a Utah juniper (*Juniperus osteosperma*) and twoneedle pinyon (*Pinus edulis*) encroached cliffrose (*Purshia stansburiana*) community (Table 10R-62.6, Table 10R-62.12). Although cliffrose dominated the preferred browse component, other browse species such as alderleaf mountain mahogany (*Cercocarpus montanus* var. *montanus*), mountain snowberry (*Symphoricarpos oreophilus*), and mormon tea (*Ephedra viridis*) were also present (Table 10R-62.12, Table 10R-62.13). No grasses were found on the site in the initial sample year, and forb species were very limited in both cover and diversity (Table 10R-62.7, Table 10R-62.10, Table 10R-62.11). The tree population was primarily composed of mature individuals with nearly equal densities of pinyon and juniper (Table 10R-62.14). The sparseness of the herbaceous understory as well as the diverse but suppressed shrub component indicates that there may be potential for significant improvement of the plant community following a proposed tree removal and seeding treatment (Table 10R-62.1).

**Trend Summary Tables**

**Table 10R-62.6 - 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
2018	1.9	2.0	10.1	3.4	3.7	23.4

**Table 10R-62.7 - 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
2018	-	-	-	22	-	-	-	0.2

**Table 10R-62.8 - 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
2018	35.5	7.5	29.3	15.1	19.5	14.3

**Table 10R-62.9 - 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	Coyote	Mule Deer	Rabbit
	Quadrat Frequency		
2018	1	9	17
Year	Days Use Per Acre (ha)		
2018	-	10.7 (26.5)	-

**Table 10R-62.10 - Grass Species.** Nested frequency and modified Daubenmire average cover by year.

GRASS SPECIES	No Grasses Found
year	Nested Frequency
year	Average Cover (%)

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

**Table 10R-62.11 - Forb Species.** Nested frequency and modified Daubenmire average cover by year.

FORB SPECIES				
	Astragalus mollissimus (woolly locoweed)			
	Packera multilobata (lobeleaf groundsel)			
	Penstemon (beardtongue)			
	Petradoria pumila (rock goldenrod)			
year	Nested Frequency			
2018	4	12	2	4
year	Average Cover (%)			
2018	0.0	0.0	0.0	0.1

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

**Table 10R-62.12 - Shrub and Tree Species.** Average modified Daubenmire quadrat and line intercept cover by year.

SHRUB SPECIES											
	Artemisia nova <sup>p</sup> (black sagebrush)										
	Cercocarpus intricatus <sup>p</sup> (littleleaf mountain mahogany)										
	Cercocarpus montanus var. montanus <sup>p</sup> (alderleaf mountain mahogany)										
	Ephedra viridis <sup>p</sup> (mormon tea)										
	Eriogonum microthecum <sup>p</sup> (slender buckwheat)										
	Fraxinus anomala (singleleaf ash)										
	Gutierrezia sarothrae (broom snakeweed)										
	Juniperus osteosperma <sup>t</sup> (Utah juniper)										
	Pinus edulis <sup>t</sup> (twoneedle pinyon)										
	Purshia stansburiana <sup>p</sup> (Stansbury cliffrose)										
	Symphoricarpos oreophilus <sup>p</sup> (mountain snowberry)										
year	Line Intercept Cover (%)										
2018	0.1	-	0.6	0.4	-	3.6	0.1	7.9	15.5	1.7	0.6
year	Quadrat Cover (%)										
2018	0.2	0.0	1.0	0.0	0.1	1.9	0.1	5.0	5.1	0.4	0.1

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

**Table 10R-62.13 - 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 (%)				
<b>Artemisia nova<sup>p</sup> -- (black sagebrush)</b>									
2018	580	-	31	14	55	7	0	72	24/51
<b>Cercocarpus montanus var. montanus<sup>p</sup> -- (alderleaf mountain mahogany)</b>									
2018	60	-	0	100	0	67	33	67	94/130
<b>Chrysothamnus viscidiflorus ssp. viscidiflorus var. stenophyllus -- (yellow rabbitbrush)</b>									
2018	-	-	-	-	-	-	-	-	18/19
<b>Ephedra viridis<sup>p</sup> -- (mormon tea)</b>									
2018	80	-	0	50	50	25	0	50	66/66
<b>Eriogonum microthecum<sup>p</sup> -- (slender buckwheat)</b>									
2018	140	-	0	71	29	43	43	57	6/9
<b>Fraxinus anomala -- (singleleaf ash)</b>									
2018	200	-	0	30	70	20	10	50	142/144
<b>Gutierrezia sarothrae -- (broom snakeweed)</b>									
2018	500	-	8	76	16	0	0	60	12/16
<b>Juniperus osteosperma<sup>t</sup> -- (Utah juniper)</b>									
2018	220	20	46	55	0	0	0	18	- / -
<b>Opuntia polyacantha -- (plains pricklypear)</b>									
2018	60	-	0	33	67	0	0	67	11/16
<b>Pinus edulis<sup>t</sup> -- (twoneedle pinyon)</b>									
2018	140	-	14	71	14	0	0	14	- / -
<b>Purshia stansburiana<sup>p</sup> -- (Stansbury cliffrose)</b>									
2018	260	-	31	39	31	46	15	92	56/81
<b>Symphoricarpos oreophilus<sup>p</sup> -- (mountain snowberry)</b>									
2018	120	-	17	0	83	0	67	83	38/51
<b>Yucca -- (yucca)</b>									
2018	20	-	0	100	0	0	0	0	18/16

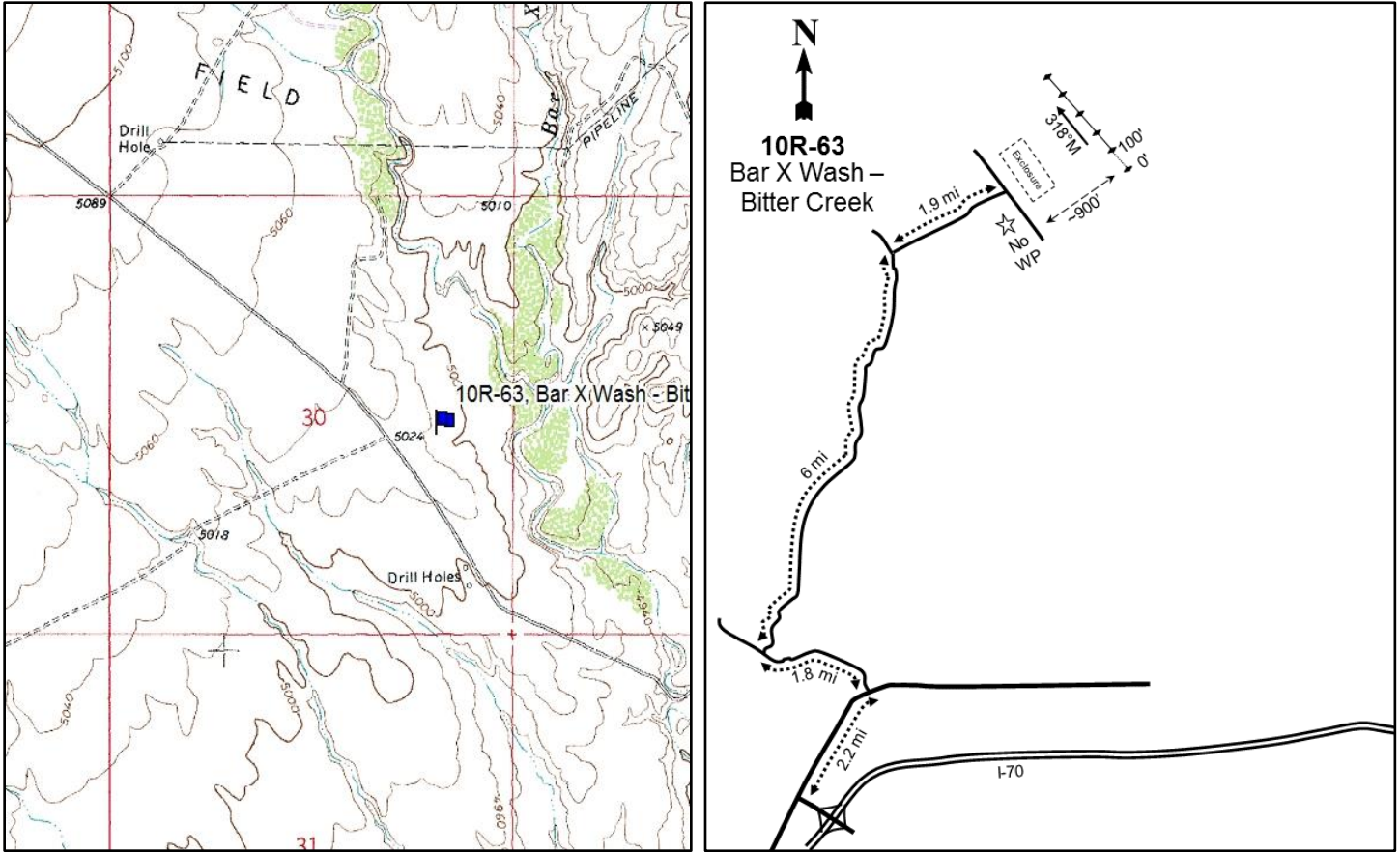
t - Tree Species; p - Preferred Browse; i - Introduced Species

**Table 10R-62.14 - 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' (%)	
<b>Juniperus osteosperma (Utah juniper)</b>							
2018	181	10	25	50	10	5	26.7
<b>Pinus edulis (twoneedle pinyon)</b>							
2018	158	5	42	37	-	16	7.3



## BAR X WASH - BITTER CREEK - STUDY NO. 10R-63



### Location Information

USGS 7.5 min Map Info  
GPS (0' Stake)

Bar X Wash SW; Township 17S, Range 26E, Section 30  
NAD 83 UTM ZONE 12, 666068 East 4351770 North

### Transect Information

Browse Tag # (0' Stake)	Not Available
Transect Bearing	318° 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 I-70, take exit 227 (Harley Dome), go under the interstate, and turn right (east) onto the old Harley Dome highway. Drive 2.2 miles to Book Cliff road. Turn left and drive for another 1.8 miles to Macintyre Cutoff. Bear right and proceed for 6 miles to a "T"-junction, then turn right. Continue for another 1.9 miles to another "T"-junction near an enclosure. Turn right and park near the south edge of the enclosure; there is no witness post. Walk 300 paces northeast to the transect. There are no stakes or rebar markers, so a GPS should be used to navigate to the exact location of the stakes.

**Site Information**

Land Ownership	Federal
Land Administrator	BLM
Allotment	SAN ARROYO
Elevation	No data
Aspect	Northeast
Slope	3-5%
Sample Dates	08/23/2018

**Table 10R-63.1 Disturbance History.** Recorded history of major disturbances.

Treatment/Disturbance	Name	WRI DB#	Date	Size (acres)
Herbicide - Plateau	Bitter Creek Restoration Phase 3 (Proposed)	4465	Fall 2018/2019	4143
Seeding - Rangeland Drill	Bitter Creek Restoration Phase 3 (Proposed)	4465	Fall/Winter 2020	4143

**Wildlife Habitat and Vegetation History**

**Table 10R-63.3 - Wildlife Seasonal Habitat.** UDWR wildlife habitat and seasonality.

Species	Habitat	Season
Deer	substantial	year-long
Elk	substantial	year-long
Pronghorn	crucial	year-long

**Site Notes**

No Notes

**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 study establishment in 2018, the plant community on this site was dominated by the introduced annual grass species cheatgrass (*Bromus tectorum*). The perennial grass species James' galleta (*Pleuraphis jamesii*) provided moderate amounts of cover, and blue grama (*Bouteloua gracilis*) was also observed in very low amounts (Table 10R-63.7, Table 10R-63.10). Forbs exhibited a lack of diversity with most of the cover provided by ruderal annual species. Perennial forb cover was low at 0.9 percent, and was entirely contributed by rose heath (*Chaetopappa ericoides*) and scarlet globemallow (*Sphaeralcea coccinea*) (Table 10R-63.7, Table 10R-63.11). Broom snakeweed (*Gutierrezia sarothrae*) and plains pricklypear (*Opuntia polyacantha*) were the only shrub species sampled, neither of which contributed much cover (Table 10R-63.6, Table 10R-63.12). Without treatment, this site would likely continue to remain in an ecologically degraded state in future sample years. However, the area is proposed to be sprayed with herbicide in the Fall of 2018 and re-seeded in 2020 (Table 10R-63.1), treatments which will likely yield augmented and diversified shrub and herbaceous components.

**Trend Summary Tables**

**Table 10R-63.6 - 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
2018	-	1.7	-	-	0.8	-

**Table 10R-63.7 - 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
2018	262	193	105	56	10.6	3.5	3.5	0.9

**Table 10R-63.8 - 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
2018	41.8	2.8	51.1	0.1	-	19.7

**Table 10R-63.9 - 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		
2018	1	8	51
Year	Days Use Per Acre (ha)		
2018	0.7 (1.8)	4.7 (11.6)	-

**Table 10R-63.10 - Grass Species.** Nested frequency and modified Daubenmire average cover by year.

GRASS SPECIES	Nested Frequency		
	year	Nested Frequency	
Bouteloua gracilis (blue grama)	2018	1	262
Bromus tectorum <sup>ai</sup> (cheatgrass)	2018	192	
Pleuraphis jamesii (james galleta)	2018		
year	Average Cover (%)		
2018	0.0	10.6	3.4

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

**Table 10R-63.11 - Forb Species.** Nested frequency and modified Daubenmire average cover by year.

FORB SPECIES	Nested Frequency						
Alyssum desertorum <sup>ai</sup> (desert madwort)	2	25	62	1	3	51	31
Chaetopappa ericoides (rose heath)							
Chenopodium fremontii <sup>a</sup> (Fremont's goosefoot)							
Descurainia pinnata <sup>a</sup> (western fansymustard)							
Erodium cicutarium <sup>ai</sup> (redstem stork's bill)							
Salsola tragus <sup>ai</sup> (prickly Russian thistle)							
Sphaeralcea coccinea (scarlet globemallow)							
year	Average Cover (%)						
2018	0.0	0.6	1.1	0.0	0.0	2.3	0.3

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

**Table 10R-63.12 - Shrub and Tree Species.** Average modified Daubenmire quadrat and line intercept cover by year.

SHRUB SPECIES	Line Intercept Cover (%)	
Gutierrezia sarothrae (broom snakeweed)	0.8	0
Opuntia polyacantha (plains pricklypear)	1.7	0.0
year	Quadrat Cover (%)	
2018	1.7	0.0

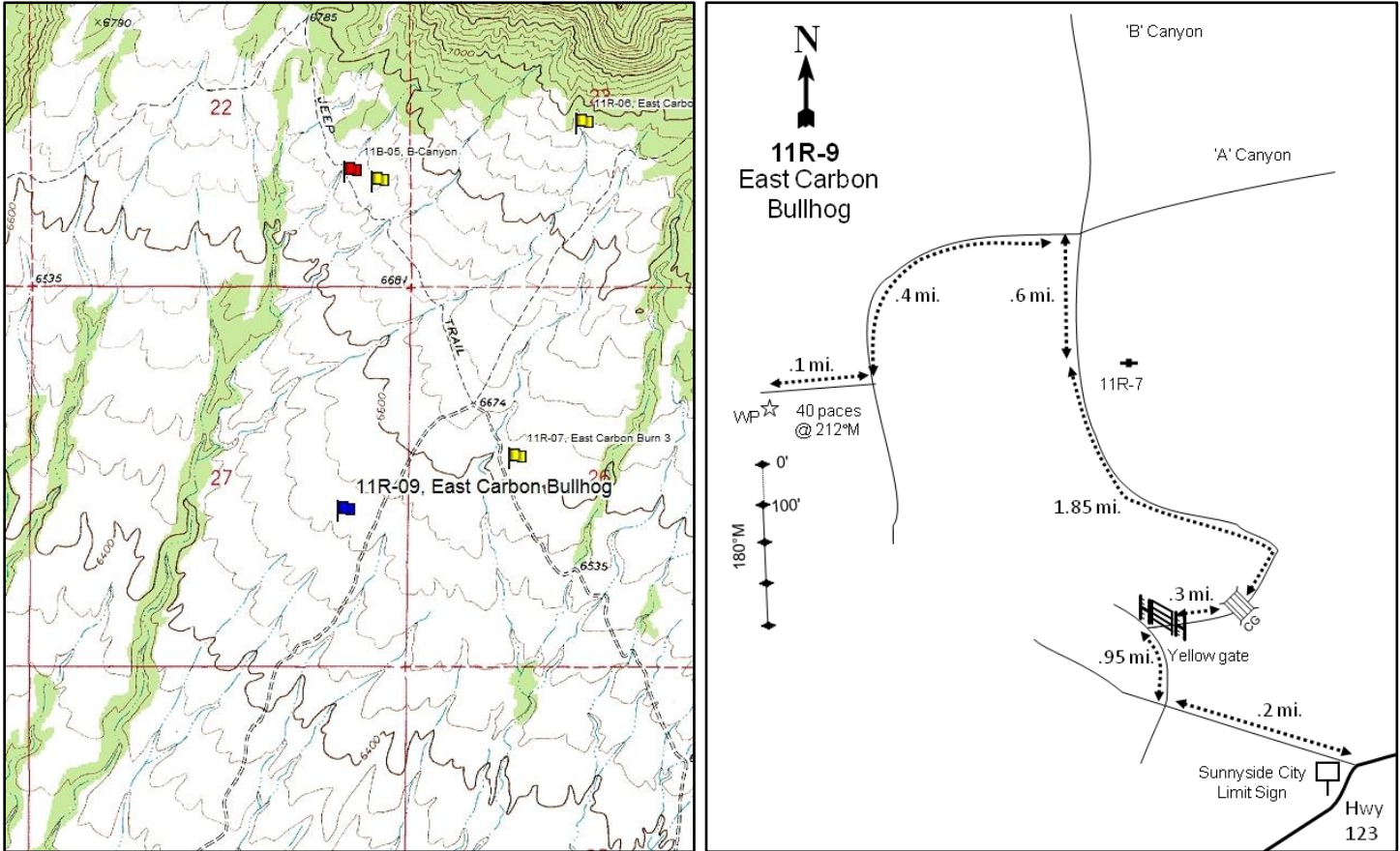
t - Tree Species; p - Preferred Browse; i - Introduced Species

**Table 10R-63.13 - 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)									
2018	1080	-	2	65	33	0	2	41	22/30
Opuntia polyacantha -- (plains pricklypear)									
2018	100	-	0	100	0	0	0	0	10/13

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

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

**Location Information**

USGS 7.5 min Map Info  
GPS (0' Stake)

Sunnyside NW; Township 14S, Range 13E, Section 27  
NAD 83 UTM ZONE 12, 547915 East 4380935 North

**Transect Information**

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

Not Available  
180° magnetic  
400ft  
Line 1 (11ft & 95ft), Line 2 (34ft), Line 3 (59ft), Line 4 (71ft)  
No Rebar

**Directions to Site**

From Highway 123, turn left after passing the "Sunnyside City Limits" sign on the west side of town. Drive for 0.2 miles to an intersection and turn right. Continue 0.95 miles to a right turn through a yellow gate. Proceed for 0.3 miles to a cattle guard, then 1.45 miles to another intersection (of A and B canyons). Turn left and continue for 0.4 miles to a road on the right. Turn right and drive another 0.1 miles to the witness post on the left (south) side of the road. From the witness post walk 40 paces at 212 degrees magnetic to the 0-foot stake; there is no browse tag.

**Site Information**

Land Ownership	Federal
Land Administrator	BLM
Allotment	MUD SPRINGS
Elevation	6,550ft (1,996m)
Aspect	South
Slope	7%
Sample Dates	08/23/2006, 05/20/2010, 08/04/2014, 08/15/2018

**Table 11R-09.1 Disturbance History.** Recorded history of major disturbances.

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

**Wildlife Habitat and Vegetation History****Table 11R-09.3 - Wildlife Seasonal Habitat.** UDWR wildlife habitat and seasonality.

Species	Habitat	Season
Deer	crucial	winter
Elk	crucial	year-long

**Table 11R-09.4 - 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 II
2010	Perennial Grass	Phase I
2014	Perennial Grass	Phase I
2018	Perennial Grass	Phase I

**Site Notes**

The seed mix was applied aerially to the west half of the bullhog project and as a result the study site was not part of the seeded portion. Many individual mature trees were left scattered across the landscape to provide escape or thermal cover (WRI Database 2019). As a result, the second half of belt one had some mature trees present.

**Soils****Table 11R-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 Clay Loam	7.8	48.2	27.0	24.8	3.5	17.1	83.2	0.6	08/23/2006

**Site Potential**

1981 - 2010 Average Annual Precipitation	13 inches
NRCS Ecological Site	Upland Shallow Loam (Birchleaf Mountain Mahogany)
NRCS Ecological Site #	R034XY321UT
States and Transitions	No state and transition model is available for this ecological site.

When established in 2006, this study site was dominated by twoneedle pinyon (*Pinus edulis*) and Utah juniper (*Juniperus osteosperma*) and was considered to be within Phase II of woodland succession; other browse species provided little cover. A bullhog project later that year (Table 11R-09.1) removed most of the trees, but browse cover has remained low (Photos, Table 11R-09.12, Table 11R-09.13). In addition, point-quarter density shows that pinyon and juniper have increased over the post-treatment sample years (Table 11R-09.14): this continued tree presence indicates that this site has the potential for infilling over time. Herbaceous cover was low prior to treatment. Perennial grasses, mainly crested wheatgrass (*Agropyron cristatum*), increased after treatment and became the dominant vegetation component in 2010. Forbs have remained rare (Table 11R-09.7, Table 11R-09.10, Table 11R-09.11).

**Trend Summary Tables****Table 11R-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
2006	1.7	0.0	9.3	2.7	-	17.4
2010	1.7	0.0	2.6	2.0	0.1	4.7
2014	0.9	0.6	4.6	2.1	0.2	5.3
2018	2.7	0.4	4.3	2.5	0.3	6.1

**Table 11R-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
2006	-	208	-	15	-	7.7	-	0.1
2010	-	219	-	67	-	18.7	-	0.6
2014	-	285	10	48	-	19.3	0.0	0.4
2018	-	291	-	74	-	17.7	-	1.0

**Table 11R-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
2006	31.8	1.1	45.5	4.7	13.4	18.9
2010	18.5	0.3	44.4	5.0	12.8	23.8
2014	20.2	0.1	54.5	5.1	13.1	25.9
2018	29.2	0.7	47.2	9.8	16.4	25.6

**Table 11R-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	Horse	Rabbit
	Quadrat Frequency				
2006	-	22	-	-	82
2010	2	8	3	-	11
2014	2	2	-	-	19
2018	3	10	1	-	13
Days Use Per Acre (ha)					
2006	-	36.2 (89.4)	2.0 (5.0)	-	-
2010	7.2 (17.9)	28.1 (69.5)	12.8 (31.5)	-	-
2014	3.6 (9.0)	11.4 (28.1)	1.3 (3.3)	0.6 (1.4)	-
2018	2.9 (7.2)	18.1 (44.7)	2.0 (5.0)	-	-



**Table 11R-09.10 - Grass Species.** Nested frequency and modified Daubenmire average cover by year.

GRASS SPECIES	Nested Frequency				
Achnatherum hymenoides (Indian ricegrass)					
Agropyron cristatum <sup>i</sup> (crested wheatgrass)					
Aristida purpurea (purple threeawn)					
Elymus elymoides (squirreltail)					
Psathyrostachys juncea <sup>i</sup> (Russian wildrye)					
year	Nested Frequency				
2006	1	204	3	-	-
2010	3	212	7	2	2
2014	1	282	12	2	-
2018	4	284	22	0	-
year	Average Cover (%)				
2006	0.2	7.4	0.2	-	-
2010	0.0	18.3	0.2	0.2	0.0
2014	0.1	18.8	0.4	0.0	-
2018	0.2	16.7	0.8	0.0	-

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

**Table 11R-09.11 - Forb Species.** Nested frequency and modified Daubenmire average cover by year.

FORB SPECIES	Nested Frequency															
Astragalus convallarius (lesser rushy milkvetch)																
Chamaesyce (sandmat)																
Descurainia pinnata <sup>a</sup> (western tansymustard)																
Draba <sup>a</sup> (draba)																
Eriogonum umbellatum (sulphur-flower buckwheat)																
Hymenoxys richardsonii (pingue rubberweed)																
Lesquerella (bladderpod)																
Lithospermum incisum (narrowleaf stone seed)																
Lomatium (desertparsley)																
Machaeranthera canescens (hoary tansyaster)																
Packera multilobata (lobeleaf groundsel)																
Penstemon (beardtongue)																
Phlox longifolia (longleaf phlox)																
Physaria (twinpod)																
Schoenocrambe limifolia (flaxleaf plainsmustard)																
Townsendia (Townsend daisy)																
year	Nested Frequency															
2006	-	8	-	-	-	-	-	-	-	-	-	6	1	-	-	-
2010	-	16	-	-	-	-	5	12	3	7	-	31	-	3	-	3
2014	-	42	5	5	-	-	3	-	1	2	3	6	-	-	-	-
2018	4	60	-	-	1	2	-	1	-	1	-	3	-	-	2	4
year	Average Cover (%)															
2006	-	0.1	-	-	-	-	-	-	-	-	-	0.0	0.0	-	-	-
2010	-	0.1	-	-	-	-	0.0	0.1	0.0	0.2	-	0.2	-	0.0	-	0.0
2014	-	0.4	0.0	0.0	-	-	0.0	-	0.0	0.0	0.0	0.0	-	-	-	-
2018	0.0	0.8	-	-	0.0	0.0	-	0.1	-	0.0	-	0.0	-	-	0.0	0.0

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

**Table 11R-09.12 - Shrub and Tree Species.** Average modified Daubenmire quadrat and line intercept cover by year.

SHRUB SPECIES	Cercocarpus montanus <sup>p</sup> (alderleaf mountain mahogany)	Ephedra viridis <sup>p</sup> (mormon tea)	Gutierrezia sarothrae (broom snakeweed)	Juniperus osteosperma <sup>i</sup> (Utah juniper)	Pinus edulis <sup>t</sup> (twoneedle pinyon)
year	Line Intercept Cover (%)				
2006	1.8	0.9	-	2.5	14.9
2010	1.5	0.5	0.1	1	3.7
2014	1.4	0.7	0.2	1.5	3.8
2018	2	0.5	0.3	4.6	1.5
year	Quadrat Cover (%)				
2006	1.4	0.4	0.0	3.2	6.1
2010	0.8	0.9	0.0	0.1	2.5
2014	0.2	0.7	0.6	1.5	3.1
2018	1.7	1.0	0.4	1.8	2.5

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

**Table 11R-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 (%)				
<b>Cercocarpus montanus<sup>p</sup> -- (alderleaf mountain mahogany)</b>									
2006	120	-	0	33	67	67	17	67	145/148
2010	60	60	67	33	0	0	0	0	123/135
2014	140	-	43	43	14	43	29	14	114/133
2018	120	-	17	67	17	33	0	0	129/139
<b>Echinocereus coccineus -- (scarlet hedgehog cactus)</b>									
2006	-	-	-	-	-	-	-	-	-/-
2010	-	-	-	-	-	-	-	-	10/23
2014	-	-	-	-	-	-	-	-	10/23
2018	-	-	-	-	-	-	-	-	7/12
<b>Ephedra viridis<sup>p</sup> -- (mormon tea)</b>									
2006	140	-	0	100	0	0	100	0	108/127
2010	320	60	88	13	0	0	0	0	96/112
2014	320	-	19	81	0	69	25	0	57/59
2018	360	-	67	33	0	0	0	0	62/63
<b>Gutierrezia sarothrae -- (broom snakeweed)</b>									
2006	-	20	0	0	0	0	0	0	5/5
2010	220	-	36	64	0	0	0	0	12/20
2014	1720	560	4	97	0	0	0	0	11/12
2018	1080	-	32	69	0	0	0	0	13/23
<b>Juniperus osteosperma<sup>i</sup> -- (Utah juniper)</b>									
2006	240	20	25	75	0	0	0	0	-/-
2010	60	20	67	33	0	0	0	0	-/-
2014	60	-	67	33	0	0	0	0	-/-
2018	100	-	60	40	0	0	0	0	-/-

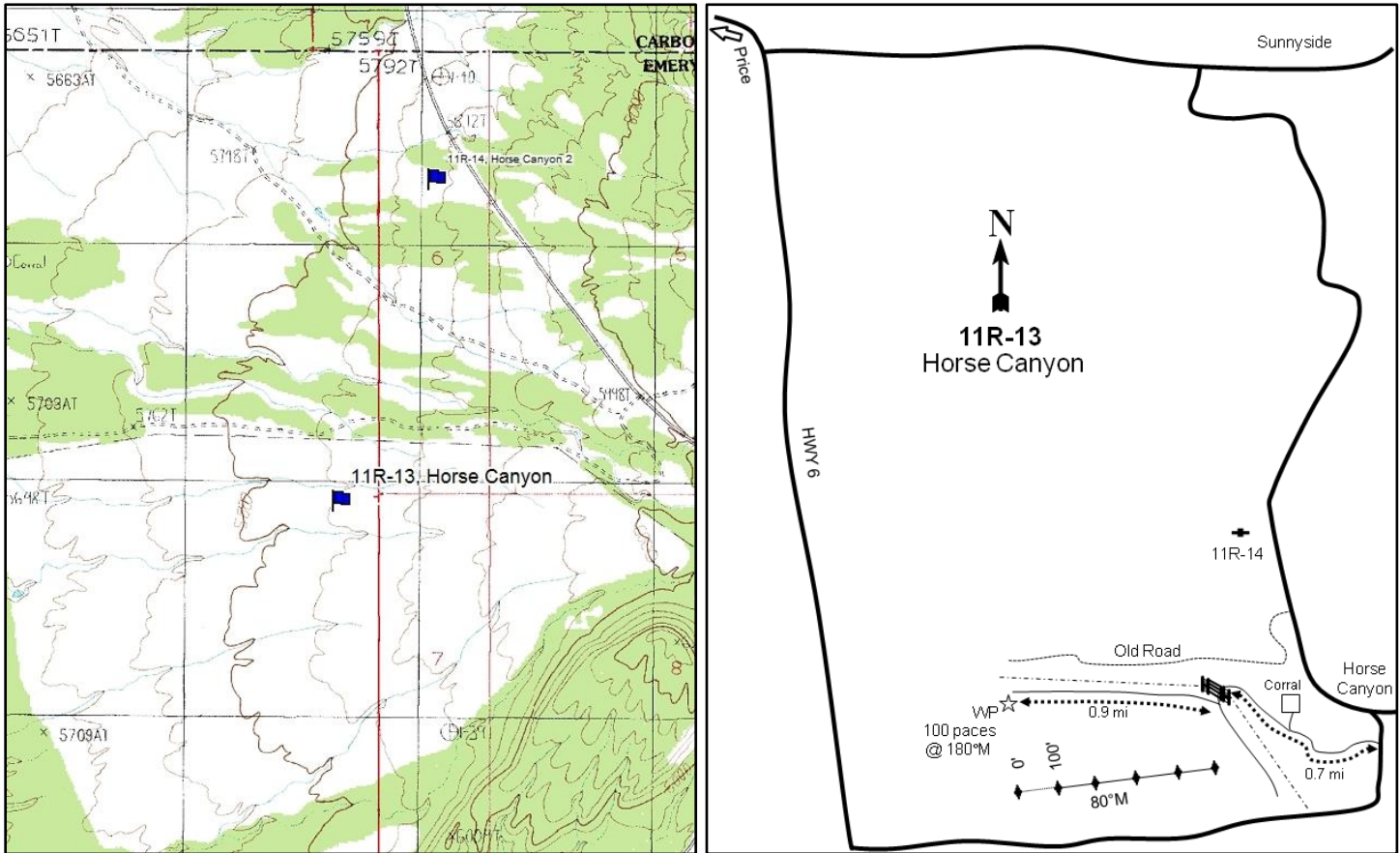
Year	Density		Age Class Distribution			Utilization		Poor Vigor (%)	Average Height Crown (cm)
	Plants Per Acre		Excluding Seedlings			Moderate (%)	Heavy (%)		
	Excluding Seedlings	Seedling	Young (%)	Mature (%)	Decadent (%)				
<b>Opuntia -- (pricklypear)</b>									
2006	-	-	-	-	-	-	-	-	10/23
2010	-	-	-	-	-	-	-	-	11/22
2014	-	-	-	-	-	-	-	-	11/33
2018	-	-	-	-	-	-	-	-	11/38
<b>Pinus edulis<sup>t</sup> -- (twoneedle pinyon)</b>									
2006	220	20	18	82	0	0	0	0	- / -
2010	40	-	0	100	0	0	0	0	- / -
2014	-	-	-	-	-	-	-	-	- / -
2018	60	-	0	100	0	0	0	0	- / -
<b>Yucca -- (yucca)</b>									
2006	-	-	-	-	-	-	-	-	- / -
2010	-	-	-	-	-	-	-	-	29/56
2014	-	-	-	-	-	-	-	-	- / -
2018	-	-	-	-	-	-	-	-	38/156

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

**Table 11R-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' (%)	
<b>Juniperus osteosperma (Utah juniper)</b>							
2006	232	-	25	40	15	20	11.0
2010	74	-	68	21	5	5	6.5
2014	125	6	61	28	-	6	6.4
2018	114	17	17	56	6	6	6.7
<b>Pinus edulis (twoneedle pinyon)</b>							
2006	116	-	15	10	50	25	12.6
2010	18	-	30	30	10	30	9.8
2014	24	-	38	50	13	-	11.6
2018	30	-	27	36	18	18	10.5

## HORSE CANYON - STUDY NO. 11R-13

**Location Information**

USGS 7.5 min Map Info  
GPS (0' Stake)

Cedar NE; Township 16S, Range 13E, Section 12  
NAD 83 UTM ZONE 12, 551577 East 4367069 North

**Transect Information**

Browse Tag # (0' Stake)	157
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	No Rebar

**Directions to Site**

Driving from US-6 and the junction of Horse Canyon Road, travel 4.5 miles east on Horse Canyon Road. Turn left onto a dirt road just before SR-124. Travel for 0.7 miles to a gate. Proceed through the gate, travel along the fence for 0.9 miles, and park. The 0-foot stake is 100 paces south at 180 degrees magnetic and is marked with browse tag #157.

**Site Information**

Land Ownership	Federal
Land Administrator	BLM
Allotment	ICELANDER
Elevation	5,852ft (1,784m)
Aspect	Southwest
Slope	5%
Sample Dates	08/20/2012, 07/20/2015, 08/14/2018

**Table 11R-13.1 Disturbance History.** Recorded history of major disturbances.

Treatment/Disturbance	Name	WRI DB#	Date	Size (acres)
Seeding - Aerial Before	Horse Canyon Juniper Removal and Seeding	LTDL	Fall 1963	920
Chaining - Two-Way Unknown	Horse Canyon Juniper Removal and Seeding	LTDL	Fall 1963	920
Mechanical - Bullhog	Horse Canyon Fuel Reduction and Habitat Restoration - Phase I	2238	Fall 2012	1173
Seeding - Aerial Before	Horse Canyon Fuel Reduction and Habitat Restoration - Phase I	2238	Fall 2012	1173

**Table 11R-13.2 Seed Mix.** List of known seeded plant species and rates (if available).

Mix Name			Application Type	Application Date	Acres
Horse Canyon Fuel Reduction			Aerial	Sep 2012	1752
Type	Species	Common Name	Cultivar/Source ID	Bulk lbs/acre	PLS
G	Achnatherum hymenoides	Indian Ricegrass	Emery UT	0.80	0.61
G	Achnatherum hymenoides	Indian Ricegrass	Nezpar	0.40	0.38
G	Achnatherum hymenoides	Indian Ricegrass	Nezpar	0.66	0.58
G	Elymus elymoides	Bottlebrush Squirreltail	Toe Jam Creek	1.20	1.07
G	Elymus elymoides	Bottlebrush Squirreltail	Juab UT	0.23	0.20
G	Hesperostipa comata	Needle and Threadgrass	Beaver UT	0.02	0.02
G	Hesperostipa comata	Needle and Threadgrass	Utah UT	0.31	0.18
G	Hesperostipa comata	Needle and Threadgrass	Iron UT	0.27	0.21
G	Hesperostipa comata	Needle and Threadgrass	Beaver UT	0.57	0.43
G	Hesperostipa comata	Needle and Threadgrass	Iron UT	0.68	0.42
G	Hesperostipa comata	Needle and Threadgrass	Iron UT	0.14	0.09
G	Pleuraphis jamesii	Galleta		0.53	0.27
G	Pleuraphis jamesii	Galleta		1.06	0.68
G	Pleuraphis jamesii	Galleta	Viva	0.23	0.12
G	Poa secunda	Sandberg Bluegrass	UP/Colorado Plateau	0.40	0.34
G	Sporobolus cryptandrus	Sand Dropseed		0.06	0.05
G	Thinopyrum intermedium	Intermediate Wheatgrass		0.29	0.24
G	Thinopyrum intermedium	Intermediate Wheatgrass		1.14	1.03
G	Thinopyrum intermedium	Intermediate Wheatgrass	Clarke	1.57	1.38
F	Linum perenne	Blue Flax	Appar	0.51	0.46
F	Penstemon strictus	Rocky Mountain Penstemon	Beaver UT	0.18	0.15
S	Atriplex canescens	Fourwing Saltbush	Emery/Grand UT	0.14	0.04
S	Atriplex canescens	Fourwing Saltbush	Kane UT	1.83	0.75
S	Atriplex canescens	Fourwing Saltbush	Carbon/Emery UT	0.57	0.22

**Wildlife Habitat and Vegetation History****Table 11R-13.3 - Wildlife Seasonal Habitat.** UDWR wildlife habitat and seasonality.

Species	Habitat	Season
Deer	substantial	winter
Pronghorn	crucial	year-long

**Table 11R-13.4 - 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/Broom Snakeweed	Phase I
2015	Broom Snakeweed	Phase I
2018	Broom Snakeweed	Phase I

**Site Notes**

No Notes

**Site Potential**

1981 - 2010 Average Annual Precipitation	10 inches
NRCS Ecological Site	Upland Shallow Loam (Birchleaf Mountain Mahogany)
NRCS Ecological Site #	034BY321UT
States and Transitions	No state and transition model is available for this ecological site.

This site was dominated by Utah juniper (*Juniperus osteosperma*) and broom snakeweed (*Gutierrezia sarothrae*) when it was established in 2012. Juniper cover decreased following the 2012 bullhog treatment (Table 11R-13.1), while that of broom snakeweed increased overall; broom snakeweed has been the dominant vegetation component since 2015 (Table 11R-13.12, Table 11R-13.13). The herbaceous layer has remained rather depauperate (Table 11R-13.7) with either annual or perennial forbs contributing the most understory cover in all sample years (Table 11R-13.11). Although density is low as of 2018, trees have maintained a presence on site following treatment (Table 11R-13.14): this indicates that there may be potential for infilling over time.

### Trend Summary Tables

**Table 11R-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
2012	1.5	3.9	1.0	1.8	2.6	2.5
2015	1.4	8.4	0.8	1.8	12.2	0.6
2018	0.9	7.0	0.8	2.0	6.8	0.5

**Table 11R-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
2012	-	34	42	198	-	0.6	0.3	3.9
2015	-	48	308	150	-	0.7	5.1	2.7
2018	6	41	78	90	0.1	0.5	0.9	2.8

**Table 11R-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
2012	48.2	1.5	26.8	11.7	5.4	10.7
2015	51.3	0.0	27.6	9.2	5.2	17.0
2018	46.9	-	37.1	16.7	4.5	12.3

**Table 11R-13.9 - Pellet Group Data.** Quadrat frequency and pellet group transect data for animal pellets. Rabbit pellet groups are not sampled in the pellet group transect.

Year	Cattle	Mule Deer	Rabbit
	Quadrat Frequency		
2012	1	1	17
2015	2	4	22
2018	-	1	21
Year	Days Use Per Acre (ha)		
2012	-	-	-
2015	-	2.7 (6.6)	-
2018	6.5 (16.1)	2.0 (5.0)	-

**Table 11R-13.10 - Grass Species.** Nested frequency and modified Daubenmire average cover by year.

GRASS SPECIES								
Achnatherum hymenoides (Indian ricegrass)								
Agropyron cristatum <sup>i</sup> (crested wheatgrass)								
Aristida purpurea (purple threeawn)								
Bromus tectorum <sup>ai</sup> (cheatgrass)								
Elymus elymoides (squirreltail)								
Hesperostipa comata (needle and thread)								
Pleuraphis jamesii (James' galleta)								
Psathyrostachys juncea <sup>i</sup> (Russian wildrye)								
year	Nested Frequency							
2012	6	3	20	-	-	-	-	5
2015	9	8	4	-	4	-	3	20
2018	7	11	8	6	1	7	-	8
year	Average Cover (%)							
2012	0.2	0.0	0.2	-	-	-	-	0.2
2015	0.4	0.0	0.1	-	0.0	-	0.0	0.2
2018	0.0	0.1	0.1	0.1	0.0	0.1	-	0.1

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

**Table 11R-13.11 - Forb Species.** Nested frequency and modified Daubenmire average cover by year.

FORB SPECIES																		
Caulanthus crassicaulis <sup>a</sup> (thickstem wild cabbage)																		
Chamaesyce albomarginata (whitemargin sandmat)																		
Cryptantha (cryptantha)																		
Descurainia pinnata <sup>a</sup> (western tansymustard)																		
Eriogonum (buckwheat)																		
Eriogonum cernuum <sup>a</sup> (nodding buckwheat)																		
Eriogonum ovalifolium (cushion buckwheat)																		
Eriogonum shockleyi (Shockley's buckwheat)																		
Frasera albomarginata (desert frasera)																		
Gilia inconspicua <sup>a</sup> (shy gilia)																		
Hymenopappus filifolius (fineleaf hymenopappus)																		
Lepidium <sup>a</sup> (pepperweed)																		
Lesquerella (bladderpod)																		
Machaeranthera grindelioides (rayless tansyaster)																		
Packera multilobata (lobeleaf groundsel)																		
Penstemon (beardtongue)																		
Salsola tragus <sup>ai</sup> (prickly Russian thistle)																		
year	Nested Frequency																	
2012	1	12	70	25	40	14	16	-	112	-	-	-	8	13	3	7	4	
2015	9	51	55	29	5	16	5	40	32	4	0	1	8	14	5	6	297	
2018	-	15	37	21	-	-	14	31	12	-	-	-	1	5	12	-	63	
year	Average Cover (%)																	
2012	0.0	0.1	1.6	0.2	0.5	0.1	0.2	-	1.2	-	-	-	0.0	0.2	0.0	0.1	0.0	
2015	0.0	0.5	1.1	0.3	0.1	0.1	0.0	0.5	0.1	0.0	0.0	0.0	0.1	0.1	0.2	0.2	4.7	
2018	-	0.1	1.2	0.3	-	-	0.2	1.1	0.1	-	-	-	0.0	0.1	0.1	-	0.6	

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



FORB SPECIES	Townsendia (Townsend daisy)
year	Nested Frequency
2012	-
2015	1
2018	-
year	Average Cover (%)
2012	-
2015	0.0
2018	-

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

**Table 11R-13.12 - Shrub and Tree Species.** Average modified Daubenmire quadrat and line intercept cover by year.

SHRUB SPECIES								
Cercocarpus montanus <sup>p</sup> (alderleaf mountain mahogany)								
Chrysothamnus viscidiflorus ssp. viscidiflorus var. stenophyllus (yellow rabbitbrush)								
Ephedra viridis <sup>p</sup> (mormon tea)								
Eriogonum microthecum <sup>p</sup> (slender buckwheat)								
Fraxinus anomala (singleleaf ash)								
Gutierrezia sarothrae (broom snakeweed)								
Juniperus osteosperma <sup>t</sup> (Utah juniper)								
Linanthus pungens (granite prickly phlox)								
year	Line Intercept Cover (%)							
2012	-	-	1.8	-	-	2.6	2.5	-
2015	-	-	1.7	0.1	1.4	10.8	0.6	-
2018	-	-	1.9	0.1	1.2	5.6	0.5	-
year	Quadrat Cover (%)							
2012	0.0	-	1.5	0.0	-	3.9	1.0	0.0
2015	0.1	0.0	1.2	0.0	0.8	7.6	0.8	-
2018	0.1	-	0.8	0.0	0.0	6.8	0.8	0.1

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

**Table 11R-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 (%)				
Atriplex canescens <sup>p</sup> -- (fourwing saltbush)									
2012	-	-	-	-	-	-	-	-	-/-
2015	-	-	-	-	-	-	-	-	-/-
2018	-	-	-	-	-	-	-	-	22/12
Cercocarpus montanus <sup>p</sup> -- (alderleaf mountain mahogany)									
2012	40	-	50	50	0	100	0	0	98/84
2015	20	-	100	0	0	0	0	0	68/93
2018	20	-	0	100	0	0	100	0	93/67

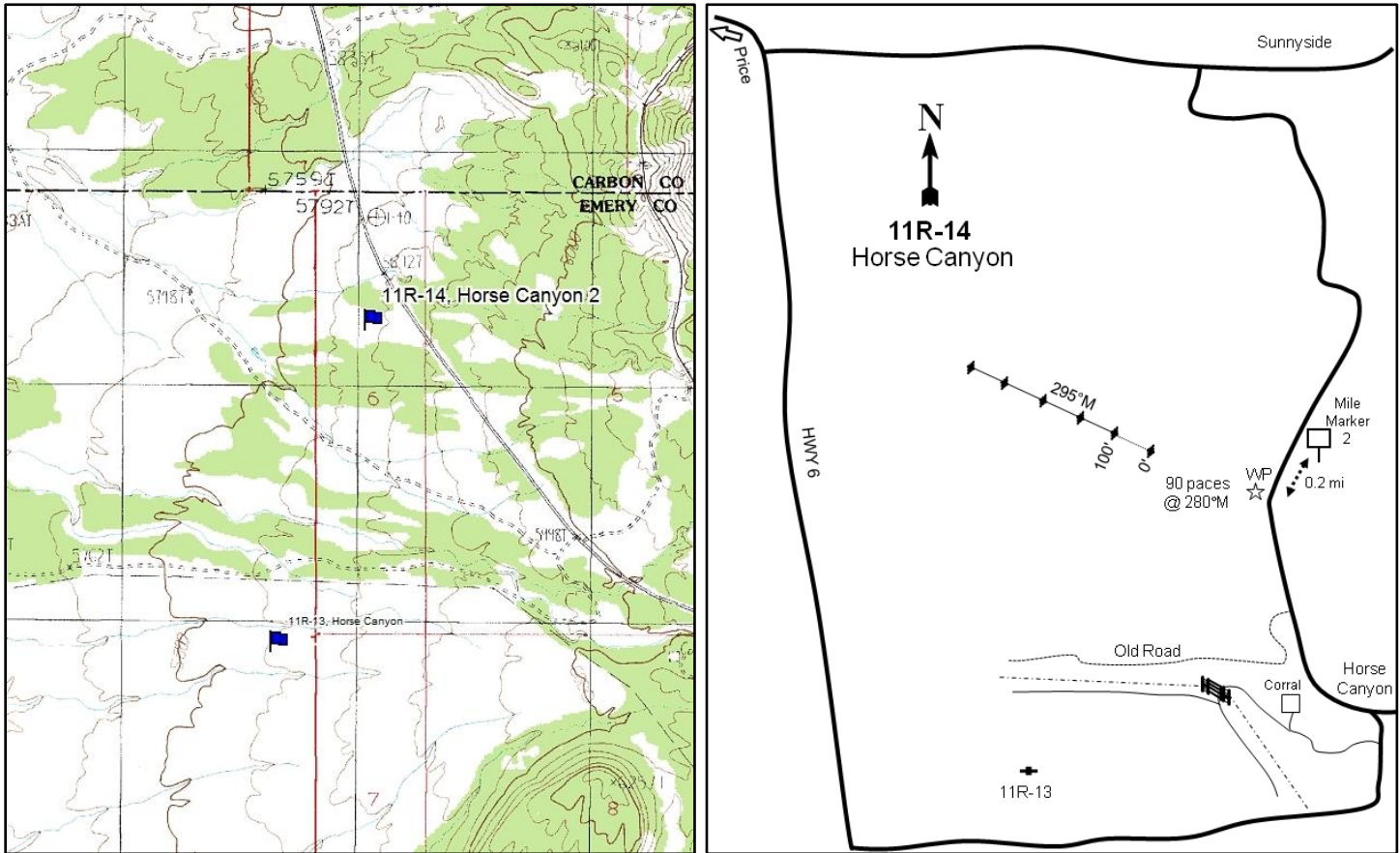
Year	Density		Age Class Distribution			Utilization		Poor Vigor (%)	Average Height Crown (cm)
	Plants Per Acre		Excluding Seedlings			Moderate (%)	Heavy (%)		
	Excluding Seedlings	Seedling	Young (%)	Mature (%)	Decadent (%)				
<b>Chrysothamnus viscidiflorus ssp. viscidiflorus var. stenophyllus -- (yellow rabbitbrush)</b>									
2012	-	-	-	-	-	-	-	-	-/-
2015	60	-	67	33	0	0	67	67	8/15
2018	-	-	-	-	-	-	-	-	-/-
<b>Ephedra viridis<sup>p</sup> -- (mormon tea)</b>									
2012	40	-	0	100	0	0	0	0	110/207
2015	60	-	0	100	0	0	0	0	91/192
2018	40	-	0	100	0	50	0	0	75/168
<b>Eriogonum microthecum<sup>p</sup> -- (slender buckwheat)</b>									
2012	120	-	17	83	0	17	0	0	8/13
2015	100	-	20	60	20	0	0	20	7/12
2018	280	-	0	100	0	36	14	0	7/11
<b>Fraxinus anomala<sup>t</sup> -- (singleleaf ash)</b>									
2012	-	-	-	-	-	-	-	-	-/-
2015	40	-	0	100	0	0	0	0	156/144
2018	120	-	17	83	0	0	0	0	240/186
<b>Gutierrezia sarothrae -- (broom snakeweed)</b>									
2012	4900	320	20	76	5	0	0	27	17/24
2015	10980	780	12	85	3	0	0	6	21/36
2018	11480	280	14	76	11	0	0	10	17/25
<b>Juniperus osteosperma<sup>t</sup> -- (Utah juniper)</b>									
2012	40	-	0	100	0	0	0	0	-/-
2015	40	-	50	50	0	0	0	0	-/-
2018	20	20	0	100	0	0	0	0	-/-
<b>Linanthus pungens -- (granite prickly phlox)</b>									
2012	40	-	50	50	0	0	0	0	6/14
2015	20	-	0	100	0	0	100	0	4/17
2018	20	-	0	100	0	0	0	0	8/20
<b>Opuntia -- (pricklypear)</b>									
2012	20	-	0	100	0	0	0	0	9/25
2015	-	-	-	-	-	-	-	-	8/19
2018	-	-	-	-	-	-	-	-	9/33
<b>Purshia stansburiana<sup>p</sup> -- (Stansbury cliffrose)</b>									
2012	-	-	-	-	-	-	-	-	148/172
2015	-	-	-	-	-	-	-	-	238/259
2018	-	-	-	-	-	-	-	-	62/71

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

**Table 11R-13.14 - Tree Characteristics.** Point-quarter tree density, size class distribution, and average diameter.

Year	Density	Size Class Distribution					Average Diameter (cm)
	Trees per Acre	Seedling (%)	1-4' (%)	4-8' (%)	8-12' (%)	>12' (%)	
<b>Fraxinus anomala (singleleaf ash)</b>							
2012	23	-	11	11	56	22	10.0
2015	27	6	19	6	50	19	13.1
2018	28	-	25	31	44	-	12.9
<b>Juniperus osteosperma (Utah juniper)</b>							
2012	43	-	21	21	58	-	12.6
2015	17	36	57	7	-	-	4.6
2018	20	23	62	15	-	-	9.0
<b>Pinus edulis (twoneedle pinyon)</b>							
2012	5	-	33	33	33	-	8.7
2015	2	100	-	-	-	-	3.0
2018	10	-	100	-	-	-	5.0

## HORSE CANYON 2 - STUDY NO. 11R-14

**Location Information**

USGS 7.5 min Map Info  
GPS (0' Stake)

Cedar NE; Township 16S, Range 14E, Section 06  
NAD 83 UTM ZONE 12, 551974 East 4368440 North

**Transect Information**

Browse Tag # (0' Stake)	Not available
Transect Bearing	295° 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 mile marker 2 on SR-124, travel 0.2 miles south and park. The study site is on the right (west) side of the road. The 0-foot stake is approximately 90 paces away from the road at 280 degrees magnetic; there is no browse tag.

**Site Information**

Land Ownership	Federal
Land Administrator	BLM
Allotment	ICELANDER
Elevation	5,879ft (1,792m)
Aspect	West
Slope	5%
Sample Dates	08/20/2012, 07/20/2015, 08/15/2018

**Table 11R-14.1 Disturbance History.** Recorded history of major disturbances.

Treatment/Disturbance	Name	WRI DB#	Date	Size (acres)
Hand Crew - Lop and Scatter	Horse Canyon Fuel Reduction and Habitat Restoration	2238	August-December 2012	447

**Wildlife Habitat and Vegetation History****Table 11R-14.3 - Wildlife Seasonal Habitat.** UDWR wildlife habitat and seasonality.

Species	Habitat	Season
Deer	substantial	winter
Pronghorn	crucial	year-long

**Table 11R-14.4 - Vegetation History.** The dominant vegetation type(s) and phase of woodland succession (Tausch, Miller, Roundy, & Chambers, 2009).

Year	Vegetation Type	Woodland Succession
2012	Juniper/Mountain Big Sagebrush	Phase I
2015	Juniper/Mountain Big Sagebrush	Phase I
2018	Juniper/Mountain Big Sagebrush	Phase I

**Site Notes**

No Notes

**Site Potential**

1981 - 2010 Average Annual Precipitation	11 inches
NRCS Ecological Site	Upland Loam (Mountain Big Sagebrush-Indian Ricegrass)
NRCS Ecological Site #	047XB308UT
States and Transitions	No state and transition model is available for this ecological site.

This site has been dominated by Utah juniper (*Juniperus osteosperma*) and mountain big sagebrush (*Artemisia tridentata* ssp. *vaseyana*) since study establishment in 2012. Cover of juniper has exhibited a slight decrease following treatment while that of sagebrush has slightly increased. (Table 11R-14.12, Table 11R-14.13). Point quarter data shows that although juniper did decrease in the first sample year following treatment, density in 2018 was equivalent to that observed prior to treatment. The continued presence of trees on this site indicates that infilling may be possible over time (Table 11R-14.14). The herbaceous understory has never been abundant (Table 11R-14.7), with most of the diversity and limited cover provided by perennial grasses (Table 11R-14.10). Forbs have remained rare and have lacked diversity (Table 11R-14.11).

**Trend Summary Tables****Table 11R-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
2012	9.6	3.8	6.7	8.3	4.0	9.1
2015	12.1	2.3	4.4	15.5	4.7	8.0
2018	12.8	2.3	2.5	9.9	2.1	6.7

**Table 11R-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
2012	4	153	6	19	0.0	3.8	0.0	0.2
2015	4	160	48	37	0.0	3.5	0.3	0.1
2018	8	121	18	21	0.0	4.2	0.5	0.1

**Table 11R-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
2012	49.8	5.4	32.8	0.7	3.8	21.4
2015	48.5	12.9	31.1	1.2	4.2	21.5
2018	54.4	5.6	35.5	1.5	4.7	19.4

**Table 11R-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	Horse	Rabbit
	Quadrat Frequency			
2012	-	15	1	29
2015	-	5	-	52
2018	-	2	-	30
Year	Days Use Per Acre (ha)			
2012	-	27.5 (67.9)	-	-
2015	1.5 (3.6)	-	-	-
2018	-	-	-	-

**Table 11R-14.10 - Grass Species.** Nested frequency and modified Daubenmire average cover by year.

GRASS SPECIES	Achnatherum hymenoides (Indian ricegrass)	Aristida purpurea (purple threeawn)	Bouteloua gracilis (blue grama)	Bromus tectorum <sup>ai</sup> (cheatgrass)	Elymus elymoides (squirreltail)	Festuca idahoensis (Idaho fescue)	Hesperostipa comata (needle and thread)	Pleuraphis jamesii (James' galleta)	Vulpia octoflora <sup>a</sup> (sixweeks fescue)
year	Nested Frequency								
2012	6	48	77	-	40	2	7	-	4
2015	3	17	65	-	55	-	25	28	4
2018	4	-	50	4	57	4	22	9	5
year	Average Cover (%)								
2012	0.1	1.1	1.3	-	1.2	0.0	0.1	-	0.0
2015	0.0	0.4	1.5	-	0.8	-	0.4	0.4	0.0
2018	0.2	-	2.4	0.0	1.0	0.0	0.5	0.2	0.0

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

**Table 11R-14.11 - Forb Species.** Nested frequency and modified Daubenmire average cover by year.

FORB SPECIES	Astragalus (milkvetch)	Chenopodium album <sup>a</sup> (lambsquarters)	Cordylanthus <sup>a</sup> (bird's-beak)	Cryptantha (cryptantha)	Descurainia pinnata <sup>a</sup> (western tansymustard)	Lappula occidentalis <sup>ai</sup> (flat-spine stickseed)	Lepidium <sup>a</sup> (pepperweed)	Packera multilobata (lobeleaf groundsel)	Phlox longifolia (long/leaf phlox)	Plantago patagonica <sup>a</sup> (woolly plantain)	Schoenocrambe limifolia (flaxleaf plainsmustard)	Sphaeralcea coccinea (scarlet globemallow)
year	Nested Frequency											
2012	3	-	-	2	6	-	-	-	12	-	1	1
2015	-	1	3	1	31	-	6	5	22	13	2	11
2018	4	-	-	-	13	2	-	-	14	3	2	2
year	Average Cover (%)											
2012	0.1	-	-	0.0	0.0	-	-	-	0.0	-	0.0	0.0
2015	-	0.0	0.0	0.0	0.2	-	0.0	0.0	0.1	0.0	0.0	0.0
2018	0.0	-	-	-	0.5	0.0	-	-	0.1	0.0	0.0	0.0

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

**Table 11R-14.12 - Shrub and Tree Species.** Average modified Daubenmire quadrat and line intercept cover by year.

SHRUB SPECIES	Artemisia tridentata ssp. vaseyana <sup>p</sup> (mountain big sagebrush)	Chrysothamnus depressus <sup>p</sup> (longflower rabbitbrush)	Chrysothamnus viscidiflorus ssp. viscidiflorus var. stenophyllus (yellow rabbitbrush)	Ephedra nevadensis <sup>p</sup> (Nevada jointfir)	Ephedra viridis <sup>p</sup> (mormon tea)	Gutierrezia sarothrae (broom snakeweed)	Juniperus osteosperma <sup>i</sup> (Utah juniper)	Opuntia (pricklypear)
year	Line Intercept Cover (%)							
2012	7.3	-	-	-	1	4	9.1	0
2015	14.5	-	0.1	-	1	4.5	8	0.1
2018	9.2	-	-	0.1	0.6	2.1	6.7	-
year	Quadrat Cover (%)							
2012	9.1	-	-	-	0.5	3.8	6.7	0.0
2015	11.7	0.0	0.0	-	0.3	2.3	4.4	0.0
2018	12.3	0.1	0.0	0.1	0.1	2.2	2.5	-

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

**Table 11R-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 (%)				
<b>Artemisia tridentata ssp. vaseyana<sup>p</sup> -- (mountain big sagebrush)</b>									
2012	4020	40	52	33	14	20	19	38	55/79
2015	4100	180	39	45	17	11	74	16	49/75
2018	4620	20	31	48	21	7	2	18	53/80
<b>Chrysothamnus depressus<sup>p</sup> -- (longflower rabbitbrush)</b>									
2012	-	-	-	-	-	-	-	-	-/-
2015	20	-	0	0	100	0	100	100	15/39
2018	20	-	0	100	0	0	0	0	14/28
<b>Chrysothamnus viscidiflorus ssp. viscidiflorus var. stenophyllus -- (yellow rabbitbrush)</b>									
2012	-	-	-	-	-	-	-	-	-/-
2015	20	-	0	100	0	0	0	0	15/35
2018	-	-	-	-	-	-	-	-	13/22
<b>Echinocereus -- (hedgehog cactus)</b>									
2012	-	-	-	-	-	-	-	-	-/-
2015	20	-	0	100	0	0	0	0	12/18
2018	20	-	0	100	0	0	0	0	9/18
<b>Ephedra nevadensis<sup>p</sup> -- (Nevada jointfir)</b>									
2012	-	-	-	-	-	-	-	-	-/-
2015	-	-	-	-	-	-	-	-	-/-
2018	200	-	0	100	0	30	0	0	20/20
<b>Ephedra viridis<sup>p</sup> -- (mormon tea)</b>									
2012	120	-	83	17	0	0	0	0	31/39
2015	100	-	20	80	0	0	60	0	32/42
2018	20	-	0	100	0	0	0	0	87/153
<b>Gutierrezia sarothrae -- (broom snakeweed)</b>									
2012	11480	220	17	82	1	1	0	25	15/22
2015	7900	2240	6	93	1	1	19	1	18/22
2018	7940	140	18	76	6	1	0	11	13/14



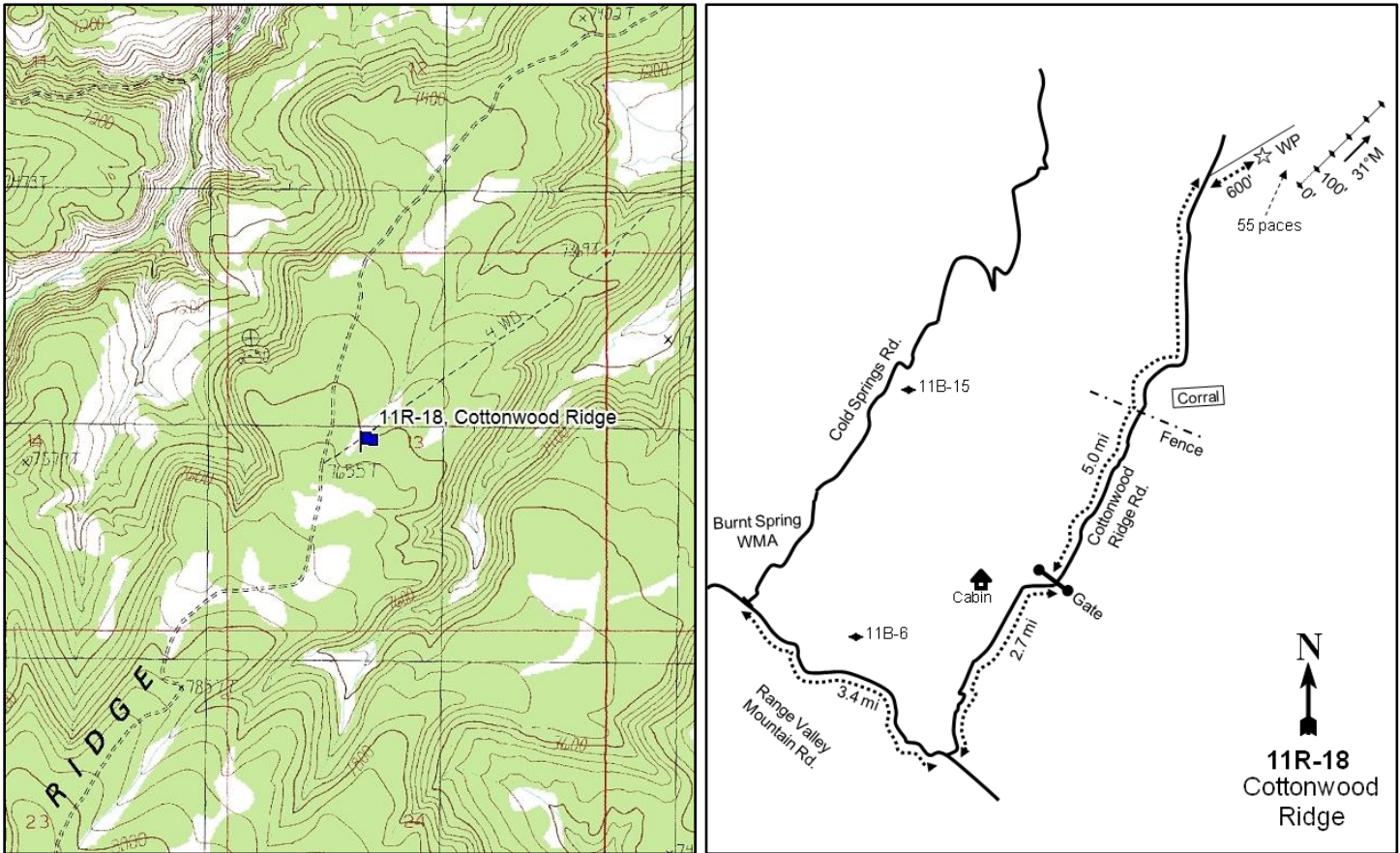
Year	Density		Age Class Distribution			Utilization		Poor Vigor (%)	Average Height Crown (cm)
	Plants Per Acre		Excluding Seedlings			Moderate (%)	Heavy (%)		
	Excluding Seedlings	Seedling	Young (%)	Mature (%)	Decadent (%)				
<b>Juniperus osteosperma<sup>t</sup> -- (Utah juniper)</b>									
2012	160	-	88	13	0	0	0	25	- / -
2015	120	-	67	17	17	0	0	17	- / -
2018	140	-	86	14	0	0	0	14	- / -
<b>Opuntia -- (pricklypear)</b>									
2012	60	-	0	100	0	0	0	33	7/34
2015	120	-	0	100	0	0	0	0	8/21
2018	80	-	0	100	0	0	0	0	7/23
<b>Pinus edulis<sup>t</sup> -- (twoneedle pinyon)</b>									
2012	-	-	-	-	-	-	-	-	- / -
2015	-	-	-	-	-	-	-	-	- / -
2018	-	-	-	-	-	-	-	-	- / -
<b>Sclerocactus -- (fishhook cactus)</b>									
2012	20	-	0	100	0	0	0	0	10/20

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

**Table 11R-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' (%)	
<b>Juniperus osteosperma (Utah juniper)</b>							
2012	147	25	20	15	25	15	8.2
2015	128	-	75	5	-	20	10.0
2018	147	5	80	-	-	15	9.1

## COTTONWOOD RIDGE - STUDY NO. 11R-18

**Location Information**

USGS 7.5 min Map Info  
GPS (0' Stake)

Twin Hollow NW; Township 13S, Range 15E, Section 13  
NAD 83 UTM ZONE 12, 569591 East 4394086 North

**Transect Information**

Browse Tag # (0' Stake)	550
Transect Bearing	55° 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: 1ft

**Directions to Site**

From the intersection of Range Valley Mountain Road and Cold Springs Road, continue southeast on Range Valley Mountain Road for 3 miles. Turn right onto Cottonwood Ridge Road and drive 2.7 miles to a gate. Continue through the gate and drive for 5.0 miles until you reach a dirt road on the right: continue on this road for 600 feet. The site is 55 paces southeast of the road.

**Site Information**

Land Ownership	Federal
Land Administrator	BLM
Allotment	GREEN RIVER
Elevation	7,612ft (2,320m)
Aspect	North
Slope	5-15%
Sample Dates	07/21/2015, 08/15/2018

**Table 11R-18.1 Disturbance History.** Recorded history of major disturbances.

Treatment/Disturbance	Name	WRI DB#	Date	Size (acres)
Mechanical - Bullhog	Cottonwood Ridge PJ Removal	3267	October 2015-January 2016	1048
Seeding - Aerial Before	Cottonwood Ridge PJ Removal	3267	October 2015-January 2016	1048
Seeding - Aerial After	Cottonwood Ridge PJ Removal	3267	January 2016-July 2017	1048

**Wildlife Habitat and Vegetation History****Table 11R-18.3 - 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
Rocky Mountain Bighorn	substantial	year-long	

**Table 11R-18.4 - Vegetation History.** The dominant vegetation type(s) and phase of woodland succession (Tausch, Miller, Roundy, & Chambers, 2009).

Year	Vegetation Type	Woodland Succession
2015	Pinyon-Juniper	Phase II transitioning to Phase III
2018	Perennial Grass-Forb	Phase I

**Site Notes**

No Notes

**Site Potential**

1981 - 2010 Average Annual Precipitation	16 inches
NRCS Ecological Site	Mountain Shallow Loam (Black Sagebrush)
NRCS Ecological Site #	R048AY433UT
States and Transitions	No state and transition model is available for this ecological site.

When established in 2015, this study site was dominated by twoneedle pinyon (*Pinus edulis*) and Utah juniper (*Juniperus osteosperma*) in the overstory and was considered to be within Phase II transitioning to Phase III of woodland succession. The shrub component was present, but contributed less cover than the tree component, with black sagebrush (*Artemisia nova*) and alderleaf mountain mahogany (*Cercocarpus montanus*) as the dominant species. Much of the tree cover was removed by a bullhog project (Table 11R-18.1). However, pinyon and juniper have maintained a presence on site, indicating that there may be potential for future infilling. Shrub cover also decreased following treatment, with Parry's rabbitbrush (*Ericameria parryi*) as the most abundant species (Photos, Table 11R-18.4, Table 11R-18.12, Table 11R-18.13, Table 11R-18.14). The herbaceous understory has remained diverse and moderately abundant. Perennial grasses and forbs have provided the most herbaceous cover in both sample years and were the dominant vegetation component in 2018 (Table 11R-18.7, Table 11R-18.10, Table 11R-18.11).

**Trend Summary Tables****Table 11R-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
2015	9.7	0.1	4.8	10.6	0.4	24.5
2018	3.6	5.9	0.5	4.3	4.1	0.4

**Table 11R-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
2015	4	243	17	247	0.0	9.3	0.1	7.6
2018	-	233	10	241	-	8.3	0.1	9.0

**Table 11R-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
2015	10.3	3.2	55.5	7.4	8.8	31.0
2018	15.9	1.3	68.3	5.1	4.2	25.5

**Table 11R-18.9 - Pellet Group Data.** Quadrat frequency and pellet group transect data for animal pellets. Rabbit pellet groups are not sampled in the pellet group transect.

Year	Mule Deer	Rocky Mountain Elk	Horse	Rabbit
	Quadrat Frequency			
2015	4	10	-	17
2018	2	11	1	-
Year	Days Use Per Acre (ha)			
2015	8.1 (19.9)	18.7 (46.3)	-	-
2018	0.7 (1.7)	10.0 (24.8)	1.7 (4.3)	-

**Table 11R-18.10 - Grass Species.** Nested frequency and modified Daubenmire average cover by year.

GRASS SPECIES									
Achnatherum hymenoides (Indian ricegrass)									
Bromus tectorum <sup>ai</sup> (cheatgrass)									
Carex (sedge)									
Elymus elymoides (squirreltail)									
Hesperostipa comata (needle and thread)									
Koeleria macrantha (prairie Junegrass)									
Poa fendleriana (muttongrass)									
Poa secunda (Sandberg bluegrass)									
Pseudoroegneria spicata (bluebunch wheatgrass)									
year	Nested Frequency								
2015	3	4	52	0	9	66	65	50	106
2018	6	-	39	-	6	55	56	56	112
year	Average Cover (%)								
2015	0.0	0.0	2.2	0.0	0.3	1.1	2.7	0.3	2.6
2018	0.3	-	0.9	-	0.2	1.2	1.6	0.5	3.6

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

**Table 11R-18.11 - Forb Species.** Nested frequency and modified Daubenmire average cover by year.

FORB SPECIES																	
Achillea millefolium (Common yarrow)																	
Antennaria (pussytoes)																	
Arabis (rockcress)																	
Arenaria (sandwort)																	
Astragalus miser (timber milkvetch)																	
Astragalus spatulatus (tufted milkvetch)																	
Castilleja flava (yellow Indian paintbrush)																	
Chenopodium fremontii <sup>a</sup> (Fremont's goosefoot)																	
Crepis acuminata (tapertip hawkbeard)																	
Cryptantha (cryptantha)																	
Descurainia pinnata <sup>a</sup> (western tansymustard)																	
Erigeron eatonii (Eaton's fleabane)																	
Erigeron pumilus (shaggy fleabane)																	
Eriogonum alatum (winged buckwheat)																	
Eriogonum racemosum (redroot buckwheat)																	
Eriogonum umbellatum (sulphur-flower buckwheat)																	
Gayophytum ramosissimum <sup>a</sup> (pinyon groundsmoke)																	
year	Nested Frequency																
2015	-	28	37	25	21	42	5	3	9	9	2	25	2	-	9	37	2
2018	1	8	5	16	1	26	-	-	7	3	3	17	-	3	-	21	1
year	Average Cover (%)																
2015	-	0.4	0.2	0.1	0.4	0.4	0.0	0.0	0.2	0.1	0.0	0.2	0.0	-	0.1	0.6	0.0
2018	0.0	0.1	0.0	0.2	0.0	0.3	-	-	0.0	0.1	0.0	0.2	-	0.0	-	0.3	0.0

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

FORB SPECIES	Hedysarum boreale (Utah sweetvetch)	Ipomopsis aggregata (scarlet gilia)	Lappula occidentalis <sup>a</sup> (flatspine stickseed)	Linum perenne <sup>i</sup> (blue flax)	Lithospermum incisum (narrowleaf stoneseed)	Machaeranthera canescens (hoary tansyaster)	Machaeranthera grindelioides (rayless tansyaster)	Orthocarpus <sup>a</sup> (owl's-clover)	Packera multilobata (lobeleaf groundsel)	Pedicularis centranthera (dwarf lousewort)	Penstemon caespitosus (mat penstemon)	Petradoria pumila (rock goldenrod)	Phlox hoodii (spiny phlox)	Polygonum douglasii <sup>a</sup> (Douglas' knotweed)	Sanguisorba minor <sup>i</sup> (small burnet)	Schoenocrambe linifolia (flaxleaf plainsmustard)	Tetranuris acaulis (stemless four-nerve daisy)
year	Nested Frequency																
2015	26	14	10	-	-	-	22	-	11	55	29	8	91	5	-	10	15
2018	-	2	-	97	1	1	26	1	31	-	20	22	66	5	15	9	3
year	Average Cover (%)																
2015	1.5	0.0	0.0	-	-	-	0.6	-	0.1	1.6	0.1	0.2	0.9	0.0	-	0.0	0.1
2018	-	0.0	-	4.1	0.0	0.0	1.6	0.0	0.3	-	0.2	0.5	0.7	0.0	0.2	0.0	0.1

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

**Table 11R-18.12 - Shrub and Tree Species.** Average modified Daubenmire quadrat and line intercept cover by year.

SHRUB SPECIES	Artemisia nova <sup>p</sup> (black sagebrush)	Artemisia tridentata ssp. vaseyana <sup>p</sup> (mountain big sagebrush)	Cercocarpus montanus <sup>p</sup> (alderleaf mountain mahogany)	Chrysothamnus depressus <sup>p</sup> (longflower rabbitbrush)	Chrysothamnus viscidiflorus ssp. viscidiflorus var. viscidiflorus (yellow rabbitbrush)	Ericameria parryi (Parry's rabbitbrush)	Gutierrezia sarothrae (broom snakeweed)	Juniperus osteosperma <sup>t</sup> (Utah juniper)	Opuntia (pricklypear)	Pinus edulis <sup>t</sup> (twoneedle pinyon)
year	Line Intercept Cover (%)									
2015	4.1	0.6	4.3	1.6	0.1	-	0.3	10.4	-	14.1
2018	2.7	0.4	1.2	-	0.3	3.3	0.5	0.1	-	0.3
year	Quadrat Cover (%)									
2015	3.3	0.2	4.0	2.1	0.1	-	0.0	2.1	0.0	2.7
2018	2.2	0.2	1.2	-	0.0	4.9	1.0	0.5	-	0.1

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

**Table 11R-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 (%)				
<b>Amelanchier utahensis<sup>p</sup> -- (Utah serviceberry)</b>									
2015	-	-	-	-	-	-	-	-	-/-
2018	-	-	-	-	-	-	-	-	45/57
<b>Artemisia nova<sup>p</sup> -- (black sagebrush)</b>									
2015	2680	120	13	69	18	35	5	45	23/38
2018	2760	-	38	58	4	0	0	1	24/37
<b>Artemisia tridentata ssp. vaseyana<sup>p</sup> -- (mountain big sagebrush)</b>									
2015	240	-	25	33	42	8	17	58	50/68
2018	140	20	29	71	0	0	0	0	48/70
<b>Atriplex canescens<sup>p</sup> -- (fourwing saltbush)</b>									
2015	-	-	-	-	-	-	-	-	-/-
2018	-	-	-	-	-	-	-	-	67/69

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 (%)				
<b>Cercocarpus montanus<sup>p</sup> -- (alderleaf mountain mahogany)</b>									
2015	280	-	29	71	0	29	7	29	127/139
2018	140	-	0	71	29	43	14	29	103/135
<b>Chrysothamnus depressus<sup>p</sup> -- (longflower rabbitbrush)</b>									
2015	4060	20	5	93	2	37	1	2	12/20
2018	100	-	0	100	0	0	0	0	9/24
<b>Chrysothamnus viscidiflorus ssp. viscidiflorus var. viscidiflorus -- (yellow rabbitbrush)</b>									
2015	160	-	25	75	0	25	13	0	31/41
2018	100	-	20	60	20	0	0	20	41/60
<b>Ericameria parryi -- (Parry's rabbitbrush)</b>									
2015	-	-	-	-	-	-	-	-	-/-
2018	5100	-	6	91	4	5	0	0	15/26
<b>Gutierrezia sarothrae -- (broom snakeweed)</b>									
2015	360	-	28	72	0	0	0	0	18/16
2018	840	-	7	93	0	0	0	0	18/20
<b>Juniperus osteosperma<sup>t</sup> -- (Utah juniper)</b>									
2015	400	60	70	30	0	0	0	15	-/-
2018	180	20	100	0	0	11	0	22	-/-
<b>Opuntia -- (pricklypear)</b>									
2015	40	-	0	100	0	0	0	0	8/18
2018	-	-	-	-	-	-	-	-	7/55
<b>Pinus edulis<sup>t</sup> -- (twoneedle pinyon)</b>									
2015	460	160	61	35	4	0	0	4	-/-
2018	80	160	75	25	0	0	0	25	-/-

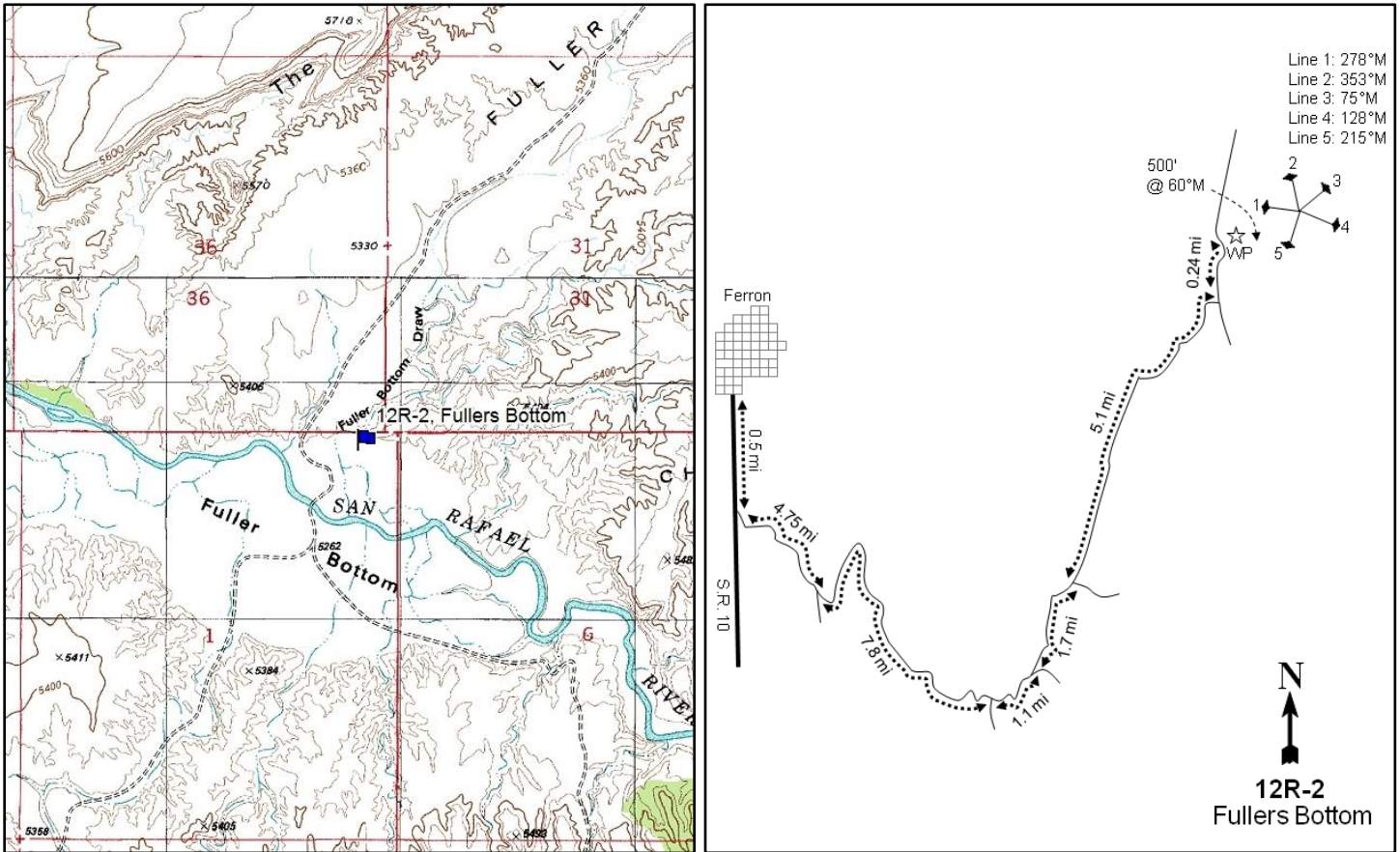
t - Tree Species; p - Preferred Browse; i - Introduced Species

**Table 11R-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' (%)	
<b>Juniperus osteosperma (Utah juniper)</b>							
2015	285	30	10	30	5	25	16.2
2018	86	61	39	-	-	-	3.4
<b>Pinus edulis (twoneedle pinyon)</b>							
2015	405	20	35	20	15	10	9.0
2018	105	63	37	-	-	-	2.1



## FULLERS BOTTOM - STUDY NO. 12R-2



### Location Information

USGS 7.5 min Map Info  
GPS (0' Stake)

Sids Mountain NW; Township 20S, Range 9E, Section 01  
NAD 83 UTM ZONE 12, 512758 East 4329917 North

### Transect Information

Browse Tag # (0' Stake)  
Transect Bearing

Not Available  
278° magnetic (Line 2: 353° magnetic, Line 3: 75° magnetic, Line 4: 128° magnetic, Line 5: 215° magnetic)

Length  
Belt Placement  
Belt Marker Placement

100ft  
Lines originate from the 0-foot stake. No belts, read data along lines.  
Rebar

### Directions to Site

Drive east from Castle Dale and travel 1.1 miles on SR-10 from the intersection of 500 East and SR-10. Turn right onto CR-401/Green River Cutoff Road. Travel 13 miles and turn right onto Fullers Bottom Road. Drive for another 5.5 miles; the study site is on the right (east) side of the road. The study is set up in a spoke design and rebar has been left on the site to mark the transect ends and center.

**Site Information**

Land Ownership	State
Land Administrator	UDWR
Allotment	FULLER BOTTOM
Elevation	5,280ft (1,609m)
Aspect	East
Slope	1%
Sample Dates	08/05/2015, 07/31/2018

**Table 12R-02.1 Disturbance History.** Recorded history of major disturbances.

Treatment/Disturbance	Name	WRI DB#	Date	Size (acres)
Mechanical - Hydro Ax	Fuller Bottom Riparian and Upland Improvement	3371	October 2015-June 2016	24

**Wildlife Habitat and Vegetation History****Table 12R-02.3 - Wildlife Seasonal Habitat.** UDWR wildlife habitat and seasonality.

Species	Habitat	Season
Deer	substantial	year-long
Pronghorn	crucial	year-long

**Table 12R-02.4 - Vegetation History.** The dominant vegetation type(s) and phase of woodland succession (Tausch, Miller, Roundy, & Chambers, 2009).

Year	Vegetation Type	Woodland Succession
2015	Tamarisk	NA
2018	Rubber Rabbitbrush	NA

**Site Notes**

The study transect is set up in a spoke design.

**Site Potential**

1981 - 2010 Average Annual Precipitation	8 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.

When the study was established in 2015, the plant community on this site was dominated by five-stamen tamarisk (*Tamarix chinensis*). Following a tamarisk removal treatment in the Fall of 2015 (Table 12R-02.1), however, the site transitioned to a rubber rabbitbrush (*Ericameria nauseosa*) dominated state (Table 12R-02.12, Table 12R-02.13). The herbaceous understory has remained in very poor condition in both sample years. The understory consisted of mainly annual forbs both prior to and after treatment, although cover decreased significantly; no grass species were observed in either sample year (Table 12R-02.10, Table 12R-02.11). Fremont cottonwood (*Populus fremontii*) trees have been observed near the site, but none have been sampled on the transect itself (Photos).

**Trend Summary Tables**

**Table 12R-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
2015	0.0	36.9	-	0.2	59.9	-
2018	-	2.4	-	-	3.4	-

**Table 12R-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
2015	-	-	259	11	-	-	20.7	0.4
2018	-	-	29	-	-	-	1.2	-

**Table 12R-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
2015	21.1	0.0	39.4	-	-	56.0
2018	43.0	-	64.1	0.0	-	5.8

**Table 12R-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	Horse	Rabbit
	Quadrat Frequency			
2015	-	1	3	12
2018	1	-	-	13
Year	Days Use Per Acre (ha)			
	2015	0.7 (1.8)	-	2.3 (5.7)
2018	2.9 (7.2)	-	-	-

**Table 12R-02.10 - Grass Species.** Nested frequency and modified Daubenmire average cover by year.

GRASS SPECIES	No Grasses Found		
		year	Nested Frequency
		year	Average Cover (%)

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

**Table 12R-02.11 - Forb Species.** Nested frequency and modified Daubenmire average cover by year.

FORB SPECIES	Ambrosia psilostachya (Cuman ragweed)	Artemisia dracunculus (tarragon)	Bassia scoparia <sup>ai</sup> (burningbush)	Chenopodium fremontii <sup>a</sup> (Fremont's goosefoot)	Chenopodium leptophyllum <sup>a</sup> (narrowleaf goosefoot)	Descurainia pinnata <sup>a</sup> (western tansymustard)	Halogeton glomeratus <sup>ai</sup> (saltlover)	Salsola tragus <sup>ai</sup> (prickly Russian thistle)
year	Nested Frequency							
2015	1	10	-	246	12	3	10	1
2018	-	-	29	-	-	-	-	3
year	Average Cover (%)							
2015	0.0	0.4	-	19.6	0.3	0.2	0.7	0.0
2018	-	-	0.7	-	-	-	-	0.5

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

**Table 12R-02.12 - Shrub and Tree Species.** Average modified Daubenmire quadrat and line intercept cover by year.

SHRUB SPECIES	Atriplex canescens <sup>p</sup> (fourwing saltbush)	Chrysothamnus viscidiflorus (yellow rabbitbrush)	Ericameria nauseosa (rubber rabbitbrush)	Gutierrezia sarothrae (broom snakeweed)	Tamarix chinensis <sup>i</sup> (five-stamen tamarisk)
year	Line Intercept Cover (%)				
2015	0.2	1.9	2.7	0.2	55.1
2018	-	0.4	2.5	-	0.5
year	Quadrat Cover (%)				
2015	0.0	0.6	1.3	0.1	34.8
2018	-	0.5	1.1	-	0.8

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

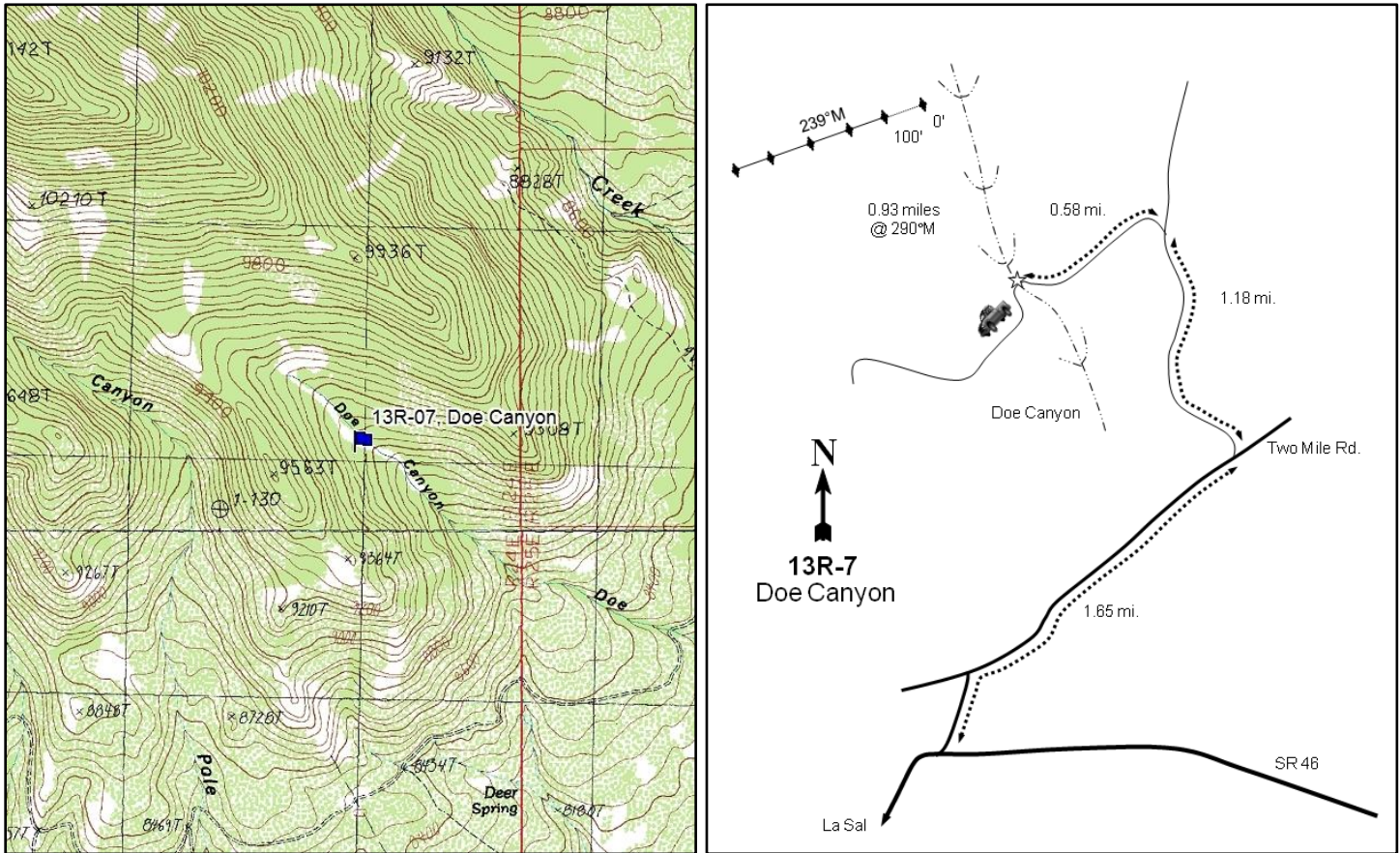
**Table 12R-02.13 - Shrub/Tree Characteristics.** Population characteristics of shrub/tree species populations including density reproduction (seedlings), age distribution, utilization, vigor and average size (height/crown) of plants.

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 (%)				
<b>Atriplex canescens<sup>p</sup> -- (fourwing saltbush)</b>									
2015	40	-	0	100	0	0	0	0	120/110
2018	20	-	0	100	0	100	0	100	71/78
<b>Chrysothamnus viscidiflorus -- (yellow rabbitbrush)</b>									
2015	580	-	48	52	0	0	0	0	81/71
2018	1140	-	2	86	12	21	0	12	40/44
<b>Ericameria nauseosa -- (rubber rabbitbrush)</b>									
2015	120	-	0	100	0	0	0	50	112/140
2018	240	-	0	83	17	0	0	0	90/114
<b>Gutierrezia sarothrae -- (broom snakeweed)</b>									
2015	120	-	0	100	0	0	0	0	23/32
2018	-	-	-	-	-	-	-	-	-/-
<b>Sarcobatus vermiculatus -- (greasewood)</b>									
2015	20	-	0	100	0	0	0	0	128/221
2018	-	-	-	-	-	-	-	-	104/255
<b>Tamarix chinensis<sup>i</sup> -- (five-stamen tamarisk)</b>									
2015	7660	120	33	54	13	0	0	7	142/125
2018	1280	-	28	22	50	0	0	34	37/34

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



## DOE CANYON - STUDY NO. 13R-7

**Location Information**

USGS 7.5 min Map Info  
GPS (0' Stake)

Mount Peale SW; Township 28S, Range 24E, Section 12  
NAD 83 UTM ZONE 12, 654901 East 4249242 North

**Transect Information**

Browse Tag # (0' Stake)	Not Available
Transect Bearing	244° 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 La Sal, travel on Highway 46 to Upper Two Mile Road. Turn left (north), continue for 1.65 miles, and turn left onto La Sal Pass Road. Continue for another 1.18 miles at which point the road will fork. Keep left and drive for 0.58 miles to Doe Canyon trail. Hike 0.93 miles up the canyon and the study should be to the left at a bearing of 290 degrees magnetic.

**Site Information**

Land Ownership	Federal
Land Administrator	USFS
Allotment	LASAL
Elevation	9,347ft (2,849m)
Aspect	Northeast-East
Slope	40%
Sample Dates	06/26/2013, 08/21/2018

**Table 13R-07.1 Disturbance History.** Recorded history of major disturbances.

Treatment/Disturbance	Name	WRI DB#	Date	Size (acres)
Fire - Prescribed Fire	Lackey Basin Aspen Restoration	2620	June 2016	665

**Wildlife Habitat and Vegetation History****Table 13R-07.3 - Wildlife Seasonal Habitat.** UDWR wildlife habitat and seasonality.

Species	Habitat	Season
Deer	crucial	summer
Elk	crucial	summer

**Table 13R-07.4 - Vegetation History.** The dominant vegetation type(s) and phase of woodland succession (Tausch, Miller, Roundy, & Chambers, 2009).

Year	Vegetation Type	Woodland Succession
2013	Quaking Aspen-Conifer Encroached	NA
2018	Quaking Aspen	NA

**Site Notes**

Game trails were observed across the site in 2013.

**Site Potential**

1981 - 2010 Average Annual Precipitation	28 inches
NRCS Ecological Site	High Mountain Loam (Aspen)
NRCS Ecological Site #	R048AY506UT
States and Transitions	No state and transition model is available for this ecological site.

Upon study establishment in 2013, the plant community on this study site was dominated by Douglas-fir (*Pseudotsuga menziesii*) with a lesser component of quaking aspen (*Populus tremuloides*); understory browse species were sparse. A prescribed burn in 2016 (Table 13R-07.1) removed most of the Douglas-fir, and aspen became the dominant vegetation type in 2018. The shrub component also diversified, with red elderberry (*Sambucus racemosa*) contributing the most cover (Table 13R-07.12, Table 13R-07.13). The herbaceous understory was moderately abundant, but not very diverse prior to treatment. Herbaceous diversity and abundance increased following the burn, with mainly native perennial grass and forb species providing the most cover (Table 13R-07.7, Table 13R-07.10, Table 13R-07.11). Although most conifer trees were removed by the fire, they were observed in point-quarter measurements in 2018 (Table 13R-07.14). This continued tree presence indicates that given enough time, the aspen stand on this site may again be encroached by conifers.



**Trend Summary Tables****Table 13R-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
2013	0.0	1.0	4.7	0.1	0.9	73.5
2018	5.5	3.5	30.7	10.4	2.0	54.7

**Table 13R-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
2013	-	171	-	44	-	6.2	-	1.1
2018	3	113	25	136	0.2	6.6	2.5	8.3

**Table 13R-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
2013	1.6	0.1	87.5	-	3.1	14.7
2018	14.5	0.4	72.7	1.2	6.8	46.7

**Table 13R-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
	Quadrat Frequency		
2013	-	-	-
2018	1	4	8
Year	Days Use Per Acre (ha)		
2013	-	4.7 (11.6)	5.3 (13.2)
2018	2.2 (5.4)	20.1 (49.7)	6.7 (16.6)

**Table 13R-07.10 - Grass Species.** Nested frequency and modified Daubenmire average cover by year.

GRASS SPECIES	Bromus porteri (Porter brome)	Bromus tectorum <sup>a</sup> (cheatgrass)	Carex (sedge)	Carex geyeri (Geyer's sedge)	Carex rossii (Ross' sedge)	Elymus trachycaulus (slender wheatgrass)
year	Nested Frequency					
2013	-	-	171	-	-	-
2018	13	3	-	94	16	1
year	Average Cover (%)					
2013	-	-	6.2	-	-	-
2018	0.8	0.2	-	5.4	0.2	0.2

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

**Table 13R-07.11 - Forb Species.** Nested frequency and modified Daubenmire average cover by year.

FORB SPECIES	Achillea millefolium (Common yarrow)	Chenopodium atrovirens <sup>a</sup> (pinyon goosefoot)	Cirsium (thistle)	Corydalis <sup>a</sup> (fumewort)	Goodyera oblongifolia (western rattlesnake plantain)	Lactuca serriola <sup>ai</sup> (prickly lettuce)	Lathyrus lanszwertii (Nevada pea)	Lomatium (desertparsley)	Maianthemum stellatum (starry false lily of the valley)	Orobanche fasciculata (clustered broomrape)	Polygonum douglasii <sup>a</sup> (Douglas' knotweed)	Senecio eremophilus (desert ragwort)	Taraxacum officinale (common dandelion)	Thalictrum fendleri (Fendler's meadow-rue)	Thermopsis montana (mountain goldenbanner)	Vicia americana (American vetch)	Viola (violet)
year	Nested Frequency																
2013	-	-	-	-	2	-	-	11	14	2	-	-	-	22	-	-	5
2018	2	15	0	4	-	1	26	-	5	-	5	32	1	4	26	61	5
year	Average Cover (%)																
2013	-	-	-	-	0.0	-	-	0.2	0.3	0.0	-	-	-	0.6	-	-	0.0
2018	0.0	1.6	0.1	0.8	-	0.1	1.8	-	0.2	-	0.0	1.9	0.0	0.7	0.6	2.9	0.0

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

**Table 13R-07.12 - Shrub and Tree Species.** Average modified Daubenmire quadrat and line intercept cover by year.

SHRUB SPECIES	Abies lasiocarpa <sup>a</sup> (subalpine fir)	Mahonia repens (creeping barberry)	Populus tremuloides <sup>a</sup> (quaking aspen)	Pseudotsuga menziesii <sup>t</sup> (Douglas-fir)	Purshia tridentata <sup>p</sup> (antelope bitterbrush)	Ribes cereum <sup>p</sup> (wax currant)	Ribes montigenum <sup>p</sup> (gooseberry currant)	Rubus idaeus ssp. strigosus (gray/leaf red raspberry)	Sambucus racemosa <sup>p</sup> (red elderberry)	Symphoricarpos oreophilus <sup>p</sup> (mountain snowberry)
year	Line Intercept Cover (%)									
2013	-	0.9	25	48.5	-	-	-	-	-	0.1
2018	0.2	1.9	51.6	2.9	-	1.4	0.2	0.1	8.8	-
year	Quadrat Cover (%)									
2013	-	1.0	1.8	2.9	0.0	-	-	-	-	0.0
2018	0.2	3.0	30.5	0.0	-	0.3	0.0	0.4	5.1	0.1

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

**Table 13R-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 (%)				
<b>Abies lasiocarpa<sup>t</sup> -- (subalpine fir)</b>									
2013	-	-	-	-	-	-	-	-	-/-
2018	-	40	0	0	0	0	0	0	-/-
<b>Mahonia repens -- (creeping barberry)</b>									
2013	7040	160	0	99	0	1	0	1	11/12
2018	4060	-	1	100	0	0	0	0	13/17
<b>Pseudotsuga menziesii<sup>t</sup> -- (Douglas-fir)</b>									
2013	240	60	8	92	0	0	0	0	-/-
2018	-	140	0	0	0	0	0	0	-/-
<b>Quercus gambelii<sup>p</sup> -- (Gambel oak)</b>									
2013	-	20	0	0	0	0	0	0	-/-
2018	-	-	-	-	-	-	-	-	-/-
<b>Ribes cereum<sup>p</sup> -- (wax currant)</b>									
2013	-	-	-	-	-	-	-	-	-/-
2018	160	-	50	50	0	0	0	13	34/32
<b>Ribes montigenum<sup>p</sup> -- (gooseberry currant)</b>									
2013	-	-	-	-	-	-	-	-	-/-
2018	40	-	50	50	0	0	0	0	45/52
<b>Rubus idaeus ssp. strigosus -- (grayleaf red raspberry)</b>									
2013	-	-	-	-	-	-	-	-	-/-
2018	320	-	0	100	0	44	6	0	28/22
<b>Sambucus racemosa<sup>p</sup> -- (red elderberry)</b>									
2013	-	-	-	-	-	-	-	-	-/-
2018	420	-	10	91	0	0	0	0	96/110
<b>Symphoricarpos oreophilus<sup>p</sup> -- (mountain snowberry)</b>									
2013	100	-	40	60	0	60	0	0	20/41
2018	40	-	100	0	0	0	0	0	-/-

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

**Table 13R-07.13a - Aspen Characteristics.** Characteristics of aspen populations including density, size class distribution, and vigor of plants.

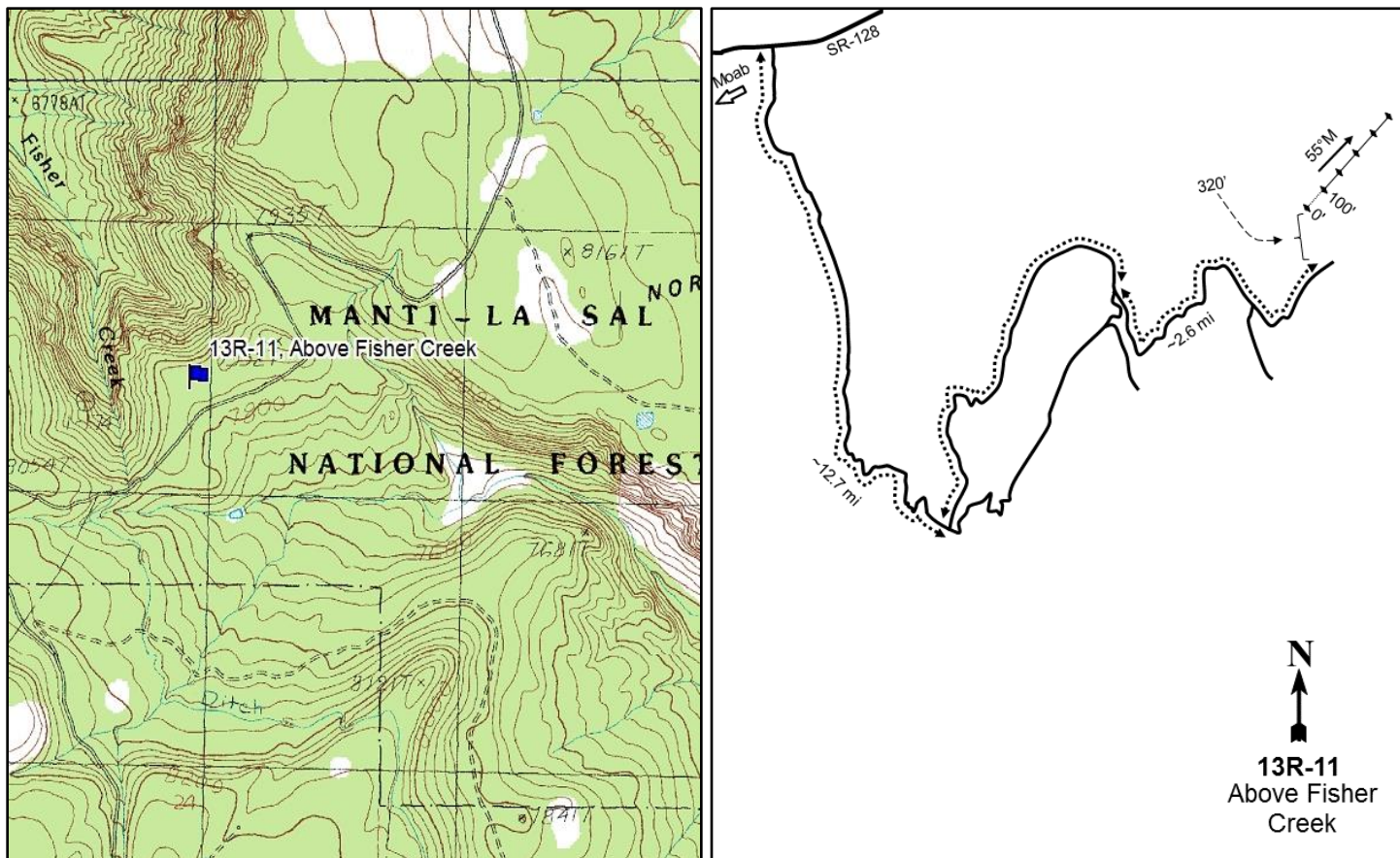
Year	Density	Size Class Distribution				Utilization		Poor Vigor (%)
	Plants per Acre	Class I (%)	Class II (%)	Class III (%)	Class IV (%)	Moderate (%)	Heavy (%)	
<b>Populus tremuloides (quaking aspen)</b>								
2013	1560	73	12	3	13	10	5	10
2018	14500	4	47	49	0	5	0	0

Class I - &lt;= 1.5 feet; Class II - &gt; 1.5 feet to 5 feet; Class III - &gt; 5 feet and up to 1 inch diameter at breast height (dbh); Class IV - &gt; 1 in diameter at breast height (dbh)

**Table 13R-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' (%)	
<b>Abies lasiocarpa (subalpine fir)</b>							
2018	53	88	-	-	13	-	1.6
<b>Populus tremuloides (quaking aspen)</b>							
2013	576	45	10	-	-	45	11.1
2018	1195	-	75	25	-	-	1.5
<b>Pseudotsuga menziesii (Douglas-fir)</b>							
2013	421	-	10	-	5	85	21.4
2018	258	100	-	-	-	-	0.3

## ABOVE FISHER CREEK - STUDY NO. 13R-11



### Location Information

USGS 7.5 min Map Info  
GPS (0' Stake)

Mount Waas NE; Township 25S, Range 25E, Section 20  
NAD 83 UTM ZONE 12, 657863 East 4275588 North

### Transect Information

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

Not Available  
55° 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 SR-128, turn onto Castleton Road and travel south for about 12.7 miles, passing numerous intersections and crossing Castle Creek, to a fork. Proceed left at the fork onto North End road and continue for approximately 3.2 miles (the road on the right will eventually lead to the same place, but it passes through private property) to another fork. Stay left again and drive for 2.6 miles, then park. The transect is approximately 320 feet north of the road; there are no stakes or rebar, so use a GPS to navigate.

**Site Information**

Land Ownership	Federal
Land Administrator	USFS
Allotment	BEAVER
Elevation	No data
Aspect	South
Slope	4-8%
Sample Dates	08/22/2018

**Table 13R-11.1 Disturbance History.** Recorded history of major disturbances.

Treatment/Disturbance	Name	WRI DB#	Date	Size (acres)
Mechanical - Bullhog	North End La Sal (Brush Hole Phase 3) (Proposed)	4614	2018	747

**Wildlife Habitat and Vegetation History**

**Table 13R-11.3 - Wildlife Seasonal Habitat.** UDWR wildlife habitat and seasonality.

Species	Habitat	Season
Deer	crucial	summer
Elk	crucial	spring/fall

**Table 13R-11.4 - Vegetation History.** The dominant vegetation type(s) and phase of woodland succession (Tausch, Miller, Roundy, & Chambers, 2009).

Year	Vegetation Type	Woodland Succession
2018	Mixed Mountain Brush/Pinyon-Juniper	Phase II

**Site Notes**

No Notes

**Site Potential**

1981 - 2010 Average Annual Precipitation	21 inches
NRCS Ecological Site	Mountain Stony Loam (Browse)
NRCS Ecological Site #	048AY451UT
States and Transitions	No state and transition model is available for this ecological site.

Upon study establishment in 2018, this site was dominated by a mixture of mountain browse species including Utah serviceberry (*Amelanchier utahensis*), Gambel oak (*Quercus gambelii*), and wild crab apple (*Peraphyllum ramosissimum*), among others (Table 13R-11.12, Table 13R-11.13). The site was also considered to be within Phase II of woodland succession (Table 13R-11.4), being encroached by twoneedle pinyon (*Pinus edulis*) with lesser amounts of Utah juniper (*Juniperus osteosperma*) and Rocky Mountain juniper (*J. scopulorum*) (Photos, Table 13R-11.14). The herbaceous understory was lacking in abundance, although perennial forbs were moderately diverse (Table 13R-11.7, Table 13R-11.10, Table 13R-11.11). The first sampling following the scheduled bullhog treatment (Table 13R-11.1) will likely show that many of the trees will have been removed; the browse component may also exhibit an initial decrease following treatment.

**Trend Summary Tables**

**Table 13R-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
2018	36.7	1.0	5.6	61.1	0.8	38.5

**Table 13R-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
2018	-	120	-	47	-	3.0	-	0.8

**Table 13R-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
2018	17.2	1.5	77.0	1.0	0.5	37.9

**Table 13R-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	Black Bear	Mule Deer	Rocky Mountain Elk	Rabbit
	Quadrat Frequency			
2018	-	-	1	1
Year	Days Use Per Acre (ha)			
2018	17.4 (43.0)*	2.0 (5.0)	0.7 (1.7)	-

\*Pellets per acre (ha)

**Table 13R-11.10 - Grass Species.** Nested frequency and modified Daubenmire average cover by year.

GRASS SPECIES	Nested Frequency			
Carex obtusata (obtusate sedge)	13	55	12	60
Carex rossii (Ross' sedge)				
Elymus elymoides (squirreltail)				
Poa fendleriana (nuttongrass)				
year	Average Cover (%)			
2018	0.2	1.6	0.1	1.1

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

**Table 13R-11.11 - Forb Species.** Nested frequency and modified Daubenmire average cover by year.

FORB SPECIES	Allium (onion)	Arenaria (sandwort)	Astragalus lentiginosus (freckled milkvetch)	Erigeron eatonii (Eaton's fleabane)	Erigeron flagellaris (trailing fleabane)	Eriogonum racemosum (redroot buckwheat)	Lesquerella (bladderpod)	Phlox longifolia (longleaf phlox)	Sphaeralcea coccinea (scarlet globemallow)	Townsendia (Townsend daisy)	Zigadenus paniculatus (foothill deathcamas)
year	Nested Frequency										
2018	0	22	2	4	1	1	5	3	5	3	1
year	Average Cover (%)										
2018	0.0	0.5	0.2	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0

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

**Table 13R-11.12 - Shrub and Tree Species.** Average modified Daubenmire quadrat and line intercept cover by year.

SHRUB SPECIES	Amelanchier utahensis <sup>s</sup> (Utah serviceberry)	Artemisia tridentata ssp. vaseyana <sup>p</sup> (mountain big sagebrush)	Cercocarpus montanus <sup>p</sup> (alderleaf mountain mahogany)	Juniperus osteosperma <sup>i</sup> (Utah juniper)	Juniperus scopulorum <sup>i</sup> (Rocky Mountain juniper)	Opuntia fragilis (brittle pricklypear)	Opuntia polyacantha (plains pricklypear)	Peraphyllum ramosissimum <sup>p</sup> (wild crab apple)	Pinus edulis <sup>i</sup> (twoneedle pinyon)	Quercus gambelii <sup>p</sup> (Gambel oak)	Symphoricarpos oreophilus <sup>p</sup> (mountain snowberry)
year	Line Intercept Cover (%)										
2018	18.8	1.2	10.3	6	0.8	0.6	0.2	10.7	31.7	11.2	8.9
year	Quadrat Cover (%)										
2018	9.4	0.5	8.7	0.7	0.5	0.5	0.6	7.5	4.4	4.8	5.9

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

**Table 13R-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 (%)				
Amelanchier utahensis <sup>p</sup> -- (Utah serviceberry)									
2018	1240	40	5	73	23	0	0	10	170/151
Artemisia tridentata ssp. vaseyana <sup>p</sup> -- (mountain big sagebrush)									
2018	420	20	52	33	14	0	0	10	36/63
Cercocarpus montanus <sup>p</sup> -- (alderleaf mountain mahogany)									
2018	960	-	10	63	27	0	0	23	157/141
Juniperus osteosperma <sup>i</sup> -- (Utah juniper)									
2018	80	20	25	75	0	0	0	25	- / -
Juniperus scopulorum <sup>i</sup> -- (Rocky Mountain juniper)									
2018	20	-	100	0	0	0	0	0	- / -
Opuntia fragilis -- (brittle pricklypear)									
2018	220	-	18	82	0	0	0	0	13/44
Opuntia polyacantha -- (plains pricklypear)									
2018	200	-	20	80	0	10	0	0	12/27



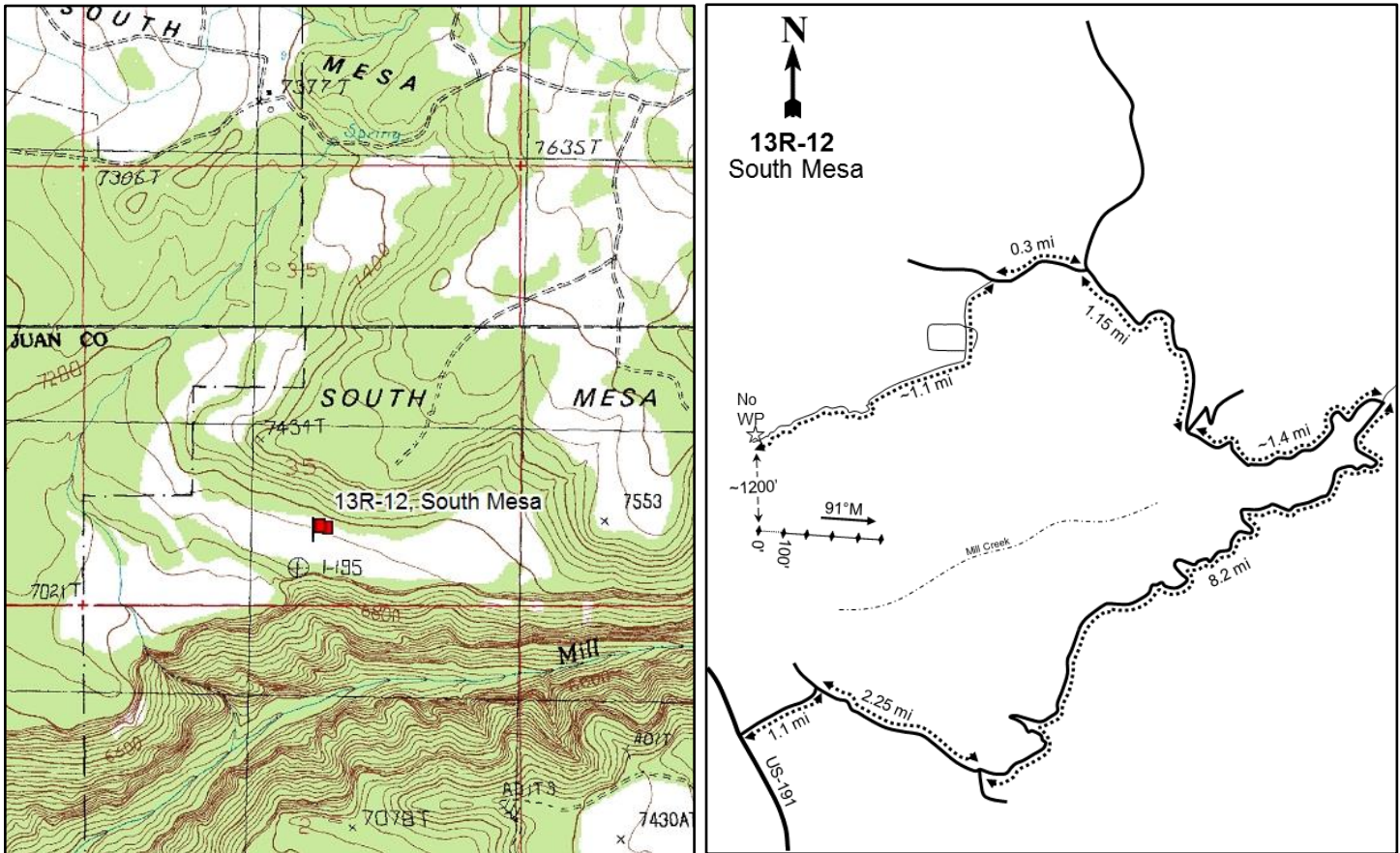
Year	Density		Age Class Distribution			Utilization		Poor Vigor (%)	Average Height Crown (cm)
	Plants Per Acre		Excluding Seedlings			Moderate (%)	Heavy (%)		
	Excluding Seedlings	Seedling	Young (%)	Mature (%)	Decadent (%)				
Peraphyllum ramosissimum <sup>p</sup> -- (wild crab apple)									
2018	1140	-	7	84	9	0	0	39	119/122
Pinus edulis <sup>t</sup> -- (twoneedle pinyon)									
2018	200	400	80	20	0	0	0	0	- / -
Quercus gambelii <sup>p</sup> -- (Gambel oak)									
2018	2200	-	36	65	0	3	0	3	117/75
Symphoricarpos oreophilus <sup>p</sup> -- (mountain snowberry)									
2018	3380	-	10	77	13	4	1	4	40/57

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

**Table 13R-11.14 - Tree Characteristics.** Point-quarter tree density, size class distribution, and average diameter.

Year	Density	Size Class Distribution					Average Diameter (cm)
	Trees per Acre	Seedling (%)	1-4' (%)	4-8' (%)	8-12' (%)	>12' (%)	
Juniperus osteosperma (Utah juniper)							
2018	55	-	-	57	29	14	12.1
Juniperus scopulorum (Rocky Mountain juniper)							
2018	13	33	-	-	33	33	16.0
Pinus edulis (twoneedle pinyon)							
2018	116	-	-	10	30	60	18.7
Pseudotsuga menziesii (Douglas-fir)							
2018	5	-	-	-	-	100	20.0

## SOUTH MESA - STUDY NO. 13R-12

**Location Information**

USGS 7.5 min Map Info  
GPS (0' Stake)

Mount Tukuhtivatz ; Township 26S, Range 23E, Section 35  
NAD 83 UTM ZONE 12, 643003 East 4261778 North

**Transect Information**

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

Not Available  
91° magnetic  
500ft  
Line 1 (11ft), Line 2 (34ft), Line 3 (59ft), Line 4 (71ft), Line 5 (95ft)  
No Rebar or Stakes

**Directions to Site**

Traveling south on US-191, turn left (east) onto Pack Creek Cutoff road, and drive for about 1.1 miles. At the "T"-junction, turn right onto La Sal Loop. Proceed for 2.25 miles to a road on the right (south) (Pack Creek Road); continue straight on La Sal Loop. Travel for about 9.6 miles, staying on the main road, to a fork: the right fork is Warner Lake road, while the left fork turns into Loop Road. Bear left and drive for 1.15 miles, then turn left (west) onto South Mesa road. Continue for 0.3 miles to a two-track on the left (south). Turn onto this two-track, travel for about 1.1 miles, and park. There is no witness post and there are no stakes or rebar. Use a GPS to navigate to the transect, which is approximately 1200 feet south of the road.

**Site Information**

Land Ownership	Federal
Land Administrator	USFS
Allotment	BRUMLEY RIDGE
Elevation	No data
Aspect	South
Slope	2%
Sample Dates	08/22/2018

**Table 13R-12.1 Disturbance History.** Recorded history of major disturbances.

Treatment/Disturbance	Name	WRI DB#	Date	Size (acres)
Mechanical - Bullhog	West Slope WUI Phase 4 (Proposed)	4491	2018	375

**Wildlife Habitat and Vegetation History****Table 13R-12.3 - Wildlife Seasonal Habitat.** UDWR wildlife habitat and seasonality.

Species	Habitat	Season
Deer	crucial	winter
Elk	crucial	winter

**Table 13R-12.4 - Vegetation History.** The dominant vegetation type(s) and phase of woodland succession (Tausch, Miller, Roundy, & Chambers, 2009).

Year	Vegetation Type	Woodland Succession
2018	Black Sagebrush/Pinyon-Juniper	Phase II

**Site Notes**

No Notes

**Site Potential**

1981 - 2010 Average Annual Precipitation	17 inches
NRCS Ecological Site	Mountain Shallow Loam (Black Sagebrush)
NRCS Ecological Site #	048AY433UT
States and Transitions	No state and transition model is available for this ecological site.

This study site was dominated by black sagebrush (*Artemisia nova*) upon establishment in 2018, with other browse species present to a lesser extent. Twoneedle pinyon (*Pinus edulis*) was also a co-dominant site component, and the study site can be considered to be within Phase II of woodland succession as of 2018. Utah juniper (*Juniperus osteosperma*) trees were also present, but in low amounts (Table 13R-12.4, Table 13R-12.12, Table 13R-12.13, Table 13R-12.14). The understory was moderately diverse, but not very abundant; the perennial grass muttongrass (*Poa fendleriana*) provided the most cover of any single herbaceous species (Table 13R-12.7, Table 13R-12.10, Table 13R-12.11). Data collected during the next sampling will likely show that a bullhog treatment scheduled for later in 2018 (Table 13R-12.1) will have removed a majority of the trees; the shrub component may also exhibit an initial decrease following treatment.

**Trend Summary Tables****Table 13R-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
2018	17.3	0.0	12.9	19.7	0.1	18.1

**Table 13R-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
2018	-	132	-	53	-	5.0	-	1.5

**Table 13R-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
2018	33.9	3.0	46.3	5.7	4.9	33.3

**Table 13R-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	Mule Deer	Rocky Mountain Elk	Rabbit
	Quadrat Frequency		
2018	3	18	1
Year	Days Use Per Acre (ha)		
2018	2.0 (5.0)	17.4 (43.0)	-

**Table 13R-12.10 - Grass Species.** Nested frequency and modified Daubenmire average cover by year.

GRASS SPECIES						
Achnatherum hymenoides (Indian ricegrass)						
Agropyron cristatum <sup>i</sup> (crested wheatgrass)						
Bromus inermis <sup>i</sup> (smooth brome)						
Elymus elymoides (squirreltail)						
Hesperostipa comata (needle and thread)						
Poa fendleriana (muttongrass)						
year	Nested Frequency					
2018	8	28	13	4	9	79
year	Average Cover (%)					
2018	0.7	0.6	0.1	0.1	0.1	3.5

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

**Table 13R-12.11 - Forb Species.** Nested frequency and modified Daubenmire average cover by year.

FORB SPECIES											
Arabis (rockcress)											
Astragalus (milkvetch)											
Astragalus convallarius (lesser rushy milkvetch)											
Cryptantha (cryptantha)											
Ipomopsis aggregata (scarlet gilia)											
Machaeranthera canescens (hoary tansyaster)											
Packera multilobata (lobeleaf groundsel)											
Penstemon (beardtongue)											
Petroradia pumila (rock goldenrod)											
Stenotus acaulis (stemless mock goldenweed)											
Townsendia incana (hoary Townsend daisy)											
year	Nested Frequency										
2018	1	8	2	1	2	1	1	4	32	5	3
year	Average Cover (%)										
2018	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.0	1.1	0.3	0.0

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

**Table 13R-12.12 - Shrub and Tree Species.** Average modified Daubenmire quadrat and line intercept cover by year.

SHRUB SPECIES						
Artemisia nova <sup>p</sup> (black sagebrush)						
Artemisia tridentata ssp. vaseyana <sup>p</sup> (mountain big sagebrush)						
Juniperus osteosperma <sup>i</sup> (Utah juniper)						
Pinus edulis <sup>i</sup> (twoneedle pinyon)						
Purshia stansburiana <sup>p</sup> (Stansbury cliffrose)						
Sclerocactus (fishhook cactus)						
year	Line Intercept Cover (%)					
2018	19.4	-	1.2	16.9	0.3	0.1
year	Quadrat Cover (%)					
2018	17.0	0.1	0.4	12.6	0.1	0.0

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

**Table 13R-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 (%)				
<b>Amelanchier utahensis<sup>p</sup> -- (Utah serviceberry)</b>									
2018	-	-	-	-	-	-	-	-	110/74
<b>Artemisia nova<sup>p</sup> -- (black sagebrush)</b>									
2018	6160	-	6	63	31	10	2	45	32/58
<b>Artemisia tridentata ssp. vaseyana<sup>p</sup> -- (mountain big sagebrush)</b>									
2018	40	-	50	0	50	50	50	100	- / -
<b>Atriplex canescens<sup>p</sup> -- (fourwing saltbush)</b>									
2018	-	-	-	-	-	-	-	-	42/37
<b>Echinocereus coccineus -- (scarlet hedgehog cactus)</b>									
2018	-	-	-	-	-	-	-	-	12/13
<b>Ephedra viridis<sup>p</sup> -- (mormon tea)</b>									
2018	40	-	0	100	0	0	0	0	55/76
<b>Gutierrezia sarothrae -- (broom snakeweed)</b>									
2018	-	-	-	-	-	-	-	-	21/25
<b>Juniperus osteosperma<sup>t</sup> -- (Utah juniper)</b>									
2018	80	40	100	0	0	0	0	0	- / -
<b>Opuntia polyacantha -- (plains pricklypear)</b>									
2018	60	20	0	100	0	0	0	0	12/24
<b>Pinus edulis<sup>t</sup> -- (twoneedle pinyon)</b>									
2018	380	40	37	63	0	0	0	5	- / -
<b>Purshia stansburiana<sup>p</sup> -- (Stansbury cliffrose)</b>									
2018	40	-	0	0	100	0	0	100	90/153
<b>Purshia tridentata<sup>p</sup> -- (antelope bitterbrush)</b>									
2018	20	-	0	100	0	0	0	100	47/91
<b>Sclerocactus -- (fishhook cactus)</b>									
2018	80	-	0	100	0	0	0	0	13/11

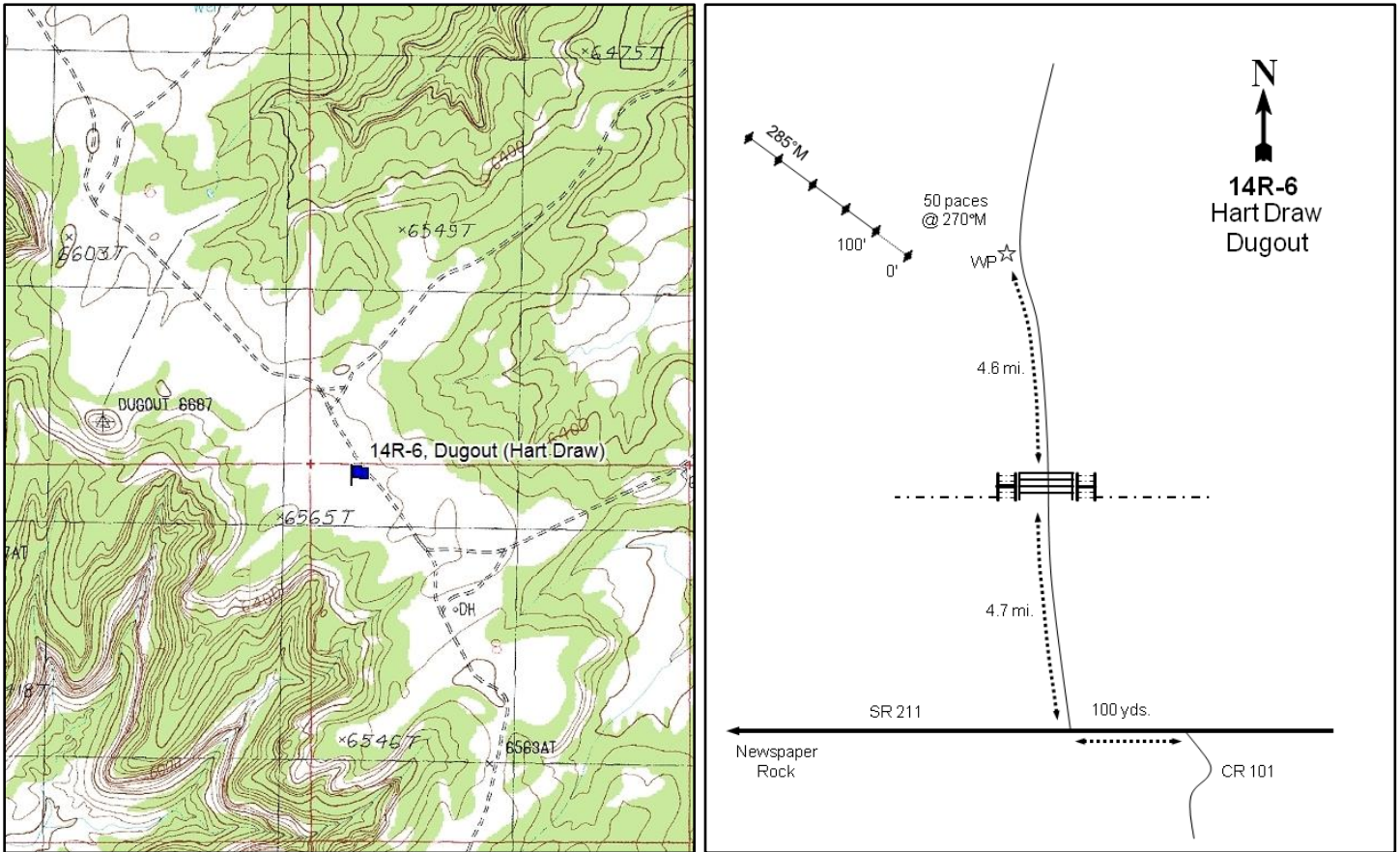
t - Tree Species; p - Preferred Browse; i - Introduced Species

**Table 13R-12.14 - Tree Characteristics.** Point-quarter tree density, size class distribution, and average diameter.

Year	Density	Size Class Distribution					Average Diameter (cm)
	Trees per Acre	Seedling (%)	1-4' (%)	4-8' (%)	8-12' (%)	>12' (%)	
<b>Juniperus osteosperma (Utah juniper)</b>							
2018	49	7	57	36	-	-	8.0
<b>Pinus edulis (twoneedle pinyon)</b>							
2018	255	5	30	65	-	-	8.1



## DUGOUT (HART DRAW) - STUDY NO. 14R-6



### Location Information

USGS 7.5 min Map Info  
GPS (0' Stake)

Harts Point South NE; Township 31S, Range 22E, Section 08  
NAD 83 UTM ZONE 12, 628236 East 4218365 North

### Transect Information

Browse Tag # (0' Stake)	28
Transect Bearing	290° magnetic
Length	500ft
Belt Placement	Line 1 (11ft), Line 2 (34ft), Line 3 (59ft), Line 4 (71ft), Line 5 (95ft)
Belt Marker Placement	No Rebar

### Directions to Site

From SR-211 about 2.4 miles east of Newspaper Rock, turn north onto a road that is about 100 yards west of a paved road (SJ County Road #101) that goes south toward Monticello Lake. Follow this road for 4.7 miles to a gate. Pass through the gate and continue for 4.6 miles to a witness post on the left (west) side of the road. The 0-foot stake is 50 paces from the witness post at 270 degrees magnetic and is marked with browse tag #28.



**Site Information**

Land Ownership	Federal
Land Administrator	BLM
Allotment	HART POINT
Elevation	6,560ft (1,999m)
Aspect	Northwest
Slope	4-6%
Sample Dates	06/17/2004, 07/14/2008, 06/25/2013, 08/21/2018

**Table 14R-06.1 Disturbance History.** Recorded history of major disturbances.

Treatment/Disturbance	Name	WRI DB#	Date	Size (acres)
Aerator - Single Drum/Seed	Hart Draw Sagebrush Restoration (year 1)	246	December 2005	628

**Table 14R-06.2 Seed Mix.** List of known seeded plant species and rates (if available).

Mix Name			Application Type	Application Date	Acres
Hart Draw			Broadcast	Dec 2005	517
Type	Species	Common Name	Cultivar/Source ID	Bulk lbs/acre	PLS
G	Achnatherum hymenoides	Indian Ricegrass	Rimrock	0.97	0.94
G	Agropyron fragile	Siberian Wheatgrass	Vavilov	1.06	1.01
G	Dactylis glomerata	Orchardgrass	Paiute	0.48	0.45
G	Hesperostipa comata	Needle and Threadgrass	Beaver UT	0.29	0.22
G	Hesperostipa comata	Needle and Threadgrass	Beaver UT	0.19	0.18
G	Pascopyrum smithii	Western Wheatgrass		0.95	0.79
G	Sporobolus cryptandrus	Sand Dropseed		0.29	0.28
F	Linum perenne	Blue Flax		0.19	0.17
F	Medicago sativa	Alfalfa	Nomad	0.48	0.45
F	Medicago sativa	Alfalfa	Spreader 4	0.48	0.45
F	Onobrychis viciifolia	Sainfoin	Eski	2.03	1.87
F	Sanguisorba minor	Small Burnet	Delar	2.03	1.89
S	Atriplex canescens	Fourwing Saltbush	San Juan UT	0.20	0.07
S	Atriplex canescens	Fourwing Saltbush	Juab/Tooele UT	0.77	0.44
S	Atriplex canescens	Fourwing Saltbush	Wayne UT	0.06	0.02
Mix Name			Application Type	Application Date	Acres
Harts Draw Browse			Broadcast	Dec 2005	517
Type	Species	Common Name	Cultivar/Source ID	Bulk lbs/acre	PLS
S	Artemisia tridentata ssp. wyomingensis	Wyoming Big Sagebrush	Sanpete UT	0.97	0.29

**Wildlife Habitat and Vegetation History****Table 14R-06.3 - Wildlife Seasonal Habitat.** UDWR wildlife habitat and seasonality.

Species	Habitat	Season
Deer	crucial	winter

**Table 14R-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	Mountain Big Sagebrush	No Encroachment
2008	Mountain Big Sagebrush	No Encroachment
2013	Mountain Big Sagebrush/Perennial Grass	Phase I
2018	Mountain Big Sagebrush/Perennial Grass	Phase I

**Site Notes**

No notes

**Soils****Table 14R-06.5 - Soil Analysis Data.** List of chemical and textural soil characteristics determined by laboratory analysis.

Texture	pH	%sand	%silt	%clay	%OM	PPM P	PPM K	ds/m	Sample Date
Sandy Loam	6.9	61.3	25.4	13.3	0.6	9.0	80.0	0.7	06/17/2004

**Site Potential**

1981 - 2010 Average Annual Precipitation	13 inches
NRCS Ecological Site	Upland Loam (Mountain Big Sagebrush)
NRCS Ecological Site #	035XY308UT
States and Transitions	No state and transition model is available for this ecological site.

Mountain big sagebrush (*Artemisia tridentata* ssp. *vaseyana*) has been the dominant shrub species on this site since study establishment in 2004; cover has decreased to nearly half that of pre-treatment levels as of 2018. Other shrub species have remained sparse (Table 14R-06.12, Table 14R-06.13). The herbaceous understory has been abundant in all sample years. Perennial grasses, primarily blue grama (*Bouteloua gracilis*) have contributed the most herbaceous cover throughout the duration of the study period and have been a co-dominant vegetation component since 2013. Forbs have generally remained rare (Table 14R-06.7, Table 14R-06.10, Table 14R-06.11). This site will likely transition to one dominated solely by perennial grasses should sagebrush cover continue to decrease in future sample years.

**Trend Summary Tables****Table 14R-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	10.6	0.3	-	9.6	0.5	-
2008	6.1	0.2	-	6.4	0.3	-
2013	6.7	0.1	-	6.8	0.5	-
2018	5.5	0.5	-	5.1	0.5	-

**Table 14R-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	45	359	123	41	0.2	25.3	0.5	0.5
2008	363	373	363	50	5.2	16.2	6.5	0.5
2013	61	388	190	40	0.2	25.0	0.8	0.2
2018	50	407	12	10	0.1	26.6	0.0	0.0

**Table 14R-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	49.2	3.3	18.6	0.0	-	36.4
2008	36.5	1.3	38.7	0.4	-	34.4
2013	43.1	1.0	27.8	-	-	36.2
2018	46.4	2.6	37.7	0.0	-	31.8

**Table 14R-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			
2004	4	29	-	11
2008	8	38	-	65
2013	1	27	1	29
2018	6	52	1	32
Year	Days Use Per Acre (ha)			
2004	25.4 (62.8)	38.2 (94.4)	-	-
2008	19.6 (48.4)	29.5 (72.8)	-	-
2013	5.8 (14.3)	58.3 (144.0)	-	-
2018	17.4 (43.0)	48.9 (120.8)	-	-

**Table 14R-06.10 - Grass Species.** Nested frequency and modified Daubenmire average cover by year.

GRASS SPECIES								
Achnatherum hymenoides (Indian ricegrass)								
Agropyron fragile <sup>i</sup> (Siberian wheatgrass)								
Bouteloua gracilis (blue grama)								
Bromus tectorum <sup>ai</sup> (cheatgrass)								
Elymus elymoides (squirreltail)								
Hesperostipa comata (needle and thread)								
Sporobolus cryptandrus (sand dropseed)								
Vulpia octoflora <sup>a</sup> (sixweeks fescue)								
year	Nested Frequency							
2004	7	-	329	40	11	52	-	7
2008	7	13	323	268	27	75	-	315
2013	20	-	361	47	6	49	3	21
2018	6	-	388	7	31	27	-	43
year	Average Cover (%)							
2004	0.1	-	23.7	0.1	0.3	1.2	-	0.0
2008	0.1	0.1	14.8	2.6	0.6	0.7	-	2.6
2013	0.1	-	24.3	0.2	0.0	0.6	0.0	0.1
2018	0.1	-	25.8	0.0	0.3	0.4	-	0.1

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

**Table 14R-06.11 - Forb Species.** Nested frequency and modified Daubenmire average cover by year.

FORB SPECIES																	
Calochortus nuttallii (sego lily)																	
Chenopodium <sup>a</sup> (goosefoot)																	
Cryptantha <sup>a</sup> (annual cryptantha)																	
Delphinium nuttallianum (twolobe larkspur)																	
Descurainia pinnata <sup>a</sup> (western tansymustard)																	
Erodium cicutarium <sup>ai</sup> (redstem stork's bill)																	
Gilia inconspicua <sup>a</sup> (shy gilia)																	
Lappula occidentalis <sup>ai</sup> (flatspine stickseed)																	
Linum perenne <sup>i</sup> (blue flax)																	
Machaeranthera canescens (hoary tansyaster)																	
Mentzelia albicaulis <sup>a</sup> (whitestem blazingstar)																	
Oenothera (evening primrose)																	
Packera multilobata (lobeleaf groundsel)																	
Phacelia <sup>a</sup> (phacelia)																	
Phlox longifolia (longleaf phlox)																	
Plantago patagonica <sup>a</sup> (woolly plantain)																	
Sphaeralcea coccinea (scarlet globemallow)																	
year	Nested Frequency																
2004	2	1	-	6	-	1	75	1	-	-	-	-	3	-	-	66	30
2008	-	-	-	1	7	33	40	22	0	3	-	11	3	14	-	359	34
2013	-	-	-	-	5	7	3	15	-	-	-	-	6	-	3	183	31
2018	6	1	1	-	-	-	-	-	-	-	3	-	-	-	3	7	3
year	Average Cover (%)																
2004	0.0	0.0	-	0.0	-	0.0	0.3	0.0	-	-	-	-	0.1	-	-	0.2	0.3
2008	-	-	-	0.0	0.0	0.8	0.1	0.1	0.0	0.0	-	0.0	0.0	0.1	-	5.5	0.5
2013	-	-	-	-	0.0	0.0	0.0	0.0	-	-	-	-	0.0	-	0.0	0.7	0.1
2018	0.0	0.0	0.0	-	-	-	-	-	-	-	0.0	-	-	-	0.0	0.0	0.0

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

**Table 14R-06.12 - Shrub and Tree Species.** Average modified Daubenmire quadrat and line intercept cover by year.

SHRUB SPECIES	Artemisia tridentata ssp. vaseyana <sup>p</sup> (mountain big sagebrush)	Atriplex canescens <sup>p</sup> (fourwing saltbush)	Gutierrezia sarothrae (broom snakeweed)	Krascheninnikovia lanata <sup>p</sup> (winterfat)	Opuntia (pricklypear)
year	Line Intercept Cover (%)				
2004	9.1	-	0.2	0.5	0.3
2008	5.9	-	0.2	0.5	0.1
2013	6.3	-	0.2	0.5	0.3
2018	4.6	-	0.1	0.5	0.4
year	Quadrat Cover (%)				
2004	10.4	0.1	0.2	0.0	0.1
2008	6.1	-	0.0	0.1	0.1
2013	6.7	-	0.0	0.0	0.0
2018	5.5	-	0.1	0.0	0.5

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

**Table 14R-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 (%)				
<b>Artemisia tridentata ssp. vaseyana<sup>p</sup> -- (mountain big sagebrush)</b>									
2004	2360	40	0	6	94	38	6	55	50/81
2008	1720	-	1	16	83	58	19	56	41/63
2013	1840	-	1	40	59	58	22	69	43/75
2018	1540	-	0	48	52	66	25	36	45/85
<b>Chrysothamnus viscidiflorus -- (yellow rabbitbrush)</b>									
2004	-	-	-	-	-	-	-	-	-/-
2008	20	-	0	0	100	0	0	0	-/-
2013	-	-	-	-	-	-	-	-	-/-
2018	20	-	0	0	100	0	100	100	-/-
<b>Ericameria nauseosa -- (rubber rabbitbrush)</b>									
2004	-	-	-	-	-	-	-	-	-/-
2008	-	-	-	-	-	-	-	-	-/-
2013	20	-	0	100	0	0	0	0	50/54
2018	-	-	-	-	-	-	-	-	-/-
<b>Gutierrezia sarothrae -- (broom snakeweed)</b>									
2004	220	-	0	91	9	9	0	9	27/30
2008	520	40	46	54	0	0	0	0	21/21
2013	260	140	31	69	0	0	0	0	12/25
2018	500	-	0	80	20	0	0	20	13/17
<b>Krascheninnikovia lanata<sup>p</sup> -- (winterfat)</b>									
2004	320	-	0	100	0	31	63	19	14/26
2008	400	-	0	60	40	0	85	20	28/27
2013	400	20	10	90	0	25	65	10	18/27
2018	400	-	5	65	30	45	50	15	15/31

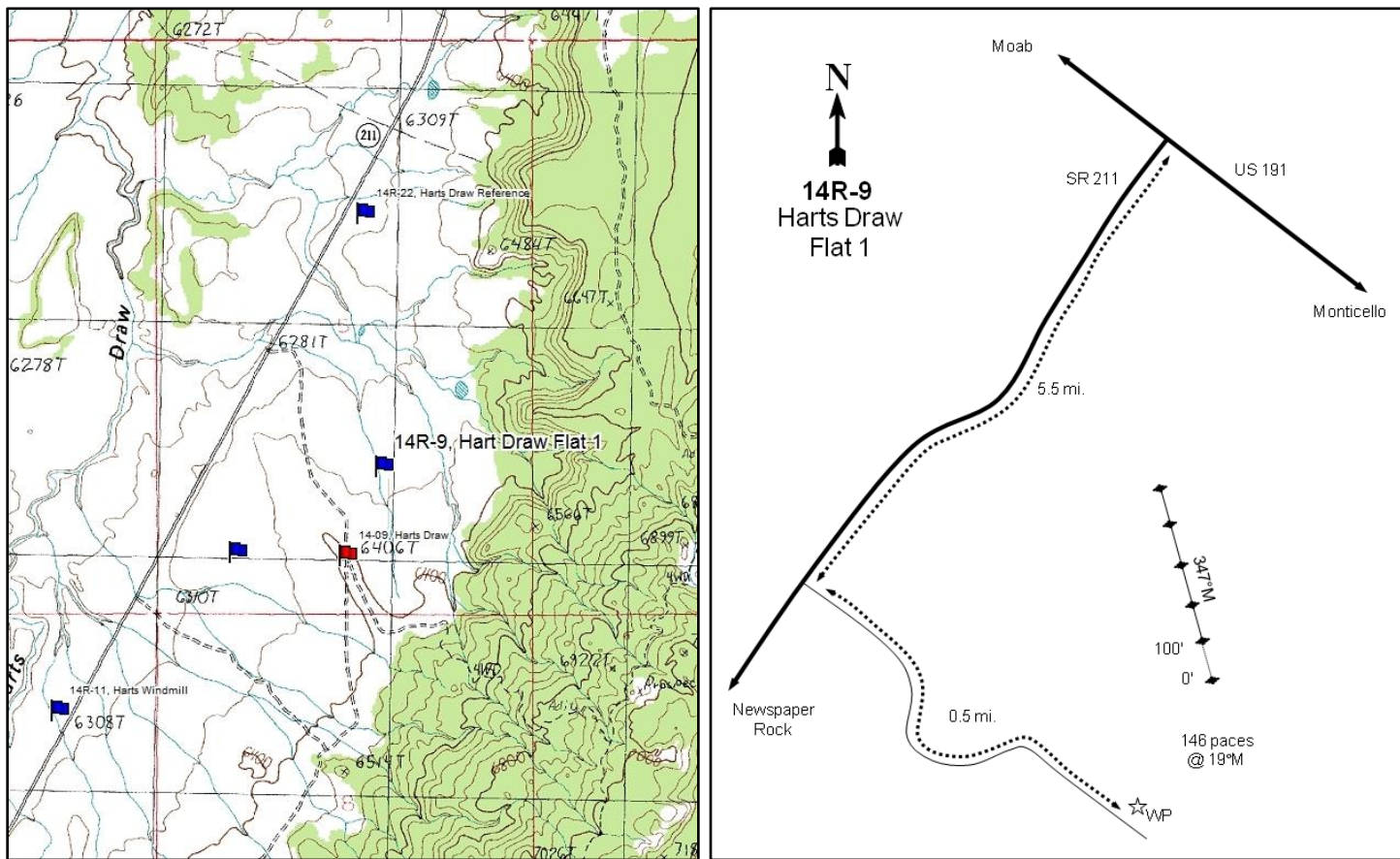
Year	Density		Age Class Distribution			Utilization		Poor Vigor (%)	Average Height Crown (cm)
	Plants Per Acre		Excluding Seedlings			Moderate (%)	Heavy (%)		
	Excluding Seedlings	Seedling	Young (%)	Mature (%)	Decadent (%)				
<b>Opuntia -- (pricklypear)</b>									
2004	120	-	0	67	33	0	0	0	11/38
2008	180	-	0	44	56	0	0	22	10/29
2013	200	-	30	60	10	0	0	30	10/28
2018	240	-	0	100	0	0	0	8	8/39
<b>Pediocactus simpsonii -- (mountain ball cactus)</b>									
2004	20	-	0	100	0	0	0	0	- / -
2008	-	-	-	-	-	-	-	-	3/6

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

**Table 14R-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' (%)	
<b>Juniperus osteosperma (Utah juniper)</b>							
2018	26	-	100	-	-	-	3.3
<b>Pinus edulis (twoneedle pinyon)</b>							
2018	3	-	100	-	-	-	3.0

## HART DRAW FLAT 1 - STUDY NO. 14R-9



### Location Information

USGS 7.5 min Map Info  
GPS (0' Stake)

Photograph Gap SE; Township 32S, Range 23E, Section 05  
NAD 83 UTM ZONE 12, 638863 East 4209556 North

### Transect Information

Browse Tag # (0' Stake)	65
Transect Bearing	347° 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-191 and SR-211 north of Monticello, drive 5.5 miles on SR-211 to a dirt road on the left (south) side of the road. Turn onto this road and drive 0.5 miles to the witness post on the left (east) side of the road. From the witness post, walk 146 paces at 19 degrees magnetic to the 0-foot stake which is marked with browse tag #65.

**Site Information**

Land Ownership	Federal
Land Administrator	BLM
Allotment	HART DRAW
Elevation	6,350ft (1,935m)
Aspect	North
Slope	1-3%
Sample Dates	06/29/2005, 07/15/2008, 06/25/2013, 08/22/2018

**Table 14R-09.1 Disturbance History.** Recorded history of major disturbances.

Treatment/Disturbance	Name	WRI DB#	Date	Size (acres)
Seeding - Rangeland Drill	Hart Draw Phase 1 Cont.	1231	September-October 2008	263
Seeding - Aerial	Hart Draw Phase 1 Cont.	1231	October 2008	263
Aerator - Single Drum/Seed	Hart Draw Sagebrush Restoration (year 1)	246	December 2005	628

**Table 14R-09.2 Seed Mix.** List of known seeded plant species and rates (if available).

Mix Name			Application Type	Application Date	Acres
Hart Draw			Broadcast	Dec 2005	517
Type	Species	Common Name	Cultivar/Source ID	Bulk lbs/acre	PLS
G	<i>Achnatherum hymenoides</i>	Indian Ricegrass	Rimrock	0.97	0.94
G	<i>Agropyron fragile</i>	Siberian Wheatgrass	Vavilov	1.06	1.01
G	<i>Dactylis glomerata</i>	Orchardgrass	Paiute	0.48	0.45
G	<i>Hesperostipa comata</i>	Needle and Threadgrass	Beaver UT	0.29	0.22
G	<i>Hesperostipa comata</i>	Needle and Threadgrass	Beaver UT	0.19	0.18
G	<i>Pascopyrum smithii</i>	Western Wheatgrass		0.95	0.79
G	<i>Sporobolus cryptandrus</i>	Sand Dropseed		0.29	0.28
F	<i>Linum perenne</i>	Blue Flax		0.19	0.17
F	<i>Medicago sativa</i>	Alfalfa	Nomad	0.48	0.45
F	<i>Medicago sativa</i>	Alfalfa	Spreador 4	0.48	0.45
F	<i>Onobrychis viciifolia</i>	Sainfoin	Eski	2.03	1.87
F	<i>Sanguisorba minor</i>	Small Burnet	Delar	2.03	1.89
S	<i>Atriplex canescens</i>	Fourwing Saltbush	San Juan UT	0.20	0.07
S	<i>Atriplex canescens</i>	Fourwing Saltbush	Juab/Tooele UT	0.77	0.44
S	<i>Atriplex canescens</i>	Fourwing Saltbush	Wayne UT	0.06	0.02
Mix Name			Application Type	Application Date	Acres
Harts Draw Browse			Broadcast	Dec 2005	517
Type	Species	Common Name	Cultivar/Source ID	Bulk lbs/acre	PLS
S	<i>Artemisia tridentata</i> ssp. <i>wyomingensis</i>	Wyoming Big Sagebrush	Sanpete UT	0.97	0.29
Mix Name			Application Type	Application Date	Acres
Harts Draw			Drill	Sep 2008	100
Type	Species	Common Name	Cultivar/Source ID	Bulk lbs/acre	PLS
G	<i>Achnatherum hymenoides</i>	Indian Ricegrass	Rimrock	1.00	0.92
G	<i>Agropyron cristatum</i>	Crested Wheatgrass	Hycrest	1.50	1.37
G	<i>Agropyron cristatum</i>	Crested Wheatgrass	Nordan	1.50	1.39
G	<i>Pascopyrum smithii</i>	Western Wheatgrass	Arriba	2.00	1.87
G	<i>Pleuraphis jamesii</i>	Galleta	Viva	0.25	0.20
G	<i>Psathyrostachys juncea</i>	Russian Wildrye	Bozoisky	1.50	1.28
G	<i>Sporobolus cryptandrus</i>	Sand Dropseed		0.25	0.21
G	<i>Thinopyrum intermedium</i>	Pubescent Wheatgrass	Luna	1.00	0.88
F	<i>Medicago sativa</i>	Alfalfa	Ladak	1.00	0.95
F	<i>Medicago sativa</i>	Alfalfa	Ranger	0.50	0.46
F	<i>Melilotus officinalis</i>	Yellow Sweetclover		0.50	0.45
F	<i>Sanguisorba minor</i>	Small Burnet	Delar	1.00	0.92
Mix Name			Application Type	Application Date	Acres
Harts Draw - Fluffy Box			Drill	Sep 2008	100
Type	Species	Common Name	Cultivar/Source ID	Bulk lbs/acre	PLS
S	<i>Artemisia tridentata</i> ssp. <i>wyomingensis</i>	Wyoming Big Sagebrush	Garfield UT	0.75	0.20
S	<i>Bassia prostrata</i>	Forage Kochia	Immigrant	0.75	0.52



Mix Name			Application Type	Application Date	Acres
Harts Draw Aerial Sagebrush			Aerial	Oct 2008	300
Type	Species	Common Name	Cultivar/Source ID	Bulk lbs/acre	PLS
		Rice Hulls		0.67	0.00
S	<i>Artemisia tridentata</i> ssp. <i>wyomingensis</i>	Wyoming Big Sagebrush	Garfield UT	0.70	0.18

#### Wildlife Habitat and Vegetation History

**Table 14R-09.3 - Wildlife Seasonal Habitat.** UDWR wildlife habitat and seasonality.

Species	Habitat	Season
Deer	crucial	winter

**Table 14R-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-Perennial Grass/Black Greasewood	No Encroachment
2008	Annual-Perennial Grass/Black Greasewood	No Encroachment
2013	Perennial Grass/Black Greasewood	No Encroachment
2018	Perennial Grass/Black Greasewood	No Encroachment

#### Site Notes

No Notes

#### Soils

**Table 14R-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 Clay Loam	7.7	50.7	23.5	25.8	0.7	3.4	131.2	0.5	06/28/2005

#### Site Potential

1981 - 2010 Average Annual Precipitation                      14 inches  
 NRCS Ecological Site    Upland Loam (Mountain Big Sagebrush)  
 NRCS Ecological Site #    R035XY308UT  
 States and Transitions    No state and transition model is available for this ecological site.

Since study establishment in 2005, black greasewood (*Sarcobatus vermiculatus*) has been the most abundant shrub species and a co-dominant vegetation component of the site; other browse species have remained rare (Table 14R-09.12, Table 14R-09.13). Perennial grasses, particularly James' galleta (*Pleuraphis jamesii*), have contributed a majority of the herbaceous cover in most sample years and have remained a co-dominant cover type since study establishment. The introduced annual grass species cheatgrass (*Bromus tectorum*) was also co-dominant in 2005 and 2008, but has since decreased in cover. Forbs have remained rare in most sample years (Table 14R-09.7, Table 14R-09.10, Table 14R-09.11).

**Trend Summary Tables****Table 14R-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	1.1	4.7	-	1.1	4.8	-
2008	0.7	2.1	-	0.5	2.6	-
2013	0.7	3.2	-	0.8	4.8	-
2018	0.8	2.0	-	1.2	2.5	-

**Table 14R-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	356	290	338	13	10.2	9.0	7.9	0.1
2008	394	291	101	6	6.2	11.8	0.4	0.0
2013	7	307	17	3	0.0	17.1	0.1	0.0
2018	9	321	29	4	0.0	15.1	0.2	0.0

**Table 14R-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	50.7	0.1	34.5	0.3	0.0	27.8
2008	46.3	0.2	38.7	1.1	0.1	22.8
2013	64.1	0.4	16.8	0.1	0.2	21.8
2018	68.8	0.1	31.2	0.7	0.2	18.4

**Table 14R-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	Horse	Rabbit
	Quadrat Frequency				
2005	12	16	-	-	33
2008	13	8	-	-	82
2013	4	6	1	-	30
2018	8	4	-	-	72
Days Use Per Acre (ha)					
2005	18.1 (44.8)	4.0 (9.9)	-	4.0 (10.0)	-
2008	39.9 (98.6)	0.7 (1.7)	0.7 (1.7)	-	-
2013	16.7 (41.2)	7.4 (18.2)	-	-	-
2018	19.6 (48.4)	4.0 (9.9)	-	-	-

**Table 14R-09.10 - Grass Species.** Nested frequency and modified Daubenmire average cover by year.

GRASS SPECIES										
Achnatherum hymenoides (Indian ricegrass)										
Bouteloua gracilis (blue grama)										
Bromus tectorum <sup>ai</sup> (cheatgrass)										
Elymus elymoides (squirreltail)										
Hordeum murinum ssp. glaucum <sup>ai</sup> (smooth barley)										
Pascopyrum smithii (western wheatgrass)										
Pleuraphis jamesii (James' galleta)										
Poa pratensis <sup>i</sup> (Kentucky bluegrass)										
Sporobolus cryptandrus (sand dropseed)										
Vulpia octoflora <sup>a</sup> (sixweeks fescue)										
year	Nested Frequency									
2005	-	-	355	10	25	60	238	5	6	20
2008	-	-	393	3	11	38	260	1	24	18
2013	6	12	7	-	-	22	283	-	12	-
2018	-	6	9	13	-	5	301	-	8	-
year	Average Cover (%)									
2005	-	-	9.7	0.0	0.4	0.8	8.0	0.1	0.1	0.1
2008	-	-	6.0	0.0	0.2	0.6	10.6	0.0	0.5	0.0
2013	0.0	0.3	0.0	-	-	0.2	16.2	-	0.4	-
2018	-	0.0	0.0	0.1	-	0.1	14.9	-	0.0	-

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

**Table 14R-09.11 - Forb Species.** Nested frequency and modified Daubenmire average cover by year.

FORB SPECIES											
Calochortus nuttallii (sego lily)											
Ceratocephala testiculata <sup>ai</sup> (curvseed butterwort)											
Chamaesyce (sandmat)											
Descurainia pinnata <sup>a</sup> (western tansymustard)											
Eriogonum cernuum <sup>a</sup> (nodding buckwheat)											
Erodium cicutarium <sup>ai</sup> (redstem stork's bill)											
Gilia inconspicua <sup>a</sup> (shy gilia)											
Lappula occidentalis <sup>ai</sup> (flatspine stickseed)											
Portulaca oleracea <sup>ai</sup> (little hogweed)											
Salsola tragus <sup>ai</sup> (prickly Russian thistle)											
Sphaeralcea coccinea (scarlet globemallow)											
year	Nested Frequency										
2005	9	326	-	53	1	51	0	78	-	-	4
2008	1	79	1	-	-	9	3	15	-	-	4
2013	2	-	-	-	-	-	2	-	-	15	1
2018	-	4	4	-	-	-	-	-	25	1	-
year	Average Cover (%)										
2005	0.0	5.7	-	0.5	0.0	1.1	0.0	0.6	-	-	0.0
2008	0.0	0.3	0.0	-	-	0.1	0.0	0.0	-	-	0.0
2013	0.0	-	-	-	-	-	0.0	-	-	0.1	0.0
2018	-	0.0	0.0	-	-	-	-	-	0.2	0.0	-

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

**Table 14R-09.12 - Shrub and Tree Species.** Average modified Daubenmire quadrat and line intercept cover by year.

SHRUB SPECIES	Artemisia tridentata ssp. vaseyana <sup>p</sup> (mountain big sagebrush)	Atriplex confertifolia <sup>p</sup> (shadscale saltbush)	Sarcobatus vermiculatus (greasewood)
year	Line Intercept Cover (%)		
2005	1.1	-	4.8
2008	0.4	0.1	2.6
2013	0.8	-	4.8
2018	1.2	-	2.5
year	Quadrat Cover (%)		
2005	1.1	-	4.7
2008	0.5	0.2	2.1
2013	0.7	-	3.2
2018	0.8	-	2.0

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

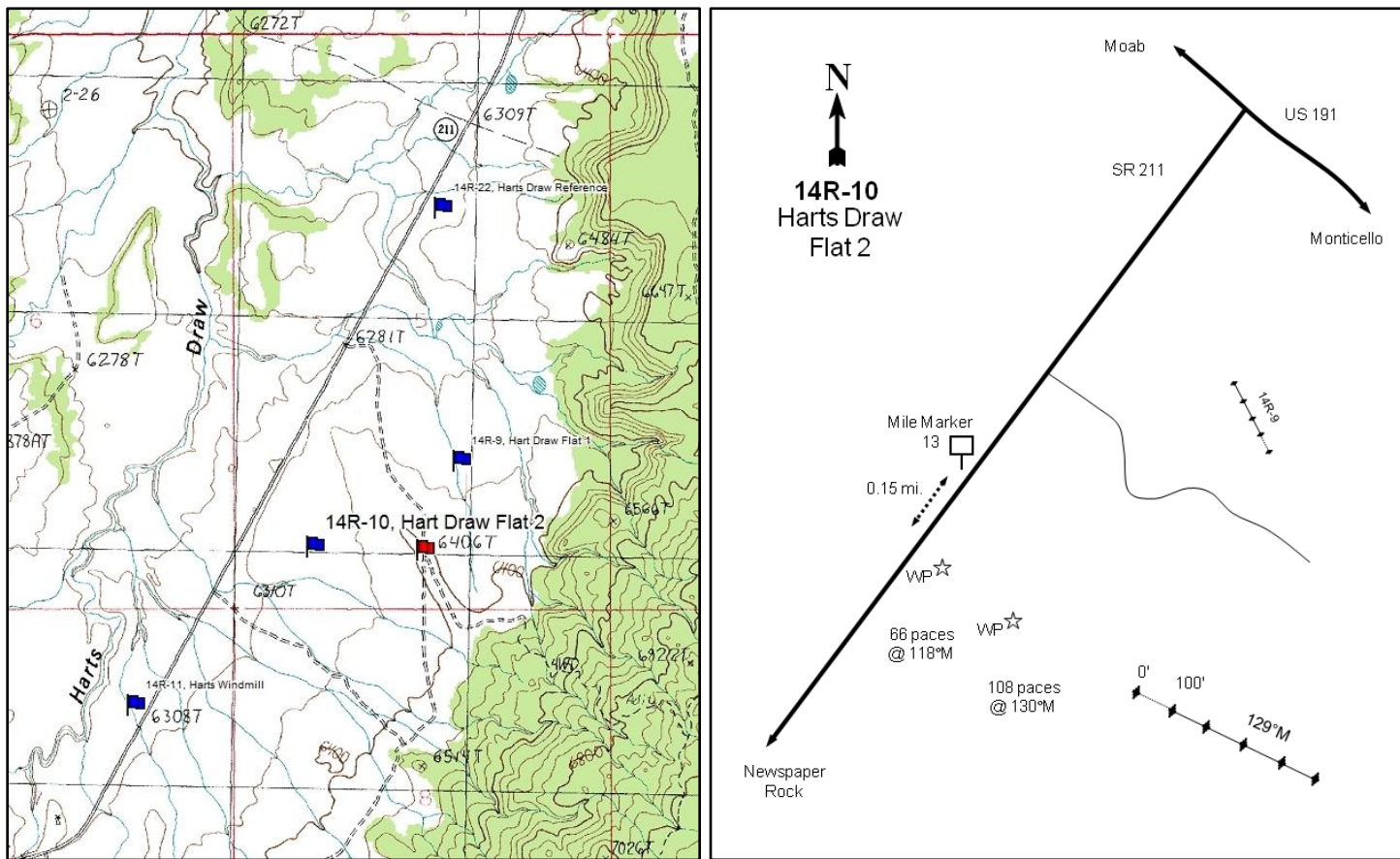
**Table 14R-09.13 - Shrub/Tree Characteristics.** Population characteristics of shrub/tree species populations including density reproduction (seedlings), age distribution, utilization, vigor and average size (height/crown) of plants.

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 (%)				
<b>Artemisia tridentata ssp. vaseyana<sup>p</sup> -- (mountain big sagebrush)</b>									
2005	220	-	0	27	73	18	64	82	65/81
2008	100	-	0	40	60	0	0	60	61/68
2013	80	-	0	75	25	50	0	50	60/84
2018	120	-	0	67	33	0	0	33	54/89
<b>Atriplex confertifolia<sup>p</sup> -- (shadscale saltbush)</b>									
2005	-	-	-	-	-	-	-	-	15/27
2008	240	200	50	50	0	0	0	0	12/17
2013	-	-	-	-	-	-	-	-	-/-
2018	-	-	-	-	-	-	-	-	-/-
<b>Escobaria vivipara var. arizonica -- (Arizona spinystar)</b>									
2005	20	-	0	100	0	0	0	0	12/10
2008	-	-	-	-	-	-	-	-	-/-
2013	-	-	-	-	-	-	-	-	-/-
2018	-	-	-	-	-	-	-	-	2/4
<b>Gutierrezia sarothrae -- (broom snakeweed)</b>									
2005	-	-	-	-	-	-	-	-	18/24
2008	20	-	0	100	0	0	0	0	17/21
2013	-	-	-	-	-	-	-	-	-/-
2018	-	-	-	-	-	-	-	-	-/-
<b>Opuntia -- (pricklypear)</b>									
2005	20	-	0	100	0	0	0	0	13/22
2008	60	20	0	100	0	0	0	0	10/24
2013	80	-	0	50	50	0	0	25	15/32
2018	40	-	0	0	100	0	0	100	-/-

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 (%)				
Sarcobatus vermiculatus -- (greasewood)									
2005	1360	60	25	53	22	44	28	6	53/73
2008	1360	60	18	74	9	0	0	15	47/61
2013	1300	-	11	85	5	14	2	23	51/68
2018	1080	-	6	33	61	6	0	44	44/57

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

## HART DRAW FLAT 2 - STUDY NO. 14R-10



### Location Information

USGS 7.5 min Map Info  
GPS (0' Stake)

Photograph Gap SE; Township 32S, Range 23E, Section 05  
NAD 83 UTM ZONE 12, 638248 East 4209181 North

### Transect Information

Browse Tag # (0' Stake)	66
Transect Bearing	129° magnetic
Length	500ft
Belt Placement	Line 1 (11ft), Line 2 (34ft), Line 3 (59ft), Line 4 (71ft), Line 5 (95ft)
Belt Marker Placement	No Rebar

### Directions to Site

From the junction of US-191 and SR-211 north of Monticello, drive past study site 14R-9 to mile marker 13. Continue for 0.15 miles to the witness post on the left (southeast) side of the road (about 20 feet from the road). From the witness post, walk 66 paces at 118 degrees magnetic to a second witness post. From the second witness post, walk 108 paces at 130 degrees magnetic to the 0-foot stake which is marked with browse tag #66.

**Site Information**

Land Ownership	Federal
Land Administrator	BLM
Allotment	HART DRAW
Elevation	6,350ft (1,935m)
Aspect	South-Southwest
Slope	1-3%
Sample Dates	06/30/2005, 07/16/2008, 06/25/2013, 08/22/2018

**Table 14R-10.1 Disturbance History.** Recorded history of major disturbances.

Treatment/Disturbance	Name	WRI DB#	Date	Size (acres)
Seeding - Aerial	Hart Draw Phase 1 Cont.	1231	October 2008	263
Aerator - Single Drum/Seed	Hart Draw Sagebrush Restoration (year 1)	246	December 2005	628

**Table 14R-10.2 Seed Mix.** List of known seeded plant species and rates (if available).

Mix Name			Application Type	Application Date	Acres
Hart Draw			Broadcast	Dec 2005	517
Type	Species	Common Name	Cultivar/Source ID	Bulk lbs/acre	PLS
G	Achnatherum hymenoides	Indian Ricegrass	Rimrock	0.97	0.94
G	Agropyron fragile	Siberian Wheatgrass	Vavilov	1.06	1.01
G	Dactylis glomerata	Orchardgrass	Paiute	0.48	0.45
G	Hesperostipa comata	Needle and Threadgrass	Beaver UT	0.29	0.22
G	Hesperostipa comata	Needle and Threadgrass	Beaver UT	0.19	0.18
G	Pascopyrum smithii	Western Wheatgrass		0.95	0.79
G	Sporobolus cryptandrus	Sand Dropseed		0.29	0.28
F	Linum perenne	Blue Flax		0.19	0.17
F	Medicago sativa	Alfalfa	Nomad	0.48	0.45
F	Medicago sativa	Alfalfa	Spreador 4	0.48	0.45
F	Onobrychis viciifolia	Sainfoin	Eski	2.03	1.87
F	Sanguisorba minor	Small Burnet	Delar	2.03	1.89
S	Atriplex canescens	Fourwing Saltbush	San Juan UT	0.20	0.07
S	Atriplex canescens	Fourwing Saltbush	Juab/Tooele UT	0.77	0.44
S	Atriplex canescens	Fourwing Saltbush	Wayne UT	0.06	0.02
Mix Name			Application Type	Application Date	Acres
Harts Draw Browse			Broadcast	Dec 2005	517
Type	Species	Common Name	Cultivar/Source ID	Bulk lbs/acre	PLS
S	Artemisia tridentata ssp. wyomingensis	Wyoming Big Sagebrush	Sanpete UT	0.97	0.29
Mix Name			Application Type	Application Date	Acres
Harts Draw Aerial Sagebrush			Aerial	Oct 2008	300
Type	Species	Common Name	Cultivar/Source ID	Bulk lbs/acre	PLS
		Rice Hulls		0.67	0.00
S	Artemisia tridentata ssp. wyomingensis	Wyoming Big Sagebrush	Garfield UT	0.70	0.18

**Wildlife Habitat and Vegetation History****Table 14R-10.3 - Wildlife Seasonal Habitat.** UDWR wildlife habitat and seasonality.

Species	Habitat	Season
Deer	crucial	winter

**Table 14R-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	Annual Weed/Perennial Grass	No Encroachment
2008	Annual Weed	No Encroachment
2013	Annual Weed	No Encroachment
2018	Perennial Grass/Annual Weed	No Encroachment

**Site Notes**

No Notes

**Soils****Table 14R-10.5 - Soil Analysis Data.** List of chemical and textural soil characteristics determined by laboratory analysis.



Texture	pH	% sand	% silt	% clay	% OM	PPM P	PPM K	ds/m	Sample Date
Clay Loam	7.7	28.4	36.8	34.8	1.0	5.5	364.8	0.5	06/30/2005

### Site Potential

1981 - 2010 Average Annual Precipitation	14 inches
NRCS Ecological Site	Upland Loam (Mountain Big Sagebrush)
NRCS Ecological Site #	R035XY308UT
States and Transitions	No state and transition model is available for this ecological site.

Weedy annual forbs have been a dominant vegetation component on this site since study establishment in 2005, with prickly Russian thistle (*Salsola iberica*) as the most abundant species. The annual grass species cheatgrass (*Bromus tectorum*) was a co-dominant vegetation in 2005 and 2008, but contributed very little cover in 2013 and 2018. Perennial grass cover has remained low, but blue grama (*Bouteloua gracilis*) was co-dominant in 2018 (Table 14R-10.7, Table 14R-10.10, Table 14R-10.11). Browse cover has been limited throughout the duration of the study, with all of the cover contributed by mountain big sagebrush (*Artemisia tridentata* ssp. *vaseyana*) (Table 14R-10.12). Vegetation cover has exhibited a significant decrease overall, and bare ground has been the dominant ground cover type since 2008 (Table 14R-10.8).

### Trend Summary Tables

**Table 14R-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	2.9	-	-	1.4	-	-
2008	0.2	-	-	0.5	-	-
2013	0.2	-	-	0.4	-	-
2018	0.5	-	-	0.5	-	-

**Table 14R-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	279	185	360	25	11.5	8.0	17.1	1.3
2008	383	191	330	25	11.5	5.1	11.7	0.6
2013	13	19	292	-	0.0	0.5	1.4	-
2018	20	52	73	21	0.0	1.9	1.1	0.3

**Table 14R-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	38.6	0.0	33.0	0.1	0.4	36.2
2008	36.8	0.0	39.4	0.1	0.0	32.7
2013	73.0	-	24.7	0.0	-	2.0
2018	80.2	-	27.6	0.1	-	4.0

**Table 14R-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			
2005	12	10	-	52
2008	31	19	1	91
2013	11	23	-	58
2018	8	25	4	71
Year	Days Use Per Acre (ha)			
2005	40.6 (100.4)	5.3 (13.2)	-	-
2008	63.2 (156.0)	10.7 (26.5)	1.3 (3.3)	-
2013	18.9 (46.6)	10.0 (24.8)	-	-
2018	8.0 (19.7)	1.3 (3.3)	-	-

**Table 14R-10.10 - Grass Species.** Nested frequency and modified Daubenmire average cover by year.

GRASS SPECIES										
Achnatherum hymenoides (Indian ricegrass)										
Agropyron cristatum <sup>i</sup> (crested wheatgrass)										
Bouteloua gracilis (blue grama)										
Bromus tectorum <sup>ai</sup> (cheatgrass)										
Elymus elymoides (squirreltail)										
Erenopyrum trifiticeum <sup>ai</sup> (annual wheatgrass)										
Pascopyrum smithii (western wheatgrass)										
Pleuraphis jamesii (James' galleta)										
Sporobolus cryptandrus (sand dropseed)										
Vulpia octoflora <sup>a</sup> (sixweeks fescue)										
year	Nested Frequency									
2005	16	155	-	279	26	-	-	7	5	2
2008	-	164	-	383	3	3	1	19	16	-
2013	-	19	-	13	-	-	-	-	-	-
2018	-	27	23	20	4	-	-	-	-	-
year	Average Cover (%)									
2005	0.2	6.6	-	11.5	0.9	-	-	0.2	0.1	0.0
2008	-	4.2	-	11.5	0.0	0.0	0.0	0.3	0.6	-
2013	-	0.5	-	0.0	-	-	-	-	-	-
2018	-	0.7	1.2	0.0	0.1	-	-	-	-	-

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

**Table 14R-10.11 - Forb Species.** Nested frequency and modified Daubenmire average cover by year.

FORB SPECIES												
Ceratocephala testiculata <sup>ai</sup> (curveseed butterwort)												
Chamaesyce (sandmat)												
Chenopodium album <sup>a</sup> (lambsquarters)												
Chenopodium fremontii <sup>a</sup> (Fremont's goosefoot)												
Descurainia pinnata <sup>a</sup> (western tansymustard)												
Helianthus (sunflower)												
Lappula occidentalis <sup>ai</sup> (flatspine stickseed)												
Portulaca oleracea <sup>ai</sup> (litttle hogweed)												
Salsola tragus <sup>ai</sup> (prickly Russian thistle)												
Sisymbrium altissimum <sup>ai</sup> (tall tumblemustard)												
Sphaeralcea coccinea (scarlet globemallow)												
Sphaeralcea grossularifolia (gooseberryleaf globemallow)												
year	Nested Frequency											
2005	33	-	8	38	39	-	46	-	352	2	25	-
2008	10	1	-	15	-	-	29	-	323	3	21	3
2013	3	-	-	-	-	-	11	-	286	1	-	-
2018	-	3	-	-	-	18	-	16	60	-	-	-
year	Average Cover (%)											
2005	0.1	-	0.0	0.2	1.0	-	1.0	-	14.5	0.2	1.3	-
2008	0.0	0.0	-	0.0	-	-	0.2	-	11.4	0.0	0.5	0.0
2013	0.0	-	-	-	-	-	0.0	-	1.4	0.0	-	-
2018	-	0.0	-	-	-	0.3	-	0.3	0.8	-	-	-

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

**Table 14R-10.12 - Shrub and Tree Species.** Average modified Daubenmire quadrat and line intercept cover by year.

SHRUB SPECIES	Artemisia tridentata ssp. vaseyana <sup>p</sup> (mountain big sagebrush)		
		year	Line Intercept Cover (%)
		2005	1.4
		2008	0.5
		2013	0.4
		2018	0.5
		year	Quadrat Cover (%)
		2005	2.9
		2008	0.2
		2013	0.2
2018	0.5		

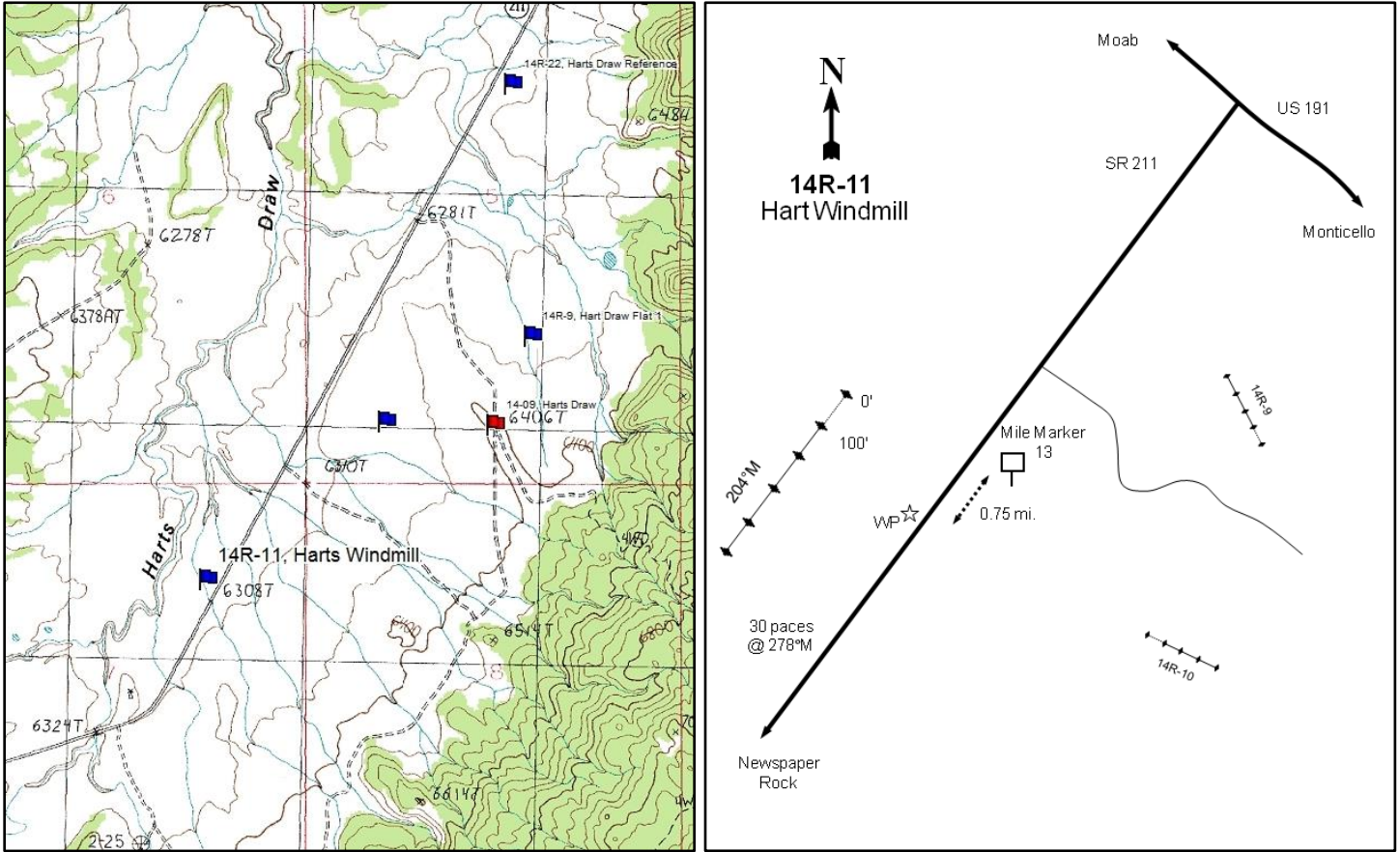
t - Tree Species; p - Preferred Browse; i - Introduced Species

**Table 14R-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 <sup>p</sup> -- (mountain big sagebrush)									
2005	600	-	7	20	73	30	23	60	65/69
2008	140	-	0	43	57	29	43	43	56/70
2013	180	-	0	22	78	44	11	89	50/58
2018	200	-	0	80	20	10	10	0	49/69
Gutierrezia sarothrae -- (broom snakeweed)									
2005	20	-	0	100	0	0	0	0	13/23
2008	20	-	0	100	0	0	0	0	15/14
2013	-	-	-	-	-	-	-	-	-/-
2018	-	-	-	-	-	-	-	-	-/-
Krascheninnikovia lanata <sup>p</sup> -- (winterfat)									
2005	-	-	-	-	-	-	-	-	51/27

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

## HARTS WINDMILL - STUDY NO. 14R-11



### Location Information

USGS 7.5 min Map Info  
GPS (0' Stake)

Photograph Gap SE; Township 32S, Range 23E, Section 07  
NAD 83 UTM ZONE 12, 637497 East 4208499 North

### Transect Information

Browse Tag # (0' Stake)	67
Transect Bearing	208° 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-191 and SR-211 north of Monticello, drive past study site 14R-9 to mile marker 13. Continue for 0.75 miles to the witness post on the right (northwest) side of the road (about 20 feet from the road). From the witness post, walk 30 paces at 278 degrees magnetic to the 0-foot stake which is marked with browse tag #67.

**Site Information**

Land Ownership	Federal
Land Administrator	BLM
Allotment	HART DRAW
Elevation	6,300ft (1,920m)
Aspect	West-Northwest
Slope	1-2%
Sample Dates	06/30/2005, 07/15/2008, 06/25/2013, 08/22/2018

**Table 14R-11.1 Disturbance History.** Recorded history of major disturbances.

Treatment/Disturbance	Name	WRI DB#	Date	Size (acres)
Seeding - Rangeland Drill	Hart Draw Phase 1 Cont.	1231	September-October 2008	263
Seeding - Aerial	Hart Draw Phase 1 Cont.	1231	October 2008	263
Aerator - Single Drum/Seed	Hart Draw Sagebrush Restoration (year 1)	246	December 2005	628

**Table 14R-11.2 Seed Mix.** List of known seeded plant species and rates (if available).

Mix Name			Application Type	Application Date	Acres
Hart Draw			Broadcast	Dec 2005	517
Type	Species	Common Name	Cultivar/Source ID	Bulk lbs/acre	PLS
G	<i>Achnatherum hymenoides</i>	Indian Ricegrass	Rimrock	0.97	0.94
G	<i>Agropyron fragile</i>	Siberian Wheatgrass	Vavilov	1.06	1.01
G	<i>Dactylis glomerata</i>	Orchardgrass	Paiute	0.48	0.45
G	<i>Hesperostipa comata</i>	Needle and Threadgrass	Beaver UT	0.29	0.22
G	<i>Hesperostipa comata</i>	Needle and Threadgrass	Beaver UT	0.19	0.18
G	<i>Pascopyrum smithii</i>	Western Wheatgrass		0.95	0.79
G	<i>Sporobolus cryptandrus</i>	Sand Dropseed		0.29	0.28
F	<i>Linum perenne</i>	Blue Flax		0.19	0.17
F	<i>Medicago sativa</i>	Alfalfa	Nomad	0.48	0.45
F	<i>Medicago sativa</i>	Alfalfa	Spreador 4	0.48	0.45
F	<i>Onobrychis viciifolia</i>	Sainfoin	Eski	2.03	1.87
F	<i>Sanguisorba minor</i>	Small Burnet	Delar	2.03	1.89
S	<i>Atriplex canescens</i>	Fourwing Saltbush	San Juan UT	0.20	0.07
S	<i>Atriplex canescens</i>	Fourwing Saltbush	Juab/Tooele UT	0.77	0.44
S	<i>Atriplex canescens</i>	Fourwing Saltbush	Wayne UT	0.06	0.02
Mix Name			Application Type	Application Date	Acres
Harts Draw Browse			Broadcast	Dec 2005	517
Type	Species	Common Name	Cultivar/Source ID	Bulk lbs/acre	PLS
S	<i>Artemisia tridentata</i> ssp. <i>wyomingensis</i>	Wyoming Big Sagebrush	Sanpete UT	0.97	0.29
Mix Name			Application Type	Application Date	Acres
Harts Draw			Drill	Sep 2008	100
Type	Species	Common Name	Cultivar/Source ID	Bulk lbs/acre	PLS
G	<i>Achnatherum hymenoides</i>	Indian Ricegrass	Rimrock	1.00	0.92
G	<i>Agropyron cristatum</i>	Crested Wheatgrass	Hycrest	1.50	1.37
G	<i>Agropyron cristatum</i>	Crested Wheatgrass	Nordan	1.50	1.39
G	<i>Pascopyrum smithii</i>	Western Wheatgrass	Arriba	2.00	1.87
G	<i>Pleuraphis jamesii</i>	Galleta	Viva	0.25	0.20
G	<i>Psathyrostachys juncea</i>	Russian Wildrye	Bozoisky	1.50	1.28
G	<i>Sporobolus cryptandrus</i>	Sand Dropseed		0.25	0.21
G	<i>Thinopyrum intermedium</i>	Pubescent Wheatgrass	Luna	1.00	0.88
F	<i>Medicago sativa</i>	Alfalfa	Ladak	1.00	0.95
F	<i>Medicago sativa</i>	Alfalfa	Ranger	0.50	0.46
F	<i>Melilotus officinalis</i>	Yellow Sweetclover		0.50	0.45
F	<i>Sanguisorba minor</i>	Small Burnet	Delar	1.00	0.92
Mix Name			Application Type	Application Date	Acres
Harts Draw - Fluffy Box			Drill	Sep 2008	100
Type	Species	Common Name	Cultivar/Source ID	Bulk lbs/acre	PLS
S	<i>Artemisia tridentata</i> ssp. <i>wyomingensis</i>	Wyoming Big Sagebrush	Garfield UT	0.75	0.20
S	<i>Bassia prostrata</i>	Forage Kochia	Immigrant	0.75	0.52

Mix Name			Application Type	Application Date	Acres
Harts Draw Aerial Sagebrush			Aerial	Oct 2008	300
Type	Species	Common Name	Cultivar/Source ID	Bulk lbs/acre	PLS
		Rice Hulls		0.67	0.00
S	Artemisia tridentata ssp. wyomingensis	Wyoming Big Sagebrush	Garfield UT	0.70	0.18

### Wildlife Habitat and Vegetation History

**Table 14R-11.3 - Wildlife Seasonal Habitat.** UDWR wildlife habitat and seasonality.

Species	Habitat	Season
Deer	crucial	winter

**Table 14R-11.4 - Vegetation History.** The dominant vegetation type(s) and phase of woodland succession (Tausch, Miller, Roundy, & Chambers, 2009).

Year	Vegetation Type	Woodland Succession
2005	Annual Weed	No Encroachment
2008	Annual Weed	No Encroachment
2013	Annual Weed	No Encroachment
2018	Annual Weed	No Encroachment

### Site Notes

No Notes

### Soils

**Table 14R-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
Clay	7.6	20.7	37.5	41.8	1.3	6.8	496.0	0.5	06/30/2005

### Site Potential

1981 - 2010 Average Annual Precipitation                      14 inches  
 NRCS Ecological Site    Upland Loam (Mountain Big Sagebrush)  
 NRCS Ecological Site #    R035XY308UT  
 States and Transitions    No state and transition model is available for this ecological site.

Upon study establishment in 2005, this site was in an annual grass-forb state with the majority of the cover being provided by annual wheatgrass (*Eremopyrum triticeum*). Since treatment in 2005, grass cover has decreased significantly and very little annual forb cover has persisted (Table 14R-11.7, Table 14R-11.10, Table 14R-11.11). Browse species have not contributed cover in any sample year and have only been observed in height/crown measurements (Table 14R-11.12, Table 14R-11.13). Bare ground cover has exhibited a significant increase over the duration of the study period and has been the primary ground cover type since 2008 (Table 14R-11.8).

**Trend Summary Tables****Table 14R-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
2005						
2008						
2013						
2018						

**Table 14R-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
2005	445	1	153	-	43.6	0.0	2.6	-
2008	397	6	394	-	8.5	0.1	20.9	-
2013	72	11	223	3	0.3	0.1	1.1	0.0
2018	31	6	42	2	0.1	0.1	0.6	0.0

**Table 14R-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
2005	40.0	0.0	27.7	0.1	0.0	45.5
2008	50.8	0.0	26.0	1.6	0.0	31.6
2013	80.3	-	16.9	0.5	0.1	1.4
2018	89.2	-	19.1	0.7	0.1	1.0

**Table 14R-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	Rabbit
	Quadrat Frequency			
2005	9	4	-	43
2008	16	2	-	78
2013	8	3	-	26
2018	8	11	-	71
Year	Days Use Per Acre (ha)			
2005	23.2 (57.4)	-	-	-
2008	45.7 (113.0)	-	0.7 (1.7)	-
2013	15.3 (37.7)	2.7 (6.6)	-	-
2018	22.5 (55.6)	3.4 (8.3)	-	-



**Table 14R-11.10 - Grass Species.** Nested frequency and modified Daubenmire average cover by year.

GRASS SPECIES					
Agropyron fragile <sup>i</sup> (Sibetan wheatgrass)					
Bromus tectorum <sup>ai</sup> (cheatgrass)					
Eremopyrum triticeum <sup>ai</sup> (annual wheatgrass)					
Sporobolus cryptandrus (sand dropseed)					
Vulpia octoflora <sup>ai</sup> (sixweeks fescue)					
year	Nested Frequency				
2005	-	12	445	1	-
2008	1	67	397	5	-
2013	-	2	64	11	6
2018	-	7	22	6	2
year	Average Cover (%)				
2005	-	0.1	43.6	0.0	-
2008	0.0	0.3	8.2	0.1	-
2013	-	0.0	0.3	0.1	0.0
2018	-	0.0	0.1	0.1	0.0

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

**Table 14R-11.11 - Forb Species.** Nested frequency and modified Daubenmire average cover by year.

FORB SPECIES								
Ceratocephala testiculata <sup>ai</sup> (curvseed butterwort)								
Chamaesyce (sandmat)								
Erodium cicutarium <sup>ai</sup> (redstem stork's bill)								
Helianthus annuus <sup>ai</sup> (common sunflower)								
Lappula occidentalis <sup>ai</sup> (flatspine stickseed)								
Salsola tragus <sup>ai</sup> (prickly Russian thistle)								
Sanguisorba minor <sup>i</sup> (small burnet)								
Solanum jamesii (wild potato)								
year	Nested Frequency							
2005	47	-	3	-	15	117	-	-
2008	-	-	2	126	7	391	-	-
2013	-	-	7	-	11	220	3	-
2018	-	2	-	5	-	42	-	0
year	Average Cover (%)							
2005	1.2	-	0.0	-	0.3	1.1	-	-
2008	-	-	0.0	0.5	0.0	20.4	-	-
2013	-	-	0.0	-	0.0	1.0	0.0	-
2018	-	0.0	-	0.2	-	0.5	-	0.0

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

**Table 14R-11.12 - Shrub and Tree Species.** Average modified Daubenmire quadrat and line intercept cover by year.

SHRUB SPECIES	No Shrubs Found
year	Line Intercept Cover (%)
year	Quadrat Cover (%)

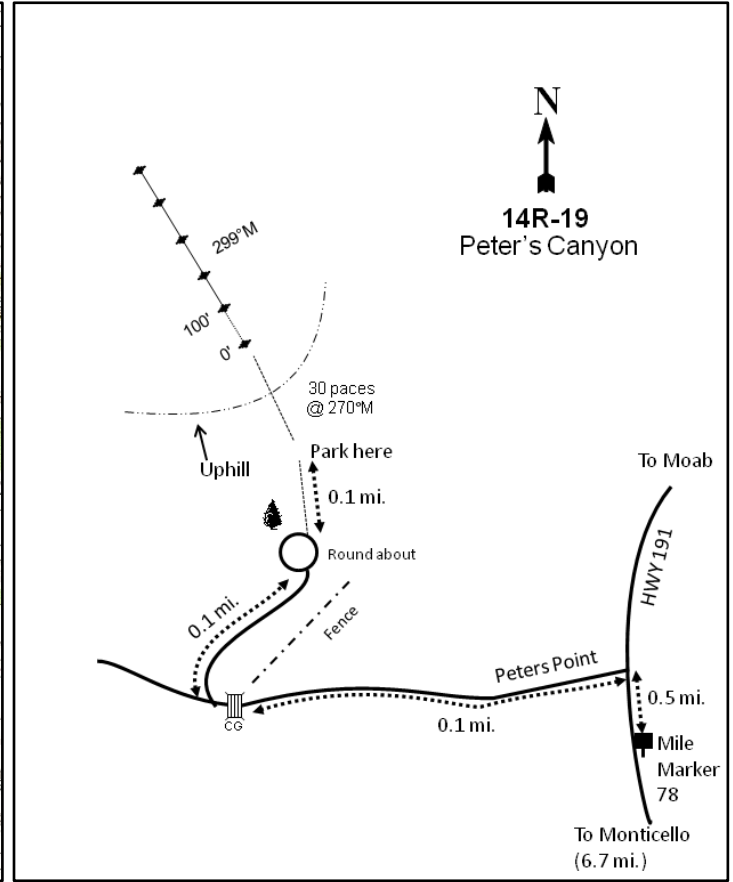
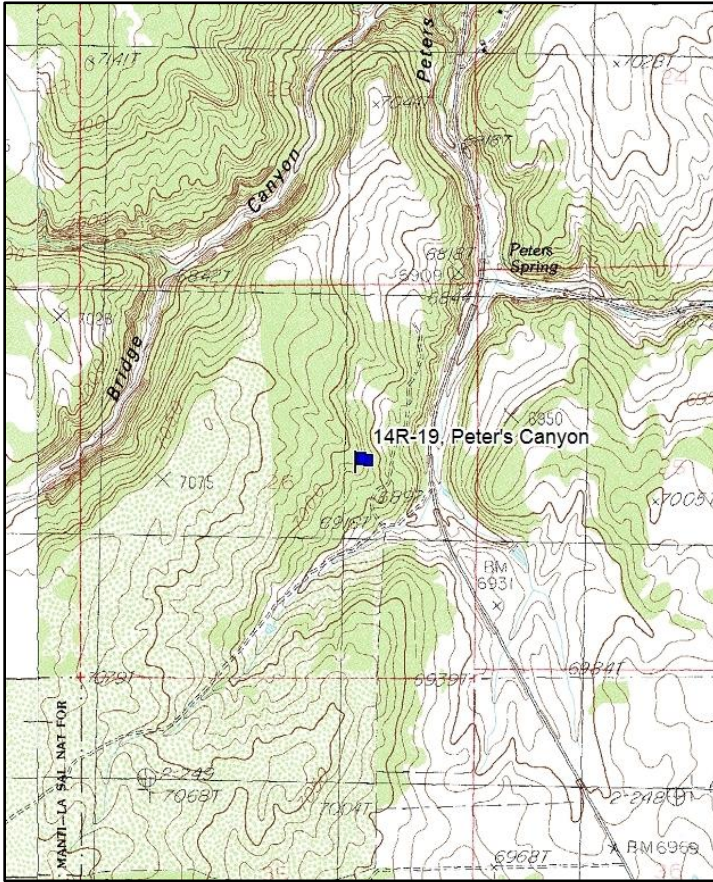
t - Tree Species; p - Preferred Browse; i - Introduced Species

**Table 14R-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 (%)				
<b>Artemisia tridentata ssp. vaseyana<sup>p</sup> -- (mountain big sagebrush)</b>									
2005	-	-	-	-	-	-	-	-	-/-
2008	-	-	-	-	-	-	-	-	-/-
2018	-	-	-	-	-	-	-	-	35/33
<b>Atriplex canescens<sup>p</sup> -- (fourwing saltbush)</b>									
2005	-	-	-	-	-	-	-	-	72/89
2008	-	-	-	-	-	-	-	-	93/89
2018	-	-	-	-	-	-	-	-	70/66
<b>Gutierrezia sarothrae -- (broom snakeweed)</b>									
2005	-	-	-	-	-	-	-	-	11/18
2008	-	-	-	-	-	-	-	-	-/-
2018	-	-	-	-	-	-	-	-	87/71

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

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



### Location Information

USGS 7.5 min Map Info  
GPS (0' Stake)

Monticello North NW; Township 32S, Range 23E, Section 26  
NAD 83 UTM ZONE 12, 643989 East 4203465 North

### Transect Information

Browse Tag # (0' Stake)	182
Transect Bearing	299° magnetic
Length	500ft
Belt Placement	Line 1 (11ft), Line 2 (34ft), Line 3 (59ft), Line 4 (71ft), Line 5 (95ft)
Belt Marker Placement	No Rebar

### Directions to Site

On US-191 travel north from Monticello for about 6.7 miles to mile marker 78. Continue for 0.5 miles to a road that comes in from the left. Turn left here and follow this road for 0.1 miles to a cattle guard. Immediately after the cattle guard there will be a road to the right. Turn here and travel north for 0.1 miles to a small dirt roundabout. The 0-foot stake is 57 paces at 304 degrees magnetic from an old dead pinyon on the northwest part of the roundabout or 0.1 miles from the northwest part of the roundabout.

**Site Information**

Land Ownership	Federal
Land Administrator	BLM
Allotment	SPRING CREEK
Elevation	9,700ft (2,957m)
Aspect	Southeast
Slope	2%
Sample Dates	06/11/2007, 06/14/2010, 06/25/2014, 08/21/2018

**Table 14R-19.1 Disturbance History.** Recorded history of major disturbances.

Treatment/Disturbance	Name	WRI DB#	Date	Size (acres)
Fire - Prescribed Fire	Peter's Canyon	906	October 2007	151
Mechanical - Bullhog	Peter's Canyon	906	December 2006	151
Seeding - Broadcast/Harrow	Peter's Canyon	906	December 2007	151

**Table 14R-19.2 Seed Mix.** List of known seeded plant species and rates (if available).

Mix Name			Application Type	Application Date	Acres
Peter's Canyon			Broadcast	Dec 2007	170
Type	Species	Common Name	Cultivar/Source ID	Bulk lbs/acre	PLS
G	Achnatherum hymenoides	Indian Ricegrass	Rimrock	1.76	1.53
G	Agropyron fragile	Siberian Wheatgrass	Vavilov	2.06	1.78
G	Bouteloua gracilis	Blue Grama		1.18	0.78
G	Elymus lanceolatus	Thickspike Wheatgrass	Bannock	1.47	1.37
G	Poa secunda	Sandberg Bluegrass	Mountain Home ID	0.59	0.54
G	Poa secunda	Canby Bluegrass	Canbar	0.88	0.79
G	Sporobolus cryptandrus	Sand Dropseed		0.06	0.06
G	Sporobolus cryptandrus	Sand Dropseed		0.24	0.21
S	Atriplex canescens	Fourwing Saltbush	Kane UT	0.29	0.10
S	Purshia tridentata	Bitterbrush	Elko NV	0.29	0.28

**Wildlife Habitat and Vegetation History**

**Table 14R-19.3 - Wildlife Seasonal Habitat.** UDWR wildlife habitat and seasonality.

Species	Habitat	Season
Deer	crucial	spring/fall

**Table 14R-19.4 - 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 I transitioning to Phase II
2010	Pinyon-Juniper	Phase I transitioning to Phase II
2014	Pinyon-Juniper	Phase I transitioning to Phase II
2018	Pinyon-Juniper	Phase II

**Site Notes**

No Notes

**Site Potential**

1981 - 2010 Average Annual Precipitation	16 inches
NRCS Ecological Site	Upland Loam (Mountain Big Sagebrush)
NRCS Ecological Site #	R035XY308UT
States and Transitions	No state and transition model is available for the above ecological site.

Since establishment in 2007, the plant community on this site has remained dominated by twoneedle pinyon (*Pinus edulis*) and Utah juniper (*Juniperus osteosperma*), even after treatment. A small number of other shrub species are present, but they have contributed little cover (Table 14R-19.12). The introduced annual grass species cheatgrass (*Bromus tectorum*) provided a majority of the herbaceous cover prior to treatment, but has since decreased. However, perennial grasses -- namely squirreltail (*Elymus elymoides*) and muttongrass (*Poa fendleriana*) -- have increased in cover over time. Forbs have been diverse throughout the study period, but not abundant (Table 14R-19.7, Table 14R-19.10, Table 14R-19.11). Although the tree component decreased following treatment, cover increased between 2014 and 2018, indicating that future infilling is possible (Table 14R-19.12).

**Trend Summary Tables**

**Table 14R-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
2007	0.2	1.0	2.2	0.2	2.0	19.4
2010	0.1	1.3	3.5	0.2	1.0	17.0
2014	1.1	1.6	3.5	1.1	1.1	15.9
2018	1.1	2.3	4.8	1.5	0.9	21.7

**Table 14R-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
2007	263	180	150	114	8.2	7.2	4.0	1.8
2010	216	227	107	48	5.5	13.5	2.3	1.4
2014	15	228	116	63	0.2	10.2	2.3	0.4
2018	3	226	29	46	0.0	8.9	0.5	0.5

**Table 14R-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
2007	16.8	0.9	61.2	0.4	2.0	24.4
2010	24.7	0.1	55.5	0.7	2.0	26.4
2014	40.4	-	53.4	0.7	2.5	18.3
2018	45.0	0.0	51.2	1.9	5.6	17.7

**Table 14R-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	Rabbit
	Quadrat Frequency			
2007	1	5	1	71
2010	1	6	4	2
2014	2	1	-	-
2018	1	12	-	6
Year	Days Use Per Acre (ha)			
2007	1.5 (3.6)	4.7 (11.6)	6.7 (16.6)	-
2010	6.5 (16.1)	2.7 (6.6)	6.7 (16.6)	-
2014	9.4 (23.3)	1.3 (3.3)	2.7 (6.6)	-
2018	13.8 (34.1)	6.0 (14.9)	1.3 (3.3)	-

**Table 14R-19.10 - Grass Species.** Nested frequency and modified Daubenmire average cover by year.

GRASS SPECIES	Achnatherum hymenoides (Indian ricegrass)	Agropyron fragile <sup>i</sup> (Siberian wheatgrass)	Bouteloua gracilis (blue grama)	Bromus tectorum <sup>ai</sup> (cheatgrass)	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)	Sporobolus cryptandrus (sand dropseed)	Vulpia octoflora <sup>a</sup> (sixweeks fescue)
year	Nested Frequency												
2007	13	-	11	262	13	115	-	2	7	83	7	-	5
2010	23	3	11	216	-	170	10	3	-	56	17	-	-
2014	18	12	17	14	19	126	1	-	-	91	-	9	1
2018	31	8	48	3	28	52	7	-	-	99	-	25	-
year	Average Cover (%)												
2007	0.2	-	0.1	8.1	0.0	3.8	-	0.1	0.0	2.8	0.0	-	0.0
2010	1.1	0.2	0.7	5.5	-	8.3	0.1	0.2	-	2.7	0.3	-	-
2014	0.3	0.5	0.5	0.2	0.1	4.4	0.0	-	-	4.0	-	0.3	0.0
2018	0.7	0.2	1.7	0.0	0.7	1.3	0.2	-	-	2.7	-	1.5	-

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

**Table 14R-19.11 - Forb Species.** Nested frequency and modified Daubenmire average cover by year.

FORB SPECIES	Arabis (rockcress)	Astragalus humistratus (groundcover milkvetch)	Castilleja (Indian paintbrush)	Ceratocephala testiculata <sup>ai</sup> (curvseed butterwort)	Chaenactis douglasii (Douglas' dustymaiden)	Chaetopappa ericoides (rose heath)	Chamaesyce (sandmat)	Chenopodium fremontii <sup>a</sup> (Fremont's goosefoot)	Cirsium (thistle)	Cryptantha (cryptantha)	Descurainia pinnata <sup>a</sup> (western tansymustard)	Draba <sup>a</sup> (draba)	Erigeron pumilus (shaggy fleabane)	Eriogonum alatum (winged buckwheat)	Erodium cicutarium <sup>ai</sup> (redstem stork's bill)	Erysimum (wallflower)	Gayophytum ramosissimum <sup>a</sup> (pinyon groundsmoke)
year	Nested Frequency																
2007	1	1	4	26	4	11	-	7	0	3	77	21	7	-	8	5	1
2010	-	3	-	3	-	-	-	27	5	8	13	4	9	-	-	-	1
2014	-	2	-	-	-	13	-	-	-	12	46	15	2	1	-	-	-
2018	3	-	-	-	-	-	16	2	-	1	-	-	4	1	-	-	-
year	Average Cover (%)																
2007	0.0	0.1	0.0	0.1	0.0	0.3	-	0.0	0.0	0.0	3.1	0.1	0.1	-	0.0	0.0	0.0
2010	-	0.0	-	0.0	-	-	-	0.1	0.3	0.1	0.6	0.0	0.6	-	-	-	0.0
2014	-	0.0	-	-	-	0.2	-	-	-	0.1	1.1	0.1	0.0	0.0	-	-	-
2018	0.0	-	-	-	-	-	0.2	0.0	-	0.0	-	-	0.0	0.0	-	-	-

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

FORB SPECIES																		
<i>Gilia inconspicua</i> <sup>a</sup> (shy gilia)																		
<i>Halogeton glomeratus</i> <sup>ai</sup> (saltflower)																		
<i>Ipomopsis aggregata</i> (scarlet gilia)																		
<i>Lactuca serriola</i> <sup>ai</sup> (prickly lettuce)																		
<i>Lappula occidentalis</i> <sup>a</sup> (flatspine stickseed)																		
<i>Lesquerella</i> (bladderpod)																		
<i>Linum lewisii</i> (Lewis flax)																		
<i>Machaeranthera grindelioides</i> (rayless tansyaster)																		
<i>Microsteris gracilis</i> <sup>a</sup> (slender phlox)																		
<i>Packera multilobata</i> (lobeleaf groundsel)																		
<i>Pedicularis centranthera</i> (dwarf lousewort)																		
<i>Penstemon cyanocaulis</i> (bluestem beardtongue)																		
<i>Petroradia pumila</i> (rock goldenrod)																		
<i>Phlox hoodii</i> (spiny phlox)																		
<i>Phlox longifolia</i> (longleaf phlox)																		
<i>Polygonum douglasii</i> <sup>a</sup> (Douglas' knotweed)																		
<i>Portulaca oleracea</i> <sup>ai</sup> (little hogweed)																		
year	Nested Frequency																	
2007	18	1	10	-	64	1	3	-	41	1	17	4	9	1	44	6	-	
2010	11	-	-	3	44	-	-	2	3	-	-	4	3	-	14	15	-	
2014	-	-	1	-	46	-	-	3	3	1	3	-	-	-	16	-	-	
2018	-	-	-	-	-	-	-	2	-	-	1	-	15	-	2	-	22	
year	Average Cover (%)																	
2007	0.1	0.0	0.1	-	0.5	0.1	0.0	-	0.1	0.0	0.4	0.1	0.2	0.0	0.1	0.0	-	
2010	0.4	-	-	0.0	0.9	-	-	0.0	0.0	-	-	0.2	0.0	-	0.1	0.1	-	
2014	-	-	0.0	-	1.1	-	-	0.0	0.0	0.0	0.0	-	-	-	0.1	-	-	
2018	-	-	-	-	-	-	-	0.0	-	-	0.0	-	0.2	-	0.0	-	0.3	

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

FORB SPECIES				
<i>Salsola tragus</i> <sup>ai</sup> (prickly Russian thistle)				
<i>Sphaeralcea coccinea</i> (scarlet globemallow)				
<i>Stenotus acaulis</i> (stemless mock goldenweed)				
<i>Trifolium</i> (clover)				
year	Nested Frequency			
2007	-	-	5	11
2010	20	-	-	10
2014	30	-	-	11
2018	6	3	-	-
year	Average Cover (%)			
2007	-	-	0.0	0.0
2010	0.2	-	-	0.1
2014	0.1	-	-	0.0
2018	0.2	0.0	-	-

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



**Table 14R-19.12 - Shrub and Tree Species.** Average modified Daubenmire quadrat and line intercept cover by year.

SHRUB SPECIES	Line Intercept Cover (%)					
	Artemisia tridentata ssp. vaseyana <sup>p</sup> (mountain big sagebrush)	Echinocereus coccineus var. coccineus (scarlet hedgehog cactus)	Gutierrezia sarothrae (broom snakeweed)	Juniperus osteosperma <sup>i</sup> (Utah juniper)	Opuntia (pricklypear)	Pinus edulis <sup>i</sup> (twoneedle pinyon)
year	Line Intercept Cover (%)					
2007	0.2	-	2	10	0	9.4
2010	0.2	-	0.9	8.2	0.1	8.8
2014	1.1	-	1	9.3	0.1	6.6
2018	1.5	-	0.9	10.6	-	11.1
year	Quadrat Cover (%)					
2007	0.2	0.0	0.7	0.0	0.3	2.2
2010	0.1	-	0.9	1.0	0.3	2.5
2014	1.1	-	1.3	0.1	0.3	3.3
2018	1.1	-	2.2	0.0	0.0	4.8

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

**Table 14R-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 (%)				
<b>Artemisia tridentata ssp. vaseyana<sup>p</sup> -- (mountain big sagebrush)</b>									
2007	140	200	29	43	29	29	0	29	51/76
2010	260	-	15	54	31	0	0	31	43/61
2014	360	-	39	56	6	28	6	0	44/59
2018	560	-	18	79	4	50	11	4	39/60
<b>Echinocereus coccineus var. coccineus -- (scarlet hedgehog cactus)</b>									
2007	-	-	-	-	-	-	-	-	6/39
2010	-	-	-	-	-	-	-	-	-/-
2014	-	-	-	-	-	-	-	-	-/-
2018	20	-	0	100	0	0	0	0	5/2
<b>Ericameria nauseosa -- (rubber rabbitbrush)</b>									
2007	-	-	-	-	-	-	-	-	-/-
2010	-	-	-	-	-	-	-	-	-/-
2014	-	-	-	-	-	-	-	-	-/-
2018	-	-	-	-	-	-	-	-	48/92
<b>Gutierrezia sarothrae -- (broom snakeweed)</b>									
2007	3480	2200	32	66	2	0	0	1	22/28
2010	1300	20	15	83	2	0	0	2	18/23
2014	2360	3440	49	51	0	8	0	1	21/26
2018	6280	-	32	66	2	0	0	1	10/17
<b>Juniperus osteosperma<sup>i</sup> -- (Utah juniper)</b>									
2007	100	40	0	100	0	0	0	0	-/-
2010	80	-	25	75	0	0	0	0	-/-
2014	80	-	25	75	0	0	0	0	-/-
2018	100	-	0	100	0	0	0	0	-/-

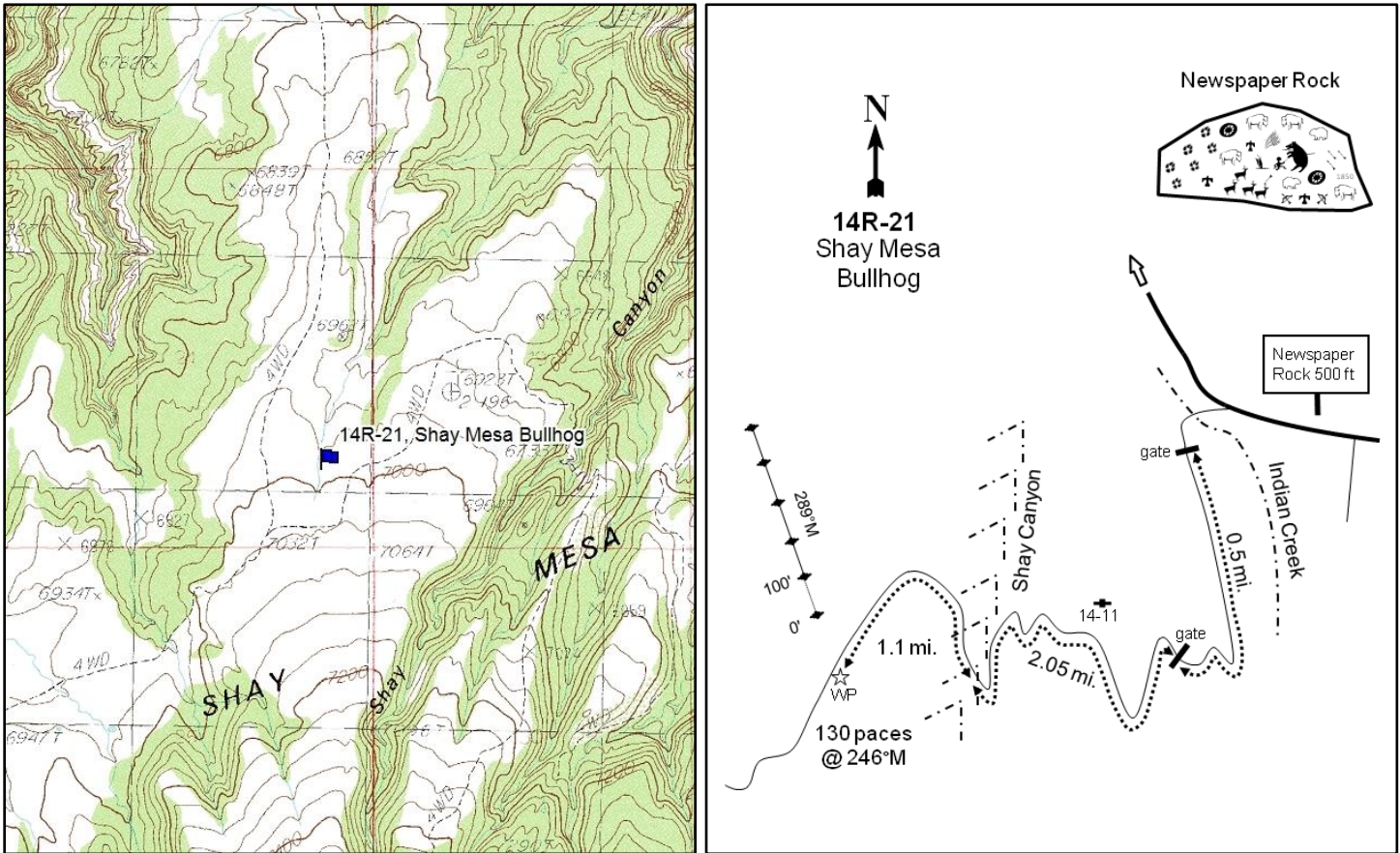
Year	Density		Age Class Distribution			Utilization		Poor Vigor (%)	Average Height Crown (cm)
	Plants Per Acre		Excluding Seedlings			Moderate (%)	Heavy (%)		
	Excluding Seedlings	Seedling	Young (%)	Mature (%)	Decadent (%)				
<b>Opuntia fragilis -- (brittle pricklypear)</b>									
2007	-	-	-	-	-	-	-	-	-/-
2010	-	-	-	-	-	-	-	-	-/-
2014	-	-	-	-	-	-	-	-	-/-
2018	40	-	0	100	0	0	0	0	6/13
<b>Opuntia -- (pricklypear)</b>									
2007	340	-	12	82	6	0	0	6	11/34
2010	140	-	14	86	0	0	0	0	11/23
2014	140	-	0	100	0	0	0	14	11/37
2018	60	-	0	100	0	0	0	0	10/35
<b>Pinus edulis<sup>t</sup> -- (twoneedle pinyon)</b>									
2007	140	20	29	71	0	0	0	0	-/-
2010	60	20	33	67	0	0	0	0	-/-
2014	80	60	50	50	0	0	0	0	-/-
2018	140	-	29	71	0	0	0	0	-/-
<b>Purshia stansburiana<sup>p</sup> -- (Stansbury cliffrose)</b>									
2007	-	-	-	-	-	-	-	-	65/106
2010	-	-	-	-	-	-	-	-	43/103
2014	-	-	-	-	-	-	-	-	-/-
2018	-	-	-	-	-	-	-	-	-/-
<b>Purshia tridentata<sup>p</sup> -- (antelope bitterbrush)</b>									
2007	-	-	-	-	-	-	-	-	-/-
2010	-	-	-	-	-	-	-	-	-/-
2014	40	-	100	0	0	0	0	0	49/114
2018	-	-	-	-	-	-	-	-	37/127
<b>Yucca baccata -- (banana yucca)</b>									
2007	-	-	-	-	-	-	-	-	-/-
2010	-	-	-	-	-	-	-	-	-/-
2014	-	-	-	-	-	-	-	-	-/-
2018	-	-	-	-	-	-	-	-	74/111
<b>Yucca -- (yucca)</b>									
2007	-	-	-	-	-	-	-	-	82/176
2010	-	-	-	-	-	-	-	-	85/87
2014	-	-	-	-	-	-	-	-	25/89

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

**Table 14R-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' (%)	
<b>Juniperus osteosperma (Utah juniper)</b>							
2007	56	17	33	11	-	39	23.1
2010	46	12	47	-	6	35	24.5
2014	46	-	47	12	12	29	28.8
2018	47	-	31	31	6	31	20.4
<b>Pinus edulis (twoneedle pinyon)</b>							
2007	39	21	7	14	7	50	15.4
2010	36	25	25	-	6	44	14.4
2014	41	31	31	-	6	31	11.4
2018	37	-	44	6	6	44	13.6

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

**Location Information**

USGS 7.5 min Map Info  
GPS (0' Stake)

Shay Mountain NE; Township 32S, Range 21E, Section 24  
NAD 83 UTM ZONE 12, 626684 East 4204320 North

**Transect Information**

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

Not Available  
289° magnetic  
500ft  
Line 1 (11ft), Line 2 (34ft), Line 3 (59ft), Line 4 (71ft), Line 5 (95ft)  
No Rebar

**Directions to Site**

Between Newspaper Rock and the 'Newspaper Rock 500 ft' sign, turn west onto a road that crosses Indian Creek and leads to a gate. From the gate, go 0.5 miles to a second gate. From this gate, drive 2.05 miles to the first sharp turn in Shay Canyon (you will probably have to back down the switchbacks). From here, continue for 1.1 miles to the witness post on the right (north) side of the road. The 0-foot stake is 130 paces from the witness post at 264 degrees magnetic and does not have a browse tag.

**Site Information**

Land Ownership	Federal
Land Administrator	BLM
Allotment	HART DRAW
Elevation	7,000ft (2,134m)
Aspect	North
Slope	4-6%
Sample Dates	07/16/2008, 07/20/2011, 06/24/2014, 08/20/2018

**Table 14R-21.1 Disturbance History.** Recorded history of major disturbances.

Treatment/Disturbance	Name	WRI DB#	Date	Size (acres)
Chaining - Chain Unknown	-	-	1959	-
Seeding - Seed Unknown	-	-	1959	-
Mechanical - Bullhog	Shay Mesa Phase II	1091	April-September 2009	545
Seeding - Aerial Before	Shay Mesa Phase II	1091	December 2008-March 2009	212

**Table 14R-21.2 Seed Mix.** List of known seeded plant species and rates (if available).

Mix Name			Application Type	Application Date	Acres
Shay Mesa phase II - Winterfat/Sage			Aerial	Oct 2008	483
Type	Species	Common Name	Cultivar/Source ID	Bulk lbs/acre	PLS
G	<i>Achnatherum hymenoides</i>	Indian Ricegrass	White River	1.55	1.35
G	<i>Agropyron cristatum</i>	Crested Wheatgrass	Douglas	0.83	0.68
G	<i>Hesperostipa comata</i>	Needle and Threadgrass	Custer CO	0.21	0.16
G	<i>Hesperostipa comata</i>	Needle and Threadgrass	Iron UT	0.31	0.27
G	<i>Pascopyrum smithii</i>	Western Wheatgrass	Arriba	0.57	0.54
G	<i>Pascopyrum smithii</i>	Western Wheatgrass	Arriba	1.35	1.17
G	<i>Poa secunda</i>	Sandberg Bluegrass	Toole MT	0.52	0.44
F	<i>Astragalus cicer</i>	Cicer Milkvetch	Lutana	1.04	1.00
F	<i>Linum perenne</i>	Blue Flax	Appar	0.52	0.43
F	<i>Melilotus officinalis</i>	Yellow Sweetclover		1.04	0.93
F	<i>Onobrychis viciifolia</i>	Sainfoin	Eski	1.55	1.36
S	<i>Artemisia tridentata</i> ssp. <i>vaseyana</i>	Mountain Big Sagebrush	Sanpete UT	0.91	0.16
S	<i>Krascheninnikovia lanata</i>	Winterfat	Beaver UT	0.53	0.12
S	<i>Krascheninnikovia lanata</i>	Winterfat	White Pine NV	0.52	0.18
S	<i>Purshia tridentata</i>	Bitterbrush	Millard/Iron UT	0.20	0.14
S	<i>Purshia tridentata</i>	Bitterbrush	Lincoln NV	0.10	0.08
S	<i>Purshia tridentata</i>	Bitterbrush	Elko NV	0.31	0.27
S	<i>Purshia tridentata</i>	Bitterbrush	Eureka NV	0.31	0.25

**Wildlife Habitat and Vegetation History****Table 14R-21.3 - Wildlife Seasonal Habitat.** UDWR wildlife habitat and seasonality.

Species	Habitat	Season
Deer	crucial	winter
Elk	crucial	winter

**Table 14R-21.4 - Vegetation History.** The dominant vegetation type(s) and phase of woodland succession (Tausch, Miller, Roundy, & Chambers, 2009).

Year	Vegetation Type	Woodland Succession
2008	Pinyon	Phase II
2011	Mountain Big Sagebrush	Phase I
2014	Mountain Big Sagebrush	Phase I
2018	Mountain Big Sagebrush	Phase I

**Site Notes**

Original study stakes were not found following treatment. New stakes were therefore placed as close to the previous location of the pre-treatment transect as possible.

**Site Potential**

1981 - 2010 Average Annual Precipitation	15 inches
NRCS Ecological Site	Upland Loam (Mountain Big Sagebrush)
NRCS Ecological Site #	R035XY308UT
States and Transitions	No state and transition model is available for this ecological site.

Upon study establishment in 2008, this site was considered to be in Phase II of woodland succession (Table 14R-21.4) and dominated by twoneedle pinyon (*Pinus edulis*) with a minor component of Utah juniper (*Juniperus osteosperma*). Mountain big sagebrush (*Artemisia tridentata* ssp. *vaseyana*) and broom snakeweed (*Gutierrezia sarothrae*) contributed a moderate amount of cover with few other browse species present (Table 14R-21.12, Table 14R-21.13). Tree cover and density decreased following the 2009 bullhog treatment (Table 14R-21.1) while that of sagebrush increased; sagebrush has been the dominant vegetation component since 2011. However, point-quarter data shows that trees have remained on site throughout the duration of the study, indicating that infilling may be possible in future sample years (Table 14R-21.14). The herbaceous understory was sparse prior to treatment, with most of the cover provided by the introduced annual grass species cheatgrass (*Bromus tectorum*). Annual grass cover decreased following treatment, while that of perennial grasses increased (Table 14R-21.7, Table 14R-21.10, Table 14R-21.11).

**Trend Summary Tables****Table 14R-21.6 - Shrub/Tree Summary.** Average modified Daubenmire quadrat and line intercept cover by year for shrubs/trees

Year	Quadrat Cover (%)			Line-intercept Cover (%)		
	Preferred Shrub	Other Shrub	Tree	Preferred Shrub	Other Shrub	Tree
2008	5.8	5.3	12.5	6.9	6.6	22.8
2011	11.9	1.5	1.2	17.8	1.4	3.3
2014	15.4	0.7	1.3	16.6	0.2	1.6
2018	15.8	0.9	1.5	18.6	0.3	1.6

**Table 14R-21.7 - Herbaceous Summary.** Nested frequency and average modified Daubenmire quadrat cover by year for herbaceous functional groups

Year	Nested Frequency				Quadrat Cover (%)			
	Annual Grass	Perennial Grass	Annual/Biennial Forb	Perennial Forb	Annual Grass	Perennial Grass	Annual/Biennial Forb	Perennial Forb
2008	141	101	53	25	2.3	0.7	0.3	0.1
2011	62	184	-	68	0.3	6.2	-	1.3
2014	102	213	118	92	0.7	9.3	0.8	1.1
2018	8	253	-	65	0.0	10.8	-	1.1

**Table 14R-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
2008	40.6	0.4	45.9	5.6	0.1	26.1
2011	46.5	0.7	32.2	0.3	0.0	22.2
2014	44.1	0.4	28.3	0.6	0.1	31.1
2018	48.1	0.4	43.5	1.9	0.2	26.9

**Table 14R-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	Rocky Mountain Elk	Horse	Rabbit
	Quadrat Frequency				
2008	3	2	12	-	43
2011	-	1	12	-	-
2014	3	7	9	-	4
2018	3	9	15	-	11
Year	Days Use Per Acre (ha)				
2008	5.1 (12.6)	4.7 (11.6)	25.5 (62.9)	0.6 (1.4)	-
2011	0.7 (1.8)	9.4 (23.2)	20.8 (51.3)	-	-
2014	1.5 (3.6)	4.0 (9.9)	4.0 (9.9)	-	-
2018	11.6 (28.7)	7.4 (18.2)	8.7 (21.5)	-	-

**Table 14R-21.10 - Grass Species.** Nested frequency and modified Daubenmire average cover by year.

GRASS SPECIES												
Achnatherum hymenoides (Indian ricegrass)												
Agropyron cristatum <sup>i</sup> (crested wheatgrass)												
Bouteloua gracilis (blue grama)												
Bromus tectorum <sup>ai</sup> (cheatgrass)												
Elymus elymoides (squirreltail)												
Hesperostipa comata (needle and thread)												
Koeleria macrantha (prairie Junegrass)												
Pascopyrum smithii (western wheatgrass)												
Pleuraphis jamesii (James' galleta)												
Poa secunda (Sandberg bluegrass)												
Sporobolus cryptandrus (sand dropseed)												
Vulpia octoflora <sup>a</sup> (sixweeks fescue)												
year	Nested Frequency											
2008	1	78	-	141	10	12	-	-	3	-	-	-
2011	10	58	39	60	35	47	-	-	-	32	-	2
2014	9	64	35	50	88	31	2	14	7	20	6	64
2018	14	106	56	8	75	16	-	25	2	29	2	-
year	Average Cover (%)											
2008	0.0	0.5	-	2.3	0.1	0.1	-	-	0.0	-	-	-
2011	0.1	3.0	0.4	0.3	1.2	0.8	-	-	-	0.6	-	0.0
2014	0.6	2.9	1.9	0.5	2.3	1.1	0.0	0.1	0.3	0.2	0.0	0.2
2018	0.3	3.9	3.4	0.0	1.9	0.9	-	0.2	0.0	0.2	0.0	-

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

**Table 14R-21.11 - Forb Species.** Nested frequency and modified Daubenmire average cover by year.

FORB SPECIES																	
Agoseris glauca (pale agoseris)																	
Astragalus cibarius (browse milkvetch)																	
Astragalus mollissimus (woolly locoweed)																	
Ceratocephala testiculata <sup>ai</sup> (curvseed butterwort)																	
Chenopodium leptophyllum <sup>a</sup> (narrowleaf goosefoot)																	
Cryptantha (cryptantha)																	
Descurainia pinnata <sup>a</sup> (western tansymustard)																	
Draba <sup>a</sup> (draba)																	
Erigeron pumilus (shaggy fleabane)																	
Gilia inconspicua <sup>a</sup> (shy gilia)																	
Lappula occidentalis <sup>a</sup> (flatspine stickseed)																	
Linum perenne <sup>i</sup> (blue flax)																	
Machaeranthera canescens (hoary tansyaster)																	
Melilotus officinalis <sup>i</sup> (sweetclover)																	
Phlox austromontana (mountain phlox)																	
Phlox longifolia (longleaf phlox)																	
Sphaeralcea coccinea (scarlet globemallow)																	
year	Nested Frequency																
2008	5	-	14	32	3	-	11	-	-	-	20	-	-	-	7	-	-
2011	-	8	9	-	-	5	-	-	6	-	-	11	2	0	3	15	11
2014	-	2	31	-	1	-	64	29	3	29	49	-	2	-	18	18	28
2018	-	-	-	-	-	-	-	-	8	-	-	-	-	-	16	22	25
year	Average Cover (%)																
2008	0.0	-	0.1	0.1	0.0	-	0.1	-	-	-	0.1	-	-	-	0.0	-	-
2011	-	0.0	0.1	-	-	0.0	-	-	0.0	-	-	0.6	0.2	0.0	0.1	0.1	0.1
2014	-	0.0	0.2	-	0.0	-	0.3	0.1	0.0	0.2	0.4	-	0.0	-	0.5	0.1	0.4
2018	-	-	-	-	-	-	-	-	0.1	-	-	-	-	-	0.7	0.2	0.2

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

FORB SPECIES	Trifolium (clover)
year	Nested Frequency
2008	-
2011	1
2014	2
2018	-
year	Average Cover (%)
2008	-
2011	0.0
2014	0.0
2018	-

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

**Table 14R-21.12 - Shrub and Tree Species.** Average modified Daubenmire quadrat and line intercept cover by year.

SHRUB SPECIES	Artemisia tridentata ssp. vaseyana <sup>p</sup> (mountain big sagebrush)	Chrysothamnus depressus <sup>p</sup> (longflower rabbitbrush)	Ephedra viridis <sup>p</sup> (mormon tea)	Ericameria nauseosa (rubber rabbitbrush)	Eriogonum microthecum <sup>p</sup> (slender buckwheat)	Gutierrezia sarothrae (broom snakeweed)	Juniperus osteosperma <sup>a</sup> (Utah juniper)	Linanthus pungens (granite prickly phlox)	Opuntia (pricklypear)	Pinus edulis <sup>i</sup> (twoneedle pinyon)
year	Line Intercept Cover (%)									
2008	6.8	-	-	-	0.1	6.6	1.6	-	-	21.2
2011	17.6	-	0.1	-	0.1	1.2	-	0.2	-	3.3
2014	16.2	-	0.1	-	0.3	0.2	-	-	-	1.6
2018	17.5	1.1	-	-	0	0	-	-	0.3	1.6
year	Quadrat Cover (%)									
2008	5.8	0.0	-	0.1	0.0	5.1	1.5	-	-	11.0
2011	11.2	-	0.4	-	0.2	1.4	-	0.1	-	1.2
2014	14.9	0.0	0.4	-	0.1	0.7	-	-	-	1.3
2018	15.4	0.0	0.0	-	0.3	0.9	-	-	0.0	1.5

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



**Table 14R-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.

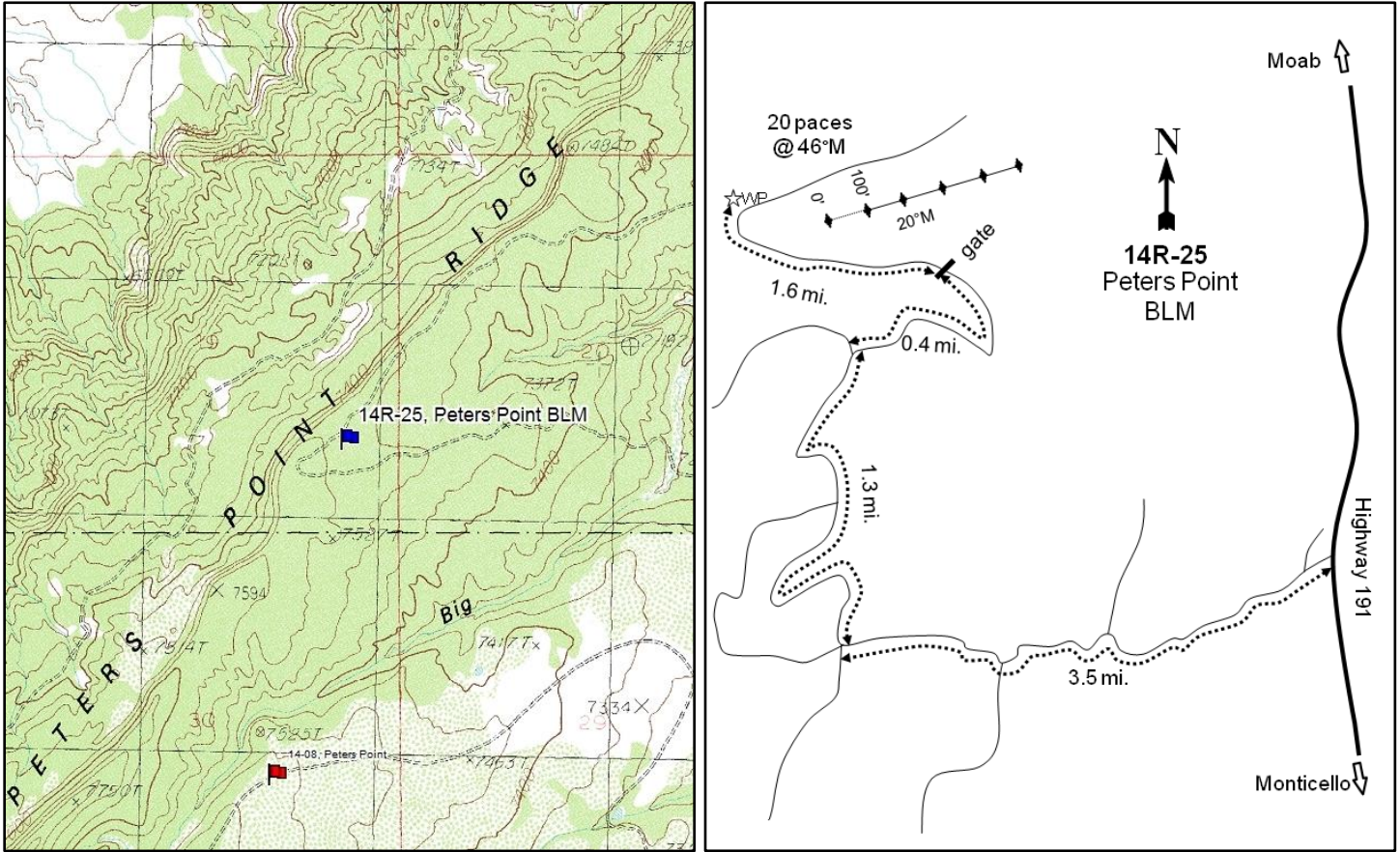
Year	Density		Age Class Distribution			Utilization		Poor Vigor (%)	Average Height Crown (cm)
	Plants Per Acre		Excluding Seedlings			Moderate (%)	Heavy (%)		
	Excluding Seedlings	Seedling	Young (%)	Mature (%)	Decadent (%)				
<b>Artemisia tridentata ssp. vaseyana<sup>P</sup> -- (mountain big sagebrush)</b>									
2008	2400	3380	16	73	12	14	7	5	62/81
2011	3560	60	5	64	32	33	15	23	41/69
2014	4520	-	11	86	4	36	56	2	42/66
2018	4440	-	9	76	15	28	22	25	41/75
<b>Chrysothamnus depressus<sup>P</sup> -- (longflower rabbitbrush)</b>									
2008	60	-	0	33	67	0	100	67	7/10
2011	-	-	-	-	-	-	-	-	-/-
2014	80	-	75	25	0	0	0	0	10/26
2018	20	-	100	0	0	0	0	0	-/-
<b>Ephedra viridis<sup>P</sup> -- (mormon tea)</b>									
2008	-	-	-	-	-	-	-	-	38/28
2011	180	-	0	100	0	0	100	0	24/26
2014	140	-	86	14	0	0	86	0	52/78
2018	80	-	0	100	0	0	0	0	23/27
<b>Eriogonum microthecum<sup>P</sup> -- (slender buckwheat)</b>									
2008	240	20	42	58	0	17	0	0	19/13
2011	460	-	4	96	0	74	9	17	14/17
2014	640	-	38	63	0	9	0	0	16/19
2018	440	-	0	100	0	18	14	0	18/17
<b>Ericameria nauseosa -- (rubber rabbitbrush)</b>									
2008	20	-	0	100	0	0	0	0	44/41
2011	-	-	-	-	-	-	-	-	-/-
2014	80	-	100	0	0	0	0	0	-/-
2018	40	-	0	100	0	0	0	100	38/37
<b>Gutierrezia sarothrae -- (broom snakeweed)</b>									
2008	9400	920	24	73	4	0	0	0	24/31
2011	2700	20	8	87	5	1	0	7	14/21
2014	1680	7100	38	62	0	0	0	0	15/17
2018	1160	-	0	71	29	0	0	43	9/13
<b>Juniperus osteosperma<sup>I</sup> -- (Utah juniper)</b>									
2008	20	-	0	100	0	0	0	0	-/-
2011	-	-	-	-	-	-	-	-	-/-
2014	-	-	-	-	-	-	-	-	-/-
2018	20	-	100	0	0	0	0	0	-/-
<b>Linanthus pungens -- (granite prickly phlox)</b>									
2008	-	-	-	-	-	-	-	-	-/-
2011	560	-	0	100	0	0	0	0	5/13
2014	-	-	-	-	-	-	-	-	-/-
2018	-	-	-	-	-	-	-	-	-/-
<b>Opuntia -- (pricklypear)</b>									
2008	-	-	-	-	-	-	-	-	-/-
2011	20	-	0	100	0	0	0	0	4/10
2014	-	-	-	-	-	-	-	-	19/53
2018	60	-	0	100	0	0	0	0	10/43
<b>Pinus edulis<sup>I</sup> -- (twoneedle pinyon)</b>									
2008	180	-	0	100	0	0	0	0	-/-
2011	80	-	75	25	0	0	0	0	-/-
2014	60	-	100	0	0	0	0	0	-/-
2018	40	-	0	100	0	0	0	0	-/-

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

**Table 14R-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' (%)	
<b>Juniperus osteosperma (Utah juniper)</b>							
2008	46	-	11	28	33	28	25.2
2011	5	33	33	-	33	-	10.3
2014	3	-	50	50	-	-	8.0
2018	11	20	60	20	-	-	3.8
<b>Pinus edulis (twoneedle pinyon)</b>							
2008	65	-	5	37	47	11	16.8
2011	37	30	50	-	20	-	3.1
2014	24	-	78	22	-	-	6.8
2018	38	8	85	8	-	-	3.8

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



### Location Information

USGS 7.5 min Map Info  
GPS (0' Stake)

Monticello Lake NE; Township 32S, Range 23E, Section 19  
NAD 83 UTM ZONE 12, 637776 East 4204486 North

### Transect Information

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

Not Available  
20° magnetic  
500ft  
No Rebar  
Line 1 (11ft), Line 2 (34ft), Line 3 (59ft), Line 4 (71ft), Line 5 (95ft)

### Directions to Site

From US-191, travel west on a gravel road for 3.5 miles; stay on the main road until you reach an intersection. Turn right at the intersection and travel north for another 1.3 miles, staying right. Turn right again to travel northeast and continue for 2.0 miles to a witness post on the left (west) side of the road. The study is 20 paces from the witness post at 43 degrees magnetic; there is no browse tag.

**Site Information**

Land Ownership	Federal
Land Administrator	BLM
Allotment	PETERS POINT
Elevation	7,456ft (2,273m)
Aspect	East
Slope	5%
Sample Dates	07/19/2011, 06/24/2014, 08/21/2018

**Table 14R-25.1 Disturbance History.** Recorded history of major disturbances.

Treatment/Disturbance	Name	WRI DB#	Date	Size (acres)
Mechanical - Bullhog	Peters Point - Phase I	1944	October 2011-May 2012	1253

**Wildlife Habitat and Vegetation History****Table 14R-25.3 - Wildlife Seasonal Habitat.** UDWR wildlife habitat and seasonality.

Species	Habitat	Season
Deer	crucial	spring/fall
Elk	crucial	year-long

**Table 14R-25.4 - 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 transitioning to Phase II
2018	Pinyon-Juniper	Phase II

**Site Notes**

No Notes

**Site Potential**

1981 - 2010 Average Annual Precipitation	16 inches
NRCS Ecological Site	Upland Loam (Mountain Big Sagebrush)
NRCS Ecological Site #	R035XY308UT
States and Transitions	No state and transition model is available for this ecological site.

When established in 2011, this study site was dominated by twoneedle pinyon (*Pinus edulis*) and Utah juniper (*Juniperus osteosperma*) and considered to be within Phase III of woodland succession (Table 14R-25.4). Other browse species were present, but offered little cover. Tree cover decreased following the bullhog project (Table 14R-25.1), but pinyon and juniper have continued to be dominant vegetation components following treatment. Furthermore, tree cover and density increased between 2014 and 2018, indicating that there may be potential for future infilling (Table 14R-25.12, Table 14R-25.13, Table 14R-25.14). The herbaceous understory was moderately abundant prior to treatment, but not diverse: a majority of the cover was provided by muttongrass (*Poa fendleriana*). Perennial herbaceous species have exhibited a post-treatment increase overall, but grasses have continued to lack diversity. The introduced annual grass cheatgrass (*Bromus tectorum*) has been observed in both post-treatment sample years, but in low amounts (Table 14R-25.7, Table 14R-25.10, Table 14R-25.11).

**Trend Summary Tables****Table 14R-25.6 - Shrub/Tree Summary.** Average modified Daubenmire quadrat and line intercept cover by year for shrubs/trees

Year	Quadrat Cover (%)			Line-intercept Cover (%)		
	Preferred Shrub	Other Shrub	Tree	Preferred Shrub	Other Shrub	Tree
2011	0.2	0.1	2.8	0.1	0.3	42.1
2014	-	0.3	5.1	-	0.1	14.2
2018	-	0.5	0.2	-	0.5	21.4

**Table 14R-25.7 - Herbaceous Summary.** Nested frequency and average modified Daubenmire quadrat cover by year for herbaceous functional groups

Year	Nested Frequency				Quadrat Cover (%)			
	Annual Grass	Perennial Grass	Annual/Biennial Forb	Perennial Forb	Annual Grass	Perennial Grass	Annual/Biennial Forb	Perennial Forb
2011	-	237	13	62	-	9.5	0.1	0.9
2014	1	226	65	59	0.0	12.7	1.8	2.3
2018	2	305	7	42	0.0	16.7	0.0	1.6

**Table 14R-25.8 - 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	20.6	4.6	55.8	1.5	4.9	15.3
2014	12.9	0.3	74.2	2.5	3.0	21.9
2018	13.4	0.4	76.4	2.4	3.5	19.3

**Table 14R-25.9 - Pellet Group Data.** Quadrat frequency and pellet group transect data for animal pellets. Rabbit pellet groups are not sampled in the pellet group transect.

Year	Cattle	Mule Deer	Rocky Mountain Elk	Rabbit
	Quadrat Frequency			
2011	-	5	13	10
2014	1	-	2	2
2018	2	14	27	5
Days Use Per Acre (ha)				
2011	5.8 (14.3)	11.4 (28.1)	22.1 (54.6)	-
2014	-	-	12.1 (29.8)	-
2018	3.6 (9.0)	2.7 (6.6)	21.5 (53.0)	-

**Table 14R-25.10 - Grass Species.** Nested frequency and modified Daubenmire average cover by year.

GRASS SPECIES	Nested Frequency					
Achnatherum hymenoides (Indian ricegrass)	10	6	-	-	233	
Bouteloua gracilis (blue grama)	3	8	1	41	185	
Bromus tectorum <sup>ai</sup> (cheatgrass)	7	25	2	101	239	
Elymus elymoides (squirreltail)	Average Cover (%)					
Poa fendleriana (muttongrass)	2011	0.1	0.1	-	-	9.3
	2014	0.6	0.3	0.0	1.5	10.3
	2018	0.9	1.5	0.0	2.4	12.0

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

**Table 14R-25.11 - Forb Species.** Nested frequency and modified Daubenmire average cover by year.

FORB SPECIES	Nested Frequency																
Arabis holboellii <sup>a</sup> (Holboell's rockcress)	13	-	-	-	-	-	-	-	5	3	43	13	-	-	-	-	
Chenopodium fremontii <sup>a</sup> (Fremont's goosefoot)	19	6	18	16	6	2	2	1	1	3	32	23	1	-	3	1	
Descurainia pinnata <sup>a</sup> (western tansymustard)	4	-	-	-	-	4	-	-	-	3	34	-	3	2	-	-	
Draba <sup>a</sup> (draba)	Average Cover (%)																
Gilia inconspicua <sup>a</sup> (shy gilia)	2011	0.1	-	-	-	-	-	-	0.0	0.0	0.9	0.0	-	-	-	-	
Heterotheca villosa (hairy false goldenaster)	2014	0.7	0.0	0.9	0.1	0.1	0.2	0.0	0.0	0.0	1.3	0.7	0.0	-	0.0	0.0	
Lactuca serriola <sup>ai</sup> (prickly lettuce)	2018	0.0	-	-	-	-	0.3	-	-	-	0.0	1.3	-	0.0	0.0	-	
Lappula occidentalis <sup>ai</sup> (flat-spine stickseed)																	
Pedicularis centranthera (dwarf lousewort)																	
Penstemon pachyphyllus (thickleaf beardtongue)																	
Petradoria pumila (rock goldenrod)																	
Physaria rectipes (straight bladderpod)																	
Polygonum douglasii <sup>n</sup> (Douglas' knotweed)																	
Streptanthus cordatus (heartleaf twistflower)																	
Tetraneuris acaulis (stemless four-nerve daisy)																	
Tragopogon dubius <sup>ai</sup> (yellow safsify)																	

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

**Table 14R-25.12 - Shrub and Tree Species.** Average modified Daubenmire quadrat and line intercept cover by year.

SHRUB SPECIES	Artemisia tridentata ssp. vaseyana <sup>p</sup> (mountain big sagebrush)	Gutierrezia sarothrae (broom snakeweed)	Juniperus osteosperma <sup>i</sup> (Utah juniper)	Opuntia (pricklypear)	Pinus edulis <sup>i</sup> (twoneedle pinyon)
year	Line Intercept Cover (%)				
2011	0.1	0.1	21.5	0.2	20.6
2014	-	-	4.2	0.1	10
2018	-	0.4	11.1	0.1	10.3
year	Quadrat Cover (%)				
2011	0.2	0.0	0.4	0.1	2.4
2014	-	0.1	1.0	0.2	4.1
2018	-	0.5	0.0	0.0	0.2

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

**Table 14R-25.13 - Shrub/Tree Characteristics.** Population characteristics of shrub/tree species populations including density reproduction (seedlings), age distribution, utilization, vigor and average size (height/crown) of plants.

Year	Density		Age Class Distribution			Utilization		Poor Vigor (%)	Average Height Crown (cm)
	Plants Per Acre		Excluding Seedlings			Moderate (%)	Heavy (%)		
	Excluding Seedlings	Seedling	Young (%)	Mature (%)	Decadent (%)				
<b>Artemisia tridentata ssp. vaseyana<sup>p</sup> -- (mountain big sagebrush)</b>									
2011	60	-	0	33	67	0	67	33	31/65
2014	20	-	0	100	0	0	0	0	34/57
2018	20	-	0	100	0	0	0	0	30/67
<b>Cercocarpus montanus<sup>p</sup> -- (alderleaf mountain mahogany)</b>									
2011	-	-	-	-	-	-	-	-	67/73
2014	-	-	-	-	-	-	-	-	50/56
2018	-	-	-	-	-	-	-	-	78/83
<b>Echinocereus mojavnensis -- (Mojave kingcup cactus)</b>									
2011	-	-	-	-	-	-	-	-	-/-
2014	-	-	-	-	-	-	-	-	5/20
2018	-	-	-	-	-	-	-	-	7/11
<b>Gutierrezia sarothrae -- (broom snakeweed)</b>									
2011	40	-	0	100	0	0	0	0	13/16
2014	340	-	77	24	0	18	0	0	20/32
2018	1160	-	10	86	3	0	0	3	13/25
<b>Juniperus osteosperma<sup>i</sup> -- (Utah juniper)</b>									
2011	100	-	0	0	100	0	0	60	-/-
2014	20	-	0	0	100	0	0	100	-/-
2018	40	-	0	50	50	0	0	50	-/-
<b>Opuntia -- (pricklypear)</b>									
2011	320	-	31	69	0	0	0	0	8/29
2014	220	-	36	55	9	0	0	9	10/28
2018	160	-	13	88	0	0	0	0	7/20
<b>Pediocactus simpsonii -- (mountain ball cactus)</b>									
2011	-	-	-	-	-	-	-	-	8/32
2014	-	-	-	-	-	-	-	-	-/-
2018	-	-	-	-	-	-	-	-	-/-



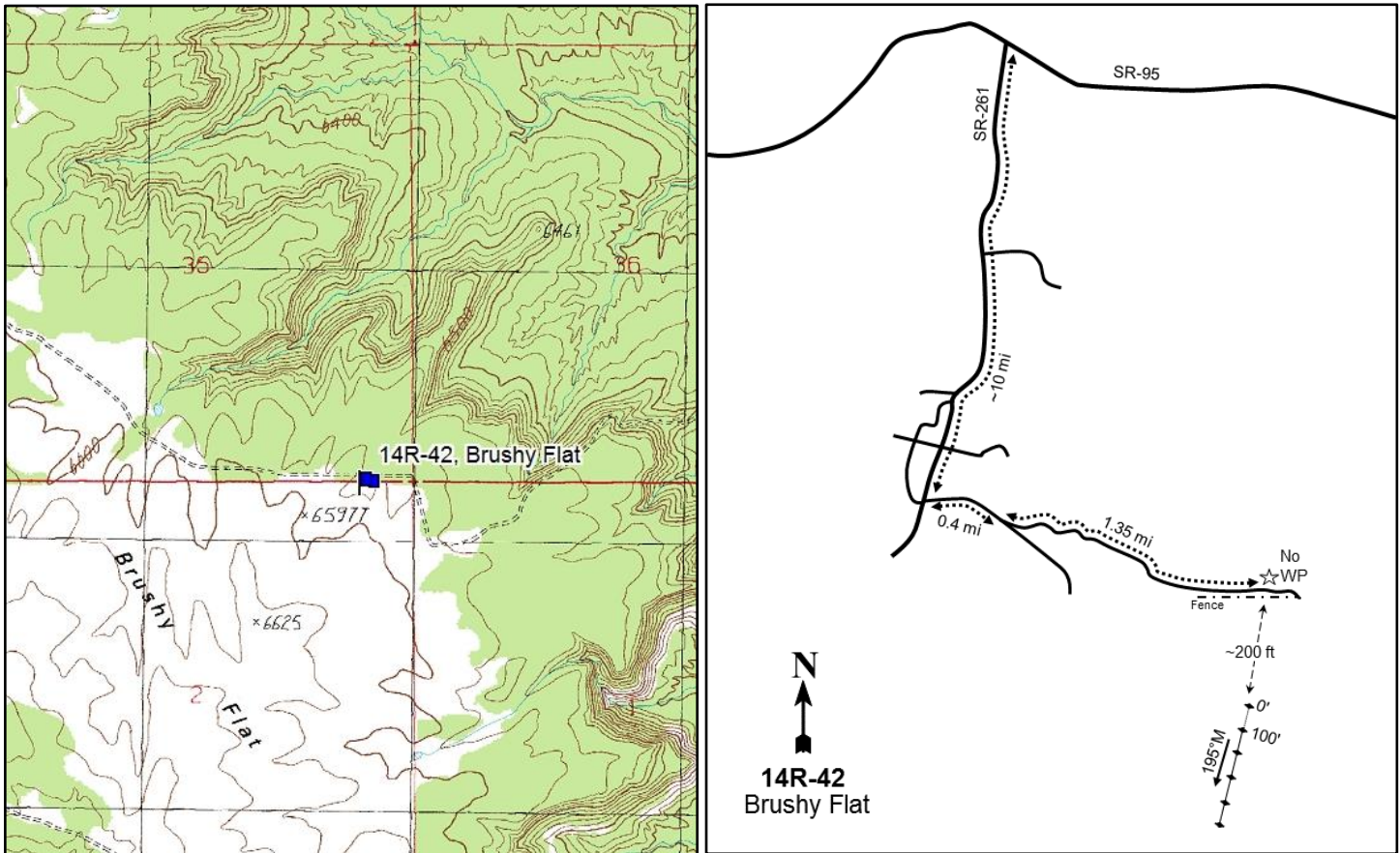
Year	Density		Age Class Distribution			Utilization		Poor Vigor (%)	Average Height Crown (cm)
	Plants Per Acre		Excluding Seedlings			Moderate (%)	Heavy (%)		
	Excluding Seedlings	Seedling	Young (%)	Mature (%)	Decadent (%)				
<b>Pinus edulis<sup>t</sup> -- (twoneedle pinyon)</b>									
2011	180	20	22	22	56	11	0	22	- / -
2014	60	40	67	33	0	0	0	0	- / -
2018	140	20	57	43	0	0	0	0	- / -
<b>Yucca baccata -- (banana yucca)</b>									
2011	-	-	-	-	-	-	-	-	18/29
2014	-	-	-	-	-	-	-	-	14/116
2018	-	-	-	-	-	-	-	-	31/48

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

**Table 14R-25.14 - Tree Characteristics.** Point-quarter tree density, size class distribution, and average diameter.

Year	Density	Size Class Distribution					Average Diameter (cm)
	Trees per Acre	Seedling (%)	1-4' (%)	4-8' (%)	8-12' (%)	>12' (%)	
<b>Juniperus osteosperma (Utah juniper)</b>							
2011	62	-	5	11	-	84	37.9
2014	26	-	-	-	8	92	60.4
2018	53	21	-	-	7	71	41.7
<b>Pinus edulis (twoneedle pinyon)</b>							
2011	122	-	10	10	-	80	22.8
2014	34	-	20	-	-	80	31.5
2018	71	50	13	-	-	38	15.3

## BRUSHY FLAT - STUDY NO. 14R-42

**Location Information**

USGS 7.5 min Map Info  
GPS (0' Stake)

Cedar Mesa North SE; Township 39S, Range 18E, Section 02  
NAD 83 UTM ZONE 12, 597735 East 4143373 North

**Transect Information**

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

Not Available  
195° magnetic  
500ft  
Line 1 (11ft), Line 2 (34ft), Line 3 (59ft), Line 4 (71ft), Line 5 (95ft)  
No Rebar or Stakes

**Directions to Site**

Traveling west on SR-95, turn left (south) onto SR-261 and drive for approximately 10 miles. Turn left (east) onto Snow Flat Road and continue for 0.4 miles to a fork. Bear left, proceed for 1.35 miles, and park; there is no witness post. The study is approximately 200 feet south of the road (you will cross a fence). As there are no stakes or rebar, a GPS should be used to navigate to the exact location of the transect.

**Site Information**

Land Ownership	Private
Land Administrator	Private
Allotment	SLICKHORN
Elevation	No data
Aspect	North
Slope	3%
Sample Dates	08/20/2018

**Table 14R-42.1 Disturbance History.** Recorded history of major disturbances.

Treatment/Disturbance	Name	WRI DB#	Date	Size (acres)
Seeding - Aerial Before	Cedar Mesa "Buck Pasture" Seeding (Proposed)	4423	2018	588
Mechanical - Bullhog	Cedar Mesa "Buck Pasture" Seeding (Proposed)	4423	2018	588
Agriculture - Dry Farm	-	-	Historic	-

**Wildlife Habitat and Vegetation History****Table 14R-42.3 - Wildlife Seasonal Habitat.** UDWR wildlife habitat and seasonality.

Species	Habitat	Season
Deer	crucial	winter

**Site Notes**

No Notes

**Site Potential**

1981 - 2010 Average Annual Precipitation	12 inches
NRCS Ecological Site	Upland Loam (Mountain Big Sagebrush)
NRCS Ecological Site #	R035XY308UT
States and Transitions	No state and transition model is available for this ecological site.

Upon study establishment in 2018, this site was dominated by weedy annual forbs, mainly prickly Russian thistle (*Salsola tragus*). Perennial forbs were also present with a moderate amount of cover being contributed by sandmat (*Chamaesyce sp.*). The only grasses observed on site were the introduced annual species cheatgrass (*Bromus tectorum*) and cereal rye (*Secale cereale*), and both offered little cover (Table 14R-42.7, Table 14R-42.10, Table 14R-42.11). The shrub component was also sparse with mountain big sagebrush (*Artemisia tridentata ssp. vaseyana*) offering what little browse cover was observed (Table 14R-42.12, Table 14R-42.13). This study site would likely continue to remain dominated by weedy annual species without treatment. However, data collected during the next sampling will likely show that a seeding scheduled for later in 2018 (Table 14R-42.1) has yielded diversified herbaceous and shrub components.

**Trend Summary Tables****Table 14R-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
2018	0.9	-	-	3.3	-	-

**Table 14R-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
2018	68	-	280	298	0.5	-	19.2	10.3

**Table 14R-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
2018	40.8	-	51.6	-	0.0	28.3

**Table 14R-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	Coyote	Mule Deer	Rocky Mountain Elk	Rabbit
	Quadrat Frequency				
2018	1	-	4	3	5
Year	Days Use Per Acre (ha)				
2018	19.6 (48.4)	17.4 (43.0)*	6.7 (16.6)	4.7 (11.6)	-

\*Pellets per acre (ha)

**Table 14R-42.10 - Grass Species.** Nested frequency and modified Daubenmire average cover by year.

GRASS SPECIES	Nested Frequency	
	year	Nested Frequency
Bromus tectorum <sup>ai</sup> (cheatgrass)	2018	64
		6
Secale cereale <sup>ui</sup> (cereal rye)	year	Average Cover (%)
	2018	0.4
		0.0

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

**Table 14R-42.11 - Forb Species.** Nested frequency and modified Daubenmire average cover by year.

FORB SPECIES	Nested Frequency								
Amaranthus <sup>ai</sup> (pigweed)	161	7	290	1	69	92	7	8	5
Bassia scoparia <sup>ai</sup> (burningbush)									
Chamaesyce (sandmat)									
Chenopodium leptophyllum <sup>a</sup> (narrowleaf goosefoot)									
Portulaca oleracea <sup>ai</sup> (litttle hogweed)									
Salsola tragus <sup>ai</sup> (prickly Russian thistle)									
Sisymbrium altissimum <sup>ai</sup> (tall tumbleweed)									
Sphaeralcea parvifolia (smallflower globemallow)									
Tragopogon dubius <sup>ai</sup> (yellow salsify)									
year	Average Cover (%)								
2018	4.5	1.0	9.2	0.0	0.2	13.3	0.2	1.1	0.0

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

**Table 14R-42.12 - Shrub and Tree Species.** Average modified Daubenmire quadrat and line intercept cover by year.

SHRUB SPECIES	Line Intercept Cover (%)
Artemisia tridentata ssp. vaseyana <sup>p</sup> (mountain big sagebrush)	3.3
year	Quadrat Cover (%)
2018	0.9

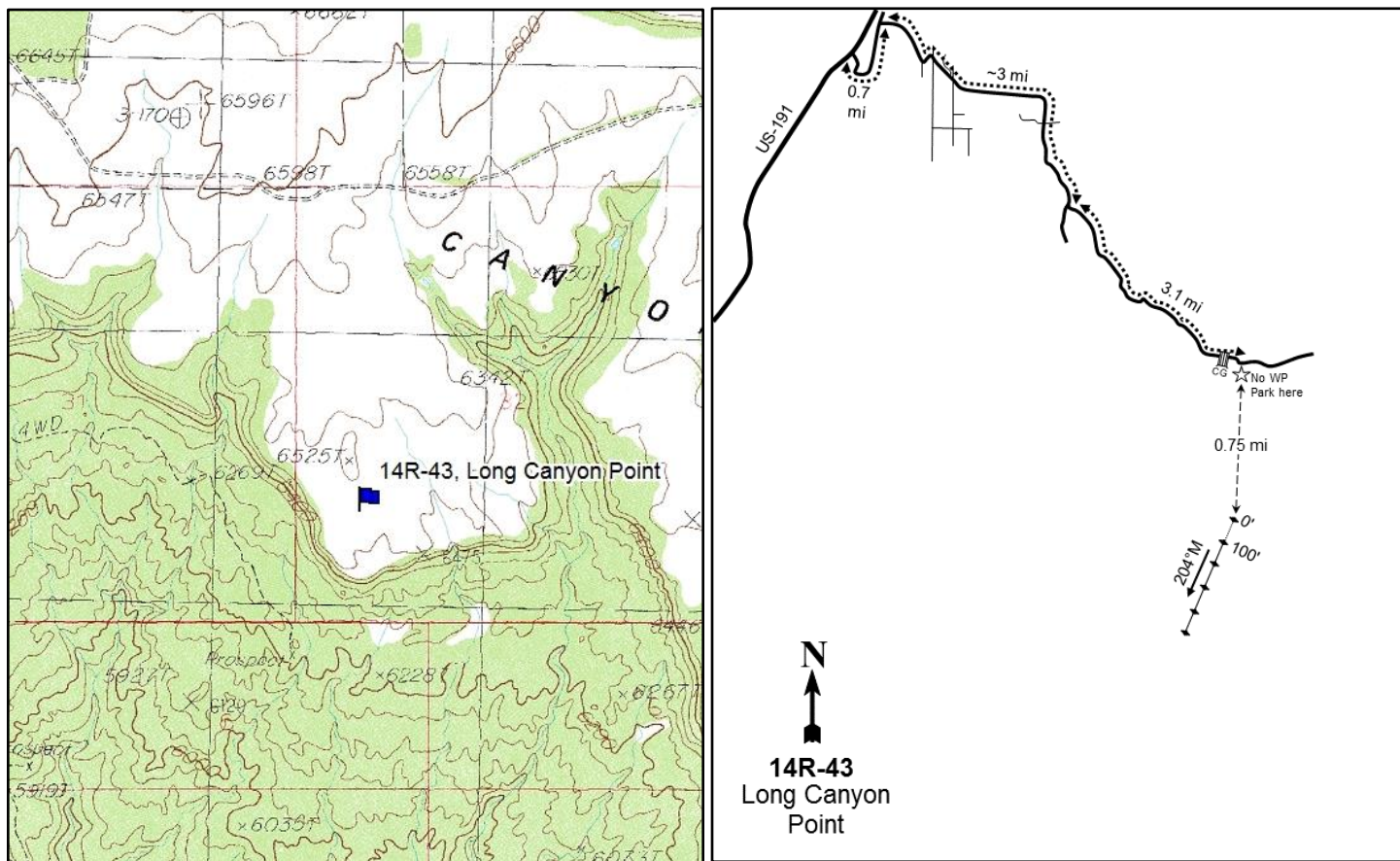
t - Tree Species; p - Preferred Browse; i - Introduced Species

**Table 14R-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 (%)				
Artemisia tridentata ssp. vaseyana <sup>p</sup> -- (mountain big sagebrush)									
2018	40	-	0	100	0	0	0	0	63/133
Ericameria nauseosa -- (rubber rabbitbrush)									
2018	-	-	-	-	-	-	-	-	105/174
Opuntia -- (pricklypear)									
2018	-	-	-	-	-	-	-	-	21/73

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

## LONG CANYON POINT - STUDY NO. 14R-43

**Location Information**

USGS 7.5 min Map Info  
GPS (0' Stake)

Devil Mesa NW; Township 35S, Range 24E, Section 32  
NAD 83 UTM ZONE 12, 648483 East 4172543 North

**Transect Information**

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

Not Available  
204° magnetic  
500ft  
Line 1 (11ft), Line 2 (34ft), Line 3 (59ft), Line 4 (71ft), Line 5 (95ft)  
No Rebar or Stakes

**Directions to Site**

Traveling south on US-191, turn left (east) onto Long Canyon Highway. Proceed for 0.7 miles, looping back north, to a road on the right (east). Turn right onto East Long Canyon Point Road and drive for 6.1 miles, passing a cattle guard, and park; there is no witness post. The study site is approximately 0.75 miles south of the road. There are no stakes or rebar markers, so use a GPS to navigate to the transect.



**Site Information**

Land Ownership	State
Land Administrator	SITLA
Allotment	MONTEZUMA CANYON
Elevation	No data
Aspect	South
Slope	2%
Sample Dates	08/21/2018

**Table 14R-43.1 Disturbance History.** Recorded history of major disturbances.

Treatment/Disturbance	Name	WRI DB#	Date	Size (acres)
Mechanical - Bullhog	Devil's Canyon (Proposed)	4476	2018	450
Seeding - Aerial Before	Devil's Canyon (Proposed)	4476	2018	450
Seeding - Aerial After	Devil's Canyon (Proposed)	4476	2018	450
Chaining - Chain Unknown	-	-	1972	-
Seeding - Aerial Unknown	-	-	1972	-

**Wildlife Habitat and Vegetation History****Table 14R-43.3 - Wildlife Seasonal Habitat.** UDWR wildlife habitat and seasonality.

Species	Habitat	Season
Deer	crucial	spring/fall

**Table 14R-43.4 - Vegetation History.** The dominant vegetation type(s) and phase of woodland succession (Tausch, Miller, Roundy, & Chambers, 2009).

Year	Vegetation Type	Woodland Succession
2018	Pinyon-Juniper/Mountain Big Sagebrush	Phase II

**Site Notes**

No Notes

**Site Potential**

1981 - 2010 Average Annual Precipitation	14 inches
NRCS Ecological Site	Upland Loam (Mountain Big Sagebrush)
NRCS Ecological Site #	R035XY308UT
States and Transitions	No state and transition model is available for this ecological site.

Upon study establishment in 2018, this site was considered to be in Phase II of woodland succession (Table 14R-43.4) and dominated by twoneedle pinyon (*Pinus edulis*) and Utah juniper (*Juniperus osteosperma*). The shrub component was moderately abundant, with mountain big sagebrush (*Artemisia tridentata* ssp. *vaseyana*) providing a majority of the cover (Table 14R-43.12, Table 14R-43.13, Table 14R-43.14). The herbaceous understory was sparse in both abundance and biodiversity (Table 14R-43.7, Table 14R-43.10, Table 14R-43.11). Barring the occurrence of a tree-removing disturbance, encroachment of pinyon and juniper would likely continue. However, a bullhog and seeding treatment scheduled for later in 2018 (Table 14R-43.1) will have likely removed a majority of the tree component and increased shrub and herbaceous diversity and abundance.



**Trend Summary Tables**

**Table 14R-43.6 - Shrub/Tree Summary.** Average modified Daubenmire quadrat and line intercept cover by year for shrubs/trees

Year	Quadrat Cover (%)			Line-intercept Cover (%)		
	Preferred Shrub	Other Shrub	Tree	Preferred Shrub	Other Shrub	Tree
2018	5.3	0.3	13.9	10.2	0.4	19.7

**Table 14R-43.7 - Herbaceous Summary.** Nested frequency and average modified Daubenmire quadrat cover by year for herbaceous functional groups

Year	Nested Frequency				Quadrat Cover (%)			
	Annual Grass	Perennial Grass	Annual/Biennial Forb	Perennial Forb	Annual Grass	Perennial Grass	Annual/Biennial Forb	Perennial Forb
2018	-	9	-	15	-	0.2	-	0.2

**Table 14R-43.8 - 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
2018	60.7	2.7	38.0	1.0	0.2	20.5

**Table 14R-43.9 - Pellet Group Data.** Quadrat frequency and pellet group transect data for animal pellets. Rabbit pellet groups are not sampled in the pellet group transect.

Year	Cattle	Mule Deer	Rabbit
	Quadrat Frequency		
2018	1	3	27
Year	Days Use Per Acre (ha)		
2018	2.9 (7.2)	4.7 (11.6)	-

**Table 14R-43.10 - Grass Species.** Nested frequency and modified Daubenmire average cover by year.

GRASS SPECIES	Nested Frequency	
	year	Nested Frequency
<i>Elymus elymoides</i> (squirreltail)	2018	2
<i>Hesperostipa comata</i> (needle and thread)	2018	7
GRASS SPECIES	Average Cover (%)	
<i>Elymus elymoides</i> (squirreltail)	2018	0.0
<i>Hesperostipa comata</i> (needle and thread)	2018	0.2

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

**Table 14R-43.11 - Forb Species.** Nested frequency and modified Daubenmire average cover by year.

FORB SPECIES	Nested Frequency		
	Penstemon (beardtongue)	2	7
Petroragia pumila (rock goldenrod)			
Phlox austromontana (mountain phlox)			
year	Average Cover (%)		
2018	0.0	0.1	0.1

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

**Table 14R-43.12 - Shrub and Tree Species.** Average modified Daubenmire quadrat and line intercept cover by year.

SHRUB SPECIES	Line Intercept Cover (%)								
	Artemisia tridentata ssp. vaseyana <sup>p</sup> (mountain big sagebrush)	8.5	-	0.6	0.3	0.1	8.4	11.3	1.1
Chrysothamnus viscidiflorus (yellow rabbitbrush)									
Ephedra viridis <sup>p</sup> (mormon tea)									
Ericameria nauseosa (rubber rabbitbrush)									
Gutierrezia sarothrae (broom snakeweed)									
Juniperus osteosperma <sup>i</sup> (Utah juniper)									
Pinus edulis <sup>i</sup> (twoneedle pinyon)									
Purshia stansburiana <sup>p</sup> (Stansbury cliffrose)									
year	Quadrat Cover (%)								
2018	4.7	0.0	0.5	0.0	0.3	6.0	8.0	0.0	

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

**Table 14R-43.13 - Shrub/Tree Characteristics.** Population characteristics of shrub/tree species populations including density reproduction (seedlings), age distribution, utilization, vigor and average size (height/crown) of plants.

Year	Density		Age Class Distribution			Utilization		Poor Vigor (%)	Average Height Crown (cm)
	Plants Per Acre		Excluding Seedlings			Moderate (%)	Heavy (%)		
	Excluding Seedlings	Seedling	Young (%)	Mature (%)	Decadent (%)				
<b>Amelanchier utahensis<sup>p</sup> -- (Utah serviceberry)</b>									
2018	-	-	-	-	-	-	-	-	- / -
<b>Artemisia tridentata ssp. vaseyana<sup>p</sup> -- (mountain big sagebrush)</b>									
2018	1940	-	13	76	10	2	0	45	63/100
<b>Chrysothamnus depressus<sup>p</sup> -- (longflower rabbitbrush)</b>									
2018	-	-	-	-	-	-	-	-	- / -
<b>Chrysothamnus viscidiflorus ssp. viscidiflorus var. stenophyllus -- (yellow rabbitbrush)</b>									
2018	20	-	0	0	100	0	100	100	26/44
<b>Ephedra viridis<sup>p</sup> -- (mormon tea)</b>									
2018	320	-	50	38	13	0	0	13	60/64
<b>Eriogonum microthecum<sup>p</sup> -- (slender buckwheat)</b>									
2018	-	-	-	-	-	-	-	-	4/7
<b>Ericameria nauseosa -- (rubber rabbitbrush)</b>									
2018	40	-	0	0	100	0	0	100	82/103

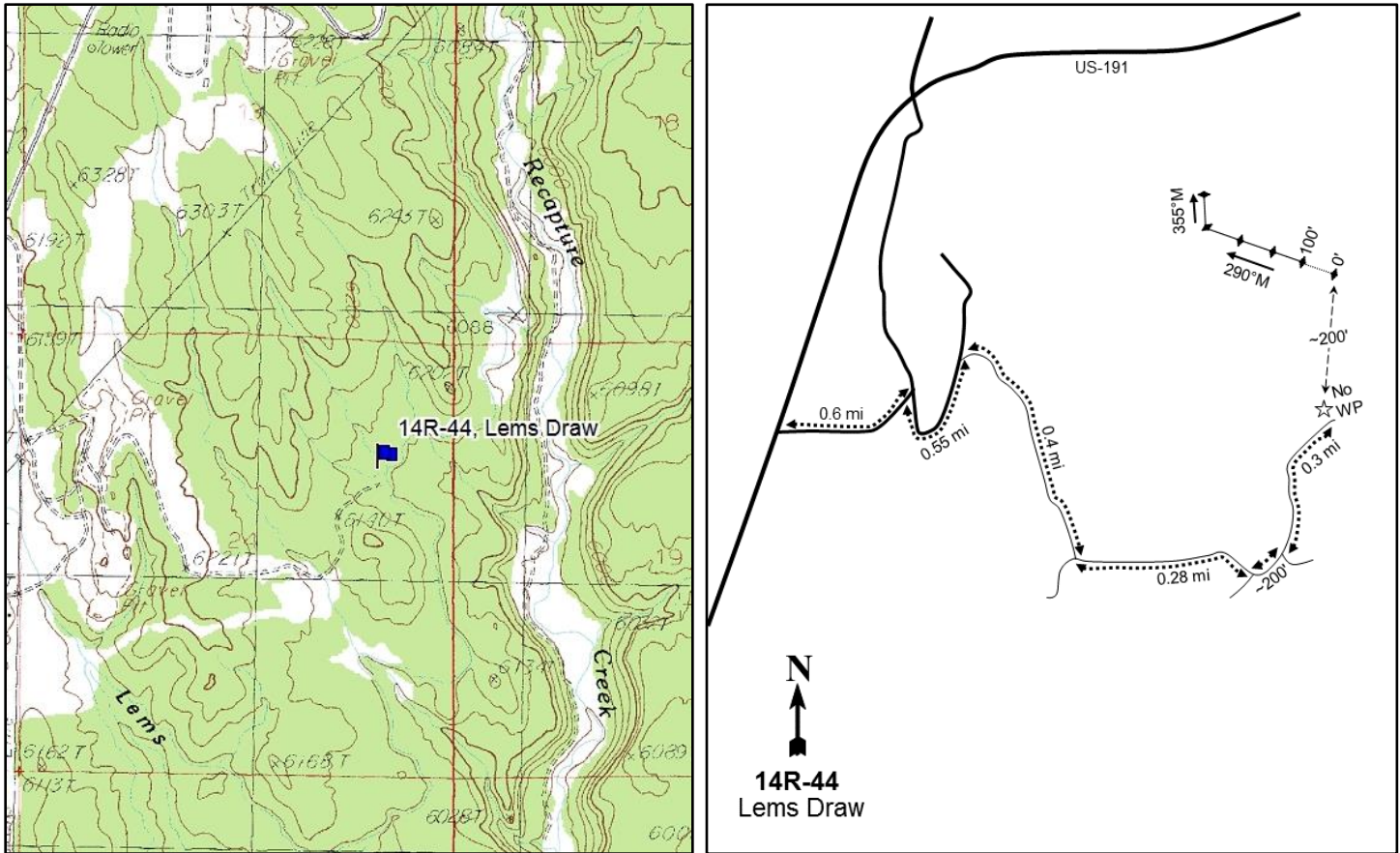
Year	Density		Age Class Distribution			Utilization		Poor Vigor (%)	Average Height Crown (cm)
	Plants Per Acre		Excluding Seedlings			Moderate (%)	Heavy (%)		
	Excluding Seedlings	Seedling	Young (%)	Mature (%)	Decadent (%)				
Gutierrezia sarothrae -- (broom snakeweed)									
2018	860	-	0	42	58	0	0	72	10/13
Juniperus osteosperma <sup>i</sup> -- (Utah juniper)									
2018	100	-	20	80	0	0	0	40	- / -
Opuntia polyacantha -- (plains pricklypear)									
2018	-	-	-	-	-	-	-	-	6/7
Pinus edulis <sup>t</sup> -- (twoneedle pinyon)									
2018	200	20	20	80	0	0	0	0	- / -
Purshia stansburiana <sup>p</sup> -- (Stansbury cliffrose)									
2018	20	-	0	0	100	0	0	0	169/230
Yucca -- (yucca)									
2018	-	-	-	-	-	-	-	-	41/49

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

**Table 14R-43.14 - Tree Characteristics.** Point-quarter tree density, size class distribution, and average diameter.

Year	Density	Size Class Distribution					Average Diameter (cm)
	Trees per Acre	Seedling (%)	1-4' (%)	4-8' (%)	8-12' (%)	>12' (%)	
Juniperus osteosperma (Utah juniper)							
2018	115	-	5	15	45	35	16.2
Pinus edulis (twoneedle pinyon)							
2018	91	-	13	38	25	25	9.4

## LEMS DRAW - STUDY NO. 14R-44

**Location Information**

USGS 7.5 min Map Info  
GPS (0' Stake)

Blanding North SW; Township 36S, Range 22E, Section 24  
NAD 83 UTM ZONE 12, 637373 East 4167615 North

**Transect Information**

Browse Tag # (0' Stake)	Not Available
Transect Bearing	290° magnetic (Line 5: 355° magnetic)
Length	500ft
Belt Placement	Line 1 (11ft), Line 2 (34ft), Line 3 (59ft), Line 4 (71ft), Line 5 (95ft)
Belt Marker Placement	No Rebar or Stakes

**Directions to Site**

Traveling north from Blanding, turn right (east) onto East Kiva Drive. Continue for 0.6 miles to a "T"-junction with North Beeson road and North Lems Draw Road. Turn right (south) onto North Lems Draw Road and follow this road for approximately 0.55 miles. Turn right (east) and drive for 0.4 miles, then turn left (east). Continue for about 0.28 miles, passing a number of other roads, to a fork. Bear left and drive for 100 feet to another fork. Proceed to the left (north), continue for roughly 0.3 miles, and park; there is no witness post. The study site is about 200 feet northeast of the road. There are no stakes or rebar markers, so use a GPS to navigate to the exact location of the transect.

**Site Information**

Land Ownership	Federal
Land Administrator	BLM
Allotment	BULLDOG
Elevation	No data
Aspect	No data
Slope	No data
Sample Dates	08/21/2018

**Table 14R-44.1 Disturbance History.** Recorded history of major disturbances.

Treatment/Disturbance	Name	WRI DB#	Date	Size (acres)
Mechanical - Bullhog	Blanding East Phase III (Proposed)	4323	2018	233
Hand Crew - Lop and Scatter	Blanding East Phase III	4323	November 2018	233

**Wildlife Habitat and Vegetation History****Table 14R-44.3 - Wildlife Seasonal Habitat.** UDWR wildlife habitat and seasonality.

Species	Habitat	Season
Deer	crucial	spring/fall
Elk	crucial	winter

**Table 14R-44.4 - Vegetation History.** The dominant vegetation type(s) and phase of woodland succession (Tausch, Miller, Roundy, & Chambers, 2009).

Year	Vegetation Type	Woodland Succession
2018	Pinyon-Juniper	Phase III

**Site Notes**

Exact transect bearings were not taken when the study was established: these will need to be collected during the next sampling.

**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 site was dominated by Utah juniper (*Juniperus osteosperma*) and twoneedle pinyon (*Pinus edulis*) upon study establishment in 2018 and was considered to be within Phase III of woodland succession (Table 14R-44.4). Other browse species were present, but offered much less cover (Table 14R-44.12, Table 14R-44.13, Table 14R-44.14). The understory was extremely limited, with all of the herbaceous cover being provided by annual and perennial forbs (Table 14R-44.7, Table 14R-44.10, Table 14R-44.11). This study site would likely continue to remain in a tree-dominated and ecologically degraded state without a major disturbance. However, data collected during the next sample year will likely show that a 2018 bullhog and lop and scatter project (Table 14R-44.1) will have removed most of the trees, allowing the herbaceous and shrub components to increase and diversify.

**Trend Summary Tables**

**Table 14R-44.6 - 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
2018	0.5	0.3	10.2	3.2	0.4	28.6

**Table 14R-44.7 - 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
2018	-	-	3	1	-	-	0.0	0.0

**Table 14R-44.8 - 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
2018	48.6	1.6	40.0	7.9	6.6	11.8

**Table 14R-44.9 - 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	
2018	6	6
Year	Days Use Per Acre (ha)	
2018	12.8 (31.5)	
		-

**Table 14R-44.10 - Grass Species.** Nested frequency and modified Daubenmire average cover by year.

GRASS SPECIES	No Grasses Found
year	Nested Frequency
year	Average Cover (%)

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

**Table 14R-44.11 - Forb Species.** Nested frequency and modified Daubenmire average cover by year.

FORB SPECIES		
	Lactuca serriola <sup>ai</sup> (prickly lettuce)	
	Physaria (twinpod)	
year	Nested Frequency	
2018	3	1
year	Average Cover (%)	
2018	0.0	0.0

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

**Table 14R-44.12 - Shrub and Tree Species.** Average modified Daubenmire quadrat and line intercept cover by year.

SHRUB SPECIES										
	Artemisia nova <sup>p</sup> (black sagebrush)		Chrysothamnus viscidiflorus (yellow rabbitbrush)		Ephedra viridis <sup>p</sup> (mormon tea)		Gutierrezia sarothrae (broom snakeweed)		Juniperus osteosperma <sup>i</sup> (Utah juniper)	
	Pinus edulis <sup>i</sup> (twoneedle pinyon)		Purshia tridentata <sup>p</sup> (antelope bitterbrush)		Quercus gambelii <sup>p</sup> (Gambel oak)					
year	Line Intercept Cover (%)									
2018	0.6	0.2	2	0.2	16	12.6	0.6	0		
year	Quadrat Cover (%)									
2018	0.1	0.0	0.3	0.2	5.3	5.0	0.1	0.0		

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



**Table 14R-44.13 - 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.

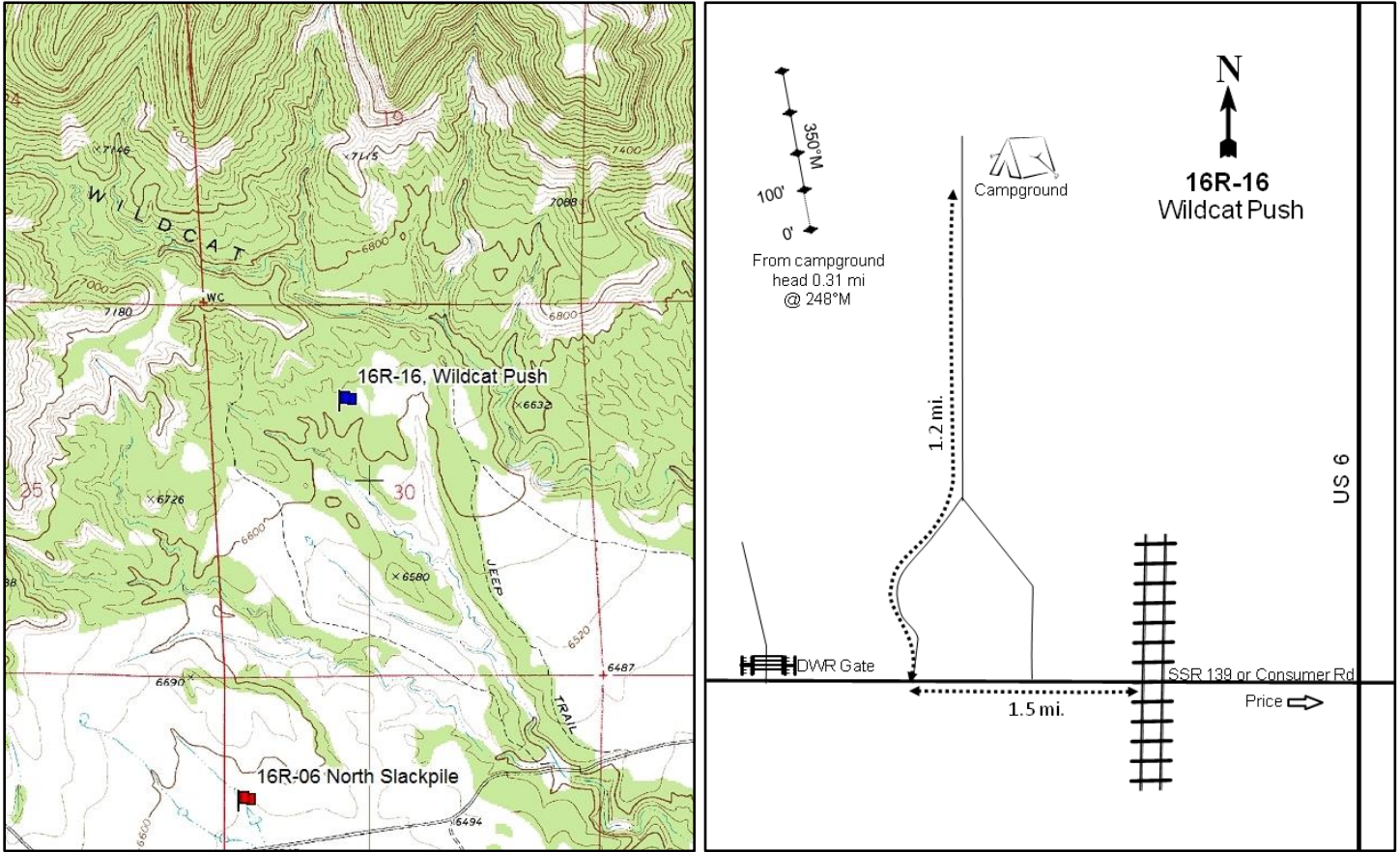
Year	Density		Age Class Distribution			Utilization		Poor Vigor (%)	Average Height Crown (cm)
	Plants Per Acre		Excluding Seedlings			Moderate (%)	Heavy (%)		
	Excluding Seedlings	Seedling	Young (%)	Mature (%)	Decadent (%)				
<b>Amelanchier utahensis<sup>p</sup> -- (Utah serviceberry)</b>									
2018	20	-	0	0	100	0	100	100	202/212
<b>Artemisia nova<sup>p</sup> -- (black sagebrush)</b>									
2018	280	-	0	7	93	14	0	93	25/45
<b>Chrysothamnus viscidiflorus ssp. viscidiflorus var. stenophyllus -- (yellow rabbitbrush)</b>									
2018	20	-	0	0	100	0	0	100	44/72
<b>Ephedra viridis<sup>p</sup> -- (mormon tea)</b>									
2018	100	-	0	20	80	80	0	80	52/80
<b>Gutierrezia sarothrae -- (broom snakeweed)</b>									
2018	360	-	0	28	72	0	0	78	11/20
<b>Juniperus osteosperma<sup>t</sup> -- (Utah juniper)</b>									
2018	160	-	25	38	38	0	0	63	- / -
<b>Opuntia polyacantha -- (plains pricklypear)</b>									
2018	20	-	0	100	0	0	0	100	10/21
<b>Pinus edulis<sup>t</sup> -- (twoneedle pinyon)</b>									
2018	160	-	25	63	13	0	0	0	- / -
<b>Purshia tridentata<sup>p</sup> -- (antelope bitterbrush)</b>									
2018	120	-	0	0	100	33	0	100	23/59
<b>Quercus gambelii<sup>p</sup> -- (Gambel oak)</b>									
2018	80	-	0	0	100	0	0	100	73/20

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

**Table 14R-44.14 - 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' (%)	
<b>Juniperus osteosperma (Utah juniper)</b>							
2018	194	5	15	15	20	45	27.5
<b>Pinus edulis (twoneedle pinyon)</b>							
2018	119	-	33	33	33	-	12.1

## WILDCAT PUSH - STUDY NO. 16R-16



### Location Information

USGS 7.5 min Map Info	Standardville SW; Township 13S, Range 9E, Section 30
GPS (0' Stake)	NAD 83 UTM ZONE 12, 503387 East 4391049 North

### Transect Information

Browse Tag # (0' Stake)	80
Transect Bearing	8° magnetic
Length	400ft
Belt Placement	Line 1 (11ft & 95ft), Line 2 (34ft), Line 3 (59ft), Line 4 (71ft)
Belt Marker Placement	Standard

### Directions to Site

Drive west on SR-139 for 3.2 miles to a railroad crossing from the junction of US-6 and SR-139 in Price. Drive over the railroad tracks and continue 1.5 miles to road on the right (north). Turn right onto this road and drive 1.2 miles to a campground on the right (east) side of the road; park at the campground. From the west side of the road, walk 0.31 miles at 248 degrees magnetic to the 0-foot stake which is marked with browse tag #80.

**Site Information**

Land Ownership	State
Land Administrator	UDWR
Allotment	GORDON CRK WITHDRAWAL
Elevation	6,630ft (2,021m)
Aspect	South
Slope	5-6%
Sample Dates	07/21/2005, 08/16/2010, 07/22/2014, 08/13/2018

**Table 16R-16.1 Disturbance History.** Recorded history of major disturbances.

Treatment/Disturbance	Name	WRI DB#	Date	Size (acres)
Mechanical - Roller Chopper	Wildcat Canyon P-J Removal	32	October-November 2007	140
Seeding - Aerial Before	Wildcat Canyon P-J Removal	32	October 2007	140
Seeding - Dribbler	Wildcat Canyon P-J Removal	32	October-November 2007	140

**Table 16R-16.2 Seed Mix.** List of known seeded plant species and rates (if available).

Mix Name			Application Type	Application Date	Acres
Wildcat Canyon PJ Removal			Aerial	Oct 2007	205
Type	Species	Common Name	Cultivar/Source ID	Bulk lbs/acre	PLS
G	Achnatherum hymenoides	Indian Ricegrass	Rimrock	1.46	1.27
G	Agropyron cristatum	Crested Wheatgrass	Douglas	0.49	0.41
G	Agropyron cristatum	Crested Wheatgrass	Ephraim	0.49	0.44
G	Bouteloua gracilis	Blue Grama		0.98	0.64
G	Elymus lanceolatus	Thickspike Wheatgrass	Bannock	1.22	1.14
G	Poa secunda	Sandberg Bluegrass	Mountain Home ID	0.49	0.45
G	Poa secunda	Canby Bluegrass	Canbar	0.49	0.43
G	Psathyrostachys juncea	Russian Wildrye		0.49	0.41
G	Pseudoroegneria spicata	Bluebunch Wheatgrass	Anatone	1.22	1.04
G	Purshia stansburiana	Snake River Wheatgrass	Secar	0.98	0.79
G	Thinopyrum intermedium	Pubescent Wheatgrass		0.98	0.82
G	Thinopyrum ponticum	Tall Wheatgrass	Alkar	0.73	0.67
F	Cleome serrulata	Rocky Mountain Beeplant	Sanpete UT	0.24	0.24
F	Medicago sativa	Alfalfa	Ladak	0.98	0.90
F	Medicago sativa	Alfalfa	Ranger	0.98	0.87
F	Medicago sativa	Alfalfa	Spreador 4	0.73	0.70
S	Artemisia tridentata ssp. wyomingensis	Wyoming Big Sagebrush	Sanpete UT	0.49	0.15
S	Atriplex canescens	Fourwing Saltbush	Juab/Millard UT	0.12	0.05
Mix Name			Application Type	Application Date	Acres
Wildcat Canyon PJ Removal Dribbler			Dribbler	Oct 2007	205
Type	Species	Common Name	Cultivar/Source ID	Bulk lbs/acre	PLS
S	Atriplex canescens	Fourwing Saltbush	Juab/Millard UT	0.37	0.14
S	Ephedra viridis	Green Ephedra	Grand UT	0.12	0.11

**Wildlife Habitat and Vegetation History****Table 16R-16.3 - Wildlife Seasonal Habitat.** UDWR wildlife habitat and seasonality.

Species	Habitat	Season
Deer	crucial	winter
Elk	crucial	winter

**Table 16R-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	Juniper	Phase II transitioning to Phase III
2010	Perennial Grass	Phase I
2014	Perennial Grass	Phase I
2018	Perennial Grass	Phase I

**Site Notes****Soils****Table 16R-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
Clay Loam	7.2	42.4	28.4	29.2	1.9	5.5	83.2	0.5	07/21/2005

### Site Potential

1981 - 2010 Average Annual Precipitation	14 inches
NRCS Ecological Site	Upland Loam (Mountain Big Sagebrush-Indian Ricegrass)
NRCS Ecological Site #	R047XB308UT
States and Transitions	No state and transition model is available for this ecological site.

This plant community on this site was dominated by Utah juniper (*Juniperus osteosperma*) upon study establishment in 2005 and was considered to be within Phase II transitioning to Phase III of woodland succession. Twoneedle pinyon (*Pinus edulis*) trees and shrubs such as black sagebrush (*Artemisia nova*) were also present, but in much lesser amounts; tree cover decreased significantly following a 2007 roller chopper treatment. Although cover of browse species has remained low, it has exhibited a slightly increasing trend over the post-treatment years (Photos, Table 16R-16.1, Table 16R-16.4, Table 16R-16.12, Table 16R-16.13). Prior to treatment, the herbaceous understory was primarily comprised of annual forbs with a minor perennial grass component. Perennial grasses such as saline wildrye (*Leymus salinus*) and bluebunch wheatgrass (*Pseudoroegneria spicata*) increased in cover and frequency and have been the dominant vegetation component since 2010. The introduced annual grass species cheatgrass (*Bromus tectorum*) has been observed in all sample years, but in low amounts (Table 16R-16.7, Table 16R-16.10, Table 16R-16.11). Point-quarter data shows that juniper and pinyon have increased in the years following treatment (Table 16R-16.14). Although the study is considered to be within Phase I of succession as of 2018 (Table 16R-16.4), this increase indicates that trees will likely infill the area in the future.

**Trend Summary Tables****Table 16R-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	0.2	0.1	3.5	0.1	0.6	16.4
2010	0.7	0.1	2.3	1.0	0.5	2.3
2014	1.5	0.0	0.6	1.5	-	1.3
2018	2.6	0.2	1.9	2.6	-	2.2

**Table 16R-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	3	130	258	36	0.0	3.1	7.2	1.0
2010	24	293	216	49	0.1	13.9	3.3	0.5
2014	14	314	111	23	0.1	18.6	0.7	0.1
2018	3	329	63	26	0.0	21.7	1.1	0.4

**Table 16R-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	46.7	0.8	41.2	2.8	0.8	15.6
2010	32.2	0.3	50.4	1.1	0.1	25.6
2014	36.4	0.0	46.6	1.0	0.6	23.2
2018	37.0	0.5	50.1	4.9	1.1	28.2

**Table 16R-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	Coyote	Mule Deer	Rocky Mountain Elk	Rabbit
	Quadrat Frequency				
2005	1	-	8	3	59
2010	1	-	9	2	14
2014	3	-	12	14	45
2018	-	-	17	9	38
Days Use Per Acre (ha)					
2005	-	8.7 (21.5)*	2.7 (6.6)	12.1 (29.8)	-
2010	1.5 (3.6)	-	16.1 (39.7)	14.1 (34.8)	-
2014	2.2 (5.4)	-	6.7 (16.6)	18.1 (44.7)	-
2018	0.7 (1.8)	-	12.8 (31.5)	5.3 (13.2)	-

Pellets per acre (ha)

**Table 16R-16.10 - Grass Species.** Nested frequency and modified Daubenmire average cover by year.

GRASS SPECIES														
Achnatherum hymenoides (Indian ricegrass)														
Agropyron cristatum <sup>i</sup> (crested wheatgrass)														
Bouteloua gracilis (blue grama)														
Bromus tectorum <sup>ai</sup> (cheatgrass)														
Elymus elymoides (squirreltail)														
Elymus lanceolatus (thickspike wheatgrass)														
Elymus trachycaulus (slender wheatgrass)														
Hesperostipa comata (needle and thread)														
Leymus salinus (saline wildrye)														
Poa secunda (Sandberg bluegrass)														
Psathyrostachys juncea <sup>i</sup> (Russian wildrye)														
Pseudoroegneria spicata (bluebunch wheatgrass)														
Thinopyrum intermedium <sup>i</sup> (intermediate wheatgrass)														
year	Nested Frequency													
2005	15	-	21	3	44	-	-	3	50	3	-	-	12	
2010	42	45	9	24	21	3	78	24	40	6	-	12	136	
2014	46	45	17	14	34	10	53	17	57	3	-	83	71	
2018	40	65	22	3	8	92	13	-	93	8	15	92	25	
year	Average Cover (%)													
2005	0.1	-	0.4	0.0	1.1	-	-	0.0	1.3	0.0	-	-	0.2	
2010	2.0	1.0	0.4	0.1	0.9	0.0	1.9	0.8	1.6	0.0	-	0.4	4.9	
2014	2.8	0.9	0.8	0.1	0.8	0.3	2.2	0.7	3.9	0.0	-	4.3	1.8	
2018	2.4	1.6	0.9	0.0	0.3	2.2	0.6	-	7.0	0.1	0.5	5.5	0.5	

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

**Table 16R-16.11 - Forb Species.** Nested frequency and modified Daubenmire average cover by year.

FORB SPECIES																		
Arabis (rockcress)																		
Astragalus (milkvetch)																		
Astragalus convallarius (lesser rushy milkvetch)																		
Chenopodium album <sup>a</sup> (lambsquarters)																		
Chenopodium fremontii <sup>a</sup> (Fremont's goosefoot)																		
Chenopodium leptophyllum <sup>a</sup> (narrowleaf goosefoot)																		
Chorispora tenella <sup>ai</sup> (crossflower)																		
Cirsium (thistle)																		
Cordylanthus <sup>a</sup> (bird's-beak)																		
Cryptantha (cryptantha)																		
Descurainia pinnata <sup>a</sup> (western tansymustard)																		
Erigeron pumilus (shaggy fleabane)																		
Eriogonum cernuum <sup>a</sup> (nodding buckwheat)																		
Gayophytum ramosissimum <sup>a</sup> (pinyon groundsmoke)																		
Gilia inconspicua <sup>a</sup> (shy gilia)																		
Lactuca serriola <sup>ai</sup> (prickly lettuce)																		
Lappula occidentalis <sup>a</sup> (flatspine stickseed)																		
year	Nested Frequency																	
2005	11	-	15	-	43	5	-	-	60	-	44	-	14	46	127	41	50	
2010	3	1	18	10	49	63	2	-	14	-	3	-	113	-	20	43	48	
2014	-	-	4	-	2	-	-	-	-	5	30	11	4	-	3	1	90	
2018	-	-	-	-	-	-	-	1	1	-	34	13	-	-	1	-	45	
year	Average Cover (%)																	
2005	0.1	-	0.6	-	0.2	0.0	-	-	2.3	-	0.2	-	0.1	0.1	1.5	0.8	1.9	
2010	0.0	0.0	0.1	0.2	0.4	0.3	0.0	-	0.6	-	0.0	-	1.1	-	0.1	0.4	0.2	
2014	-	-	0.0	-	0.0	-	-	-	-	0.0	0.1	0.0	0.0	-	0.0	0.0	0.5	
2018	-	-	-	-	-	-	-	0.0	0.0	-	0.6	0.1	-	-	0.1	-	0.4	

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

FORB SPECIES											
Lepidium <sup>a</sup> (pepperweed)											
Machaeranthera canescens (hoary tansyaster)											
Medicago sativa <sup>i</sup> (alfalfa)											
Mentzelia <sup>a</sup> (blazingstar)											
Pedicularis centranthera (dwarf lousewort)											
Penstemon (beardtongue)											
Penstemon pachyphyllus (thickleaf beardtongue)											
Phlox longifolia (longleaf phlox)											
Polygonum douglasii <sup>a</sup> (Douglas' knotweed)											
Sisymbrium altissimum <sup>at</sup> (tall tumblemustard)											
Sphaeralcea coccinea (scarlet globemallow)											
year	Nested Frequency										
2005	6	-	-	4	8	3	-	-	-	0	-
2010	-	4	19	3	-	7	-	2	1	-	-
2014	-	-	2	-	-	2	-	-	-	1	3
2018	-	-	3	-	-	5	1	-	-	-	5
year	Average Cover (%)										
2005	0.0	-	-	0.1	0.3	0.0	-	-	-	0.0	-
2010	-	0.0	0.3	0.0	-	0.0	-	0.0	0.0	-	-
2014	-	-	0.0	-	-	0.0	-	-	-	0.0	0.0
2018	-	-	0.1	-	-	0.0	0.0	-	-	-	0.0

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

**Table 16R-16.12 - Shrub and Tree Species.** Average modified Daubenmire quadrat and line intercept cover by year.

SHRUB SPECIES											
Artemisia nova <sup>p</sup> (black sagebrush)											
Artemisia tridentata ssp. vaseyana <sup>p</sup> (mountain big sagebrush)											
Atriplex canescens <sup>p</sup> (fourwing saltbush)											
Ephedra viridis <sup>p</sup> (mormon tea)											
Gutierrezia sarothrae (broom snakeweed)											
Juniperus osteosperma <sup>t</sup> (Utah juniper)											
Opuntia (pricklypear)											
Pediocactus simpsonii (mountain ball cactus)											
Pinus edulis <sup>t</sup> (twoneedle pinyon)											
Sclerocactus (fishhook cactus)											
year	Line Intercept Cover (%)										
2005	0.1	-	-	-	-	15.3	0.6	0	1.1	-	-
2010	-	0.8	-	0.2	-	2.3	0.4	-	-	0.1	-
2014	0.2	0.8	0.5	-	-	1.3	0	-	-	-	-
2018	0.1	2.1	0.3	0.1	-	2.2	-	-	-	-	-
year	Quadrat Cover (%)										
2005	0.0	-	-	0.1	-	3.3	0.0	0.0	0.2	-	-
2010	0.0	0.6	0.0	0.0	-	2.1	0.0	0.0	0.1	0.0	-
2014	0.3	1.2	0.0	0.0	0.0	0.6	0.0	-	-	0.0	-
2018	0.2	2.2	0.0	0.1	0.0	1.3	0.0	-	0.6	0.1	-

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



**Table 16R-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 (%)				
<b>Artemisia nova<sup>P</sup> -- (black sagebrush)</b>									
2005	240	40	83	8	8	0	0	8	24/35
2010	60	-	0	100	0	0	0	0	19/41
2014	320	-	0	100	0	69	25	0	19/32
2018	80	-	0	100	0	100	0	0	22/46
<b>Artemisia tridentata ssp. vaseyana<sup>P</sup> -- (mountain big sagebrush)</b>									
2005	-	-	-	-	-	-	-	-	-/-
2010	1560	20	67	32	1	0	0	1	31/26
2014	1620	-	5	95	0	77	11	10	31/35
2018	1720	1060	9	91	0	55	13	0	34/44
<b>Atriplex canescens<sup>P</sup> -- (fourwing saltbush)</b>									
2005	-	-	-	-	-	-	-	-	-/-
2010	40	20	0	100	0	0	0	0	46/50
2014	60	20	33	67	0	0	0	0	81/96
2018	80	20	50	50	0	0	0	0	83/119
<b>Chrysothamnus viscidiflorus -- (yellow rabbitbrush)</b>									
2005	-	-	-	-	-	-	-	-	-/-
2010	-	-	-	-	-	-	-	-	24/21
2014	-	-	-	-	-	-	-	-	-/-
2018	-	-	-	-	-	-	-	-	-/-
<b>Ephedra viridis<sup>P</sup> -- (mormon tea)</b>									
2005	20	-	0	100	0	0	0	0	101/128
2010	20	-	0	100	0	0	0	0	74/99
2014	20	-	100	0	0	100	0	0	50/44
2018	40	-	50	50	0	0	0	0	55/79
<b>Ericameria nauseosa -- (rubber rabbitbrush)</b>									
2005	-	-	-	-	-	-	-	-	-/-
2010	-	-	-	-	-	-	-	-	37/43
2014	-	-	-	-	-	-	-	-	-/-
2018	-	-	-	-	-	-	-	-	-/-
<b>Escobaria vivipara -- (spiny star)</b>									
2005	-	-	-	-	-	-	-	-	-/-
2010	-	-	-	-	-	-	-	-	-/-
2014	-	-	-	-	-	-	-	-	-/-
2018	-	-	-	-	-	-	-	-	5/13
<b>Gutierrezia sarothrae -- (broom snakeweed)</b>									
2005	20	-	0	100	0	0	0	0	25/32
2010	-	-	-	-	-	-	-	-	26/38
2014	40	-	50	50	0	0	0	0	15/17
2018	180	-	33	67	0	0	0	0	20/27
<b>Juniperus osteosperma<sup>1</sup> -- (Utah juniper)</b>									
2005	220	-	27	64	9	0	0	0	-/-
2010	120	200	17	50	33	0	0	50	-/-
2014	100	-	40	60	0	0	0	20	-/-
2018	100	40	40	60	0	0	0	20	-/-
<b>Opuntia -- (pricklypear)</b>									
2005	220	-	0	91	9	0	0	9	10/32
2010	60	-	0	100	0	0	0	0	7/36
2014	60	-	0	67	33	0	0	100	7/34
2018	60	-	0	100	0	0	0	0	8/20

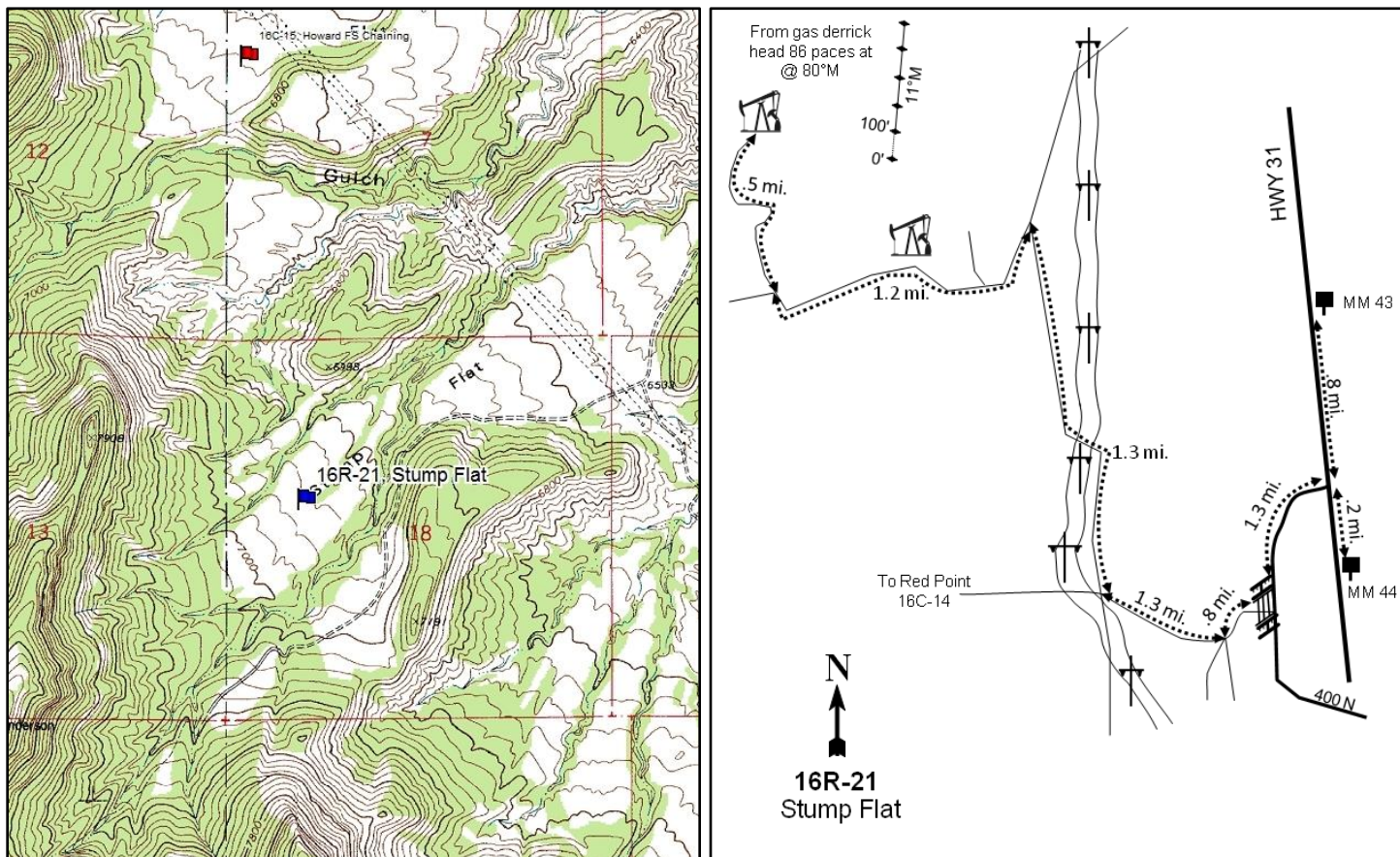
Year	Density		Age Class Distribution			Utilization		Poor Vigor (%)	Average Height Crown (cm)
	Plants Per Acre		Excluding Seedlings			Moderate (%)	Heavy (%)		
	Excluding Seedlings	Seedling	Young (%)	Mature (%)	Decadent (%)				
<b>Pediocactus simpsonii -- (mountain ball cactus)</b>									
2005	-	20	0	0	0	0	0	0	3/5
2010	20	-	0	100	0	0	0	0	4/9
2014	-	-	-	-	-	-	-	-	-/-
2018	-	-	-	-	-	-	-	-	-/-
<b>Pinus edulis<sup>t</sup> -- (twoneedle pinyon)</b>									
2005	60	40	33	67	0	0	0	0	- / -
2010	40	40	50	50	0	0	0	0	- / -
2014	40	-	100	0	0	0	0	0	- / -
2018	20	20	100	0	0	0	0	0	- / -
<b>Sclerocactus -- (fishhook cactus)</b>									
2005	40	-	50	50	0	0	0	0	16/15
2010	20	-	0	100	0	0	0	0	8/15

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

**Table 16R-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' (%)	
<b>Juniperus osteosperma (Utah juniper)</b>							
2010	88	12	59	6	6	18	10.8
2014	75	6	72	17	-	6	7.6
2018	100	5	74	16	-	5	13.6
<b>Pinus edulis (twoneedle pinyon)</b>							
2010	25	40	53	7	-	-	3.1
2014	26	13	87	-	-	-	2.8
2018	31	14	71	14	-	-	4.4

## STUMP FLAT - STUDY NO. 16R-21



### Location Information

USGS 7.5 min Map Info  
GPS (0' Stake)

Red Point NW; Township 17S, Range 8E, Section 18  
NAD 83 UTM ZONE 12, 493633 East 4354996 North

### Transect Information

Browse Tag # (0' Stake)	153
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	Standard

### Directions to Site

Traveling south from mile marker 43 on Highway 31, drive 0.8 miles to a road on the right (if traveling north, drive 0.2 miles from mile marker 44). Turn right and drive 1.3 miles to a road on the right (west) and a gate. Go through the gate, drive 0.8 miles to a fork, and stay right. Drive 1.3 miles to a fork and some powerlines. Proceed to the right, following the powerlines, for 1.3 miles to another fork. Turn left here and drive 1.2 miles to a fork passing a road and gas derrick on the right side of the road. At the fork, proceed to the right and drive 0.5 miles to another gas derrick. From the gas derrick, walk 86 paces at 80 degrees magnetic to the 0-foot stake that is marked with browse tag #153.

**Site Information**

Land Ownership	State
Land Administrator	SITLA
Allotment	WEST HUNTINGTON
Elevation	6,900ft (2,103m)
Aspect	North-Northeast
Slope	5-10%
Sample Dates	06/21/2006, 08/24/2010, 07/28/2014, 08/01/2018

**Table 16R-21.1 Disturbance History.** Recorded history of major disturbances.

Treatment/Disturbance	Name	WRI DB#	Date	Size (acres)
Hand Crew - Lop and Scatter	Burma Rd. Pinyon/Juniper Removal	2556	October-December 2013	1312
Chaining - Two-Way Unknown	West Huntington Chain and Seed	LTDL	September-December 1969	1158
Mechanical - Roller Chopper	Stump Flat Pinyon/Juniper Habitat Restoration	431	September-October 2006	67
Seeding - Aerial After	West Huntington Chain and Seed	LTDL	March 1973	1158
Seeding - Aerial After	West Huntington Chain and Seed	LTDL	December 1969	1158

**Table 16R-21.2 Seed Mix.** List of known seeded plant species and rates (if available).

Mix Name			Application Type	Application Date	Acres
West Huntington Chain and Seed			Aerial	Dec 1969	1158
Type	Species	Common Name	Cultivar/Source ID	Bulk lbs/acre	PLS
G	Agropyron desertorum	Desert Wheatgrass		9.00	0.00
Mix Name			Application Type	Application Date	Acres
West Huntington Chain and Seed			Aerial	Mar 1973	1158
Type	Species	Common Name	Cultivar/Source ID	Bulk lbs/acre	PLS
G		Alkali Sacaton		0.78	0.00
G	Agropyron cristatum	Crested Wheatgrass		4.25	0.00
G	Psathyrostachys juncea	Russian Wildrye		0.17	0.00
G	Thinopyrum intermedium	Pubescent Wheatgrass		0.18	0.00
F	Medicago sativa	Alfalfa	Nomad	0.61	0.00
F	Sanguisorba minor	Small Burnet		0.75	0.00
S	Artemisia tridentata	Big Sagebrush		0.43	0.00
S	Atriplex canescens	Fourwing Saltbush		0.61	0.00
S	Cercocarpus ledifolius	Curlleaf Mountain Mahogany		0.00	0.00
S	Cercocarpus montanus	Birchleaf Mahogany		0.00	0.00
S	Ericameria nauseosa	Rabbitbrush		0.44	0.00
S	Krascheninnikovia lanata	Winterfat		0.04	0.00
S	Purshia stansburiana	Cliffrose		0.01	0.00
S	Purshia tridentata	Bitterbrush		0.02	0.00

**Wildlife Habitat and Vegetation History****Table 16R-21.3 - Wildlife Seasonal Habitat.** UDWR wildlife habitat and seasonality.

Species	Habitat	Season
Deer	crucial	winter
Elk	substantial	winter

**Table 16R-21.4 - Vegetation History.** The dominant vegetation type(s) and phase of woodland succession (Tausch, Miller, Roundy, & Chambers, 2009).

Year	Vegetation Type	Woodland Succession
2006	Pinyon/Perennial Grass	Phase I
2010	Perennial Grass	Phase I
2014	Perennial Grass	Phase I
2018	Perennial Grass	Phase I

**Site Notes**

No Notes

**Soils****Table 16R-21.5 - Soil Analysis Data.** List of chemical and textural soil characteristics determined by laboratory analysis.

Texture	pH	% sand	% silt	% clay	% OM	PPM P	PPM K	ds/m	Sample Date
Clay Loam	7.3	40.2	31.0	28.8	3.6	14.3	96.0	0.7	06/20/2006

**Site Potential**

1981 - 2010 Average Annual Precipitation	13 inches
NRCS Ecological Site	Upland Loam (Black Sagebrush)
NRCS Ecological Site #	R047XB309UT
States and Transitions	No state and transition model is available for this ecological site.

Upon establishment in 2006, this site was being encroached by twoneedle pinyon (*Pinus edulis*) and Utah juniper (*Juniperus osteosperma*) and was considered to be within Phase I of woodland succession (Table 16R-21.4); other browse species were rare. Tree cover and density decreased following a post-sampling roller chopper treatment in 2006 and a lop and scatter treatment in 2013 (Table 16R-21.1). Cover and density of black sagebrush (*Artemisia nova*) increased over the post-treatment sample years, and it has been the dominant shrub species since 2010 (Table 16R-21.12, Table 16R-21.13). The herbaceous understory has remained abundant throughout the duration of the study, but not very diverse. A vast majority of the cover has been contributed by the introduced perennial grass species crested wheatgrass (*Agropyron cristatum*), which has been the dominant vegetation component since 2010. Forbs have remained comparatively rare (Table 16R-21.7, Table 16R-21.10, Table 16R-21.11). Although tree density has remained low, a slight increase was observed in point-quarter measurements between 2014 and 2018 (Table 16R-21.14); this indicates that there may be potential for infilling in future sample years.

**Trend Summary Tables****Table 16R-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
2006	1.1	-	7.4	1.9	-	7.1
2010	0.7	0.0	0.1	1.1	-	0.4
2014	0.7	0.0	0.0	1.2	-	0.1
2018	1.9	0.3	0.0	3.1	0.2	0.1

**Table 16R-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
2006	-	336	12	113	-	17.6	0.0	3.0
2010	-	285	108	121	-	16.2	2.5	4.1
2014	-	341	50	95	-	18.8	0.2	0.8
2018	-	354	17	68	-	26.7	0.1	0.9

**Table 16R-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
2006	30.2	1.2	46.8	2.0	4.7	27.0
2010	25.1	0.0	49.1	5.9	6.3	21.8
2014	27.0	0.7	50.2	4.2	7.0	21.7
2018	21.3	0.1	58.4	3.1	6.9	31.4

**Table 16R-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	Rocky Mountain Elk	Rabbit
	Quadrat Frequency			
2006	3	3	38	49
2010	5	22	3	20
2014	15	8	28	35
2018	10	27	6	49
Year	Days Use Per Acre (ha)			
2006	7.2 (17.9)	9.4 (23.2)	93.8 (231.7)	-
2010	14.5 (35.9)	31.5 (77.8)	3.4 (8.3)	-
2014	26.2 (64.6)	8.7 (21.5)	29.5 (72.8)	-
2018	18.9 (46.6)	32.8 (81.1)	7.4 (18.2)	-

**Table 16R-21.10 - Grass Species.** Nested frequency and modified Daubenmire average cover by year.

GRASS SPECIES	Achnatherum hymenoides (Indian ricegrass)	Agropyron cristatum <sup>i</sup> (crested wheatgrass)	Elymus elymoides (squirreltail)	Leymus salinus (saline wildrye)	Psathyrostachys juncea <sup>i</sup> (Russian wildrye)	Thinopyrum intermedium <sup>i</sup> (intermediate wheatgrass)
year	Nested Frequency					
2006	2	333	0	3	2	7
2010	3	280	-	-	-	6
2014	5	316	2	30	10	6
2018	8	343	-	11	0	20
year	Average Cover (%)					
2006	0.0	17.1	0.0	0.1	0.1	0.2
2010	0.0	16.0	-	-	-	0.2
2014	0.2	17.1	0.0	1.2	0.2	0.1
2018	0.2	25.5	-	0.6	0.0	0.5

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

**Table 16R-21.11 - Forb Species.** Nested frequency and modified Daubenmire average cover by year.

FORB SPECIES	Arabis (rockcress)	Astragalus (milkvetch)	Astragalus convallarius (lesser rushy milkvetch)	Chenopodium fremontii <sup>a</sup> (Fremont's goosefoot)	Cryptantha (cryptantha)	Descurainia pinnata <sup>a</sup> (western tansymustard)	Eriogonum umbellatum (sulphur-flower buckwheat)	Hedysarum boreale (Utah sweetvetch)	Ipomopsis aggregata (scarlet gilia)	Lactuca serriola <sup>ai</sup> (prickly lettuce)	Lappula occidentalis <sup>a</sup> (flatspine stickseed)	Lesquerella (bladderpod)	Machaeranthera canescens (hoary tansyaster)	Machaeranthera grindelioides (rayless tansyaster)	Medicago sativa <sup>i</sup> (alfalfa)	Packera multilobata (lobeleaf groundsel)	Penstemon (beardtongue)
year	Nested Frequency																
2006	1	-	11	-	18	-	4	4	1	-	12	7	-	5	31	8	14
2010	46	-	25	13	19	-	-	3	1	3	58	-	-	3	24	-	14
2014	-	-	-	-	19	3	4	1	-	-	18	-	1	8	14	1	-
2018	3	1	3	2	17	3	-	1	-	-	-	-	6	1	5	2	4
year	Average Cover (%)																
2006	0.0	-	0.3	-	0.3	-	0.0	0.1	0.0	-	0.0	0.0	-	0.2	0.6	0.1	0.4
2010	0.9	-	0.3	0.1	0.6	-	-	0.1	0.1	0.0	0.8	-	-	0.0	1.5	-	0.3
2014	-	-	-	-	0.2	0.0	0.1	0.0	-	-	0.0	-	0.0	0.0	0.1	0.0	-
2018	0.0	0.0	0.0	0.0	0.4	0.0	-	0.0	-	-	-	-	0.1	0.0	0.0	0.0	0.0

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



FORB SPECIES	Nested Frequency				
Salsola tragus <sup>ai</sup> (prickly Russian thistle)	-	6	40	-	-
Schoenocrambe linifolia (flaxleaf plainsmustard)	53	21	-	8	-
Stanleya viridiflora (green princesplume)	36	16	39	-	3
Tragopogon dubius <sup>ai</sup> (yellow salsify)	10	4	28	2	-
FORB SPECIES	Average Cover (%)				
Salsola tragus <sup>ai</sup> (prickly Russian thistle)	-	0.1	1.0	-	-
Schoenocrambe linifolia (flaxleaf plainsmustard)	1.5	0.3	-	0.0	-
Stanleya viridiflora (green princesplume)	0.1	0.0	0.2	-	0.0
Tragopogon dubius <sup>ai</sup> (yellow salsify)	0.1	0.0	0.3	0.0	-

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

**Table 16R-21.12 - Shrub and Tree Species.** Average modified Daubenmire quadrat and line intercept cover by year.

SHRUB SPECIES	Line Intercept Cover (%)									
Amelanchier utahensis <sup>p</sup> (Utah serviceberry)	-	0.3	-	1.6	-	-	-	-	-	7.1
Artemisia nova <sup>p</sup> (black sagebrush)	-	0.3	-	0.5	-	0.3	-	0.4	-	-
Artemisia tridentata ssp. vaseyana <sup>p</sup> (mountain big sagebrush)	-	1.1	-	0.1	-	-	-	0.1	-	-
Cercocarpus montanus <sup>p</sup> (alderleaf mountain mahogany)	0.5	2.1	0.5	0	0	-	0.2	0.1	-	-
Chrysothamnus viscidiflorus ssp. viscidiflorus var. viscidiflorus (yellow rabbitbrush)	Quadrat Cover (%)									
Ephedra viridis <sup>p</sup> (mormon tea)	-	0.5	-	0.7	-	0.0	-	1.0	-	6.4
Gutierrezia sarothrae (broom snakeweed)	-	0.3	-	0.0	-	0.4	0.0	0.1	-	-
Juniperus osteosperma <sup>t</sup> (Utah juniper)	-	0.6	0.0	0.0	-	0.0	-	0.0	0.0	-
Opuntia (pricklypear)	0.1	0.7	0.8	0.1	0.0	0.1	0.2	0.0	0.0	-
Pinus edulis <sup>t</sup> (twoneedle pinyon)										

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

**Table 16R-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 (%)				
<b>Amelanchier utahensis<sup>P</sup> -- (Utah serviceberry)</b>									
2006	-	-	-	-	-	-	-	-	82/76
2010	-	-	-	-	-	-	-	-	-/-
2014	-	-	-	-	-	-	-	-	43/87
2018	40	-	0	100	0	0	100	0	157/104
<b>Artemisia nova<sup>P</sup> -- (black sagebrush)</b>									
2006	120	2080	67	33	0	17	0	0	41/82
2010	320	240	38	56	6	31	0	6	23/37
2014	1300	40	15	85	0	35	60	0	25/48
2018	1240	-	21	79	0	24	52	2	23/49
<b>Artemisia tridentata ssp. vaseyana<sup>P</sup> -- (mountain big sagebrush)</b>									
2006	-	-	-	-	-	-	-	-	-/-
2010	260	-	39	62	0	0	0	0	39/48
2014	240	60	58	42	0	58	0	0	26/39
2018	280	-	29	71	0	7	71	0	23/53
<b>Cercocarpus montanus<sup>P</sup> -- (alderleaf mountain mahogany)</b>									
2006	60	20	0	100	0	0	33	0	166/163
2010	80	-	0	100	0	0	100	0	99/128
2014	80	-	25	75	0	75	0	0	116/120
2018	40	-	50	50	0	0	50	0	109/130
<b>Chrysothamnus viscidiflorus ssp. viscidiflorus var. viscidiflorus -- (yellow rabbitbrush)</b>									
2006	-	-	-	-	-	-	-	-	25/32
2010	-	-	-	-	-	-	-	-	19/31
2014	-	-	-	-	-	-	-	-	26/32
2018	60	-	0	100	0	0	0	0	65/97
<b>Echinocereus -- (hedgehog cactus)</b>									
2006	-	-	-	-	-	-	-	-	-/-
2010	-	-	-	-	-	-	-	-	-/-
2014	-	-	-	-	-	-	-	-	-/-
2018	-	-	-	-	-	-	-	-	6/11
<b>Ephedra nevadensis<sup>P</sup> -- (Nevada jointfir)</b>									
2006	-	-	-	-	-	-	-	-	-/-
2010	-	-	-	-	-	-	-	-	-/-
2014	-	-	-	-	-	-	-	-	96/136
2018	-	-	-	-	-	-	-	-	118/170
<b>Ephedra viridis<sup>P</sup> -- (mormon tea)</b>									
2006	20	-	100	0	0	0	0	0	84/146
2010	20	-	0	100	0	0	100	0	66/115
2014	20	-	0	100	0	0	100	100	80/119
2018	100	-	40	60	0	0	0	0	63/96
<b>Eriogonum microthecum<sup>P</sup> -- (slender buckwheat)</b>									
2006	-	-	-	-	-	-	-	-	-/-
2010	-	-	-	-	-	-	-	-	11/13
2014	-	-	-	-	-	-	-	-	-/-
2018	-	-	-	-	-	-	-	-	7/13
<b>Ericameria nauseosa -- (rubber rabbitbrush)</b>									
2006	-	-	-	-	-	-	-	-	87/99
2010	-	-	-	-	-	-	-	-	47/65
2014	40	-	50	50	0	0	0	0	50/66
2018	60	-	100	0	0	67	33	0	79/103

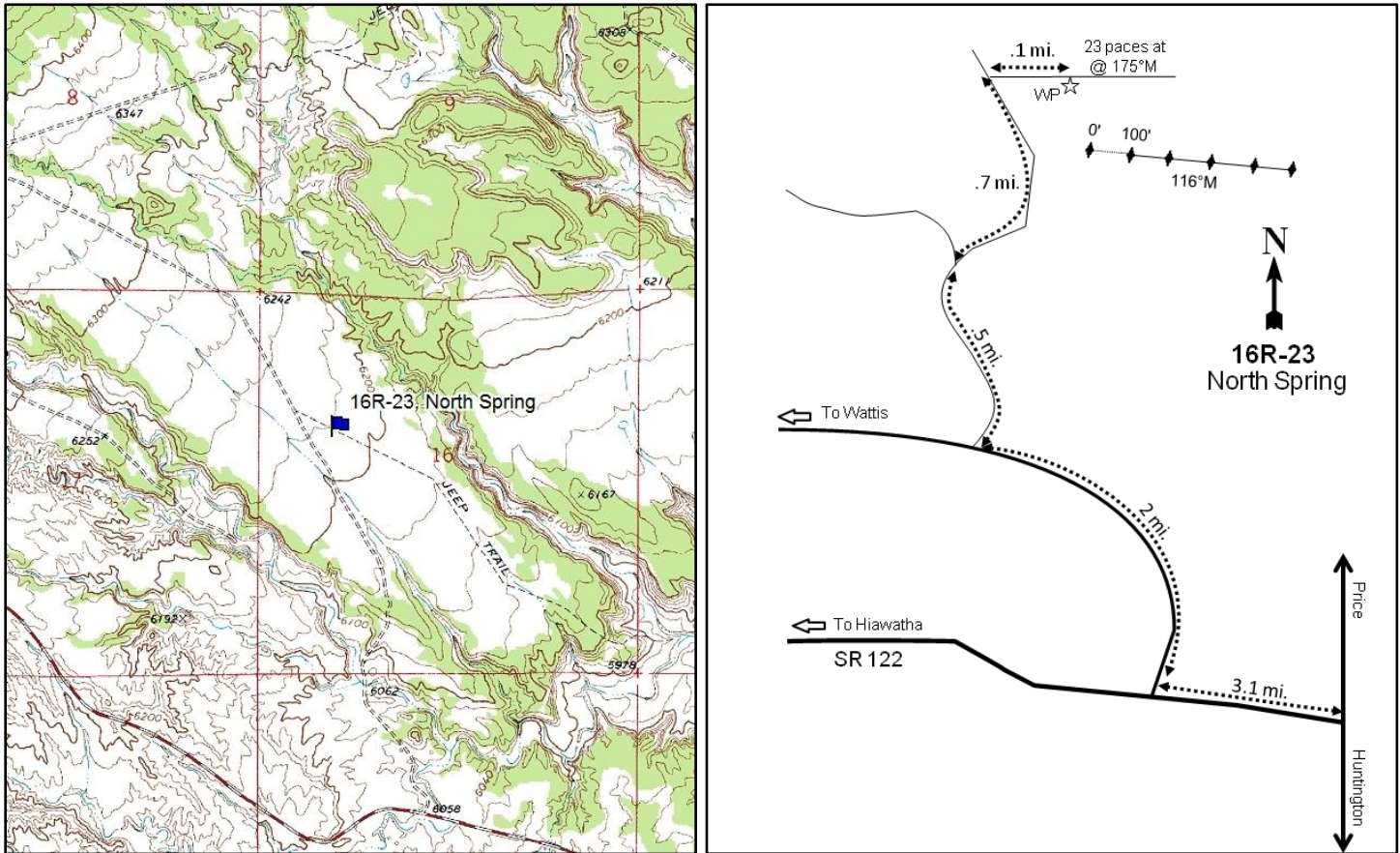
Year	Density		Age Class Distribution			Utilization		Poor Vigor (%)	Average Height Crown (cm)
	Plants Per Acre		Excluding Seedlings			Moderate (%)	Heavy (%)		
	Excluding Seedlings	Seedling	Young (%)	Mature (%)	Decadent (%)				
<b>Gutierrezia sarothrae -- (broom snakeweed)</b>									
2006	-	-	-	-	-	-	-	-	23/29
2010	20	-	0	100	0	0	0	0	23/26
2014	-	-	-	-	-	-	-	-	17/21
2018	800	-	23	75	3	0	0	3	17/19
<b>Juniperus osteosperma<sup>1</sup> -- (Utah juniper)</b>									
2006	40	-	100	0	0	0	0	0	- / -
2010	20	-	100	0	0	0	0	0	- / -
2014	20	-	100	0	0	0	0	0	- / -
2018	20	-	100	0	0	0	0	100	- / -
<b>Krascheninnikovia lanata<sup>p</sup> -- (winterfat)</b>									
2006	-	-	-	-	-	-	-	-	54/40
2010	-	-	-	-	-	-	-	-	36/37
2014	-	-	-	-	-	-	-	-	- / -
2018	-	-	-	-	-	-	-	-	- / -
<b>Opuntia -- (pricklypear)</b>									
2006	20	-	0	100	0	0	0	0	- / -
2010	-	-	-	-	-	-	-	-	- / -
2014	40	-	50	50	0	0	0	0	10/28
2018	60	-	33	67	0	0	0	0	7/18
<b>Pinus edulis<sup>1</sup> -- (twoneedle pinyon)</b>									
2006	120	-	17	83	0	0	0	0	- / -
2010	-	-	-	-	-	-	-	-	- / -
2014	-	-	-	-	-	-	-	-	- / -
2018	-	-	-	-	-	-	-	-	- / -
<b>Purshia stansburiana<sup>p</sup> -- (Stansbury cliffrose)</b>									
2006	-	-	-	-	-	-	-	-	99/104
2010	-	-	-	-	-	-	-	-	93/95
2014	20	-	0	100	0	0	100	0	89/97
2018	-	-	-	-	-	-	-	-	100/111
<b>Purshia tridentata<sup>p</sup> -- (antelope bitterbrush)</b>									
2006	-	-	-	-	-	-	-	-	64/122
2010	-	-	-	-	-	-	-	-	42/91
2014	-	-	-	-	-	-	-	-	- / -
2018	-	-	-	-	-	-	-	-	45/103

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

**Table 16R-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' (%)	
<b>Juniperus osteosperma (Utah juniper)</b>							
2006	35	-	25	63	13	-	11.4
2010	12	-	89	11	-	-	3.9
2014	2	100	-	-	-	-	3.0
2018	7	80	20	-	-	-	5.0
<b>Pinus edulis (twoneedle pinyon)</b>							
2006	63	-	11	53	26	11	12.7
2010	16	-	50	38	13	-	5.9
2014	3	-	100	-	-	-	5.0
2018	8	-	100	-	-	-	4.5

## NORTH SPRING - STUDY NO. 16R-23

**Location Information**

USGS 7.5 min Map Info  
GPS (0' Stake)

Pinnacle Peak SE; Township 15S, Range 9E, Section 16  
NAD 83 UTM ZONE 12, 506474 East 4374741 North

**Transect Information**

Browse Tag # (0' Stake)	175
Transect Bearing	116° magnetic
Length	500ft
Belt Placement	Line 1 (11ft), Line 2 (34ft), Line 3 (59ft), Line 4 (71ft), Line 5 (95ft)
Belt Marker Placement	Belt 3: 7ft, Belt 5: 3ft; Line 4: 83ft long to avoid a gully

**Directions to Site**

Turn from SR-10 onto SR-122 from Price or Huntington and drive 3.1 miles to a road on the right. Turn onto this road and drive 2.0 miles to another road on the right. Turn right again and drive 0.5 miles to a fork. Proceed right and travel for another 0.7 miles to a road on the right heading southeast. Turn right and travel 0.1 miles to a witness post on the right (south) side of the road. From the witness post walk 23 paces at 175 degrees magnetic to the 0-foot stake that is marked with browse tag #175.

**Site Information**

Land Ownership	State
Land Administrator	SITLA
Allotment	No data
Elevation	6,200ft (1,890m)
Aspect	S
Slope	1%
Sample Dates	08/16/2006, 08/24/2010, 07/29/2014, 08/13/2018

**Table 16R-23.1 Disturbance History.** Recorded history of major disturbances.

Treatment/Disturbance	Name	WRI DB#	Date	Size (acres)
Harrow - One-Way Dixie	Price West Benches Phase 3 - North Springs	430	October 2006	680
Seeding - Broadcast Before	Price West Benches Phase 3 - North Springs	430	October 2006	340

**Table 16R-23.2 Seed Mix.** List of known seeded plant species and rates (if available).

Mix Name			Application Type	Application Date	Acres
Price West Benches--Phase 3			Broadcast	Oct 2006	340
Type	Species	Common Name	Cultivar/Source ID	Bulk lbs/acre	PLS
G	<i>Achnatherum hymenoides</i>	Indian Ricegrass	Rimrock	1.03	1.02
G	<i>Agropyron cristatum</i>	Crested Wheatgrass	Hycrest	1.03	0.92
G	<i>Agropyron fragile</i>	Siberian Wheatgrass	Vavilov	1.99	1.82
G	<i>Festuca ovina</i>	Sheep Fescue		0.51	0.49
G	<i>Pascopyrum smithii</i>	Western Wheatgrass	Arriba	1.03	0.78
G	<i>Psathyrostachys juncea</i>	Russian Wildrye		0.76	0.67
G	<i>Psathyrostachys juncea</i>	Russian Wildrye		0.01	0.01
G	<i>Psathyrostachys juncea</i>	Russian Wildrye		3.09	2.51
F	<i>Medicago sativa</i>	Alfalfa	Ranger	0.51	0.45
F	<i>Medicago sativa</i>	Alfalfa	Spreador 4	0.51	0.49
F	<i>Onobrychis viciifolia</i>	Sainfoin	Eski	1.03	0.93
F	<i>Sanguisorba minor</i>	Small Burnet	Delar	0.51	0.48
S	<i>Artemisia tridentata</i> ssp. <i>wyomingensis</i>	Wyoming Big Sagebrush	Sanpete UT	0.51	0.10
S	<i>Atriplex canescens</i>	Fourwing Saltbush	Juab/Tooele UT	1.47	0.74

**Wildlife Habitat and Vegetation History****Table 16R-23.3 - Wildlife Seasonal Habitat.** UDWR wildlife habitat and seasonality.

Species	Habitat	Season
Deer	crucial	winter
Elk	crucial	winter
Greater Sage Grouse	occupied	year-long

**Site Notes**

This area is heavily used by the oil and gas industry.

**Soils****Table 16R-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
Loam	7.5	41.2	33.0	25.8	3.3	12.1	118.4	0.5	08/15/2006

**Site Potential**

1981 - 2010 Average Annual Precipitation	10 inches
NRCS Ecological Site	Upland Loam (Mountain Big Sagebrush-Indian Ricegrass)
NRCS Ecological Site #	R047XB308UT
States and Transitions	No state and transition model is available for this ecological site.

Since study establishment in 2006, the plant community on this site has remained dominated by mountain big sagebrush (*Artemisia tridentata* ssp. *vaseyana*) with other browse species contributing less cover. Sagebrush cover exhibited an initial decrease in the first sample year following a harrow and seeding treatment (Table 16R-23.1), but has since recovered to pre-treatment levels. Sagebrush density has also increased and the age class of the population has diversified (Table 16R-23.12, Table 16R-23.13). Perennial grasses such as blue grama (*Bouteloua gracilis*) and squirreltail (*Elymus elymoides*) have contributed most of the herbaceous cover in all study years. However, the understory has exhibited an overall decrease following treatment (Table 16R-23.7, Table 16R-23.10, Table 16R-23.11). Twoneedle pinyon (*Pinus edulis*) trees were observed in low amounts in point-quarter measurements in 2018 (Table 16R-

23.14). Although the study is considered to be within Phase I of woodland succession as of 2018 (Table 16R-23.4), the presence of trees indicates that further encroachment may be possible over time.

### Trend Summary Tables

**Table 16R-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	9.7	7.6	-	11.7	6.3	-
2010	9.4	5.6	-	8.4	5.4	-
2014	8.3	4.0	-	8.0	3.9	-
2018	9.4	7.7	-	10.7	7.0	-

**Table 16R-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	26	259	121	51	0.2	9.7	1.0	1.0
2010	9	245	39	21	0.0	10.0	0.5	1.1
2014	8	187	85	5	0.1	3.9	0.6	0.0
2018	7	198	39	11	0.4	7.2	0.5	0.0

**Table 16R-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	56.8	4.1	29.0	0.1	0.0	24.3
2010	57.4	0.2	29.3	0.2	1.0	25.5
2014	60.0	0.3	26.6	0.2	0.4	18.6
2018	62.4	0.5	28.8	0.9	0.4	23.4

**Table 16R-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	Coyote	Mule Deer	Rocky Mountain Elk	Rabbit
	Quadrat Frequency			
2006	-	32	22	33
2010	-	65	-	12
2014	-	36	5	38
2018	-	42	4	53
Year	Days Use Per Acre (ha)			
2006	-	121.3 (299.6)	5.3 (13.2)	-
2010	8.7 (21.5)*	113.2 (279.7)	1.3 (3.3)	-
2014	-	39.6 (97.7)	-	-
2018	-	30.2 (74.5)	10.7 (26.5)	-

\*Pellets per acre (ha)

**Table 16R-23.10 - Grass Species.** Nested frequency and modified Daubenmire average cover by year.

GRASS SPECIES	Achnatherum hymenoides (Indian ricegrass)	Achnatherum thurberianum (Thurber's needlegrass)	Agropyron cristatum <sup>i</sup> (crested wheatgrass)	Bouteloua gracilis (blue grama)	Bromus tectorum <sup>ai</sup> (cheatgrass)	Elymus elymoides (squirreltail)	Festuca idahoensis (Idaho fescue)	Hesperostipa comata (needle and thread)	Poa secunda (Sandberg bluegrass)	Psathyrostachys juncea <sup>i</sup> (Russian wildrye)	Sporobolus cryptandrus (sand dropseed)	Thinopyrum intermedium <sup>i</sup> (intermediate wheatgrass)	Vulpia octiflora <sup>a</sup> (sixweeks fescue)
year	Nested Frequency												
2006	80	1	-	66	13	179	-	5	2	-	-	-	13
2010	38	-	47	53	9	170	-	1	2	-	-	1	-
2014	43	-	52	59	2	52	6	-	-	-	-	-	6
2018	41	-	23	93	7	50	-	-	1	4	33	-	-
year	Average Cover (%)												
2006	1.1	0.0	-	3.9	0.1	4.6	-	0.0	0.0	-	-	-	0.1
2010	1.6	-	1.4	3.4	0.0	3.6	-	0.0	0.0	-	-	0.0	-
2014	0.7	-	0.7	2.2	0.0	0.3	0.0	-	-	-	-	-	0.0
2018	0.5	-	0.2	4.8	0.4	0.8	-	-	0.1	0.3	0.4	-	-

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

**Table 16R-23.11 - Forb Species.** Nested frequency and modified Daubenmire average cover by year.

FORB SPECIES	Alyssum desertorum <sup>ai</sup> (desert madwort)	Calochortus nuttallii (sego lily)	Ceratocephala testiculata <sup>ai</sup> (curvseed butterwort)	Chaenactis douglasii (Douglas' dustymaiden)	Chaetopappa ericoides (rose heath)	Chenopodium leptophyllum <sup>a</sup> (narrowleaf goosefoot)	Crepis acuminata (tapertip hawkbeard)	Cryptantha (cryptantha)	Descurainia pinnata <sup>a</sup> (western tansymustard)	Eriogonum cernuum <sup>a</sup> (nodding buckwheat)	Halogeton glomeratus <sup>ai</sup> (saltlover)	Lappula occidentalis <sup>a</sup> (flatspine stickseed)	Lepidium montanum <sup>a</sup> (mountain pepperweed)	Lupinus (lupine)	Machaeranthera grindelioides (rayless tansyaster)	Plantago patagonica <sup>a</sup> (woolly plantain)	Salsola tragus <sup>ai</sup> (prickly Russian thistle)
year	Nested Frequency																
2006	2	-	3	1	10	-	1	10	24	44	10	4	23	1	21	6	18
2010	1	3	-	-	7	5	-	-	2	28	-	1	1	-	7	7	-
2014	-	-	-	-	-	-	-	3	32	12	22	12	-	-	-	2	3
2018	-	-	-	-	1	5	-	-	26	3	1	-	-	-	4	2	3
year	Average Cover (%)																
2006	0.0	-	0.0	0.0	0.2	-	0.0	0.1	0.1	0.2	0.1	0.0	0.4	0.0	0.6	0.0	0.1
2010	0.0	0.0	-	-	0.2	0.0	-	-	0.0	0.3	-	0.0	0.2	-	0.7	0.0	-
2014	-	-	-	-	-	-	-	0.0	0.1	0.0	0.0	0.1	-	-	-	0.0	0.0
2018	-	-	-	-	0.0	0.0	-	-	0.2	0.0	0.0	-	-	-	0.0	0.0	0.1

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



FORB SPECIES	Nested Frequency		
<i>Schoenocrambe limifolia</i> (flaxleaf plainsmustard)	15	7	3
<i>Sisymbrium altissimum</i> <sup>ai</sup> (tall tumblemustard)	3	-	2
<i>Sphaeralcea coccinea</i> (scarlet globemallow)	-	25	2
year	1	4	5
year	Average Cover (%)		
2006	0.0	0.0	0.0
2010	0.2	-	0.0
2014	-	0.2	0.0
2018	0.0	0.0	0.0

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

**Table 16R-23.12 - Shrub and Tree Species.** Average modified Daubenmire quadrat and line intercept cover by year.

SHRUB SPECIES	Line Intercept Cover (%)						
<i>Artemisia tridentata</i> ssp. <i>vaseyana</i> <sup>p</sup> (mountain big sagebrush)	10.9	0.8	0.6	0.7	-	5	
<i>Atriplex confertifolia</i> <sup>p</sup> (shadscale saltbush)	8.3	0.1	1.2	1.4	-	2.8	
<i>Chrysothamnus viscidiflorus</i> sp. <i>viscidiflorus</i> var. <i>stenophyllus</i> (yellow rabbitbrush)	7.6	0.4	1	0.3	-	2.6	
<i>Gutierrezia sarothrae</i> (broom snakeweed)	10.7	-	0.2	1.1	-	5.7	
<i>Krascheninnikovia lanata</i> <sup>p</sup> (winterfat)	year	Quadrat Cover (%)					
<i>Opuntia</i> (pricklypear)	2006	9.3	0.4	1.0	0.6	0.0	6.0
	2010	9.0	0.3	1.4	1.4	0.1	2.8
	2014	7.7	0.5	0.6	0.2	0.0	3.2
	2018	9.4	0.0	0.3	1.4	-	6.0

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

**Table 16R-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.

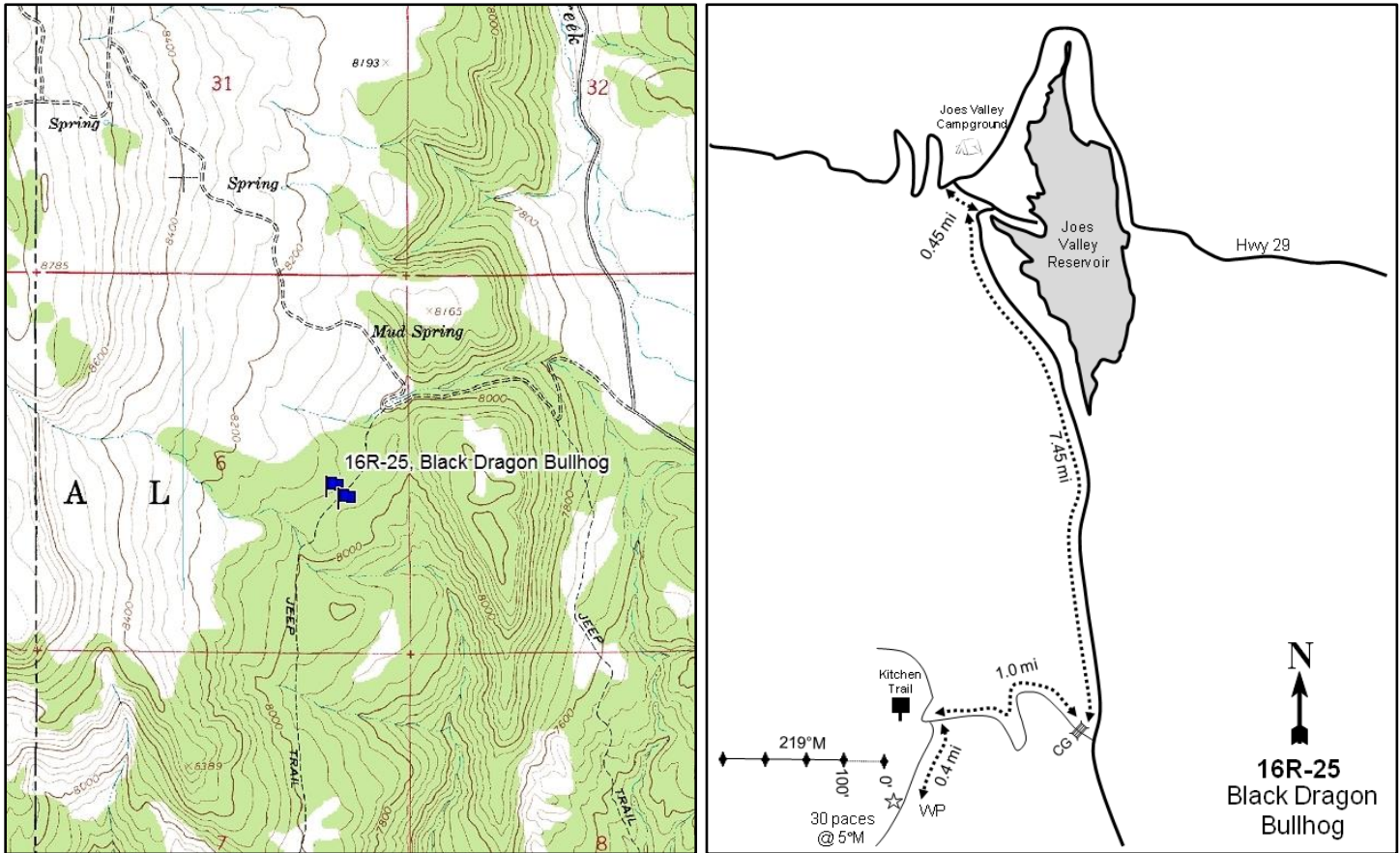
Year	Density		Age Class Distribution			Utilization		Poor Vigor (%)	Average Height Crown (cm)
	Plants Per Acre		Excluding Seedlings			Moderate (%)	Heavy (%)		
	Excluding Seedlings	Seedling	Young (%)	Mature (%)	Decadent (%)				
<b>Artemisia tridentata ssp. vaseyana<sup>p</sup> -- (mountain big sagebrush)</b>									
2006	3700	41260	6	24	70	29	46	60	46/68
2010	7700	1600	51	37	12	25	11	13	38/65
2014	8500	300	25	66	10	36	49	11	29/51
2018	8200	20	34	52	14	42	1	12	31/48
<b>Atriplex confertifolia<sup>p</sup> -- (shadscale saltbush)</b>									
2006	140	20	57	43	0	14	0	0	39/70
2010	140	-	29	71	0	0	0	0	37/86
2014	180	20	33	67	0	22	0	0	27/58
2018	100	-	0	100	0	0	80	0	9/24
<b>Chrysothamnus viscidiflorus ssp. viscidiflorus var. stenophyllus -- (yellow rabbitbrush)</b>									
2006	640	100	25	69	6	0	25	6	20/40
2010	1540	-	7	94	0	3	0	0	20/31
2014	1960	540	8	87	5	1	1	11	16/24
2018	1280	20	8	66	27	16	52	30	10/16
<b>Gutierrezia sarothrae -- (broom snakeweed)</b>									
2006	980	520	43	57	0	0	0	0	27/34
2010	1780	-	2	91	7	0	0	9	22/24
2014	580	40	10	83	7	3	0	10	13/15
2018	10960	60	72	26	2	0	0	1	11/15
<b>Krascheninnikovia lanata<sup>p</sup> -- (winterfat)</b>									
2006	20	-	0	100	0	0	100	0	37/30
2010	40	-	0	100	0	50	0	0	37/30
2014	40	60	50	50	0	0	100	0	22/19
2018	140	-	0	100	0	0	14	0	24/15
<b>Opuntia -- (pricklypear)</b>									
2006	4840	20	1	98	1	0	0	1	9/30
2010	2300	40	1	92	7	0	0	10	7/36
2014	4640	-	0	97	3	0	0	5	9/31
2018	5760	-	0	98	2	0	0	1	10/37
<b>Sarcobatus vermiculatus -- (greasewood)</b>									
2006	-	-	-	-	-	-	-	-	-/-
2010	-	-	-	-	-	-	-	-	-/-
2014	-	-	-	-	-	-	-	-	-/-
2018	-	-	-	-	-	-	-	-	60/101
<b>Yucca -- (yucca)</b>									
2006	-	-	-	-	-	-	-	-	42/68
2010	-	-	-	-	-	-	-	-	34/70
2014	-	-	-	-	-	-	-	-	-/-
2018	-	-	-	-	-	-	-	-	48/87

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

**Table 16R-23.14 - Tree Characteristics.** Point-quarter tree density, size class distribution, and average diameter.

Year	Density	Size Class Distribution					Average Diameter (cm)
	Trees per Acre	Seedling (%)	1-4' (%)	4-8' (%)	8-12' (%)	>12' (%)	
<b>Pinus edulis (twoneedle pinyon)</b>							
2018	17	-	100	-	-	-	3.0

## BLACK DRAGON BULLHOG - STUDY NO. 16R-25



### Location Information

USGS 7.5 min Map Info  
GPS (0' Stake)

Ferron Canyon NE; Township 19S, Range 6E, Section 06  
NAD 83 UTM ZONE 12, 475364 East 4338569 North

### Transect Information

Browse Tag # (0' Stake)	194
Transect Bearing	270° magnetic
Length	400ft
Belt Placement	Line 1 (11ft & 95ft), Line 2 (34ft), Line 3 (59ft), Line 4 (71ft)
Belt Marker Placement	Standard

### Directions to Site

Drive west on SR-29 to the west side of Joe's Valley Reservoir. Turn south onto the road that leads to the marina, drive 0.45 miles to a fork, and go right. Drive for 7.25 miles to a junction. Turn right and drive 1.0 mile, crossing a cattle guard and passing an ATV trail. Turn left onto the road with a sign reading "Kitchen Trail." Drive for 0.4 miles to a witness post on the right. Walk 30 paces at 5 degrees magnetic to the 0-foot stake marked with browse tag #194.

**Site Information**

Land Ownership	Federal
Land Administrator	USFS
Allotment	HORN MT
Elevation	8,050ft (2,454m)
Aspect	Southeast
Slope	8-12%
Sample Dates	08/23/2006, 07/22/2009, 08/02/2012, 08/01/2018

**Table 16R-25.1 Disturbance History.** Recorded history of major disturbances.

Treatment/Disturbance	Name	WRI DB#	Date	Size (acres)
Mechanical - Bullhog	Black Dragon	514	August 2006-June 2008	4358

**Wildlife Habitat and Vegetation History****Table 16R-25.3 - Wildlife Seasonal Habitat.** UDWR wildlife habitat and seasonality.

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

**Table 16R-25.4 - Vegetation History.** The dominant vegetation type(s) and phase of woodland succession (Tausch, Miller, Roundy, & Chambers, 2009).

Year	Vegetation Type	Woodland Succession
2006	Alderleaf Mountain Mahogany/Pinyon-Juniper	Phase II
2009	Alderleaf Mountain Mahogany/Perennial Grass	Phase I
2012	Alderleaf Mountain Mahogany/Perennial Grass	Phase I
2018	Alderleaf Mountain Mahogany/Perennial Grass	Phase I

**Site Notes**

No Notes

**Soils****Table 16R-25.5 - Soil Analysis Data.** List of chemical and textural soil characteristics determined by laboratory analysis.

Texture	pH	% sand	% silt	% clay	% OM	PPM P	PPM K	ds/m	Sample Date
Clay Loam	7.5	41.2	30.0	28.8	2.3	12.7	137.6	0.6	08/23/2006

**Site Potential**

1981 - 2010 Average Annual Precipitation	19 inches
NRCS Ecological Site	Mountain Loam (Browse)
NRCS Ecological Site #	R047XB420UT
States and Transitions	No state and transition model is available for this ecological site.

The plant community on this site has remained dominated by alderleaf mountain mahogany (*Cercocarpus montanus*) since study establishment in 2006; a variety of other shrub species have also been present, but have provided less cover (Table 16R-25.12). Twoneedle pinyon (*Pinus edulis*) and Rocky Mountain juniper (*Juniperus scopulorum*) were encroaching in the area, and the study was considered to be within Phase II of woodland succession in 2006. A bullhog treatment sometime between the initial sampling and the 2008 sampling removed most of these trees (Table 16R-25.1), and the site has been considered to be within Phase I since 2009. However, point-quarter measurements show that density of trees has increased each sample year following treatment, indicating that there may be potential for infilling over time (Table 16R-25.4, Table 16R-25.14). The herbaceous understory has remained abundant and diverse throughout the sample years. Perennial grasses such as saline wildrye (*Leymus salinus*) and Indian ricegrass (*Achnatherum hymenoides*) have provided the most herbaceous cover in all years and have been a co-dominant vegetation component since 2009 (Table 16R-25.7, Table 16R-25.10, Table 16R-25.11).

**Trend Summary Tables****Table 16R-25.6 - Shrub/Tree Summary.** Average modified Daubenmire quadrat and line intercept cover by year for shrubs/trees

Year	Quadrat Cover (%)			Line-intercept Cover (%)		
	Preferred Shrub	Other Shrub	Tree	Preferred Shrub	Other Shrub	Tree
2006	15.2	2.0	3.1	20.4	1.3	6.1
2009	7.0	1.8	-	10.3	3.0	-
2012	8.1	1.3	0.0	12.4	1.5	-
2018	10.9	3.4	0.4	13.8	4.0	0.4

**Table 16R-25.7 - Herbaceous Summary.** Nested frequency and average modified Daubenmire quadrat cover by year for herbaceous functional groups

Year	Nested Frequency				Quadrat Cover (%)			
	Annual Grass	Perennial Grass	Annual/Biennial Forb	Perennial Forb	Annual Grass	Perennial Grass	Annual/Biennial Forb	Perennial Forb
2006	-	220	10	171	-	10.7	0.0	6.8
2009	-	247	22	191	-	13.7	0.3	7.8
2012	2	295	-	236	0.0	16.4	-	8.3
2018	-	332	-	204	-	21.4	-	5.1

**Table 16R-25.8 - 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	29.0	0.4	33.4	20.6	7.1	34.4
2009	29.2	0.2	35.0	8.5	5.8	28.3
2012	21.9	0.2	49.0	12.3	4.8	31.4
2018	32.1	-	37.9	17.2	9.0	32.5

**Table 16R-25.9 - Pellet Group Data.** Quadrat frequency and pellet group transect data for animal pellets. Rabbit pellet groups are not sampled in the pellet group transect.

Year	Cattle	Mule Deer	Rocky Mountain Elk	Rabbit
	Quadrat Frequency			
2006	1	1	4	26
2009	-	-	-	11
2012	1	-	1	6
2018	2	-	1	17
Days Use Per Acre (ha)				
2006	0.7 (1.8)	2.7 (6.6)	2.0 (5.0)	-
2009	1.5 (3.6)	2.0 (5.0)	9.4 (23.2)	-
2012	-	2.7 (6.6)	5.3 (13.2)	-
2018	0.7 (1.8)	-	-	-

**Table 16R-25.10 - Grass Species.** Nested frequency and modified Daubenmire average cover by year.

GRASS SPECIES	Achnatherum hymenoides (Indian ricegrass)	Achnatherum lettermanii (Letterman's needlegrass)	Bromus inermis <sup>i</sup> (smooth brome)	Bromus tectorum <sup>ai</sup> (cheatgrass)	Carex rossii (Ross' sedge)	Elymus elymoides (squirreltail)	Hesperostipa comata (needle and thread)	Leymus salinus (saline wildrye)	Pascopyrum smithii (western wheatgrass)	Poa secunda (Sandberg bluegrass)	Thinopyrum intermedium <sup>i</sup> (intermediate wheatgrass)
year	Nested Frequency										
2006	73	6	12	-	8	-	3	103	-	-	54
2009	111	-	3	-	18	18	17	91	-	-	53
2012	153	5	3	2	38	11	8	126	-	3	56
2018	88	-	-	-	38	1	23	190	10	2	66
year	Average Cover (%)										
2006	2.6	0.0	0.2	-	0.1	-	0.2	6.1	-	-	1.4
2009	3.3	-	0.0	-	0.3	0.6	0.6	7.1	-	-	1.7
2012	5.8	0.0	0.0	0.0	0.7	0.1	0.2	6.9	-	0.0	2.6
2018	3.0	-	-	-	1.2	0.0	0.7	13.8	0.6	0.0	2.1

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

**Table 16R-25.11 - Forb Species.** Nested frequency and modified Daubenmire average cover by year.

FORB SPECIES	Arabis (rockcress)	Astragalus (milkvetch)	Astragalus utahensis (Utah milkvetch)	Calochortus nuttallii (sego lily)	Castilleja linariifolia (Wyoming Indian paintbrush)	Caulanthus crassicaulis <sup>a</sup> (thickstem wild cabbage)	Chaenactis douglasii (Douglas' dustymaiden)	Comandra umbellata (bastard toadflax)	Cryptantha (cryptantha)	Erigeron (fleabane)	Eriogonum alatum (winged buckwheat)	Hymenopappus filifolius (fineleaf hymenopappus)	Hymenoxys richardsonii (pingue rubberweed)	Ipomopsis aggregata (scarlet gilia)	Lesquerella (bladderpod)	Machaeranthera canescens (hoary tansyaster)	Machaeranthera grindelioides (rayless tansyaster)
year	Nested Frequency																
2006	8	1	12	-	3	10	7	12	-	9	76	10	11	6	4	-	40
2009	-	1	8	3	11	16	9	30	-	4	61	15	6	2	22	8	27
2012	-	3	11	-	9	-	21	40	8	-	89	18	19	19	5	10	38
2018	-	2	-	-	1	-	1	22	24	3	46	6	5	4	3	21	45
year	Average Cover (%)																
2006	0.0	0.0	0.1	-	0.2	0.0	0.0	0.1	-	0.1	2.1	0.5	0.4	0.0	0.0	-	0.8
2009	-	0.0	0.1	0.0	0.2	0.3	0.1	0.4	-	0.0	1.6	0.8	0.0	0.0	0.2	0.6	1.3
2012	-	0.0	0.1	-	0.1	-	0.1	0.4	0.0	-	1.0	0.6	0.2	0.1	0.0	0.1	1.5
2018	-	0.0	-	-	0.0	-	0.0	0.1	0.1	0.0	0.4	0.0	0.1	0.0	0.0	0.4	1.1

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

FORB SPECIES	Nested Frequency											
<i>Madia glomerata</i> <sup>a</sup> (mountain tarweed)	-	-	6	17	57	23	24	12	-	1	-	
<i>Oenothera</i> (evening primrose)	5	-	-	8	74	48	23	8	-	-	1	
<i>Packera multiflobata</i> (lobeleaf groundsel)	-	3	6	-	107	56	34	7	-	-	-	
<i>Penstemon</i> (beardtongue)	-	-	12	4	69	33	40	-	1	-	-	
<i>Penstemon caespitosus</i> (mat penstemon)	Average Cover (%)											
<i>Penstemon pachyphyllus</i> (thickleaf beardtongue)	2006	-	-	0.0	0.5	0.9	0.6	0.5	0.0	-	0.0	-
<i>Phlox austromontana</i> (mountain phlox)	2009	0.1	-	-	0.2	1.1	0.8	0.3	0.0	-	-	0.0
<i>Schoenocrambe linifolia</i> (flaxleaf plainsmustard)	2012	-	0.0	0.0	-	1.9	0.7	1.2	0.0	-	-	-
<i>Symphotrichum ascendens</i> (western aster)	2018	-	-	0.1	0.0	1.4	0.5	0.8	-	0.0	-	-
<i>Taraxacum officinale</i> (common dandelion)												
unknown annual forb <sup>a</sup> (unknown forb)												

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

**Table 16R-25.12 - Shrub and Tree Species.** Average modified Daubenmire quadrat and line intercept cover by year.

SHRUB SPECIES	Line Intercept Cover (%)														
<i>Amelanchier utahensis</i> <sup>p</sup> (Utah serviceberry)	2006	1.8	-	1.2	17.4	-	-	-	0.1	0.9	1.8	0.3	4.3	0	-
<i>Artemisia nova</i> <sup>p</sup> (black sagebrush)	2009	1.5	0.2	0.5	7.8	0.2	-	-	-	1.9	-	0.4	-	0.3	0.5
<i>Artemisia tridentata</i> ssp. <i>vaseyana</i> <sup>p</sup> (mountain big sagebrush)	2012	1.8	-	1	9.2	0.7	-	-	0.1	0.1	-	0.1	-	0.4	0.5
<i>Cercocarpus montanus</i> <sup>p</sup> (alderleaf mountain mahogany)	2018	1.4	-	0.6	11.8	0.1	-	0.2	-	3.2	-	0.2	0.4	-	0.3
<i>Chrysothamnus viscidiflorus</i> ssp. <i>viscidiflorus</i> var. <i>stenophyllus</i> (yellow rabbitbrush)	Quadrat Cover (%)														
<i>Ericameria nauseosa</i> ssp. <i>nauseosa</i> var. <i>speciosa</i> <sup>p</sup> (rubber rabbitbrush)	2006	3.0	-	0.8	11.2	0.0	-	-	0.0	1.4	0.5	0.6	2.6	0.1	0.0
<i>Ericameria parryi</i> (Parry's rabbitbrush)	2009	1.4	0.0	0.8	4.5	0.0	0.2	-	-	1.1	-	0.6	-	0.1	0.0
<i>Eriogonum corymbosum</i> (crisp-leaf buckwheat)	2012	1.4	-	1.2	5.4	0.5	-	-	0.0	0.3	-	0.3	0.0	0.2	0.3
<i>Gutierrezia sarothrae</i> (broom snakeweed)	2018	0.6	-	1.4	8.8	0.1	-	0.0	-	2.6	-	0.4	0.4	0.2	0.3
<i>Juniperus scopulorum</i> <sup>i</sup> (Rocky Mountain juniper)															
<i>Mahonia repens</i> (creeping barberry)															
<i>Pinus edulis</i> <sup>i</sup> (twoneedle pinyon)															
<i>Symphoricarpos oreophilus</i> <sup>p</sup> (mountain snowberry)															
<i>Tetradymia canescens</i> (spineless horsebrush)															

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



**Table 16R-25.13 - Shrub/Tree Characteristics.** Population characteristics of shrub/tree species populations including density reproduction (seedlings), age distribution, utilization, vigor and average size (height/crown) of plants.

Year	Density		Age Class Distribution			Utilization		Poor Vigor (%)	Average Height Crown (cm)
	Plants Per Acre		Excluding Seedlings			Moderate (%)	Heavy (%)		
	Excluding Seedlings	Seedling	Young (%)	Mature (%)	Decadent (%)				
<b>Amelanchier utahensis<sup>P</sup> -- (Utah serviceberry)</b>									
2006	680	20	38	24	38	9	3	29	125/119
2009	-	-	-	-	-	-	-	-	61/84
2012	680	-	29	59	12	59	18	12	70/81
2018	300	-	47	27	27	20	53	27	71/88
<b>Artemisia nova<sup>P</sup> -- (black sagebrush)</b>									
2006	-	-	-	-	-	-	-	-	27/60
2009	-	-	-	-	-	-	-	-	26/46
2012	-	-	-	-	-	-	-	-	28/48
2018	-	-	-	-	-	-	-	-	35/73
<b>Artemisia tridentata ssp. vaseyana<sup>P</sup> -- (mountain big sagebrush)</b>									
2006	600	20	10	70	20	3	0	13	37/51
2009	-	-	-	-	-	-	-	-	40/60
2012	440	-	46	50	5	27	55	9	37/56
2018	520	-	46	50	4	0	0	4	39/65
<b>Cercocarpus montanus<sup>P</sup> -- (alderleaf mountain mahogany)</b>									
2006	1520	1500	40	53	8	12	0	5	129/133
2009	-	-	-	-	-	-	-	-	67/83
2012	2180	80	41	59	0	62	17	11	82/87
2018	2240	20	25	75	0	42	38	2	80/88
<b>Ceanothus velutinus -- (snowbrush ceanothus)</b>									
2006	-	-	-	-	-	-	-	-	35/117
2009	-	-	-	-	-	-	-	-	-/-
2012	-	-	-	-	-	-	-	-	-/-
2018	-	-	-	-	-	-	-	-	-/-
<b>Chrysothamnus viscidiflorus ssp. viscidiflorus var. stenophyllus -- (yellow rabbitbrush)</b>									
2006	20	60	0	100	0	0	0	0	12/20
2009	-	-	-	-	-	-	-	-	28/43
2012	780	-	10	87	3	0	3	10	13/19
2018	120	-	0	100	0	0	0	0	-/-
<b>Eriogonum corymbosum -- (crispleaf buckwheat)</b>									
2006	40	-	0	100	0	0	0	0	18/26
2009	-	-	-	-	-	-	-	-	-/-
2012	40	-	0	100	0	0	0	0	15/17
2018	-	-	-	-	-	-	-	-	-/-
<b>Ericameria nauseosa ssp. nauseosa var. speciosa<sup>P</sup> -- (rubber rabbitbrush)</b>									
2006	20	-	100	0	0	0	0	0	91/90
2009	-	-	-	-	-	-	-	-	19/36
2012	-	-	-	-	-	-	-	-	-/-
2018	-	-	-	-	-	-	-	-	66/75
<b>Ericameria parryi -- (Parry's rabbitbrush)</b>									
2006	-	-	-	-	-	-	-	-	-/-
2009	-	-	-	-	-	-	-	-	-/-
2012	-	-	-	-	-	-	-	-	-/-
2018	20	-	0	100	0	0	0	0	26/44
<b>Gutierrezia sarothrae -- (broom snakeweed)</b>									
2006	3560	40	12	84	3	0	0	1	15/19
2009	-	-	-	-	-	-	-	-	19/26
2012	480	-	21	79	0	0	0	0	12/16
2018	9600	-	2	98	0	0	0	0	11/15

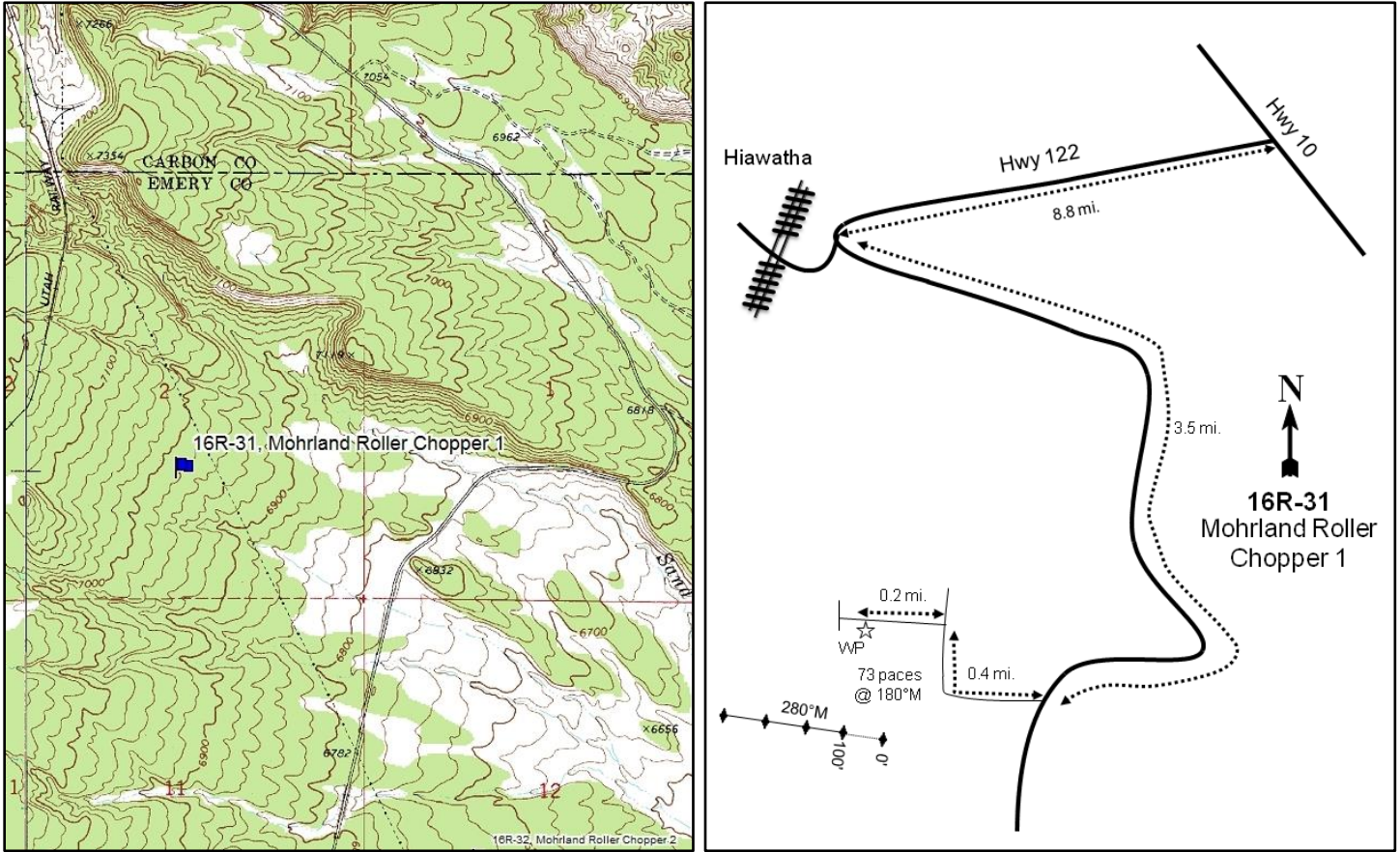
Year	Density		Age Class Distribution			Utilization		Poor Vigor (%)	Average Height Crown (cm)
	Plants Per Acre		Excluding Seedlings			Moderate (%)	Heavy (%)		
	Excluding Seedlings	Seedling	Young (%)	Mature (%)	Decadent (%)				
<b>Juniperus scopulorum<sup>t</sup> -- (Rocky Mountain juniper)</b>									
2006	40	20	0	100	0	0	0	0	- / -
2009	-	-	-	-	-	-	-	-	- / -
2012	-	-	-	-	-	-	-	-	- / -
2018	-	-	-	-	-	-	-	-	- / -
<b>Mahonia repens -- (creeping barberry)</b>									
2006	3980	40	12	88	0	0	0	0	7/10
2009	-	-	-	-	-	-	-	-	8/10
2012	2440	-	0	100	0	0	0	3	8/12
2018	2260	20	12	84	4	0	0	13	6/7
<b>Pinus edulis<sup>t</sup> -- (twoneedle pinyon)</b>									
2006	220	60	73	27	0	0	0	0	- / -
2009	-	-	-	-	-	-	-	-	- / -
2012	80	20	75	25	0	0	0	0	- / -
2018	80	-	100	0	0	0	0	0	- / -
<b>Purshia tridentata<sup>p</sup> -- (antelope bitterbrush)</b>									
2006	-	-	-	-	-	-	-	-	- / -
2009	-	-	-	-	-	-	-	-	- / -
2012	20	-	100	0	0	100	0	0	- / -
2018	20	-	0	100	0	100	0	0	13/35
<b>Symphoricarpos oreophilus<sup>p</sup> -- (mountain snowberry)</b>									
2006	120	20	17	83	0	0	0	0	20/32
2009	-	-	-	-	-	-	-	-	17/33
2012	80	-	0	100	0	0	0	0	26/48
2018	60	-	0	100	0	0	0	0	21/50
<b>Tetradymia canescens -- (spineless horsebrush)</b>									
2006	160	-	38	13	50	13	0	38	23/41
2009	-	-	-	-	-	-	-	-	24/39
2012	260	20	54	46	0	23	15	0	22/38
2018	60	-	0	100	0	33	0	0	23/45

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

**Table 16R-25.14 - Tree Characteristics.** Point-quarter tree density, size class distribution, and average diameter.

Year	Density	Size Class Distribution					Average Diameter (cm)
	Trees per Acre	Seedling (%)	1-4' (%)	4-8' (%)	8-12' (%)	>12' (%)	
<b>Juniperus scopulorum (Rocky Mountain juniper)</b>							
2006	24	33	44	-	11	11	6.4
2009	17	9	91	-	-	-	2.0
2012	23	14	79	7	-	-	3.5
2018	24	-	85	15	-	-	4.3
<b>Pinus edulis (twoneedle pinyon)</b>							
2006	280	25	40	20	10	5	5.6
2009	58	67	33	-	-	-	2.0
2012	87	58	42	-	-	-	2.1
2018	88	5	74	21	-	-	3.6

## MOHRLAND ROLLER CHOPPER 1 - STUDY NO. 16R-31



### Location Information

USGS 7.5 min Map Info  
GPS (0' Stake)

Poison Spring Bench ; Township 16S, Range 8E, Section 02  
NAD 83 UTM ZONE 12, 500581 East 4367603 North

### Transect Information

Browse Tag # (0' Stake)	262
Transect Bearing	280° magnetic
Length	400ft
Belt Placement	Line 1 (11ft & 95ft), Line 2 (34ft), Line 3 (59ft), Line 4 (71ft)
Belt Marker Placement	Standard

### Directions to Site

From SR-10, turn onto SR-122 and drive 8.8 miles to a road on the left just before the railroad crossing near Hiawatha. Continue on this road for 3.5 miles to a fork and bear right. Drive 0.4 miles to a road on the left and go 0.2 miles to the half-high witness post on the left (south) side of the road. The 0-foot stake is 73 paces from the witness post at 180 degrees magnetic and is marked with browse tag #262.

**Site Information**

Land Ownership	State
Land Administrator	SITLA
Allotment	No data
Elevation	6,979ft (2,127m)
Aspect	Southeast
Slope	6%
Sample Dates	07/23/2008, 07/05/2011, 07/31/2014, 08/14/2018

**Table 16R-31.1 Disturbance History.** Recorded history of major disturbances.

Treatment/Disturbance	Name	WRI DB#	Date	Size (acres)
Chaining - Two-Way Unknown	Poison Spring Bench Seeding	LTDL	1970	-
Seeding - Aerial Before	Poison Spring Bench Seeding	LTDL	1970	4995
Mechanical - Roller Chopper	Mohrland PJ Removal	1083	October-December 2008	743
Seeding - Aerial Before	Mohrland PJ Removal	1083	October 2008	743
Seeding - Dribbler	Mohrland PJ Removal	1083	October-December 2008	743

**Table 16R-31.2 Seed Mix.** List of known seeded plant species and rates (if available).

Mix Name			Application Type	Application Date	Acres
Mohrland PJ Removal			Aerial	Oct 2008	847
Type	Species	Common Name	Cultivar/Source ID	Bulk lbs/acre	PLS
G	Achnatherum hymenoides	Indian Ricegrass	Emery UT	0.30	0.27
G	Agropyron cristatum	Crested Wheatgrass	Hycrest	0.77	0.62
G	Agropyron cristatum	Crested Wheatgrass	Nordan	0.47	0.44
G	Agropyron cristatum	Crested Wheatgrass	Nordan	0.24	0.21
G	Elymus elymoides	Bottlebrush Squirreltail	Toe Jam	0.30	0.25
G	Elymus elymoides	Bottlebrush Squirreltail	Emery UT	0.18	0.15
G	Elymus wawawaiensis	Snake River Wheatgrass	Secar	1.00	0.76
G	Hesperostipa comata	Needle and Threadgrass	Custer CO	0.24	0.18
G	Pascopyrum smithii	Western Wheatgrass	Arriba	1.48	1.38
G	Poa secunda	Canby Bluegrass	Canbar	0.47	0.41
G	Thinopyrum intermedium	Intermediate Wheatgrass	Rush	1.06	0.93
G	Thinopyrum intermedium	Pubescent Wheatgrass		1.89	1.66
F	Achillea millefolium	Western Yarrow		0.06	0.06
F	Linum perenne	Blue Flax	Appar	0.53	0.44
F	Sphaeralcea coccinea	Scarlet Globemallow	Duchesne/Uintah UT	0.02	0.02
S	Atriplex canescens	Fourwing Saltbush	Central UT	0.59	0.25
Mix Name			Application Type	Application Date	Acres
Mohrland PJ Removal Dribbler			Dribbler	Oct 2008	847
Type	Species	Common Name	Cultivar/Source ID	Bulk lbs/acre	PLS
S	Atriplex canescens	Fourwing Saltbush	Central UT	0.41	0.18
S	Cercocarpus montanus	True Mountain Mahogany	Sevier UT	0.03	0.02

**Wildlife Habitat and Vegetation History****Table 16R-31.3 - Wildlife Seasonal Habitat.** UDWR wildlife habitat and seasonality.

Species	Habitat	Season
Deer	crucial	winter
Elk	crucial	winter

**Table 16R-31.4 - 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 I transitioning to Phase II
2011	Black Sagebrush	Phase I
2014	Black Sagebrush	Phase I
2018	Black Sagebrush	Phase I

**Site Notes**

No Notes

**Site Potential**

1981 - 2010 Average Annual Precipitation 13 inches

NRCS Ecological Site  
NRCS Ecological Site #  
States and Transitions

Upland Loam (Black Sagebrush)

R047XB306UT

No state and transition model is available for this ecological site.

The dominant shrub species on this site has been black sagebrush (*Artemisia nova*) since study establishment in 2008. Twoneedle pinyon (*Pinus edulis*) and Utah juniper (*Juniperus osteosperma*) were present in moderate amounts in 2008, and the study was considered to be within Phase I transitioning to Phase II of woodland succession. A roller chopper and seeding treatment later in 2008 removed most of the trees, and the site has been classified as being within Phase I since 2011 (Table 16R-31.1, Table 16R-31.4, Table 16R-31.12, Table 16R-31.13, Table 16R-31.14). The herbaceous component was initially sparse. Although the understory exhibited an increase during the first sampling following treatment (mainly due to perennial grasses), it decreased during each subsequent sample year (Table 16R-31.7, Table 16R-31.10, Table 16R-31.11). Density of trees is low as of 2018 (Table 16R-31.14), but their continued presence indicates that this site may be at risk of infilling in the future.

### Trend Summary Tables

**Table 16R-31.6 - 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	12.8	1.7	8.9	14.4	2.1	13.3
2011	10.1	2.0	0.7	9.0	2.9	0.7
2014	8.0	1.9	0.5	8.3	1.6	0.8
2018	9.2	2.8	0.8	11.5	2.8	0.6

**Table 16R-31.7 - 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	-	71	17	49	-	0.3	0.1	1.5
2011	11	241	129	34	0.2	9.8	2.7	0.9
2014	3	261	54	15	0.0	8.2	0.2	0.1
2018	-	232	44	21	-	4.9	0.4	0.2

**Table 16R-31.8 - 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	40.3	0.1	37.2	7.9	7.3	26.0
2011	26.1	0.1	32.0	7.0	8.1	28.9
2014	39.3	-	38.2	9.8	10.1	18.6
2018	38.2	-	37.4	15.4	10.7	17.3

**Table 16R-31.9 - 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	3	41	1	54
2011	2	15	4	8
2014	1	16	6	37
2018	2	18	16	42
Year	Days Use Per Acre (ha)			
2008	2.2 (5.4)	34.2 (84.4)	2.7 (6.6)	-
2011	-	34.2 (84.4)	21.5 (53.0)	-
2014	18.1 (44.8)	30.2 (74.5)	24.1 (59.6)	-
2018	8.0 (19.7)	26.2 (64.6)	29.5 (72.8)	-

**Table 16R-31.10 - Grass Species.** Nested frequency and modified Daubenmire average cover by year.

GRASS SPECIES	Nested Frequency										
Achnatherum hymenoides (Indian ricegrass)											
Agropyron cristatum <sup>i</sup> (crested wheatgrass)											
Bromus arvensis <sup>ai</sup> (field brome)											
Bromus tectorum <sup>ai</sup> (cheatgrass)											
Elymus elymoides (squirreltail)											
Elymus wawawaiensis (Snake River wheatgrass)											
Hesperostipa comata (needle and thread)											
Pascopyron smithii (western wheatgrass)											
Poa fendleriana (muttongrass)											
Poa secunda (Sandberg bluegrass)											
Thinopyrum intermedium <sup>i</sup> (intermediate wheatgrass)											
year	Average Cover (%)										
2008	-	71	-	-	-	-	-	-	-	-	-
2011	14	146	7	4	12	4	-	29	-	1	143
2014	5	244	3	-	-	-	-	11	1	4	37
2018	8	199	-	-	-	-	5	-	-	1	42
year	Average Cover (%)										
2008	-	0.3	-	-	-	-	-	-	-	-	-
2011	0.2	4.6	0.2	0.0	0.2	0.0	-	1.1	-	0.0	3.6
2014	0.0	7.4	0.0	-	-	-	-	0.1	0.1	0.0	0.5
2018	0.1	4.3	-	-	-	-	0.0	-	-	0.0	0.6

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

**Table 16R-31.11 - Forb Species.** Nested frequency and modified Daubenmire average cover by year.

FORB SPECIES	Nested Frequency																
Arabis (rockcross)																	
Astragalus convallarius (lesser rushy milkvetch)																	
Chamaesyce albomarginata (whitemargin sandmat)																	
Descurainia pinnata <sup>a</sup> (western tansymustard)																	
Eriogonum cernuum <sup>a</sup> (nodding buckwheat)																	
Ipomopsis aggregata (scarlet gilia)																	
Lactuca serriola <sup>ai</sup> (prickly lettuce)																	
Lappula occidentalis <sup>ai</sup> (flatspine stickseed)																	
Linum perenne <sup>i</sup> (blue flax)																	
Machaeranthera canescens (hoary tansyaster)																	
Packera multilobata (lobeleaf groundsel)																	
Penstemon (beardtongue)																	
Phlox austromontana (mountain phlox)																	
Salsola tragus <sup>ai</sup> (prickly Russian thistle)																	
Sisymbrium altissimum <sup>ai</sup> (tall tumblemustard)																	
Sphaeralcea coccinea (scarlet globemallow)																	
year	Average Cover (%)																
2008	1	5	38	-	17	1	-	-	-	-	1	3	-	2	-	-	-
2011	-	7	23	12	17	-	5	-	2	2	-	-	-	109	6	-	-
2014	-	-	14	8	-	-	-	-	-	1	-	-	-	48	-	-	-
2018	-	1	12	12	3	-	-	2	-	-	-	-	3	27	-	-	5
year	Average Cover (%)																
2008	0.0	0.1	1.3	-	0.1	0.0	-	-	-	-	0.0	0.0	-	0.0	-	-	-
2011	-	0.2	0.7	0.4	0.2	-	0.0	-	0.0	0.0	-	-	-	2.0	0.0	-	-
2014	-	-	0.1	0.0	-	-	-	-	-	0.0	-	-	-	0.2	-	-	-
2018	-	0.0	0.2	0.3	0.0	-	-	0.0	-	-	-	-	0.0	0.1	-	-	0.0

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

**Table 16R-31.12 - Shrub and Tree Species.** Average modified Daubenmire quadrat and line intercept cover by year.

SHRUB SPECIES	Line Intercept Cover (%)									
	year	2008	2011	2014	2018	year	2008	2011	2014	2018
Artemisia nova <sup>p</sup> (black sagebrush)	13.8	8.8	8.3	11.5	0.6	12.7	10.1	8.0	9.2	-
Artemisia tridentata ssp. vaseyana <sup>p</sup> (mountain big sagebrush)	-	0	-	-	1.9	-	0.0	-	-	-
Cercocarpus montanus <sup>p</sup> (alderleaf mountain mahogany)	0.6	0.2	-	-	0.1	0.1	-	-	-	-
Ericameria nauseosa (rubber rabbitbrush)	1.9	2.1	1.3	1.5	1.6	1.1	1.1	1.1	1.1	-
Gutierrezia sarothrae (broom snakeweed)	-	0.5	0.2	1.2	0.0	0.8	0.8	0.5	1.7	-
Juniperus osteosperma <sup>t</sup> (Utah juniper)	7.1	0.7	0.8	0.6	5.9	0.7	0.5	0.8	0.8	-
Linanthus pungens (granite prickly phlox)	-	-	-	-	0.0	0.1	0.0	0.0	-	-
Opuntia (pricklypear)	0.2	0.3	0.1	0.1	0.0	0.0	0.0	0.0	0.0	-
Pinus edulis <sup>t</sup> (twoneedle pinyon)	6.2	-	-	-	3.0	0.0	-	-	-	-

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

**Table 16R-31.13 - 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 (%)				
<b>Amelanchier utahensis<sup>p</sup> -- (Utah serviceberry)</b>									
2008	-	-	-	-	-	-	-	-	-/-
2011	-	-	-	-	-	-	-	-	-/-
2014	-	-	-	-	-	-	-	-	67/93
2018	20	-	100	0	0	0	100	0	53/79
<b>Artemisia nova<sup>p</sup> -- (black sagebrush)</b>									
2008	8620	2940	23	42	35	32	12	6	23/59
2011	4440	1340	25	72	3	69	9	5	24/44
2014	7000	380	22	74	4	37	46	3	22/43
2018	6140	340	17	72	11	24	5	6	19/45
<b>Artemisia tridentata ssp. vaseyana<sup>p</sup> -- (mountain big sagebrush)</b>									
2008	-	-	-	-	-	-	-	-	-/-
2011	20	-	0	100	0	0	0	0	24/24
2014	-	-	-	-	-	-	-	-	13/34
2018	-	-	-	-	-	-	-	-	21/42
<b>Bassia prostrata<sup>pi</sup> -- (forage kochia)</b>									
2008	-	-	-	-	-	-	-	-	-/-
2011	-	-	-	-	-	-	-	-	-/-
2014	-	-	-	-	-	-	-	-	12/8
2018	-	-	-	-	-	-	-	-	-/-
<b>Cercocarpus montanus<sup>p</sup> -- (alderleaf mountain mahogany)</b>									
2008	40	-	0	100	0	100	0	0	105/124
2011	20	-	100	0	0	100	0	0	66/94
2014	40	-	0	100	0	0	0	0	28/35
2018	-	-	-	-	-	-	-	-	38/60



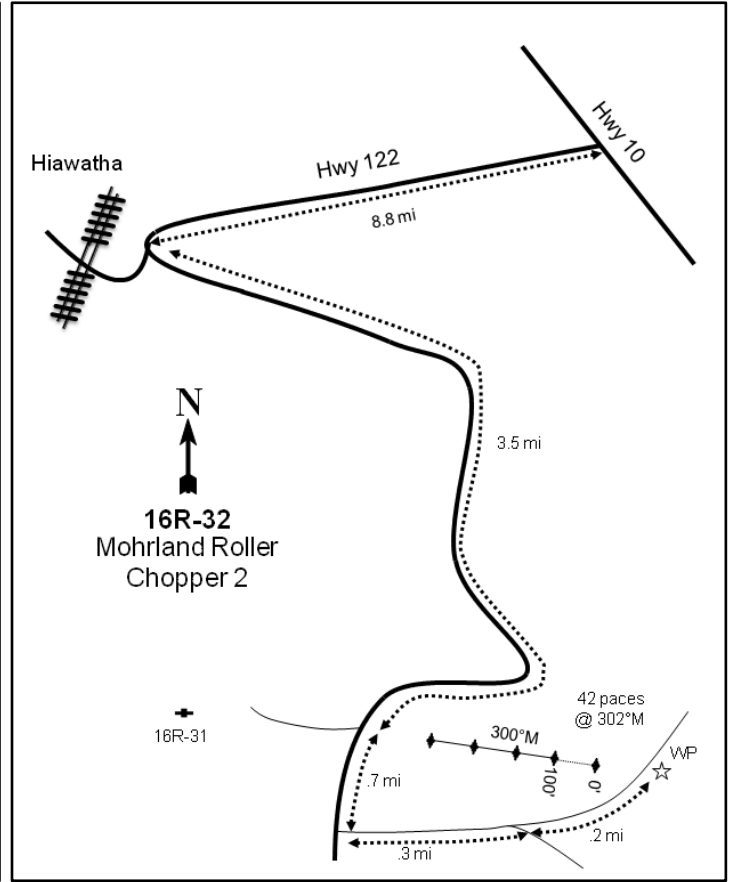
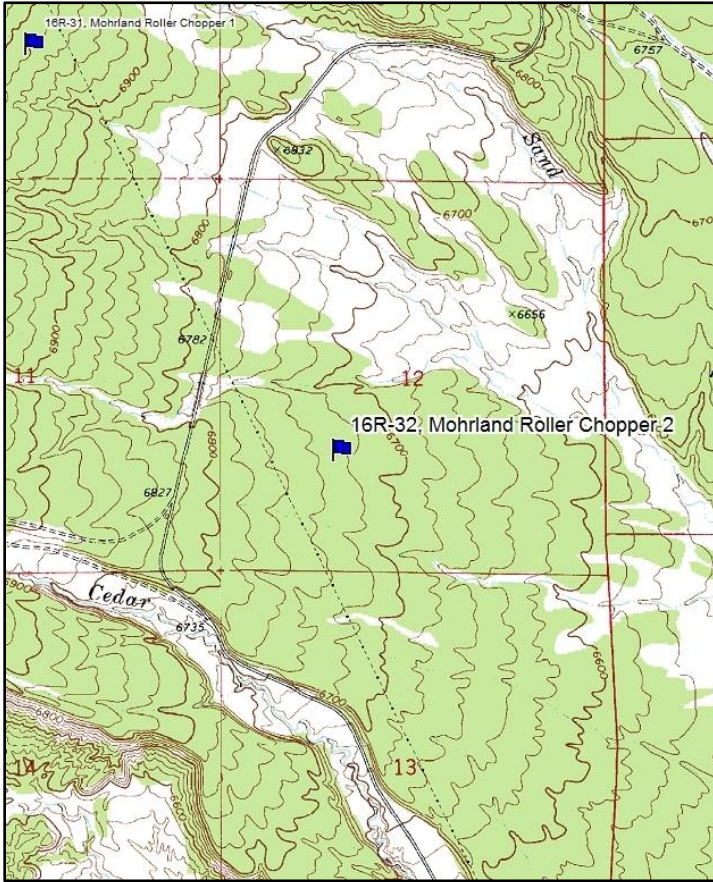
Year	Density		Age Class Distribution			Utilization		Poor Vigor (%)	Average Height Crown (cm)
	Plants Per Acre		Excluding Seedlings			Moderate (%)	Heavy (%)		
	Excluding Seedlings	Seedling	Young (%)	Mature (%)	Decadent (%)				
<b>Ericameria nauseosa -- (rubber rabbitbrush)</b>									
2008	200	-	10	90	0	0	0	10	65/100
2011	240	-	33	58	8	25	0	8	34/52
2014	460	-	4	74	22	9	13	26	47/61
2018	540	-	15	85	0	7	11	0	56/69
<b>Gutierrezia sarothrae -- (broom snakeweed)</b>									
2008	800	20	10	83	8	0	5	8	16/15
2011	280	-	43	50	7	0	0	7	22/26
2014	1340	40	5	96	0	0	0	0	14/16
2018	5520	-	26	73	1	0	0	1	13/16
<b>Juniperus osteosperma<sup>1</sup> -- (Utah juniper)</b>									
2008	180	-	22	78	0	0	0	0	- / -
2011	20	20	0	100	0	0	0	0	- / -
2014	100	40	60	0	40	0	20	20	- / -
2018	100	20	60	40	0	0	0	0	- / -
<b>Linanthus pungens -- (granite prickly phlox)</b>									
2008	120	-	50	33	17	0	0	0	5/9
2011	40	20	0	100	0	0	0	0	8/21
2014	20	20	0	0	100	0	100	100	- / -
2018	-	-	-	-	-	-	-	-	- / -
<b>Opuntia -- (pricklypear)</b>									
2008	40	-	0	100	0	0	0	0	7/37
2011	20	-	0	100	0	0	0	0	8/21
2014	-	-	-	-	-	-	-	-	8/21
2018	60	-	0	100	0	0	0	0	8/25
<b>Pinus edulis<sup>t</sup> -- (twoneedle pinyon)</b>									
2008	20	-	0	100	0	0	0	0	- / -
2011	-	20	0	0	0	0	0	0	- / -

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

**Table 16R-31.14 - 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' (%)	
<b>Juniperus osteosperma (Utah juniper)</b>							
2008	107	5	25	40	15	15	12.1
2011	41	-	80	20	-	-	5.1
2014	42	-	100	-	-	-	8.0
2018	48	6	67	28	-	-	6.9
<b>Pinus edulis (twoneedle pinyon)</b>							
2008	46	-	12	41	41	6	16.6
2011	4	-	100	-	-	-	3.5
2014	6	-	100	-	-	-	5.0
2018	10	-	100	-	-	-	5.0

## MOHRLAND ROLLER CHOPPER 2 - STUDY NO. 16R-32



### Location Information

USGS 7.5 min Map Info  
GPS (0' Stake)

Poison Spring Bench ; Township 16S, Range 8E, Section 12  
NAD 83 UTM ZONE 12, 501846 East 4365934 North

### Transect Information

Browse Tag # (0' Stake)	254
Transect Bearing	300° magnetic
Length	400ft
Belt Placement	Line 1 (11ft & 95ft), Line 2 (34ft), Line 3 (59ft), Line 4 (71ft)
Belt Marker Placement	Standard

### Directions to Site

From SR-10, turn onto SR-122 and drive 8.8 miles to a road on the left just before the railroad crossing near Hiawatha. Continue on this road for 3.5 miles to the fork that leads to 16R-31. Continue straight for 0.7 miles to a left turn and follow this road for 0.3 miles to a fork. Bear left and drive 0.2 miles to the witness post on the right (southeast) side of the road. The 0-foot stake is 42 paces from the witness post at 302 degrees magnetic and is marked with browse tag #254.

**Site Information**

Land Ownership	State
Land Administrator	SITLA
Allotment	No data
Elevation	6,732ft (2,052m)
Aspect	East
Slope	5-9%
Sample Dates	07/23/2008, 07/05/2011, 07/31/2014, 08/13/2018

**Table 16R-32.1 Disturbance History.** Recorded history of major disturbances.

Treatment/Disturbance	Name	WRI DB#	Date	Size (acres)
Chaining - Two-Way Unknown	Poison Spring Bench Seeding	LTDL	1970	4995
Seeding - Aerial Before	Poison Spring Bench Seeding	LTDL	1970	4995
Mechanical - Roller Chopper	Mohrland PJ Removal	1083	October-December 2008	743
Seeding - Aerial Before	Mohrland PJ Removal	1083	October 2008	743
Seeding - Dribbler	Mohrland PJ Removal	1083	October-December 2008	743

**Table 16R-32.2 Seed Mix.** List of known seeded plant species and rates (if available).

Mix Name			Application Type	Application Date	Acres
Mohrland PJ Removal			Aerial	Oct 2008	847
Type	Species	Common Name	Cultivar/Source ID	Bulk lbs/acre	PLS
G	Achnatherum hymenoides	Indian Ricegrass	Emery UT	0.30	0.27
G	Agropyron cristatum	Crested Wheatgrass	Hycrest	0.77	0.62
G	Agropyron cristatum	Crested Wheatgrass	Nordan	0.47	0.44
G	Agropyron cristatum	Crested Wheatgrass	Nordan	0.24	0.21
G	Elymus elymoides	Bottlebrush Squirreltail	Toe Jam	0.30	0.25
G	Elymus elymoides	Bottlebrush Squirreltail	Emery UT	0.18	0.15
G	Elymus wawawaiensis	Snake River Wheatgrass	Secar	1.00	0.76
G	Hesperostipa comata	Needle and Threadgrass	Custer CO	0.24	0.18
G	Pascopyrum smithii	Western Wheatgrass	Arriba	1.48	1.38
G	Poa secunda	Canby Bluegrass	Canbar	0.47	0.41
G	Thinopyrum intermedium	Intermediate Wheatgrass	Rush	1.06	0.93
G	Thinopyrum intermedium	Pubescent Wheatgrass		1.89	1.66
F	Achillea millefolium	Western Yarrow		0.06	0.06
F	Linum perenne	Blue Flax	Appar	0.53	0.44
F	Sphaeralcea coccinea	Scarlet Globemallow	Duchesne/Uintah UT	0.02	0.02
S	Atriplex canescens	Fourwing Saltbush	Central UT	0.59	0.25
Mix Name			Application Type	Application Date	Acres
Mohrland PJ Removal Dribbler			Dribbler	Oct 2008	847
Type	Species	Common Name	Cultivar/Source ID	Bulk lbs/acre	PLS
S	Atriplex canescens	Fourwing Saltbush	Central UT	0.41	0.18
S	Cercocarpus montanus	True Mountain Mahogany	Sevier UT	0.03	0.02

**Wildlife Habitat and Vegetation History**

**Table 16R-32.3 - Wildlife Seasonal Habitat.** UDWR wildlife habitat and seasonality.

Species	Habitat	Season
Deer	crucial	winter
Elk	crucial	winter

**Table 16R-32.4 - Vegetation History.** The dominant vegetation type(s) and phase of woodland succession (Tausch, Miller, Roundy, & Chambers, 2009).

Year	Vegetation Type	Woodland Succession
2008	Black Sagebrush	Phase I transitioning to Phase II
2011	Black Sagebrush	Phase I
2014	Black Sagebrush	Phase I
2018	Black Sagebrush	Phase I

**Site Notes**

No Notes

**Site Potential**

1981 - 2010 Average Annual Precipitation 12 inches

NRCS Ecological Site	Upland Loam (Black Sagebrush)
NRCS Ecological Site #	R047XB306UT
States and Transitions	No state and transition model is available for this ecological site.

Since study establishment in 2008, the plant community on this site has been dominated by black sagebrush (*Artemisia nova*). Cover and density of sagebrush decreased following a post-sampling roller chopper and seeding treatment in 2008, but they have exhibited an overall increase since the initial post-treatment sampling. Twoneedle pinyon (*Pinus edulis*) and Utah juniper (*Juniperus osteosperma*) have been observed on site since study establishment. Although treatment removed many of these trees, their continued presence on site indicates that there may be potential for infilling in future sample years (Photos, Table 16R-32.12, Table 16R-32.13, Table 16R-32.14). Perennial grasses have contributed a majority of the herbaceous cover throughout the duration of the study period. The cover of the herbaceous understory increased initially following treatment, but has decreased during each subsequent sampling; forbs have generally remained rare (Table 16R-32.7, Table 16R-32.10, Table 16R-32.11).

### Trend Summary Tables

**Table 16R-32.6 - Shrub/Tree Summary.** Average modified Daubenmire quadrat and line intercept cover by year for shrubs/trees

Year	Quadrat Cover (%)			Line-intercept Cover (%)		
	Preferred Shrub	Other Shrub	Tree	Preferred Shrub	Other Shrub	Tree
2008	17.0	-	5.3	20.1	-	9.5
2011	6.0	-	0.0	9.1	-	0.5
2014	6.3	-	0.1	9.9	-	0.9
2018	11.1	0.4	0.0	12.0	0.3	1.0

**Table 16R-32.7 - Herbaceous Summary.** Nested frequency and average modified Daubenmire quadrat cover by year for herbaceous functional groups

Year	Nested Frequency				Quadrat Cover (%)			
	Annual Grass	Perennial Grass	Annual/Biennial Forb	Perennial Forb	Annual Grass	Perennial Grass	Annual/Biennial Forb	Perennial Forb
2008	-	84	16	20	-	0.8	0.1	0.1
2011	3	248	99	37	0.0	12.1	1.8	0.5
2014	-	263	45	13	-	7.2	0.3	0.1
2018	-	233	55	25	-	5.6	0.3	0.3

**Table 16R-32.8 - 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	39.5	0.2	26.6	25.3	3.0	23.7
2011	29.9	-	29.2	15.4	4.4	23.5
2014	41.5	0.0	33.1	14.1	7.9	13.0
2018	33.4	0.0	34.9	32.4	6.8	15.1

**Table 16R-32.9 - Pellet Group Data.** Quadrat frequency and pellet group transect data for animal pellets. Rabbit pellet groups are not sampled in the pellet group transect.

Year	Cattle	Mule Deer	Rocky Mountain Elk	Horse	Rabbit
	Quadrat Frequency				
2008	-	45	1	-	47
2011	-	6	3	-	3
2014	4	9	8	-	44
2018	1	9	1	-	29
Year	Days Use Per Acre (ha)				
2008	5.1 (12.6)	29.5 (72.8)	1.3 (3.3)	-	-
2011	2.9 (7.2)	16.8 (41.4)	8.1 (19.9)	-	-
2014	16.7 (41.2)	8.7 (21.5)	10.7 (26.5)	-	-
2018	0.7 (1.8)	26.2 (64.6)	-	0.6 (1.4)	-

**Table 16R-32.10 - Grass Species.** Nested frequency and modified Daubenmire average cover by year.

GRASS SPECIES	Nested Frequency									
Achnatherum hymenoides (Indian ricegrass)										
Agropyron cristatum <sup>i</sup> (crested wheatgrass)										
Bromus arvensis <sup>ai</sup> (field brome)										
Bromus tectorum <sup>ai</sup> (cheatgrass)										
Elymus elymoides (squirreltail)										
Elymus wawawaiensis (Snake River wheatgrass)										
Hesperostipa comata (needle and thread)										
Pascopyrum smithii (western wheatgrass)										
Psathyrostachys juncea <sup>i</sup> (Russian wildrye)										
Thinopyrum intermedium <sup>i</sup> (intermediate wheatgrass)										
year	Average Cover (%)									
2008	-	84	-	-	-	-	-	-	-	-
2011	33	167	0	3	18	7	1	11	2	114
2014	16	239	-	-	5	-	-	3	-	32
2018	19	206	-	-	1	-	-	15	2	17
year	Average Cover (%)									
2008	-	0.8	-	-	-	-	-	-	-	-
2011	0.8	7.3	0.0	0.0	0.3	0.1	0.0	0.1	0.1	3.4
2014	0.3	6.1	-	-	0.0	-	-	0.0	-	0.9
2018	0.1	5.2	-	-	0.0	-	-	0.1	0.0	0.1

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

**Table 16R-32.11 - Forb Species.** Nested frequency and modified Daubenmire average cover by year.

FORB SPECIES	Nested Frequency														
Chamaesyce albomarginata (whitemargin sandmat)															
Chenopodium fremontii <sup>a</sup> (Fremont's goosefoot)															
Cryptantha (cryptantha)															
Descurainia pinnata <sup>a</sup> (western tansymustard)															
Eriogonum cernuum <sup>a</sup> (nodding buckwheat)															
Erodium cicutarium <sup>ai</sup> (redstem stork's bill)															
Lactuca serriola <sup>ai</sup> (prickly lettuce)															
Linum perenne <sup>i</sup> (blue flax)															
Lithospermum incisum (narrowleaf stone seed)															
Penstemon (beardtongue)															
Penstemon palmeri (Palmer's penstemon)															
Salsola tragus <sup>ai</sup> (prickly Russian thistle)															
Sisymbrium altissimum <sup>ai</sup> (tall tumblemustard)															
Streptanthus cordatus (heartleaf twistflower)															
year	Average Cover (%)														
2008	16	-	4	-	14	-	-	-	-	-	-	4	-	-	-
2011	26	2	-	26	6	2	1	7	4	2	1	78	3	-	-
2014	9	-	-	-	3	-	-	-	-	-	3	42	-	1	-
2018	12	-	10	15	5	1	-	3	-	-	1	41	-	-	-
2008	0.1	-	0.0	-	0.1	-	-	-	-	-	-	0.0	-	-	-
2011	0.3	0.0	-	0.8	0.0	0.0	0.0	0.0	0.0	0.1	0.0	0.7	0.1	-	-
2014	0.1	-	-	-	0.0	-	-	-	-	-	0.0	0.3	-	0.0	-
2018	0.2	-	0.1	0.1	0.0	0.0	-	0.0	-	-	0.0	0.1	-	-	-

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

**Table 16R-32.12 - Shrub and Tree Species.** Average modified Daubenmire quadrat and line intercept cover by year.

SHRUB SPECIES	Line Intercept Cover (%)				
	Artemisia nova <sup>p</sup> (black sagebrush)	Gutierrezia sarothrae (broom snakeweed)	Juniperus osteosperma <sup>i</sup> (Utah juniper)	Opuntia (pricklypear)	Pinus edulis <sup>i</sup> (twoneedle pinyon)
year	Line Intercept Cover (%)				
2008	20.1	-	0.7	-	8.8
2011	9.1	-	0.5	-	0
2014	9.9	-	0.7	-	0.2
2018	12	0.3	0.7	-	0.3
year	Quadrat Cover (%)				
2008	17.0	-	1.1	-	4.2
2011	6.0	-	0.0	-	0.0
2014	6.3	-	0.0	-	0.0
2018	11.1	0.4	0.0	0.0	0.0

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

**Table 16R-32.13 - Shrub/Tree Characteristics.** Population characteristics of shrub/tree species populations including density reproduction (seedlings), age distribution, utilization, vigor and average size (height/crown) of plants.

Year	Density		Age Class Distribution			Utilization		Poor Vigor (%)	Average Height Crown (cm)
	Plants Per Acre		Excluding Seedlings			Moderate (%)	Heavy (%)		
	Excluding Seedlings	Seedling	Young (%)	Mature (%)	Decadent (%)				
<b>Artemisia nova<sup>p</sup> -- (black sagebrush)</b>									
2008	8860	3460	6	60	34	27	7	9	19/51
2011	4580	220	21	68	11	51	7	9	22/44
2014	6340	200	14	77	10	39	44	5	22/47
2018	6140	900	10	77	13	19	4	9	20/45
<b>Artemisia tridentata ssp. vaseyana<sup>p</sup> -- (mountain big sagebrush)</b>									
2008	-	-	-	-	-	-	-	-	-/-
2011	-	-	-	-	-	-	-	-	37/38
2014	-	-	-	-	-	-	-	-	34/49
2018	-	-	-	-	-	-	-	-	44/62
<b>Atriplex canescens<sup>p</sup> -- (fourwing saltbush)</b>									
2008	-	-	-	-	-	-	-	-	-/-
2011	-	-	-	-	-	-	-	-	-/-
2014	-	-	-	-	-	-	-	-	51/58
2018	-	-	-	-	-	-	-	-	-/-
<b>Ericameria nauseosa -- (rubber rabbitbrush)</b>									
2008	-	-	-	-	-	-	-	-	-/-
2011	-	-	-	-	-	-	-	-	-/-
2014	-	-	-	-	-	-	-	-	-/-
2018	-	-	-	-	-	-	-	-	65/60
<b>Gutierrezia sarothrae -- (broom snakeweed)</b>									
2008	160	-	0	100	0	0	0	0	15/16
2011	-	-	-	-	-	-	-	-	21/23
2014	-	-	-	-	-	-	-	-	17/22
2018	520	-	19	81	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 (%)				
<b>Juniperus osteosperma<sup>t</sup> -- (Utah juniper)</b>									
2008	240	-	100	0	0	0	0	0	- / -
2011	20	20	0	100	0	0	0	0	- / -
2014	120	-	100	0	0	17	0	17	- / -
2018	140	-	86	14	0	0	0	0	- / -
<b>Opuntia -- (pricklypear)</b>									
2008	-	-	-	-	-	-	-	-	8/42
2011	-	-	-	-	-	-	-	-	- / -
2014	20	-	0	100	0	0	0	0	7/21
2018	20	-	0	100	0	0	0	0	10/33
<b>Pinus edulis<sup>t</sup> -- (twoneedle pinyon)</b>									
2008	200	-	20	80	0	0	0	0	- / -
2011	20	-	100	0	0	0	0	0	- / -
2014	20	-	0	100	0	0	0	0	- / -
2018	20	-	100	0	0	0	0	0	- / -
<b>Rhus trilobata<sup>p</sup> -- (skunkbush sumac)</b>									
2008	-	-	-	-	-	-	-	-	- / -
2011	-	-	-	-	-	-	-	-	- / -
2014	-	-	-	-	-	-	-	-	- / -
2018	-	-	-	-	-	-	-	-	58/124

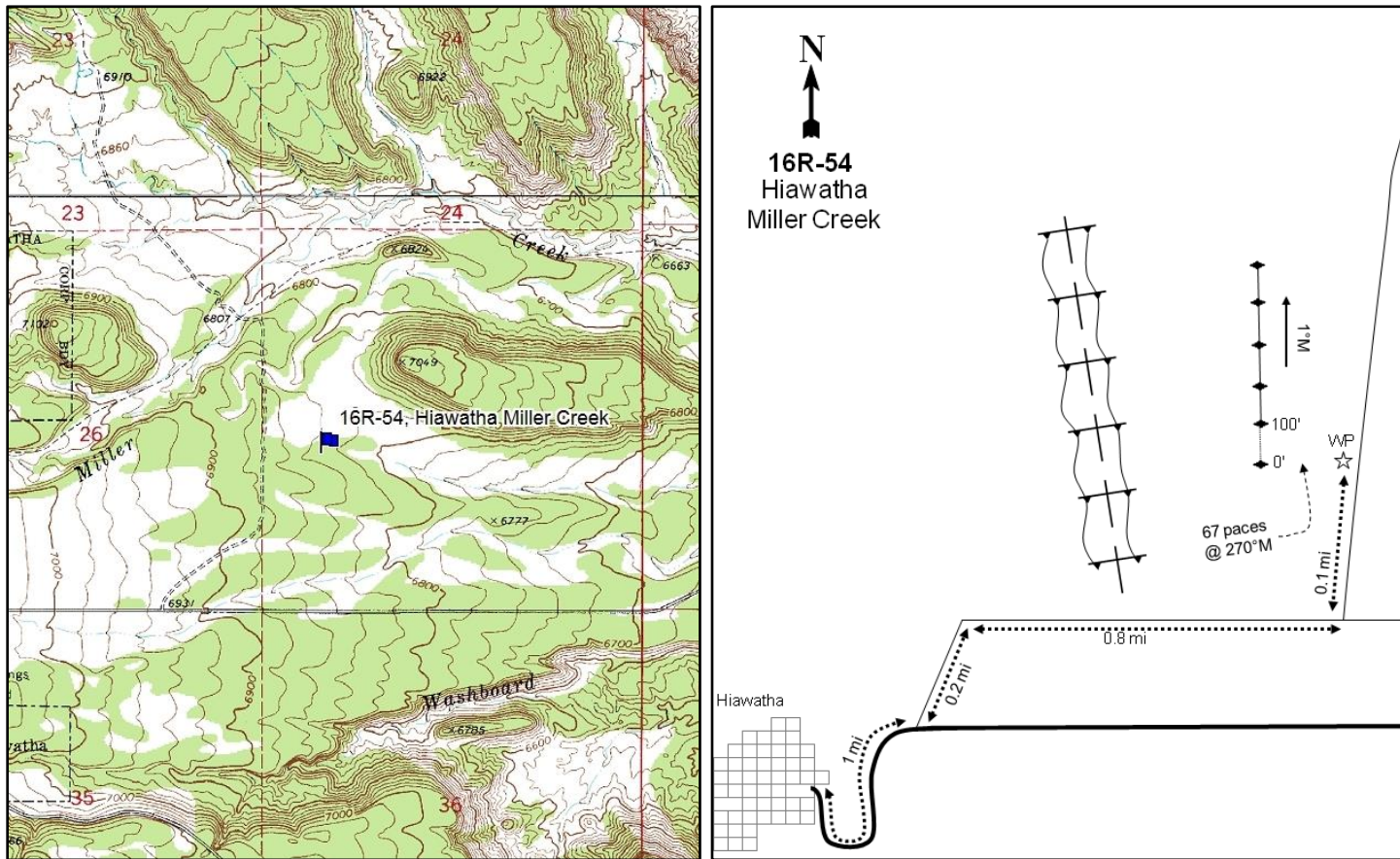
t - Tree Species; p - Preferred Browse; i - Introduced Species

**Table 16R-32.14 - Tree Characteristics.** Point-quarter tree density, size class distribution, and average diameter.

Year	Density	Size Class Distribution					Average Diameter (cm)
	Trees per Acre	Seedling (%)	1-4' (%)	4-8' (%)	8-12' (%)	>12' (%)	
<b>Juniperus osteosperma (Utah juniper)</b>							
2008	122	-	85	15	-	-	6.3
2011	64	-	100	-	-	-	4.2
2014	110	-	95	5	-	-	6.7
2018	105	5	85	10	-	-	5.0
<b>Pinus edulis (twoneedle pinyon)</b>							
2008	156	-	25	60	15	-	11.2
2011	25	-	100	-	-	-	3.7
2014	28	7	87	7	-	-	6.5
2018	32	-	73	27	-	-	6.0



## HIAWATHA MILLER CREEK - STUDY NO. 16R-54



**Location Information**

USGS 7.5 min Map Info	Poison Spring Bench ; Township 15S, Range 8E, Section 25
GPS (0' Stake)	NAD 83 UTM ZONE 12, 501579 East 4371173 North

**Transect Information**

Browse Tag # (0' Stake)	523
Transect Bearing	355° 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 Hiawatha, continue east on SR-122. After 1.0 miles, turn left (north) and continue driving for 0.2 miles; the road will curve to the right (east). Follow the road right and drive for 0.8 miles after this curve. Just after passing under some powerlines, there will be a road to the left (north). Follow this road for 0.1 miles and park. The site will be 67 paces from the road at 270 degrees magnetic; there are no stakes.

**Site Information**

Land Ownership	Private
Land Administrator	Private
Allotment	No data
Elevation	6,824ft (2,080m)
Aspect	East
Slope	1%
Sample Dates	08/05/2015, 08/14/2018

**Table 16R-54.1 Disturbance History.** Recorded history of major disturbances.

Treatment/Disturbance	Name	WRI DB#	Date	Size (acres)
Mechanical - Bullhog	Hiawatha/Miller Creek Phase 2	3365	December 2015-March 2016	486
Seeding - Aerial Before	Hiawatha/Miller Creek Phase 2	3365	December 2015-March 2016	486

**Table 16R-54.2 Seed Mix.** List of known seeded plant species and rates (if available).

Mix Name			Application Type	Application Date	Acres
Hiawatha 2			Aerial	Aug 2015	486
Type	Species	Common Name	Cultivar/Source ID	Bulk lbs/acre	PLS
G	Achnatherum hymenoides	Indian Ricegrass	White River	1.03	0.96
G	Agropyron fragile	Siberian Wheatgrass	Vavilov	0.93	0.83
G	Elymus lanceolatus	Thickspike Wheatgrass	Bannock	1.03	0.91
G	Poa secunda	Canby Bluegrass	Canbar	0.51	0.43
F	Achillea millefolium	Western Yarrow	Lincoln WA	0.10	0.09
F	Astragalus cicer	Cicer Milkvetch	Lutana	0.82	0.80
F	Cleome serrulata	Rocky Mountain Beeplant	Sevier UT	0.21	0.17
F	Cleome serrulata	Rocky Mountain Beeplant	Wayne UT	0.52	0.51
F	Linum perenne	Blue Flax	Appar	1.03	0.86
F	Medicago sativa	Alfalfa	Ladak +	1.44	1.34
F	Melilotus officinalis	Yellow Sweetclover		1.03	0.98
F	Onobrychis viciifolia	Sainfoin	Eski	1.54	1.50
F	Sanguisorba minor	Small Burnet		1.03	0.85
F	Sphaeralcea grossulariifolia	Gooseberryleaf Globemallow	Sanpete UT	0.21	0.18
S	Atriplex canescens	Fourwing Saltbush	Juab/Carbon UT	1.03	0.41
Mix Name			Application Type	Application Date	Acres
Hiawatha 2 Sagebrush			Aerial	Dec 2015	486
Type	Species	Common Name	Cultivar/Source ID	Bulk lbs/acre	PLS
		Rice Hulls		0.31	0.00
S	Artemisia tridentata ssp. wyomingensis	Wyoming Big Sagebrush	Sanpete UT	0.62	0.10
S	Bassia prostrata	Forage Kochia	Millard/Beaver UT	0.51	0.38
S	Bassia prostrata	Forage Kochia	Snowstorm	0.35	0.12

**Wildlife Habitat and Vegetation History**

**Table 16R-54.3 - Wildlife Seasonal Habitat.** UDWR wildlife habitat and seasonality.

Species	Habitat	Season
Deer	crucial	winter
Elk	crucial	winter
Greater Sage Grouse	occupied	year-long

**Table 16R-54.4 - Vegetation History.** The dominant vegetation type(s) and phase of woodland succession (Tausch, Miller, Roundy, & Chambers, 2009).

Year	Vegetation Type	Woodland Succession
2015	Pinyon-Juniper/Mountain Big Sagebrush	Phase II
2018	Mountain Big Sagebrush	Phase I

**Site Notes**

No Notes

**Site Potential**

1981 - 2010 Average Annual Precipitation 12 inches  
 NRCS Ecological Site Upland Loam (Mountain Big Sagebrush-Indian Ricegrass)  
 NRCS Ecological Site # R047XB308UT  
 States and Transitions No state and transition model is available for this ecological site.

Upon establishment in 2015, this site was a mountain big sagebrush (*Artemisia tridentata* ssp. *vaseyana*) shrubland that had been encroached by twoneedle pinyon (*Pinus edulis*) and Utah juniper (*Juniperus osteosperma*) and was considered to be within Phase II of woodland succession. A bullhog and seeding treatment removed a majority of the trees, leaving sagebrush as the dominant vegetation component in 2018 (Table 16R-54.1, Table 16R-54.4, Table 16R-54.12, Photos). The herbaceous understory was lacking in both diversity and abundance in 2015. The diversity was slightly augmented by treatment, but abundance remained low in 2018 (Table 16R-54.7, Table 16R-54.10, Table 16R-54.11). Although density of trees is low as of 2018 (Table 16R-54.14), their continued presence indicates that this site may be at risk of being infilled in future sample years.

**Trend Summary Tables**

**Table 16R-54.6 - 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
2015	4.9	0.9	3.9	5.0	1.0	13.9
2018	5.7	1.4	-	5.7	1.1	-

**Table 16R-54.7 - 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
2015	-	204	5	36	-	6.6	0.0	0.2
2018	4	174	29	48	0.0	5.5	0.3	0.5

**Table 16R-54.8 - 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
2015	62.0	6.3	24.2	0.2	1.3	17.0
2018	48.6	1.2	48.2	1.0	1.6	12.4

**Table 16R-54.9 - 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		
2015	-	45	28
2018	1	33	28
Days Use Per Acre (ha)			
2015	-	79.8 (197.0)	-
2018	3.6 (9.0)	46.2 (114.2)	-

**Table 16R-54.10 - Grass Species.** Nested frequency and modified Daubenmire average cover by year.

GRASS SPECIES								
Achnatherum hymenoides (Indian ricegrass)								
Agropyron cristatum <sup>i</sup> (crested wheatgrass)								
Agropyron fragile <sup>i</sup> (Siberian wheatgrass)								
Bouteloua gracilis (blue grama)								
Bromus tectorum <sup>ai</sup> (cheatgrass)								
Elymus elymoides (squirreltail)								
Hesperostipa comata (needle and thread)								
Sporobolus cryptandrus (sand dropseed)								
year	Nested Frequency							
2015	20	-	-	125	-	42	50	3
2018	44	1	2	74	4	26	34	5
year	Average Cover (%)							
2015	0.4	-	-	4.3	-	0.8	1.0	0.0
2018	0.4	0.0	0.0	4.2	0.0	0.6	0.4	0.0

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

**Table 16R-54.11 - Forb Species.** Nested frequency and modified Daubenmire average cover by year.

FORB SPECIES																
Achillea millefolium (Common yarrow)																
Astragalus (milkvetch)																
Astragalus cicer <sup>i</sup> (chickpea milkvetch)																
Astragalus convallarius (lesser rushy milkvetch)																
Comandra umbellata (bastard toadflax)																
Descurainia pinnata <sup>a</sup> (western tansymustard)																
Ipomopsis aggregata (scarlet gilia)																
Ipomopsis congesta (ballhead ipomopsis)																
Lactuca scariola <sup>ai</sup> (prickly lettuce)																
Lappula occidentalis <sup>ai</sup> (flatspine stickseed)																
Linum perenne <sup>i</sup> (blue flax)																
Machaeranthera canescens (hoary tansyaster)																
Penstemon pachyphyllus (thickleaf beardtongue)																
Physaria rectipes (straight bladderpod)																
Sisymbrium altissimum <sup>ai</sup> (tall tumblemustard)																
Sphaeralcea coccinea (scarlet globemallow)																
year	Nested Frequency															
2015	-	-	-	4	2	3	2	3	-	4	-	-	8	1	-	19
2018	2	1	5	6	-	18	2	-	0	14	6	4	14	2	6	12
year	Average Cover (%)															
2015	-	-	-	0.1	0.0	0.0	0.0	0.0	-	0.0	-	-	0.0	0.0	-	0.0
2018	0.0	0.0	0.2	0.0	-	0.1	0.0	-	0.0	0.1	0.0	0.0	0.1	0.0	0.1	0.0

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

**Table 16R-54.12 - Shrub and Tree Species.** Average modified Daubenmire quadrat and line intercept cover by year.

SHRUB SPECIES	Artemisia tridentata ssp. vaseyana <sup>p</sup> (mountain big sagebrush)	Ericameria parryi (Parry's rabbitbrush)	Gutierrezia sarothrae (broom snakeweed)	Juniperus osteosperma <sup>i</sup> (Utah juniper)	Linanthus pungens (granite prickly phlox)	Opuntia (pricklypear)	Pinus edulis <sup>t</sup> (twoneedle pinyon)
year	Line Intercept Cover (%)						
2015	5	-	0.9	4.8	-	0.1	9.1
2018	5.7	-	1	-	0.1	-	-
year	Quadrat Cover (%)						
2015	4.9	-	0.7	1.3	-	0.2	2.7
2018	5.7	0.1	1.1	-	0.0	0.1	-

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

**Table 16R-54.13 - 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 (%)				
<b>Artemisia tridentata ssp. vaseyana<sup>p</sup> -- (mountain big sagebrush)</b>									
2015	2340	60	9	12	79	26	56	70	45/69
2018	2300	980	24	37	38	33	29	29	46/68
<b>Ericameria parryi -- (Parry's rabbitbrush)</b>									
2015	-	-	-	-	-	-	-	-	-/-
2018	20	-	0	100	0	0	0	0	19/19
<b>Gutierrezia sarothrae -- (broom snakeweed)</b>									
2015	980	20	6	94	0	0	0	0	15/19
2018	3760	-	41	59	0	0	0	0	20/23
<b>Juniperus osteosperma<sup>i</sup> -- (Utah juniper)</b>									
2015	80	-	25	50	25	0	0	50	-/-
2018	-	-	-	-	-	-	-	-	-/-
<b>Linanthus pungens -- (granite prickly phlox)</b>									
2015	-	-	-	-	-	-	-	-	-/-
2018	40	-	0	0	100	0	0	100	5/19
<b>Opuntia -- (pricklypear)</b>									
2015	180	-	22	67	11	0	0	11	8/21
2018	60	-	0	100	0	0	0	0	8/20
<b>Pinus edulis<sup>t</sup> -- (twoneedle pinyon)</b>									
2015	20	20	100	0	0	0	0	0	-/-
2018	-	40	0	0	0	0	0	0	-/-

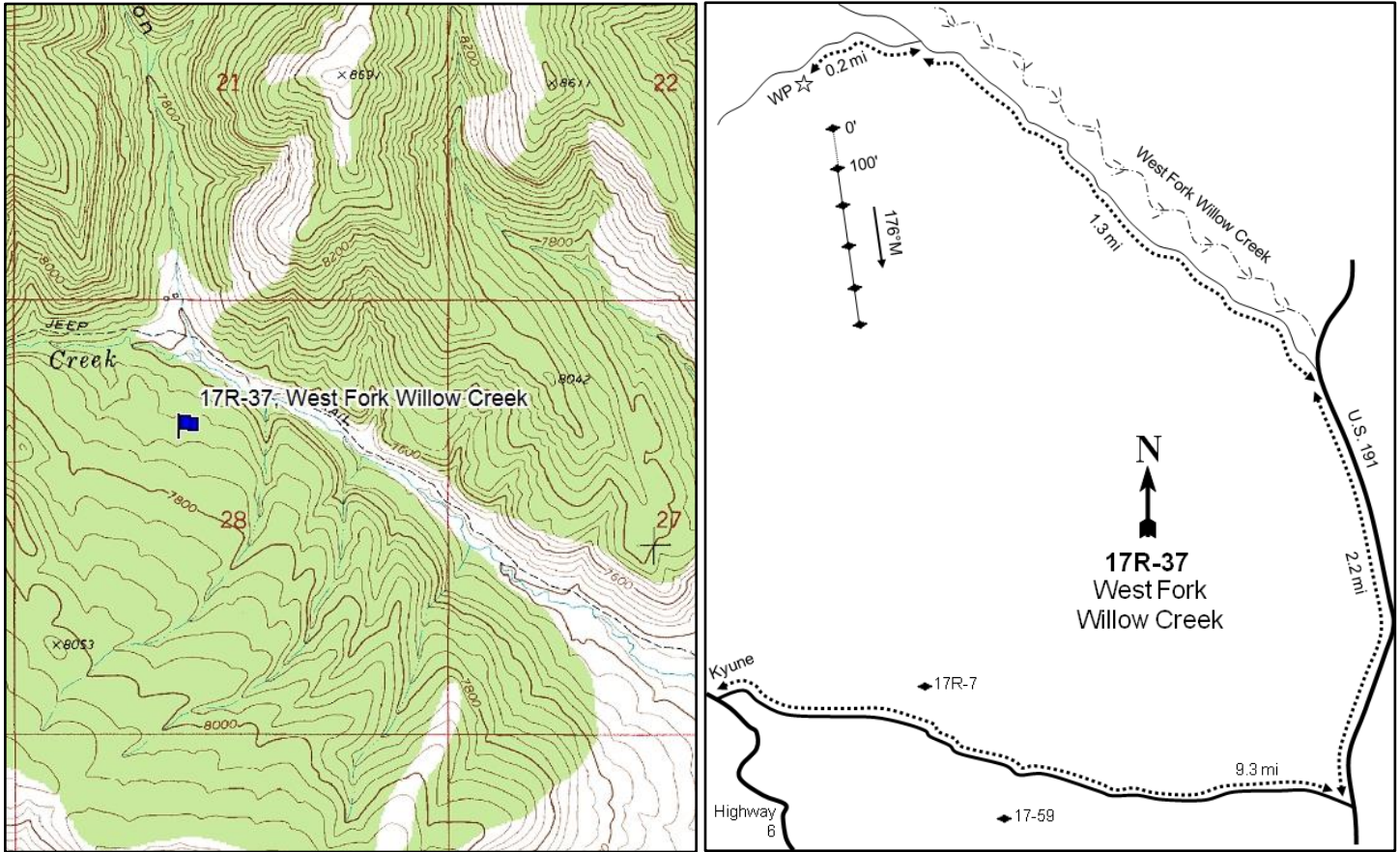
t - Tree Species; p - Preferred Browse; i - Introduced Species

**Table 16R-54.14 - 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' (%)	
<b>Juniperus osteosperma (Utah juniper)</b>							
2015	61	-	-	32	58	11	11.9
2018	10	25	50	25	-	-	4.9
<b>Pinus edulis (twoneedle pinyon)</b>							
2015	68	20	10	20	35	15	11.8
2018	18	44	44	11	-	-	2.1



## WEST FORK WILLOW CREEK - STUDY NO. 17R-37



### Location Information

USGS 7.5 min Map Info	Matts Summit NW; Township 11S, Range 10E, Section 28
GPS (0' Stake)	NAD 83 UTM ZONE 12, 515998 East 4409669 North

### Transect Information

Browse Tag # (0' Stake)	260
Transect Bearing	170° magnetic
Length	500ft
Belt Placement	Line 1 (11ft), Line 2 (34ft), Line 3 (59ft), Line 4 (71ft), Line 5 (95ft)
Belt Marker Placement	Standard

### Directions to Site

Traveling south on US-6, turn left onto the road that leads to Kyune and travel for 9.3 miles. Turn left onto US-191 and drive for 2.2 miles to a road that runs parallel to West Fork Willow Creek. Turn left onto this road and continue for 1.3 miles to a fork. Bear left at the fork and drive for 0.2 miles. The site is on the left (south) side of the road; there is no witness post.



**Site Information**

Land Ownership	Private
Land Administrator	Private
Allotment	WEST FORK
Elevation	7,717ft (2,352m)
Aspect	North
Slope	10%
Sample Dates	08/06/2015, 07/25/2018

**Table 17R-37.1 Disturbance History.** Recorded history of major disturbances.

Treatment/Disturbance	Name	WRI DB#	Date	Size (acres)
Logging - Coppice Cutting	West Fork Willow Creek Aspen Restoration Phase 1	3222	May 2016	25

**Wildlife Habitat and Vegetation History****Table 17R-37.3 - Wildlife Seasonal Habitat.** UDWR wildlife habitat and seasonality.

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

**Table 17R-37.4 - Vegetation History.** The dominant vegetation type(s) and phase of woodland succession (Tausch, Miller, Roundy, & Chambers, 2009).

Year	Vegetation Type	Woodland Succession
2015	Quaking Aspen/Perennial Grass-Forb	Phase I
2018	Quaking Aspen/Perennial Grass-Forb	Phase I

**Site Notes**

The location of the study site was shifted slightly in 2018 to better capture the treatment and avoid fences.

**Site Potential**

1981 - 2010 Average Annual Precipitation	19 inches
NRCS Ecological Site	High Mountain Loam (Aspen)
NRCS Ecological Site #	R047XA508UT
States and Transitions	No state and transition model is available for this ecological site.

This study site has remained dominated by quaking aspen (*Populus tremuloides*) since establishment in 2015. However, age of the stand has changed: many older trees were present prior to treatment, whereas all of the plants sampled in 2018 were younger (Photos, Table 17R-37.13a). The shrub understory has also been diverse and abundant with yellow rabbitbrush (*Chrysothamnus viscidiflorus* ssp. *viscidiflorus* var. *viscidiflorus*) contributing the most cover. Other shrub species such as mountain snowberry (*Symphoricarpos oreophilus*) and mountain big sagebrush (*Artemisia tridentata* ssp. *vaseyana*) have also been present to a lesser extent (Table 17R-37.12, Table 17R-37.13). The herbaceous layer has remained very abundant, although cover has exhibited a slight decrease following treatment. Perennial grasses and forbs have made up a majority of the understory throughout the duration of the study (Table 17R-37.7). However, the noxious annual forb species gypsyflower (*Cynoglossum officinale*) has been observed in both sample years (Table 17R-37.11) and may pose a threat to the resilience of the community if it increases in the future. Although many of the conifer trees in the area were removed by treatment, some trees have remained on site, indicating that there could be potential for infilling over time (Table 17R-37.12, Table 17R-37.14).

**Trend Summary Tables****Table 17R-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
2015	6.7	5.3	4.6	10.5	11.0	18.0
2018	5.3	5.5	12.9	8.8	8.9	17.3

**Table 17R-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
2015	-	463	89	379	-	29.2	2.3	23.6
2018	-	422	47	340	-	21.2	0.9	11.4

**Table 17R-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
2015	6.2	0.0	37.6	0.0	0.1	70.9
2018	14.7	-	67.8	0.2	1.1	46.1

**Table 17R-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			
2015	1	-	1	-
2018	6	1	11	2
Year	Days Use Per Acre (ha)			
2015	-	12.8 (31.5)	2.7 (6.6)	-
2018	11.6 (28.7)	4.7 (11.6)	16.8 (41.4)	-

**Table 17R-37.10 - Grass Species.** Nested frequency and modified Daubenmire average cover by year.

GRASS SPECIES	Nested Frequency					
Achnatherum nelsonii (Columbia needgrass)	11	3	11	453	4	5
Carex (sedge)	3	6	19	415	-	5
Elymus lanceolatus (thickspike wheatgrass)	Average Cover (%)					
Poa pratensis <sup>i</sup> (Kentucky bluegrass)	0.2	0.0	0.1	28.9	0.0	0.0
Poa secunda (Sandberg bluegrass)	0.0	0.0	0.4	20.7	-	0.0
Pseudoroegneria spicata (bluebunch wheatgrass)						

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

**Table 17R-37.11 - Forb Species.** Nested frequency and modified Daubenmire average cover by year.

FORB SPECIES	Nested Frequency																	
Achillea millefolium (Common yarrow)	193	1	6	15	3	3	2	7	4	3	59	4	25	8	131	1	1	
Agoseris glauca (pale agoseris)	142	6	-	4	9	-	3	-	-	-	23	-	26	-	46	4	-	
Androsace septentrionalis <sup>a</sup> (pygmyflower rockjasmine)	Average Cover (%)																	
Astragalus (milkvetch)	3.0	0.0	0.0	0.3	0.1	0.0	0.0	0.0	0.0	0.0	1.9	0.0	0.3	0.1	7.0	0.0	0.0	
Astragalus tenellus (looseflower milkvetch)	1.4	0.0	-	0.0	0.1	-	0.1	-	-	-	0.6	-	0.1	-	0.9	0.0	-	
Cerastium beeringianum (Bering chickweed)																		
Chenopodium fremontii <sup>a</sup> (Fremont's goosefoot)																		
Cirsium (thistle)																		
Clematis columbiana (rock clematis)																		
Collinsia parviflora <sup>a</sup> (maiden blue eyed Mary)																		
Cynoglossum officinale <sup>ani</sup> (gypsyflower)																		
Dracocephalum parviflorum (American dragonhead)																		
Galium <sup>a</sup> (bedstraw)																		
Geranium richardsonii (Richardson's geranium)																		
Lathyrus brachycalyx (Bonneville pea)																		
Phlox longifolia (longleaf phlox)																		
Polygonum douglasii <sup>a</sup> (Douglas' knotweed)																		

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

FORB SPECIES									
Potentilla gracilis (slender cinquefoil)									
Potentilla hippiana (woolly cinquefoil)									
Ranunculus inamoenus (graceful buttercup)									
Symphotrichum (aster)									
Taraxacum officinale (common dandelion)									
Tragopogon dubius <sup>ai</sup> (yellow salsify)									
Veronica biloba <sup>ai</sup> (two-lobed speedwell)									
Vicia americana (American vetch)									
Viola (violet)									
year	Nested Frequency								
2015	8	4	8	201	198	1	7	50	34
2018	1	-	-	276	67	-	-	-	6
year	Average Cover (%)								
2015	0.0	0.2	0.0	6.6	4.9	0.0	0.1	0.9	0.3
2018	0.0	-	-	8.6	0.3	-	-	-	0.0

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

**Table 17R-37.12 - Shrub and Tree Species.** Average modified Daubenmire quadrat and line intercept cover by year.

SHRUB SPECIES														
Amelanchier utahensis <sup>p</sup> (Utah serviceberry)														
Artemisia cana (silver sagebrush)														
Artemisia nova <sup>p</sup> (black sagebrush)														
Artemisia tridentata ssp. vaseyana <sup>p</sup> (mountain big sagebrush)														
Chrysothamnus viscidiflorus ssp. viscidiflorus var. viscidiflorus (yellow rabbitbrush)														
Ericameria nauseosa (rubber rabbitbrush)														
Juniperus communis (common juniper)														
Juniperus scopulorum <sup>t</sup> (Rocky Mountain juniper)														
Mahonia repens (creeping barberry)														
Populus tremuloides <sup>t</sup> (quaking aspen)														
Pseudotsuga menziesii <sup>t</sup> (Douglas-fir)														
Ribes <sup>p</sup> (currant)														
Rosa woodsii <sup>p</sup> (Woods' rose)														
Symphoricarpos oreophilus <sup>p</sup> (mountain snowberry)														
year	Line Intercept Cover (%)													
2015	0.4	0.6	-	0.2	9.5	-	-	5.9	0.9	10.4	1.7	-	0.9	9
2018	0.2	-	-	2.2	7.4	0.1	1	2.9	0.4	14.4	-	0.4	0.4	5.6
year	Quadrat Cover (%)													
2015	0.2	0.0	0.0	0.6	4.2	-	-	2.4	1.1	0.9	1.2	-	0.1	5.8
2018	0.2	-	-	1.6	4.3	0.0	0.0	2.4	1.2	10.2	0.4	0.1	0.3	3.0

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

**Table 17R-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 (%)				
<b>Amelanchier utahensis<sup>p</sup> -- (Utah serviceberry)</b>									
2015	140	20	57	29	14	14	29	71	33/35
2018	120	-	50	50	0	0	33	0	18/23
<b>Artemisia cana -- (silver sagebrush)</b>									
2015	40	-	0	50	50	0	0	0	51/66
2018	-	-	-	-	-	-	-	-	38/71
<b>Artemisia nova<sup>p</sup> -- (black sagebrush)</b>									
2015	-	-	-	-	-	-	-	-	39/61
2018	-	-	-	-	-	-	-	-	-/-
<b>Artemisia tridentata ssp. vaseyana<sup>p</sup> -- (mountain big sagebrush)</b>									
2015	100	-	20	40	40	40	0	40	52/83
2018	960	-	10	88	2	8	0	0	47/53
<b>Cercocarpus montanus<sup>p</sup> -- (alderleaf mountain mahogany)</b>									
2015	-	-	-	-	-	-	-	-	-/-
2018	-	-	-	-	-	-	-	-	30/46
<b>Chrysothamnus viscidiflorus ssp. viscidiflorus var. stenophyllus -- (yellow rabbitbrush)</b>									
2015	20	-	0	100	0	0	0	0	-/-
2018	200	-	10	80	10	0	0	10	-/-
<b>Chrysothamnus viscidiflorus ssp. viscidiflorus var. viscidiflorus -- (yellow rabbitbrush)</b>									
2015	2740	-	1	98	2	0	0	5	38/56
2018	4300	-	0	99	1	17	1	6	30/39
<b>Ericameria nauseosa -- (rubber rabbitbrush)</b>									
2015	-	-	-	-	-	-	-	-	-/-
2018	40	-	0	100	0	0	0	0	66/57
<b>Juniperus communis -- (common juniper)</b>									
2015	-	-	-	-	-	-	-	-	80/278
2018	120	20	0	83	17	0	0	50	33/45
<b>Juniperus scopulorum<sup>t</sup> -- (Rocky Mountain juniper)</b>									
2015	60	100	67	33	0	0	0	0	-/-
2018	20	-	0	100	0	0	0	0	-/-
<b>Mahonia repens -- (creeping barberry)</b>									
2015	5900	-	42	58	0	0	0	0	10/13
2018	6720	40	5	87	8	0	0	13	5/6
<b>Pseudotsuga menziesii<sup>t</sup> -- (Douglas-fir)</b>									
2015	20	20	0	100	0	0	0	0	-/-
2018	-	-	-	-	-	-	-	-	-/-
<b>Ribes<sup>p</sup> -- (currant)</b>									
2015	-	-	-	-	-	-	-	-	35/45
2018	120	-	0	100	0	17	0	0	83/79
<b>Rosa woodsii<sup>p</sup> -- (Woods' rose)</b>									
2015	600	20	57	43	0	43	23	3	48/35
2018	680	-	15	82	3	15	9	3	17/16
<b>Symphoricarpos oreophilus<sup>p</sup> -- (mountain snowberry)</b>									
2015	2320	-	11	88	1	3	0	0	53/80
2018	1720	-	7	93	0	6	4	0	41/66

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

**Table 17R-37.13a - 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	2400	79	11	-	10	4	0	28
2018	8060	21	79	-	-	2	0	1

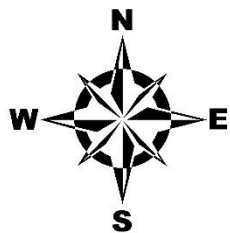
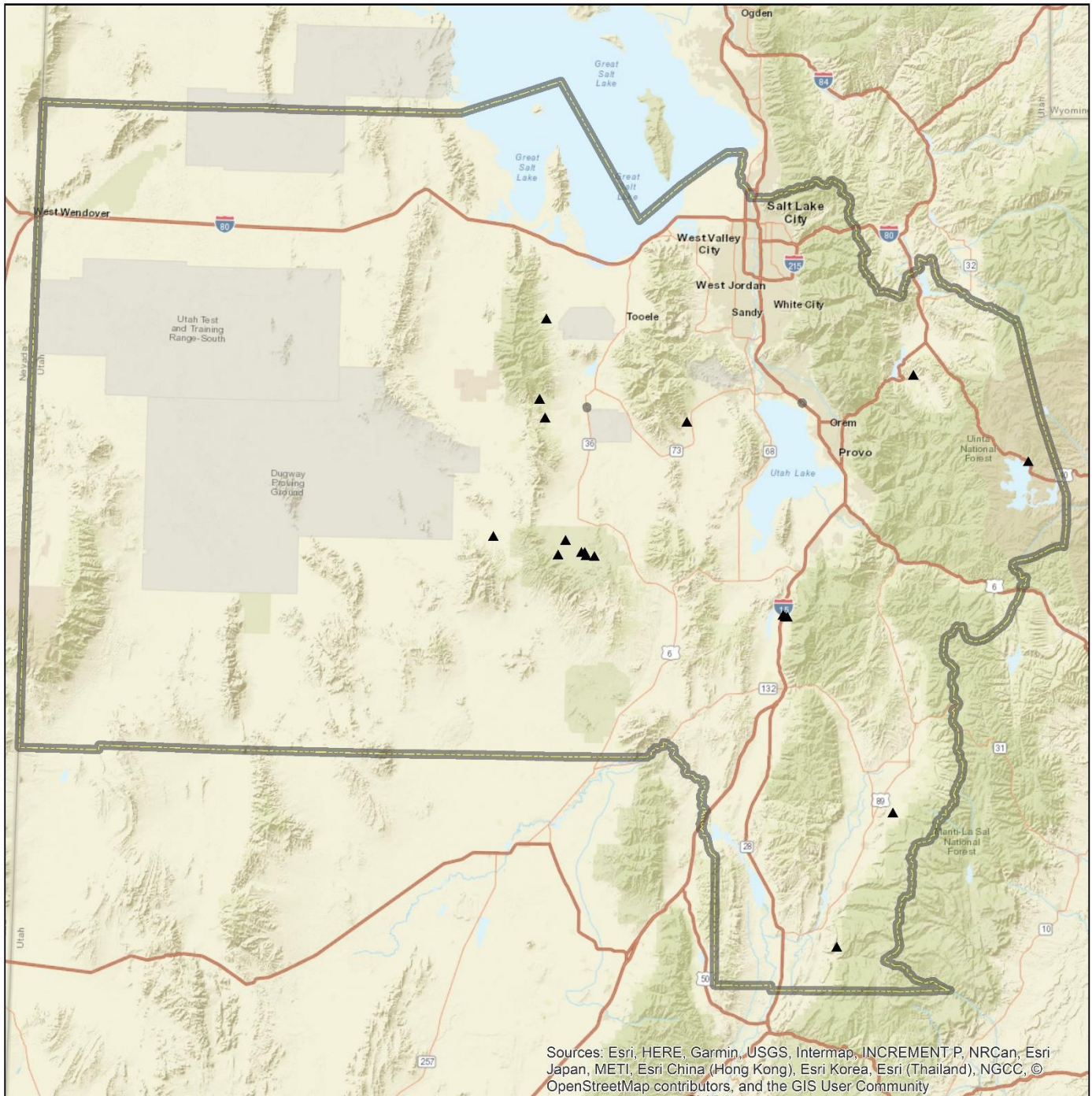
Class I -  $\leq$  1.5 feet; Class II -  $>$  1.5 feet to 5 feet; Class III -  $>$  5 feet and up to 1 inch diameter at breast height (dbh); Class IV -  $>$  1 in diameter at breast height (dbh)

**Table 17R-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 scopulorum (Rocky Mountain juniper)							
2015	54	-	33	56	-	11	10.9
2018	19	9	18	55	-	18	11.4
Pinus flexilis (limber pine)							
2015	6	-	67	33	-	-	13.7
Populus tremuloides (quaking aspen)							
2015	1663	80	20	-	-	-	1.6
2018	9727	15	85	-	-	-	1.1
Pseudotsuga menziesii (Douglas-fir)							
2015	22	-	36	27	-	36	10.1
2018	13	-	-	67	-	33	10.3

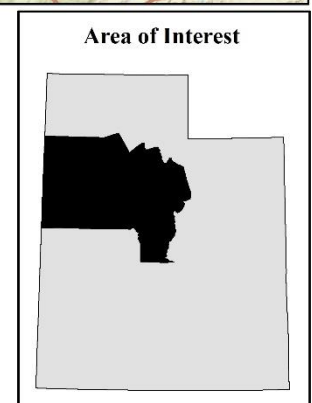
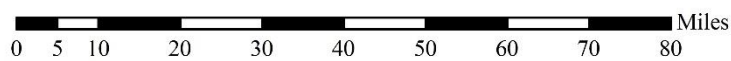


# CENTRAL REGION



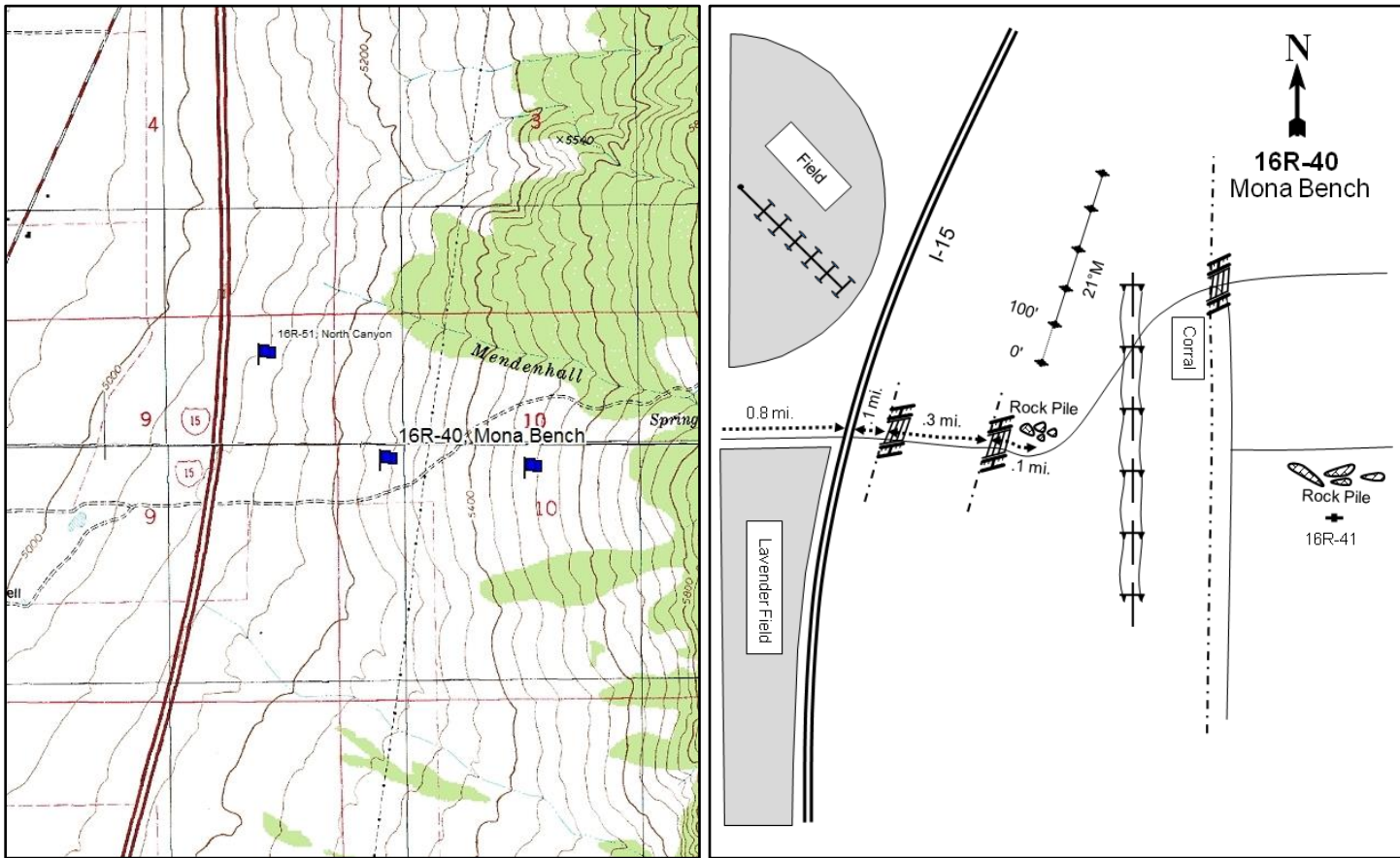
**Project**

- ▲ WRI
- ▭ Central Region Boundaries





### MONA BENCH - STUDY NO. 16R-40



**Location Information**

USGS 7.5 min Map Info                      Mona NW; Township 11S, Range 1E, Section 10  
 GPS (0' Stake)                                NAD 83 UTM ZONE 12, 429839 East 4414083 North

**Transect Information**

Browse Tag # (0' Stake)                      194  
 Transect Bearing                                21° magnetic  
 Length    500ft  
 Belt Placement                                 Line 1 (11ft), Line 2 (34ft), Line 3 (59ft), Line 4 (71ft), Line 5 (95ft)  
 Belt Marker Placement                        Line 1: No Rebar

**Directions to Site**

From Mona drive north for 3 miles. Turn right onto the road to the east by the lavender farms, then proceed for 0.8 miles and drive under the freeway. Continue for another 0.1 miles to a panel gate. Proceed through gate and go another 0.3 miles to a wire gate. Continue for another 0.1 miles to a rock pile on the north side of the road; there is no witness post. The 0-foot stake is 18 paces to the north of the road and is marked with a browse tag #194.

**Site Information**

Land Ownership	Private
Land Administrator	Private
Allotment	No data
Elevation	5,181ft (1,579m)
Aspect	West
Slope	8%
Sample Dates	07/06/2011, 08/11/2014, 07/30/2018

**Table 16R-40.1 Disturbance History.** Recorded history of major disturbances.

Treatment/Disturbance	Name	WRI DB#	Date	Size (acres)
Herbicide - Milestone	Mona Bench Project	1934	May 2011	62
Herbicide - Plateau	Mona Bench Project	1934	November 2011	190
Harrow - Two-Way Chain	Mona Bench Project	1934	October 2011	190
Seeding - Broadcast Before	Mona Bench Project	1934	October 2011	190
Seeding - Aerial After	Mona Bench Project	1934	January 2012	190
Herbicide - Milestone	Mona Bench Project	1934	May 2012	62

**Table 16R-40.2 Seed Mix.** List of known seeded plant species and rates (if available).

Mix Name			Application Type	Application Date	Acres
Mona Bench - Grass Mix			Broadcast	Oct 2011	62
Type	Species	Common Name	Cultivar/Source ID	Bulk lbs/acre	PLS
G	<i>Achnatherum hymenoides</i>	Indian Ricegrass	Rimrock	1.61	1.53
G	<i>Agropyron cristatum</i>	Crested Wheatgrass	Hycrest	1.61	1.45
G	<i>Elymus lanceolatus</i>	Thickspike Wheatgrass	Bannock	1.61	1.29
G	<i>Leymus cinereus</i>	Great Basin Wildrye	Trailhead	1.61	1.48
G	<i>Pascopyrum smithii</i>	Western Wheatgrass	Arriba	1.61	1.38
G	<i>Poa secunda</i>	Canby Bluegrass	Canbar	0.40	0.19
G	<i>Poa secunda</i>	Sandberg Bluegrass	Mountain Home	0.40	0.36
G	<i>Psathyrostachys juncea</i>	Russian Wildrye		1.61	1.26
G	<i>Pseudoroegneria spicata</i>	Bluebunch Wheatgrass	Anatone	1.61	1.58
Mix Name			Application Type	Application Date	Acres
Mona Bench - Browse Mix			Aerial	Jan 2012	235
Type	Species	Common Name	Cultivar/Source ID	Bulk lbs/acre	PLS
F	<i>Medicago sativa</i>	Alfalfa	Nomad	0.28	0.25
S	<i>Artemisia tridentata</i> ssp. <i>wyomingensis</i>	Wyoming Big Sagebrush	Sevier UT	0.17	0.03
S	<i>Bassia prostrata</i>	Forage Kochia	Beaver UT	0.55	0.32

**Wildlife Habitat and Vegetation History****Table 16R-40.3 - Wildlife Seasonal Habitat.** UDWR wildlife habitat and seasonality.

Species	Habitat	Season
Elk	crucial	winter

**Table 16R-40.4 - Vegetation History.** The dominant vegetation type(s) and phase of woodland succession (Tausch, Miller, Roundy, & Chambers, 2009).

Year	Vegetation Type	Woodland Succession
2011	Annual Grass/Mountain Big Sagebrush	No Encroachment
2014	Annual Grass	No Encroachment
2018	Annual Grass/Mountain Big Sagebrush	No Encroachment

**Site Notes**

No Notes

**Site Potential**

1981 - 2010 Average Annual Precipitation 18 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.

Upon study establishment in 2011, the plant community on this site was a stand of mountain big sagebrush (*Artemisia tridentata* ssp. *vaseyana*) co-dominant with the annual grasses cheatgrass (*Bromus tectorum*) and field brome (*B. arvensis*). Following a chaining, herbicide, and seeding treatment (Table 16R-40.1), sagebrush cover had decreased as had the perennial herbaceous understory (Table 16R-40.7, Table 16R-40.10, Table 16R-40.11, Table 16R-40.12). Cheatgrass became the dominant species and filled the interspaces in 2014, creating continuous fuels and possibly influencing the fire potential (Table 16R-40.10). Sagebrush cover increased and it became a co-dominant vegetation component in 2018 (Table 16R-40.12). Continual treatment may be needed to reduce cheatgrass.

**Trend Summary Tables**

**Table 16R-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
2011	8.6	9.8	-	11.8	10.2	-
2014	2.1	0.2	-	2.0	-	-
2018	7.0	1.0	-	6.1	0.6	-

**Table 16R-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
2011	451	145	276	84	38.1	5.0	3.6	1.2
2014	461	126	204	30	33.8	4.3	3.2	0.5
2018	447	227	407	43	19.3	6.7	12.8	0.3

**Table 16R-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
2011	14.7	0.1	29.5	15.4	4.4	57.3
2014	10.6	0.0	52.9	14.7	5.4	46.5
2018	15.9	-	44.3	11.0	7.9	37.8

**Table 16R-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	Cattle	Mule Deer	Horse	Rabbit
	Quadrat Frequency			
2011	1	16	1	3
2014	-	2	-	3
2018	2	5	1	6
Year	Days Use Per Acre (ha)			
2011	-	7.4 (18.2)	-	-
2014	3.6 (9.0)	1.3 (3.3)	-	-
2018	11.6 (28.7)	10.0 (24.8)	1.7 (4.3)	-

**Table 16R-40.10 - Grass Species.** Nested frequency and modified Daubenmire average cover by year.

GRASS SPECIES	Achnatherum hymenoides (Indian ricegrass)	Aegilops cylindrica <sup>ai</sup> (jointed goatgrass)	Agropyron cristatum <sup>i</sup> (crested wheatgrass)	Aristida purpurea (purple threeawn)	Bromus arvensis <sup>ai</sup> (field brome)	Bromus tectorum <sup>ai</sup> (cheatgrass)	Elymus elymoides (squirreltail)	Poa bulbosa <sup>i</sup> (bulbous bluegrass)	Poa fendleriana (muttongrass)	Poa secunda (Sandberg bluegrass)	Sporobolus cryptandrus (sand dropseed)	Thinopyrum intermedium <sup>i</sup> (intermediate wheatgrass)	Vulpia myuros <sup>ai</sup> (annual fescue)
year	Nested Frequency												
2011	-	8	-	67	234	311	-	45	1	45	8	12	7
2014	2	-	3	85	49	457	2	11	-	12	5	23	-
2018	-	-	17	189	59	446	-	6	-	9	6	35	17
year	Average Cover (%)												
2011	-	0.4	-	3.6	16.1	21.6	-	0.5	0.0	0.3	0.5	0.1	0.0
2014	0.1	-	0.0	2.9	0.4	33.4	0.0	0.2	-	0.5	0.2	0.5	-
2018	-	-	0.3	5.8	0.4	18.6	-	0.0	-	0.0	0.1	0.4	0.2

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

**Table 16R-40.11 - Forb Species.** Nested frequency and modified Daubenmire average cover by year.

FORB SPECIES	Alyssum desertorum <sup>ai</sup> (desert madwort)	Arenaria (sandwort)	Artemisia ludoviciana (white sagebrush)	Asclepias subverticillata (horsetail milkweed)	Astragalus utahensis (Utah milkvetch)	Calochortus nuttallii (sego lily)	Castilleja angustifolia (northwestern Indian paintbrush)	Centaurea virgata <sup>ai</sup> (suaresse knapweed)	Ceratocephala testiculata <sup>ai</sup> (curveseed butterwort)	Chaetopappa ericoides (rose heath)	Cirsium (thistle)	Crepis acuminata (tapertip hawkbeard)	Draba <sup>ai</sup> (draba)	Erigeron flagellaris (trailing fleabane)	Erodium cicutarium <sup>ai</sup> (redstem stork's bill)	Helianthus annuus <sup>a</sup> (common sunflower)	Lactuca serriola <sup>ai</sup> (prickly lettuce)
year	Nested Frequency																
2011	197	-	1	0	0	25	1	15	26	-	4	3	98	3	17	9	29
2014	20	-	-	-	-	1	-	15	5	-	1	-	-	-	195	-	-
2018	112	7	-	-	1	10	-	-	104	21	-	-	17	1	359	-	-
year	Average Cover (%)																
2011	1.2	-	0.0	0.0	0.0	0.1	0.0	0.5	0.2	-	0.2	0.0	1.0	0.0	0.3	0.0	0.1
2014	0.0	-	-	-	-	0.0	-	0.5	0.0	-	0.0	-	-	-	3.2	-	-
2018	0.3	0.0	-	-	0.0	0.0	-	-	0.4	0.1	-	-	0.4	0.0	11.7	-	-

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

FORB SPECIES					
Phlox longifolia (longleaf phlox)					
Silene antirrhina <sup>a</sup> (sleepy silene)					
Sphaeralcea coccinea (scarlet globemallow)					
Tragopogon dubius <sup>ai</sup> (yellow salsify)					
Zigadenus paniculatus (foothill deathcamas)					
year	Nested Frequency				
2011	8	128	19	2	14
2014	-	-	12	2	4
2018	-	2	-	1	8
year	Average Cover (%)				
2011	0.0	0.7	0.2	0.0	0.1
2014	-	-	0.0	0.0	0.0
2018	-	0.0	-	0.0	0.1

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

**Table 16R-40.12 - Shrub and Tree Species.** Average modified Daubenmire quadrat and line intercept cover by year.

SHRUB SPECIES			
Artemisia nova <sup>p</sup> (black sagebrush)			
Artemisia tridentata ssp. vaseyana <sup>p</sup> (mountain big sagebrush)			
Gutierrezia sarothrae (broom snakeweed)			
year	Line Intercept Cover (%)		
2011	2.5	9.3	10.2
2014	0.3	1.7	-
2018	0.6	5.5	0.6
year	Quadrat Cover (%)		
2011	1.8	6.8	9.8
2014	0.4	1.7	0.2
2018	0.5	6.6	1.0

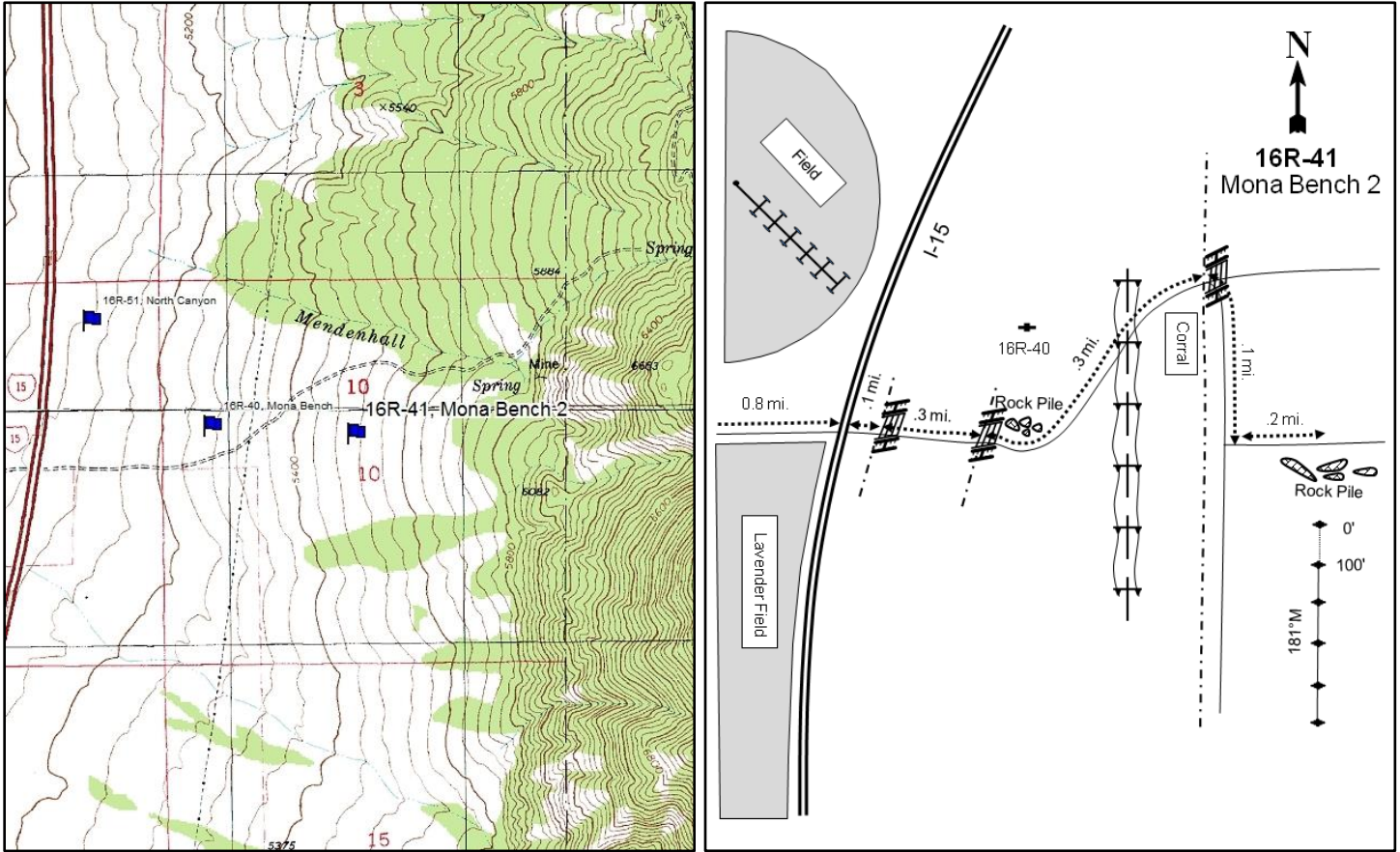
t - Tree Species; p - Preferred Browse; i - Introduced Species

**Table 16R-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 (%)				
<b>Artemisia nova<sup>p</sup> -- (black sagebrush)</b>									
2011	140	-	0	100	0	0	0	0	42/69
2014	100	-	0	100	0	80	20	0	27/50
2018	180	-	0	100	0	0	0	0	39/81
<b>Artemisia tridentata ssp. vaseyana<sup>p</sup> -- (mountain big sagebrush)</b>									
2011	1480	60	22	73	5	45	8	3	54/79
2014	940	-	11	87	2	51	6	11	38/52
2018	980	-	0	90	10	0	0	10	60/83
<b>Gutierrezia sarothrae -- (broom snakeweed)</b>									
2011	8160	980	15	80	4	3	0	4	24/31
2014	80	-	0	100	0	50	0	75	23/43
2018	1300	-	6	92	2	0	0	2	24/25
<b>Opuntia -- (pricklypear)</b>									
2011	-	-	-	-	-	-	-	-	5/12

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

## MONA BENCH 2 - STUDY NO. 16R-41



### Location Information

USGS 7.5 min Map Info  
GPS (0' Stake)

Mona NW; Township 11S, Range 1E, Section 10  
NAD 83 UTM ZONE 12, 430451 East 4414045 North

### Transect Information

Browse Tag # (0' Stake)	195
Transect Bearing	181° magnetic
Length	500ft
Belt Placement	Line 1 (11ft), Line 2 (34ft), Line 3 (59ft), Line 4 (71ft), Line 5 (95ft)
Belt Marker Placement	Standard

### Directions to Site

From Mona drive north for 3 miles. Turn right onto the road to the east by the lavender farms, then proceed for 0.8 miles and drive under the freeway. Continue for another 0.1 miles to a panel gate. Proceed through gate and go another 0.3 miles to a wire gate. Pass through the gate and continue for another 0.3 miles to a gate and corrals on the right. Turn right and travel south after passing through the gate. Continue for 0.1 miles, turn left, and travel east for 0.2 miles. There is no witness post, but there is a pile of larger rocks on the south side of the road: park here. The 0-foot stake is 18 paces south of the road and is marked with browse tag #195.



**Site Information**

Land Ownership	Private
Land Administrator	Private
Allotment	No data
Elevation	5,432ft (1,656m)
Aspect	West
Slope	5-11%
Sample Dates	07/06/2011, 08/11/2014, 07/27/2018

**Table 16R-41.1 Disturbance History.** Recorded history of major disturbances.

Treatment/Disturbance	Name	WRI DB#	Date	Size (acres)
Herbicide - Plateau	Mona Bench Project	1934	November 2011	128
Harrow - Two-Way Chain	Mona Bench Project	1934	October 2011	128
Seeding - Broadcast Before	Mona Bench Project	1934	October 2011	128
Seeding - Aerial After	Mona Bench Project	1934	January 2012	128

**Table 16R-41.2 Seed Mix.** List of known seeded plant species and rates (if available).

Mix Name			Application Type	Application Date	Acres
Mona Bench - Forb/Grass Mix			Broadcast	Oct 2011	129
Type	Species	Common Name	Cultivar/Source ID	Bulk lbs/acre	PLS
G	<i>Achnatherum hymenoides</i>	Indian Ricegrass	Rimrock	1.16	1.10
G	<i>Agropyron cristatum</i>	Crested Wheatgrass	Hycrest	1.55	1.40
G	<i>Elymus lanceolatus</i>	Thickspike Wheatgrass	Bannock	1.55	1.24
G	<i>Leymus cinereus</i>	Great Basin Wildrye	Trailhead	1.16	1.07
G	<i>Pascopyrum smithii</i>	Western Wheatgrass	Arriba	1.94	1.66
G	<i>Psathyrostachys juncea</i>	Russian Wildrye		1.55	1.21
G	<i>Pseudoroegneria spicata</i>	Bluebunch Wheatgrass	Anatone	1.16	1.14
F	<i>Linum perenne</i>	Blue Flax	Appar	0.27	0.25
F	<i>Medicago sativa</i>	Alfalfa	Nomad	0.78	0.70
F	<i>Onobrychis viciifolia</i>	Sainfoin	Eski	1.55	1.49
F	<i>Sanguisorba minor</i>	Small Burnet	Delar	1.16	1.07
Mix Name			Application Type	Application Date	Acres
Mona Bench - Browse Mix			Aerial	Jan 2012	235
Type	Species	Common Name	Cultivar/Source ID	Bulk lbs/acre	PLS
F	<i>Medicago sativa</i>	Alfalfa	Nomad	0.28	0.25
S	<i>Artemisia tridentata</i> ssp. <i>wyomingensis</i>	Wyoming Big Sagebrush	Sevier UT	0.17	0.03
S	<i>Bassia prostrata</i>	Forage Kochia	Beaver UT	0.55	0.32

**Wildlife Habitat and Vegetation History****Table 16R-41.3 - Wildlife Seasonal Habitat.** UDWR wildlife habitat and seasonality.

Species	Habitat	Season
Deer	crucial	winter
Elk	crucial	winter

**Table 16R-41.4 - Vegetation History.** The dominant vegetation type(s) and phase of woodland succession (Tausch, Miller, Roundy, & Chambers, 2009).

Year	Vegetation Type	Woodland Succession
2011	Annual-Perennial Grass	No Encroachment
2014	Annual-Perennial Grass	No Encroachment

**Site Notes**

No Notes

**Site Potential**

1981 - 2010 Average Annual Precipitation	19 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.

Since establishment in 2011, this site has remained in an annual-perennial grass state with cheatgrass (*Bromus tectorum*) and purple threeawn (*Aristida purpurea*) as the dominant species; high amounts of cheatgrass may negatively impact the ecological resilience of this site. Forb cover and diversity have generally remained low, but in 2018 the weedy introduced annual species redstem stork's bill (*Erodium cicutarium*) contributed over 17 percent cover (Table 16R-41.7, Table 16R-41.10, Table 16R-41.11). Shrubs have remained rare throughout the duration of the study period (Table 16R-41.12, Table 16R-41.13). Continual treatment is likely needed to reduce cheatgrass.

**Trend Summary Tables****Table 16R-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
2011	-	3.7	-	-	3.4	-
2014	0.2	0.4	-	0.1	0.4	-
2018	0.0	-	-	-	-	-

**Table 16R-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
2011	466	283	279	104	30.1	21.1	5.2	1.4
2014	470	324	155	120	35.4	20.3	3.2	2.4
2018	431	357	436	174	15.5	23.0	18.4	5.3

**Table 16R-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
2011	1.1	0.5	24.1	27.1	11.2	53.4
2014	0.9	-	44.7	23.7	10.7	64.1
2018	2.4	0.0	34.1	23.0	15.6	59.6

**Table 16R-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	Rabbit
	Quadrat Frequency		
2011	10	1	-
2014	-	-	3
2018	8	-	2
Year	Days Use Per Acre (ha)		
2011	-	-	-
2014	0.7 (1.8)	-	-
2018	7.2 (17.9)	-	-

**Table 16R-41.10 - Grass Species.** Nested frequency and modified Daubenmire average cover by year.

GRASS SPECIES	Nested Frequency								
<i>Aegilops cylindrica</i> <sup>ai</sup> (jointed goatgrass)	76	-	273	1	456	10	29	39	75
<i>Agropyron cristatum</i> <sup>i</sup> (crested wheatgrass)	3	3	294	-	470	4	11	65	1
<i>Aristida purpurea</i> (purple threeawn)	-	-	347	107	391	4	21	33	80
<i>Bromus arvensis</i> <sup>ai</sup> (field brome)	Average Cover (%)								
<i>Bromus tectorum</i> <sup>ai</sup> (cheatgrass)	7.0	-	19.9	0.0	22.4	0.1	0.1	1.1	0.7
<i>Poa bulbosa</i> <sup>i</sup> (bulbous bluegrass)	0.0	0.0	19.1	-	35.4	0.0	0.0	1.2	0.0
<i>Poa secunda</i> (Sandberg bluegrass)	-	-	22.2	3.0	11.9	0.1	0.1	0.5	0.6
<i>Sporobolus cryptandrus</i> (sand dropseed)									
<i>Vulpia myuros</i> <sup>ai</sup> (annual fescue)									

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

**Table 16R-41.11 - Forb Species.** Nested frequency and modified Daubenmire average cover by year.

FORB SPECIES	Nested Frequency																
<i>Alyssum desertorum</i> <sup>ai</sup> (desert madwort)	118	-	13	-	1	7	-	21	1	-	3	26	1	38	230	23	26
<i>Arenaria</i> (sandwort)	-	-	34	-	-	21	-	10	13	-	-	-	12	30	147	-	2
<i>Artemisia ludoviciana</i> (white sagebrush)	147	92	38	1	-	23	5	22	-	5	-	18	-	20	428	-	-
<i>Astragalus</i> (milkvetch)	Average Cover (%)																
<i>Astragalus utahensis</i> (Utah milkvetch)	0.5	-	0.4	-	0.0	0.1	-	0.1	0.0	-	0.0	0.1	0.0	0.3	3.5	0.1	0.1
<i>Calochortus nuttallii</i> (sego lily)	-	-	1.9	-	-	0.1	-	0.1	0.0	-	-	-	0.1	0.1	3.1	-	0.0
<i>Ceratocephala testiculata</i> <sup>ai</sup> (curveseed butterwort)	0.6	4.3	0.5	0.0	-	0.1	0.0	0.2	-	0.0	-	0.1	-	0.1	17.6	-	-
<i>Chaetopappa ericoides</i> (rose heath)																	
<i>Chamaesyce albomarginata</i> (whitemargin sandmat)																	
<i>Cymopterus</i> (springparsley)																	
<i>Descurainia pinnata</i> <sup>a</sup> (western tansymustard)																	
<i>Draba</i> <sup>a</sup> (draba)																	
<i>Epilobium brachycarpum</i> <sup>a</sup> (tall annual willowherb)																	
<i>Eriogonum racemosum</i> (redroot buckwheat)																	
<i>Erodium cicutarium</i> <sup>ai</sup> (redstem stork's bill)																	
<i>Helianthus annuus</i> <sup>a</sup> (common sunflower)																	
<i>Lactuca serriola</i> <sup>ai</sup> (prickly lettuce)																	

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

FORB SPECIES								
Lomatium (desertparsley)								
Medicago sativa <sup>i</sup> (alfalfa)								
Onobrychis vicifolia <sup>i</sup> (sainfoin)								
Sanguisorba minor <sup>i</sup> (small burnet)								
Silene antirrhina <sup>a</sup> (sleepy silene)								
Sphaeralcea coccinea (scarlet globemallow)								
Tragopogon dubius <sup>ai</sup> (yellow salsify)								
Zizadenus paniculatus (foothill deathcarnas)								
year	Nested Frequency							
2011	1	-	-	-	133	28	4	16
2014	1	2	4	4	1	25	-	4
2018	-	-	-	-	47	-	-	8
year	Average Cover (%)							
2011	0.0	-	-	-	0.9	0.5	0.0	0.1
2014	0.0	0.0	0.0	0.0	0.0	0.1	-	0.0
2018	-	-	-	-	0.1	-	-	0.1

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

**Table 16R-41.12 - Shrub and Tree Species.** Average modified Daubenmire quadrat and line intercept cover by year.

SHRUB SPECIES			
Bassia prostrata <sup>pt</sup> (forage kochia)			
Gutierrezia sarothrae (broom snakeweed)			
Pediocactus simpsonii (mountain ball cactus)			
year	Line Intercept Cover (%)		
2011	-	3.4	-
2014	0.1	0.3	0.1
2018	-	-	-
year	Quadrat Cover (%)		
2011	-	3.7	0.0
2014	0.2	0.3	0.0
2018	0.0	-	-

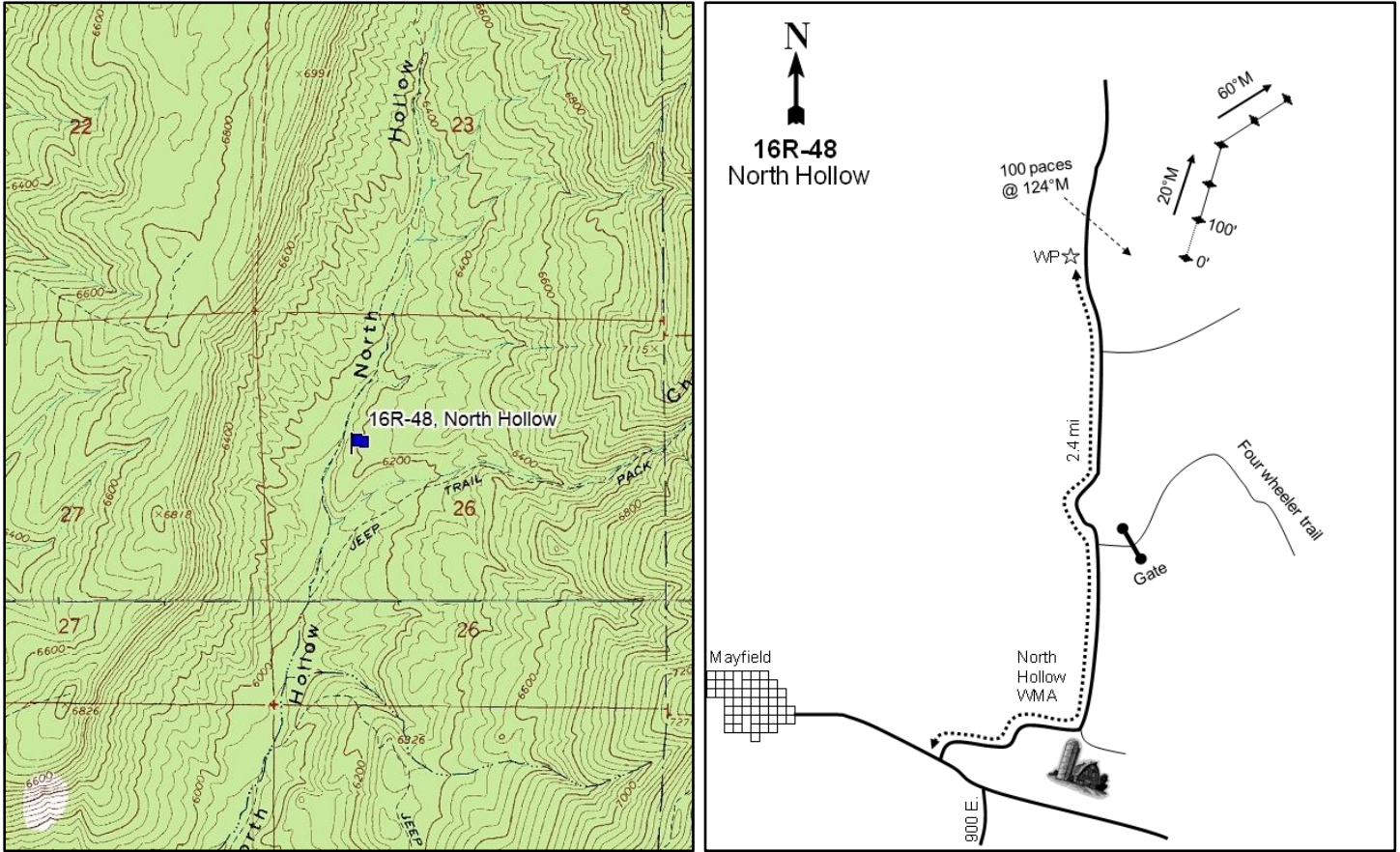
t - Tree Species; p - Preferred Browse; i - Introduced Species

**Table 16R-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 (%)				
<b>Artemisia tridentata ssp. vaseyana<sup>p</sup> -- (mountain big sagebrush)</b>									
2011	-	-	-	-	-	-	-	-	41/55
2014	-	-	-	-	-	-	-	-	34/51
2018	-	-	-	-	-	-	-	-	54/75
<b>Bassia prostrata<sup>pi</sup> -- (forage kochia)</b>									
2011	-	-	-	-	-	-	-	-	-/-
2014	700	20	26	74	0	26	0	0	12/16
2018	100	-	0	100	0	40	0	40	17/20
<b>Celtis laevigata var. reticulata -- (netleaf hackberry)</b>									
2011	-	-	-	-	-	-	-	-	-/-
2014	-	-	-	-	-	-	-	-	-/-
2018	-	-	-	-	-	-	-	-	110/214
<b>Ericameria nauseosa -- (rubber rabbitbrush)</b>									
2011	-	-	-	-	-	-	-	-	47/53
2014	-	-	-	-	-	-	-	-	58/151
2018	-	-	-	-	-	-	-	-	-/-
<b>Gutierrezia sarothrae -- (broom snakeweed)</b>									
2011	3760	740	22	76	2	1	0	5	23/31
2014	320	140	6	88	6	0	0	6	21/27
2018	60	-	0	67	33	0	0	33	24/26
<b>Opuntia fragilis -- (brittle pricklypear)</b>									
2011	-	-	-	-	-	-	-	-	-/-
2014	-	-	-	-	-	-	-	-	-/-
2018	-	-	-	-	-	-	-	-	12/31
<b>Pediocactus simpsonii -- (mountain ball cactus)</b>									
2011	20	-	0	100	0	0	0	0	8/9
2014	40	-	0	100	0	0	0	0	3/8
2018	-	-	-	-	-	-	-	-	4/8

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

## NORTH HOLLOW - STUDY NO. 16R-48



### Location Information

USGS 7.5 min Map Info  
GPS (0' Stake)

Sterling SE; Township 19S, Range 2E, Section 26  
NAD 83 UTM ZONE 12, 442736 East 4331475 North

### Transect Information

Browse Tag # (0' Stake)	9168
Transect Bearing	20° magnetic (Line 4-5: 60° 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

Driving from East Canyon Road, travel up the canyon and turn left before 900 East onto North Hollow Road. Drive 2.4 miles to a witness post on the right (west) side of the road. The 0-foot stake is 100 paces at 124 degrees magnetic from the witness post and is marked with browse tag #9168.

**Site Information**

Land Ownership	State
Land Administrator	UDWR
Allotment	No data
Elevation	6,165ft (1,879m)
Aspect	West
Slope	4-8%
Sample Dates	07/04/2012, 08/18/2015, 08/02/2018

**Table 16R-48.1 Disturbance History.** Recorded history of major disturbances.

Treatment/Disturbance	Name	WRI DB#	Date	Size (acres)
Herbicide - Plateau	North Hollow WMA and LS Conservation Easement Habitat Improvement	2276	December 2012-March 2013	447
Seeding - Aerial After	Mayfield Seeding	LTDL	October-November 1966	957
Chaining - Chain Unknown	Mayfield Seeding	LTDL	October-November 1966	957
Chaining - Two-Way Ely/Smooth	North Hollow WMA and LS Conservation Easement Habitat Improvement	2276	November 2012	321
Seeding - Aerial Before	North Hollow WMA and LS Conservation Easement Habitat Improvement	2276	November 2012	447
Seeding - Dribbler	North Hollow WMA and LS Conservation Easement Habitat Improvement	2276	November 2012	447
Seeding - Aerial After	North Hollow WMA and LS Conservation Easement Habitat Improvement	2276	January 2013	447

**Table 16R-48.2 Seed Mix.** List of known seeded plant species and rates (if available).

Mix Name			Application Type	Application Date	Acres
Mayfield Seeding			Aerial	Oct 1966	957
Type	Species	Common Name	Cultivar/Source ID	Bulk lbs/acre	PLS
G	Agropyron cristatum	Crested Wheatgrass		4.00	0.00
G	Agropyron desertorum	Desert Wheatgrass		1.00	0.00
G	Bromus inermis	Smooth Brome		1.00	0.00
G	Pascopyrum smithii	Western Wheatgrass		1.00	0.00
G	Psathyrostachys juncea	Russian Wildrye		2.00	0.00
G	Thinopyrum intermedium	Intermediate Wheatgrass		2.00	0.00
F		Forbs		3.00	0.00
S		Shrubs		2.00	0.00
Mix Name			Application Type	Application Date	Acres
North Hollow WMA Habitat Improvement			Aerial	Nov 2012	420
Type	Species	Common Name	Cultivar/Source ID	Bulk lbs/acre	PLS
		Private Land Owner Mix		7.38	0.00
G	Achnatherum hymenoides	Indian Ricegrass	Rimrock	1.31	1.23
G	Agropyron cristatum	Crested Wheatgrass	CDII	1.31	1.24
G	Dactylis glomerata	Orchardgrass	Paiute	0.36	0.32
G	Elymus wawawaiensis	Snake River Wheatgrass	Secar	1.31	1.20
G	Festuca ovina	Sheep Fescue	Covar	0.71	0.60
G	Leymus cinereus	Great Basin Wildrye	UDWR IntMtn Tetra	0.71	0.61
G	Poa secunda	Sandberg Bluegrass	Mountain Home	0.71	0.55
G	Thinopyrum intermedium	Pubescent Wheatgrass	Luna	0.71	0.58
F	Astragalus cicer	Cicer Milkvetch	Lutana	0.71	0.62
F	Medicago sativa	Alfalfa	Spredor 4	0.95	0.84
F	Melilotus officinalis	Yellow Sweetclover		0.71	0.67
F	Onobrychis viciifolia	Sainfoin	Eski	1.31	1.22
F	Sanguisorba minor	Small Burnet	Delar	1.31	1.22
Mix Name			Application Type	Application Date	Acres
North Hollow WMA Habitat Improvement - Dribbler			Dribbler	Nov 2012	420
Type	Species	Common Name	Cultivar/Source ID	Bulk lbs/acre	PLS
		Private Land Owner Mix		0.27	0.00
F	Hedysarum boreale ssp. boreale var. boreale	Utah Sweetvech	Timp	0.12	0.11
F	Sanguisorba minor	Small Burnet	Delar	0.12	0.11
S	Cercocarpus ledifolius	Curlleaf Mountain Mahogany	Sevier UT	0.12	0.11
Mix Name			Application Type	Application Date	Acres
North Hollow Sagebrush Kochia			Aerial	Jan 2013	438
Type	Species	Common Name	Cultivar/Source ID	Bulk lbs/acre	PLS



F	Medicago sativa	Alfalfa	Ladak +	1.03	0.99
S	Artemisia tridentata ssp. vaseyana	Mountain Big Sagebrush	Beaver UT	0.04	0.01
S	Artemisia tridentata ssp. vaseyana	Mountain Big Sagebrush	Sevier UT	1.03	0.28
S	Bassia prostrata	Forage Kochia	Beaver UT	1.94	1.37

### Wildlife Habitat and Vegetation History

**Table 16R-48.3 - Wildlife Seasonal Habitat.** UDWR wildlife habitat and seasonality.

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

**Table 16R-48.4 - Vegetation History.** The dominant vegetation type(s) and phase of woodland succession (Tausch, Miller, Roundy, & Chambers, 2009).

Year	Vegetation Type	Woodland Succession
2012	Gambel Oak/Pinyon-Juniper	Phase II
2015	Gambel Oak/Perennial Grass	Phase I
2018	Gambel Oak	Phase I

### Site Notes

In 2015, lines 4 and 5 were moved to a bearing of 60 degrees magnetic in order to keep the entire study within the area that was treated by the 2012 chaining and seeding project.

### Site Potential

1981 - 2010 Average Annual Precipitation	17 inches
NRCS Ecological Site	Mountain Stony Loam (Oak)
NRCS Ecological Site #	R047XA463UT
States and Transitions	No state and transition model is available for this ecological site.

When this site was established in 2012 it was considered to be within Phase II of woodland succession, being dominated by twoneedle pinyon (*Pinus edulis*), Utah Juniper (*Juniperus osteosperma*), and Gambel oak (*Quercus gambellii*). The chaining project later that year removed most of the conifers, and Gambel oak has been the dominant vegetation component since 2015 (Table 16R-48.1, Table 16R-48.4, Table 16R-48.12, Table 16R-48.13). Grasses have remained diverse throughout the duration of the study, but were not abundant in 2012. In 2015, the herbaceous understory was a co-dominant site component and was comprised mainly of the seeded perennial grass species intermediate wheatgrass (*Thinopyrum intermedium*) and crested wheatgrass (*Agropyron cristatum*). The introduced annual grass species cheatgrass (*Bromus tectorum*) has been sampled on the site in low abundance (Table 16R-48.7, Table 16R-48.10). The proximity of this site to pinyon and juniper trees and their continued presence on site (Photos, Table 16R-48.14) indicates that it could possibly be infilled over time.

**Trend Summary Tables****Table 16R-48.6 - 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	25.1	-	15.1	38.9	-	21.3
2015	24.1	0.3	1.1	27.9	0.3	0.6
2018	30.2	0.1	0.6	34.3	0.2	0.5

**Table 16R-48.7 - 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	56	170	137	53	0.1	5.1	0.7	0.3
2015	72	227	141	16	0.8	13.7	1.2	0.3
2018	58	266	214	34	0.3	10.8	1.8	0.2

**Table 16R-48.8 - 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	15.9	0.6	66.7	7.6	2.1	44.5
2015	10.1	0.1	52.6	9.3	4.4	44.9
2018	19.6	-	67.2	9.1	2.9	46.6

**Table 16R-48.9 - 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	-	5	-	7
2015	-	5	-	14
2018	-	-	-	13
Year	Days Use Per Acre (ha)			
2012	3.6 (9.0)	1.3 (3.3)	-	-
2015	2.9 (7.2)	12.1 (29.8)	2.7 (6.6)	-
2018	2.2 (5.4)	6.0 (14.9)	2.0 (5.0)	-

**Table 16R-48.10 - Grass Species.** Nested frequency and modified Daubenmire average cover by year.

GRASS SPECIES											
Achnatherum hymenoides (Indian ricegrass)											
Agropyron cristatum <sup>i</sup> (crested wheatgrass)											
Bromus inermis <sup>i</sup> (smooth brome)											
Bromus tectorum <sup>ai</sup> (cheatgrass)											
Carex geyeri (Geyer's sedge)											
Elymus elymoides (squirreltail)											
Festuca idahoensis (Idaho fescue)											
Hesperostipa comata (needle and thread)											
Poa secunda (Sandberg bluegrass)											
Pseudoroegneria spicata (bluebunch wheatgrass)											
Thinopyrum intermedium <sup>i</sup> (intermediate wheatgrass)											
year	Nested Frequency										
2012	3	73	7	56	17	-	-	-	23	46	52
2015	15	81	42	72	21	5	-	2	5	18	104
2018	11	113	33	58	10	25	7	-	19	33	117
year	Average Cover (%)										
2012	0.2	1.8	0.0	0.1	0.4	-	-	-	0.3	2.0	0.4
2015	0.9	4.3	1.5	0.8	1.3	0.1	-	0.1	0.0	0.8	4.6
2018	0.3	4.9	0.5	0.3	0.5	0.5	0.1	-	0.1	1.4	2.5

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

**Table 16R-48.11 - Forb Species.** Nested frequency and modified Daubenmire average cover by year.

FORB SPECIES																	
Alyssum desertorum <sup>ai</sup> (desert madwort)																	
Arabis (rockcress)																	
Astragalus (milkvetch)																	
Astragalus convallarius (lesser rushy milkvetch)																	
Ceratocephala testiculata <sup>ai</sup> (curveseed butterwort)																	
Chaenactis douglasii (Douglas' dustymaiden)																	
Collinsia parviflora <sup>a</sup> (maiden blue eyed Mary)																	
Descurainia pinnata <sup>a</sup> (western tansymustard)																	
Eriogonum brevicaulis (shortstem buckwheat)																	
Eriogonum umbellatum (sulphur-flower buckwheat)																	
Lathyrus brachycalyx (Bonneville pea)																	
Medicago sativa <sup>i</sup> (alfalfa)																	
Packera multilobata (lobeleaf groundsel)																	
Petrorhiza pumila (rock goldenrod)																	
Phlox austromontana (mountain phlox)																	
Phlox longifolia (longleaf phlox)																	
Tragopogon dubius <sup>ai</sup> (yellow safsify)																	
year	Nested Frequency																
2012	96	-	0	8	68	-	3	2	2	6	26	-	2	1	7	3	2
2015	140	-	-	-	-	-	-	1	-	1	11	3	1	1	-	-	-
2018	214	7	-	-	-	6	-	3	-	8	14	-	-	4	-	-	-
year	Average Cover (%)																
2012	0.6	-	0.0	0.0	0.1	-	0.0	0.0	0.0	0.1	0.1	-	0.0	0.0	0.1	0.0	0.0
2015	1.2	-	-	-	-	-	-	0.0	-	0.0	0.0	0.2	0.0	0.0	-	-	-
2018	1.8	0.0	-	-	-	0.0	-	0.0	-	0.0	0.1	-	-	0.0	-	-	-

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

**Table 16R-48.12 - Shrub and Tree Species.** Average modified Daubenmire quadrat and line intercept cover by year.

SHRUB SPECIES	Amelanchier utahensis <sup>p</sup> (Utah serviceberry)	Artemisia nova <sup>p</sup> (black sagebrush)	Artemisia tridentata ssp. vaseyana <sup>p</sup> (mountain big sagebrush)	Cercocarpus montanus <sup>p</sup> (alderleaf mountain mahogany)	Gutierrezia sarothrae (broom snakeweed)	Juniperus osteosperma <sup>t</sup> (Utah juniper)	Pinus edulis <sup>t</sup> (twoneedle pinyon)	Quercus gambelii <sup>p</sup> (Gambel oak)	Rhus trilobata <sup>p</sup> (skunkbush sumac)
year	Line Intercept Cover (%)								
2012	-	0.6	0.3	0.4	-	10	11.3	37.6	-
2015	-	0.8	-	-	0.3	0.4	0.2	27.1	-
2018	0.3	1.1	-	-	0.2	0.4	0.1	32.9	0
year	Quadrat Cover (%)								
2012	-	0.0	0.8	0.0	-	6.8	8.3	24.3	-
2015	-	0.7	-	-	0.3	1.1	0.0	23.4	-
2018	0.0	1.0	-	-	0.1	0.6	0.0	29.1	0.0

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

**Table 16R-48.13 - 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 (%)				
<b>Amelanchier utahensis<sup>p</sup> -- (Utah serviceberry)</b>									
2012	-	-	-	-	-	-	-	-	103/59
2015	-	-	-	-	-	-	-	-	-/-
2018	20	-	0	100	0	0	100	0	42/67
<b>Artemisia nova<sup>p</sup> -- (black sagebrush)</b>									
2012	340	-	0	41	59	47	0	59	28/54
2015	280	-	0	100	0	14	0	0	27/45
2018	340	-	12	88	0	0	0	0	34/52
<b>Artemisia tridentata ssp. vaseyana<sup>p</sup> -- (mountain big sagebrush)</b>									
2012	340	-	0	65	35	6	0	53	34/55
2015	-	-	-	-	-	-	-	-	54/47
2018	-	-	-	-	-	-	-	-	44/63
<b>Cercocarpus ledifolius<sup>p</sup> -- (curl-leaf mountain mahogany)</b>									
2012	-	-	-	-	-	-	-	-	31/47
2015	-	-	-	-	-	-	-	-	-/-
2018	-	-	-	-	-	-	-	-	-/-
<b>Cercocarpus montanus<sup>p</sup> -- (alderleaf mountain mahogany)</b>									
2012	80	-	50	50	0	50	0	0	109/121
2015	-	-	-	-	-	-	-	-	64/106
2018	-	-	-	-	-	-	-	-	27/60
<b>Chrysothamnus viscidiflorus ssp. viscidiflorus var. stenophyllus -- (yellow rabbitbrush)</b>									
2012	20	-	0	100	0	0	100	100	12/21
2015	-	-	-	-	-	-	-	-	-/-
2018	-	-	-	-	-	-	-	-	-/-
<b>Eriogonum heracleoides -- (parsnipflower buckwheat)</b>									
2012	-	-	-	-	-	-	-	-	13/28
2015	-	-	-	-	-	-	-	-	-/-
2018	-	-	-	-	-	-	-	-	-/-

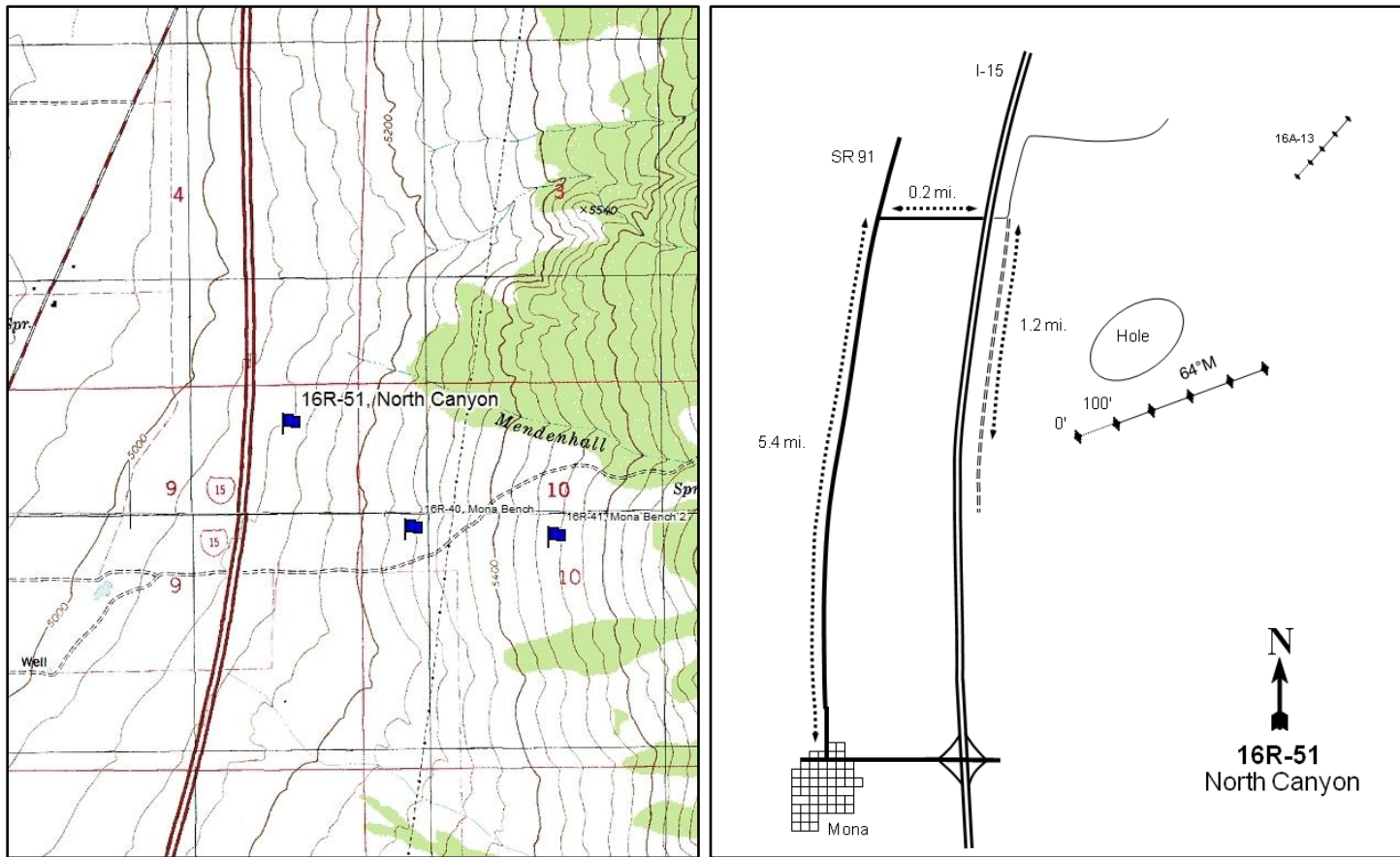
Year	Density		Age Class Distribution			Utilization		Poor Vigor (%)	Average Height Crown (cm)
	Plants Per Acre		Excluding Seedlings			Moderate (%)	Heavy (%)		
	Excluding Seedlings	Seedling	Young (%)	Mature (%)	Decadent (%)				
<b>Gutierrezia sarothrae -- (broom snakeweed)</b>									
2012	20	-	0	100	0	0	0	0	19/23
2015	640	20	22	78	0	0	0	3	26/27
2018	420	-	0	100	0	0	0	0	24/24
<b>Juniperus osteosperma<sup>1</sup> -- (Utah juniper)</b>									
2012	260	-	23	69	8	0	0	0	- / -
2015	60	-	33	33	33	0	0	33	- / -
2018	120	-	67	33	0	0	0	0	- / -
<b>Pinus edulis<sup>1</sup> -- (twoneedle pinyon)</b>									
2012	60	20	0	100	0	0	0	33	- / -
2015	20	-	100	0	0	0	0	0	- / -
2018	20	-	100	0	0	0	0	0	- / -
<b>Purshia tridentata<sup>p</sup> -- (antelope bitterbrush)</b>									
2012	-	-	-	-	-	-	-	-	- / -
2015	-	-	-	-	-	-	-	-	- / -
2018	-	-	-	-	-	-	-	-	73/175
<b>Quercus gambelii<sup>p</sup> -- (Gambel oak)</b>									
2012	10380	1420	67	26	7	0	0	8	110/87
2015	18080	300	36	64	0	5	0	0	82/69
2018	14340	500	19	81	0	1	0	0	87/60
<b>Rhus trilobata<sup>p</sup> -- (skunkbush sumac)</b>									
2012	-	-	-	-	-	-	-	-	- / -
2015	-	-	-	-	-	-	-	-	- / -
2018	-	-	-	-	-	-	-	-	92/101

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

**Table 16R-48.14 - 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' (%)	
<b>Juniperus osteosperma (Utah juniper)</b>							
2012	202	-	10	35	25	30	15.7
2015	80	6	72	11	11	-	7.2
2018	61	28	33	28	11	-	5.9
<b>Pinus edulis (twoneedle pinyon)</b>							
2012	69	-	-	38	31	31	16.8
2015	3	-	-	100	-	-	3.0
2018	11	-	100	-	-	-	5.0

## NORTH CANYON - STUDY NO. 16R-51



### Location Information

USGS 7.5 min Map Info  
GPS (0' Stake)

Santaquin SW; Township 11S, Range 1E, Section 09  
NAD 83 UTM ZONE 12, 429328 East 4414533 North

### Transect Information

Browse Tag # (0' Stake)	Not Available
Transect Bearing	45° magnetic
Length	500ft
Belt Placement	Line 1 (11ft), Line 2 (34ft), Line 3 (59ft), Line 4 (71ft), Line 5 (95ft)
Belt Marker Placement	No Rebar or Stakes

### Directions to Site

Traveling north out of Mona on SR-91 drive for 5.4 miles and turn right (east). Drive for 0.2 miles, passing under I-15 and turn right (south). Drive for 1.2 miles and the transect will be off to the left (east) of the road just south of an old gravel pit.

**Site Information**

Land Ownership	Private
Land Administrator	Private
Allotment	No data
Elevation	5,093ft (1,552m)
Aspect	West
Slope	3-6%
Sample Dates	07/03/2013, 07/26/2018

**Table 16R-51.1 Disturbance History.** Recorded history of major disturbances.

Treatment/Disturbance	Name	WRI DB#	Date	Size (acres)
Herbicide - Plateau	North Canyon Knapweed Project Phase I	2688	August 2014	447
Herbicide - Milestone	North Canyon Knapweed Project Phase I	2688	August 2016	662
Herbicide - Milestone	North Canyon Knapweed Project Phase I	2688	August 2015	662
Herbicide - Milestone	North Canyon Knapweed Project Phase I	2688	August 2013	662
Harrow - Two-Way Chain	North Canyon Knapweed Project Phase I	2688	October 2013	447
Seeding - Broadcast Before	North Canyon Knapweed Project Phase I	2688	October 2013	447

**Table 16R-51.2 Seed Mix.** List of known seeded plant species and rates (if available).

Mix Name			Application Type	Application Date	Acres
North Canyon Knapweed			Broadcast	Oct 2013	453
Type	Species	Common Name	Cultivar/Source ID	Bulk lbs/acre	PLS
G	Achnatherum hymenoides	Indian Ricegrass	Nezpar	1.43	1.33
G	Agropyron cristatum	Crested Wheatgrass	CDII	1.99	1.81
G	Leymus cinereus	Great Basin Wildrye	Magnar	0.15	0.13
G	Leymus cinereus	Great Basin Wildrye	Magnar	0.88	0.60
G	Pascopyrum smithii	Western Wheatgrass	Arriba	1.43	1.28
G	Poa secunda	Sandberg Bluegrass	Mountain Home	0.99	0.81
G	Poa secunda	Canby Bluegrass	Canbar	0.77	0.64
G	Psathyrostachys juncea	Russian Wildrye		1.99	1.72
G	Pseudoroegneria spicata	Bluebunch Wheatgrass	Anatone	1.99	1.53
G	Thinopyrum intermedium	Intermediate Wheatgrass	Clarke	1.16	0.72
G	Thinopyrum intermedium	Intermediate Wheatgrass		0.22	0.20
G	Thinopyrum intermedium	Pubescent Wheatgrass	Luna	0.99	0.84

**Wildlife Habitat and Vegetation History****Table 16R-51.3 - Wildlife Seasonal Habitat.** UDWR wildlife habitat and seasonality.

Species	Habitat	Season	Brood/Young Rearing

**Table 16R-51.4 - Vegetation History.** The dominant vegetation type(s) and phase of woodland succession (Tausch, Miller, Roundy, & Chambers, 2009).

Year	Vegetation Type	Woodland Succession
2013	Mountain Big Sagebrush	No Encroachment
2018	Annual Grass	No Encroachment

**Site Notes**

The sagebrush seemed to be affected by drought and displayed some desiccation in 2013.



**Site Potential**

1981 - 2010 Average Annual Precipitation	18 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.

This site was established in 2013 and was dominated by mountain big sagebrush (*Artemisia tridentata* ssp. *vaseyana*) with limited cover contributed by other species. Sagebrush cover and density exhibited a significant decrease in the first sample year following a harrow and several herbicide treatments (Table 16R-51.1, Table 16R-51.12, Table 16R-51.13). The herbaceous understory has remained dominated by the introduced annual grass cheatgrass (*Bromus tectorum*), which became the sole dominant vegetation component in 2018. Annual forbs have also been common. Perennial grasses and forbs have been observed in both sample years, but have provided less cover than their annual counterparts. The high amounts of cheatgrass and presence of the noxious weed species squarrose knapweed (*Centaurea virgata*) (Table 16R-51.7, Table 16R-51.10, Table 16R-51.11) may pose a threat to the ecological resilience of the plant community. Future treatments may be necessary to control undesirable plant species.

**Trend Summary Tables****Table 16R-51.6 - 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	6.6	1.8	-	8.8	2.9	-
2018	0.5	0.8	-	0.8	0.2	-

**Table 16R-51.7 - 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	434	173	391	156	14.0	2.4	15.1	6.4
2018	450	232	334	85	32.7	11.1	13.2	5.6

**Table 16R-51.8 - 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	5.2	1.9	41.8	3.0	2.6	54.5
2018	14.1	0.0	54.6	4.9	5.9	57.7

**Table 16R-51.9 - 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		
2013	7	15	9
2018	13	-	4
Year	Days Use Per Acre (ha)		
2013	6.5 (16.1)	28.1 (69.5)	-
2018	8.0 (19.7)	-	-

**Table 16R-51.10 - Grass Species.** Nested frequency and modified Daubenmire average cover by year.

GRASS SPECIES	Achnatherum hymenoides (Indian ricegrass)	Agropyron cristatum <sup>i</sup> (crested wheatgrass)	Aristida purpurea (purple threeawn)	Bromus arvensis <sup>aii</sup> (field brome)	Bromus tectorum <sup>ai</sup> (cheatgrass)	Elymus elymoides (squirreltail)	Hordeum pusillum <sup>a</sup> (little barley)	Leymus cinereus (basin wildrye)	Pascopyrum smithii (western wheatgrass)	Poa bulbosa <sup>i</sup> (bulbous bluegrass)	Poa secunda (Sandberg bluegrass)	Psathyrostachys juncea <sup>i</sup> (Russian wildrye)	Pseudoroegneria spicata (bluebunch wheatgrass)	Thinopyrum intermedium <sup>i</sup> (intermediate wheatgrass)	Vulpia octiflora <sup>a</sup> (sixweeks fescue)
year	Nested Frequency														
2013	-	3	2	29	430	12	6	-	-	32	127	-	5	2	37
2018	12	29	4	38	449	6	10	18	44	47	11	10	47	98	-
year	Average Cover (%)														
2013	-	0.0	0.0	0.5	13.4	0.1	0.1	-	-	0.6	1.6	-	0.1	0.0	0.1
2018	0.1	0.9	0.0	0.6	31.9	0.2	0.2	0.5	1.7	0.7	0.3	0.4	2.4	3.8	-

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

**Table 16R-51.11 - Forb Species.** Nested frequency and modified Daubenmire average cover by year.

FORB SPECIES	Alyssum desertorum <sup>ai</sup> (desert madwort)	Asclepias (milkweed)	Calochortus nuttallii (sego lily)	Castilleja linariifolia (Wyoming Indian paintbrush)	Centaurea virgata <sup>ai</sup> (squarrose knapweed)	Ceratocephala testiculata <sup>aii</sup> (curvseed butterwort)	Chaetopappa ericoides (rose heath)	Collinsia parviflora <sup>a</sup> (maiden blue eyed Mary)	Draba <sup>a</sup> (draba)	Epilobium brachycarpum <sup>a</sup> (tall annual willowherb)	Eriogonum racemosum (redroot buckwheat)	Erodium cicutarium <sup>ai</sup> (redstem stork's bill)	Iva axillaris (povertyweed)	Lactuca serrifolia <sup>ai</sup> (prickly lettuce)	Phlox longifolia (longleaf phlox)	Silene antirrhina <sup>a</sup> (sleepy silene)	Sphaeralcea coccinea (scarlet globemallow)
year	Nested Frequency																
2013	95	7	11	4	57	120	17	14	5	5	-	343	35	4	13	68	38
2018	51	-	14	-	58	8	-	-	-	-	1	316	-	1	-	-	18
year	Average Cover (%)																
2013	0.6	0.2	0.1	0.0	5.1	0.7	0.2	0.1	0.0	0.0	-	13.2	0.2	0.0	0.1	0.5	0.5
2018	0.2	-	0.1	-	5.4	0.0	-	-	-	-	0.0	13.0	-	0.0	-	-	0.2

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

FORB SPECIES	Nest Frequency	
	Tragopogon dubius <sup>ai</sup> (yellow salsify)	1
Zigadenus paniculatus (foothill deathcamas)	-	0
year	Average Cover (%)	
	2013	0.0
2018	-	0.0

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

**Table 16R-51.12 - Shrub and Tree Species.** Average modified Daubenmire quadrat and line intercept cover by year.

SHRUB SPECIES	Line Intercept Cover (%)	
	Artemisia tridentata ssp. vaseyana <sup>p</sup> (mountain big sagebrush)	8.8
Gutierrezia sarothrae (broom snakeweed)	0.8	0.2
year	Quadrat Cover (%)	
	2013	6.6
2018	0.5	0.8

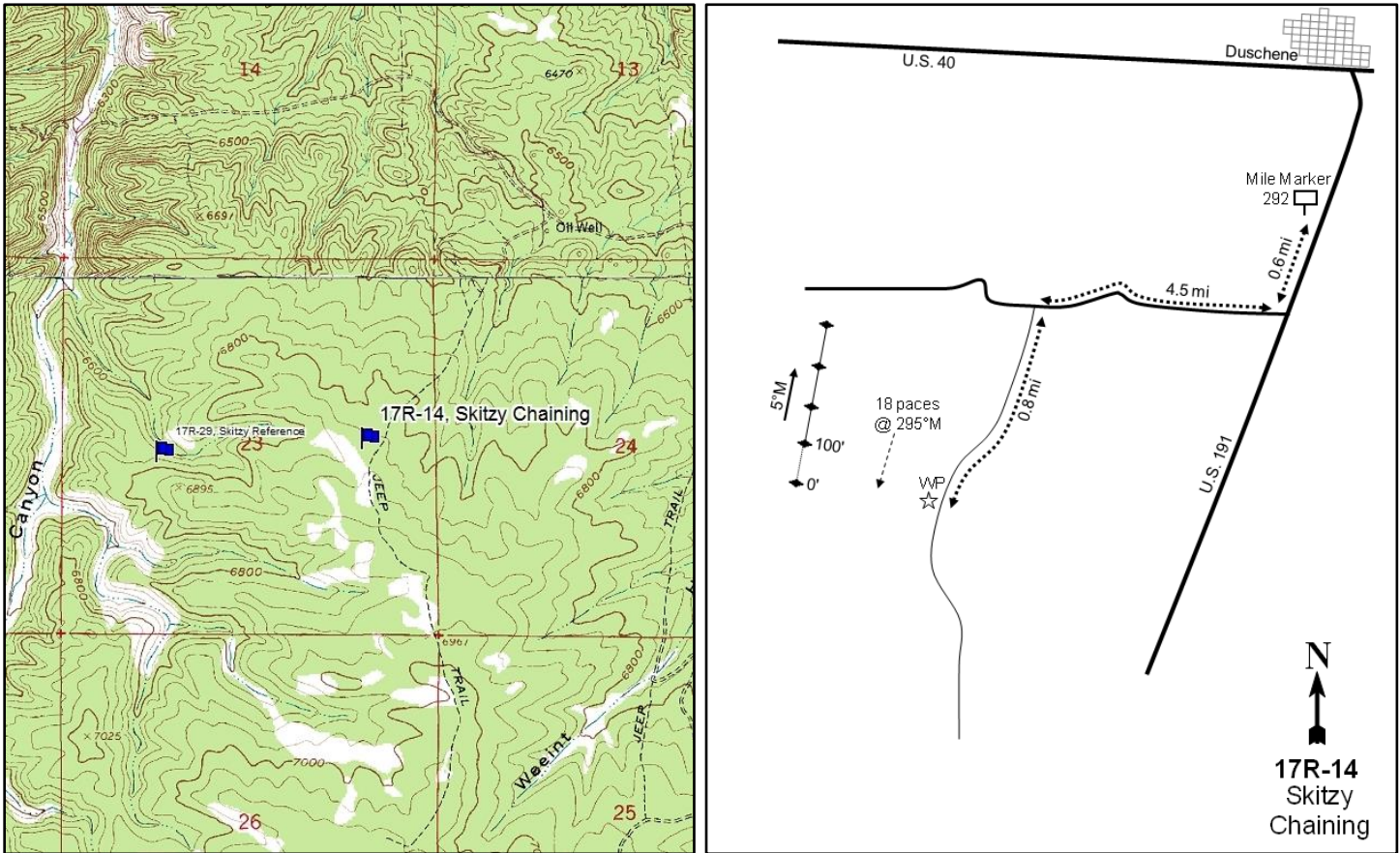
t - Tree Species; p - Preferred Browse; i - Introduced Species

**Table 16R-51.13 - 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 (%)				
<b>Artemisia tridentata ssp. vaseyana<sup>p</sup> -- (mountain big sagebrush)</b>									
2013	1080	60	6	70	24	30	2	80	78/111
2018	140	-	0	29	71	0	0	57	51/71
<b>Bassia prostrata<sup>pi</sup> -- (forage kochia)</b>									
2013	-	-	-	-	-	-	-	-	29/76
2018	-	-	-	-	-	-	-	-	-/-
<b>Gutierrezia sarothrae -- (broom snakeweed)</b>									
2013	1720	40	9	88	2	0	0	13	21/28
2018	260	-	0	100	0	0	0	31	30/36

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

## SKITZY CHAINING - STUDY NO. 17R-14

**Location Information**

USGS 7.5 min Map Info  
GPS (0' Stake)

Buck Knoll NE; Township 4S, Range 6W, Section 23  
NAD 83 UTM ZONE 12, 540499 East 4441000 North

**Transect Information**

Browse Tag # (0' Stake)	254
Transect Bearing	5° 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**

Driving from the junction of US-40 and US-191 in Duschene, drive south on US-191 to mile marker 292. Drive 0.6 miles past the mile marker to a road on the right (west) side. Turn right and proceed for 4.5 miles to a two-track on the left (south) side of the road. Turn left and drive 0.8 miles to the witness post on the right (west) side of the road. From the witness post, walk 150 feet at 290 degrees magnetic to the 0-foot stake which is marked with browse tag #254.

**Site Information**

Land Ownership	State
Land Administrator	UDWR
Allotment	No data
Elevation	6,880ft (2,097m)
Aspect	North
Slope	11-13%
Sample Dates	07/29/2005, 08/04/2008, 07/08/2009, 06/26/2013, 06/18/2015, 08/01/2018

**Table 17R-14.1 Disturbance History.** Recorded history of major disturbances.

Treatment/Disturbance	Name	WRI DB#	Date	Size (acres)
Seeding - Aerial Before	Skitzzy Canyon Range Rehabilitation	69	November 2005	529
Seeding - Aerial After	Skitzzy Canyon Range Rehabilitation	69	November 2005	529
Chaining - Two-Way Ely	Skitzzy Canyon Range Rehabilitation	69	November 2005	529

**Table 17R-14.2 Seed Mix.** List of known seeded plant species and rates (if available).

Mix Name			Application Type	Application Date	Acres
Skitzzy P/J Chaining			Aerial	Nov 2005	700
Type	Species	Common Name	Cultivar/Source ID	Bulk lbs/acre	PLS
G	Agropyron desertorum	Crested Wheatgrass	Hycrest	1.00	0.87
G	Dactylis glomerata	Orchardgrass	Paiute	0.50	0.46
G	Elymus lanceolatus	Thickspike Wheatgrass	Bannock	1.00	0.92
G	Elymus wawawaiensis	Snake River Wheatgrass	Secar	0.50	0.47
G	Poa secunda	Canby Bluegrass	Canbar	0.25	0.23
G	Psathyrostachys juncea	Russian Wildrye		1.00	0.85
F	Linum perenne	Blue Flax		0.25	0.23
F	Medicago sativa	Alfalfa	Ladak	0.50	0.47
F	Onobrychis viciifolia	Sainfoin	Eski	2.00	1.88
F	Sanguisorba minor	Small Burnet		2.00	1.92
S	Atriplex canescens	Fourwing Saltbush	Juab UT	0.71	0.32
S	Atriplex canescens	Fourwing Saltbush	Sevier UT	0.29	0.11
Mix Name			Application Type	Application Date	Acres
Skitzzy PJ Chaining - Browse			Aerial	Dec 2005	700
Type	Species	Common Name	Cultivar/Source ID	Bulk lbs/acre	PLS
S	Artemisia tridentata ssp. wyomingensis	Wyoming Big Sagebrush	Sanpete UT	1.00	0.21
S	Bassia prostrata	Forage Kochia	Beaver UT	1.00	0.67
S	Ericameria nauseosa	Whitestem Rubber Rabbitbrush	Sanpete UT	0.50	0.17

**Wildlife Habitat and Vegetation History****Table 17R-14.3 - Wildlife Seasonal Habitat.** UDWR wildlife habitat and seasonality.

Species	Habitat	Season
Deer	crucial	winter
Elk	crucial	winter

**Table 17R-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	Pinyon-Juniper	Phase III
2008	Perennial Grass	Phase I
2009	Perennial Grass	Phase I
2013	Perennial Grass	Phase I
2015	Perennial Grass	Phase I

**Site Notes**

The study was established on the Skitzzy Canyon WMA. This project was proposed after biologists attributed the loss of one half to one third of the historical herd size of deer to the loss of winter range to pinyon-juniper woodlands.

**Soils****Table 17R-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	44.0	37.4	18.6	6.4	19.2	131.2	1.3	07/29/2005

**Site Potential**

1981 - 2010 Average Annual Precipitation	13 inches
NRCS Ecological Site	Upland Stony Loam (Black Sagebrush)
NRCS Ecological Site #	R047XA332UT
States and Transitions	No state and transition model is available for this ecological site.

When established in 2005, this site was in Phase III of woodland succession and dominated by encroaching twoneedle pinyon (*Pinus edulis*) and Utah juniper (*Juniperus osteosperma*). Other browse species were present, but provided limited cover. The chaining and seeding treatment in 2005 removed most of the trees, and the post-treatment shrub component has been dominated by forage kochia (*Bassia prostrata*) and black sagebrush (*Artemisia nova*) (Table 17R-14.1, Table 17R-14.4, Table 17R-14.12, Table 17R-14.13, Table 17R-14.14). The herbaceous understory was comprised of a diverse number of forbs and grasses that contributed little cover prior to treatment. Perennial grasses increased following treatment and have been the dominant vegetation component since 2008 (Table 17R-14.7, Table 17R-14.10, Table 17R-14.11). Although density is low, pinyon and juniper have maintained a presence on site (Photos, Table 17R-14.14), indicating that infilling could occur in future sample years.

**Trend Summary Tables****Table 17R-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	1.1	0.5	9.4	0.8	0.5	28.4
2008	2.9	1.8	-	6.5	1.0	-
2009	4.0	0.9	-	5.0	0.4	-
2013	7.5	0.9	0.0	8.9	0.8	-
2015	9.5	1.0	-	10.5	0.7	-
2018	6.7	0.9	-	7.4	0.6	-

**Table 17R-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	1	200	73	120	0.0	4.0	1.0	2.4
2008	34	281	30	141	1.0	16.5	0.4	3.2
2009	26	280	39	105	0.4	14.8	0.6	1.9
2013	29	312	21	92	0.2	18.8	0.2	3.1
2015	49	326	71	75	0.9	30.4	1.1	2.6
2018	36	336	10	28	0.5	22.5	0.1	0.3

**Table 17R-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	21.3	1.9	47.5	22.0	2.9	16.6
2008	6.6	-	59.5	12.9	3.4	27.3
2009	6.1	-	54.3	16.4	2.4	28.2
2013	8.0	0.0	54.3	7.0	5.1	34.0
2015	15.0	-	51.7	17.7	2.5	44.9
2018	9.9	-	57.8	20.0	4.9	32.2

**Table 17R-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			
2005	-	2	4	31
2008	-	10	28	33
2009	-	17	23	9
2013	1	2	47	-
2015	-	2	19	9
2018	-	11	19	5
Year	Days Use Per Acre (ha)			
2005	-	14.1 (34.8)	16.1 (39.7)	-
2008	-	6.0 (14.9)	42.2 (104.3)	-
2009	-	-	-	-
2013	-	2.0 (5.0)	45.6 (112.6)	-
2015	-	2.0 (5.0)	32.2 (79.5)	-
2018	-	16.1 (39.7)	47.6 (117.5)	-



**Table 17R-14.10 - Grass Species.** Nested frequency and modified Daubenmire average cover by year.

GRASS SPECIES	Achnatherum hymenoides (Indian ricegrass)	Achnatherum lettermanii (Letterman's needlegrass)	Agropyron cristatum <sup>i</sup> (crested wheatgrass)	Bouteloua gracilis (blue grama)	Bromus tectorum <sup>ai</sup> (cheatgrass)	Carex (sedge)	Dactylis glomerata <sup>i</sup> (orchardgrass)	Elymus elymoides (squirreltail)	Elymus lanceolatus (thickspike wheatgrass)	Elymus trachycaulus (slender wheatgrass)	Hesperostipa comata (needle and thread)	Leymus salinus (saline wildrye)	Poa fendleriana (muttongrass)	Poa secunda (Sandberg bluegrass)	Psathyrostachys juncea <sup>i</sup> (Russian wildrye)	Pseudoroegneria spicata (bluebunch wheatgrass)
year	Nested Frequency															
2005	8	-	-	1	1	3	-	75	29	-	7	12	9	46	-	55
2008	10	-	75	-	34	5	-	156	60	-	7	21	18	63	10	22
2009	15	-	78	-	26	-	-	137	95	-	8	2	8	39	15	21
2013	26	1	122	3	29	5	-	127	78	-	13	-	-	49	28	98
2015	38	-	113	5	49	-	1	130	62	36	13	51	3	62	31	19
2018	54	4	137	-	36	-	-	27	45	-	17	103	19	39	32	76
year	Average Cover (%)															
2005	0.0	-	-	0.0	0.0	0.2	-	0.8	0.5	-	0.6	0.5	0.2	0.4	-	0.9
2008	0.4	-	2.9	-	1.0	0.0	-	4.6	2.7	-	0.4	1.5	0.3	1.5	0.5	1.6
2009	0.7	-	2.5	-	0.4	-	-	3.6	5.0	-	0.6	0.1	0.2	0.6	0.3	1.4
2013	1.7	0.0	3.3	0.4	0.2	0.0	-	3.5	1.8	-	0.4	-	-	0.4	1.0	6.4
2015	2.5	-	4.0	0.0	0.9	-	0.1	4.4	4.2	4.0	1.1	5.3	0.1	1.3	1.6	1.8
2018	3.2	0.0	6.6	-	0.5	-	-	0.3	0.7	-	0.3	5.6	0.1	0.2	0.6	4.7

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

**Table 17R-14.11 - Forb Species.** Nested frequency and modified Daubenmire average cover by year.

FORB SPECIES	Androsace septentrionalis <sup>ai</sup> (pygmyflower rockjasmine)	Antennaria (pussytoes)	Arabis (rockcress)	Arenaria (sandwort)	Astragalus (milkvetch)	Astragalus chamaeleuce var. chamaeleuce (cicada milkvetch)	Astragalus convallarius (lesser rushy milkvetch)	Astragalus utahensis (Utah milkvetch)	Calochortus nuttallii (sego lily)	Castilleja linariifolia (Wyoming Indian paintbrush)	Chaenactis douglasii (Douglas' dustymaiden)	Chenopodium album <sup>a</sup> (lambsquarters)	Chenopodium fremontii <sup>a</sup> (Fremont's goosefoot)	Chenopodium leptophyllum <sup>a</sup> (narrowleaf goosefoot)	Cryptantha (cryptantha)	Descurainia pinnata <sup>a</sup> (western tansymustard)	Hedysarum boreale (Utah sweetvetch)
year	Nested Frequency																
2005	8	-	56	-	-	-	2	-	-	-	8	44	-	9	5	18	37
2008	2	3	-	6	1	-	27	2	3	2	2	-	8	12	7	0	28
2009	-	-	-	-	-	-	14	14	-	2	7	6	20	7	8	-	31
2013	-	3	2	2	-	-	14	-	-	5	2	-	8	-	1	-	47
2015	12	-	-	-	-	5	7	-	-	-	1	1	6	-	5	36	37
2018	-	-	-	-	5	8	3	-	-	-	-	3	-	-	8	7	1
year	Average Cover (%)																
2005	0.0	-	0.3	-	-	-	0.0	-	-	-	0.0	0.8	-	0.0	0.0	0.1	1.8
2008	0.0	0.0	-	0.0	0.0	-	0.3	0.0	0.0	0.0	0.0	-	0.0	0.2	0.1	0.0	1.1
2009	-	-	-	-	-	-	0.1	0.2	-	0.0	0.2	0.3	0.2	0.0	0.3	-	0.4
2013	-	0.0	0.0	0.1	-	-	0.1	-	-	0.1	0.0	-	0.2	-	0.0	-	2.3
2015	0.1	-	-	-	-	0.0	0.1	-	-	-	0.0	0.0	0.0	-	0.3	0.7	1.8
2018	-	-	-	-	0.0	0.1	0.0	-	-	-	-	0.0	-	-	0.2	0.1	0.0

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

FORB SPECIES	Ipomopsis aggregata (scarlet gilia)	Lactuca serriola <sup>ai</sup> (prickly lettuce)	Lappula occidentalis <sup>ai</sup> (flatspine stickseed)	Linum perenne <sup>i</sup> (blue flax)	Mentzelia albicaulis <sup>ai</sup> (whitestem blazingstar)	Onobrychis vicifolia <sup>i</sup> (sainfoin)	Penstemon (beardtongue)	Phlox austromontana (mountain phlox)	Phlox longifolia (longleaf phlox)	Salsola tragus <sup>ai</sup> (prickly Russian thistle)	Sanguisorba minor <sup>i</sup> (small burnet)	Schoenocrambe linifolia (flaxleaf plainsmustard)	Taraxacum officinale (common dandelion)	Townsendia (Townsend daisy)
year	Nested Frequency													
2005	-	-	8	-	-	-	10	12	11	-	-	7	-	3
2008	0	-	10	5	1	12	6	4	15	1	24	35	-	3
2009	-	1	9	5	-	-	14	3	2	-	22	19	-	-
2013	-	-	10	3	-	-	5	9	27	3	4	3	-	-
2015	-	-	29	4	-	-	3	10	10	-	4	2	4	-
2018	-	-	-	-	-	-	5	3	-	-	-	-	-	-
year	Average Cover (%)													
2005	-	-	0.0	-	-	-	0.1	0.1	0.1	-	-	0.0	-	0.0
2008	0.0	-	0.1	0.0	0.0	0.2	0.1	0.0	0.1	0.0	0.7	0.5	-	0.0
2009	-	0.0	0.0	0.0	-	-	0.1	0.1	0.0	-	0.4	0.1	-	-
2013	-	-	0.0	0.0	-	-	0.0	0.1	0.1	0.0	0.2	0.0	-	-
2015	-	-	0.3	0.0	-	-	0.0	0.1	0.0	-	0.1	0.0	0.0	-
2018	-	-	-	-	-	-	0.0	0.0	-	-	-	-	-	-

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

**Table 17R-14.12 - Shrub and Tree Species.** Average modified Daubenmire quadrat and line intercept cover by year.

SHRUB SPECIES	Amelanchier utahensis <sup>p</sup> (Utah serviceberry)	Artemisia nova <sup>p</sup> (black sagebrush)	Artemisia tridentata ssp. vaseyana <sup>p</sup> (mountain big sagebrush)	Bassia prostrata <sup>pi</sup> (forage kochia)	Chrysothamnus depressus <sup>p</sup> (longflower rabbitbrush)	Chrysothamnus viscidiflorus ssp. viscidiflorus var. viscidiflorus (yellow rabbitbrush)	Echinocactus (echinocactus)	Gutierrezia sarothrae (broom snakeweed)	Juniperus osteosperma <sup>i</sup> (Utah juniper)	Linanthus pungens (granite prickly phlox)	Opuntia (pricklypear)	Pediocactus simpsonii (mountain ball cactus)	Pinus edulis <sup>i</sup> (twoneedle pinyon)
year	Line Intercept Cover (%)												
2005	0.4	0.4	-	-	0	0.3	-	0.1	12.2	-	0.1	-	16.2
2008	-	2.4	-	4.1	-	0.5	-	0.5	-	-	-	-	-
2009	-	2.3	-	2.7	-	0.4	-	-	-	-	-	-	-
2013	-	1.3	0.6	6.9	0.1	0.8	-	-	-	-	-	-	-
2015	-	3.1	0.4	7	-	0.7	-	-	-	-	-	-	-
2018	-	3.3	0.2	3.9	-	0.6	-	-	-	-	-	-	-
year	Quadrat Cover (%)												
2005	0.0	1.0	-	-	0.0	0.4	-	0.0	4.4	-	0.1	-	5.0
2008	-	1.1	-	1.6	0.2	1.0	-	0.8	-	-	-	0.0	-
2009	-	1.2	0.0	2.8	-	0.8	0.0	0.0	-	-	0.0	-	-
2013	-	2.8	0.0	4.5	0.2	0.8	-	0.0	0.0	-	0.0	-	-
2015	-	3.0	0.1	6.3	0.0	1.0	-	-	-	-	-	-	-
2018	-	2.0	0.8	3.8	0.2	0.8	-	-	-	0.0	-	-	-

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

**Table 17R-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 (%)				
<b>Amelanchier utahensis<sup>P</sup> -- (Utah serviceberry)</b>									
2005	20	-	0	100	0	100	0	0	56/26
2008	-	-	-	-	-	-	-	-	-/-
2009	-	-	-	-	-	-	-	-	-/-
2013	-	-	-	-	-	-	-	-	-/-
2015	-	-	-	-	-	-	-	-	-/-
2018	-	-	-	-	-	-	-	-	-/-
<b>Artemisia nova<sup>P</sup> -- (black sagebrush)</b>									
2005	460	-	4	61	35	35	56	17	29/61
2008	4320	6520	93	7	1	0	0	0	23/47
2009	-	-	-	-	-	-	-	-	20/33
2013	3960	40	9	91	0	25	69	7	20/37
2015	4060	240	70	31	0	30	7	0	24/46
2018	3760	-	14	83	3	0	0	3	19/35
<b>Artemisia tridentata ssp. vaseyana<sup>P</sup> -- (mountain big sagebrush)</b>									
2005	-	-	-	-	-	-	-	-	-/-
2008	-	-	-	-	-	-	-	-	-/-
2009	-	-	-	-	-	-	-	-	23/30
2013	220	-	9	91	0	36	46	0	29/37
2015	100	-	20	80	0	0	0	0	36/50
2018	400	-	5	90	5	0	10	0	36/49
<b>Atriplex canescens<sup>P</sup> -- (fourwing saltbush)</b>									
2005	-	-	-	-	-	-	-	-	-/-
2008	-	-	-	-	-	-	-	-	64/56
2009	-	-	-	-	-	-	-	-	58/80
2013	-	-	-	-	-	-	-	-	-/-
2015	-	-	-	-	-	-	-	-	97/165
2018	-	-	-	-	-	-	-	-	128/242
<b>Bassia prostrata<sup>PI</sup> -- (forage kochia)</b>									
2005	-	-	-	-	-	-	-	-	-/-
2008	3580	280	30	70	0	24	43	0	36/42
2009	-	-	-	-	-	-	-	-	31/29
2013	12480	4020	62	38	0	29	2	0	20/29
2015	11120	5460	55	45	0	15	1	0	26/36
2018	9720	300	24	73	3	16	0	3	22/23
<b>Chrysothamnus depressus<sup>P</sup> -- (longflower rabbitbrush)</b>									
2005	160	-	0	100	0	0	0	0	18/18
2008	80	-	0	100	0	25	0	0	19/33
2009	-	-	-	-	-	-	-	-	12/25
2013	160	-	25	75	0	0	0	0	23/37
2015	140	-	29	71	0	0	0	0	22/35
2018	220	-	0	73	27	18	0	27	17/37
<b>Chrysothamnus viscidiflorus ssp. viscidiflorus var. viscidiflorus -- (yellow rabbitbrush)</b>									
2005	20	-	0	100	0	0	0	0	33/57
2008	20	-	0	100	0	0	0	100	36/61
2009	-	-	-	-	-	-	-	-	34/54
2013	60	-	33	67	0	0	0	0	43/70
2015	20	-	0	100	0	0	0	0	50/89
2018	20	-	0	100	0	0	0	0	45/64

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 (%)				
<b>Ephedra viridis<sup>P</sup> -- (mormon tea)</b>									
2005	-	-	-	-	-	-	-	-	142/194
2008	-	-	-	-	-	-	-	-	-/-
2009	-	-	-	-	-	-	-	-	19/40
2013	-	-	-	-	-	-	-	-	-/-
2015	-	-	-	-	-	-	-	-	-/-
2018	-	-	-	-	-	-	-	-	52/64
<b>Ericameria nauseosa -- (rubber rabbitbrush)</b>									
2005	-	-	-	-	-	-	-	-	-/-
2008	-	-	-	-	-	-	-	-	34/45
2009	-	-	-	-	-	-	-	-	36/42
2013	-	-	-	-	-	-	-	-	53/52
2015	-	-	-	-	-	-	-	-	66/74
2018	-	-	-	-	-	-	-	-	63/82
<b>Gutierrezia sarothrae -- (broom snakeweed)</b>									
2005	300	-	0	100	0	0	0	0	18/13
2008	120	-	0	100	0	0	0	0	28/35
2009	-	-	-	-	-	-	-	-	22/29
2013	20	-	0	100	0	0	0	0	12/9
2015	40	20	0	100	0	0	0	0	24/28
2018	280	-	71	29	0	0	0	0	13/13
<b>Juniperus osteosperma<sup>1</sup> -- (Utah juniper)</b>									
2005	200	-	10	70	20	0	0	10	-/-
2008	-	-	-	-	-	-	-	-	-/-
2009	-	-	-	-	-	-	-	-	-/-
2013	80	20	100	0	0	0	0	0	-/-
2015	20	20	100	0	0	0	0	0	-/-
2018	60	-	100	0	0	0	0	0	-/-
<b>Linanthus pungens -- (granite prickly phlox)</b>									
2005	-	-	-	-	-	-	-	-	-/-
2008	-	-	-	-	-	-	-	-	-/-
2009	-	-	-	-	-	-	-	-	-/-
2013	-	40	0	0	0	0	0	0	-/-
2015	-	-	-	-	-	-	-	-	-/-
2018	60	-	0	100	0	0	0	0	3/13
<b>Opuntia -- (pricklypear)</b>									
2005	140	-	0	100	0	0	0	0	11/30
2008	60	-	0	100	0	0	0	33	7/19
2009	-	-	-	-	-	-	-	-	8/22
2013	40	-	0	100	0	0	0	0	7/18
2015	-	-	-	-	-	-	-	-	13/30
2018	20	-	0	100	0	0	0	0	9/15
<b>Pinus edulis<sup>1</sup> -- (twoneedle pinyon)</b>									
2005	160	100	25	75	0	0	0	0	-/-
2008	-	-	-	-	-	-	-	-	-/-
2009	-	-	-	-	-	-	-	-	-/-
2013	-	-	-	-	-	-	-	-	-/-
2015	-	-	-	-	-	-	-	-	-/-
2018	-	-	-	-	-	-	-	-	-/-

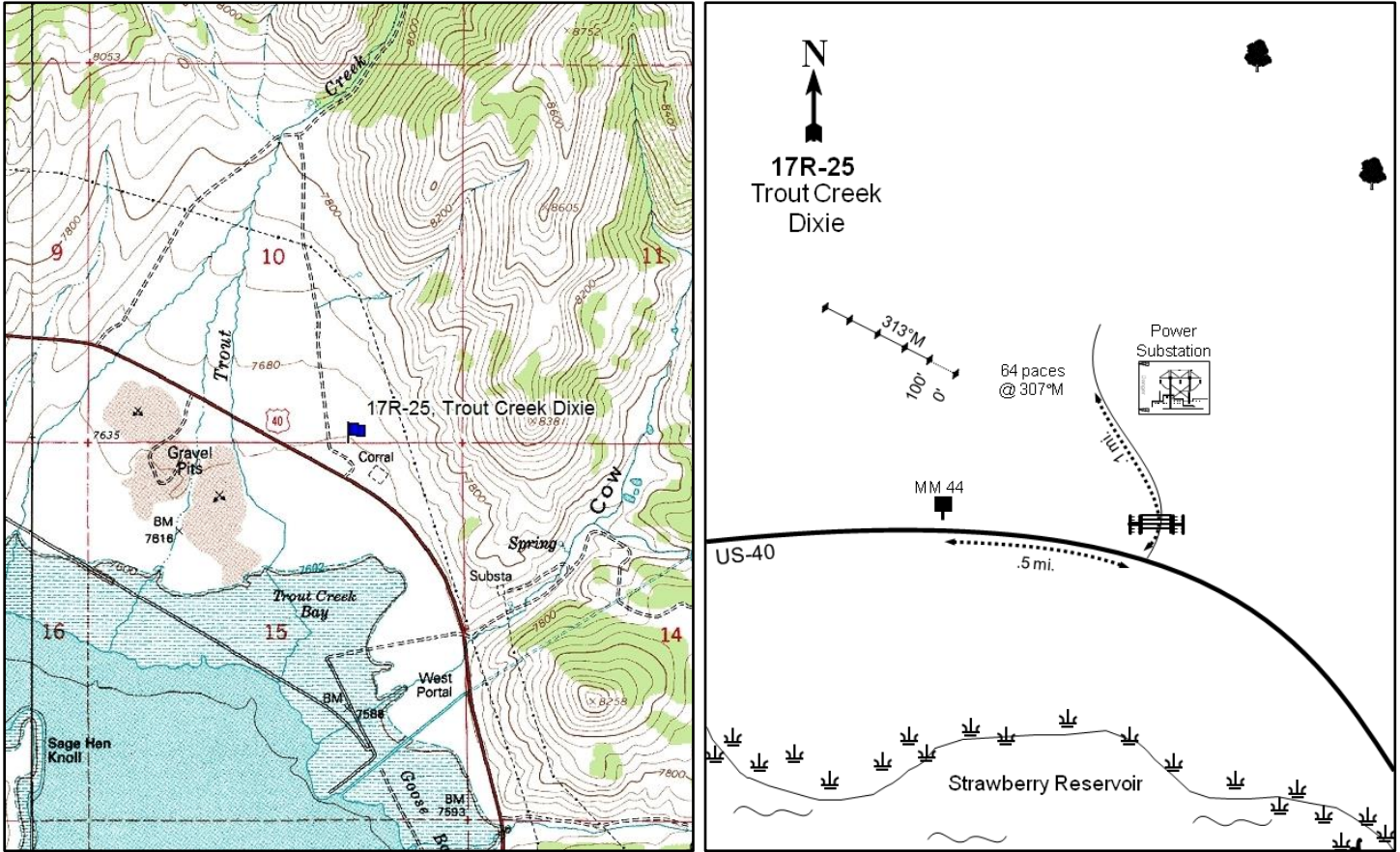
Year	Density		Age Class Distribution			Utilization		Poor Vigor (%)	Average Height Crown (cm)
	Plants Per Acre		Excluding Seedlings			Moderate (%)	Heavy (%)		
	Excluding Seedlings	Seedling	Young (%)	Mature (%)	Decadent (%)				
<b>Purshia tridentata<sup>p</sup> -- (antelope bitterbrush)</b>									
2005	-	-	-	-	-	-	-	-	-/-
2008	-	-	-	-	-	-	-	-	-/-
2009	-	-	-	-	-	-	-	-	-/-
2013	-	-	-	-	-	-	-	-	-/-
2015	-	-	-	-	-	-	-	-	-/-
2018	-	-	-	-	-	-	-	-	38/44

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

**Table 17R-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' (%)	
<b>Juniperus osteosperma (Utah juniper)</b>							
2005	252	-	5	35	25	35	30.4
2008	14	25	75	-	-	-	4.9
2009	7	-	67	17	17	-	6.8
2013	8	-	100	-	-	-	6.0
2015	14	33	56	-	-	11	4.4
2018	30	55	45	-	-	-	5.1
<b>Pinus edulis (twoneedle pinyon)</b>							
2005	185	15	35	5	20	25	10.8
2008	6	75	25	-	-	-	2.8
2009	5	-	100	-	-	-	3.0
2013	3	-	100	-	-	-	3.3
2015	5	25	75	-	-	-	2.3
2018	22	56	44	-	-	-	2.4

## TROUT CREEK DIXIE - STUDY NO. 17R-25



### Location Information

USGS 7.5 min Map Info  
GPS (0' Stake)

Strawberry Reservoir; Township 3S, Range 11W, Section 15  
NAD 83 UTM ZONE 12, 490655 East 4452940 North

### Transect Information

Browse Tag # (0' Stake)	256
Transect Bearing	313° magnetic
Length	500ft
Belt Placement	Line 1 (11ft), Line 2 (34ft), Line 3 (59ft), Line 4 (71ft), Line 5 (95ft)
Belt Marker Placement	Standard

### Directions to Site

Drive east on US-40 around Strawberry Reservoir to mile marker 44. From there, drive 0.5 miles to a road with a gate on the left (north). Turn left here and proceed 0.1 miles through the gate to a power substation. From the "danger" sign on the substation gate, walk 64 paces at 307 degrees magnetic to the 0-foot stake marked with browse tag #256.

**Site Information**

Land Ownership	Federal
Land Administrator	USFS
Allotment	No data
Elevation	7,650ft (2,332m)
Aspect	West
Slope	3-4%
Sample Dates	08/14/2006, 07/01/2010, 08/06/2014, 07/30/2018

**Table 17R-25.1 Disturbance History.** Recorded history of major disturbances.

Treatment/Disturbance	Name	WRI DB#	Date	Size (acres)
Harrow - Two-Way Dixie	Trout Creek Sagebrush Enhancement	323	July-September 2007	112
Seeding - Broadcast Unknown	Trout Creek Sagebrush Enhancement	323	July-September 2007	112

**Table 17R-25.2 Seed Mix.** List of known seeded plant species and rates (if available).

Mix Name			Application Type	Application Date	Acres
Trout Creek			Broadcast	Jul 2007	85
Type	Species	Common Name	Cultivar/Source ID	Bulk lbs/acre	PLS
F	Achillea millefolium	Western Yarrow		0.25	0.24
F	Hedysarum boreale	Utah Sweetvetch		0.51	0.41
F	Linum perenne	Blue Flax	Appar	1.00	0.92
F	Penstemon strictus	Rocky Mountain Penstemon	Bandera	0.25	0.22

**Wildlife Habitat and Vegetation History**

**Table 17R-25.3 - Wildlife Seasonal Habitat.** UDWR wildlife habitat and seasonality.

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

**Table 17R-25.4 - 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	No Encroachment
2010	Mountain Big Sagebrush	No Encroachment
2014	Mountain Big Sagebrush	No Encroachment
2018	Mountain Big Sagebrush	No Encroachment

**Site Notes**

In early October of 2007, a radio collared sage-grouse hen was located in the Trout Creek project area, just a month after treatments were completed. No sage-grouse previously used the area (WRI Database, 2018). In 2014, only one or two game trails existed and that was where all pellet groups were sampled. In 2018, there was extreme difficulty differentiating between lupine (*Lupinus sp.*) species which may be reflected in the data for that year.

**Soils**

**Table 17R-25.5 - 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	6.1	50.7	21.4	27.8	3.9	60.5	224.0	0.4	08/13/2006



**Site Potential**

1981 - 2010 Average Annual Precipitation	23 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 has remained dominated by mountain big sagebrush (*Artemisia tridentata* ssp. *vaseyana*) since study establishment in 2006. The harrow and seeding treatment caused cover of sagebrush to decrease, but density has exhibited an overall increase (Table 17R-25.1, Table 17R-25.12, Table 17R-25.13). The herbaceous understory has remained diverse and abundant throughout the duration of the study period, with a majority of the cover being contributed by perennial grasses; perennial forbs, particularly silvery lupine (*Lupinus argenteus*), have also been abundant (Table 17R-25.10, Table 17R-25.11). As more time passes since the treatment, the plant community is beginning to exhibit an increase in shrub cover once again with shrub and perennial grass cover nearly equal in 2014 and 2018 (Table 17R-25.6, Table 17R-25.7).

**Trend Summary Tables**

**Table 17R-25.6 - Shrub/Tree Summary.** Average modified Daubenmire quadrat and line intercept cover by year for shrubs/trees

Year	Quadrat Cover (%)			Line-intercept Cover (%)		
	Preferred Shrub	Other Shrub	Tree	Preferred Shrub	Other Shrub	Tree
2006	34.6	0.0	-	46.1	1.7	-
2010	18.6	0.1	-	21.5	2.3	-
2014	22.5	0.9	-	28.7	0.4	-
2018	19.7	0.3	-	24.6	0.9	-

**Table 17R-25.7 - Herbaceous Summary.** Nested frequency and average modified Daubenmire quadrat cover by year for herbaceous functional groups

Year	Nested Frequency				Quadrat Cover (%)			
	Annual Grass	Perennial Grass	Annual/Biennial Forb	Perennial Forb	Annual Grass	Perennial Grass	Annual/Biennial Forb	Perennial Forb
2006	-	414	14	186	-	20.1	0.0	6.3
2010	-	431	57	319	-	33.4	0.2	14.0
2014	-	419	7	222	-	29.5	0.0	14.6
2018	-	427	10	226	-	28.8	0.0	10.0

**Table 17R-25.8 - 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	16.8	0.1	47.2	0.3	0.2	54.6
2010	10.8	-	50.2	0.4	0.2	64.6
2014	6.2	-	68.5	0.2	0.0	63.1
2018	11.4	-	65.4	1.1	0.3	58.3

**Table 17R-25.9 - Pellet Group Data.** Quadrat frequency and pellet group transect data for animal pellets. Rabbit pellet groups are not sampled in the pellet group transect.

Year	Coyote	Mule Deer	Greater Sage-Grouse	Rabbit
	Quadrat Frequency			
2006	-	2	3	3
2010	-	1	-	1
2018	-	1	-	-
Year	Days Use Per Acre (ha)			
2006	8.7 (21.5)*	1.3 (3.3)	-	-
2010	-	0.7 (1.7)	-	-
2018	-	-	17.4 (43.0)*	-

\*Pellets per acre (ha)

**Table 17R-25.10 - Grass Species.** Nested frequency and modified Daubenmire average cover by year.

GRASS SPECIES	Achnatherum lettermanii (Letterman's needlegrass)	Achnatherum nelsonii (Columbia needlegrass)	Carex (sedge)	Dactylis glomerata <sup>i</sup> (orchardgrass)	Elymus elymoides (squirreltail)	Elymus lanceolatus (thickspike wheatgrass)	Elymus trachycaulus (slender wheatgrass)	Festuca idahoensis (Idaho fescue)	Hesperostipa comata (needle and thread)	Koeleria macrantha (prairie Junegrass)	Melica bulbosa (oniongrass)	Poa fendleriana (muttongrass)	Poa pratensis <sup>i</sup> (Kentucky bluegrass)	Poa secunda (Sandberg bluegrass)
year	Nested Frequency													
2006	209	-	16	-	-	235	-	-	119	175	0	4	52	33
2010	96	-	38	4	-	309	-	-	39	137	-	21	164	24
2014	71	2	3	-	11	298	25	12	140	106	-	6	80	-
2018	75	11	17	0	22	200	-	44	79	115	-	24	135	-
year	Average Cover (%)													
2006	6.0	-	0.2	-	-	2.0	-	-	4.3	5.3	0.0	0.2	1.3	0.8
2010	4.5	-	0.5	0.0	-	12.2	-	-	1.5	6.2	-	0.8	7.6	0.2
2014	2.1	0.1	0.1	-	0.2	9.9	0.9	0.6	8.4	2.0	-	0.4	4.7	-
2018	2.2	0.4	0.5	0.0	0.8	4.7	-	1.1	5.1	3.8	-	0.7	9.4	-

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

**Table 17R-25.11 - Forb Species.** Nested frequency and modified Daubenmire average cover by year.

FORB SPECIES	Agoseris glauca (pale agoseris)	Castilleja flava (yellow Indian paintbrush)	Chaenactis douglasii (Douglas' dustymaiden)	Collinsia parviflora <sup>a</sup> (maiden blue eyed Mary)	Draba <sup>a</sup> (draba)	Eriogonum (buckwheat)	Eriogonum heracleoides (parsnipflower buckwheat)	Eriogonum umbellatum (sulphur-flower buckwheat)	Hackelia patens (spotted stickseed)	Lappula occidentalis <sup>a</sup> (flatspine stickseed)	Linum lewisii (Lewis flax)	Lotus utahensis (Utah bird's-foot trefoil)	Lupinus (lupine)	Lupinus argenteus (silvery lupine)	Orthocarpus <sup>a</sup> (owl's-clover)	Penstemon (beardtongue)	Penstemon strictus (Rocky Mountain penstemon)
year	Nested Frequency																
2006	2	-	1	-	-	-	27	-	6	-	-	-	-	166	-	2	-
2010	-	9	-	3	-	-	81	-	127	9	-	4	-	235	-	37	-
2014	-	-	-	-	4	36	-	16	2	-	15	-	48	141	2	-	20
2018	-	-	-	-	-	-	-	59	13	1	-	1	18	169	-	-	-
year	Average Cover (%)																
2006	0.0	-	0.0	-	-	-	1.5	-	0.0	-	-	-	-	4.8	-	0.0	-
2010	-	0.1	-	0.0	-	-	2.0	-	1.5	0.0	-	0.1	-	9.8	-	0.5	-
2014	-	-	-	-	0.0	1.6	-	1.6	0.0	-	0.3	-	1.9	8.1	0.0	-	1.1
2018	-	-	-	-	-	-	-	3.4	0.4	0.0	-	0.0	0.3	5.9	-	-	-

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

FORB SPECIES			
	Polygonum douglasii <sup>a</sup> (Douglas' knotweed)	Taraxacum officinale (common dandelion)	Tragopogon dubius <sup>ai</sup> (yellow salsify)
year	Nested Frequency		
2006	14	-	-
2010	50	-	0
2014	2	3	-
2018	9	-	0
year	Average Cover (%)		
2006	0.0	-	-
2010	0.2	-	0.0
2014	0.0	0.0	-
2018	0.0	-	0.0

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

**Table 17R-25.12 - Shrub and Tree Species.** Average modified Daubenmire quadrat and line intercept cover by year.

SHRUB SPECIES			
	Artemisia tridentata ssp. vaseyana <sup>p</sup> (mountain big sagebrush)	Chrysothamnus viscidiflorus ssp. viscidiflorus var. viscidiflorus (yellow rabbitbrush)	Eriogonum heracleoides (parsnipflower buckwheat)
year	Line Intercept Cover (%)		
2006	46.1	-	1.7
2010	21.5	0.3	2
2014	28.7	0.4	-
2018	24.6	0.9	-
year	Quadrat Cover (%)		
2006	34.6	0.0	0.0
2010	18.6	0.1	0.0
2014	22.5	0.9	-
2018	19.7	0.3	-

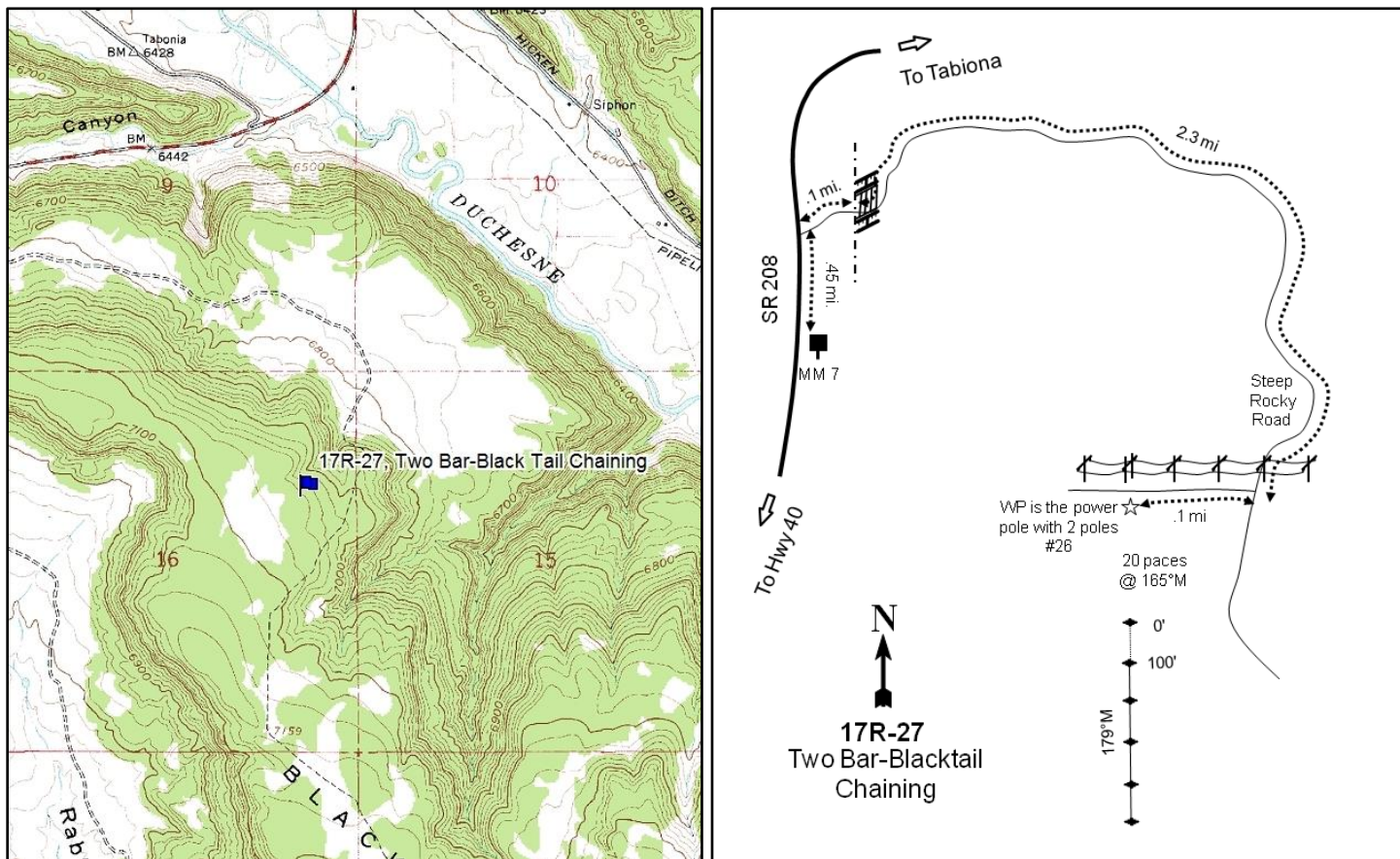
t - Tree Species; p - Preferred Browse; i - Introduced Species

**Table 17R-25.13 - Shrub/Tree Characteristics.** Population characteristics of shrub/tree species populations including density reproduction (seedlings), age distribution, utilization, vigor and average size (height/crown) of plants.

Year	Density		Age Class Distribution			Utilization		Poor Vigor (%)	Average Height Crown (cm)
	Plants Per Acre		Excluding Seedlings			Moderate (%)	Heavy (%)		
	Excluding Seedlings	Seedling	Young (%)	Mature (%)	Decadent (%)				
<b>Artemisia tridentata ssp. vaseyana<sup>p</sup> -- (mountain big sagebrush)</b>									
2006	7500	3260	1	70	29	0	0	11	58/78
2010	6620	34680	47	45	7	13	0	14	48/75
2014	12060	380	47	48	5	21	0	4	39/66
2018	11880	20	14	67	18	12	0	15	36/48
<b>Chrysothamnus viscidiflorus ssp. viscidiflorus var. viscidiflorus -- (yellow rabbitbrush)</b>									
2006	40	-	0	100	0	0	0	0	25/18
2010	120	-	0	100	0	0	0	17	27/41
2014	160	-	0	100	0	0	0	0	37/52
2018	140	20	0	100	0	0	0	0	35/47
<b>Eriogonum heracleoides -- (parsnipflower buckwheat)</b>									
2006	1100	-	4	96	0	0	2	0	8/35
2010	2360	1220	16	83	1	1	0	29	11/37

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

## TWO BAR-BLACK TAIL CHAINING - STUDY NO. 17R-27

**Location Information**

USGS 7.5 min Map Info  
GPS (0' Stake)

Tabiona SE; Township 2S, Range 7W, Section 16  
NAD 83 UTM ZONE 12, 527707 East 4462075 North

**Transect Information**

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

255  
179° magnetic  
500ft  
Line 1 (11ft), Line 2 (34ft), Line 3 (59ft), Line 4 (71ft), Line 5 (95ft)  
No Rebar

**Directions to Site**

From Highway 40 drive north on SR-208 and travel to mile marker 7. Travel north from mile marker 7 for 0.65 miles to a road coming in from the right (east). Turn right, travel 0.1 miles to a gate, and proceed for another 2.3 miles to a powerline. Park at the powerline service road (in past readings of the study, the road up the steep rocky hill was impassable. Be cautious: you may have to park at the bottom or have a spotter get out of the truck). From the service road walk 0.1 miles to the double powerpole marked with pole #26. The 0-foot stake is 20 paces away at 165 degrees magnetic and is marked with browse tag #255.

**Site Information**

Land Ownership	State
Land Administrator	UDWR
Allotment	No data
Elevation	7,050ft (2,149m)
Aspect	Northeast
Slope	4-5%
Sample Dates	07/26/2007, 07/06/2009, 08/08/2011, 08/06/2014, 07/31/2018

**Table 17R-27.1 Disturbance History.** Recorded history of major disturbances.

Treatment/Disturbance	Name	WRI DB#	Date	Size (acres)
Chaining - Two-Way Ely	2-Bar Pinyon and Juniper Thinning	368	September 2007	978
Seeding - Aerial Before	2-Bar Pinyon and Juniper Thinning	368	September 2007	978
Seeding - Dribbler	2-Bar Pinyon and Juniper Thinning	368	September 2007	978
Seeding - Aerial After	2-Bar Pinyon and Juniper Thinning	368	January 2008	978
Hand Crew - Lop and Scatter	Tabby Mountain chaining maintenance	2570	October 2013	1915

**Table 17R-27.2 Seed Mix.** List of known seeded plant species and rates (if available).

Mix Name			Application Type	Application Date	Acres
2-Bar PJ thinning- Black Tail			Aerial	Sep 2007	600
Type	Species	Common Name	Cultivar/Source ID	Bulk lbs/acre	PLS
G	Agropyron cristatum	Crested Wheatgrass	Douglas	0.50	0.42
G	Agropyron cristatum	Crested Wheatgrass	Ephraim	0.50	0.45
G	Bouteloua gracilis	Blue Grama		0.50	0.33
G	Dactylis glomerata	Orchardgrass	Paiute	0.50	0.39
G	Elymus lanceolatus	Thickspike Wheatgrass	Bannock	1.00	0.92
G	Elymus wawawaiensis	Snake River Wheatgrass	Secar	0.50	0.40
G	Leymus cinereus	Great Basin Wildrye	Trailhead	0.50	0.48
G	Poa secunda	Canby Bluegrass	Canbar	0.25	0.22
G	Poa secunda	Sandberg Bluegrass	Mountain Home ID	0.25	0.23
G	Psathyrostachys juncea	Russian Wildrye		0.75	0.63
F	Linum perenne	Blue Flax	Appar	0.25	0.23
F	Onobrychis viciifolia	Sainfoin	Eski	2.50	2.30
F	Sanguisorba minor	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
S	Atriplex canescens	Fourwing Saltbush	Carbon UT	0.01	0.01
S	Atriplex canescens	Fourwing Saltbush	Lincoln NV	0.19	0.07
S	Cercocarpus montanus	True Mountain Mahogany	Sevier UT	0.05	0.04
S	Purshia tridentata	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
S	Artemisia tridentata ssp. wyomingensis	Wyoming Big Sagebrush	Iron UT	1.04	0.22

**Wildlife Habitat and Vegetation History****Table 17R-27.3 - Wildlife Seasonal Habitat.** UDWR wildlife habitat and seasonality.

Species	Habitat	Season
Deer	crucial	winter
Elk	crucial	winter

**Table 17R-27.4 - 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
2009	Perennial Grass	Phase I
2011	Perennial Grass	Phase I
2014	Perennial Grass	Phase I
2018	Perennial Grass	Phase I

**Site Notes**

No Notes

**Soils****Table 17R-27.5 - Soil Analysis Data.** List of chemical and textural soil characteristics determined by laboratory analysis.

Texture	pH	%sand	%silt	%clay	%OM	PPM P	PPM K	ds/m	Sample Date
Loam	7.0	41.4	44.0	14.6	1.6	9.1	67.2	0.6	07/26/2007

**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 2007, this study site was in Phase II of woodland succession and being encroached by twoneedle pinyon (*Pinus edulis*) with some Utah juniper (*Juniperus osteosperma*) present. A small number of other browse species were also present, but they offered little cover. Tree cover decreased significantly following a chaining and seeding project in 2008 and a lop and scatter project in 2013 (Table 17R-27.1); browse species have exhibited an increase following tree removal. Although most of the trees were removed by treatments, they have been observed in all sample years. This continued presence of trees indicates that infilling will likely take place over time (Table 17R-27.12, Table 17R-27.13, Table 17R-27.14). The herbaceous understory was sparse prior to treatment, but has increased in subsequent sample years. Perennial grasses such as crested wheatgrass (*Agropyron cristatum*) and thickspike wheatgrass (*Elymus lanceolatus*) have contributed a majority of the herbaceous cover and have been the dominant vegetation component in all post-treatment sample years (Table 17R-27.7, Table 17R-27.10, Table 17R-27.11). Over time the shrubs will likely increase in cover and become dominant.



**Trend Summary Tables****Table 17R-27.6 - Shrub/Tree Summary.** Average modified Daubenmire quadrat and line intercept cover by year for shrubs/trees

Year	Quadrat Cover (%)			Line-intercept Cover (%)		
	Preferred Shrub	Other Shrub	Tree	Preferred Shrub	Other Shrub	Tree
2007	2.1	0.1	4.9	2.6	-	24.7
2009	2.6	0.1	3.5	1.6	0.5	3.7
2011	4.8	0.1	2.0	6.4	0.1	2.6
2014	3.5	0.1	0.2	3.6	-	-
2018	4.7	1.4	1.0	7.4	1.0	0.6

**Table 17R-27.7 - Herbaceous Summary.** Nested frequency and average modified Daubenmire quadrat cover by year for herbaceous functional groups

Year	Nested Frequency				Quadrat Cover (%)			
	Annual Grass	Perennial Grass	Annual/Biennial Forb	Perennial Forb	Annual Grass	Perennial Grass	Annual/Biennial Forb	Perennial Forb
2007	-	206	35	62	-	5.1	0.1	0.8
2009	19	188	120	98	0.2	11.5	6.0	3.9
2011	128	302	139	159	1.4	17.3	1.6	6.6
2014	30	298	10	63	0.1	20.2	0.1	1.3
2018	28	340	9	17	0.1	22.5	0.0	0.4

**Table 17R-27.8 - 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	23.8	10.4	57.8	1.2	3.2	12.6
2009	19.5	0.6	64.8	0.1	3.0	28.0
2011	16.6	0.2	55.5	0.3	3.3	31.5
2014	13.6	0.3	73.7	0.5	3.2	27.7
2018	14.5	0.5	72.0	1.5	5.3	31.8

**Table 17R-27.9 - Pellet Group Data.** Quadrat frequency and pellet group transect data for animal pellets. Rabbit pellet groups are not sampled in the pellet group transect.

Year	Mule Deer	Rocky Mountain Elk	Rabbit
	Quadrat Frequency		
2007	35	31	38
2009	14	6	4
2011	9	9	8
2014	3	11	9
2018	4	16	4
Days Use Per Acre (ha)			
2007	25.5 (62.9)	42.2 (104.3)	-
2009	-	-	-
2011	17.4 (43.0)	13.4 (33.1)	-
2014	4.0 (9.9)	30.2 (74.5)	-
2018	4.7 (11.6)	13.4 (33.1)	-

**Table 17R-27.10 - Grass Species.** Nested frequency and modified Daubenmire average cover by year.

GRASS SPECIES	Achnatherum hymenoides (Indian ricegrass)	Agropyron cristatum <sup>i</sup> (crested wheatgrass)	Bromus tectorum <sup>ai</sup> (cheatgrass)	Carex (sedge)	Dactylis glomerata <sup>i</sup> (orchardgrass)	Elymus elymoides (squirreltail)	Elymus lanceolatus (thickspike wheatgrass)	Hesperostipa comata (needle and thread)	Leymus cinereus (basin wildrye)	Pascopyrum smithii (western wheatgrass)	Poa fendleriana (muttongrass)	Poa secunda (Sandberg bluegrass)	Psathyrostachys juncea <sup>i</sup> (Russian wildrye)	Pseudoroegneria spicata (bluebunch wheatgrass)	Sporobolus cryptandrus (sand dropseed)
year	Nested Frequency														
2007	23	-	-	5	-	4	-	5	-	19	4	115	-	101	-
2009	2	30	19	-	28	2	8	2	10	2	30	56	1	96	-
2011	12	55	128	1	17	16	105	32	11	23	10	49	0	105	1
2014	22	56	30	5	-	25	31	2	16	61	1	50	17	127	-
2018	49	102	28	21	10	19	142	20	11	27	13	26	9	70	-
year	Average Cover (%)														
2007	0.4	-	-	0.0	-	0.0	-	0.0	-	0.1	0.4	1.2	-	3.0	-
2009	0.0	1.7	0.2	-	0.8	0.1	0.1	0.9	0.1	0.0	0.7	0.6	0.0	6.5	-
2011	0.4	2.0	1.4	0.0	1.0	0.6	4.6	1.0	0.8	1.1	0.3	0.5	0.0	4.8	0.0
2014	1.0	2.9	0.1	0.0	-	0.4	1.2	0.1	2.6	1.8	0.0	0.4	0.9	9.0	-
2018	2.0	5.4	0.1	0.5	0.1	0.6	5.4	0.3	1.6	1.0	0.1	0.1	0.6	4.7	-

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

**Table 17R-27.11 - Forb Species.** Nested frequency and modified Daubenmire average cover by year.

FORB SPECIES	Antennaria (pussytoes)	Arabis (rockcress)	Astragalus (milkvetch)	Astragalus convallarius (lesser rushy milkvetch)	Chaenactis douglasii (Douglas' dusty maiden)	Chenopodium album <sup>a</sup> (lambsquarters)	Chenopodium fremontii <sup>a</sup> (Fremont's goosefoot)	Chenopodium leptophyllum <sup>a</sup> (narrowleaf goosefoot)	Crepis acuminata (tapertip hawkbeard)	Cryptantha (cryptantha)	Cymopterus (springparsley)	Descurainia pinnata <sup>a</sup> (western tansymustard)	Eriogonum (buckwheat)	Gayophytum ramosissimum <sup>a</sup> (pinyon groundsmoke)	Ipomopsis aggregata (scarlet gilia)	Lactuca serriola <sup>ai</sup> (prickly lettuce)	Lappula occidentalis <sup>a</sup> (flatspine stickseed)
year	Nested Frequency																
2007	-	9	-	-	3	-	3	-	-	-	15	1	-	-	-	-	31
2009	-	-	1	3	-	1	77	2	3	1	10	5	10	29	3	-	42
2011	4	2	4	-	20	2	32	11	-	10	-	11	3	17	8	12	37
2014	-	-	-	-	3	-	1	-	-	-	-	9	-	-	1	-	-
2018	-	-	-	-	-	-	1	-	-	-	-	1	3	-	-	-	1
year	Average Cover (%)																
2007	-	0.0	-	-	0.0	-	0.0	-	-	-	0.0	0.0	-	-	-	-	0.1
2009	-	-	0.0	0.2	-	0.0	2.0	0.0	0.0	0.0	0.1	0.2	0.3	0.7	0.1	-	2.9
2011	0.0	0.0	0.0	-	0.4	0.1	0.7	0.1	-	0.1	-	0.1	0.0	0.1	0.1	0.2	0.1
2014	-	-	-	-	0.0	-	0.0	-	-	-	-	0.1	-	-	0.0	-	-
2018	-	-	-	-	-	-	0.0	-	-	-	-	0.0	0.0	-	-	-	0.0

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

FORB SPECIES	Linum perenne <sup>i</sup> (blue flax)	Machaeranthera canescens (hoary tansyaster)	Medicago sativa <sup>i</sup> (alfalfa)	Onobrychis vicifolia <sup>i</sup> (sainfoin)	Penstemon humilis (low beardtongue)	Phlox hoodii (spiny phlox)	Phlox longifolia (longleaf phlox)	Polygonum douglasii <sup>a</sup> (Douglas' knotweed)	Sanguisorba minor <sup>i</sup> (small burnet)	Silene antirrhina <sup>a</sup> (sleepy silene)	Sisymbrium altissimum <sup>at</sup> (tall tumblemustard)	Tetradeneuris acaulis (stemless four-nerve daisy)	Tragopogon dubius <sup>at</sup> (yellow salsify)
year	Nested Frequency												
2007	-	-	-	-	23	24	-	-	-	-	-	-	-
2009	18	5	-	9	19	20	4	2	9	-	-	3	-
2011	56	47	4	12	26	25	1	48	10	2	-	-	1
2014	22	34	-	-	6	11	-	-	-	-	-	-	-
2018	4	1	-	-	1	5	-	-	-	-	6	3	-
year	Average Cover (%)												
2007	-	-	-	-	0.2	0.6	-	-	-	-	-	-	-
2009	1.1	0.2	-	0.7	0.2	0.3	0.0	0.1	0.5	-	-	0.0	-
2011	2.7	0.5	0.0	0.5	0.2	1.4	0.0	0.3	0.5	0.0	-	-	0.0
2014	0.2	0.8	-	-	0.0	0.2	-	-	-	-	-	-	-
2018	0.2	0.0	-	-	0.0	0.2	-	-	-	-	0.0	0.0	-

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

**Table 17R-27.12 - Shrub and Tree Species.** Average modified Daubenmire quadrat and line intercept cover by year.

SHRUB SPECIES	Artemisia nova <sup>p</sup> (black sagebrush)	Artemisia tridentata ssp. vaseyana <sup>p</sup> (mountain big sagebrush)	Cercocarpus montanus <sup>p</sup> (alderleaf mountain mahogany)	Chrysothamnus depressus <sup>p</sup> (longflower rabbitbrush)	Chrysothamnus viscidiflorus ssp. viscidiflorus var. viscidiflorus (yellow rabbitbrush)	Ericameria nauseosa (rubber rabbitbrush)	Juniperus osteosperma <sup>i</sup> (Utah juniper)	Linanthus pungens (granite prickly phlox)	Opuntia (pricklypear)	Opuntia fragilis (brittle pricklypear)	Pinus edulis <sup>t</sup> (twoneedle pinyon)
year	Line Intercept Cover (%)										
2007	2.3	0.1	-	0.2	-	-	3.3	-	0	-	21.4
2009	1.4	0.2	-	-	-	-	2.4	0.5	0	-	1.3
2011	4.8	0.6	0.8	0.2	-	-	1.3	-	0.1	-	1.3
2014	2.9	0.7	-	-	-	-	-	-	-	-	-
2018	5.1	1.9	0.4	-	-	0.9	0.2	-	-	0.1	0.4
year	Quadrat Cover (%)										
2007	1.5	0.2	-	0.4	-	-	0.0	-	0.0	0.0	4.9
2009	1.4	0.2	-	1.0	-	-	1.1	0.0	0.1	0.0	2.4
2011	3.1	0.4	0.0	1.4	-	-	1.0	0.0	0.1	-	1.0
2014	1.8	1.7	-	-	0.0	-	-	-	0.1	0.1	0.2
2018	3.1	1.6	0.0	0.1	0.0	0.4	0.6	1.0	-	0.1	0.4

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

**Table 17R-27.13 - Shrub/Tree Characteristics.** Population characteristics of shrub/tree species populations including density reproduction (seedlings), age distribution, utilization, vigor and average size (height/crown) of plants.

Year	Density		Age Class Distribution			Utilization		Poor Vigor (%)	Average Height Crown (cm)
	Plants Per Acre		Excluding Seedlings			Moderate (%)	Heavy (%)		
	Excluding Seedlings	Seedling	Young (%)	Mature (%)	Decadent (%)				
<b>Artemisia nova<sup>P</sup> -- (black sagebrush)</b>									
2007	1400	220	21	39	40	9	39	21	24/49
2009	-	-	-	-	-	-	-	-	34/55
2011	1720	4020	42	55	4	8	0	5	20/43
2014	1720	120	61	36	4	17	14	4	23/52
2018	2920	20	58	42	0	0	0	0	29/56
<b>Artemisia tridentata ssp. vaseyana<sup>P</sup> -- (mountain big sagebrush)</b>									
2007	180	-	0	33	67	0	56	56	42/66
2009	-	-	-	-	-	-	-	-	44/62
2011	280	420	29	71	0	0	0	0	37/53
2014	680	160	77	24	0	6	9	0	48/70
2018	720	-	44	56	0	0	0	0	57/83
<b>Cercocarpus montanus<sup>P</sup> -- (alderleaf mountain mahogany)</b>									
2007	20	-	0	0	100	0	100	100	48/56
2009	-	-	-	-	-	-	-	-	57/68
2011	40	-	0	100	0	50	0	0	72/86
2014	20	-	0	100	0	100	0	0	64/72
2018	40	-	50	50	0	0	0	0	70/73
<b>Chrysothamnus depressus<sup>P</sup> -- (longflower rabbitbrush)</b>									
2007	900	440	0	84	16	40	49	7	8/24
2009	-	-	-	-	-	-	-	-	18/38
2011	680	80	9	91	0	3	0	0	14/33
2014	140	-	43	43	14	43	0	14	10/26
2018	660	20	6	94	0	3	42	0	14/28
<b>Chrysothamnus viscidiflorus ssp. viscidiflorus var. viscidiflorus -- (yellow rabbitbrush)</b>									
2007	-	-	-	-	-	-	-	-	19/25
2009	-	-	-	-	-	-	-	-	37/43
2011	40	-	0	100	0	0	0	0	18/33
2014	100	-	20	60	20	0	20	60	30/45
2018	240	-	8	83	8	0	0	8	29/42
<b>Ericameria nauseosa -- (rubber rabbitbrush)</b>									
2007	-	-	-	-	-	-	-	-	-/-
2009	-	-	-	-	-	-	-	-	-/-
2011	-	-	-	-	-	-	-	-	48/48
2014	-	-	-	-	-	-	-	-	32/144
2018	40	-	0	100	0	50	0	0	63/77
<b>Juniperus osteosperma<sup>1</sup> -- (Utah juniper)</b>									
2007	-	-	-	-	-	-	-	-	-/-
2009	-	-	-	-	-	-	-	-	-/-
2011	20	20	100	0	0	0	0	0	-/-
2014	40	20	100	0	0	0	0	0	-/-
2018	220	-	82	18	0	0	0	0	-/-
<b>Linanthus pungens -- (granite prickly phlox)</b>									
2007	100	-	0	0	100	0	0	100	-/-
2009	-	-	-	-	-	-	-	-	14/20
2011	180	-	0	100	0	0	0	0	9/18
2014	20	-	0	100	0	0	0	0	-/-
2018	500	-	0	96	4	0	0	92	8/18
<b>Opuntia fragilis -- (brittle pricklypear)</b>									
2007	320	-	19	81	0	0	0	0	6/15
2009	-	-	-	-	-	-	-	-	5/23
2011	-	-	-	-	-	-	-	-	-/-
2014	300	-	67	33	0	0	0	0	5/14
2018	80	-	0	100	0	0	0	0	6/11

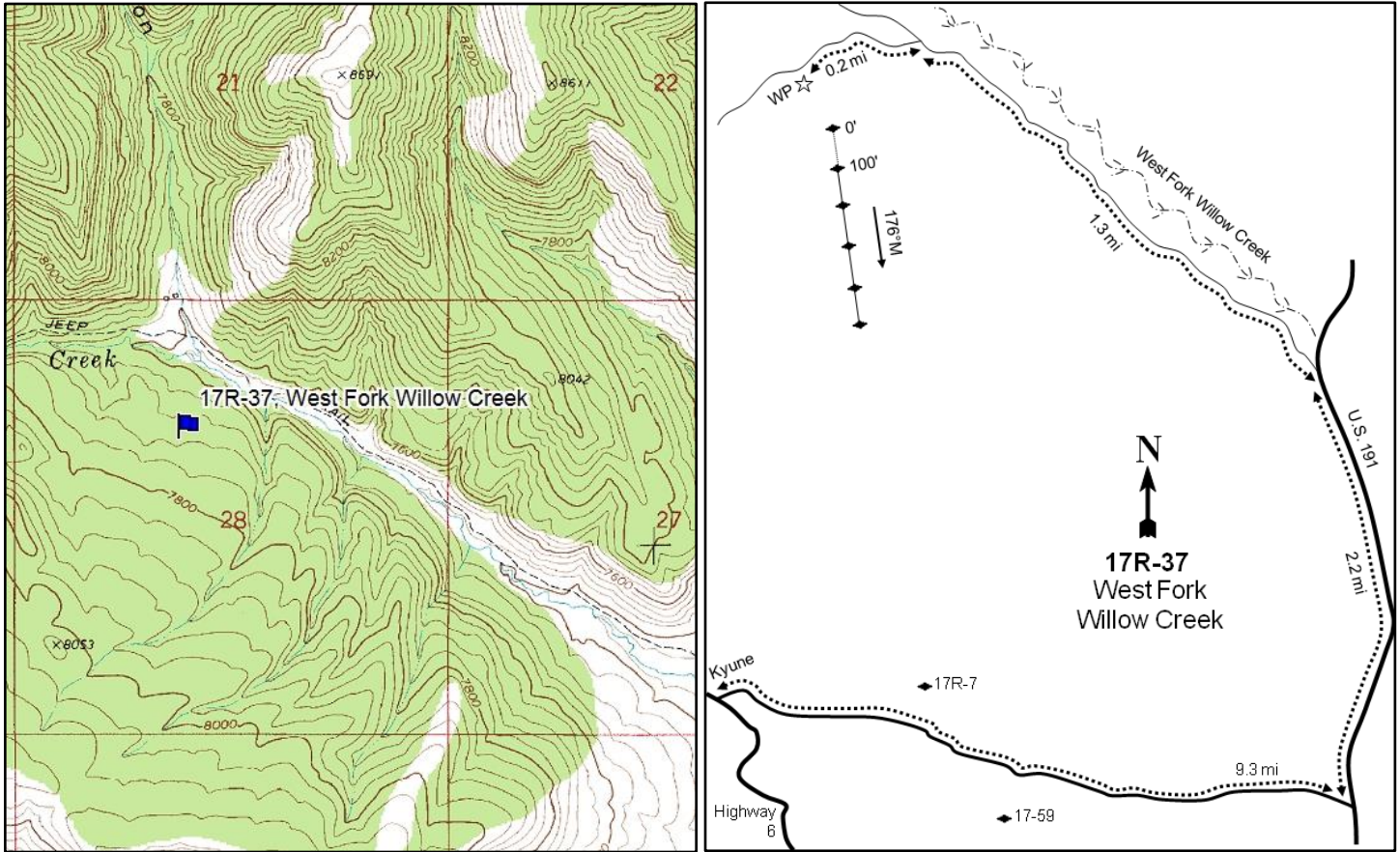
Year	Density		Age Class Distribution			Utilization		Poor Vigor (%)	Average Height Crown (cm)
	Plants Per Acre		Excluding Seedlings			Moderate (%)	Heavy (%)		
	Excluding Seedlings	Seedling	Young (%)	Mature (%)	Decadent (%)				
<b>Opuntia -- (pricklypear)</b>									
2007	260	-	8	62	31	0	0	8	12/36
2009	-	-	-	-	-	-	-	-	12/38
2011	220	20	0	91	9	0	0	9	8/21
2014	60	20	0	100	0	0	0	0	11/24
2018	80	-	0	100	0	0	0	0	11/24
<b>Pediocactus simpsonii -- (mountain ball cactus)</b>									
2007	20	-	0	100	0	0	0	0	2/4
2009	-	-	-	-	-	-	-	-	-/-
2011	-	-	-	-	-	-	-	-	-/-
2014	-	-	-	-	-	-	-	-	5/8
2018	-	-	-	-	-	-	-	-	-/-
<b>Pinus edulis<sup>t</sup> -- (twoneedle pinyon)</b>									
2007	140	20	43	57	0	0	0	0	-/-
2009	-	-	-	-	-	-	-	-	-/-
2011	40	20	100	0	0	0	0	0	-/-
2014	40	20	100	0	0	0	0	0	-/-
2018	40	-	50	50	0	0	0	0	-/-
<b>Purshia tridentata<sup>p</sup> -- (antelope bitterbrush)</b>									
2007	-	-	-	-	-	-	-	-	-/-
2009	-	-	-	-	-	-	-	-	-/-
2011	-	-	-	-	-	-	-	-	-/-
2014	-	-	-	-	-	-	-	-	61/205
2018	-	-	-	-	-	-	-	-	82/318

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

**Table 17R-27.14 - Tree Characteristics.** Point-quarter tree density, size class distribution, and average diameter.

Year	Density	Size Class Distribution					Average Diameter (cm)
	Trees per Acre	Seedling (%)	1-4' (%)	4-8' (%)	8-12' (%)	>12' (%)	
<b>Juniperus osteosperma (Utah juniper)</b>							
2007	25	-	17	25	8	50	21.3
2009	9	-	67	17	-	17	15.5
2011	23	27	55	9	-	9	10.3
2014	8	17	83	-	-	-	3.0
2018	23	-	90	10	-	-	9.3
<b>Pinus edulis (twoneedle pinyon)</b>							
2007	185	-	-	-	-	-	13.4
2009	22	-	50	33	17	-	7.8
2011	38	47	20	33	-	-	5.5
2014	26	36	64	-	-	-	3.0
2018	43	15	85	-	-	-	2.6

## WEST FORK WILLOW CREEK - STUDY NO. 17R-37



### Location Information

USGS 7.5 min Map Info                      Matts Summit NW; Township 11S, Range 10E, Section 28  
 GPS (0' Stake)                                NAD 83 UTM ZONE 12, 515998 East 4409669 North

### Transect Information

Browse Tag # (0' Stake)                      260  
 Transect Bearing                                170° magnetic  
 Length    500ft  
 Belt Placement                                 Line 1 (11ft), Line 2 (34ft), Line 3 (59ft), Line 4 (71ft), Line 5 (95ft)  
 Belt Marker Placement                        Standard

### Directions to Site

Traveling south on US-6, turn left onto the road that leads to Kyune and travel for 9.3 miles. Turn left onto US-191 and drive for 2.2 miles to a road that runs parallel to West Fork Willow Creek. Turn left onto this road and continue for 1.3 miles to a fork. Bear left at the fork and drive for 0.2 miles. The site is on the left (south) side of the road; there is no witness post.

**Site Information**

Land Ownership	Private
Land Administrator	Private
Allotment	WEST FORK
Elevation	7,717ft (2,352m)
Aspect	North
Slope	10%
Sample Dates	08/06/2015, 07/25/2018

**Table 17R-37.1 Disturbance History.** Recorded history of major disturbances.

Treatment/Disturbance	Name	WRI DB#	Date	Size (acres)
Logging - Coppice Cutting	West Fork Willow Creek Aspen Restoration Phase 1	3222	May 2016	25

**Wildlife Habitat and Vegetation History****Table 17R-37.3 - Wildlife Seasonal Habitat.** UDWR wildlife habitat and seasonality.

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

**Table 17R-37.4 - Vegetation History.** The dominant vegetation type(s) and phase of woodland succession (Tausch, Miller, Roundy, & Chambers, 2009).

Year	Vegetation Type	Woodland Succession
2015	Quaking Aspen/Perennial Grass-Forb	Phase I
2018	Quaking Aspen/Perennial Grass-Forb	Phase I

**Site Notes**

The location of the study site was shifted slightly in 2018 to better capture the treatment and avoid fences.

**Site Potential**

1981 - 2010 Average Annual Precipitation	19 inches
NRCS Ecological Site	High Mountain Loam (Aspen)
NRCS Ecological Site #	R047XA508UT
States and Transitions	No state and transition model is available for this ecological site.

This study site has remained dominated by quaking aspen (*Populus tremuloides*) since establishment in 2015. However, age of the stand has changed: many older trees were present prior to treatment, whereas all of the plants sampled in 2018 were younger (Photos, Table 17R-37.13a). The shrub understory has also been diverse and abundant with yellow rabbitbrush (*Chrysothamnus viscidiflorus* ssp. *viscidiflorus* var. *viscidiflorus*) contributing the most cover. Other shrub species such as mountain snowberry (*Symphoricarpos oreophilus*) and mountain big sagebrush (*Artemisia tridentata* ssp. *vaseyana*) have also been present to a lesser extent (Table 17R-37.12, Table 17R-37.13). The herbaceous layer has remained very abundant, although cover has exhibited a slight decrease following treatment. Perennial grasses and forbs have made up a majority of the understory throughout the duration of the study (Table 17R-37.7). However, the noxious annual forb species gypsyflower (*Cynoglossum officinale*) has been observed in both sample years (Table 17R-37.11) and may pose a threat to the resilience of the community if it increases in the future. Although many of the conifer trees in the area were removed by treatment, some trees have remained on site, indicating that there could be potential for infilling over time (Table 17R-37.12, Table 17R-37.14).



**Trend Summary Tables****Table 17R-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
2015	6.7	5.3	4.6	10.5	11.0	18.0
2018	5.3	5.5	12.9	8.8	8.9	17.3

**Table 17R-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
2015	-	463	89	379	-	29.2	2.3	23.6
2018	-	422	47	340	-	21.2	0.9	11.4

**Table 17R-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
2015	6.2	0.0	37.6	0.0	0.1	70.9
2018	14.7	-	67.8	0.2	1.1	46.1

**Table 17R-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			
2015	1	-	1	-
2018	6	1	11	2
Year	Days Use Per Acre (ha)			
2015	-	12.8 (31.5)	2.7 (6.6)	-
2018	11.6 (28.7)	4.7 (11.6)	16.8 (41.4)	-

**Table 17R-37.10 - Grass Species.** Nested frequency and modified Daubenmire average cover by year.

GRASS SPECIES						
Achnatherum nelsonii (Columbia needgrass)						
Carex (sedge)						
Elymus lanceolatus (thickspike wheatgrass)						
Poa pratensis <sup>i</sup> (Kentucky bluegrass)						
Poa secunda (Sandberg bluegrass)						
Pseudoroegneria spicata (bluebunch wheatgrass)						
year	Nested Frequency					
2015	11	3	11	453	4	5
2018	3	6	19	415	-	5
year	Average Cover (%)					
2015	0.2	0.0	0.1	28.9	0.0	0.0
2018	0.0	0.0	0.4	20.7	-	0.0

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

**Table 17R-37.11 - Forb Species.** Nested frequency and modified Daubenmire average cover by year.

FORB SPECIES																		
Achillea millefolium (Common yarrow)																		
Agoseris glauca (pale agoseris)																		
Androsace septentrionalis <sup>a</sup> (pygmyflower rockjasmine)																		
Astragalus (milkvetch)																		
Astragalus tenellus (looseflower milkvetch)																		
Cerastium beeringianum (Bering chickweed)																		
Chenopodium fremontii <sup>a</sup> (Fremont's goosefoot)																		
Cirsium (thistle)																		
Clematis columbiana (rock clematis)																		
Collinsia parviflora <sup>a</sup> (maiden blue eyed Mary)																		
Cynoglossum officinale <sup>ani</sup> (gypsyflower)																		
Dracocephalum parviflorum (American dragonhead)																		
Galium <sup>a</sup> (bedstraw)																		
Geranium richardsonii (Richardson's geranium)																		
Lathyrus brachycalyx (Bonneville pea)																		
Phlox longifolia (longleaf phlox)																		
Polygonum douglasii <sup>a</sup> (Douglas' knotweed)																		
year	Nested Frequency																	
2015	193	1	6	15	3	3	2	7	4	3	59	4	25	8	131	1	1	
2018	142	6	-	4	9	-	3	-	-	-	23	-	26	-	46	4	-	
year	Average Cover (%)																	
2015	3.0	0.0	0.0	0.3	0.1	0.0	0.0	0.0	0.0	0.0	1.9	0.0	0.3	0.1	7.0	0.0	0.0	
2018	1.4	0.0	-	0.0	0.1	-	0.1	-	-	-	0.6	-	0.1	-	0.9	0.0	-	

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

FORB SPECIES									
Potentilla gracilis (slender cinquefoil)									
Potentilla hippiana (woolly cinquefoil)									
Ranunculus inamoenus (graceful buttercup)									
Symphyotrichum (aster)									
Taraxacum officinale (common dandelion)									
Tragopogon dubius <sup>ai</sup> (yellow salsify)									
Veronica biloba <sup>ai</sup> (two-lobed speedwell)									
Vicia americana (American vetch)									
Viola (violet)									
year	Nested Frequency								
2015	8	4	8	201	198	1	7	50	34
2018	1	-	-	276	67	-	-	-	6
year	Average Cover (%)								
2015	0.0	0.2	0.0	6.6	4.9	0.0	0.1	0.9	0.3
2018	0.0	-	-	8.6	0.3	-	-	-	0.0

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

**Table 17R-37.12 - Shrub and Tree Species.** Average modified Daubenmire quadrat and line intercept cover by year.

SHRUB SPECIES															
Amelanchier utahensis <sup>p</sup> (Utah serviceberry)															
Artemisia cana (silver sagebrush)															
Artemisia nova <sup>p</sup> (black sagebrush)															
Artemisia tridentata ssp. vaseyana <sup>p</sup> (mountain big sagebrush)															
Chrysothamnus viscidiflorus ssp. viscidiflorus var. viscidiflorus (yellow rabbitbrush)															
Ericameria nauseosa (rubber rabbitbrush)															
Juniperus communis (common juniper)															
Juniperus scopulorum <sup>t</sup> (Rocky Mountain juniper)															
Mahonia repens (creeping barberry)															
Populus tremuloides <sup>t</sup> (quaking aspen)															
Pseudotsuga menziesii <sup>t</sup> (Douglas-fir)															
Ribes <sup>p</sup> (currant)															
Rosa woodsii <sup>p</sup> (Woods' rose)															
Symphoricarpos oreophilus <sup>p</sup> (mountain snowberry)															
year	Line Intercept Cover (%)														
2015	0.4	0.6	-	0.2	9.5	-	-	5.9	0.9	10.4	1.7	-	0.9	9	
2018	0.2	-	-	2.2	7.4	0.1	1	2.9	0.4	14.4	-	0.4	0.4	5.6	
year	Quadrat Cover (%)														
2015	0.2	0.0	0.0	0.6	4.2	-	-	2.4	1.1	0.9	1.2	-	0.1	5.8	
2018	0.2	-	-	1.6	4.3	0.0	0.0	2.4	1.2	10.2	0.4	0.1	0.3	3.0	

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

**Table 17R-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 (%)				
<b>Amelanchier utahensis<sup>p</sup> -- (Utah serviceberry)</b>									
2015	140	20	57	29	14	14	29	71	33/35
2018	120	-	50	50	0	0	33	0	18/23
<b>Artemisia cana -- (silver sagebrush)</b>									
2015	40	-	0	50	50	0	0	0	51/66
2018	-	-	-	-	-	-	-	-	38/71
<b>Artemisia nova<sup>p</sup> -- (black sagebrush)</b>									
2015	-	-	-	-	-	-	-	-	39/61
2018	-	-	-	-	-	-	-	-	-/-
<b>Artemisia tridentata ssp. vaseyana<sup>p</sup> -- (mountain big sagebrush)</b>									
2015	100	-	20	40	40	40	0	40	52/83
2018	960	-	10	88	2	8	0	0	47/53
<b>Cercocarpus montanus<sup>p</sup> -- (alderleaf mountain mahogany)</b>									
2015	-	-	-	-	-	-	-	-	-/-
2018	-	-	-	-	-	-	-	-	30/46
<b>Chrysothamnus viscidiflorus ssp. viscidiflorus var. stenophyllus -- (yellow rabbitbrush)</b>									
2015	20	-	0	100	0	0	0	0	-/-
2018	200	-	10	80	10	0	0	10	-/-
<b>Chrysothamnus viscidiflorus ssp. viscidiflorus var. viscidiflorus -- (yellow rabbitbrush)</b>									
2015	2740	-	1	98	2	0	0	5	38/56
2018	4300	-	0	99	1	17	1	6	30/39
<b>Ericameria nauseosa -- (rubber rabbitbrush)</b>									
2015	-	-	-	-	-	-	-	-	-/-
2018	40	-	0	100	0	0	0	0	66/57
<b>Juniperus communis -- (common juniper)</b>									
2015	-	-	-	-	-	-	-	-	80/278
2018	120	20	0	83	17	0	0	50	33/45
<b>Juniperus scopulorum<sup>t</sup> -- (Rocky Mountain juniper)</b>									
2015	60	100	67	33	0	0	0	0	-/-
2018	20	-	0	100	0	0	0	0	-/-
<b>Mahonia repens -- (creeping barberry)</b>									
2015	5900	-	42	58	0	0	0	0	10/13
2018	6720	40	5	87	8	0	0	13	5/6
<b>Pseudotsuga menziesii<sup>t</sup> -- (Douglas-fir)</b>									
2015	20	20	0	100	0	0	0	0	-/-
2018	-	-	-	-	-	-	-	-	-/-
<b>Ribes<sup>p</sup> -- (currant)</b>									
2015	-	-	-	-	-	-	-	-	35/45
2018	120	-	0	100	0	17	0	0	83/79
<b>Rosa woodsii<sup>p</sup> -- (Woods' rose)</b>									
2015	600	20	57	43	0	43	23	3	48/35
2018	680	-	15	82	3	15	9	3	17/16
<b>Symphoricarpos oreophilus<sup>p</sup> -- (mountain snowberry)</b>									
2015	2320	-	11	88	1	3	0	0	53/80
2018	1720	-	7	93	0	6	4	0	41/66

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

**Table 17R-37.13a - Aspen Characteristics.** Characteristics of aspen populations including density, size class distribution, and vigor of plants.

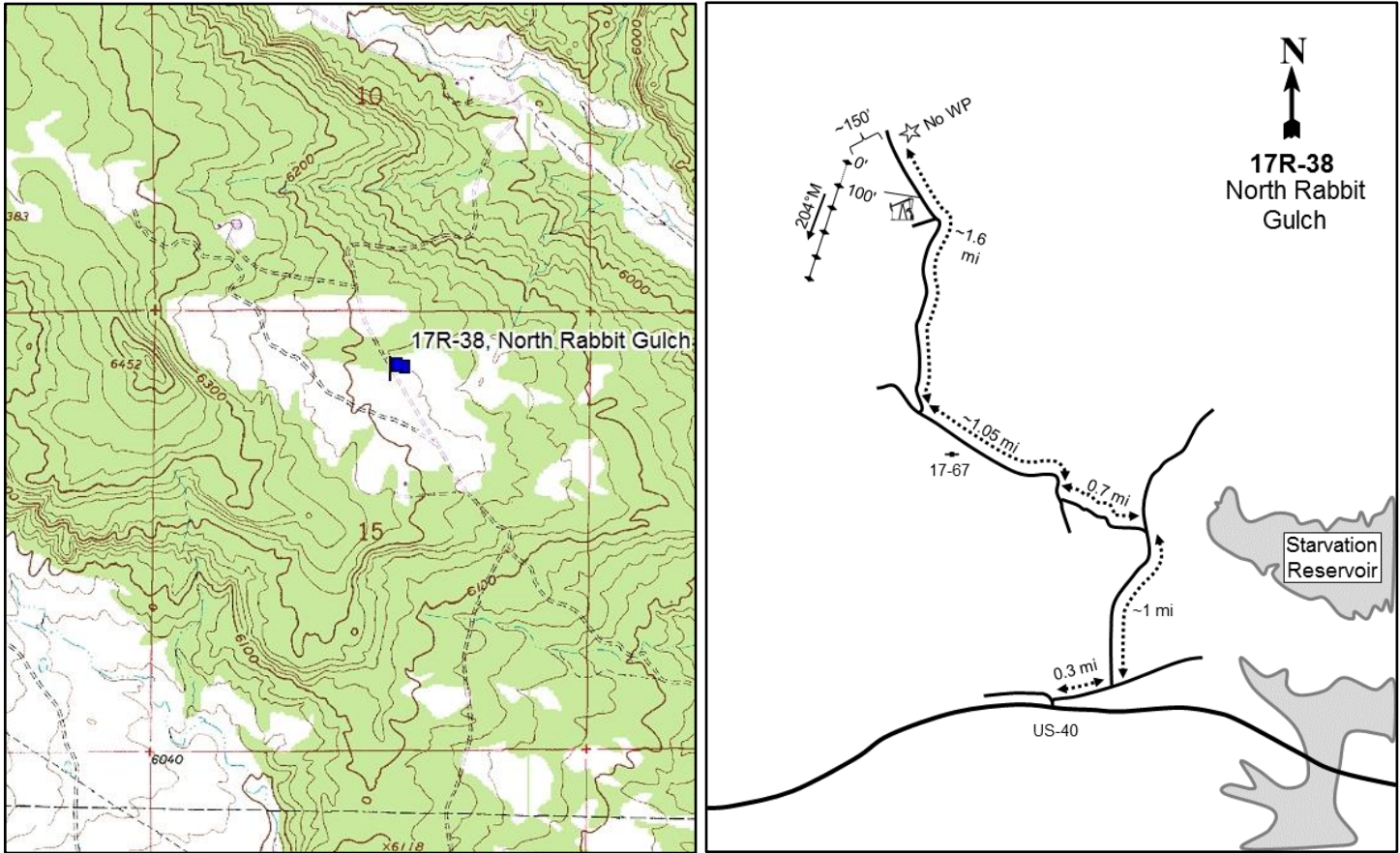
Year	Density	Size Class Distribution				Utilization		Poor Vigor (%)
	Plants per Acre	Class I (%)	Class II (%)	Class III (%)	Class IV (%)	Moderate (%)	Heavy (%)	
Populus tremuloides (quaking aspen)								
2015	2400	79	11	-	10	4	0	28
2018	8060	21	79	-	-	2	0	1

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 IV - > 1 in diameter at breast height (dbh)

**Table 17R-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 scopulorum (Rocky Mountain juniper)							
2015	54	-	33	56	-	11	10.9
2018	19	9	18	55	-	18	11.4
Pinus flexilis (limber pine)							
2015	6	-	67	33	-	-	13.7
Populus tremuloides (quaking aspen)							
2015	1663	80	20	-	-	-	1.6
2018	9727	15	85	-	-	-	1.1
Pseudotsuga menziesii (Douglas-fir)							
2015	22	-	36	27	-	36	10.1
2018	13	-	-	67	-	33	10.3

## NORTH RABBIT GULCH - STUDY NO. 17R-38



### Location Information

USGS 7.5 min Map Info  
GPS (0' Stake)

Rabbit Gulch NE; Township 3S, Range 6W, Section 15  
NAD 83 UTM ZONE 12, 538434 East 4452757 North

### Transect Information

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

Not Available  
204° magnetic  
500ft  
Line 1 (11ft), Line 2 (34ft), Line 3 (59ft), Line 4 (71ft), Line 5 (95ft)  
No Rebar or Stakes, Line 5: 98ft Long

### Directions to Site

Driving from the Starvation Bridge on US-40, travel west for 1.5 miles to a turnoff (28000 West) on the north side of the road: turn here. Follow this road for 0.3 miles to a fork. Bear left and continue for approximately 1 mile to another fork. Proceed to the left again and continue for 0.7 miles to another fork. Bear right this time and drive for 1.05 miles, passing study 17-67 (Rabbit Gulch), then turn right. Drive for 1.6 miles, passing a gas pad, and park; there is no witness post. The study site is about 150 feet west of the road and there are no stakes or rebar.

**Site Information**

Land Ownership	State
Land Administrator	UDWR
Allotment	No data
Elevation	No data
Aspect	Northeast
Slope	3%
Sample Dates	07/31/2018

**Table 17R-38.1 Disturbance History.** Recorded history of major disturbances.

Treatment/Disturbance	Name	WRI DB#	Date	Size (acres)
Herbicide - Plateau	Rabbit Gulch Winter Range Improvement Phase I	4447	September 2018 (Proposed)	107

**Wildlife Habitat and Vegetation History****Table 17R-38.3 - Wildlife Seasonal Habitat.** UDWR wildlife habitat and seasonality.

Species	Habitat	Season
Deer	crucial	winter
Elk	crucial	winter

**Site Notes**

No Notes

**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.

At the time of study establishment in 2018, this site was a degraded sagebrush/perennial grass community. Cheatgrass (*Bromus tectorum*) was the co-dominant species in the understory and an herbicide treatment was proposed to reduce the annual grasses and allow perennial species to increase (Table 17R-38.1, Table 17R-38.10). Needle and thread (*Hesperostipa comata*) is the co-dominant grass species, other diverse introduced and native perennials are present and provide moderate amounts of cover (Table 17R-38.7, Table 17R-38.10). Forbs are depauperate and provide little cover, the most common is the ruderal annual forb western tansymustard (*Descurainia pinnata*) (Table 17R-38.7, Table 17R-38.11). The shrub layer is in generally poor condition with mountain big sagebrush (*Artemisia tridentata* ssp. *vaseyana*) being the dominant species (Table 17R-38.6, Table 17R-38.12, Table 17R-38.13). Decadence among sagebrush was high as well with nearly half of the plants classified as poor vigor (Table 17R-38.13). Utah juniper (*Juniperus osteosperma*) is present on the site, it is likely that trees will continue to encroach on the site in the future provided there is not a tree removing disturbance on the site (Table 17R-38.14).



**Trend Summary Tables****Table 17R-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
2018	2.4	1.1	-	2.7	0.7	-

**Table 17R-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
2018	355	295	70	21	6.9	17.5	0.4	0.1

**Table 17R-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
2018	41.3	0.2	54.6	1.2	0.2	28.3

**Table 17R-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		
2018	14	-	55
Days Use Per Acre (ha)			
2018	6.7 (16.6)	2.0 (5.0)	-

**Table 17R-38.10 - Grass Species.** Nested frequency and modified Daubenmire average cover by year.

GRASS SPECIES	Nested Frequency											
Achnatherum hymenoides (Indian ricegrass)	53	52	36	342	6	21	154	6	12	12	61	105
Agropyron cristatum <sup>i</sup> (crested wheatgrass)	Average Cover (%)											
Bouteloua gracilis (blue grama)	1.6	3.1	1.4	6.4	0.2	0.2	8.7	0.2	0.0	0.9	1.3	0.5
Bromus tectorum <sup>ai</sup> (cheatgrass)	Nested Frequency											
Elymus lanceolatus (thickspike wheatgrass)	53	52	36	342	6	21	154	6	12	12	61	105
Festuca idahoensis (Idaho fescue)	Average Cover (%)											
Hesperostipa comata (needle and thread)	1.6	3.1	1.4	6.4	0.2	0.2	8.7	0.2	0.0	0.9	1.3	0.5
Poa fendleriana (muttongrass)	Nested Frequency											
Poa secunda (Sandberg bluegrass)	53	52	36	342	6	21	154	6	12	12	61	105
Psathyrostachys juncea <sup>i</sup> (Russian wildrye)	Average Cover (%)											
Sporobolus cryptandrus (sand dropseed)	1.6	3.1	1.4	6.4	0.2	0.2	8.7	0.2	0.0	0.9	1.3	0.5
Vulpia octoflora <sup>a</sup> (sixweeks fescue)	Nested Frequency											
	53	52	36	342	6	21	154	6	12	12	61	105
	Average Cover (%)											
	1.6	3.1	1.4	6.4	0.2	0.2	8.7	0.2	0.0	0.9	1.3	0.5

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

**Table 17R-38.11 - Forb Species.** Nested frequency and modified Daubenmire average cover by year.

FORB SPECIES	Nested Frequency							
Alyssum desertorum <sup>ai</sup> (desert madwort)	4	3	25	21	29	13	2	8
Arabis (rockcress)	Average Cover (%)							
Descurainia pinnata <sup>a</sup> (western tansymustard)	0.0	0.0	0.3	0.1	0.1	0.1	0.0	0.0
Lappula occidentalis <sup>a</sup> (flatspine stickseed)	Nested Frequency							
Plantago patagonica <sup>a</sup> (woolly plantain)	4	3	25	21	29	13	2	8
Schoenocrambe limifolia (flaxleaf plainsmustard)	Average Cover (%)							
Sisymbrium altissimum <sup>ai</sup> (tall tumblemustard)	0.0	0.0	0.3	0.1	0.1	0.1	0.0	0.0
Sphaeralcea coccinea (scarlet globemallow)	Nested Frequency							
	4	3	25	21	29	13	2	8
	Average Cover (%)							
	0.0	0.0	0.3	0.1	0.1	0.1	0.0	0.0

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

**Table 17R-38.12 - Shrub and Tree Species.** Average modified Daubenmire quadrat and line intercept cover by year.

SHRUB SPECIES	Line Intercept Cover (%)			
Artemisia tridentata ssp. vaseyana <sup>p</sup> (mountain big sagebrush)	2.3	0.4	0.7	-
Krascheninnikovia lanata <sup>p</sup> (winterfat)	Quadrat Cover (%)			
Opuntia (pricklypear)	2.1	0.3	1.1	0.0
Sarcobatus vermiculatus (greasewood)	Line Intercept Cover (%)			
	2.3	0.4	0.7	-
	Quadrat Cover (%)			
	2.1	0.3	1.1	0.0

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

**Table 17R-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.

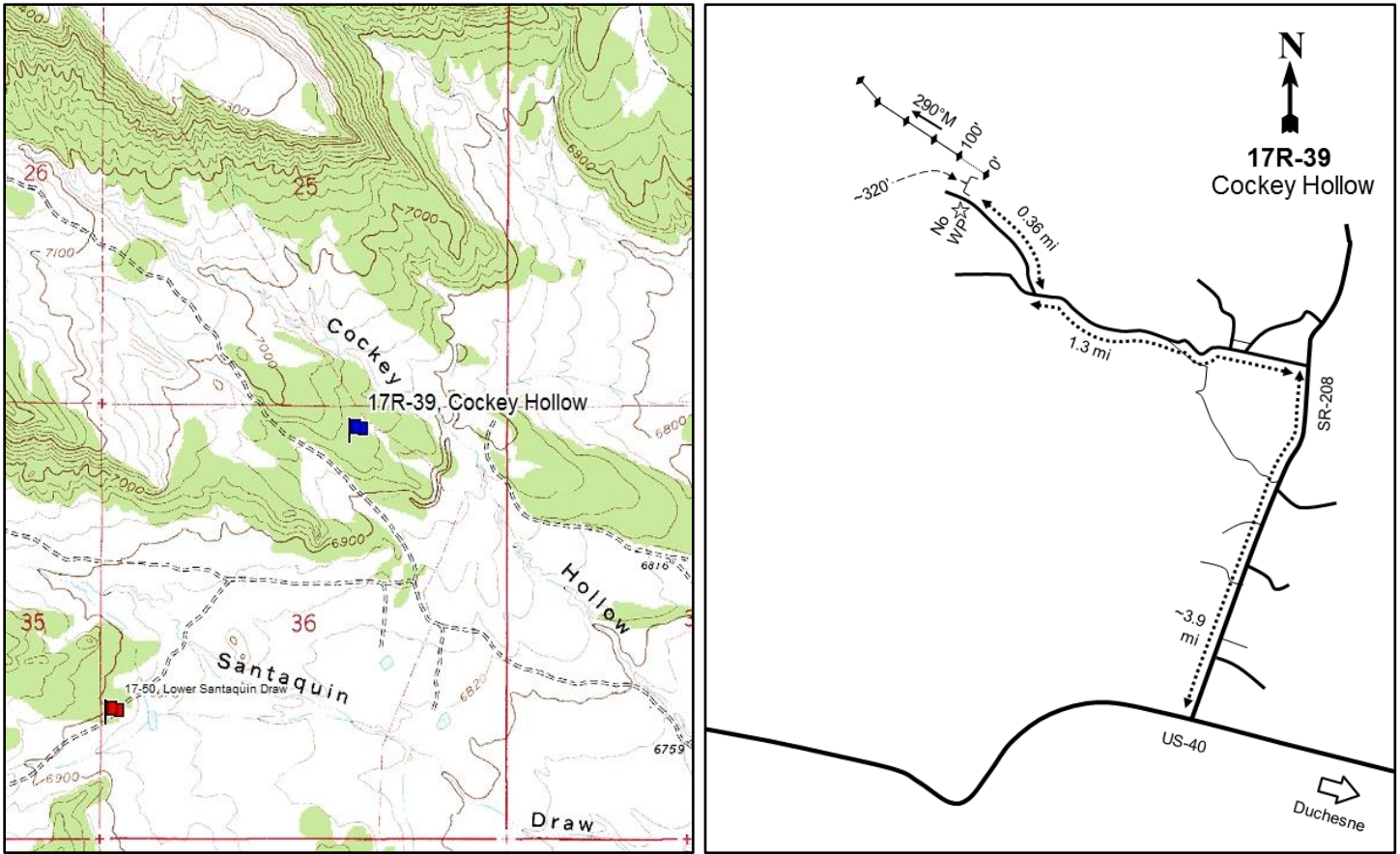
Year	Density		Age Class Distribution			Utilization		Poor Vigor (%)	Average Height Crown (cm)
	Plants Per Acre		Excluding Seedlings			Moderate (%)	Heavy (%)		
	Excluding Seedlings	Seedling	Young (%)	Mature (%)	Decadent (%)				
<i>Artemisia tridentata</i> ssp. <i>vaseyana</i> <sup>p</sup> -- (mountain big sagebrush)									
2018	920	-	7	37	56	9	26	48	47/64
<i>Atriplex canescens</i> <sup>p</sup> -- (fourwing saltbush)									
2018	-	-	-	-	-	-	-	-	49/119
<i>Atriplex confertifolia</i> <sup>p</sup> -- (shadscale saltbush)									
2018	-	-	-	-	-	-	-	-	15/50
<i>Gutierrezia sarothrae</i> -- (broom snakeweed)									
2018	-	-	-	-	-	-	-	-	15/21
<i>Juniperus osteosperma</i> <sup>1</sup> -- (Utah juniper)									
2018	20	-	0	100	0	0	0	0	- / -
<i>Krascheninnikovia lanata</i> <sup>p</sup> -- (winterfat)									
2018	1360	-	0	100	0	31	0	0	17/19
<i>Opuntia fragilis</i> -- (brittle pricklypear)									
2018	-	-	-	-	-	-	-	-	3/40
<i>Opuntia</i> -- (pricklypear)									
2018	2620	-	1	95	4	0	0	3	9/24
<i>Sarcobatus vermiculatus</i> -- (greasewood)									
2018	40	-	50	0	50	0	0	50	60/68

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

**Table 17R-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' (%)	
<i>Juniperus osteosperma</i> (Utah juniper)							
2018	18	-	25	50	25	-	10.0

## COCKEY HOLLOW - STUDY NO. 17R-39



### Location Information

USGS 7.5 min Map Info  
GPS (0' Stake)

Tabiona SW; Township 2S, Range 8W, Section 36  
NAD 83 UTM ZONE 12, 522590 East 4457630 North

### Transect Information

Browse Tag # (0' Stake)	Not Available
Transect Bearing	290° magnetic (Line 5: 295° magnetic)
Length	500ft
Belt Placement	Line 1 (11ft), Line 2 (34ft), Line 3 (59ft), Line 4 (71ft), Line 5 (95ft)
Belt Marker Placement	No Rebar or Stakes

### Directions to Site

From the intersection of US-40 and SR-208, travel northeast on SR-208 for 3.9 miles to a road and WMA sign on the left (west) side of the road. Turn left here and travel on this road for about 1.3 miles to a fork. Bear right at the fork, drive for 0.36 miles, and park; there is no witness post. The study site is approximately 320 feet uphill from and north of the road, and there are no stakes or rebar.

**Site Information**

Land Ownership	State
Land Administrator	UDWR
Allotment	No data
Elevation	No data
Aspect	Southeast
Slope	3-5%
Sample Dates	07/31/2018

**Table 17R-39.1 Disturbance History.** Recorded history of major disturbances.

Treatment/Disturbance	Name	WRI DB#	Date	Size (acres)
Mechanical - Bullhog	Cockey Hollow phase II	4433	September-December 2018 (Proposed)	663
Seeding - Aerial Before	Cockey Hollow phase II	4433	September-December 2018 (Proposed)	663
Seeding - Aerial After	Cockey Hollow phase II	4433	September-December 2018 (Proposed)	663

**Table 17R-39.2 Seed Mix.** List of known seeded plant species and rates (if available).

Mix Name			Application Type	Application Date	Acres
Cocky Hollow			Aerial	Aug 2018	663
Type	Species	Common Name	Cultivar/Source ID	Bulk lbs/acre	PLS
G	Achnatherum hymenoides	Indian Ricegrass	Rimrock	1.06	0.97
G	Dactylis glomerata	Orchardgrass	Paiute	0.45	0.41
G	Elymus lanceolatus	Thickspike Wheatgrass	Bannock II	1.28	1.05
G	Leymus cinereus	Great Basin Wildrye	Trailhead	1.06	0.80
G	Pascopyrum smithii	Western Wheatgrass	Arriba	1.06	0.94
G	Poa secunda	Sandberg Bluegrass	UP Colorado Plateau	0.15	0.13
G	Poa secunda	Big Bluegrass	Sherman	0.23	0.17
G	Pseudoroegneria spicata	Bluebunch Wheatgrass	Anatone	1.06	0.99
F	Gaillardia aristata	Blanket Flower		0.23	0.20
F	Linum perenne	Blue Flax	Appar	0.15	0.11
F	Onobrychis viciifolia	Sainfoin	Eski	3.02	2.77
F	Penstemon strictus	Rocky Mountain Penstemon	Bandera	0.06	0.05
F	Penstemon strictus	Rocky Mountain Penstemon	Bandera	0.38	0.31
F	Ratibida columnifera	Prairie Coneflower	Stillwater	0.23	0.20
F	Sanguisorba minor	Small Burnet	Delar	1.96	1.84

**Wildlife Habitat and Vegetation History****Table 17R-39.3 - Wildlife Seasonal Habitat.** UDWR wildlife habitat and seasonality.

Species	Habitat	Season
Deer	crucial	winter
Elk	crucial	winter
Greater Sage Grouse		undefined & undefined

**Table 17R-39.4 - Vegetation History.** The dominant vegetation type(s) and phase of woodland succession (Tausch, Miller, Roundy, & Chambers, 2009).

Year	Vegetation Type	Woodland Succession
2018	Pinyon-Juniper	Phase III

**Site Notes**

No Notes

**Site Potential**

1981 - 2010 Average Annual Precipitation 14 inches  
 NRCS Ecological Site Upland Loam (Mountain Big Sagebrush)  
 NRCS Ecological Site # R047XC310UT  
 States and Transitions No state and transition model is available for this ecological site.

This site was considered to be within Phase III of woodland succession upon study establishment in 2018, with twoneedle pinyon (*Pinus edulis*) and Utah juniper (*Juniperus osteosperma*) as the dominant vegetation component. Other shrub species were present, but comparatively rare (Table 17R-39.4, Table 17R-39.12, Table 17R-39.13, Table 17R-39.14). The herbaceous understory was also depauperate in diversity and abundance, probably due to competition with the tree component (Table 17R-39.7, Table 17R-39.10, Table 17R-39.11). This site would likely remain in this state in future sample years without a disturbance. However, a bullhog and seeding treatment scheduled for the Fall of 2018 (Table 17R-39.1) will likely remove many of the trees and augment and diversify the understory components.

**Trend Summary Tables**

**Table 17R-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
2018	0.0	0.5	14.5	-	0.6	50.8

**Table 17R-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
2018	4	66	3	25	0.0	0.4	0.0	0.1

**Table 17R-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
2018	17.1	2.1	72.5	6.1	3.9	17.3

**Table 17R-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	Rocky Mountain Elk	Rabbit
	Quadrat Frequency		
2018	6	6	13
Year	Days Use Per Acre (ha)		
	2018	2.7 (6.6)	14.7 (36.4)

**Table 17R-39.10 - Grass Species.** Nested frequency and modified Daubenmire average cover by year.

GRASS SPECIES						
Achnatherum hymenoides (Indian ricegrass)						
Bromus tectorum <sup>ai</sup> (cheatgrass)						
Carex (sedge)						
Hesperostipa comata (needle and thread)						
Pascopyrum smithii (western wheatgrass)						
Poa secunda (Sandberg bluegrass)						
year	Nested Frequency					
2018	15	4	2	6	17	31
year	Average Cover (%)					
2018	0.2	0.0	0.0	0.0	0.1	0.1

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

**Table 17R-39.11 - Forb Species.** Nested frequency and modified Daubenmire average cover by year.

FORB SPECIES					
Arabis (rockcress)					
Descurainia pinnatifida <sup>a</sup> (western tansymustard)					
Packera multilobata (lobeleaf groundsel)					
Penstemon humilis (low beardtongue)					
Phlox hoodii (spiny phlox)					
year	Nested Frequency				
2018	18	3	2	7	4
year	Average Cover (%)				
2018	0.0	0.0	0.0	0.0	0.0

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

**Table 17R-39.12 - Shrub and Tree Species.** Average modified Daubenmire quadrat and line intercept cover by year.

SHRUB SPECIES							
Artemisia tridentata ssp. vaseyana <sup>p</sup> (mountain big sagebrush)							
Gutierrezia sarothrae (broom snakeweed)							
Juniperus osteosperma <sup>t</sup> (Utah juniper)							
Linanthus pungens (granite prickly phlox)							
Opuntia (pricklypear)							
Opuntia fragilis (brittle pricklypear)							
Pinus edulis <sup>t</sup> (twoneedle pinyon)							
year	Line Intercept Cover (%)						
2018	-	-	11.7	-	0.1	0.5	39.1
year	Quadrat Cover (%)						
2018	0.0	0.0	0.0	0.0	0.0	0.4	14.5

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



**Table 17R-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.

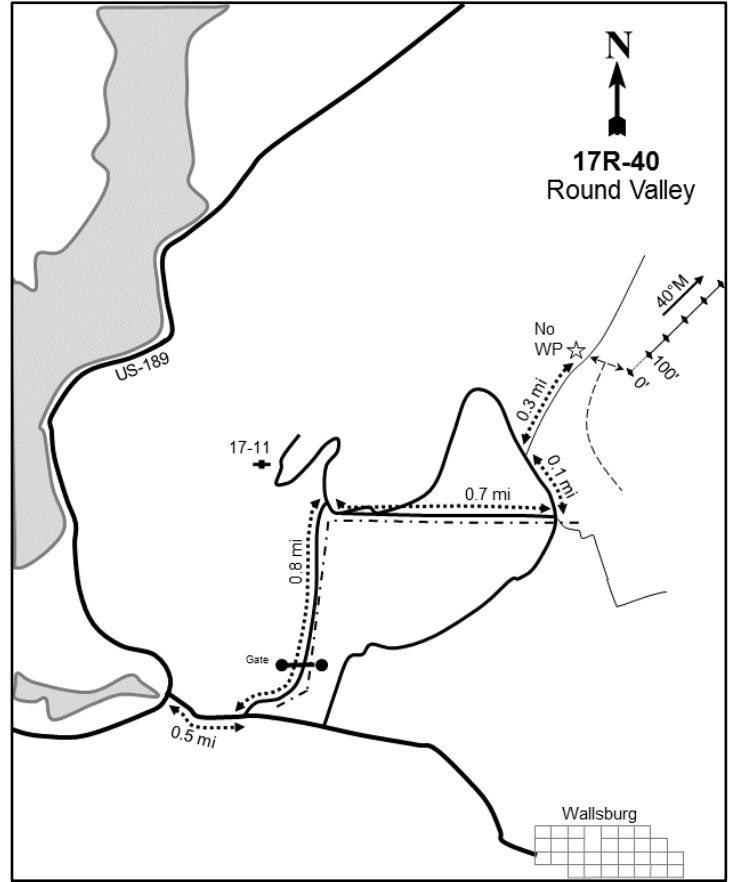
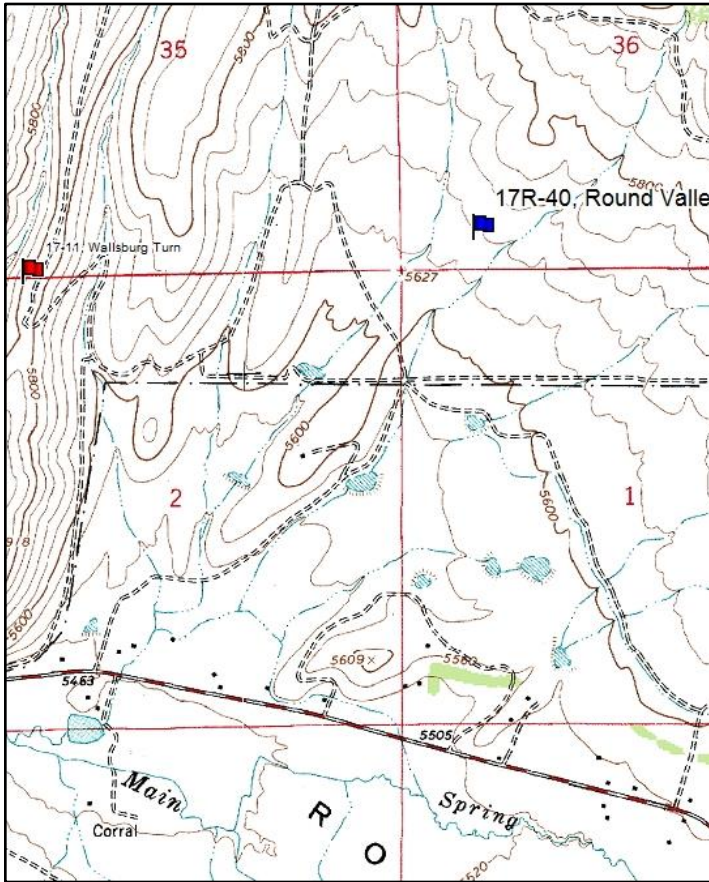
Year	Density		Age Class Distribution			Utilization		Poor Vigor (%)	Average Height Crown (cm)
	Plants Per Acre		Excluding Seedlings			Moderate (%)	Heavy (%)		
	Excluding Seedlings	Seedling	Young (%)	Mature (%)	Decadent (%)				
Artemisia tridentata ssp. vaseyana <sup>p</sup> -- (mountain big sagebrush)									
2018	40	-	0	0	100	0	0	100	36/46
Echinocereus -- (hedgehog cactus)									
2018	-	-	-	-	-	-	-	-	9/23
Gutierrezia sarothrae -- (broom snakeweed)									
2018	20	-	0	100	0	0	0	0	6/8
Juniperus osteosperma <sup>t</sup> -- (Utah juniper)									
2018	120	-	0	33	67	0	0	67	- / -
Linanthus pungens -- (granite prickly phlox)									
2018	200	-	10	20	70	0	0	40	4/8
Opuntia fragilis -- (brittle pricklypear)									
2018	1440	-	0	100	0	0	0	0	6/18
Opuntia -- (pricklypear)									
2018	160	-	0	100	0	0	0	0	9/25
Pediocactus simpsonii -- (mountain ball cactus)									
2018	-	-	-	-	-	-	-	-	2/5
Pinus edulis <sup>t</sup> -- (twoneedle pinyon)									
2018	320	80	38	56	6	0	0	0	- / -
Purshia tridentata <sup>p</sup> -- (antelope bitterbrush)									
2018	-	-	-	-	-	-	-	-	28/53

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

**Table 17R-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 osteosperma (Utah juniper)							
2018	107	5	5	5	5	80	33.1
Pinus edulis (twoneedle pinyon)							
2018	149	10	-	-	5	85	32.0

## ROUND VALLEY - STUDY NO. 17R-40



### Location Information

USGS 7.5 min Map Info  
GPS (0' Stake)

Charleston SW; Township 4S, Range 4E, Section 36  
NAD 83 UTM ZONE 12, 461904 East 4474573 North

### Transect Information

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

Not Available  
40° magnetic  
500ft  
Line 1 (11ft), Line 2 (34ft), Line 3 (59ft), Line 4 (71ft), Line 5 (95ft)  
No Rebar or Stakes

### Directions to Site

Beginning at the intersection of US-189 and the Wallsburg turnoff, proceed 0.50 miles towards Wallsburg to an intersection. Turn left at the intersection and proceed northerly for 0.8 miles to an intersection, passing through a DWR gate. Turn right at the intersection and drive for 0.7 miles to another intersection and turn left (north). Drive for 0.1 miles to a fork and bear right. Proceed for 0.3 miles and park; there is no witness post. The transect is on the right (east) side of the road and there are no stakes or rebar.

**Site Information**

Land Ownership	State
Land Administrator	UDWR
Allotment	No data
Elevation	No data
Aspect	Southeast
Slope	7%
Sample Dates	09/06/2018

**Table 17R-40.1 Disturbance History.** Recorded history of major disturbances.

Treatment/Disturbance	Name	WRI DB#	Date	Size (acres)
Seeding - Transplant	Wallsburg WMA Shrub Planting	4556	Fall 2018 (Proposed)	78
Seeding - Unknown	-	-	Historic	-

**Wildlife Habitat and Vegetation History**

**Table 17R-40.3 - Wildlife Seasonal Habitat.** UDWR wildlife habitat and seasonality.

Species	Habitat	Season
Deer	crucial	winter
Elk	crucial	winter
Greater Sage Grouse		

**Table 17R-40.4 - Vegetation History.** The dominant vegetation type(s) and phase of woodland succession (Tausch, Miller, Roundy, & Chambers, 2009).

Year	Vegetation Type	Woodland Succession
2018	Perennial Grass	NA

**Site Notes**

No Notes

**Site Potential**

1981 - 2010 Average Annual Precipitation	19 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.

Upon establishment in 2018, this study site was dominated by the introduced perennial grass species crested wheatgrass (*Agropyron cristatum*) with a minor component of Sandberg bluegrass (*Poa secunda*) and Idaho fescue (*Festuca idahoensis*). Species diversity in the herbaceous understory overall was low, and forbs were not abundant (Table 17R-40.7, Table 17R-40.10, Table 17R-40.11). Shrubs were also rare, with broom snakeweed (*Gutierrezia sarothrae*) as the most abundant species (Table 17R-40.13). A shrub planting project scheduled for the Fall of 2018 (17R-40.1) will likely diversify and augment the shrub component and may result in a decrease in abundance and cover of herbaceous species.

**Trend Summary Tables**

**Table 17R-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
2018	0.1	0.1	-	0.1	0.8	-

**Table 17R-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
2018	-	427	105	77	-	39.8	0.4	1.8

**Table 17R-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
2018	25.6	0.3	47.4	4.7	2.1	41.8

**Table 17R-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	Cattle	Mule Deer	Rocky Mountain Elk	Rabbit
	Quadrat Frequency			
2018	7	7	6	5
Year	Days Use Per Acre (ha)			
2018	24.0 (59.2)	10.7 (26.5)	18.7 (46.3)	-

**Table 17R-40.10 - Grass Species.** Nested frequency and modified Daubenmire average cover by year.

GRASS SPECIES			
	Agropyron cristatum <sup>i</sup> (crested wheatgrass)		
	Festuca idahoensis (Idaho fescue)		
	Poa secunda (Sandberg bluegrass)		
year	Nested Frequency		
2018	395	10	293
year	Average Cover (%)		
2018	33.0	0.4	6.5

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

**Table 17R-40.11 - Forb Species.** Nested frequency and modified Daubenmire average cover by year.

FORB SPECIES				
	Alyssum desertorum <sup>ai</sup> (desert madwort)			
	Eriogonum racemosum (redroot buckwheat)			
	Lathyrus brachycalyx (Bonneville pea)			
	Medicago sativa <sup>i</sup> (alfalfa)			
year	Nested Frequency			
2018	105	1	9	67
year	Average Cover (%)			
2018	0.4	0.0	0.3	1.4

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

**Table 17R-40.12 - Shrub and Tree Species.** Average modified Daubenmire quadrat and line intercept cover by year.

SHRUB SPECIES			
	Gutierrezia sarothrae (broom snakeweed)		
	Krascheninnikovia lanata <sup>p</sup> (winterfat)		
	Opuntia polyacantha (plains pricklypear)		
year	Line Intercept Cover (%)		
2018	0.5	0.1	0.3
year	Quadrat Cover (%)		
2018	0.0	0.1	0.0

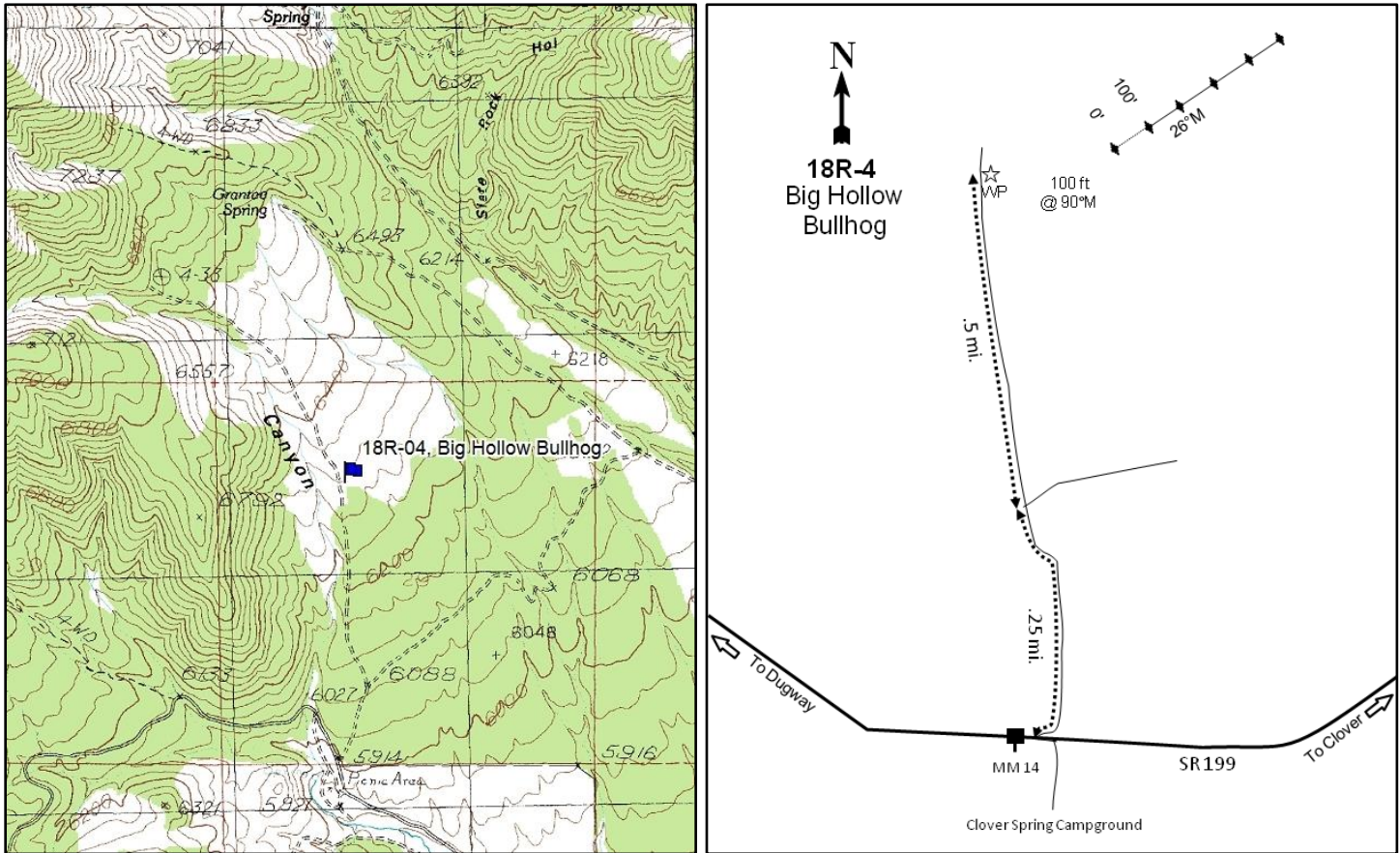
t - Tree Species; p - Preferred Browse; i - Introduced Species

**Table 17R-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 (%)				
Artemisia tridentata ssp. vaseyana <sup>p</sup> -- (mountain big sagebrush)									
2018	20	-	0	0	100	0	0	100	36/46
Gutierrezia sarothrae -- (broom snakeweed)									
2018	380	-	11	79	11	0	0	53	23/27
Krascheninnikovia lanata <sup>p</sup> -- (winterfat)									
2018	100	-	0	100	0	0	0	0	20/28
Opuntia polyacantha -- (plains pricklypear)									
2018	80	-	0	100	0	0	0	0	15/43
Opuntia -- (pricklypear)									
2018	-	-	-	-	-	-	-	-	12/53

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

## BIG HOLLOW BULLHOG - STUDY NO. 18R-4

**Location Information**

USGS 7.5 min Map Info  
GPS (0' Stake)

Johnson Pass NE; Township 5S, Range 6W, Section 29  
NAD 83 UTM ZONE 12, 368429 East 4468585 North

**Transect Information**

Browse Tag # (0' Stake)	249
Transect Bearing	28° magnetic
Length	500ft
Belt Placement	Line 1 (11ft), Line 2 (34ft), Line 3 (59ft), Line 4 (71ft), Line 5 (95ft)
Belt Marker Placement	Standard

**Directions to Site**

Drive west from Clover on SR-199 and turn north at mile marker 14 on the road across the street from the road that goes to Clover Spring Campground. From the turnoff, drive 0.25 miles to a fork and stay left. Drive 0.5 miles to a witness post on the right (east) side of the road. From the witness post, walk 100 feet at 90 degrees magnetic to the 0-foot stake that is marked with browse tag #249.



**Site Information**

Land Ownership	Federal
Land Administrator	BLM
Allotment	ONAQUI MOUNTAIN EAST
Elevation	6,300ft (1,920m)
Aspect	East
Slope	2-8%
Sample Dates	06/23/2006, 08/11/2010, 08/13/2014, 08/06/2018

**Table 18R-04.1 Disturbance History.** Recorded history of major disturbances.

Treatment/Disturbance	Name	WRI DB#	Date	Size (acres)
Mechanical - Bullhog	Big Hollow Bullhog - Phase 2	1380	April-August 2010	220

**Wildlife Habitat and Vegetation History****Table 18R-04.3 - Wildlife Seasonal Habitat.** UDWR wildlife habitat and seasonality.

Species	Habitat	Season
Deer	crucial	spring/fall

**Table 18R-04.4 - Vegetation History.** The dominant vegetation type(s) and phase of woodland succession (Tausch, Miller, Roundy, & Chambers, 2009).

Year	Vegetation Type	Woodland Succession
2006	Mountain Big Sagebrush/Juniper	Phase I transitioning to Phase II
2010	Mountain Big Sagebrush	Phase I
2014	Mountain Big Sagebrush/Perennial Grass	Phase I
2018	Perennial Grass/Mountain Big Sagebrush	Phase I

**Site Notes**

No Notes

**Soils****Table 18R-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 Clay Loam	7.1	60.7	5.5	33.8	3.3	12.5	268.8	0.7	06/22/2006

**Site Potential**

1981 - 2010 Average Annual Precipitation	19 inches
NRCS Ecological Site	Mountain Gravelly Loam (Mountain Big Sagebrush)
NRCS Ecological Site #	047XA406UT
States and Transitions	No state and transition model is available for this ecological site.

When established in 2006, the plant community on this study site existed as a mountain big sagebrush (*Artemisia tridentata* ssp. *vaseyana*) stand that was co-dominant with Utah juniper (*Juniperus osteosperma*). A small number of other browse species were also present, but they offered little cover. Tree cover decreased significantly following a bullhog treatment in 2010 (Table 18R-04.1). Shrub cover has fluctuated, but sagebrush has remained a dominant or co-dominant vegetation component in all post-treatment sample years (Table 18R-04.12, Table 18R-04.13). Perennial grasses have contributed a majority of the herbaceous cover in all sample years and have been co-dominant site components since 2014; forbs have generally remained rare (Table 18R-04.7). Although most of the trees were removed by the bullhog treatment, cover and density data indicate that juniper has begun to infill on the site (Table 18R-04.12, Table 18R-04.14). Without future treatments, this study site may again have the potential to progress through the phases of woodland succession.

**Trend Summary Tables****Table 18R-04.6 - Shrub/Tree Summary.** Average modified Daubenmire quadrat and line intercept cover by year for shrubs/trees

Year	Quadrat Cover (%)			Line-intercept Cover (%)		
	Preferred Shrub	Other Shrub	Tree	Preferred Shrub	Other Shrub	Tree
2006	9.6	0.2	7.7	16.2	0.2	13.7
2010	6.1	0.2	0.4	6.5	0.3	1.9
2014	9.5	2.9	0.4	13.3	3.4	2.9
2018	5.8	2.1	2.4	9.8	3.1	3.9

**Table 18R-04.7 - Herbaceous Summary.** Nested frequency and average modified Daubenmire quadrat cover by year for herbaceous functional groups

Year	Nested Frequency				Quadrat Cover (%)			
	Annual Grass	Perennial Grass	Annual/Biennial Forb	Perennial Forb	Annual Grass	Perennial Grass	Annual/Biennial Forb	Perennial Forb
2006	45	314	272	162	0.3	12.0	1.1	1.5
2010	22	188	111	62	0.2	10.2	1.0	2.1
2014	127	353	221	87	4.2	20.2	2.4	0.9
2018	238	338	241	128	7.0	19.2	1.9	0.7

**Table 18R-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
2006	28.1	0.9	39.3	14.8	6.3	29.0
2010	14.5	0.0	61.0	4.1	9.3	18.7
2014	8.2	0.2	62.0	11.8	3.3	43.3
2018	5.2	0.0	68.7	7.4	8.3	41.1

**Table 18R-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	Rocky Mountain Elk	Rabbit
	Quadrat Frequency			
2006	-	12	-	60
2010	-	5	-	3
2014	1	6	-	1
2018	2	15	-	2
Year	Days Use Per Acre (ha)			
2006	-	6.7 (16.6)	-	-
2010	-	2.0 (5.0)	0.7 (1.7)	-
2014	-	21.5 (53.0)	-	-
2018	3.6 (9.0)	25.5 (62.9)	-	-

**Table 18R-04.10 - Grass Species.** Nested frequency and modified Daubenmire average cover by year.

GRASS SPECIES										
Achnatherum hymenoides (Indian ricegrass)										
Agropyron cristatum <sup>i</sup> (crested wheatgrass)										
Bromus tectorum <sup>ai</sup> (cheatgrass)										
Elymus elymoides (squirreltail)										
Elymus lanceolatus (thickspike wheatgrass)										
Poa bulbosa <sup>i</sup> (bulbous bluegrass)										
Poa fendleriana (muttongrass)										
Poa pratensis <sup>i</sup> (Kentucky bluegrass)										
Poa secunda (Sandberg bluegrass)										
Pseudoroegneria spicata (bluebunch wheatgrass)										
year	Nested Frequency									
2006	17	32	45	19	69	55	25	61	99	61
2010	2	55	22	1	57	32	-	24	45	26
2014	15	59	127	30	26	101	3	117	53	110
2018	20	125	238	72	5	125	6	39	25	82
year	Average Cover (%)									
2006	0.2	1.6	0.3	0.4	2.7	1.2	0.7	1.0	1.7	2.7
2010	0.3	3.8	0.2	0.0	2.2	0.4	-	1.5	0.7	1.2
2014	0.5	2.5	4.2	1.2	1.2	1.8	0.0	6.3	0.9	5.8
2018	0.5	5.4	7.0	2.8	0.0	3.6	0.0	2.1	0.3	4.5

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

**Table 18R-04.11 - Forb Species.** Nested frequency and modified Daubenmire average cover by year.

FORB SPECIES																		
Agoseris glauca (pale agoseris)																		
Allium (onion)																		
Alyssum desertorum <sup>ai</sup> (desert madwort)																		
Arabis (rockcress)																		
Astragalus cibirius (browse milkvetch)																		
Calochortus nuttallii (sego lily)																		
Ceratocephala testiculata <sup>ai</sup> (curvseed butterwort)																		
Chaenactis douglasii (Douglas' dustymaiden)																		
Cirsium (thistle)																		
Collinsia parviflora <sup>a</sup> (maiden blue eyed Mary)																		
Comandra umbellata (bastard toadflax)																		
Crepis acuminata (tapertip hawkbeard)																		
Epilobium brachycarpum <sup>a</sup> (tall annual willowherb)																		
Eriogonum racemosum (redroot buckwheat)																		
Lactuca serriola <sup>ai</sup> (prickly lettuce)																		
Linum lewisii (Lewis flax)																		
Microsteris gracilis <sup>a</sup> (slender phlox)																		
year	Nested Frequency																	
2006	5	-	168	-	1	-	159	1	-	25	19	1	2	3	-	24	8	
2010	2	5	100	-	-	3	-	-	-	21	22	-	-	-	-	11	-	
2014	5	-	201	2	-	-	-	2	-	2	26	2	-	2	14	29	-	
2018	9	-	204	-	6	4	-	10	0	23	23	-	-	-	9	6	-	
year	Average Cover (%)																	
2006	0.0	-	0.4	-	0.0	-	0.5	0.0	-	0.1	0.2	0.0	0.0	0.0	-	0.1	0.0	
2010	0.0	0.0	0.7	-	-	0.0	-	-	-	0.2	0.9	-	-	-	-	0.3	-	
2014	0.0	-	2.2	0.0	-	-	-	0.0	-	0.0	0.2	0.1	-	0.0	0.0	0.3	-	
2018	0.0	-	1.3	-	0.0	0.0	-	0.0	0.0	0.0	0.1	-	-	-	0.1	0.1	-	

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

FORB SPECIES							
<i>Packera multilobata</i> (lobeleaf groundsel)							
<i>Phlox longifolia</i> (longleaf phlox)							
<i>Polygonum douglasii</i> <sup>a</sup> (Douglas' knotweed)							
<i>Tragopogon dubius</i> <sup>ai</sup> (yellow salsify)							
<i>Veronica biloba</i> <sup>ai</sup> (two-lobed speedwell)							
<i>Vicia americana</i> (American vetch)							
<i>Zizadenus paniculatus</i> (foothill deathcamas)							
year	Nested Frequency						
2006	-	41	18	-	74	108	3
2010	-	11	4	-	-	17	-
2014	2	3	-	18	2	26	2
2018	-	-	15	55	11	60	20
year	Average Cover (%)						
2006	-	0.2	0.0	-	0.1	0.9	0.0
2010	-	0.1	0.0	-	-	0.9	-
2014	0.0	0.0	-	0.1	0.0	0.2	0.0
2018	-	-	0.1	0.3	0.0	0.4	0.1

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

**Table 18R-04.12 - Shrub and Tree Species.** Average modified Daubenmire quadrat and line intercept cover by year.

SHRUB SPECIES										
<i>Artemisia tridentata</i> ssp. <i>vaseyana</i> <sup>p</sup> (mountain big sagebrush)										
<i>Chrysothamnus viscidiflorus</i> sp. <i>viscidiflorus</i> var. <i>viscidiflorus</i> (yellow rabbitbrush)										
<i>Ericameria nauseosa</i> ssp. <i>nauseosa</i> var. <i>speciosa</i> <sup>p</sup> (rubber rabbitbrush)										
<i>Gutierrezia sarothrae</i> (broom snakeweed)										
<i>Juniperus osteosperma</i> <sup>t</sup> (Utah juniper)										
<i>Opuntia</i> (pricklypear)										
<i>Pinus edulis</i> <sup>t</sup> (two-needle pinyon)										
<i>Purshia stansburiana</i> <sup>p</sup> (Stansbury cliffrose)										
<i>Purshia tridentata</i> <sup>p</sup> (antelope bitterbrush)										
<i>Tetradymia canescens</i> (spineless horsebrush)										
year	Line Intercept Cover (%)									
2006	10.7	0.2	-	-	13.7	-	-	-	5.5	-
2010	5.3	0.1	0.2	0.2	1.9	-	-	-	1	-
2014	9.4	0.1	1.1	2.9	2.9	-	-	-	2.8	0.4
2018	4.6	-	1.1	2.7	3.9	0	-	0.1	4	0.4
year	Quadrat Cover (%)									
2006	7.8	0.1	0.3	0.0	7.7	-	-	0.4	1.1	0.0
2010	5.6	0.0	0.0	0.2	0.4	-	-	-	0.5	-
2014	6.4	0.0	1.5	2.6	0.4	-	0.0	-	1.6	0.4
2018	2.9	0.0	1.0	1.4	2.4	0.0	0.0	0.0	1.9	0.6

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

**Table 18R-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 (%)				
<b>Amelanchier utahensis<sup>P</sup> -- (Utah serviceberry)</b>									
2006	-	-	-	-	-	-	-	-	58/88
2010	-	-	-	-	-	-	-	-	53/78
2014	-	-	-	-	-	-	-	-	40/68
2018	-	-	-	-	-	-	-	-	44/63
<b>Artemisia tridentata ssp. vaseyana<sup>P</sup> -- (mountain big sagebrush)</b>									
2006	1580	60	0	76	24	9	1	17	55/78
2010	1220	-	2	80	18	26	7	13	58/78
2014	1220	60	10	87	3	18	39	25	47/80
2018	760	-	8	45	47	16	3	34	53/73
<b>Chrysothamnus viscidiflorus ssp. viscidiflorus var. viscidiflorus -- (yellow rabbitbrush)</b>									
2006	40	-	0	100	0	0	0	0	39/56
2010	80	-	0	75	25	0	25	25	35/54
2014	80	-	25	75	0	25	0	0	36/64
2018	60	-	0	67	33	0	0	67	47/69
<b>Ericameria nauseosa ssp. nauseosa var. speciosa<sup>P</sup> -- (rubber rabbitbrush)</b>									
2006	40	-	50	0	50	0	0	0	58/74
2010	40	-	0	50	50	0	0	50	65/67
2014	120	-	17	83	0	0	0	0	59/69
2018	160	-	13	88	0	0	0	0	57/73
<b>Gutierrezia sarothrae -- (broom snakeweed)</b>									
2006	440	240	32	64	5	0	0	0	18/21
2010	260	-	46	54	0	0	0	0	25/27
2014	1780	740	3	97	0	0	0	0	25/38
2018	4080	-	11	84	5	0	0	5	20/25
<b>Juniperus osteosperma<sup>A</sup> -- (Utah juniper)</b>									
2006	100	80	60	40	0	0	0	0	- / -
2010	20	20	100	0	0	0	0	0	- / -
2014	380	220	95	5	0	0	0	0	- / -
2018	720	60	94	6	0	0	0	0	- / -
<b>Mahonia repens -- (creeping barberry)</b>									
2006	-	-	-	-	-	-	-	-	- / -
2010	-	-	-	-	-	-	-	-	- / -
2014	-	-	-	-	-	-	-	-	- / -
2018	-	-	-	-	-	-	-	-	10/14
<b>Opuntia -- (pricklypear)</b>									
2006	60	-	0	100	0	0	0	0	13/36
2010	20	-	0	100	0	0	0	0	13/36
2014	40	-	0	100	0	0	0	0	9/15
2018	40	-	0	100	0	0	0	0	12/23
<b>Purshia stansburiana<sup>P</sup> -- (Stansbury cliffrose)</b>									
2006	-	-	-	-	-	-	-	-	52/69
2010	-	-	-	-	-	-	-	-	80/114
2014	40	-	50	50	0	0	0	0	55/67
2018	20	-	0	100	0	0	100	0	146/150
<b>Purshia tridentata<sup>P</sup> -- (antelope bitterbrush)</b>									
2006	320	-	6	69	25	6	94	0	41/114
2010	220	-	46	55	0	64	27	0	49/121
2014	460	-	4	96	0	78	13	0	44/111
2018	560	-	7	93	0	29	71	0	56/127

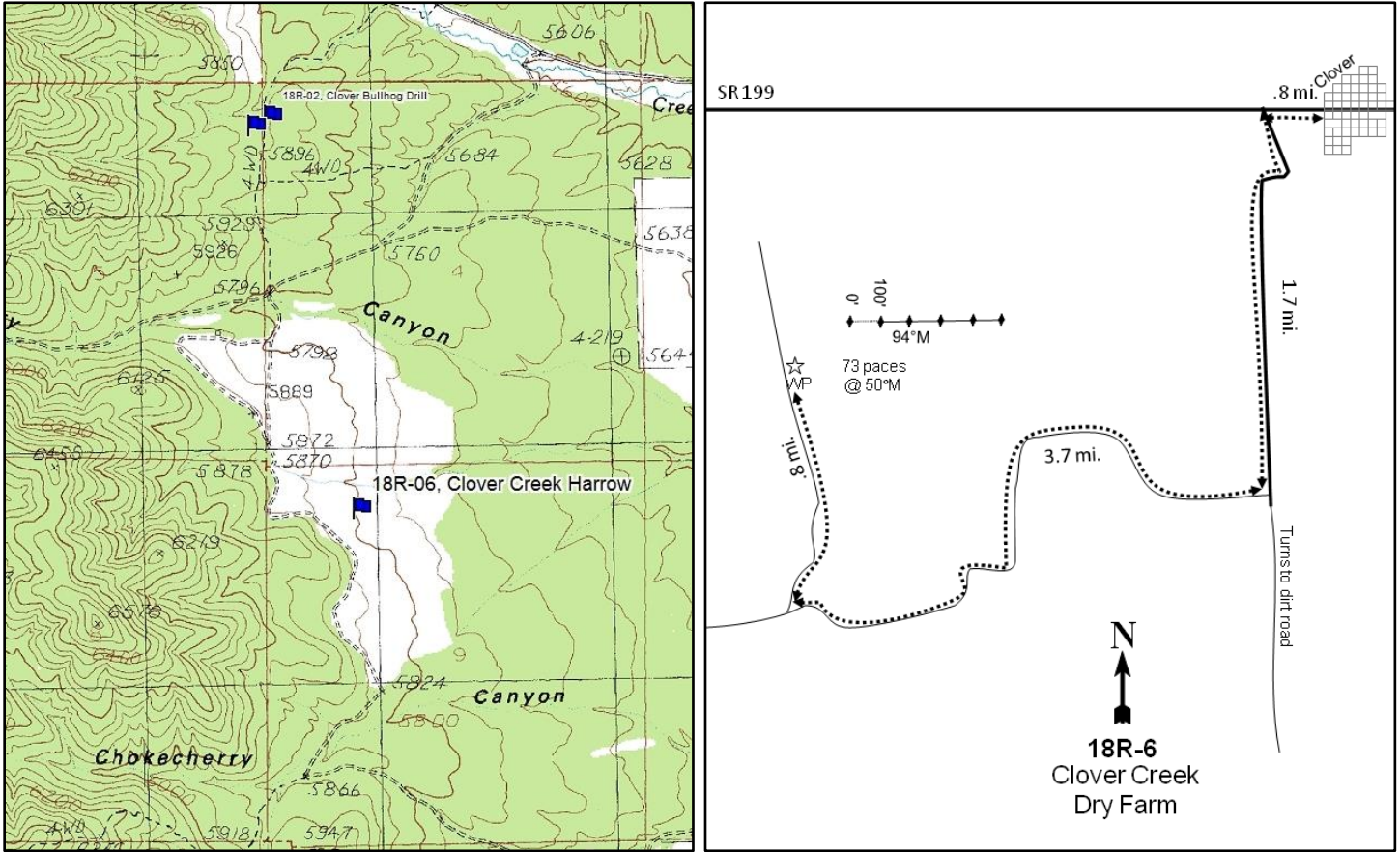
Year	Density		Age Class Distribution			Utilization		Poor Vigor (%)	Average Height Crown (cm)
	Plants Per Acre		Excluding Seedlings			Moderate (%)	Heavy (%)		
	Excluding Seedlings	Seedling	Young (%)	Mature (%)	Decadent (%)				
<b>Symphoricarpos oreophilus<sup>p</sup> -- (mountain snowberry)</b>									
2006	-	-	-	-	-	-	-	-	28/43
2010	-	-	-	-	-	-	-	-	40/89
2014	-	-	-	-	-	-	-	-	38/58
2018	-	-	-	-	-	-	-	-	49/92
<b>Tetradymia canescens -- (spineless horsebrush)</b>									
2006	120	60	33	50	17	0	50	0	20/32
2010	20	-	0	0	100	0	0	0	27/50
2014	40	-	0	100	0	50	0	0	28/45
2018	40	-	0	100	0	0	0	0	42/66

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

**Table 18R-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' (%)	
<b>Juniperus osteosperma (Utah juniper)</b>							
2006	140	-	30	25	-	45	19.3
2010	34	29	43	14	-	14	8.3
2014	138	58	32	5	-	5	4.4
2018	232	32	53	11	5	-	2.9

## CLOVER CREEK DRY FARM - STUDY NO. 18R-6



### Location Information

USGS 7.5 min Map Info Johnson Pass NE; Township 6S, Range 6W, Section 09  
 GPS (0' Stake) NAD 83 UTM ZONE 12, 369836 East 4463898 North

### Transect Information

Browse Tag # (0' Stake) 115  
 Transect Bearing 94° magnetic  
 Length 500ft  
 Belt Placement Line 1 (11ft), Line 2 (34ft), Line 3 (59ft), Line 4 (71ft), Line 5 (95ft)  
 Belt Marker Placement No Rebar

### Directions to Site

From the town of Clover, travel west out of town 0.8 miles and turn left on Johnson Road. Follow Johnson Road for 1.7 miles, then turn right just before it turns into a dirt road. Continue on this road for 3.7 miles, turn right, and drive for another 0.8 miles. The 0-foot stake is 73 paces at 50 degrees magnetic from the witness post and is identified by browse tag #115.



**Site Information**

Land Ownership	Private
Land Administrator	Private
Allotment	ONAQUI MOUNTAIN EAST
Elevation	5,800ft (1,768m)
Aspect	NE
Slope	6%
Sample Dates	08/16/2007, 08/11/2010, 08/13/2014, 08/07/2018

**Table 18R-06.1 Disturbance History.** Recorded history of major disturbances.

Treatment/Disturbance	Name	WRI DB#	Date	Size (acres)
Chaining - One-Way Smooth	Clover Creek Habitat Enhancement	712	November 2008	361
Hand Crew - Lop and Scatter	-	-	Between 2014 and 2018	-
Agriculture - Agriculture	-	-	Historic	-
Chaining - Two-Way Ely	Clover Creek Habitat Enhancement	712	September 2008	361
Seeding - Aerial Before	Clover Creek Habitat Enhancement	712	October 2008	408
Herbicide - Plateau	Clover Creek Plateau	1613	September 2010	220

**Table 18R-06.2 Seed Mix.** List of known seeded plant species and rates (if available).

Mix Name			Application Type	Application Date	Acres
Clover Creek Chain			Aerial	Oct 2008	250
Type	Species	Common Name	Cultivar/Source ID	Bulk lbs/acre	PLS
G	Achnatherum hymenoides	Indian Ricegrass	Rimrock	0.60	0.59
G	Agropyron cristatum	Crested Wheatgrass	Douglas	0.60	0.50
G	Agropyron cristatum	Crested Wheatgrass	Ephraim	0.60	0.54
G	Agropyron cristatum	Crested Wheatgrass	Hycrest	0.80	0.75
G	Agropyron fragile	Siberian Wheatgrass	Vavilov	1.80	1.57
G	Dactylis glomerata	Orchardgrass	Paiute	0.80	0.62
G	Poa secunda	Canby Bluegrass	Canbar	0.60	0.51
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	Linum perenne	Blue Flax	Appar	0.40	0.32
F	Medicago sativa	Alfalfa	Ladak	0.40	0.37
F	Medicago sativa	Alfalfa	Ranger	0.40	0.36
F	Medicago sativa	Alfalfa	Spreador 4	0.40	0.35
F	Melilotus officinalis	Yellow Sweetclover		0.80	0.74
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 18R-06.3 - 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-06.4 - Vegetation History.** The dominant vegetation type(s) and phase of woodland succession (Tausch, Miller, Roundy, & Chambers, 2009).

Year	Vegetation Type	Woodland Succession
2007	Mountain Big Sagebrush	Phase I
2010	Mountain Big Sagebrush/Annual Grass	Phase I
2014	Mountain Big Sagebrush/Perennial Grass	Phase I
2018	Mountain Big Sagebrush/Perennial Grass	Phase I

**Site Notes**

No Notes

**Soils****Table 18R-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	7.0	31.4	44.0	24.6	2.2	19.6	444.8	0.5	08/16/2007

**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.

Upon study establishment in 2007, this site was dominated by mountain big sagebrush (*Artemisia tridentata* ssp. *vaseyana*) with a few other browse species that provided limited cover. Cover of sagebrush decreased in the first sample year following a chaining treatment, but has since recovered to pre-treatment levels (Table 18R-06.1, Table 18R-06.12, Table 18R-06.13). The herbaceous understory was limited prior to the chaining, and while cheatgrass (*Bromus tectorum*) was present, cover was low. Cheatgrass cover increased and it was co-dominant with sagebrush in 2010, but the area was sprayed with Plateau following that year's sampling. Cheatgrass cover decreased substantially in 2014, while perennial grasses increased and became co-dominant site components (Table 18R-06.7, Table 18R-06.10). Utah juniper (*Juniperus osteosperma*) has been observed in all sample years (Photos, Table 18R-06.14) despite various treatments, indicating that further encroachment may be possible over time.

**Trend Summary Tables****Table 18R-06.6 - Shrub/Tree Summary.** Average modified Daubenmire quadrat and line intercept cover by year for shrubs/trees

Year	Quadrat Cover (%)			Line-intercept Cover (%)		
	Preferred Shrub	Other Shrub	Tree	Preferred Shrub	Other Shrub	Tree
2007	10.5	1.7	1.2	12.7	2.3	0.2
2010	6.4	5.6	0.0	7.8	6.3	0.5
2014	9.4	4.1	0.4	11.8	4.7	0.3
2018	7.8	2.4	-	13.5	2.0	-

**Table 18R-06.7 - Herbaceous Summary.** Nested frequency and average modified Daubenmire quadrat cover by year for herbaceous functional groups

Year	Nested Frequency				Quadrat Cover (%)			
	Annual Grass	Perennial Grass	Annual/Biennial Forb	Perennial Forb	Annual Grass	Perennial Grass	Annual/Biennial Forb	Perennial Forb
2007	277	66	368	42	2.8	1.6	3.6	0.3
2010	420	198	315	31	28.1	8.4	6.0	0.8
2014	236	305	296	86	5.1	15.3	2.0	1.9
2018	124	343	131	107	1.9	18.5	0.6	1.7

**Table 18R-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
2007	34.0	1.4	52.8	3.8	0.3	21.5
2010	19.4	0.1	51.1	2.5	0.4	50.7
2014	24.0	-	57.3	2.2	0.1	39.3
2018	23.2	0.1	66.7	2.1	0.8	37.5

**Table 18R-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			
2007	-	9	-	29
2010	-	-	-	-
2014	2	2	-	1
2018	2	4	-	7
Year	Days Use Per Acre (ha)			
2007	-	7.4 (18.2)	-	-
2010	0.7 (1.8)	1.3 (3.3)	-	-
2014	9.4 (23.3)	3.4 (8.3)	2.7 (6.6)	-
2018	-	9.4 (23.2)	-	-

**Table 18R-06.10 - Grass Species.** Nested frequency and modified Daubenmire average cover by year.

GRASS SPECIES														
Achnatherum hymenoides (Indian ricegrass)														
Agropyron cristatum <sup>i</sup> (crested wheatgrass)														
Bromus arvensis <sup>ai</sup> (field brome)														
Bromus marginatus (mountain brome)														
Bromus tectorum <sup>ai</sup> (cheatgrass)														
Dactylis glomerata <sup>i</sup> (orchardgrass)														
Elymus elymoides (squirreltail)														
Pascopyrum smithii (western wheatgrass)														
Poa bulbosa <sup>i</sup> (bulbous bluegrass)														
Poa pratensis <sup>i</sup> (Kentucky bluegrass)														
Poa secunda (Sandberg bluegrass)														
Pseudoroegneria spicata (bluebunch wheatgrass)														
Thinopyrum intermedium <sup>i</sup> (intermediate wheatgrass)														
year	Nested Frequency													
2007	-	-	141	-	222	-	-	-	1	61	4	1	-	
2010	5	14	270	80	378	-	-	-	7	90	16	-	38	
2014	-	47	66	-	185	3	6	-	22	114	10	6	165	
2018	8	103	31	-	121	-	37	10	51	85	16	42	199	
year	Average Cover (%)													
2007	-	-	1.2	-	1.7	-	-	-	0.0	1.5	0.2	0.0	-	
2010	0.0	0.3	14.7	2.9	13.4	-	-	-	0.1	3.4	0.9	-	0.9	
2014	-	2.4	0.3	-	4.8	0.0	0.3	-	0.1	5.7	0.1	0.1	6.6	
2018	0.1	3.6	0.3	-	1.6	-	1.4	0.0	0.8	1.9	0.2	1.8	8.7	

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

**Table 18R-06.11 - Forb Species.** Nested frequency and modified Daubenmire average cover by year.

FORB SPECIES																		
Agoseris glauca (pale agoseris)																		
Alyssum desertorum <sup>ai</sup> (desert madwort)																		
Arabis (rockcress)																		
Astragalus (milkvetch)																		
Astragalus convallarius (lesser rushy milkvetch)																		
Ceratocephala testiculata <sup>ai</sup> (curvseed butterwort)																		
Cirsium (thistle)																		
Crepis acuminata (tapertip hawkbeard)																		
Epilobium brachycarpum <sup>a</sup> (tall annual willowherb)																		
Helianthus annuus <sup>a</sup> (common sunflower)																		
Lactuca scariola <sup>ai</sup> (prickly lettuce)																		
Lappula occidentalis <sup>a</sup> (flatspine stickseed)																		
Linum lewisii (Lewis flax)																		
Onobrychis viciifolia <sup>i</sup> (sainfoin)																		
Polygonum douglasii <sup>a</sup> (Douglas' knotweed)																		
Sanguisorba minor <sup>i</sup> (small burnet)																		
Sisymbrium altissimum <sup>ai</sup> (tall tumbledustard)																		
year	Nested Frequency																	
2007	1	360	3	-	2	62	0	-	25	7	4	1	-	-	-	-	-	
2010	-	306	-	-	3	10	4	2	-	49	36	-	-	-	2	18	0	
2014	-	266	-	-	-	-	20	3	-	-	31	-	11	16	-	38	-	
2018	15	90	1	1	8	23	9	5	2	3	6	-	8	18	-	67	-	
year	Average Cover (%)																	
2007	0.0	2.5	0.0	-	0.1	0.4	0.0	-	0.4	0.2	0.0	0.0	-	-	-	-	-	
2010	-	4.8	-	-	0.0	0.1	0.2	0.0	-	0.3	0.6	-	-	-	0.0	0.5	0.0	
2014	-	1.4	-	-	-	-	0.3	0.1	-	-	0.3	-	0.1	0.3	-	1.0	-	
2018	0.0	0.2	0.0	0.0	0.1	0.1	0.1	0.0	0.0	0.0	0.0	-	0.0	0.5	-	1.0	-	

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

FORB SPECIES		
	Sphaeralcea munroana (Munro's globemallow)	
	Tragopogon dubius <sup>ai</sup> (yellow salsify)	
year	Nested Frequency	
2007	37	-
2010	5	-
2014	22	47
2018	6	56
year	Average Cover (%)	
2007	0.1	-
2010	0.0	-
2014	0.2	0.3
2018	0.0	0.3

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

**Table 18R-06.12 - Shrub and Tree Species.** Average modified Daubenmire quadrat and line intercept cover by year.

SHRUB SPECIES					
	Artemisia tridentata ssp. vaseyana <sup>p</sup> (mountain big sagebrush)				
	Ericameria nauseosa (rubber rabbitbrush)				
	Gutierrezia sarothrae (broom snakeweed)				
	Juniperus osteosperma <sup>t</sup> (Utah juniper)				
	Purshia tridentata <sup>p</sup> (antelope bitterbrush)				
year	Line Intercept Cover (%)				
2007	11.4	-	2.3	0.2	1.3
2010	7.8	-	6.3	0.5	-
2014	11.5	0.5	4.2	0.3	0.3
2018	12.7	-	2	-	0.8
year	Quadrat Cover (%)				
2007	10.2	-	1.7	1.2	0.2
2010	6.4	-	5.6	0.0	-
2014	9.0	0.1	4.0	0.4	0.4
2018	7.5	0.0	2.4	-	0.3

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

**Table 18R-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.

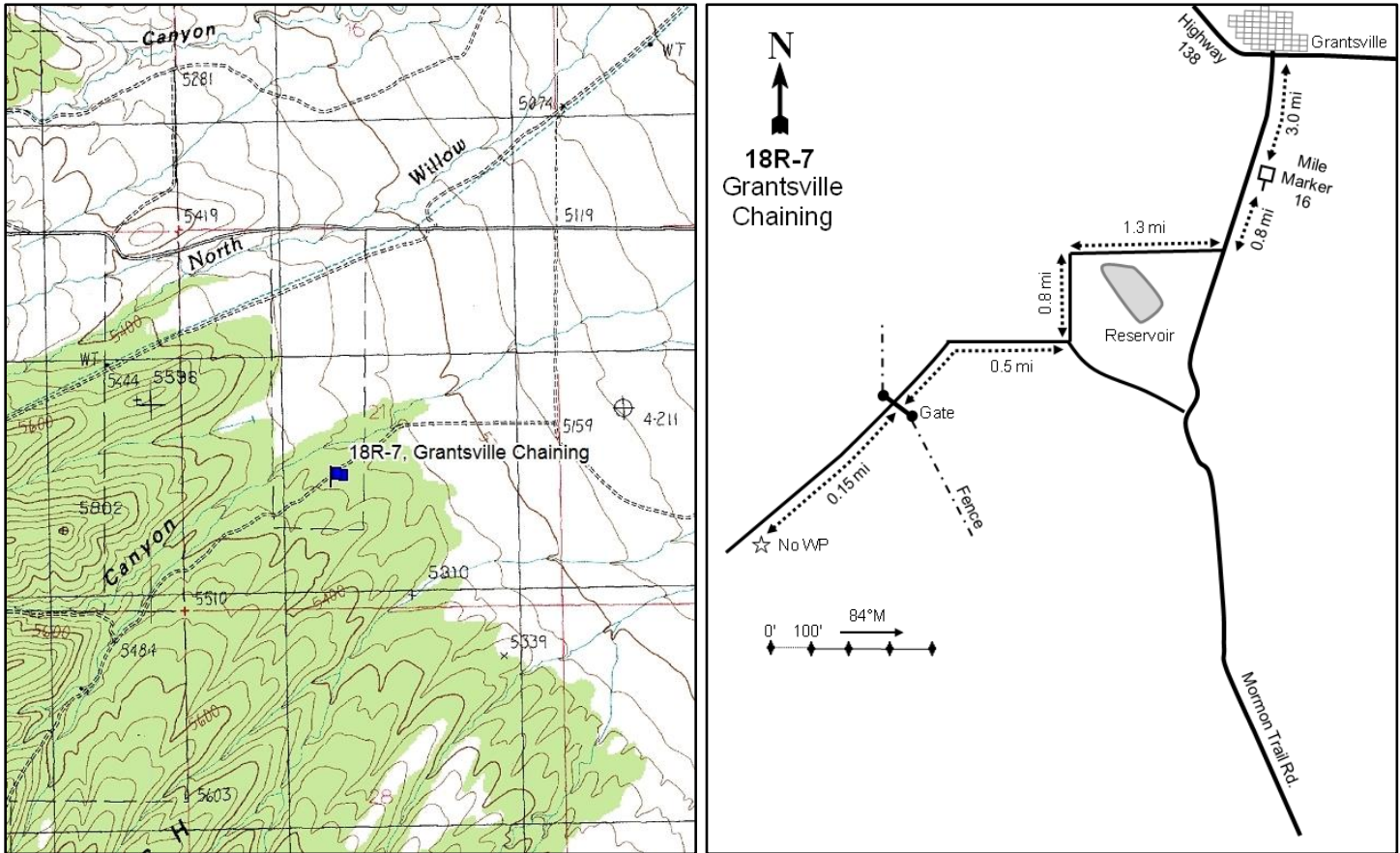
Year	Density		Age Class Distribution			Utilization		Poor Vigor (%)	Average Height Crown (cm)
	Plants Per Acre		Excluding Seedlings			Moderate (%)	Heavy (%)		
	Excluding Seedlings	Seedling	Young (%)	Mature (%)	Decadent (%)				
<b>Artemisia tridentata ssp. vaseyana<sup>p</sup> -- (mountain big sagebrush)</b>									
2007	4320	1580	1	32	68	14	13	88	52/64
2010	2740	40	13	80	7	10	0	7	49/62
2014	2660	60	2	93	5	59	11	8	47/68
2018	2980	40	4	73	24	19	0	16	61/76
<b>Ericameria nauseosa -- (rubber rabbitbrush)</b>									
2007	20	-	100	0	0	0	0	0	49/50
2010	-	-	-	-	-	-	-	-	69/68
2014	20	-	0	100	0	0	0	100	76/93
2018	-	-	-	-	-	-	-	-	65/66
<b>Gutierrezia sarothrae -- (broom snakeweed)</b>									
2007	5880	6080	37	61	2	0	0	3	17/19
2010	4680	-	7	92	1	0	0	2	31/37
2014	3820	140	4	81	15	1	0	23	25/33
2018	6600	80	12	83	5	0	0	1	20/16
<b>Juniperus osteosperma<sup>i</sup> -- (Utah juniper)</b>									
2007	80	20	75	25	0	0	0	50	- / -
2010	40	20	100	0	0	0	0	0	- / -
2014	60	-	33	33	33	0	0	33	- / -
2018	40	-	0	100	0	0	0	0	- / -
<b>Pediocactus simpsonii -- (mountain ball cactus)</b>									
2007	-	-	-	-	-	-	-	-	- / -
2010	20	-	100	0	0	0	0	0	- / -
2014	-	-	-	-	-	-	-	-	- / -
2018	-	-	-	-	-	-	-	-	- / -
<b>Purshia tridentata<sup>p</sup> -- (antelope bitterbrush)</b>									
2007	60	-	33	0	67	0	100	67	35/65
2010	40	-	100	0	0	0	0	0	60/36
2014	40	-	0	100	0	50	0	50	64/84
2018	60	-	0	100	0	33	67	0	96/148
<b>Symphoricarpos oreophilus<sup>p</sup> -- (mountain snowberry)</b>									
2007	-	-	-	-	-	-	-	-	- / -
2010	-	-	-	-	-	-	-	-	- / -
2014	-	-	-	-	-	-	-	-	- / -
2018	-	-	-	-	-	-	-	-	40/88

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

**Table 18R-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' (%)	
<b>Juniperus osteosperma (Utah juniper)</b>							
2007	56	-	47	41	-	12	7.8
2010	50	-	75	25	-	-	3.9
2014	69	6	71	24	-	-	5.1
2018	54	20	80	-	-	-	5.9

## GRANTSVILLE CHAINING - STUDY NO. 18R-7

**Location Information**

USGS 7.5 min Map Info  
GPS (0' Stake)

North Willow Canyon ; Township 3S, Range 6W, Section 21  
NAD 83 UTM ZONE 12, 370139 East 4488644 North

**Transect Information**

Browse Tag # (0' Stake)	248
Transect Bearing	84° magnetic
Length	400ft
Belt Placement	Line 1 (11ft & 95ft), Line 2 (34ft), Line 3 (59ft), Line 4 (11ft)
Belt Marker Placement	Standard

**Directions to Site**

From Center Street in Grantsville, drive west and turn south on Cooley Street. Follow this road 0.8 miles past mile marker 16 and turn onto a road on the right. Drive 0.6 miles (pavement ends) and then another 0.4 miles to a fork. Continue on the main road. Drive 0.3 miles to a fenceline and turn left. Follow the road along the fenceline for 0.5 miles to a fork and stay right. Drive for 0.2 miles to another fork, stay right, and then continue 0.3 miles to a gate. Go 0.15 miles past the gate. The site is on the right (south) side of the road; there is no witness post. The 0-foot stake is marked with browse tag #248.

**Site Information**

Land Ownership	Private
Land Administrator	Private
Allotment	GRANTSVILLE SCS
Elevation	5,364ft (1,635m)
Aspect	Northeast
Slope	12%
Sample Dates	08/26/2008, 06/08/2011, 07/28/2015, 08/07/2018

**Table 18R-07.1 Disturbance History.** Recorded history of major disturbances.

Treatment/Disturbance	Name	WRI DB#	Date	Size (acres)
Hand Crew - Lop and Scatter	Grantsville Habitat and Grazing Improvement Project	3663	October 2016-June 2018	765
Chaining - Two-Way Ely	Grantsville Chaining	1117	October 2008	304
Seeding - Aerial Before	Grantsville Chaining	1117	October 2008	304
Seeding - Dribbler	Grantsville Chaining	1117	October 2008	304

**Table 18R-07.2 Seed Mix.** List of known seeded plant species and rates (if available).

Mix Name			Application Type	Application Date	Acres
Grantsville Chaining			Aerial	Oct 2008	335
Type	Species	Common Name	Cultivar/Source ID	Bulk lbs/acre	PLS
G	Achnatherum hymenoides	Indian Ricegrass	Rimrock	1.04	0.96
G	Agropyron cristatum	Crested Wheatgrass	Douglas	1.04	0.86
G	Agropyron cristatum	Crested Wheatgrass	Nordan	0.90	0.80
G	Dactylis glomerata	Orchardgrass	Paiute	0.45	0.36
G	Elymus wawawaiensis	Snake River Wheatgrass	Secar	1.04	0.80
G	Pascopyrum smithii	Western Wheatgrass	Arriba	1.49	1.30
G	Poa secunda	Canby Bluegrass	Canbar	0.45	0.38
G	Psathyrostachys juncea	Russian Wildrye	Bozoisky	0.75	0.63
G	Pseudoroegneria spicata	Bluebunch Wheatgrass	Anatone	0.75	0.53
G	Thinopyrum intermedium	Pubescent Wheatgrass	Luna	0.45	0.40
F	Achillea millefolium	Western Yarrow		0.10	0.10
F	Linum perenne	Blue Flax	Appar	0.45	0.38
F	Medicago sativa	Alfalfa	Ladak	0.90	0.81
F	Medicago sativa	Alfalfa	Ranger	1.04	0.96
F	Onobrychis viciifolia	Sainfoin	Eski	1.94	1.70
F	Sanguisorba minor	Small Burnet	Delar	1.94	1.66
Mix Name			Application Type	Application Date	Acres
Grantsville Chaining Dribbler mix			Dribbler	Oct 2008	335
Type	Species	Common Name	Cultivar/Source ID	Bulk lbs/acre	PLS
F	Sanguisorba minor	Small Burnet	Delar	0.15	0.13
S	Purshia tridentata	Bitterbrush	Lincoln NV	0.15	0.12

**Wildlife Habitat and Vegetation History****Table 18R-07.3 - Wildlife Seasonal Habitat.** UDWR wildlife habitat and seasonality.

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

**Table 18R-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	Juniper	Phase III
2011	Perennial Grass/Juniper	Phase I
2015	Perennial Grass/Juniper	Phase I
2018	Perennial Grass	Phase I

**Site Notes**

In 2011, Belt 4 was moved to the 11ft mark on Line 4 because of a large gully that cut 10 feet deep at the end of Line 4 following the chaining.

**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	No state and transition model is available for this ecological site.

At the time of study establishment in 2008, this site was dominated by Utah juniper (*Juniperus osteosperma*) (Table 18R-07.6, Table 18R-07.12). Tree cover and density decreased significantly following a chaining project in 2008 and decreased even further after a lop and scatter treatment in 2018 (Table 18R-07.1, Table 18R-07.6, Table 18R-07.14). Shrub species have been rare overall. Mountain big sagebrush has been the most common species, albeit providing little cover and density (Table 18R-07.12, Table 18R-07.13). Although initially sparse, the herbaceous layer has increased following the treatments (Table 18R-07.2, Table 18R-07.7). Seeded perennial grasses have provided a majority of the herbaceous cover in the most recent sample years, with bluebunch wheatgrass (*Pseudoroegneria spicata*) as the dominant species (Table 18R-07.7, Table 18R-07.10). The introduced annual grass species cheatgrass (*Bromus tectorum*) was present on the site in 2008 and 2011 with low to moderate abundance, but has shown a decreasing trend in subsequent years (Table 18R-07.10). Perennial forb cover has increased slightly over time, with the seeded species alfalfa (*Medicago sativa*) and sainfoin (*Onobrychis viciifolia*) being co-dominant (Table 18R-07.7, Table 18R-07.11). Considering the continued presence of juniper trees (Table 18R-07.13, Table 18R-07.14), it is likely that future infilling will occur. However, continued maintenance of the site will keep conifer cover low and allow for robust understory production.

**Trend Summary Tables****Table 18R-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	-	-	16.9	0.2	0.1	31.3
2011	0.0	0.0	4.6	-	-	8.4
2015	0.2	-	6.8	-	-	7.7
2018	0.1	0.0	1.4	-	-	-

**Table 18R-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	45	261	271	37	0.3	3.3	0.9	0.1
2011	223	312	276	205	2.5	13.4	5.4	7.0
2015	1	323	17	133	0.0	20.4	0.0	2.6
2018	12	309	136	77	0.0	17.4	0.4	2.4

**Table 18R-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	29.4	1.5	42.4	21.4	1.9	23.3
2011	14.8	0.6	38.6	5.4	0.6	34.6
2015	35.2	0.0	36.1	11.6	3.3	31.0
2018	28.5	0.2	50.0	11.5	3.4	26.0

**Table 18R-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	Rocky Mountain Elk	Rabbit
	Quadrat Frequency				
2008	-	-	2	1	79
2011	-	-	2	-	12
2015	-	-	2	-	21
2018	-	-	5	-	2
Year	Days Use Per Acre (ha)				
2008	0.7 (1.8)	8.7 (21.5)*	1.3 (3.3)	-	-
2011	0.7 (1.8)	-	4.0 (9.9)	-	-
2015	3.6 (9.0)	-	0.7 (1.7)	-	-
2018	5.8 (14.3)	-	1.3 (3.3)	-	-

Pellets per acre (ha)

**Table 18R-07.10 - Grass Species.** Nested frequency and modified Daubenmire average cover by year.

GRASS SPECIES	Achnatherum hymenoides (Indian ricegrass)	Agropyron cristatum <sup>i</sup> (crested wheatgrass)	Bromus tectorum <sup>ai</sup> (cheatgrass)	Dactylis glomerata <sup>i</sup> (orchardgrass)	Elymus elymoides (squirreltail)	Elymus wawawaiensis (Snake River wheatgrass)	Hesperostipa comata (needle and thread)	Pascopyrum smithii (western wheatgrass)	Poa secunda (Sandberg bluegrass)	Pseudoroegneria spicata (bluebunch wheatgrass)	Thinopyrum intermedium <sup>i</sup> (intermediate wheatgrass)	Vulpia octoflora <sup>a</sup> (sixweeks fescue)
year	Nested Frequency											
2008	2	-	45	-	14	-	1	-	255	-	-	-
2011	-	198	220	19	4	8	-	59	179	95	8	3
2015	-	107	-	7	1	23	-	13	88	188	74	1
2018	0	98	6	-	17	-	-	17	181	179	44	6
year	Average Cover (%)											
2008	0.0	-	0.3	-	0.1	-	0.0	-	3.2	-	-	-
2011	-	5.9	2.5	0.4	0.1	0.1	-	0.6	3.8	2.1	0.2	0.0
2015	-	5.1	-	0.1	0.0	0.8	-	0.2	1.3	11.3	1.7	0.0
2018	0.0	2.1	0.0	-	0.2	-	-	0.2	3.6	10.2	1.1	0.0

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

**Table 18R-07.11 - Forb Species.** Nested frequency and modified Daubenmire average cover by year.

FORB SPECIES	Achillea millefolium (Common yarrow)	Allium (onion)	Alyssum desertorum <sup>ai</sup> (desert madwort)	Antennaria (pussytoes)	Astragalus (milkvetch)	Calochortus nuttallii (sego lily)	Ceratocephala testiculata <sup>ai</sup> (curvseed butterwort)	Chaenactis douglasii (Douglas' dustymaiden)	Crepis acuminata (tapertip hawksbeard)	Cryptantha (cryptantha)	Descurainia pinnata <sup>a</sup> (western tansymustard)	Epilobium brachycarpum <sup>a</sup> (tall annual willowherb)	Lactuca serriola <sup>ai</sup> (prickly lettuce)	Lappula occidentalis <sup>a</sup> (flatspine stickseed)	Linum perenne <sup>i</sup> (blue flax)	Machaeranthera grindelioides (rayless tansyaster)	Medicago sativa <sup>i</sup> (alfalfa)
year	Nested Frequency																
2008	-	2	-	4	1	-	269	-	2	4	2	-	-	6	-	-	-
2011	9	54	1	25	36	30	190	-	8	8	32	32	164	1	95	10	14
2015	-	-	17	2	2	-	-	3	-	10	-	-	-	-	50	-	4
2018	-	4	104	5	11	6	47	-	4	6	-	5	-	-	3	1	17
year	Average Cover (%)																
2008	-	0.0	-	0.0	0.0	-	0.9	-	0.0	0.0	0.0	-	-	0.0	-	-	-
2011	0.1	0.2	0.0	0.6	1.6	0.1	2.6	-	0.2	0.2	0.5	0.1	2.0	0.0	1.3	0.0	0.3
2015	-	-	0.0	0.0	0.0	-	-	0.0	-	0.1	-	-	-	-	0.6	-	0.1
2018	-	0.0	0.3	0.2	0.3	0.0	0.1	-	0.1	0.1	-	0.0	-	-	0.0	0.0	0.8

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

FORB SPECIES					
Microsteris gracilis <sup>a</sup> (slender phlox)					
Onobrychis vicifolia <sup>a</sup> (sainfoin)					
Phlox longifolia (longleaf phlox)					
Sanguisorba minor <sup>i</sup> (small burnet)					
Sphaeralcea coccinea (scarlet globemallow)					
year	Nested Frequency				
2008	1	-	24	-	-
2011	9	11	22	66	2
2015	-	24	3	79	2
2018	2	15	-	21	-
year	Average Cover (%)				
2008	0.0	-	0.1	-	-
2011	0.0	0.2	0.1	2.2	0.0
2015	-	0.3	0.0	1.5	0.0
2018	0.0	0.8	-	0.2	-

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

**Table 18R-07.12 - Shrub and Tree Species.** Average modified Daubenmire quadrat and line intercept cover by year.

SHRUB SPECIES				
Artemisia tridentata ssp. vaseyana <sup>p</sup> (mountain big sagebrush)				
Gutierrezia sarothrae (broom snakeweed)				
Juniperus osteosperma <sup>t</sup> (Utah juniper)				
Opuntia (pricklypear)				
year	Line Intercept Cover (%)			
2008	0.2	0.1	31.3	-
2011	-	-	8.4	-
2015	0	-	7.7	-
2018	-	-	-	-
year	Quadrat Cover (%)			
2008	0.0	0.0	16.9	-
2011	0.0	-	4.6	0.0
2015	0.2	-	6.8	-
2018	0.1	-	1.4	0.0

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

**Table 18R-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.

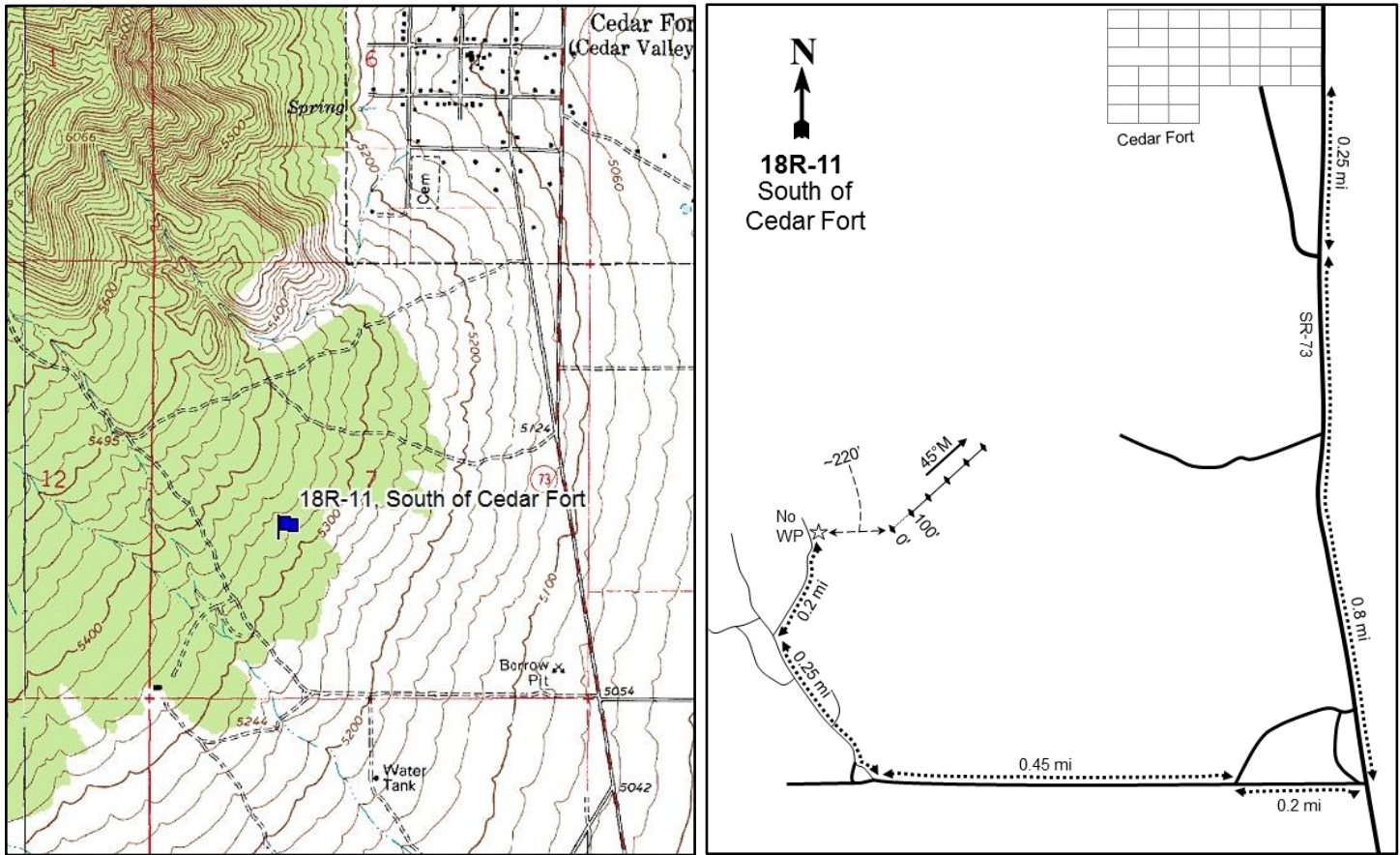
Year	Density		Age Class Distribution			Utilization		Poor Vigor (%)	Average Height Crown (cm)
	Plants Per Acre		Excluding Seedlings			Moderate (%)	Heavy (%)		
	Excluding Seedlings	Seedling	Young (%)	Mature (%)	Decadent (%)				
<b>Artemisia tridentata ssp. vaseyana<sup>p</sup> -- (mountain big sagebrush)</b>									
2008	80	-	0	0	100	0	0	25	26/46
2011	60	-	33	67	0	0	0	0	31/35
2015	180	60	56	44	0	33	0	22	44/64
2018	160	40	63	38	0	0	0	0	47/56
<b>Chrysothamnus viscidiflorus -- (yellow rabbitbrush)</b>									
2008	-	-	-	-	-	-	-	-	-/-
2011	-	-	-	-	-	-	-	-	-/-
2015	20	-	0	100	0	0	100	100	10/16
2018	-	-	-	-	-	-	-	-	31/37
<b>Ericameria nauseosa ssp. nauseosa var. speciosa<sup>p</sup> -- (rubber rabbitbrush)</b>									
2008	-	-	-	-	-	-	-	-	-/-
2011	-	-	-	-	-	-	-	-	-/-
2015	20	-	100	0	0	0	0	0	71/84
2018	-	-	-	-	-	-	-	-	65/68
<b>Gutierrezia sarothrae -- (broom snakeweed)</b>									
2008	20	-	0	100	0	0	0	0	13/10
2011	-	-	-	-	-	-	-	-	-/-
2015	-	-	-	-	-	-	-	-	21/36
2018	60	-	0	100	0	0	0	0	19/16
<b>Juniperus osteosperma<sup>i</sup> -- (Utah juniper)</b>									
2008	400	40	20	80	0	0	0	5	-/-
2011	200	40	30	50	20	0	0	20	12/18
2015	400	660	25	75	0	0	10	50	-/-
2018	100	360	80	0	20	0	0	20	-/-
<b>Opuntia -- (pricklypear)</b>									
2008	-	-	-	-	-	-	-	-	14/32
2011	40	-	0	100	0	0	0	0	16/23
2015	40	-	0	100	0	0	0	0	13/29
2018	40	-	0	50	50	0	0	50	7/19

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

**Table 18R-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' (%)	
<b>Juniperus osteosperma (Utah juniper)</b>							
2008	547	15	5	20	55	5	21.3
2011	301	15	40	30	15	-	9.8
2015	476	50	40	10	-	-	3.5
2018	61	35	65	-	-	-	2.4

## SOUTH OF CEDAR FORT - STUDY NO. 18R-11

**Location Information**

USGS 7.5 min Map Info  
GPS (0' Stake)

Cedar Fort SW; Township 6S, Range 2W, Section 07  
NAD 83 UTM ZONE 12, 405281 East 4462849 North

**Transect Information**

Browse Tag # (0' Stake)	Not Available
Transect Bearing	45° magnetic
Length	500ft
Belt Placement	Line 1 (11ft), Line 2 (34ft), Line 3 (59ft), Line 4 (71ft), Line 5 (95ft)
Belt Marker Placement	No Rebar or Stakes

**Directions to Site**

From the town of Cedar Fort, drive south for approximately 1 mile to West 4000 North which is near a gravel pit. Turn right and proceed for 0.5 miles to a fork. Bear right and proceed approximately 0.25 miles to another fork. Continue another 0.2 miles to where the road begins to end: there is a small opening where you can park. Stop here and walk approximately 220 feet at 80 degrees magnetic to transect; there are no stakes or rebar markers, so use a GPS to navigate to the exact location.

**Site Information**

Land Ownership	State
Land Administrator	SITLA
Allotment	DIAMOND VALLEY
Elevation	No data
Aspect	Southeast
Slope	0-5%
Sample Dates	09/05/2018

**Table 18R-11.1 Disturbance History.** Recorded history of major disturbances.

Treatment/Disturbance	Name	WRI DB#	Date	Size (acres)
Mechanical - Bullhog	Cedar Fort PJ Removal Phase 2	4524	2018 (Proposed)	703
Seeding - Aerial Before	Cedar Fort PJ Removal Phase 2	4524	September 2018 (Proposed)	703

**Table 18R-11.2 Seed Mix.** List of known seeded plant species and rates (if available).

Mix Name			Application Type	Application Date	Acres
Cedar Fort			Aerial	Sep 2018	760
Type	Species	Common Name	Cultivar/Source ID	Bulk lbs/acre	PLS
G	<i>Achnatherum hymenoides</i>	Indian Ricegrass	Rimrock	0.99	0.94
G	<i>Agropyron cristatum</i>	Crested Wheatgrass	Nordan	0.99	0.88
G	<i>Dactylis glomerata</i>	Orchardgrass	Paiute	0.46	0.42
G	<i>Leymus cinereus</i>	Great Basin Wildrye	UDWR IntMtn Tetra	0.03	0.02
G	<i>Leymus cinereus</i>	Great Basin Wildrye	UDWR IntMtn Tetra	0.50	0.44
G	<i>Pascopyrum smithii</i>	Western Wheatgrass	Arriba	0.99	0.88
G	<i>Poa secunda</i>	Big Bluegrass	Sherman	0.46	0.35
G	<i>Psathyrostachys juncea</i>	Russian Wildrye	Bozoisky II	0.99	0.94
G	<i>Pseudoroegneria spicata</i>	Bluebunch Wheatgrass	Anatone	1.51	1.42
F	<i>Achillea millefolium</i>	Western Yarrow	Eagle	0.10	0.08
F	<i>Helianthus annuus</i>	Annual Sunflower		0.53	0.51
F	<i>Linum perenne</i>	Blue Flax	Appar	0.13	0.10
F	<i>Medicago sativa</i>	Alfalfa	Ladak DL	0.75	0.69
F	<i>Medicago sativa</i> ssp. <i>falcata</i>	Alfalfa, Yellow	Don	0.33	0.29
F	<i>Onobrychis viciifolia</i>	Sainfoin	Eski	1.97	1.81
F	<i>Sanguisorba minor</i>	Small Burnet	Delar	2.04	1.73
S	<i>Artemisia tridentata</i> ssp. <i>wyomingensis</i>	Wyoming Big Sagebrush	Juab UT	0.26	0.09
S	<i>Artemisia tridentata</i> ssp. <i>wyomingensis</i>	Wyoming Big Sagebrush	Elko NV	0.26	0.05
S	<i>Atriplex canescens</i>	Fourwing Saltbush	Lincoln NV	0.33	0.18
S	<i>Purshia tridentata</i>	Bitterbrush	Wasatch UT	0.30	0.23

**Wildlife Habitat and Vegetation History****Table 18R-11.3 - Wildlife Seasonal Habitat.** UDWR wildlife habitat and seasonality.

Species	Habitat	Season	Brood/Young Rearing
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**Table 18R-11.4 - Vegetation History.** The dominant vegetation type(s) and phase of woodland succession (Tausch, Miller, Roundy, & Chambers, 2009).

Year	Vegetation Type	Woodland Succession
2018	Pinyon/Juniper	Phase II transitioning to Phase III

**Site Notes**

No Notes



**Site Potential**

1981 - 2010 Average Annual Precipitation	14 inches
NRCS Ecological Site	Upland Gravelly Loam (Mountain Big Sagebrush)
NRCS Ecological Site #	028AY306UT
States and Transitions	No state and transition model is available for this ecological site.

At the time of study establishment in 2018, the plant community on this site was dominated by Utah juniper (*Juniperus osteosperma*) and twoneedle pinyon (*Pinus edulis*) (Photos, Table 18R-11.12, Table 18R-11.14). The presence of extant mountain big sagebrush (*Artemisia tridentata* ssp. *vaseyana*) plants indicates that the site was historically a sagebrush plant community. Although sparse, the shrub layer was dominated by sagebrush which contributed 4.6 percent cover in 2018 (Table 18R-11.12). However, the shrub community was in poor condition overall with a majority of the plants being classified as decadent or with poor vigor (Table 18R-11.13). The grass component was depauperate in diversity and quantity, with squirreltail (*Elymus elymoides*) providing the most cover at 0.7 percent. The introduced annual grass cheatgrass (*Bromus tectorum*) was also observed, but with low cover (Table 18R-11.10). The forb community was depleted and provided a meager amount of cover that was mainly contributed by the introduced annual species desert madwort (*Alyssum desertorum*) (Table 18R-11.7, Table 18R-11.11). A bullhog treatment scheduled for the Fall of 2018 (Table 18R-11.1) will likely remove much of the tree component and help to restore understory diversity and shrub production for wildlife.

**Trend Summary Tables****Table 18R-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
2018	3.0	0.1	11.0	4.6	0.1	29.7

**Table 18R-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
2018	97	105	210	90	0.4	1.1	1.8	1.0

**Table 18R-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
2018	28.1	7.1	43.8	12.9	14.3	19.8

**Table 18R-11.9 - Pellet Group Data.** Quadrat frequency and pellet group transect data for animal pellets. Rabbit pellet groups are not sampled in the pellet group transect.

Year	Mule Deer	Rabbit
	Quadrat Frequency	
2018	2	28
Year	Days Use Per Acre (ha)	
2018	4.7 (11.6)	-

**Table 18R-11.10 - Grass Species.** Nested frequency and modified Daubenmire average cover by year.

GRASS SPECIES				
	Achnatherum hymenoides (Indian ricegrass)			
	Bromus tectorum <sup>ai</sup> (cheatgrass)			
	Elymus elymoides (squirreltail)			
	Poa secunda (Sandberg bluegrass)			
year	Nested Frequency			
2018	4	97	49	70
year	Average Cover (%)			
2018	0.0	0.4	0.7	0.4

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

**Table 18R-11.11 - Forb Species.** Nested frequency and modified Daubenmire average cover by year.

FORB SPECIES								
	Alyssum desertorum <sup>ai</sup> (desert madwort)		Chaetopappa ericoides (rose heath)		Cryptantha (cryptantha)		Draba <sup>a</sup> (draba)	
	Lathyrus brachycalyx (Bonneville pea)		Petradonia pumila (rock goldenrod)		Streptanthus cordatus (heartleaf twistflower)		Zigadenus paniculatus (foothill deathcamas)	
year	Nested Frequency							
2018	207	13	13	3	55	8	3	9
year	Average Cover (%)							
2018	1.8	0.1	0.1	0.0	0.5	0.3	0.0	0.1

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

**Table 18R-11.12 - Shrub and Tree Species.** Average modified Daubenmire quadrat and line intercept cover by year.

SHRUB SPECIES					
	Artemisia tridentata ssp. vaseyana <sup>p</sup> (mountain big sagebrush)		Gutierrezia sarothrae (broom snakeweed)		Juniperus osteosperma <sup>t</sup> (Utah juniper)
	Opuntia polyacantha (plains pricklypear)		Pinus edulis <sup>t</sup> (twoneedle pinyon)		
year	Line Intercept Cover (%)				
2018	4.6	0.1	29.7	0	-
year	Quadrat Cover (%)				
2018	3.0	0.0	10.3	0.1	0.7

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

**Table 18R-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.

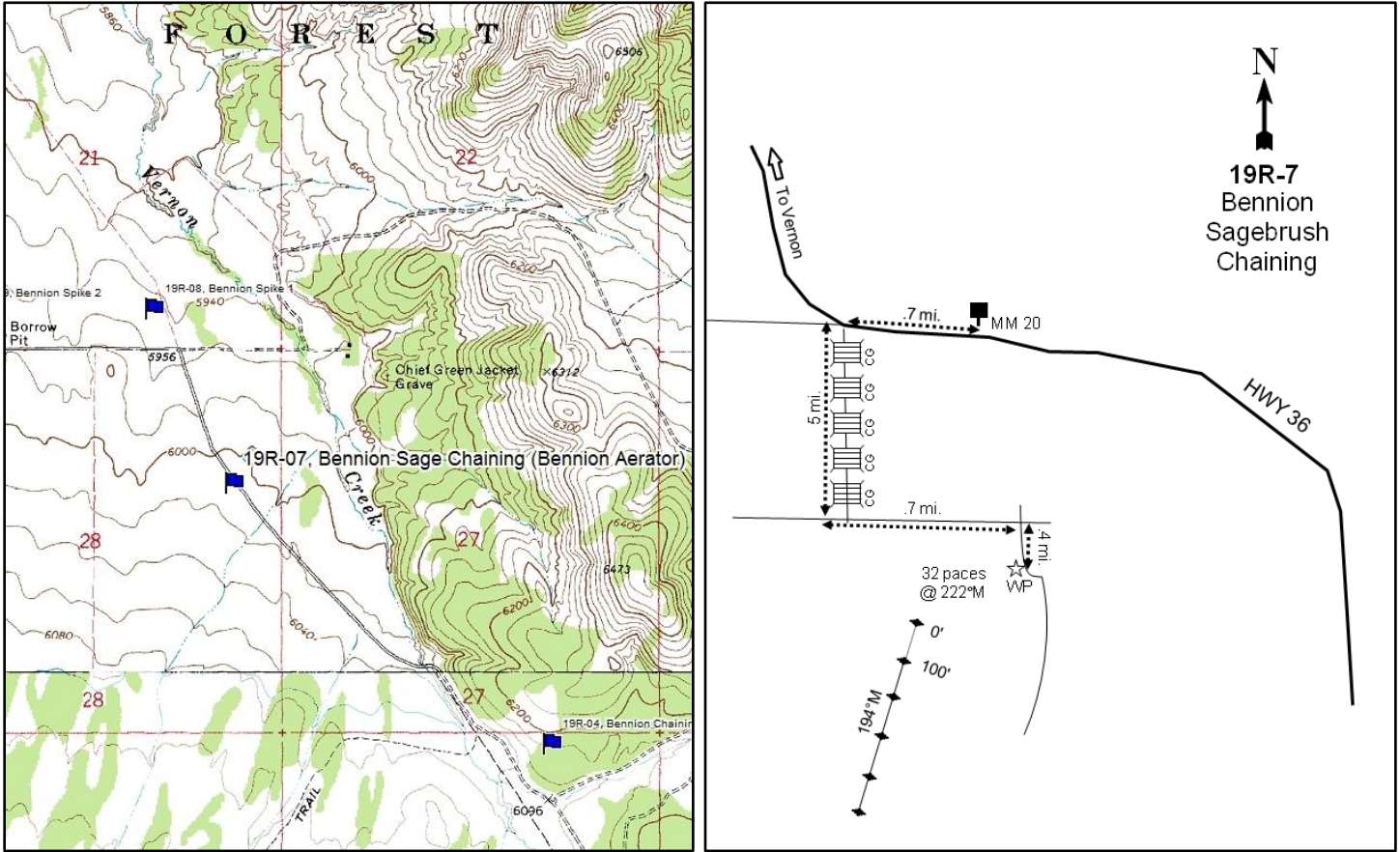
Year	Density		Age Class Distribution			Utilization		Poor Vigor (%)	Average Height Crown (cm)
	Plants Per Acre		Excluding Seedlings			Moderate (%)	Heavy (%)		
	Excluding Seedlings	Seedling	Young (%)	Mature (%)	Decadent (%)				
Artemisia tridentata ssp. vaseyana <sup>p</sup> -- (mountain big sagebrush)									
2018	980	-	2	45	53	6	0	59	45/56
Gutierrezia sarothrae -- (broom snakeweed)									
2018	200	-	10	90	0	0	0	0	14/14
Juniperus osteosperma <sup>i</sup> -- (Utah juniper)									
2018	400	20	55	40	5	5	0	0	- / -
Opuntia polyacantha -- (plains pricklypear)									
2018	120	-	0	100	0	0	0	17	12/29
Opuntia -- (pricklypear)									
2018	20	-	0	100	0	0	0	0	9/23
Pinus edulis <sup>t</sup> -- (twoneedle pinyon)									
2018	60	-	100	0	0	0	0	0	- / -

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

**Table 18R-11.14 - Tree Characteristics.** Point-quarter tree density, size class distribution, and average diameter.

Year	Density	Size Class Distribution					Average Diameter (cm)
	Trees per Acre	Seedling (%)	1-4' (%)	4-8' (%)	8-12' (%)	>12' (%)	
Juniperus osteosperma (Utah juniper)							
2018	176	10	10	20	50	10	13.7
Pinus edulis (twoneedle pinyon)							
2018	19	-	33	33	33	-	8.7

## BENNION SAGEBRUSH CHAINING - STUDY NO. 19R-7



### Location Information

USGS 7.5 min Map Info  
GPS (0' Stake)

Vernon SE; Township 9S, Range 5W, Section 28  
NAD 83 UTM ZONE 12, 380054 East 4429455 North

### Transect Information

Browse Tag # (0' Stake)	Not Available
Transect Bearing	194° magnetic
Length	500ft
Belt Placement	Line 1 (11ft), Line 2 (34ft), Line 3 (59ft), Line 4 (71ft), Line 5 (95ft)
Belt Marker Placement	No Rebar

### Directions to Site

From Highway 36 south of Vernon, drive to mile marker 20. From there, drive 0.7 miles to a turnoff on the left (west). Turn left here and drive south for 5.0 miles passing several (4 or 5) cattle guards to a fork. Turn left and drive 0.7 miles to an intersection. Turn right (south), crossing a cattle guard, and drive 0.4 miles to a witness post on the right (west) side of the road. Walk 32 paces at 222 degrees magnetic from the witness post to the 0-foot stake; there is no browse tag.

**Site Information**

Land Ownership	Private
Land Administrator	Private
Allotment	BENNION RANCH
Elevation	6,000ft (1,829m)
Aspect	East
Slope	1%
Sample Dates	06/21/2006, 08/10/2010, 08/14/2014, 08/07/2018

**Table 19R-07.1 Disturbance History.** Recorded history of major disturbances.

Treatment/Disturbance	Name	WRI DB#	Date	Size (acres)
Hand Crew - Lop and Scatter	Bennion Ranch Lop and Scatter	3408	May 2016	1047
Chaining - Two-Way Ely	Bennion Ranch Sage Grouse Demonstration Year 2	396	November-December 2006	192
Seeding - Aerial Before	Bennion Ranch Sage Grouse Demonstration Year 2	396	December 2006	192
Seeding - Dribbler	Bennion Ranch Sage Grouse Demonstration Year 2	396	December 2006	192

**Table 19R-07.2 Seed Mix.** List of known seeded plant species and rates (if available).

Mix Name			Application Type	Application Date	Acres
Bennion Ranch P-J Chaining			Aerial	Dec 2006	180
Type	Species	Common Name	Cultivar/Source ID	Bulk lbs/acre	PLS
G	Achnatherum hymenoides	Indian Ricegrass	Rimrock	0.50	0.43
G	Agropyron cristatum	Crested Wheatgrass	Hycrest	1.11	0.92
G	Agropyron cristatum	Crested Wheatgrass	VNS	1.11	0.96
G	Agropyron fragile	Siberian Wheatgrass	Vavilov	1.11	1.00
G	Psathyrostachys juncea	Russian Wildrye	Bozoisky	1.11	0.93
G	Pseudoroegneria spicata	Bluebunch Wheatgrass	Anatone	0.83	0.71
G	Thinopyrum intermedium	Pubescent Wheatgrass		0.83	0.70
F	Medicago sativa	Alfalfa	Ladak	0.42	0.38
F	Medicago sativa	Alfalfa	Ranger	0.42	0.37
F	Medicago sativa	Alfalfa	Spreador 4	0.42	0.40
F	Melilotus officinalis	Yellow Sweetclover		0.17	0.14
F	Onobrychis viciifolia	Sainfoin	Eski	1.94	1.79
F	Sanguisorba minor	Small Burnet	Delar	1.94	1.81
Mix Name			Application Type	Application Date	Acres
Bennion Ranch Dribbler Mix			Dribbler	Dec 2006	320
Type	Species	Common Name	Cultivar/Source ID	Bulk lbs/acre	PLS
S	Atriplex canescens	Fourwing Saltbush	Juab/Millard UT	0.31	0.12
S	Purshia tridentata	Bitterbrush	Millard UT	0.16	0.12

**Wildlife Habitat and Vegetation History****Table 19R-07.3 - 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-07.4 - 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	Yellow Rabbitbrush/Perennial Grass	Phase I
2014	Yellow Rabbitbrush/Perennial Grass	Phase I
2018	Yellow Rabbitbrush/Perennial Grass	Phase I

**Site Notes**

No Notes

**Soils****Table 19R-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
Silt Loam	7.5	28.2	56.0	15.8	1.7	10.3	316.8	0.6	06/21/2006

**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.

Upon study establishment in 2006, the plant community on this site was dominated by mountain big sagebrush (*Artemisia tridentata* ssp. *vaseyana*). Sagebrush cover decreased substantially following a chaining and seeding treatment later that year (Table 19R-07.1), while yellow rabbitbrush (*Chrysothamnus viscidiflorus* ssp. *viscidiflorus* var. *viscidiflorus*) cover increased and became a dominant site component in 2010 (Table 19R-07.12, Table 19R-07.13). The herbaceous understory has remained abundant and diverse, with perennial grasses being a co-dominant vegetation component in all post-treatment sample years (Table 19R-07.7). Cheatgrass (*Bromus tectorum*) and Utah juniper (*Juniperus osteosperma*) are both present on the site as of 2018. Although they have been observed in low amounts, their presence indicates that there may be possible threats to the ecological resilience of the plant community in the future (Table 19R-07.10, Table 19R-07.14).

**Trend Summary Tables****Table 19R-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
2006	10.7	2.4	0.1	13.2	1.6	-
2010	0.6	6.1	-	1.9	7.1	-
2014	2.7	6.4	0.0	1.9	5.6	0.1
2018	3.1	5.5	-	4.0	6.3	-

**Table 19R-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
2006	65	339	281	136	1.1	15.9	4.1	3.2
2010	89	343	250	137	3.3	20.8	5.7	4.6
2014	82	395	159	122	0.3	19.6	0.4	2.2
2018	46	385	279	167	0.3	18.9	1.6	3.3

**Table 19R-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
2006	45.8	2.0	30.4	0.4	0.1	33.1
2010	35.0	0.2	39.4	1.0	0.6	39.8
2014	36.0	0.6	44.9	0.8	0.0	36.1
2018	41.0	0.3	50.6	1.1	0.1	36.2

**Table 19R-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			
2006	1	5	1	59
2010	3	-	-	12
2014	2	2	-	3
2018	4	2	-	10
Year	Days Use Per Acre (ha)			
2006	5.1 (12.6)	2.7 (6.6)	2.0 (5.0)	-
2010	9.4 (23.3)	-	-	-
2014	4.4 (10.8)	-	-	-
2018	6.5 (16.1)	-	-	-

**Table 19R-07.10 - Grass Species.** Nested frequency and modified Daubenmire average cover by year.

GRASS SPECIES	Achnatherum hymenoides (Indian ricegrass)	Agropyron cristatum <sup>i</sup> (crested wheatgrass)	Bromus tectorum <sup>ai</sup> (cheatgrass)	Elymus elymoides (squirreltail)	Leymus cinereus (basin wildrye)	Pascopyron smithii (western wheatgrass)	Poa bulbosa <sup>i</sup> (bulbous bluegrass)	Poa secunda (Sandberg bluegrass)	Psathyrostachys juncea <sup>i</sup> (Russian wildrye)	Pseudoroegneria spicata (bluebunch wheatgrass)	Thinopyrum intermedium <sup>i</sup> (intermediate wheatgrass)
year	Nested Frequency										
2006	24	-	65	18	-	229	45	212	-	44	6
2010	28	42	89	6	3	177	59	68	3	34	57
2014	31	114	82	10	2	129	99	160	2	85	32
2018	39	95	46	5	6	119	105	151	10	78	71
year	Average Cover (%)										
2006	1.5	-	1.1	0.6	-	4.6	0.8	6.7	-	1.7	0.0
2010	1.6	2.0	3.3	0.3	0.1	10.8	0.7	1.3	0.1	1.8	2.0
2014	1.5	3.9	0.3	0.3	0.1	3.0	1.8	2.4	0.2	4.6	1.6
2018	1.5	3.8	0.3	0.2	0.2	3.4	1.7	2.9	0.2	3.9	1.3

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

**Table 19R-07.11 - Forb Species.** Nested frequency and modified Daubenmire average cover by year.

FORB SPECIES	Agoseris glauca (pale agoseris)	Allium (onion)	Alyssum desertorum <sup>ai</sup> (desert madwort)	Astragalus (milkvetch)	Astragalus convallarius (lesser rushy milkvetch)	Calochortus nuttallii (sego lily)	Camelina microcarpa <sup>ai</sup> (littledod false flax)	Ceratocephala testiculata <sup>ai</sup> (curvseed butterwort)	Cirsium (thistle)	Comandra umbellata (bastard toadflax)	Crepis acuminata (tapertip hawkbeard)	Cymopterus (springparsley)	Ipomopsis congesta (ballhead ipomopsis)	Lactuca serriola <sup>ai</sup> (prickly lettuce)	Lepidium <sup>n</sup> (pepperweed)	Machaeranthera canescens (hoary tansyaster)	Melilotus officinalis <sup>i</sup> (sweetclover)
year	Nested Frequency																
2006	-	7	112	-	19	-	-	262	-	19	8	3	4	-	-	1	-
2010	5	9	225	-	21	1	-	85	-	23	5	11	4	11	1	-	-
2014	1	-	159	-	5	-	-	-	4	28	0	3	5	-	-	2	1
2018	2	-	262	4	8	2	2	92	-	44	12	3	-	-	2	-	-
year	Average Cover (%)																
2006	-	0.0	0.3	-	0.2	-	-	3.9	-	0.2	0.0	0.0	0.0	-	-	0.0	-
2010	0.0	0.1	4.2	-	0.6	0.0	-	1.3	-	0.4	0.1	0.2	0.1	0.1	0.0	-	-
2014	0.0	-	0.4	-	0.1	-	-	-	0.0	0.2	0.0	0.0	0.0	-	-	0.0	0.0
2018	0.0	-	1.1	0.0	0.0	0.0	0.0	0.5	-	0.8	0.3	0.0	-	-	0.0	-	-

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



FORB SPECIES								
Microsteris gracilis <sup>a</sup> (slender phlox)								
Onobrychis vicifolia <sup>i</sup> (sainfoin)								
Phlox austromontana (mountain phlox)								
Phlox longifolia (longleaf phlox)								
Senecio integerrimus <sup>a</sup> (lambstongue ragwort)								
Tragopogon dubius <sup>ai</sup> (yellow salsify)								
Vicia americana (American vetch)								
Zigadenus paniculatus (foothill deathcamas)								
year	Nested Frequency							
2006	-	-	80	7	-	-	23	2
2010	5	5	85	3	5	0	6	0
2014	-	3	93	-	-	-	1	-
2018	-	-	88	1	-	-	33	4
year	Average Cover (%)							
2006	-	-	2.5	0.0	-	-	0.2	0.1
2010	0.0	0.1	2.8	0.0	0.0	0.0	0.1	0.0
2014	-	0.0	1.8	-	-	-	0.0	-
2018	-	-	1.9	0.0	-	-	0.2	0.1

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

**Table 19R-07.12 - Shrub and Tree Species.** Average modified Daubenmire quadrat and line intercept cover by year.

SHRUB SPECIES					
Artemisia tridentata ssp. vaseyana <sup>p</sup> (mountain big sagebrush)					
Chrysothamnus viscidiflorus sp. viscidiflorus var. stenophyllus (yellow rabbitbrush)					
Chrysothamnus viscidiflorus sp. viscidiflorus var. viscidiflorus (yellow rabbitbrush)					
Ericameria nauseosa ssp. nauseosa var. speciosa <sup>p</sup> (rubber rabbitbrush)					
Juniperus osteosperma <sup>t</sup> (Utah juniper)					
year	Line Intercept Cover (%)				
2006	13	0.1	1.5	0.2	-
2010	1.3	0.2	6.9	0.6	-
2014	1.5	-	5.6	0.4	0.1
2018	3.4	0.2	6.1	0.6	-
year	Quadrat Cover (%)				
2006	10.7	0.1	2.2	0.0	0.1
2010	0.6	0.0	6.1	0.0	-
2014	2.6	0.4	6.0	0.1	0.0
2018	2.7	0.6	4.9	0.4	-

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

**Table 19R-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.

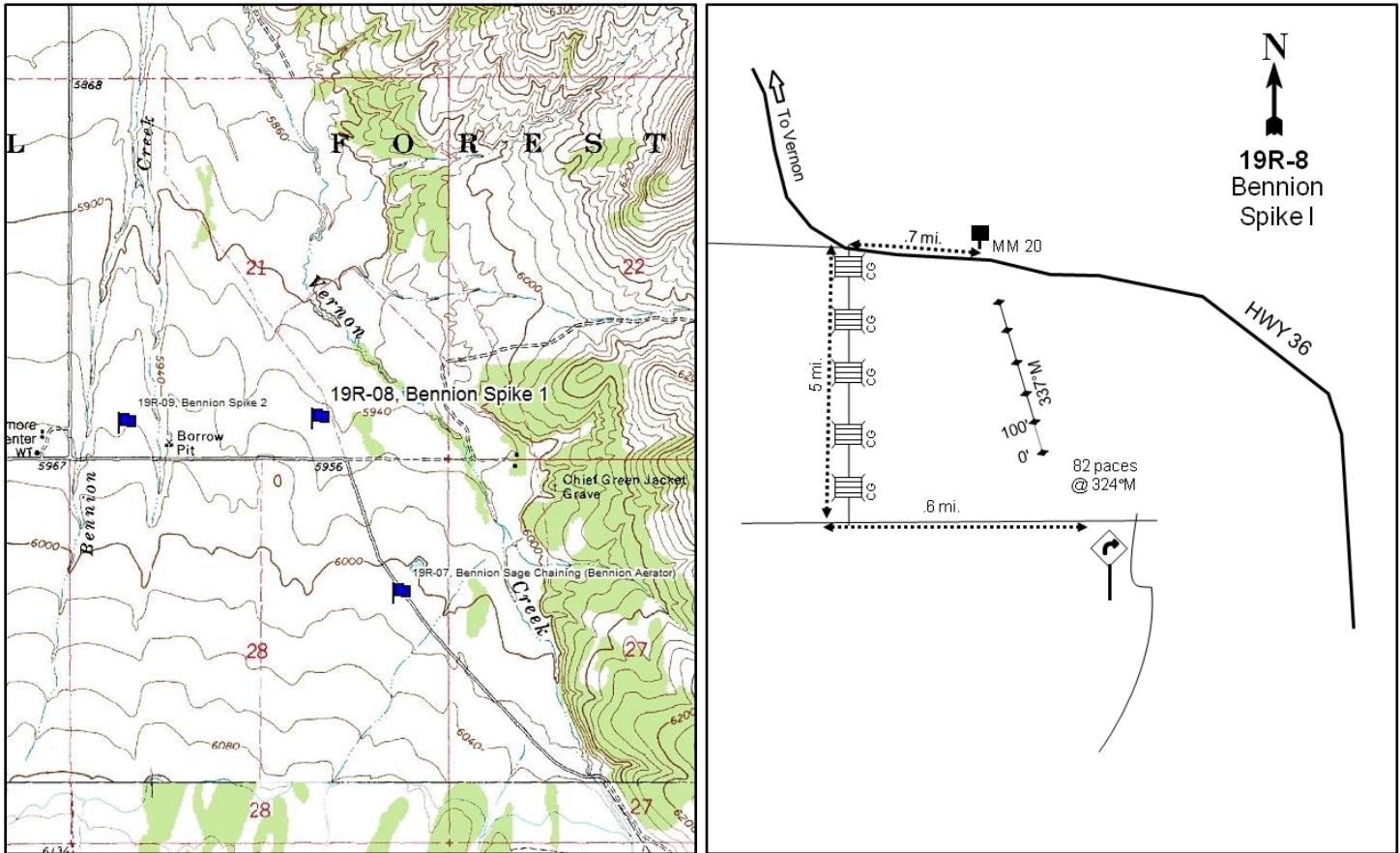
Year	Density		Age Class Distribution			Utilization		Poor Vigor (%)	Average Height Crown (cm)
	Plants Per Acre		Excluding Seedlings			Moderate (%)	Heavy (%)		
	Excluding Seedlings	Seedling	Young (%)	Mature (%)	Decadent (%)				
<b>Artemisia tridentata ssp. vaseyana<sup>p</sup> -- (mountain big sagebrush)</b>									
2006	2140	320	1	47	52	8	0	57	63/81
2010	780	-	31	41	28	3	0	26	52/62
2014	740	-	5	87	8	32	14	14	43/59
2018	640	-	0	94	6	3	0	16	63/79
<b>Bassia prostrata<sup>pi</sup> -- (forage kochia)</b>									
2006	-	-	-	-	-	-	-	-	-/-
2010	-	-	-	-	-	-	-	-	-/-
2014	20	-	0	100	0	100	0	0	24/14
2018	-	-	-	-	-	-	-	-	9/18
<b>Chrysothamnus viscidiflorus ssp. viscidiflorus var. stenophyllus -- (yellow rabbitbrush)</b>									
2006	40	-	0	100	0	0	0	0	32/81
2010	120	-	0	100	0	0	0	0	33/55
2014	80	-	0	100	0	0	0	0	18/29
2018	40	-	100	0	0	0	0	0	29/60
<b>Chrysothamnus viscidiflorus ssp. viscidiflorus var. viscidiflorus -- (yellow rabbitbrush)</b>									
2006	3100	20	15	85	0	0	3	0	24/31
2010	2260	-	3	97	0	0	0	11	34/56
2014	3100	40	1	94	5	5	1	21	27/50
2018	2660	-	5	73	22	1	0	52	32/54
<b>Ericameria nauseosa ssp. nauseosa var. speciosa<sup>p</sup> -- (rubber rabbitbrush)</b>									
2006	20	-	0	100	0	0	0	0	49/48
2010	20	-	0	100	0	0	0	0	61/85
2014	20	-	0	100	0	0	0	0	56/89
2018	20	-	0	100	0	0	0	0	48/86
<b>Gutierrezia sarothrae -- (broom snakeweed)</b>									
2006	-	-	-	-	-	-	-	-	-/-
2010	-	-	-	-	-	-	-	-	-/-
2014	-	-	-	-	-	-	-	-	-/-
2018	-	-	-	-	-	-	-	-	18/23
<b>Juniperus osteosperma<sup>i</sup> -- (Utah juniper)</b>									
2006	20	-	100	0	0	0	0	0	-/-
2010	-	-	-	-	-	-	-	-	-/-
2014	-	20	0	0	0	0	0	0	-/-
2018	20	-	100	0	0	0	0	0	-/-
<b>Opuntia -- (pricklypear)</b>									
2006	-	-	-	-	-	-	-	-	-/-
2010	-	-	-	-	-	-	-	-	-/-
2014	-	-	-	-	-	-	-	-	-/-
2018	-	-	-	-	-	-	-	-	14/28

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

**Table 19R-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' (%)	
<b>Juniperus osteosperma (Utah juniper)</b>							
2006	71	-	55	30	15	-	6.3
2010	36	10	90	-	-	-	3.3
2014	25	-	83	17	-	-	6.6
2018	16	33	67	-	-	-	1.7

## BENNION SPIKE 1 - STUDY NO. 19R-8

**Location Information**

USGS 7.5 min Map Info  
GPS (0' Stake)

Vernon SE; Township 9S, Range 5W, Section 21  
NAD 83 UTM ZONE 12, 379721 East 4430198 North

**Transect Information**

Browse Tag # (0' Stake)	176
Transect Bearing	337° magnetic
Length	500ft
Belt Placement	Line 1 (11ft), Line 2 (34ft), Line 3 (59ft), Line 4 (71ft), Line 5 (95ft)
Belt Marker Placement	No Rebar

**Directions to Site**

From Highway 36 south of Vernon, drive to mile marker 20. From there, drive 0.7 miles to a 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 0.6 miles to a road sign showing a bend in the road: this is the witness post. Walk 82 paces at 324 degrees magnetic from the witness post to the 0-foot stake marked with browse tag #176.

**Site Information**

Land Ownership	Private
Land Administrator	Private
Allotment	BENNION RANCH
Elevation	5,950ft (1,814m)
Aspect	Northeast
Slope	2-4%
Sample Dates	08/14/2006, 08/10/2010, 08/12/2014, 08/08/2018

**Table 19R-08.1 Disturbance History.** Recorded history of major disturbances.

Treatment/Disturbance	Name	WRI DB#	Date	Size (acres)
Hand Crew - Lop and Scatter	Bennion Ranch Lop and Scatter	3408	May 2016	1047
Herbicide - Spike	Bennion Ranch Sage Grouse Demonstration Year 2	396	September 2006	158

**Wildlife Habitat and Vegetation History****Table 19R-08.3 - 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-08.4 - 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	Perennial Grass	Phase I
2014	Perennial Grass	Phase I
2018	Perennial Grass	Phase I

**Site Notes**

No Notes

**Soils****Table 19R-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	7.5	25.2	45.0	29.8	1.9	8.7	467.2	0.6	08/14/2006

**Site Potential**

1981 - 2010 Average Annual Precipitation	14 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.

Upon study establishment in 2006, the plant community on this site was dominated by mountain big sagebrush (*Artemisia tridentata* ssp. *vaseyana*) with a vigorous and diverse perennial grass component; forbs and other browse species contributed little cover. Sagebrush cover decreased significantly following a herbicide treatment in the Fall of 2006 (Table 19R-08.1), although cover of other shrub species is moderate as of 2018 (Table 19R-08.12, Table 19R-08.13). Perennial grasses have been the dominant cover type in all post-treatment samplings. The introduced annual grass species cheatgrass (*Bromus tectorum*) has been present throughout the duration of the study period, but cover has remained relatively low. Forbs have generally remained rare (Table 19R-08.7, Table 19R-08.10, Table 19R-08.11). Utah juniper (*Juniperus osteosperma*) has been observed in all sample years (Photos, Table 19R-08.14). Although the study site is considered to be within Phase I of woodland succession as of 2018 (Table 19R-08.4), further encroachment could be possible in the future.

**Trend Summary Tables****Table 19R-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
2006	8.6	0.2	-	12.2	0.8	0.1
2010	0.9	1.3	0.1	1.9	1.5	0.3
2014	0.2	4.9	-	0.9	4.8	-
2018	0.4	7.9	-	1.4	7.8	-

**Table 19R-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
2006	7	348	282	85	0.1	15.4	3.0	1.7
2010	64	302	271	66	1.2	16.7	6.2	1.5
2014	131	361	168	32	2.9	19.3	4.5	0.5
2018	81	358	159	59	1.6	16.7	0.7	0.9

**Table 19R-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
2006	50.2	2.8	34.9	0.5	0.2	28.3
2010	42.8	4.5	36.7	1.8	0.0	26.9
2014	44.3	3.6	41.8	1.1	0.0	34.3
2018	35.5	1.8	55.1	0.6	0.1	31.6

**Table 19R-08.9 - Pellet Group Data.** Quadrat frequency and pellet group transect data for animal pellets. Rabbit pellet groups are not sampled in the pellet group transect.

Year	Cattle	Mule Deer	Horse	Rabbit
	Quadrat Frequency			
2006	9	2	1	52
2010	5	-	-	6
2014	6	-	-	-
2018	6	1	-	16
Days Use Per Acre (ha)				
2006	18.9 (46.6)	4.0 (9.9)	-	-
2010	9.4 (23.3)	0.7 (1.7)	-	-
2014	19.6 (48.4)	-	-	-
2018	15.3 (37.7)	0.7 (1.7)	1.2 (2.9)	-

**Table 19R-08.10 - Grass Species.** Nested frequency and modified Daubenmire average cover by year.

GRASS SPECIES											
Achnatherum hymenoides (Indian ricegrass)											
Agropyron cristatum <sup>i</sup> (crested wheatgrass)											
Bromus briziformis <sup>ai</sup> (rattlesnake brome)											
Bromus tectorum <sup>ai</sup> (cheatgrass)											
Elymus elymoides (squirreltail)											
Pascopyrum smithii (western wheatgrass)											
Poa bulbosa <sup>i</sup> (bulbous bluegrass)											
Poa secunda (Sandberg bluegrass)											
Psathyrostachys juncea <sup>i</sup> (Russian wildrye)											
Pseudoroegneria spicata (bluebunch wheatgrass)											
Thinopyrum intermedium <sup>i</sup> (intermediate wheatgrass)											
year	Nested Frequency										
2006	15	14	-	7	30	176	-	276	-	19	-
2010	19	11	-	64	24	139	19	111	-	11	71
2014	16	47	2	131	2	155	74	235	-	24	66
2018	4	71	5	81	13	119	86	235	0	28	85
year	Average Cover (%)										
2006	0.5	0.3	-	0.1	0.7	2.7	-	10.6	-	0.7	-
2010	1.1	0.6	-	1.2	1.3	5.6	0.4	4.3	-	0.4	3.1
2014	0.4	1.6	0.0	2.9	0.0	4.1	1.6	6.0	-	1.8	3.7
2018	0.0	3.5	0.0	1.6	0.5	1.8	1.6	6.4	0.0	1.2	1.8

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

**Table 19R-08.11 - Forb Species.** Nested frequency and modified Daubenmire average cover by year.

FORB SPECIES																	
Alyssum desertorum <sup>ai</sup> (desert madwort)																	
Astragalus convallarius (lesser rushy milkvetch)																	
Calochortus nuttallii (sego lily)																	
Ceratocephala testiculata <sup>ai</sup> (curvseed butterwort)																	
Crepis acuminata (tapertip hawkbeard)																	
Cymopterus (springparsley)																	
Erigeron pumilus (shaggy fleabane)																	
Ipomopsis congesta (ballhead ipomopsis)																	
Lactuca serriola <sup>ai</sup> (prickly lettuce)																	
Machaeranthera canescens (hoary tansyaster)																	
Machaeranthera grindelioides (rayless tansyaster)																	
Phlox austromontana (mountain phlox)																	
Phlox longifolia (longleaf phlox)																	
Salsola tragus <sup>ai</sup> (prickly Russian thistle)																	
Tragopogon dubius <sup>ai</sup> (yellow safsify)																	
Zigadenus paniculatus (foothill deathcamas)																	
year	Nested Frequency																
2006	24	5	-	276	3	7	-	-	-	-	-	79	2	-	-	-	
2010	40	9	3	260	4	27	-	-	4	-	-	27	1	1	-	1	
2014	73	9	-	19	3	-	-	1	-	1	1	19	1	104	12	-	
2018	80	0	-	96	31	14	3	-	-	1	-	17	-	-	17	3	
year	Average Cover (%)																
2006	0.1	0.1	-	2.9	0.0	0.0	-	-	-	-	-	1.6	0.0	-	-	-	
2010	1.0	0.3	0.0	5.1	0.2	0.4	-	-	0.1	-	-	0.6	0.0	0.0	-	0.0	
2014	0.2	0.2	-	0.1	0.0	-	-	0.0	-	0.0	0.0	0.1	0.0	4.1	0.1	-	
2018	0.2	0.0	-	0.4	0.3	0.3	0.1	-	-	0.0	-	0.3	-	-	0.1	0.0	

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

**Table 19R-08.12 - Shrub and Tree Species.** Average modified Daubenmire quadrat and line intercept cover by year.

SHRUB SPECIES	Artemisia tridentata ssp. vaseyana <sup>p</sup> (mountain big sagebrush)	Chrysothamnus viscidiflorus ssp. viscidiflorus var. stenophyllus (yellow rabbitbrush)	Chrysothamnus viscidiflorus ssp. viscidiflorus var. viscidiflorus (yellow rabbitbrush)	Ericameria nauseosa (rubber rabbitbrush)	Juniperus osteosperma <sup>i</sup> (Utah juniper)	Opuntia (pricklypear)
year	Line Intercept Cover (%)					
2006	12.2	0.8	-	-	0.1	-
2010	1.9	0.3	1.1	0.1	0.3	-
2014	0.9	0.7	2.2	1.9	-	-
2018	1.4	4.1	0.6	3.1	-	-
year	Quadrat Cover (%)					
2006	8.6	0.2	0.0	-	0.0	-
2010	0.9	0.0	1.0	0.2	0.1	-
2014	0.2	0.2	1.6	3.1	-	0.0
2018	0.4	3.8	0.5	3.6	-	-

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

**Table 19R-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 (%)				
<b>Artemisia tridentata ssp. vaseyana<sup>p</sup> -- (mountain big sagebrush)</b>									
2006	3280	180	0	51	49	6	3	40	72/80
2010	700	20	6	9	86	11	6	89	54/51
2014	480	-	4	50	46	25	4	58	37/49
2018	420	-	0	71	29	0	0	29	51/54
<b>Chrysothamnus viscidiflorus ssp. viscidiflorus var. stenophyllus -- (yellow rabbitbrush)</b>									
2006	240	60	0	100	0	17	0	0	28/36
2010	-	-	-	-	-	-	-	-	38/51
2014	580	-	52	48	0	7	0	3	23/35
2018	2620	-	2	93	5	5	0	36	31/42
<b>Chrysothamnus viscidiflorus ssp. viscidiflorus var. viscidiflorus -- (yellow rabbitbrush)</b>									
2006	-	-	-	-	-	-	-	-	35/48
2010	1160	40	47	52	2	0	0	2	29/44
2014	1880	-	13	86	1	0	0	5	22/40
2018	420	-	0	81	19	0	0	29	29/39
<b>Ericameria nauseosa -- (rubber rabbitbrush)</b>									
2006	-	-	-	-	-	-	-	-	-/-
2010	220	80	82	18	0	0	0	0	66/71
2014	640	-	3	91	6	0	0	6	50/63
2018	900	-	4	91	4	4	0	11	47/61
<b>Gutierrezia sarothrae -- (broom snakeweed)</b>									
2006	-	-	-	-	-	-	-	-	-/-
2010	-	-	-	-	-	-	-	-	-/-
2014	-	-	-	-	-	-	-	-	33/35
2018	-	-	-	-	-	-	-	-	35/35



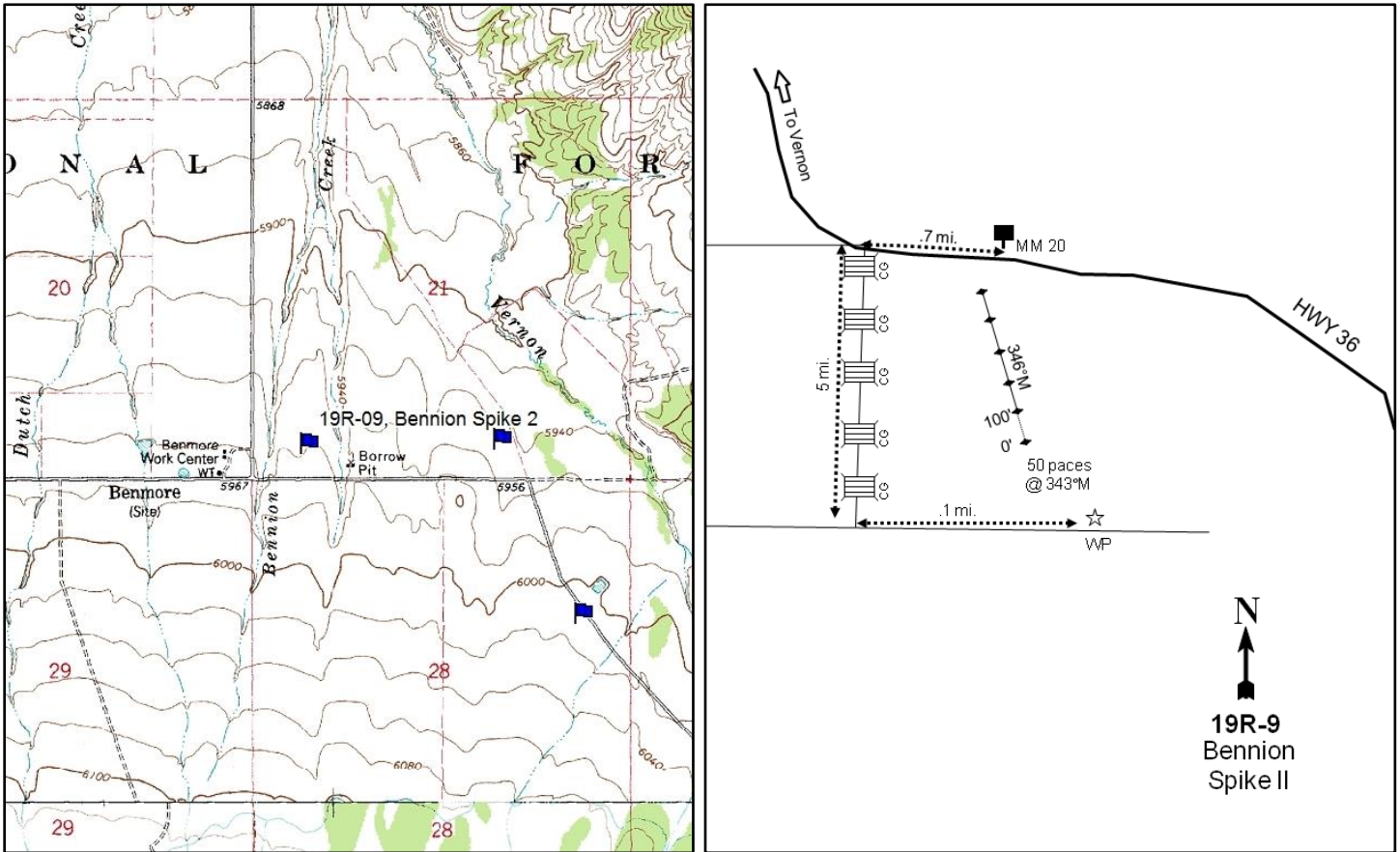
Year	Density		Age Class Distribution			Utilization		Poor Vigor (%)	Average Height Crown (cm)
	Plants Per Acre		Excluding Seedlings			Moderate (%)	Heavy (%)		
	Excluding Seedlings	Seedling	Young (%)	Mature (%)	Decadent (%)				
<b>Juniperus osteosperma<sup>1</sup> -- (Utah juniper)</b>									
2006	40	20	50	50	0	0	0	50	- / -
2010	40	-	100	0	0	0	0	0	- / -
2014	-	-	-	-	-	-	-	-	- / -
2018	-	-	-	-	-	-	-	-	- / -
<b>Linanthus pungens -- (granite prickly phlox)</b>									
2006	-	-	-	-	-	-	-	-	- / -
2010	20	-	100	0	0	0	0	0	- / -
2014	-	-	-	-	-	-	-	-	- / -
2018	-	-	-	-	-	-	-	-	- / -
<b>Opuntia -- (pricklypear)</b>									
2006	-	-	-	-	-	-	-	-	- / -
2010	-	-	-	-	-	-	-	-	15/37
2014	20	-	100	0	0	0	0	0	16/44
2018	-	-	-	-	-	-	-	-	10/27

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

**Table 19R-08.14 - Tree Characteristics.** Point-quarter tree density, size class distribution, and average diameter.

Year	Density	Size Class Distribution					Average Diameter (cm)
	Trees per Acre	Seedling (%)	1-4' (%)	4-8' (%)	8-12' (%)	>12' (%)	
<b>Juniperus osteosperma (Utah juniper)</b>							
2018	40	-	100	-	-	-	2.3

## BENNION SPIKE 2 - STUDY NO. 19R-9



### Location Information

USGS 7.5 min Map Info  
GPS (0' Stake)

Vernon SE; Township 9S, Range 5W, Section 21  
NAD 83 UTM ZONE 12, 378898 East 4430193 North

### Transect Information

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

174  
346° magnetic  
500ft  
Line 1 (11ft), Line 2 (34ft), Line 3 (59ft), Line 4 (71ft), Line 5 (95ft)  
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 0.1 miles to a witness post on the left (north) side of the road. Walk 55 paces at 343 degrees magnetic from the witness post to the 0-foot stake marked with browse tag #174.

**Site Information**

Land Ownership	Private
Land Administrator	Private
Allotment	BENNION RANCH
Elevation	5,950ft (1,814m)
Aspect	North
Slope	2%
Sample Dates	08/17/2006, 08/10/2010, 08/12/2014, 08/08/2018

**Table 19R-09.1 Disturbance History.** Recorded history of major disturbances.

Treatment/Disturbance	Name	WRI DB#	Date	Size (acres)
Mechanical - Mower	-	-	May-June 2018	-
Herbicide - Spike	Bennion Ranch Sage Grouse Demonstration Year 2	396	September 2006	158

**Wildlife Habitat and Vegetation History****Table 19R-09.3 - 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-09.4 - 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	No Encroachment
2010	Perennial Grass	No Encroachment
2014	Perennial Grass	No Encroachment
2018	Perennial Grass	No Encroachment

**Site Notes**

No Notes

**Soils****Table 19R-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
Clay Loam	7.6	33.2	36.0	30.8	1.6	21.2	336.0	0.6	08/17/2006

**Site Potential**

1981 - 2010 Average Annual Precipitation	14 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.

Upon study establishment in 2006, the plant community on this site was dominated by mountain big sagebrush (*Artemisia tridentata* ssp. *vaseyana*) with few other browse species present. Sagebrush cover exhibited a significant decrease following the herbicide treatment in 2006, and no cover was observed following a 2018 mower treatment (Table 19R-09.1, Table 19R-09.12). The herbaceous understory was initially sparse. However, perennial grasses increased following treatment and have been the dominant vegetation component since 2010, with the introduced species crested wheatgrass (*Agropyron cristatum*) providing most of the cover. Cheatgrass (*Bromus tectorum*) and bulbous bluegrass (*Poa bulbosa*) have been observed in all sample years. Although cover of both species is low as of 2018, an increase of these grasses could potentially threaten the ecological resilience of the plant community in the future. Forbs have remained rare in most sample years (Table 19R-09.7, Table 19R-09.10, Table 19R-09.11).

**Trend Summary Tables****Table 19R-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
2006	11.1	0.0	-	18.7	-	-
2010	0.1	0.2	-	0.4	-	-
2014	-	1.6	-	0.1	2.2	-
2018	-	0.4	-	-	0.1	-

**Table 19R-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
2006	19	253	239	29	0.1	4.9	1.0	0.7
2010	59	295	295	6	0.9	20.0	10.8	0.1
2014	73	404	152	2	1.2	24.5	1.6	0.0
2018	27	359	13	7	0.1	25.6	0.0	0.0

**Table 19R-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
2006	53.8	2.9	35.9	2.4	0.6	15.1
2010	42.2	0.6	39.6	2.1	1.1	29.4
2014	40.6	0.7	43.8	1.6	0.6	32.1
2018	28.9	0.2	65.8	0.9	0.9	28.9

**Table 19R-09.9 - Pellet Group Data.** Quadrat frequency and pellet group transect data for animal pellets. Rabbit pellet groups are not sampled in the pellet group transect.

Year	Cattle	Mule Deer/Pronghorn	Rabbit
	Quadrat Frequency		
2006	1	-	86
2010	2	-	16
2014	2	-	-
2018	-	4	9
Days Use Per Acre (ha)			
2006	12.3 (30.5)	0.7 (1.7)	-
2010	6.5 (16.1)	-	-
2014	-	-	-
2018	2.9 (7.2)	-	-

**Table 19R-09.10 - Grass Species.** Nested frequency and modified Daubenmire average cover by year.

GRASS SPECIES								
Achnatherum hymenoides (Indian ricegrass)								
Agropyron cristatum <sup>i</sup> (crested wheatgrass)								
Bromus briziformis <sup>ai</sup> (rattlesnake brome)								
Bromus tectorum <sup>ai</sup> (cheatgrass)								
Elymus elymoides (squirreltail)								
Pascopyrum smithii (western wheatgrass)								
Poa bulbosa <sup>i</sup> (bulbous bluegrass)								
Poa secunda (Sandberg bluegrass)								
year	Nested Frequency							
2006	6	132	-	19	13	82	-	102
2010	4	213	3	56	3	57	116	27
2014	1	233	-	73	-	69	205	123
2018	1	309	-	27	15	64	41	60
year	Average Cover (%)							
2006	0.1	3.4	-	0.1	0.3	0.3	-	0.9
2010	0.4	12.0	0.0	0.9	0.0	3.1	3.5	1.0
2014	0.0	11.2	-	1.2	-	3.1	6.3	3.9
2018	0.0	22.2	-	0.1	0.2	1.3	0.6	1.3

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

**Table 19R-09.11 - Forb Species.** Nested frequency and modified Daubenmire average cover by year.

FORB SPECIES														
Alyssum desertorum <sup>ai</sup> (desert madwort)														
Arenaria (sandwort)														
Argemone corymbosa <sup>a</sup> (Mojave pricklypoppy)														
Ceratocephala testiculata <sup>ai</sup> (curviseed butterwort)														
Crepis acuminata (tapertip hawkbeard)														
Descurainia pinnata <sup>a</sup> (western tansymustard)														
Lactuca serriola <sup>ai</sup> (prickly lettuce)														
Lygodesmia (skeletonplant)														
Phlox austromontana (mountain phlox)														
Salsola tragus <sup>ai</sup> (prickly Russian thistle)														
Senecio integerrimus <sup>a</sup> (lambstongue ragwort)														
Sphaeralcea grossularifolia (gooseberryleaf globemallow)														
Tragopogon dubius <sup>ai</sup> (yellow safsify)														
Zigadenus paniculatus (foothill deathcamas)														
year	Nested Frequency													
2006	128	4	-	212	3	-	-	-	21	-	-	-	-	1
2010	214	-	1	225	1	3	6	1	2	-	1	2	-	-
2014	149	-	-	6	-	1	-	-	-	7	-	2	4	-
2018	7	-	-	6	3	-	-	-	-	-	-	-	3	4
year	Average Cover (%)													
2006	0.3	0.0	-	0.7	0.0	-	-	-	0.7	-	-	-	-	0.0
2010	6.0	-	0.0	4.6	0.0	0.0	0.2	0.0	0.1	-	0.0	0.0	-	-
2014	1.2	-	-	0.0	-	0.0	-	-	-	0.4	-	0.0	0.0	-
2018	0.0	-	-	0.0	0.0	-	-	-	-	-	-	-	0.0	0.0

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

**Table 19R-09.12 - Shrub and Tree Species.** Average modified Daubenmire quadrat and line intercept cover by year.

SHRUB SPECIES	Line Intercept Cover (%)		
	Artemisia tridentata ssp. vaseyana <sup>p</sup> (mountain big sagebrush)	Ericameria nauseosa (rubber rabbitbrush)	Tetradymia canescens (spineless horsebrush)
year	Line Intercept Cover (%)		
2006	18.7	-	-
2010	0.4	-	-
2014	0.1	2.2	-
2018	-	-	0.1
year	Quadrat Cover (%)		
2006	11.1	-	0.0
2010	0.1	0.1	0.0
2014	0.0	1.6	-
2018	-	-	0.4

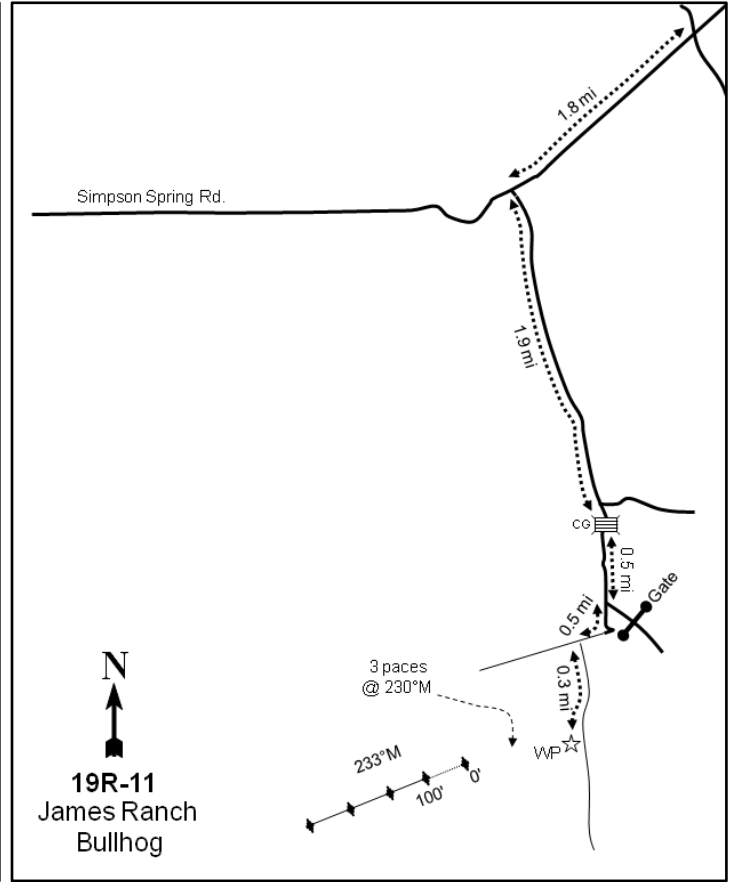
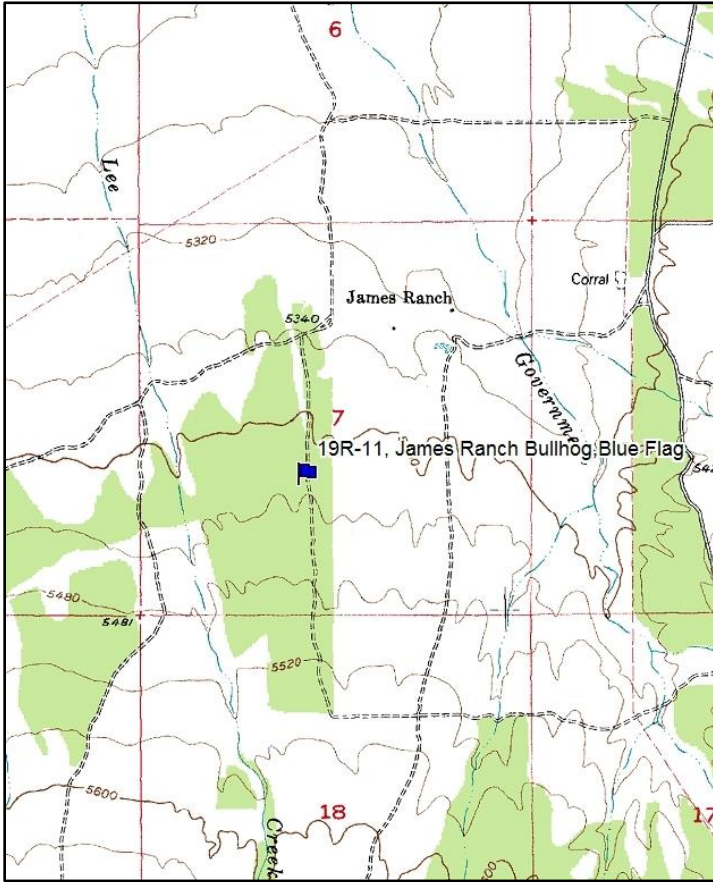
t - Tree Species; p - Preferred Browse; i - Introduced Species

**Table 19R-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 (%)				
<b>Amelanchier utahensis<sup>p</sup> -- (Utah serviceberry)</b>									
2006	40	-	0	0	100	0	0	100	- / -
2010	-	-	-	-	-	-	-	-	- / -
2014	-	-	-	-	-	-	-	-	- / -
2018	-	-	-	-	-	-	-	-	- / -
<b>Artemisia tridentata ssp. vaseyana<sup>p</sup> -- (mountain big sagebrush)</b>									
2006	2800	180	8	51	41	5	0	26	74/100
2010	160	20	25	25	50	0	13	63	38/34
2014	40	-	100	0	0	0	0	0	45/52
2018	20	-	0	100	0	0	0	0	27/46
<b>Chrysothamnus viscidiflorus ssp. viscidiflorus var. viscidiflorus -- (yellow rabbitbrush)</b>									
2006	-	-	-	-	-	-	-	-	- / -
2010	-	-	-	-	-	-	-	-	38/59
2014	-	-	-	-	-	-	-	-	43/53
2018	-	-	-	-	-	-	-	-	- / -
<b>Ericameria nauseosa -- (rubber rabbitbrush)</b>									
2006	-	-	-	-	-	-	-	-	- / -
2010	40	-	100	0	0	0	0	0	51/59
2014	420	-	5	91	5	0	0	5	54/70
2018	-	-	-	-	-	-	-	-	29/70
<b>Tetradymia canescens -- (spineless horsebrush)</b>									
2006	40	-	0	0	100	0	100	100	39/65
2010	20	-	0	0	100	0	0	100	39/61
2014	-	-	-	-	-	-	-	-	31/57
2018	100	-	0	80	20	0	100	20	24/36

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

## JAMES RANCH BULLHOG - STUDY NO. 19R-11



### Location Information

USGS 7.5 min Map Info  
GPS (0' Stake)

Indian Peaks SE; Township 9S, Range 7W, Section 07  
NAD 83 UTM ZONE 12, 356907 East 4434229 North

### Transect Information

Browse Tag # (0' Stake)	230
Transect Bearing	233° 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 Erickson Pass and Simpson Springs Road, proceed west on Simpson Springs Road for 1.8 miles to a road on the left. Turn left and follow this road for 1.8 miles to a fork, keeping right. Continue 0.1 miles to a cattle guard, and then drive 0.5 miles to a fork and go right (the left fork leads to a gate). From here, proceed for 0.5 miles and stay left at the fork. Drive 0.3 miles to the witness post on the right (west) side of the road. The 0-foot stake is 30 paces away from the witness post at 230 degrees magnetic and is marked with browse tag #230.



**Site Information**

Land Ownership	Federal
Land Administrator	BLM
Allotment	GOVERNMENT CREEK
Elevation	5,460ft (1,664m)
Aspect	Northeast
Slope	3-5%
Sample Dates	07/02/2008, 08/29/2011, 07/29/2015, 08/09/2018

**Table 19R-11.1 Disturbance History.** Recorded history of major disturbances.

Treatment/Disturbance	Name	WRI DB#	Date	Size (acres)
Mechanical - Bullhog	James Ranch Juniper Bullhog	1131	February-March 2009	473

**Wildlife Habitat and Vegetation History**

**Table 19R-11.3 - Wildlife Seasonal Habitat.** UDWR wildlife habitat and seasonality.

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

**Table 19R-11.4 - Vegetation History.** The dominant vegetation type(s) and phase of woodland succession (Tausch, Miller, Roundy, & Chambers, 2009).

Year	Vegetation Type	Woodland Succession
2008	Juniper	Phase II
2011	Perennial Grass/Mountain Big Sagebrush	Phase I
2015	Perennial Grass/Mountain Big Sagebrush	Phase I
2018	Mountain Big Sagebrush/Perennial Grass	Phase I

**Site Notes**

No Notes

**Site Potential**

1981 - 2010 Average Annual Precipitation	13 inches
NRCS Ecological Site	Upland Loam (Mountain Big Sagebrush)
NRCS Ecological Site #	R028AY310UT
States and Transitions	No state and transition model is available for this ecological site.

This site was established in 2008 and was in Phase II of woodland succession with a plant community mainly comprised of Utah juniper (*Juniperus osteosperma*) (Table 19R-11.6); other shrub species such as mountain big sagebrush (*Artemisia tridentata* ssp. *vaseyana*) were also present to a lesser extent. Cover of sagebrush increased each sample year following the mastication treatment, and it has been a co-dominant vegetation component since 2011 (Table 19R-11.4, Table 19R-11.12). Perennial grasses also increased in cover and have been considered to be co-dominant site components in all post-treatment sample years. However, perennial grass cover did decrease between 2015 and 2018. The introduced annual grass cheatgrass (*Bromus tectorum*) has fluctuated in cover. Although cheatgrass cover is low as of 2018, it could pose a threat to the ecological resilience of the plant community if future increases occur (Table 19R-11.7, Table 19R-11.10). Furthermore, point-quarter data shows an increase in juniper density between 2015 and 2018, indicating the site could be prone to infilling over time (Table 19R-11.14).

**Trend Summary Tables**

**Table 19R-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
2008	3.4	0.0	11.5	4.4	0.2	24.1
2011	3.5	0.1	-	5.9	1.1	-
2015	6.1	2.2	-	9.0	2.7	-
2018	7.9	2.1	-	12.4	3.1	-

**Table 19R-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
2008	58	279	221	24	0.3	8.5	0.6	0.3
2011	143	279	244	20	1.7	15.5	4.5	0.4
2015	255	269	187	26	7.3	11.1	1.1	0.4
2018	116	254	159	47	3.4	7.9	0.7	1.3

**Table 19R-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
2008	30.9	6.3	44.5	12.6	1.1	24.3
2011	27.1	1.9	43.4	3.8	0.3	25.7
2015	29.9	1.1	49.3	4.1	1.3	27.5
2018	28.8	0.6	57.2	4.4	1.9	24.6

**Table 19R-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/Pronghorn	Rabbit
	Quadrat Frequency		
2008	4	2	86
2011	2	1	13
2015	2	1	18
2018	1	1	19
Days Use Per Acre (ha)			
2008	4.4 (10.8)	7.4 (18.2)	-
2011	8.7 (21.5)	2.0 (5.0)	-
2015	3.6 (9.0)	1.3 (3.3)	-
2018	8.7 (21.5)	1.3 (3.3)	-

**Table 19R-11.10 - Grass Species.** Nested frequency and modified Daubenmire average cover by year.

GRASS SPECIES	Nested Frequency				
Achnatherum hymenoides (Indian ricegrass)	11	58	68	248	18
Bromus tectorum <sup>ai</sup> (cheatgrass)	4	143	106	227	28
Elymus elymoides (squirreltail)	3	255	184	103	35
Poa secunda (Sandberg bluegrass)	9	116	171	115	16
Pseudoroegneria spicata (bluebunch wheatgrass)	Average Cover (%)				
year	0.4	0.3	2.1	5.3	0.6
2008	0.1	1.7	3.8	11.1	0.5
2011	0.0	7.3	6.8	3.0	1.2
2015	0.4	3.4	5.0	1.5	1.0
2018					

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

**Table 19R-11.11 - Forb Species.** Nested frequency and modified Daubenmire average cover by year.

FORB SPECIES	Nested Frequency																	
Alyssum desertorum <sup>ai</sup> (desert madwort)	33	6	1	3	206	-	-	-	1	-	3	4	-	1	7	3	4	
Antennaria (pussytoes)	106	4	1	6	210	-	1	-	1	0	2	-	7	3	8	-	-	
Astragalus (milkvetch)	187	16	-	1	-	3	-	6	-	-	-	-	-	4	5	-	-	
Calochortus nuttallii (sego lily)	154	2	5	4	28	6	-	9	-	-	10	-	-	9	18	-	-	
Ceratocephala testiculata <sup>ai</sup> (curvseed butterwort)	Average Cover (%)																	
Chaenactis douglasii (Douglas' dustymaiden)	0.1	0.0	0.0	0.0	0.4	-	-	-	0.0	-	0.0	0.0	-	0.2	0.1	0.0	0.0	
Cirsium (thistle)	0.5	0.0	0.0	0.0	4.0	-	0.1	-	0.0	0.0	0.0	-	0.1	0.1	0.1	-	-	
Comandra umbellata (bastard toadflax)	1.1	0.2	-	0.0	-	0.0	-	0.0	-	-	-	-	-	0.1	0.1	-	-	
Descurainia pinnata <sup>a</sup> (western tansymustard)	0.5	0.0	0.1	0.0	0.1	0.0	-	0.2	-	-	0.0	-	-	0.4	0.6	-	-	
Erigeron (fleabane)																		
Eriogonum ovalifolium (cushion buckwheat)																		
Gilia inconspicua <sup>a</sup> (shy gilia)																		
Lactuca serriola <sup>ai</sup> (prickly lettuce)																		
Petrorhiza pumila (rock goldenrod)																		
Phlox hoodii (spiny phlox)																		
Phlox longifolia (longleaf phlox)																		
Zigadenus paniculatus (foothill deathcamas)																		

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

**Table 19R-11.12 - Shrub and Tree Species.** Average modified Daubenmire quadrat and line intercept cover by year.

SHRUB SPECIES	Artemisia tridentata ssp. vaseyana <sup>p</sup> (mountain big sagebrush)	Chrysothamnus viscidiflorus (yellow rabbitbrush)	Gutierrezia sarothrae (broom snakeweed)	Juniperus osteosperma <sup>i</sup> (Utah juniper)	Linanthus pungens (granite prickly phlox)
year	Line Intercept Cover (%)				
2008	4.4	0.2	-	24.1	-
2011	5.9	1.1	-	-	-
2015	9	2.7	-	-	-
2018	12.4	2	1.1	-	-
year	Quadrat Cover (%)				
2008	3.4	0.0	-	11.5	-
2011	3.5	0.1	-	-	-
2015	6.1	2.2	-	-	-
2018	7.9	1.6	0.5	-	0.0

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

**Table 19R-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 (%)				
<b>Artemisia tridentata ssp. vaseyana<sup>p</sup> -- (mountain big sagebrush)</b>									
2008	860	60	7	19	74	16	23	63	54/72
2011	1720	1260	45	36	19	4	0	17	55/75
2015	5620	460	66	31	3	61	10	8	48/71
2018	4640	1280	40	55	5	0	0	4	49/60
<b>Chrysothamnus viscidiflorus -- (yellow rabbitbrush)</b>									
2008	140	-	0	57	43	0	29	14	19/17
2011	640	560	38	63	0	0	0	0	30/41
2015	3400	140	58	28	14	0	0	81	29/44
2018	3600	40	62	37	1	0	0	1	26/36
<b>Ericameria nauseosa -- (rubber rabbitbrush)</b>									
2008	-	-	-	-	-	-	-	-	-/-
2011	-	-	-	-	-	-	-	-	-/-
2015	20	-	100	0	0	100	0	0	57/70
2018	20	-	0	100	0	0	0	0	53/69
<b>Gutierrezia sarothrae -- (broom snakeweed)</b>									
2008	-	-	-	-	-	-	-	-	-/-
2011	-	-	-	-	-	-	-	-	-/-
2015	60	-	0	100	0	0	0	0	14/47
2018	620	-	0	100	0	0	0	0	26/35
<b>Juniperus osteosperma<sup>i</sup> -- (Utah juniper)</b>									
2008	120	-	0	50	50	0	0	17	-/-
2011	-	-	-	-	-	-	-	-	-/-
2015	-	-	-	-	-	-	-	-	-/-
2018	-	-	-	-	-	-	-	-	-/-

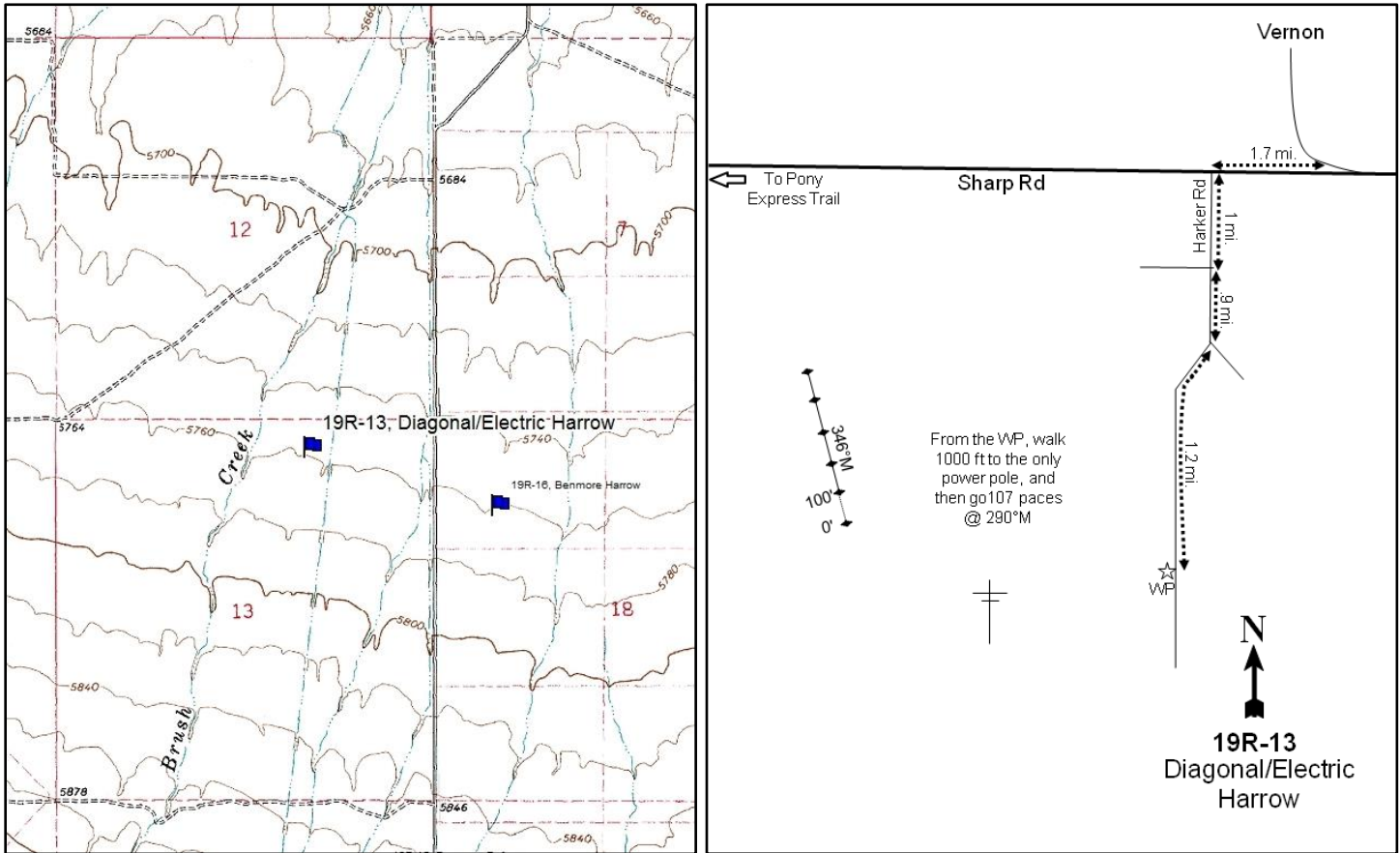
Year	Density		Age Class Distribution			Utilization		Poor Vigor (%)	Average Height Crown (cm)
	Plants Per Acre		Excluding Seedlings			Moderate (%)	Heavy (%)		
	Excluding Seedlings	Seedling	Young (%)	Mature (%)	Decadent (%)				
Linanthus pungens -- (granite prickly phlox)									
2008	-	-	-	-	-	-	-	-	26/29
2011	-	-	-	-	-	-	-	-	-/-
2015	-	-	-	-	-	-	-	-	27/32
2018	-	-	-	-	-	-	-	-	15/16

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

**Table 19R-11.14 - Tree Characteristics.** Point-quarter tree density, size class distribution, and average diameter.

Year	Density	Size Class Distribution					Average Diameter (cm)
	Trees per Acre	Seedling (%)	1-4' (%)	4-8' (%)	8-12' (%)	>12' (%)	
Juniperus osteosperma (Utah juniper)							
2008	110	-	16	11	47	26	27.6
2011	29	27	73	-	-	-	3.0
2015	39	46	54	-	-	-	2.1
2018	71	25	58	17	-	-	5.4

## DIAGONAL/ELECTRIC HARROW - STUDY NO. 19R-13

**Location Information**

USGS 7.5 min Map Info  
GPS (0' Stake)

Vernon SW; Township 9S, Range 6W, Section 13  
NAD 83 UTM ZONE 12, 374946 East 4433229 North

**Transect Information**

Browse Tag # (0' Stake)	655
Transect Bearing	175° magnetic
Length	400ft
Belt Placement	Line 1 (11ft & 95ft), Line 2 (34ft), Line 3 (59ft), Line 4 (71ft)
Belt Marker Placement	No Rebar

**Directions to Site**

From Vernon, drive 1.7 miles on Sharp Road (leads to the Pony Express Trail). Turn left onto Harker Road and drive 1.0 miles to a fork. Stay left and drive 0.9 miles to another fork. Keep to the right and drive 1.2 miles to the witness post on the right (west) side of the road. From the witness post, walk 1,000 feet to the only powerpole, then go 107 paces at 290 degrees magnetic to the 0-foot stake; there is no browse tag.

**Site Information**

Land Ownership	Federal
Land Administrator	USFS
Allotment	VERNON
Elevation	5,697ft (1,736m)
Aspect	North
Slope	1-3%
Sample Dates	08/05/2008, 07/20/2009, 08/09/2010, 08/12/2014, 08/06/2018

**Table 19R-13.1 Disturbance History.** Recorded history of major disturbances.

Treatment/Disturbance	Name	WRI DB#	Date	Size (acres)
Harrow - Two-Way Dixie	Diagonal-Electric Sagebrush Improvement	659	November 2008-March 2009	993
Seeding - Broadcast Before	Diagonal-Electric Sagebrush Improvement	659	November 2008-March 2009	993

**Table 19R-13.2 Seed Mix.** List of known seeded plant species and rates (if available).

Mix Name			Application Type	Application Date	Acres
Diagonal-Electric Sagebrush Improvement			Broadcast	Nov 2008	1000
Type	Species	Common Name	Cultivar/Source ID	Bulk lbs/acre	PLS
G	<i>Achnatherum hymenoides</i>	Indian Ricegrass	Rimrock	1.50	1.38
G	<i>Elymus wawawaiensis</i>	Snake River Wheatgrass	Secar	0.64	0.49
G	<i>Elymus wawawaiensis</i>	Snake River Wheatgrass	Secar	0.35	0.32
G	<i>Leymus cinereus</i>	Great Basin Wildrye	Trailhead	0.08	0.07
G	<i>Leymus cinereus</i>	Great Basin Wildrye	Trailhead	0.90	0.77
G	<i>Pascopyrum smithii</i>	Western Wheatgrass	Arriba	2.00	1.74
G	<i>Pseudoroegneria spicata</i>	Bluebunch Wheatgrass	Anatone	1.30	0.93
G	<i>Pseudoroegneria spicata</i>	Bluebunch Wheatgrass	Anatone	0.70	0.57
F	<i>Achillea millefolium</i>	Western Yarrow		0.10	0.10
F	<i>Cleome serrulata</i>	Rocky Mountain Beeplant	Sevier UT	0.25	0.23
F	<i>Linum perenne</i>	Blue Flax	Appar	0.50	0.45
F	<i>Medicago sativa</i>	Alfalfa	Ladak	1.50	1.36
F	<i>Onobrychis viciifolia</i>	Sainfoin	Eski	3.00	2.63
F	<i>Sanguisorba minor</i>	Small Burnet	Delar	0.90	0.88
F	<i>Sanguisorba minor</i>	Small Burnet	Delar	0.65	0.54
F	<i>Sanguisorba minor</i>	Small Burnet	Delar	0.45	0.40

**Wildlife Habitat and Vegetation History****Table 19R-13.3 - 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-13.4 - Vegetation History.** The dominant vegetation type(s) and phase of woodland succession (Tausch, Miller, Roundy, & Chambers, 2009).

Year	Vegetation Type	Woodland Succession
2008	Mountain Big Sagebrush	No Encroachment
2009	Perennial Grass	No Encroachment
2010	Mountain Big Sagebrush/Perennial Grass	No Encroachment
2014	Mountain Big Sagebrush/Perennial Grass	No Encroachment
2018	Mountain Big Sagebrush/Perennial Grass	No Encroachment

**Site Notes**

No Notes

**Site Potential**

1981 - 2010 Average Annual Precipitation	12 inches
NRCS Ecological Site	Upland Loam (Mountain Big Sagebrush)
NRCS Ecological Site #	R028AY310UT
States and Transitions	No state and transition model is available for this ecological site.

When established in 2008, this study site was dominated by mountain big sagebrush (*Artemisia tridentata* ssp. *vaseyana*). Cover of sagebrush exhibited an initial decrease following the harrow and seeding treatment, but increased in each subsequent sample year;



sagebrush has been a co-dominant vegetation component since 2010 (Table 19R-13.1, Table 19R-13.12, Table 19R-13.13). The herbaceous understory has generally remained abundant, but not very diverse. Perennial grasses -- particularly the introduced species crested wheatgrass (*Agropyron cristatum*) -- decreased in the first sample year following treatment, but have been a co-dominant vegetation component in all post-treatment sample years. Forbs have fluctuated, but have generally remained rare (Table 19R-13.7, Table 19R-13.10, Table 19R-13.11).

**Trend Summary Tables****Table 19R-13.6 - Shrub/Tree Summary.** Average modified Daubenmire quadrat and line intercept cover by year for shrubs/trees

Year	Quadrat Cover (%)			Line-intercept Cover (%)		
	Preferred Shrub	Other Shrub	Tree	Preferred Shrub	Other Shrub	Tree
2008	8.3	0.2	-	12.8	-	-
2009	3.3	0.1	-	3.4	-	-
2010	4.5	0.1	-	6.1	-	-
2014	5.4	0.5	-	6.9	-	-
2018	8.6	0.1	-	9.4	0.2	-

**Table 19R-13.7 - Herbaceous Summary.** Nested frequency and average modified Daubenmire quadrat cover by year for herbaceous functional groups

Year	Nested Frequency				Quadrat Cover (%)			
	Annual Grass	Perennial Grass	Annual/Biennial Forb	Perennial Forb	Annual Grass	Perennial Grass	Annual/Biennial Forb	Perennial Forb
2008	-	347	266	48	-	16.5	1.4	0.4
2009	3	246	318	52	0.0	6.2	4.2	0.4
2010	-	282	358	53	-	13.0	8.2	1.5
2014	-	334	37	39	-	19.5	0.1	0.8
2018	1	330	138	36	0.0	17.6	1.7	1.2

**Table 19R-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
2008	40.4	11.8	31.1	3.2	0.0	27.8
2009	67.5	0.5	22.9	4.3	0.3	14.1
2010	53.6	0.2	22.9	4.7	0.2	25.8
2014	50.1	0.4	39.3	1.9	0.2	28.3
2018	48.2	1.4	41.1	3.6	0.4	29.4

**Table 19R-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	Coyote	Mule Deer	Greater Sage-Grouse	Rabbit
	Quadrat Frequency				
2008	7	-	1	-	97
2009	2	-	6	-	49
2010	-	-	-	-	29
2014	-	-	-	-	1
2018	3	-	1	2	16
Year	Days Use Per Acre (ha)				
2008	9.4 (23.3)	-	-	-	-
2009	-	-	-	-	-
2010	-	8.7 (21.5)*	2.0 (5.0)	26.2 (64.6)*	-
2014	-	-	-	-	-
2018	10.2 (25.1)	-	-	-	-

\*Pellets per acre (ha)

**Table 19R-13.10 - Grass Species.** Nested frequency and modified Daubenmire average cover by year.

GRASS SPECIES	Achnatherum hymenoides (Indian ricegrass)	Agropyron cristatum <sup>i</sup> (crested wheatgrass)	Bromus tectorum <sup>ai</sup> (cheatgrass)	Leymus cinereus (basin wildrye)	Pascopyrum smithii (western wheatgrass)	Poa bulbosa <sup>i</sup> (bulbous bluegrass)	Poa secunda (Sandberg bluegrass)	Pseudoroegneria spicata (bluebunch wheatgrass)	Thinopyrum intermedium <sup>i</sup> (intermediate wheatgrass)
year	Nested Frequency								
2008	-	230	-	-	-	-	268	-	3
2009	-	216	3	-	-	-	94	-	9
2010	3	229	-	-	19	-	128	-	1
2014	-	290	-	3	1	-	155	10	10
2018	-	276	1	-	4	3	184	2	7
year	Average Cover (%)								
2008	-	8.6	-	-	-	-	7.7	-	0.1
2009	-	5.0	0.0	-	-	-	1.2	-	0.0
2010	0.0	10.7	-	-	0.2	-	2.1	-	0.0
2014	-	16.4	-	0.0	0.0	-	2.7	0.3	0.1
2018	-	15.0	0.0	-	0.0	0.0	2.5	0.0	0.1

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

**Table 19R-13.11 - Forb Species.** Nested frequency and modified Daubenmire average cover by year.

FORB SPECIES	Alyssum desertorum <sup>ai</sup> (desert madwort)	Astragalus (milkvetch)	Ceratocephala testiculata <sup>ai</sup> (curveseed butterwort)	Cleome serrulata <sup>a</sup> (Rocky Mountain beplant)	Linum lewisii (Lewis flax)	Medicago sativa <sup>i</sup> (alfalfa)	Onobrychis viciifolia <sup>i</sup> (sainfoin)	Packera multilobata (lobeleaf groundsel)	Phlox austromontana (mountain phlox)	Phlox longifolia (longleaf phlox)	Salsola tragus <sup>ai</sup> (prickly Russian thistle)	Sanguisorba minor <sup>i</sup> (small burnet)	unknown annual forb <sup>a</sup> (unknown forb)
year	Nested Frequency												
2008	14	1	264	-	-	-	-	1	44	2	-	-	-
2009	-	4	314	-	2	3	10	2	30	1	4	4	5
2010	10	3	358	7	9	-	4	-	37	-	-	1	-
2014	35	-	2	-	2	-	-	-	37	-	-	-	-
2018	14	-	126	-	-	-	-	-	36	-	-	-	-
year	Average Cover (%)												
2008	0.0	0.0	1.4	-	-	-	-	0.0	0.3	0.0	-	-	-
2009	-	0.0	4.2	-	0.0	0.0	0.0	0.0	0.3	0.0	0.0	0.0	0.0
2010	0.0	0.0	8.2	0.0	0.0	-	0.0	-	1.4	-	-	0.0	-
2014	0.1	-	0.0	-	0.0	-	-	-	0.8	-	-	-	-
2018	0.0	-	1.7	-	-	-	-	-	1.2	-	-	-	-

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

**Table 19R-13.12 - Shrub and Tree Species.** Average modified Daubenmire quadrat and line intercept cover by year.

SHRUB SPECIES	Line Intercept Cover (%)		
	Artemisia tridentata ssp. vaseyana <sup>p</sup> (mountain big sagebrush)	Chrysothamnus viscidiflorus (yellow rabbitbrush)	Ericameria nauseosa (rubber rabbitbrush)
year	Line Intercept Cover (%)		
2008	12.8	-	-
2009	3.4	0	-
2010	6.1	-	-
2014	6.9	-	-
2018	9.4	0.2	0
year	Quadrat Cover (%)		
2008	8.3	0.2	-
2009	3.3	0.1	-
2010	4.5	0.1	-
2014	5.4	0.5	-
2018	8.6	0.1	0.0

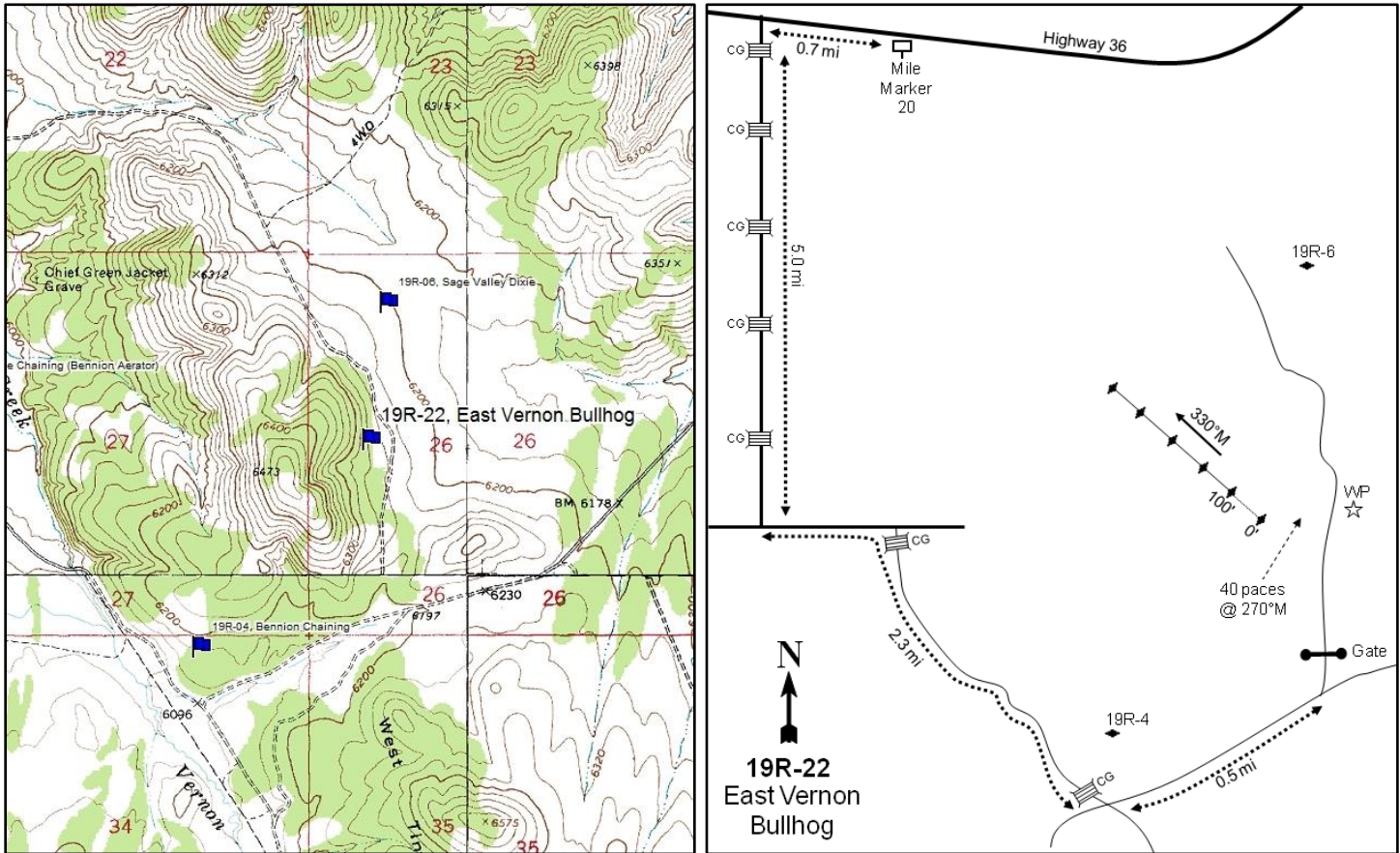
t - Tree Species; p - Preferred Browse; i - Introduced Species

**Table 19R-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 (%)				
<b>Artemisia tridentata ssp. vaseyana<sup>p</sup> -- (mountain big sagebrush)</b>									
2008	3020	80	9	37	54	30	3	33	60/80
2009	-	-	-	-	-	-	-	-	34/47
2010	3240	2200	58	35	7	5	0	6	48/63
2014	4340	160	36	58	6	38	8	7	37/55
2018	4980	-	16	76	8	12	0	6	38/49
<b>Chrysothamnus viscidiflorus -- (yellow rabbitbrush)</b>									
2008	80	-	0	100	0	0	0	0	17/21
2009	-	-	-	-	-	-	-	-	24/25
2010	120	-	33	67	0	0	0	0	21/22
2014	80	-	0	100	0	0	0	0	30/39
2018	160	-	0	100	0	0	0	13	19/27
<b>Ericameria nauseosa -- (rubber rabbitbrush)</b>									
2008	-	-	-	-	-	-	-	-	43/43
2009	-	-	-	-	-	-	-	-	-/-
2010	-	-	-	-	-	-	-	-	-/-
2014	80	-	25	75	0	0	0	0	35/32
2018	40	-	50	50	0	0	0	0	49/58
<b>Gutierrezia sarothrae -- (broom snakeweed)</b>									
2008	40	-	0	100	0	0	0	0	22/21
2009	-	-	-	-	-	-	-	-	30/32
2010	-	-	-	-	-	-	-	-	-/-
2014	80	-	0	50	50	25	0	75	23/27
2018	40	-	0	100	0	0	0	0	21/25

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

## EAST VERNON BULLHOG - STUDY NO. 19R-22

**Location Information**

USGS 7.5 min Map Info  
GPS (0' Stake)

Vernon SE; Township 9S, Range 5W, Section 26  
NAD 83 UTM ZONE 12, 382131 East 4429191 North

**Transect Information**

Browse Tag # (0' Stake)	114
Transect Bearing	330° magnetic
Length	400ft
Belt Placement	Line 1 (11ft & 95ft), Line 2 (34ft), Line 3 (59ft), Line 4 (61ft)
Belt Marker Placement	No Rebar

**Directions to Site**

Traveling on SR-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. Bear 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, go through the gate, and proceed 0.45 miles to a witness post on the right (east) side of the road. Walk approximately 40 paces at 270 degrees magnetic to the 0-foot stake that is marked with browse tag #114.

**Site Information**

Land Ownership	Federal
Land Administrator	USFS
Allotment	BENNION
Elevation	6,300ft (1,920m)
Aspect	Northeast
Slope	13%
Sample Dates	06/21/2012, 07/27/2015, 08/06/2018

**Table 19R-22.1 Disturbance History.** Recorded history of major disturbances.

Treatment/Disturbance	Name	WRI DB#	Date	Size (acres)
Hand Crew - Lop and Scatter	Vernon Ecosystem Phase 4 (Proposed)	4900	August 2019	7023
Mechanical - Bullhog	East Vernon Habitat Restoration	2292	September 2012-January 2013	413

**Wildlife Habitat and Vegetation History****Table 19R-22.3 - 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-22.4 - Vegetation History.** The dominant vegetation type(s) and phase of woodland succession (Tausch, Miller, Roundy, & Chambers, 2009).

Year	Vegetation Type	Woodland Succession
2012	Juniper	Phase II transitioning to Phase III
2015	Annual-Perennial Grass	Phase I
2018	Annual-Perennial Grass	Phase I

**Site Notes**

The transect was shortened to 400 feet in 2015 and belt 4 was moved to the 61ft mark in order to keep the study within the treatment area. In 2018, point-quarter data for the fifth stake was collected in an untreated pinyon-juniper woodland.

**Site Potential**

1981 - 2010 Average Annual Precipitation	16 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.

This site was established in 2012 and was in Phase II transitioning to Phase III of woodland succession with mainly Utah juniper (*Juniperus osteosperma*) in the overstory and a minor component of singleleaf pinyon (*Pinus monophylla*). Mountain big sagebrush (*Artemisia tridentata* ssp. *vaseyana*) was also present, but with low cover. A 2012 bullhog treatment removed many of the trees (Table 19R-22.1), making sagebrush the dominant shrub species. Cover of sagebrush remains low as of 2018, but it has increased each sample year following treatment (Table 19R-22.4, Table 19R-22.12). The herbaceous understory was abundant and diverse prior to treatment, with the perennial grass Sandberg bluegrass (*Poa secunda*) providing a vast majority of the cover. The introduced annual grass species cheatgrass (*Bromus tectorum*) increased in cover following treatment, and it has been co-dominant with the perennial grass species bluebunch wheatgrass (*Pseudoroegneria spicata*) since 2015 (Table 19R-22.7, Table 19R-22.10). Pinyon and juniper trees have maintained a continued presence on site following treatment (Photos, Table 19R-22.14), but a proposed lop and scatter project will likely remove many of these trees (Table 19R-22.1).

**Trend Summary Tables****Table 19R-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
2012	0.9	0.1	23.8	0.6	-	42.7
2015	1.6	0.3	0.8	2.1	0.2	3.7
2018	2.3	0.2	1.4	3.3	0.5	4.5

**Table 19R-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
2012	30	338	236	69	0.4	16.4	2.2	1.1
2015	292	214	188	10	13.5	9.2	2.9	0.0
2018	334	197	245	10	9.4	9.7	2.2	0.6

**Table 19R-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
2012	8.3	2.2	45.5	19.0	9.2	38.6
2015	8.4	0.2	66.0	7.7	4.9	28.7
2018	6.2	1.0	72.4	5.4	4.6	31.4

**Table 19R-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			
2012	-	-	-	9
2015	-	6	-	2
2018	-	4	-	1
Year	Days Use Per Acre (ha)			
2012	-	2.7 (6.6)	0.7 (1.7)	-
2015	2.9 (7.2)	-	-	-
2018	2.9 (7.2)	7.4 (18.2)	-	-



**Table 19R-22.10 - Grass Species.** Nested frequency and modified Daubenmire average cover by year.

GRASS SPECIES	Nested Frequency					
Achnatherum hymenoides (Indian ricegrass)	-	30	18	-	315	58
Bromus tectorum <sup>ai</sup> (cheatgrass)	0	292	50	3	101	117
Elymus elymoides (squirreltail)	-	334	49	-	81	105
Pascopyrum smithii (western wheatgrass)	Average Cover (%)					
Poa secunda (Sandberg bluegrass)	-	0.4	0.3	-	14.6	1.6
Pseudoroegneria spicata (bluebunch wheatgrass)	0.0	13.5	0.9	0.1	2.2	5.9
	-	9.4	1.1	-	1.0	7.6

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

**Table 19R-22.11 - Forb Species.** Nested frequency and modified Daubenmire average cover by year.

FORB SPECIES	Nested Frequency																	
Alyssum desertorum <sup>ai</sup> (desert madwort)	216	3	1	43	14	-	-	4	3	-	3	1	3	3	12	14	2	
Antennaria (pussytoes)	184	-	-	-	-	1	1	-	-	2	-	5	-	-	-	7	2	
Arabis (rockcross)	241	-	-	-	-	-	-	-	-	6	-	7	-	-	4	-	2	
Astragalus (milkvetch)	Average Cover (%)																	
Ceratocephala testiculata <sup>ai</sup> (curveseed butterwort)	1.8	0.1	0.0	0.5	0.0	-	-	0.0	0.0	-	0.0	0.0	0.0	0.0	0.5	0.0	0.0	
Chaenactis douglasii (Douglas' dustymaiden)	2.9	-	-	-	-	0.0	0.0	-	-	0.0	-	0.0	-	-	-	0.0	0.0	
Chenopodium fremontii <sup>a</sup> (Fremont's goosefoot)	2.2	-	-	-	-	-	-	-	-	0.6	-	0.0	-	-	0.0	-	0.0	
Collinsia parviflora <sup>a</sup> (maiden blue eyed Mary)																		
Crepis acuminata (tapertip hawksbeard)																		
Cryptantha (cryptantha)																		
Epilobium brachycarpum <sup>a</sup> (tall annual willowherb)																		
Lactuca serrifolia <sup>ai</sup> (prickly lettuce)																		
Lesquerella (bladderpod)																		
Microsteris gracilis <sup>a</sup> (slender phlox)																		
Phlox hoodii (spiny phlox)																		
Phlox longifolia (longleaf phlox)																		
Silene antirrhina <sup>a</sup> (sleepy silene)																		

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

FORB SPECIES		
	Sisymbrium altissimum <sup>ai</sup> (tall tumblemustard)	
	Tragopogon dubius <sup>ai</sup> (yellow salsify)	
year	Nested Frequency	
2012	20	-
2015	-	-
2018	-	9
year	Average Cover (%)	
2012	0.4	-
2015	-	-
2018	-	0.0

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

**Table 19R-22.12 - Shrub and Tree Species.** Average modified Daubenmire quadrat and line intercept cover by year.

SHRUB SPECIES						
	Artemisia nova <sup>p</sup> (black sagebrush)	Artemisia tridentata ssp. vaseyana <sup>p</sup> (mountain big sagebrush)	Ericameria nauseosa (rubber rabbitbrush)	Juniperus osteosperma <sup>t</sup> (Utah juniper)	Opuntia (pricklypear)	Pinus monophylla <sup>t</sup> (singleleaf pinyon)
year	Line Intercept Cover (%)					
2012	-	0.6	-	42.6	-	0.1
2015	0.5	1.6	-	3.7	0.2	-
2018	0.4	2.9	-	4.5	0.5	-
year	Quadrat Cover (%)					
2012	-	0.9	-	23.5	0.1	0.3
2015	0.2	1.4	-	0.8	0.3	-
2018	0.3	2.0	0.1	1.4	0.1	0.0

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

**Table 19R-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 (%)				
<b>Artemisia nova<sup>p</sup> -- (black sagebrush)</b>									
2012	-	-	-	-	-	-	-	-	-/-
2015	100	-	40	60	0	20	0	0	29/66
2018	120	20	0	100	0	0	0	0	33/60
<b>Artemisia tridentata ssp. vaseyana<sup>p</sup> -- (mountain big sagebrush)</b>									
2012	480	-	0	50	50	17	4	92	29/49
2015	400	-	0	85	15	70	0	5	45/74
2018	360	-	6	78	17	6	0	33	67/94

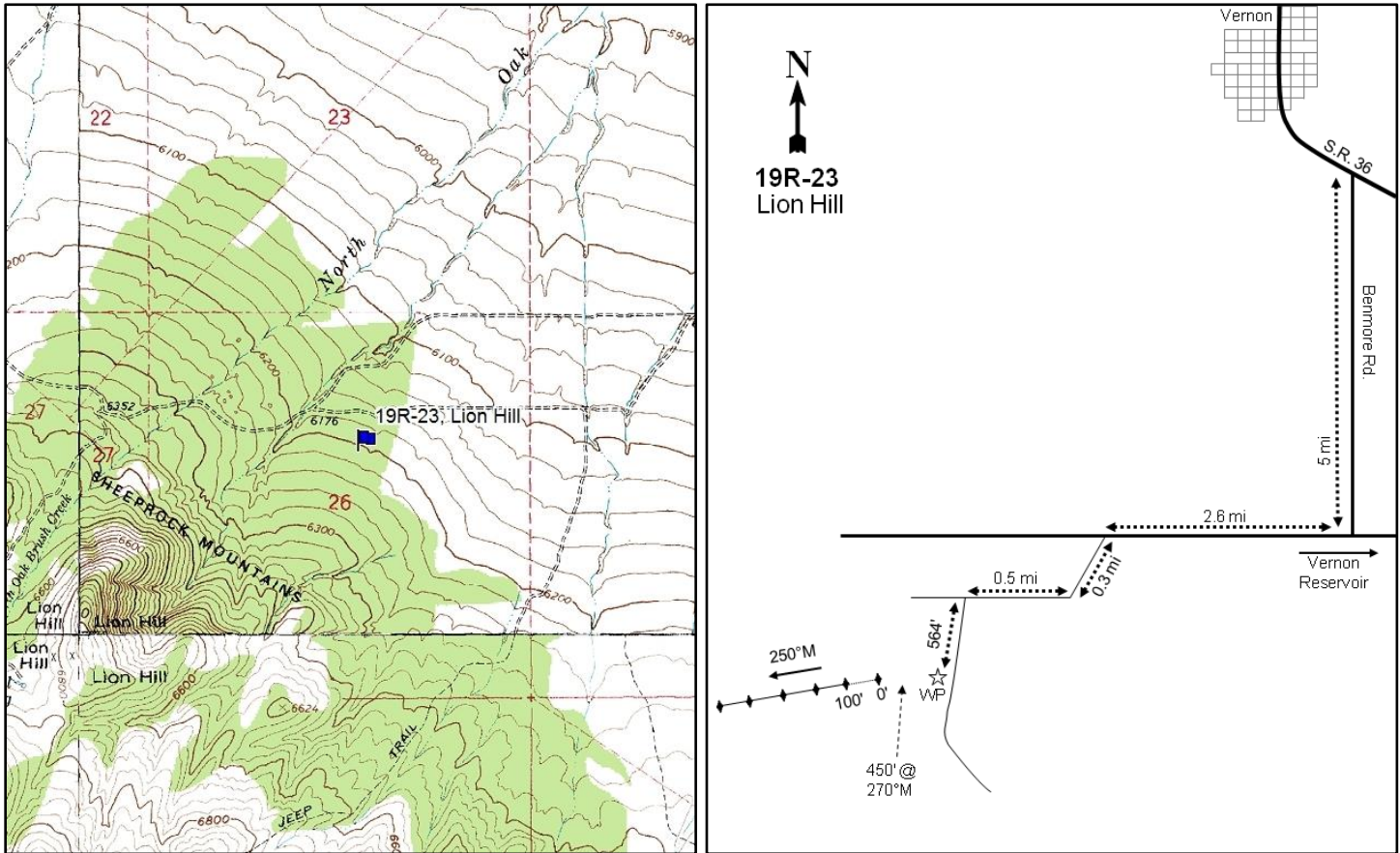
Year	Density		Age Class Distribution			Utilization		Poor Vigor (%)	Average Height Crown (cm)
	Plants Per Acre		Excluding Seedlings			Moderate (%)	Heavy (%)		
	Excluding Seedlings	Seedling	Young (%)	Mature (%)	Decadent (%)				
<b>Ericameria nauseosa -- (rubber rabbitbrush)</b>									
2012	-	-	-	-	-	-	-	-	-/-
2015	-	-	-	-	-	-	-	-	52/57
2018	-	-	-	-	-	-	-	-	76/119
<b>Gutierrezia sarothrae -- (broom snakeweed)</b>									
2012	-	-	-	-	-	-	-	-	-/-
2015	-	-	-	-	-	-	-	-	46/61
2018	-	-	-	-	-	-	-	-	45/72
<b>Juniperus osteosperma<sup>t</sup> -- (Utah juniper)</b>									
2012	300	20	7	87	7	0	0	13	- / -
2015	100	-	100	0	0	0	0	0	- / -
2018	60	-	67	33	0	0	0	0	- / -
<b>Opuntia -- (pricklypear)</b>									
2012	280	-	0	100	0	0	0	0	11/31
2015	440	-	0	100	0	0	0	0	14/33
2018	200	-	10	90	0	0	0	0	11/28
<b>Pinus edulis<sup>t</sup> -- (twoneedle pinyon)</b>									
2012	-	-	-	-	-	-	-	-	-/-
2015	20	-	100	0	0	0	0	0	- / -
2018	-	-	-	-	-	-	-	-	-/-
<b>Pinus monophylla<sup>t</sup> -- (singleleaf pinyon)</b>									
2012	60	-	100	0	0	0	0	0	- / -
2015	-	-	-	-	-	-	-	-	-/-
2018	20	-	100	0	0	0	0	0	- / -
<b>Purshia tridentata<sup>p</sup> -- (antelope bitterbrush)</b>									
2012	-	-	-	-	-	-	-	-	-/-
2015	-	-	-	-	-	-	-	-	-/-
2018	-	-	-	-	-	-	-	-	16/38

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

**Table 19R-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' (%)	
<b>Juniperus osteosperma (Utah juniper)</b>							
2012	448	-	10	10	65	15	19.8
2015	108	33	39	-	17	11	12.4
2018	129	16	53	11	-	21	14.4
<b>Pinus monophylla (singleleaf pinyon)</b>							
2012	16	10	-	10	20	60	14.0
2015	4	-	-	-	-	100	16.5
2018	24	-	33	-	-	67	11.3

## LION HILL - STUDY NO. 19R-23

**Location Information**

USGS 7.5 min Map Info  
GPS (0' Stake)

Vernon SW; Township 9S, Range 6W, Section 26  
NAD 83 UTM ZONE 12, 373099 East 4429585 North

**Transect Information**

Browse Tag # (0' Stake)	247
Transect Bearing	250° magnetic
Length	500ft
Belt Placement	Line 1 (11ft), Line 2 (34ft), Line 3 (59ft), Line 4 (71ft), Line 5 (95ft)
Belt Marker Placement	Standard

**Directions to Site**

Traveling on SR-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 'T' intersection: turn right (west). Travel for 2.6 miles to a left turn. Turn left (south) and continue for 0.9 miles to a right turn (west). Turn right and travel for 0.5 miles to a two-track on the left. Turn left, drive 0.1 miles, and park near the site located on the GPS. There is no witness post.

**Site Information**

Land Ownership	Private
Land Administrator	Private
Allotment	VERNON
Elevation	6,200ft (1,890m)
Aspect	Northeast
Slope	5-8%
Sample Dates	07/29/2015, 08/08/2018

**Table 19R-23.1 Disturbance History.** Recorded history of major disturbances.

Treatment/Disturbance	Name	WRI DB#	Date	Size (acres)
Mechanical - Push (Wind Row)	West Vernon Phase 5: Lion Hill	3236	May 2016	285
Herbicide - Plateau	West Vernon Phase 5: Lion Hill	3236	May 2016	285
Chaining - One-Way Ely	West Vernon Phase 5: Lion Hill	3236	April 2016	285
Seeding - Aerial Before	West Vernon Phase 5: Lion Hill	3236	November 2016	285

**Table 19R-23.2 Seed Mix.** List of known seeded plant species and rates (if available).

Mix Name			Application Type	Application Date	Acres
Lion Hill			Aerial	Nov 2016	255
Type	Species	Common Name	Cultivar/Source ID	Bulk lbs/acre	PLS
G	Achnatherum hymenoides	Indian Ricegrass	Rimrock	1.57	1.49
G	Agropyron cristatum	Crested Wheatgrass	Hycrest II	0.78	0.74
G	Agropyron cristatum	Crested Wheatgrass	Nordan	0.78	0.71
G	Poa secunda	Sandberg Bluegrass	Mountain Home	0.49	0.39
G	Psathyrostachys juncea	Russian Wildrye	Bozoisky II	0.98	0.87
G	Pseudoroegneria spicata	Bluebunch Wheatgrass	Anatone	2.55	2.38
F	Astragalus cicer	Cicer Milkvetch	Lutana	0.98	0.84
F	Linum perenne	Blue Flax	Appar	0.24	0.21
F	Onobrychis viciifolia	Sainfoin	Eski	1.96	1.70
F	Sanguisorba minor	Small Burnet		1.96	1.84
Mix Name			Application Type	Application Date	Acres
Lion Hill Dribbler			Dribbler	Nov 2016	255
Type	Species	Common Name	Cultivar/Source ID	Bulk lbs/acre	PLS
F	Sanguisorba minor	Small Burnet		0.20	0.18
S	Purshia tridentata	Bitterbrush	Elko NV	0.39	0.34

**Wildlife Habitat and Vegetation History****Table 19R-23.3 - 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-23.4 - Vegetation History.** The dominant vegetation type(s) and phase of woodland succession (Tausch, Miller, Roundy, & Chambers, 2009).

Year	Vegetation Type	Woodland Succession
2015	Juniper	Phase III
2018	Perennial Grass	Phase I

**Site Notes**

No Notes

**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.

This site was established in 2015 and was considered to be within Phase III of woodland succession (Table 19R-23.4) with Utah juniper (*Juniperus osteosperma*) dominating the overstory. Other shrubs such as black sagebrush (*Artemisia nova*) and mountain big sagebrush (*A. tridentata* ssp. *vaseyana*) were present, but they contributed much less cover (Table 19R-23.12). The herbaceous understory was moderately diverse and not abundant prior to treatment. Many of the trees were removed by a chaining project in 2016 (Table 19R-23.1), causing the study site to transition to one dominated by perennial grasses (Table 19R-23.7, Table 19R-23.10, Table 19R-23.11). Mountain big sagebrush has exhibited an increase in both cover and density between 2015 and 2018 (Table 19R-23.12, Table 19R-23.13), indicating that it may increase and become a dominant vegetation component in the future. Although density was low, juniper trees were observed in point-quarter measurements in 2018 (Table 19R-23.14): this continued tree presence indicates that there may be potential for infilling in the future.

**Trend Summary Tables****Table 19R-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
2015	1.0	0.2	15.8	1.0	0.6	30.7
2018	1.0	0.1	0.0	2.6	-	0.1

**Table 19R-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
2015	16	301	345	31	0.1	8.5	2.0	0.6
2018	96	264	165	100	4.2	15.2	3.6	4.1

**Table 19R-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
2015	8.0	5.4	39.9	39.6	2.1	25.3
2018	36.8	0.0	33.6	15.7	3.9	33.5

**Table 19R-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	Rabbit
	Quadrat Frequency		
2015	-	-	18
2018	-	6	2
Year	Days Use Per Acre (ha)		
2015	3.6 (9.0)	0.7 (1.7)	-
2018	-	14.1 (34.8)	-

**Table 19R-23.10 - Grass Species.** Nested frequency and modified Daubenmire average cover by year.

GRASS SPECIES	Achnatherum hymenoides (Indian ricegrass)	Agropyron cristatum <sup>i</sup> (crested wheatgrass)	Bromus tectorum <sup>ai</sup> (cheatgrass)	Elymus elymoides (squirreltail)	Poa fendleriana (muttongrass)	Poa secunda (Sandberg bluegrass)	Psathyrostachys juncea <sup>i</sup> (Russian wildrye)	Pseudoroegneria spicata (bluebunch wheatgrass)	Thinopyrum intermedium <sup>i</sup> (intermediate wheatgrass)
year	Nested Frequency								
2015	-	-	16	47	-	297	-	-	-
2018	14	119	96	43	5	130	17	90	1
year	Average Cover (%)								
2015	-	-	0.1	0.6	-	7.9	-	-	-
2018	0.9	4.7	4.2	1.3	0.2	4.4	0.5	3.1	0.0

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

**Table 19R-23.11 - Forb Species.** Nested frequency and modified Daubenmire average cover by year.

FORB SPECIES	Alyssum desertorum <sup>ai</sup> (desert madwort)	Antennaria (pussytoes)	Arabis (rockcress)	Argemone corymbosa <sup>a</sup> (Mojave pricklypoppy)	Astragalus (milkvetch)	Ceratocephala testiculata <sup>ai</sup> (curvseed butterwort)	Chaenactis douglasii (Douglas' dustymaiden)	Crepis acuminata (tapertip hawkbeard)	Cryptantha (cryptantha)	Descurainia pinnata <sup>a</sup> (western tansymustard)	Eriogonum umbellatum (sulphur-flower buckwheat)	Gilia inconspicua <sup>a</sup> (shy gilia)	Lactuca serrifolia <sup>ai</sup> (prickly lettuce)	Linum perenne <sup>i</sup> (blue flax)	Lotus utahensis (Utah bird's-foot trefoil)	Onobrychis viciifolia <sup>i</sup> (sainfoin)	Packera multiflobata (lobeleaf groundsel)
year	Nested Frequency																
2015	343	13	1	-	-	-	4	-	1	9	-	2	-	-	-	-	-
2018	124	-	8	1	1	16	5	1	-	-	5	1	70	9	1	34	1
year	Average Cover (%)																
2015	1.9	0.1	0.0	-	-	-	0.0	-	0.0	0.1	-	0.0	-	-	-	-	-
2018	1.5	-	0.0	0.0	0.0	0.1	0.1	0.0	-	-	0.0	0.0	2.0	0.1	0.0	1.9	0.0

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



FORB SPECIES					
<i>Petroragia pumila</i> (rock goldenrod)					
<i>Phlox longifolia</i> (longleaf phlox)					
<i>Sanguisorba minor</i> <sup>i</sup> (small burnet)					
<i>Sisymbrium altissimum</i> <sup>ai</sup> (tall tumblemustard)					
<i>Vicia americana</i> (American vetch)					
year	Nested Frequency				
2015	16	2	-	-	-
2018	15	-	24	2	19
year	Average Cover (%)				
2015	0.5	0.0	-	-	-
2018	0.8	-	1.0	0.0	0.2

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

**Table 19R-23.12 - Shrub and Tree Species.** Average modified Daubenmire quadrat and line intercept cover by year.

SHRUB SPECIES					
<i>Artemisia nova</i> <sup>p</sup> (black sagebrush)					
<i>Artemisia tridentata</i> ssp. <i>vaseyana</i> <sup>p</sup> (mountain big sagebrush)					
<i>Gutierrezia sarothrae</i> (broom snakeweed)					
<i>Juniperus osteosperma</i> <sup>t</sup> (Utah juniper)					
<i>Opuntia</i> (pricklypear)					
year	Line Intercept Cover (%)				
2015	0.8	0.2	-	30.7	0.6
2018	0.8	1.8	-	0.1	0
year	Quadrat Cover (%)				
2015	0.8	0.2	-	15.8	0.2
2018	0.4	0.7	0.1	0.0	0.0

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

**Table 19R-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.

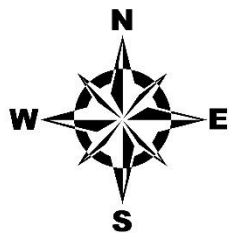
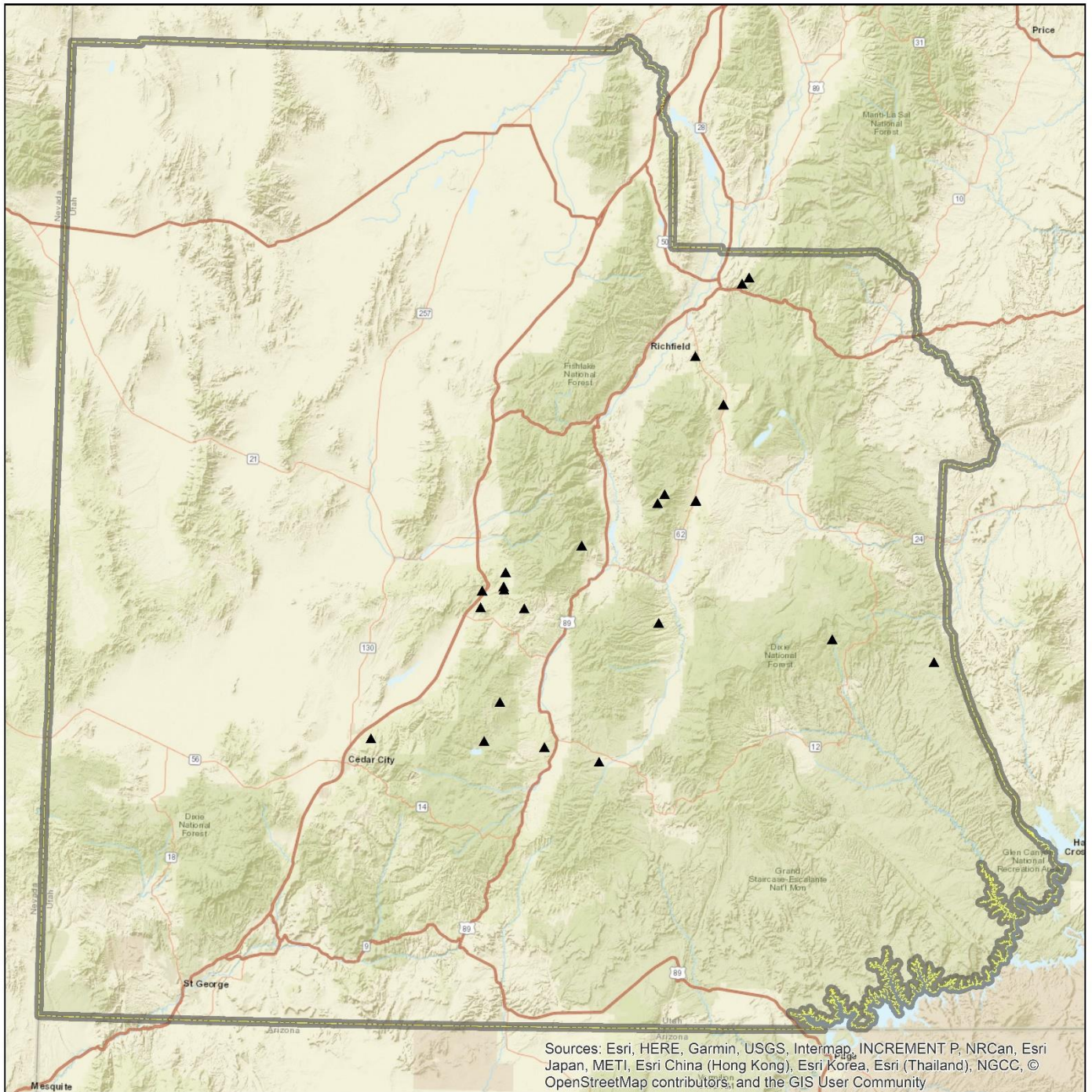
Year	Density		Age Class Distribution			Utilization		Poor Vigor (%)	Average Height Crown (cm)
	Plants Per Acre		Excluding Seedlings			Moderate (%)	Heavy (%)		
	Excluding Seedlings	Seedling	Young (%)	Mature (%)	Decadent (%)				
<b>Artemisia nova<sup>P</sup> -- (black sagebrush)</b>									
2015	620	100	32	55	13	10	26	45	25/51
2018	200	20	10	90	0	0	0	0	35/49
<b>Artemisia tridentata ssp. vaseyana<sup>P</sup> -- (mountain big sagebrush)</b>									
2015	160	20	38	25	38	13	50	38	38/67
2018	480	-	38	63	0	0	0	0	44/71
<b>Gutierrezia sarothrae -- (broom snakeweed)</b>									
2015	20	-	0	100	0	0	0	0	21/27
2018	140	-	0	100	0	0	0	0	27/38
<b>Juniperus osteosperma<sup>I</sup> -- (Utah juniper)</b>									
2015	500	40	12	88	0	0	0	8	- / -
2018	20	80	100	0	0	0	0	0	- / -
<b>Opuntia -- (pricklypear)</b>									
2015	620	40	16	84	0	10	0	10	15/40
2018	140	-	0	100	0	0	0	0	10/17

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

**Table 19R-23.14 - Tree Characteristics.** Point-quarter tree density, size class distribution, and average diameter.

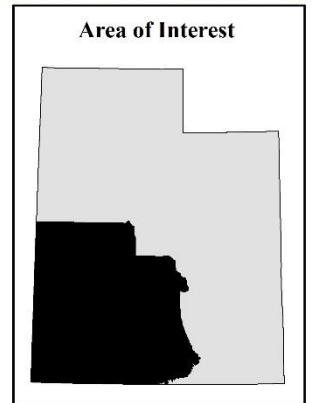
Year	Density	Size Class Distribution					Average Diameter (cm)
	Trees per Acre	Seedling (%)	1-4' (%)	4-8' (%)	8-12' (%)	>12' (%)	
<b>Juniperus osteosperma (Utah juniper)</b>							
2015	476	5	20	10	35	30	25.4
2018	11	25	75	-	-	-	3.0

# SOUTHERN REGION



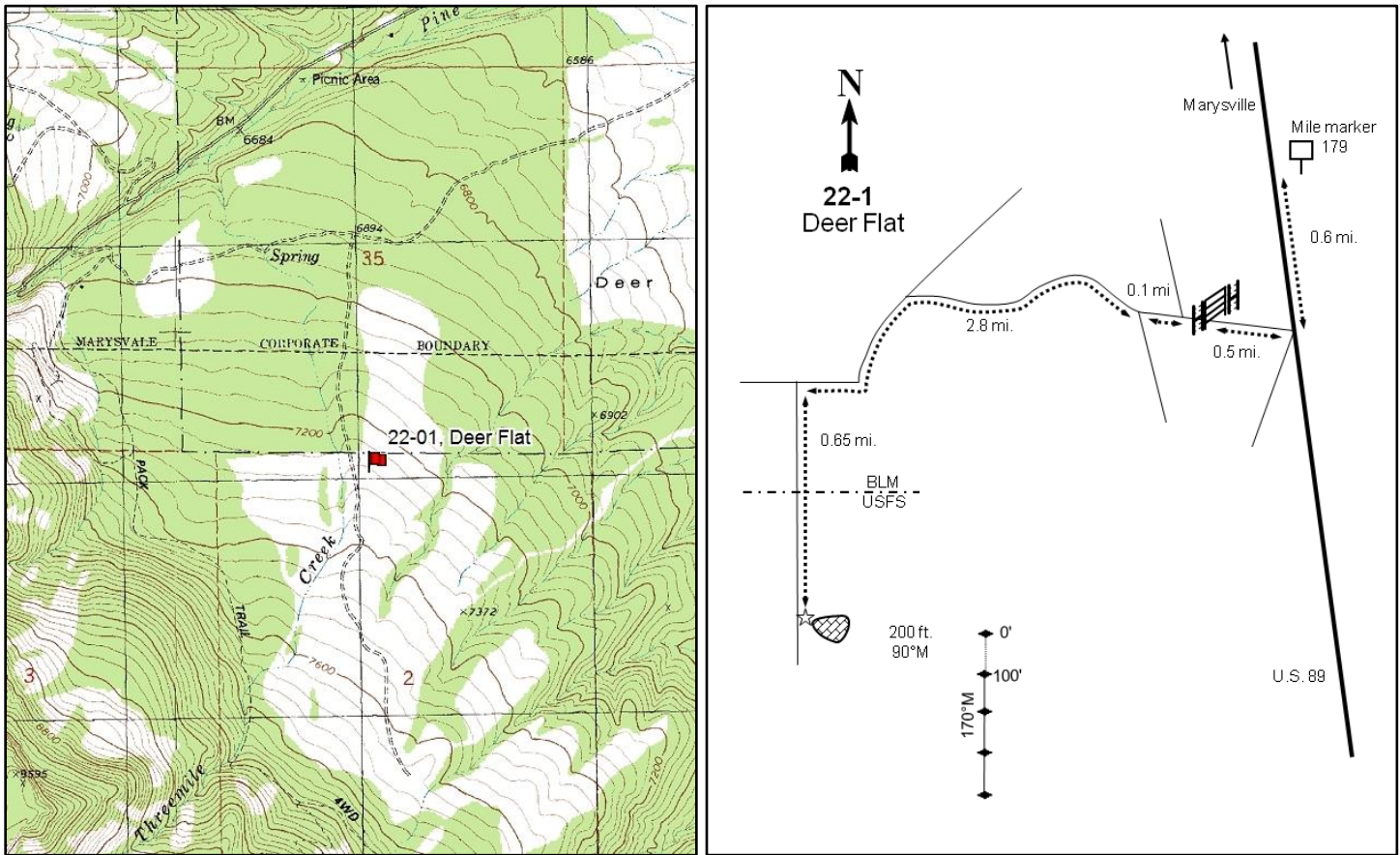
**Project**

- ▲ WRI
- ▭ Southern Region Boundaries





## DEER FLAT - STUDY NO. 22-1

**Location Information**

USGS 7.5 min Map Info  
GPS (0' Stake)

Mount Brigham SE; Township 28S, Range 4W, Section 02  
NAD 83 UTM ZONE 12, 387986 East 4252229 North

**Transect Information**

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

7106  
170° magnetic  
400ft  
Line 1 (11ft & 95ft), Line 2 (34ft), Line 3 (59ft), Line 4 (71ft)  
Belt 1: 1ft, Belt 2: 2ft, Belt 3: 1ft, Belt 4: 5ft, Belt 5: 4ft

**Directions to Site**

From mile marker 177 south of Marysville, proceed 0.6 miles and turn right on a dirt road. The road forks immediately beyond a fence: stay to the right. Proceed for 0.5 miles to another fork in the road at a fence corner. Go straight through the gate, passing a road on each side. Continue for 0.1 miles and turn right. Proceed 2.8 miles up this road, following a ditch, passing two ponds, and passing through a DWR fence to another fork. Turn left, travel for 0.65 miles (passing through a gate), and park near a large rock on the left (east) side of the road. The 0-foot baseline stake is 200 feet east of the rock and is a rebar with browse tag #7106 attached.

**Site Information**

Land Ownership	Federal
Land Administrator	USFS
Allotment	Marysville Allotment
Elevation	7,260ft (2,213m)
Aspect	North
Slope	15%
Sample Dates	07/06/1998, 06/27/2003, 06/10/2008, 05/30/2013, 06/20/2018

**Table 22-01.1 Disturbance History.** Recorded history of major disturbances.

Treatment/Disturbance	Name	WRI DB#	Date	Size (acres)
Chaining - Chain Unknown	-	-	1968	-
Seeding - Seed Unknown	-	-	1968	-
Hand Crew - Lop and Scatter	Deer Flat Lop and Scatter Project	3775	May-June 2017	724

**Wildlife Habitat and Vegetation History****Table 22-01.3 - Wildlife Seasonal Habitat.** UDWR wildlife habitat and seasonality.

Species	Habitat	Season
Deer	crucial	winter
Elk	substantial	winter

**Table 22-01.4 - Vegetation History.** The dominant vegetation type(s) and phase of woodland succession (Tausch, Miller, Roundy, & Chambers, 2009).

Year	Vegetation Type	Woodland Succession
1985	Mountain Big Sagebrush	Phase I
1991	Mountain Big Sagebrush	Phase I
1998	Mountain Big Sagebrush	Phase I
2003	Mountain Big Sagebrush	Phase I
2008	Mountain Big Sagebrush/Pinyon-Juniper	Phase I transitioning to Phase II
2013	Mountain Big Sagebrush/Pinyon-Juniper	Phase I transitioning to Phase II
2018	Mountain Big Sagebrush	Phase I

**Site Notes**

Some hybridization between mountain big sagebrush (*Artemisia tridentata* ssp. *vaseyana*) and black sagebrush (*A. nova*) is likely occurring; sagebrush was classified based on color, growth form, leaf size, and seed-head formation. Water is available in Pine Creek, located about a half mile to the north.

**Soils****Table 22-01.5 - 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 Clay Loam	6.2	52.0	27.4	20.6	6.5	12.1	233.6	1.0	07/06/1998
Sandy Loam	7.6	64.7	16.7	18.6	3.0	13.8	182.4	0.8	08/18/1999

**Site Potential**

1981 - 2010 Average Annual Precipitation	16 inches
NRCS Ecological Site	Mountain Stony Loam (Mountain Big Sagebrush)
NRCS Ecological Site #	R047XB462UT
States and Transitions	No state and transition model is available for this ecological site.

Upon study establishment in 1985, the plant community on this study site was a mixed stand of mountain big sagebrush (*Artemisia tridentata* ssp. *vaseyana*) and black sagebrush (*A. nova*) with a diverse component of other shrub species present that provided limited cover. The herbaceous understory was composed of mainly perennial grass species with a moderate number of native forb species and few annual grass species present. The study site had undergone a chaining and seeding treatment in 1968, but young pinyon (*Pinus edulis*) and juniper (*Juniperus osteosperma*) trees had reestablished in the area, albeit providing limited cover (Pre-1992 Data, Photos). Mountain big sagebrush and black sagebrush have maintained dominance throughout the study years (Table 22-01.12, Table 22-01.13). Cover and frequency of herbaceous understory components has remained largely stable over time, with perennial grasses remaining dominant (Table 22-01.7, Table 22-01.10, Table 22-01.11). Pinyon and juniper trees increased in size and cover with density remaining relatively stable, and the study site was classified as being within Phase I transitioning to Phase II of woodland succession in 2008 and 2013. However, a lop and scatter treatment in 2017 removed a majority of the trees, and the study site is considered to be within Phase I of woodland succession as of the 2018 sample year (Table 22-01.1, Table 22-01.4, Table 22-01.12, Table 22-01.13, Table 22-01.14). This study site is expected to remain in a similar state in future sample years, although the continued

presence of small trees indicates that there may be the potential for future infilling.

### Trend Summary Tables

**Table 22-01.6 - 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	30.2	0.4	2.6	-	-	-
2003	23.1	0.6	3.6	27.0	0.5	6.8
2008	20.4	0.7	7.1	23.8	0.2	10.0
2013	16.5	0.6	8.7	23.7	0.3	13.6
2018	20.1	0.4	-	22.7	0.7	-

**Table 22-01.7 - 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	38	339	18	120	0.6	14.0	0.1	1.8
2003	16	247	117	80	0.1	6.9	1.0	1.0
2008	5	311	79	186	0.0	12.1	0.3	2.7
2013	26	311	37	110	0.5	10.1	0.1	0.8
2018	34	309	9	57	1.0	15.5	0.0	0.5

**Table 22-01.8 - 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	12.3	0.6	49.9	9.2	15.9	41.9
2003	14.0	0.2	39.9	5.7	17.5	36.0
2008	14.3	0.3	42.3	5.6	14.8	43.6
2013	13.5	0.4	53.3	3.2	16.8	39.2
2018	13.4	0.4	64.1	5.0	15.4	34.2

**Table 22-01.9 - 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	Rocky Mountain Elk	Rabbit
	Quadrat Frequency			
1998	7	52	5	34
2003	2	31	8	13
2008	3	51	4	38
2013	6	29	5	10
2018	5	7	5	7
Year	Days Use Per Acre (ha)			
1998	10.9 (26.9)	58.3 (144.0)	12.1 (29.8)	-
2003	8.0 (19.7)	149.4 (369.1)	38.9 (96.0)	-
2008	20.3 (50.2)	38.2 (94.4)	4.7 (11.6)	-
2013	5.1 (12.6)	59.6 (147.3)	12.8 (31.5)	-
2018	9.4 (23.3)	22.8 (56.3)	20.1 (49.7)	-

**Table 22-01.10 - Grass Species.** Nested frequency and modified Daubenmire average cover by year.

GRASS SPECIES	Achnatherum hymenoides (Indian ricegrass)	Agropyron cristatum <sup>i</sup> (crested wheatgrass)	Bouteloua gracilis (blue grama)	Bromus inermis <sup>i</sup> (smooth brome)	Bromus tectorum <sup>ai</sup> (cheatgrass)	Carex (sedge)	Elymus elymoides (squirreltail)	Hesperostipa comata (needle and thread)	Koeleria macrantha (prairie Junegrass)	Poa fendleriana (muttongrass)	Poa secunda (Sandberg bluegrass)	Pseudoroegneria spicata (bluebunch wheatgrass)	Thinopyrum intermedium <sup>i</sup> (intermediate wheatgrass)
year	Nested Frequency												
1998	-	125	11	47	38	23	23	7	63	124	49	16	-
2003	3	130	13	53	16	1	38	9	11	72	3	3	-
2008	14	112	26	112	5	-	21	5	23	75	34	-	33
2013	1	125	10	81	26	17	7	11	17	164	22	-	22
2018	10	156	17	120	34	3	27	14	2	85	6	-	-
year	Average Cover (%)												
1998	-	5.0	0.1	1.9	0.6	0.1	0.2	0.2	1.1	3.3	1.7	0.4	-
2003	0.0	3.4	0.2	1.5	0.1	0.0	0.6	0.1	0.1	0.9	0.0	0.0	-
2008	0.1	3.1	0.5	3.1	0.0	-	0.3	0.1	0.2	2.4	0.2	-	2.0
2013	0.0	3.2	0.3	1.6	0.5	0.2	0.2	0.1	0.2	3.6	0.3	-	0.4
2018	0.1	6.8	1.1	4.3	1.0	0.0	0.7	0.5	0.1	1.8	0.1	-	-

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

**Table 22-01.11 - Forb Species.** Nested frequency and modified Daubenmire average cover by year.

FORB SPECIES	Agoseris glauca (pale agoseris)	Allium (onion)	Alyssum desertorum <sup>ai</sup> (desert madwort)	Antennaria (pussytoes)	Arabis demissa (nodding rockcress)	Astragalus (milkvetch)	Astragalus utahensis (Utah milkvetch)	Calochortus nuttallii (sego lily)	Camelina microcarpa <sup>ai</sup> (littelpod false flax)	Castilleja angustifolia (northwestern Indian paintbrush)	Collinsia parviflora <sup>a</sup> (maiden blue eyed Mary)	Crepis acuminata (tapertip hawkbeard)	Cryptantha (cryptantha)	Delphinium nuttallianum (twolobe larkspur)	Descurainia pinnata <sup>a</sup> (western tansymustard)	Erigeron pumilus (shaggy fleabane)	Eriogonum racemosum (redroot buckwheat)
year	Nested Frequency																
1998	6	-	-	3	1	9	2	-	1	1	-	-	-	-	-	6	32
2003	3	-	2	-	-	-	1	8	-	-	7	-	-	-	8	4	26
2008	89	-	-	3	2	-	3	35	-	12	4	2	-	3	11	-	14
2013	41	5	3	3	-	-	9	1	-	-	-	-	13	-	5	-	15
2018	3	-	-	-	-	-	9	-	-	3	-	2	3	-	-	3	24
year	Average Cover (%)																
1998	0.0	-	-	0.0	0.0	0.1	0.0	-	0.0	0.0	-	-	-	-	-	0.1	0.3
2003	0.0	-	0.0	-	-	-	0.0	0.0	-	-	0.0	-	-	-	0.0	0.0	0.4
2008	0.6	-	-	0.0	0.0	-	0.0	0.2	-	0.2	0.0	0.0	-	0.0	0.0	-	0.1
2013	0.1	0.0	0.0	0.0	-	-	0.1	0.0	-	-	-	-	0.1	-	0.0	-	0.0
2018	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	Eriogonum umbellatum (sulphur-flower buckwheat)	Gayophytum ramosissimum <sup>a</sup> (pinyon groundsmoke)	Hymenopappus filifolius (fineleaf hymenopappus)	Lappula occidentalis <sup>a</sup> (flatspine stickseed)	Lesquerella intermedia (mid bladderpod)	Lithospermum ruderale (western stone seed)	Lomatium (desertparsley)	Machaeranthera canescens (hoary tansyaster)	Microsteris gracilis <sup>a</sup> (slender phlox)	Orobanche fasciculata (clustered broomrape)	Petradoria pumila (rock goldenrod)	Phlox longifolia (longleaf phlox)	Polygonum douglasii <sup>a</sup> (Douglas' knotweed)	Sphaeralcea coccinea (scarlet globemallow)	Tetraneris acaulis (stemless four-nerve daisy)	Tragopogon dubius <sup>ai</sup> (yellow salsify)	Trifolium (clover)
year	Nested Frequency																
1998	-	-	-	-	1	3	0	0	2	7	16	57	15	3	-	-	14
2003	3	-	-	104	4	2	7	-	11	-	9	27	6	-	-	-	10
2008	1	-	-	60	-	15	28	-	8	-	2	31	12	-	5	-	35
2013	-	-	2	30	-	3	24	-	6	-	-	26	-	-	-	1	25
2018	-	2	-	5	3	4	-	-	-	-	2	-	2	-	7	-	7
year	Average Cover (%)																
1998	-	-	-	-	0.0	0.3	0.0	0.0	0.0	0.0	0.7	0.2	0.0	0.0	-	-	0.0
2003	0.0	-	-	0.9	0.0	0.1	0.0	-	0.0	-	0.1	0.1	0.0	-	-	-	0.1
2008	0.0	-	-	0.2	-	0.2	0.2	-	0.0	-	0.0	0.2	0.0	-	0.1	-	0.8
2013	-	-	0.0	0.1	-	0.1	0.1	-	0.0	-	-	0.1	-	-	-	0.0	0.1
2018	-	0.0	-	0.0	0.0	0.1	-	-	-	-	0.1	-	0.0	-	0.1	-	0.0

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

**Table 22-01.12 - Shrub and Tree Species.** Average modified Daubenmire quadrat and line intercept cover by year.

SHRUB SPECIES	Artemisia nova <sup>p</sup> (black sagebrush)	Artemisia tridentata ssp. vaseyana <sup>p</sup> (mountain big sagebrush)	Cercocarpus ledifolius <sup>p</sup> (curl-leaf mountain mahogany)	Cercocarpus montanus <sup>p</sup> (alderleaf mountain mahogany)	Chrysothamnus depressus <sup>p</sup> (longflower rabbitbrush)	Chrysothamnus viscidiflorus ssp. viscidiflorus var. viscidiflorus (yellow rabbitbrush)	Ericameria parryi var. parryi (Parry's rabbitbrush)	Eriogonum microthecum <sup>p</sup> (slender buckwheat)	Gutierrezia sarothrae (broom snakeweed)	Juniperus osteosperma <sup>t</sup> (Utah juniper)	Opuntia (pricklypear)	Pediocactus simpsonii (mountain ball cactus)	Pinus edulis <sup>t</sup> (twoneedle pinyon)	Purshia tridentata <sup>p</sup> (antelope bitterbrush)	Quercus gambelii <sup>p</sup> (Gambel oak)	Sclerocactus (fishhook cactus)	Tetradymia canescens (spineless horsebrush)
year	Line Intercept Cover (%)																
1998	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
2003	6.4	13	-	0.5	0.1	-	-	0.3	-	2.4	0.5	-	4.4	-	6.7	-	-
2008	5.4	15.9	0	0.2	-	-	-	0	0.1	0.3	0.1	-	9.7	-	2.3	-	-
2013	4.7	15.9	-	0.2	0.1	0.1	-	0.1	-	-	0.2	-	13.6	-	2.7	-	-
2018	4.9	13.6	-	0.9	0.1	0.3	-	-	0.2	-	0.2	-	-	-	3.2	-	-
year	Quadrat Cover (%)																
1998	8.7	18.5	0.1	0.4	0.0	-	-	0.7	0.0	-	0.4	-	2.6	0.0	1.8	0.0	-
2003	6.3	15.1	-	0.3	0.0	-	-	0.2	0.2	1.3	0.4	-	2.3	-	1.1	-	0.0
2008	5.5	12.7	0.0	0.6	-	-	0.1	0.5	0.0	0.7	0.6	0.0	6.5	-	1.1	-	0.0
2013	3.0	10.5	0.0	0.3	0.2	0.0	-	0.1	-	0.5	0.6	-	8.2	-	2.4	-	-
2018	4.3	12.8	0.0	0.2	0.0	0.0	-	0.3	0.0	-	0.3	-	-	-	2.5	-	-

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

**Table 22-01.13 - 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 (%)				
<b>Artemisia nova<sup>P</sup> -- (black sagebrush)</b>									
1998	3920	20	13	71	16	17	1	2	35/58
2003	3520	-	1	49	50	7	3	4	41/52
2008	3100	340	15	37	48	48	0	14	29/53
2013	1660	20	14	69	17	37	0	22	29/61
2018	1880	80	10	86	4	4	2	0	30/53
<b>Artemisia tridentata ssp. vaseyana<sup>P</sup> -- (mountain big sagebrush)</b>									
1998	3640	-	13	68	19	39	6	5	62/87
2003	3480	-	1	55	45	32	52	9	64/73
2008	2920	120	8	47	45	35	1	23	58/82
2013	2660	40	7	79	14	46	1	12	61/88
2018	3040	180	16	63	21	18	3	9	61/73
<b>Cercocarpus ledifolius<sup>P</sup> -- (curl-leaf mountain mahogany)</b>									
1998	120	-	83	17	0	0	0	0	40/40
2003	40	-	0	100	0	0	100	0	33/31
2008	80	20	75	0	25	0	0	0	37/38
2013	40	-	50	50	0	0	50	0	29/39
2018	60	-	33	33	33	67	33	0	43/46
<b>Cercocarpus montanus<sup>P</sup> -- (alderleaf mountain mahogany)</b>									
1998	380	60	68	32	0	32	5	0	45/48
2003	480	-	0	100	0	8	75	0	33/33
2008	320	-	25	63	13	25	31	0	32/48
2013	300	-	53	47	0	13	47	0	34/43
2018	360	20	28	72	0	22	56	0	36/44
<b>Chrysothamnus depressus<sup>P</sup> -- (longflower rabbitbrush)</b>									
1998	120	-	50	50	0	17	0	17	6/21
2003	280	-	0	93	7	14	86	0	17/20
2008	160	-	13	75	13	25	25	0	8/26
2013	120	-	0	100	0	17	0	0	7/23
2018	100	-	0	100	0	20	40	0	10/21
<b>Chrysothamnus viscidiflorus ssp. viscidiflorus var. viscidiflorus -- (yellow rabbitbrush)</b>									
1998	20	-	0	100	0	0	0	0	28/33
2003	-	-	-	-	-	-	-	-	-/-
2008	80	-	0	100	0	0	0	0	19/31
2013	100	-	40	60	0	0	0	0	19/28
2018	40	-	50	50	0	0	0	0	29/44
<b>Eriogonum microthecum<sup>P</sup> -- (slender buckwheat)</b>									
1998	400	-	5	90	5	10	0	5	14/27
2003	680	-	6	94	0	24	35	0	13/14
2008	480	-	17	75	8	8	8	0	14/21
2013	140	-	14	86	0	29	0	0	11/11
2018	200	-	20	80	0	30	20	0	14/16
<b>Ericameria parryi var. parryi -- (Parry's rabbitbrush)</b>									
1998	-	-	-	-	-	-	-	-	-/-
2003	40	-	0	100	0	0	0	0	33/45
2008	60	-	0	33	67	0	0	0	- / -
2013	-	-	-	-	-	-	-	-	-/-
2018	20	-	0	100	0	100	0	0	30/42

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 (%)				
<b>Gutierrezia sarothrae -- (broom snakeweed)</b>									
1998	20	-	0	100	0	0	0	0	19/13
2003	40	-	50	50	0	0	0	0	15/17
2008	60	20	33	67	0	0	0	0	15/21
2013	20	-	100	0	0	0	0	0	14/14
2018	40	-	0	100	0	0	0	0	17/19
<b>Juniperus osteosperma<sup>i</sup> -- (Utah juniper)</b>									
1998	-	-	-	-	-	-	-	-	-/-
2003	20	-	0	100	0	0	0	0	-/-
2008	20	-	0	100	0	0	0	0	-/-
2013	-	-	-	-	-	-	-	-	-/-
2018	-	-	-	-	-	-	-	-	-/-
<b>Opuntia -- (pricklypear)</b>									
1998	720	40	25	69	6	0	0	6	13/25
2003	820	-	0	85	15	0	7	5	12/27
2008	860	-	16	72	12	0	0	7	11/30
2013	580	20	0	79	21	3	0	28	11/26
2018	740	-	8	89	3	3	0	0	11/25
<b>Pediocactus simpsonii -- (mountain ball cactus)</b>									
1998	-	-	-	-	-	-	-	-	-/-
2003	100	-	40	60	0	0	0	0	6/7
2008	-	-	-	-	-	-	-	-	4/7
2013	60	-	0	100	0	0	0	0	4/8
2018	-	-	-	-	-	-	-	-	-/-
<b>Pinus edulis<sup>t</sup> -- (twoneedle pinyon)</b>									
1998	100	-	0	100	0	0	0	0	-/-
2003	60	-	0	100	0	0	0	0	-/-
2008	160	-	13	88	0	0	0	13	-/-
2013	160	-	25	75	0	0	0	0	-/-
2018	40	40	100	0	0	0	0	0	-/-
<b>Quercus gambelii<sup>p</sup> -- (Gambel oak)</b>									
1998	540	-	19	78	4	7	26	4	74/67
2003	1040	-	19	81	0	64	17	4	49/40
2008	480	-	21	67	13	33	0	0	71/50
2013	1140	-	72	28	0	25	0	0	70/46
2018	1080	220	70	30	0	11	7	0	68/60
<b>Sclerocactus -- (fishhook cactus)</b>									
1998	40	20	50	50	0	0	0	0	5/7
2003	-	-	-	-	-	-	-	-	-/-
2008	40	-	0	100	0	0	0	0	8/13
2013	20	-	0	100	0	0	0	0	17/18
2018	-	-	-	-	-	-	-	-	-/-
<b>Tetradymia canescens -- (spineless horsebrush)</b>									
1998	-	-	-	-	-	-	-	-	-/-
2003	40	-	50	50	0	0	0	0	14/25
2008	40	-	50	0	50	0	0	0	-/-

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

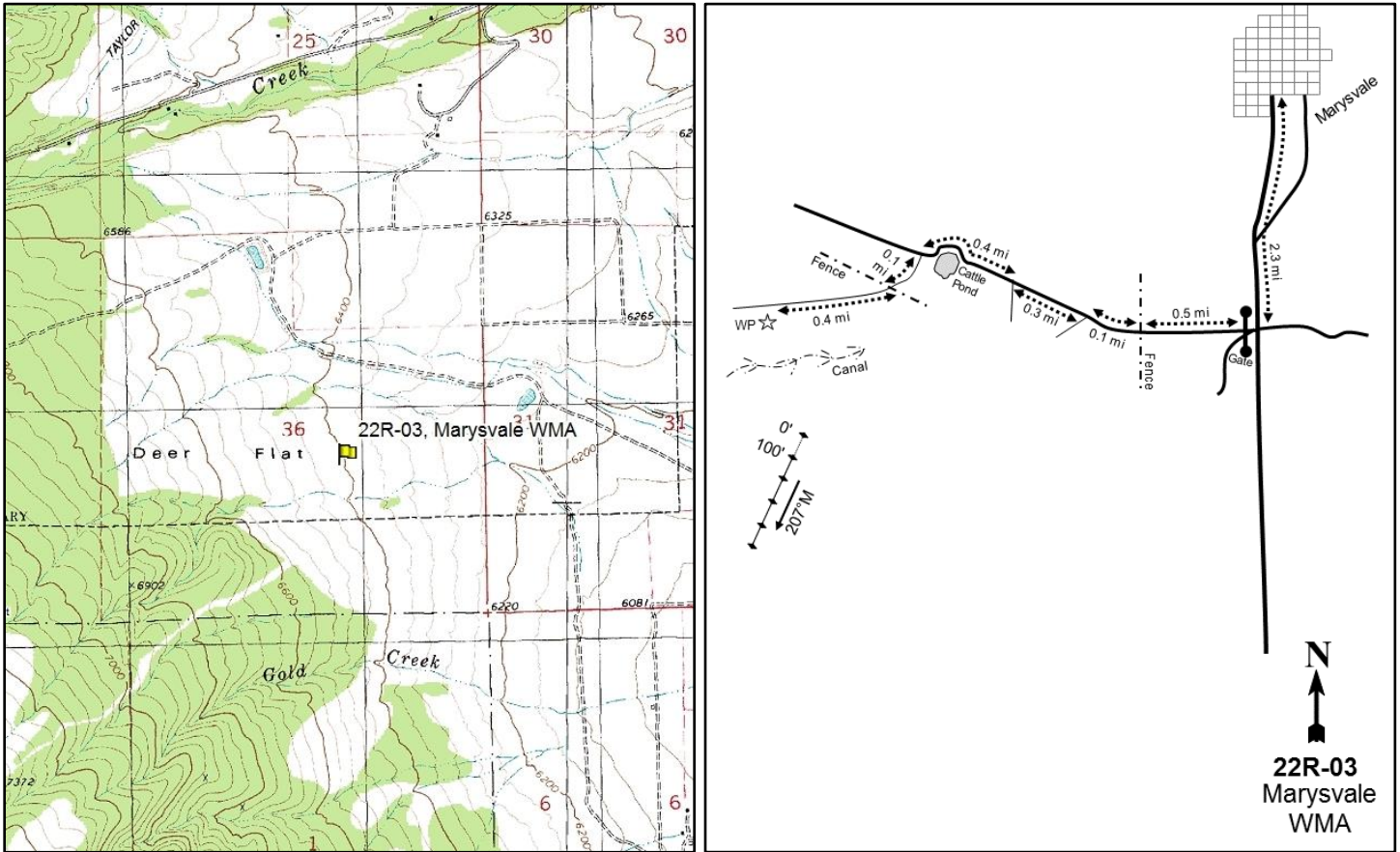
**Table 22-01.14 - Tree Characteristics.** Point-quarter tree density, size class distribution, and average diameter.

Year	Density	Size Class Distribution					Average Diameter (cm)
	Trees per Acre	Seedling (%)	1-4' (%)	4-8' (%)	8-12' (%)	>12' (%)	
<b>Juniperus osteosperma (Utah juniper)</b>							
1998	8	-	-	-	-	-	8.6
2003	8	-	-	71	29	-	12.4
2008	8	-	17	50	33	-	15.6
2013	8	-	17	50	33	-	8.7
2018	8	33	67	-	-	-	39.3
<b>Pinus edulis (twoneedle pinyon)</b>							
1998	20	-	-	-	-	-	10.8
2003	52	6	18	24	47	6	10.6
2008	50	-	-	47	53	-	14.8
2013	46	-	6	28	61	6	11.9
2018	16	40	60	-	-	-	2.0

**Table -22-01.15 - Deer Desirable Components Index: High Potential Scale.**

Year	Preferred Browse Cover	Preferred Browse Decadence	Preferred Browse Young	Perennial Grass Cover	Annual Grass Cover	Perennial Forb Cover	Noxious Weeds	Total Score	Ranking
1998	30	10.1	7	28	-0.4	3.7	0	<b>78.4</b>	Good
2003	30	5	2.6	13.9	0	1.9	0	<b>53.4</b>	Poor-Fair
2008	29.2	2.3	5.5	24.2	0	5.5	0	<b>66.7</b>	Fair
2013	29	11.1	8.1	20.3	-0.4	1.5	0	<b>69.6</b>	Fair-Good
2018	27.8	10.9	11.3	30	-0.8	1.1	0	<b>80.3</b>	Good

## MARYSVALE WMA - STUDY NO. 22R-3



### Location Information

USGS 7.5 min Map Info  
GPS (0' Stake)

Mount Brigham SE; Township 27S, Range 4W, Section 36  
NAD 83 UTM ZONE 12, 389844 East 4252957 North

### Transect Information

Browse Tag # (0' Stake)	614
Transect Bearing	207° 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 Center Street and Main Street in Marysville, travel south on Highway 89 for 2.3 miles to a gate on the west side of the road. Turn right and continue for 0.5 miles to a fence, then proceed for 0.1 miles to a fork and stay right. Continue for 0.3 miles to another fork and stay right again. Drive for 0.4 miles to a fork and stay left, then proceed for 0.1 miles to a fence. Travel for another 0.4 miles to the witness post on the left side of the road by a canal. The site is 170 degrees magnetic from the witness post, and the 0-foot stake is marked by browse tag #614.

**Site Information**

Land Ownership	State
Land Administrator	UDWR
Allotment	No data
Elevation	No data
Aspect	West
Slope	7-12%
Sample Dates	07/22/1998, 06/21/2018

**Table 22R-03.1 Disturbance History.** Recorded history of major disturbances.

Treatment/Disturbance	Name	WRI DB#	Date	Size (acres)
Hand Crew - Lop and Scatter	Deer Flat Lop and Scatter Project	3775	May-June 2017	724

**Wildlife Habitat and Vegetation History**

**Table 22R-03.3 - Wildlife Seasonal Habitat.** UDWR wildlife habitat and seasonality.

Species	Habitat	Season
Deer	crucial	winter

**Table 22R-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	Wyoming Big Sagebrush	Phase I
2018	Wyoming Big Sagebrush	Phase I

**Site Notes**

All stakes except the 0-foot stake are rebar.

**Soils**

**Table 22R-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	6.3	64.7	20.7	14.6	2.7	17.1	105.6	0.7	07/22/1998

**Site Potential**

1981 - 2010 Average Annual Precipitation	11 inches
NRCS Ecological Site	Semidesert Gravelly Loam (Wyoming Big Sagebrush)
NRCS Ecological Site #	R047XB214UT
States and Transitions	No state and transition model is available for this ecological site.

This site has been dominated by Wyoming big sagebrush (*Artemisia tridentata* ssp. *wyomingensis*) since study establishment in 1998 (Table 22R-03.12, Table 22R-03.13). The herbaceous understory has remained abundant in both sample years, with perennial grasses such as crested wheatgrass (*Agropyron cristatum*) as a co-dominant vegetation component (Table 22R-03.7, Table 22R-03.10). Density and cover data indicate that Utah juniper (*Juniperus osteosperma*) and twoneedle pinyon (*Pinus edulis*) were present in 1998 (Table 22R-03.12, Table 22R-03.13); a lop and scatter project in 2017 (Table 22R-03.1) likely removed a majority of these trees. However, seedlings were present during the 2018 reading and may infill on the site in future sample years (Table 22R-03.14).

**Trend Summary Tables**

**Table 22R-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	6.5	1.4	3.8	-	-	0.1
2018	9.6	1.6	-	9.3	0.9	-

**Table 22R-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	210	312	3	33	2.1	13.1	0.0	0.2
2018	205	268	2	52	3.1	15.9	0.0	0.6

**Table 22R-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	7.3	1.4	34.9	7.6	26.8	27.0
2018	13.9	0.1	51.6	9.4	34.5	30.0

**Table 22R-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	Rabbit
	Quadrat Frequency		
1998	3	56	46
2018	1	23	37
Year	Days Use Per Acre (ha)		
1998	-	-	-
2018	0.7 (1.8)	21.5 (53.0)	-

**Table 22R-03.10 - Grass Species.** Nested frequency and modified Daubenmire average cover by year.

GRASS SPECIES	Achnatherum hymenoides (Indian ricegrass)	Agropyron cristatum <sup>1</sup> (crested wheatgrass)	Aristida purpurea (purple threeawn)	Bouteloua gracilis (blue grama)	Bromus tectorum <sup>aa</sup> (cheatgrass)	Elymus elymoides (squirreltail)	Festuca idahoensis (Idaho fescue)	Hesperostipa comata (needle and thread)	Psathyrostachys juncea <sup>1</sup> (Russian wildrye)	Pseudoroegneria spicata (bluebunch wheatgrass)	Sporobolus cryptandrus (sand dropseed)	Thinopyrum intermedium <sup>1</sup> (intermediate wheatgrass)	Vulpia octoflora <sup>a</sup> (sixweeks fescue)
year	Nested Frequency												
1998	8	209	6	35	207	20	30	88	9	2	-	8	9
2018	6	165	1	29	205	29	8	80	7	2	11	17	-
year	Average Cover (%)												
1998	0.1	9.1	0.1	0.3	2.0	0.2	0.8	2.2	0.2	0.0	-	0.2	0.2
2018	0.1	9.1	0.0	1.7	3.1	0.8	0.3	3.0	0.2	0.0	0.1	0.5	-

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



**Table 22R-03.11 - Forb Species.** Nested frequency and modified Daubenmire average cover by year.

FORB SPECIES	Nested Frequency					
Alyssum desertorum <sup>ai</sup> (desert madwort)						
Erigeron pumilus (shaggy fleabane)						
Heterotheca villosa (hairy false goldenaster)						
Hymenopappus filifolius (fineleaf hymenopappus)						
Phlox hoodii (spiny phlox)						
Sphaeralcea coccinea (scarlet globemallow)						
year	Average Cover (%)					
1998	3	-	-	-	3	30
2018	2	5	7	8	-	32
year	Average Cover (%)					
1998	0.0	-	-	-	0.0	0.2
2018	0.0	0.0	0.2	0.1	-	0.3

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

**Table 22R-03.12 - Shrub and Tree Species.** Average modified Daubenmire quadrat and line intercept cover by year.

SHRUB SPECIES	Line Intercept Cover (%)									
Artemisia tridentata ssp. tridentata <sup>p</sup> (basin big sagebrush)										
Artemisia tridentata ssp. wyomingensis <sup>p</sup> (Wyoming big sagebrush)										
Chrysothamnus viscidiflorus ssp. viscidiflorus var. viscidiflorus (yellow rabbitbrush)										
Ericameria nauseosa ssp. nauseosa var. speciosa <sup>p</sup> (rubber rabbitbrush)										
Gutierrezia sarothrae (broom snakeweed)										
Juniperus osteosperma <sup>t</sup> (Utah juniper)										
Opuntia polyacantha (plains pricklypear)										
Pinus edulis <sup>t</sup> (twoneedle pinyon)										
Sclerocactus (fishhook cactus)										
year	Quadrat Cover (%)									
1998	-	-	-	-	-	-	-	-	-	-
2018	-	9.1	0.3	0.2	0.6	-	-	-	-	-
year	Quadrat Cover (%)									
1998	0.4	5.9	0.0	0.1	1.3	1.7	-	2.1	0.0	
2018	-	9.5	0.2	0.1	1.3	-	0.0	-	-	-

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

**Table 22R-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 (%)				
<b>Amelanchier utahensis<sup>p</sup> -- (Utah serviceberry)</b>									
1998	20	-	0	100	0	100	0	0	- / -
2018	-	-	-	-	-	-	-	-	- / -
<b>Artemisia tridentata ssp. tridentata<sup>p</sup> -- (basin big sagebrush)</b>									
1998	20	-	100	0	0	0	0	0	141/184
2018	40	-	0	0	100	0	0	100	- / -
<b>Artemisia tridentata ssp. wyomingensis<sup>p</sup> -- (Wyoming big sagebrush)</b>									
1998	2120	-	36	55	9	8	3	9	56/85
2018	1340	20	2	61	37	27	5	18	49/73

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 (%)				
<b>Chrysothamnus viscidiflorus ssp. viscidiflorus var. viscidiflorus -- (yellow rabbitbrush)</b>									
1998	-	-	-	-	-	-	-	-	15/20
2018	160	-	0	100	0	0	0	0	17/23
<b>Echinocereus -- (hedgehog cactus)</b>									
1998	-	-	-	-	-	-	-	-	-/-
2018	20	-	0	100	0	0	0	0	7/15
<b>Ephedra viridis<sup>p</sup> -- (mormon tea)</b>									
1998	-	-	-	-	-	-	-	-	-/-
2018	-	-	-	-	-	-	-	-	24/43
<b>Ericameria nauseosa ssp. nauseosa var. hololeuca<sup>p</sup> -- (rubber rabbitbrush)</b>									
1998	-	-	-	-	-	-	-	-	-/-
2018	20	-	0	100	0	0	0	0	- / -
<b>Ericameria nauseosa ssp. nauseosa var. speciosa<sup>p</sup> -- (rubber rabbitbrush)</b>									
1998	40	-	0	100	0	0	0	0	80/120
2018	220	-	0	100	0	0	0	18	59/100
<b>Gutierrezia sarothrae -- (broom snakeweed)</b>									
1998	2660	-	20	76	5	0	0	4	16/20
2018	1560	20	6	46	47	0	0	90	12/15
<b>Juniperus osteosperma<sup>t</sup> -- (Utah juniper)</b>									
1998	100	-	80	20	0	0	0	0	- / -
2018	20	-	100	0	0	0	0	0	- / -
<b>Opuntia polyacantha -- (plains pricklypear)</b>									
1998	40	-	0	100	0	0	0	0	7/21
2018	40	-	0	100	0	0	0	0	12/28
<b>Opuntia -- (pricklypear)</b>									
1998	-	-	-	-	-	-	-	-	-/-
2018	-	-	-	-	-	-	-	-	20/48
<b>Pinus edulis<sup>t</sup> -- (twoneedle pinyon)</b>									
1998	100	-	60	40	0	0	0	0	- / -
2018	-	-	-	-	-	-	-	-	-/-
<b>Purshia tridentata<sup>p</sup> -- (antelope bitterbrush)</b>									
1998	-	-	-	-	-	-	-	-	-/-
2018	-	-	-	-	-	-	-	-	13/67
<b>Sclerocactus -- (fishhook cactus)</b>									
1998	40	-	50	50	0	0	0	0	12/34
2018	-	-	-	-	-	-	-	-	-/-
<b>Yucca -- (yucca)</b>									
1998	-	-	-	-	-	-	-	-	59/60
2018	-	-	-	-	-	-	-	-	37/43

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

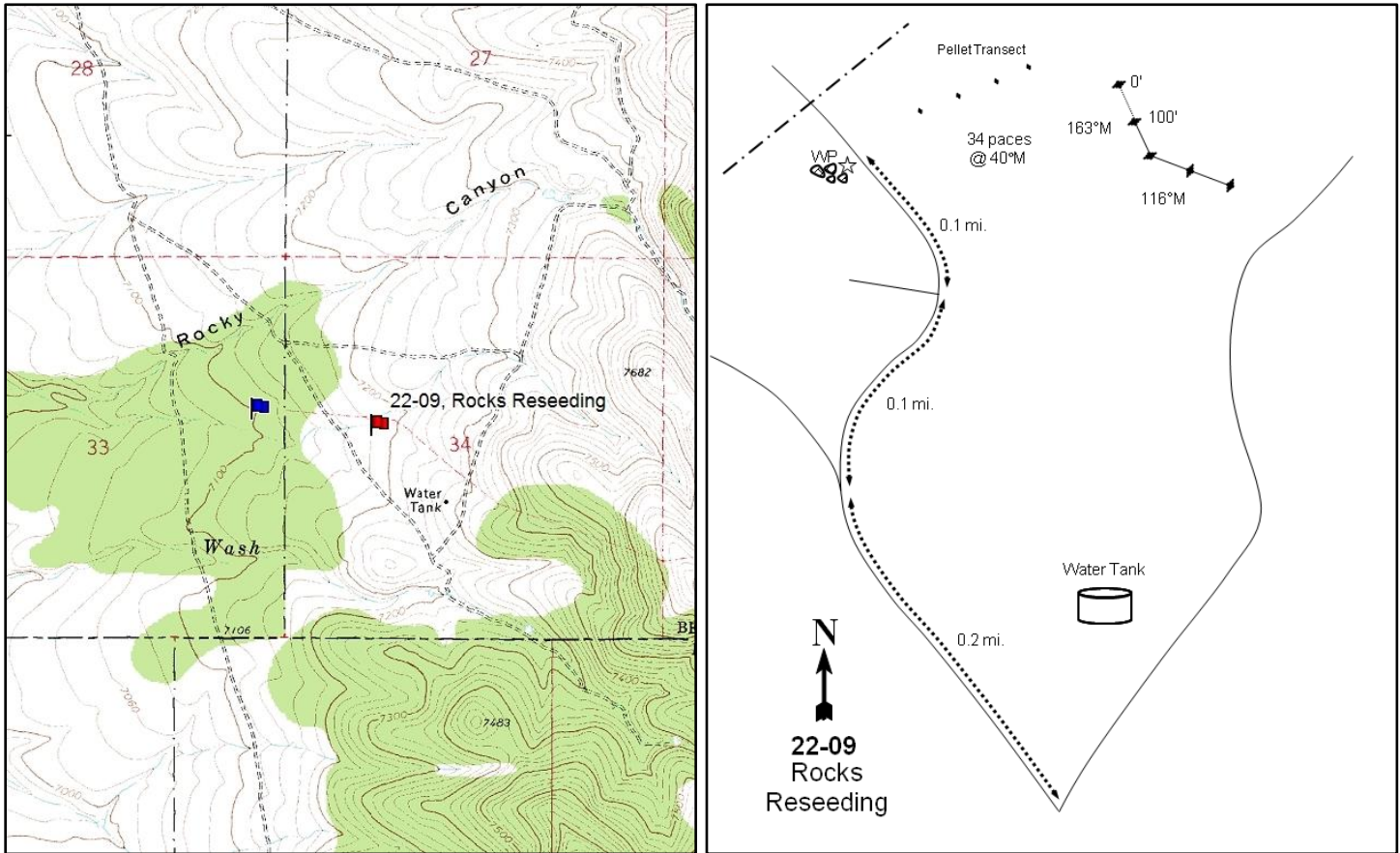
**Table 22R-03.14 - Tree Characteristics.** Point-quarter tree density, size class distribution, and average diameter.

Year	Density	Size Class Distribution					Average Diameter (cm)
	Trees per Acre	Seedling (%)	1-4' (%)	4-8' (%)	8-12' (%)	>12' (%)	
<b>Juniperus osteosperma (Utah juniper)</b>							
2018	4	100	-	-	-	-	17.0
<b>Pinus edulis (twoneedle pinyon)</b>							
2018	3	100	-	-	-	-	1.0

**Table -22R-03.15 - Deer Desirable Components Index: Low Potential Scale.**

Year	Preferred Browse Cover	Preferred Browse Decadence	Preferred Browse Young	Perennial Grass Cover	Annual Grass Cover	Perennial Forb Cover	Noxious Weeds	Total Score	Ranking
1998	8.1	12.3	15	26.3	-1.6	0.4	0	<b>60.4</b>	Good
2018	11.6	4.1	0.7	30	-2.3	1.1	0	<b>45.2</b>	Fair-Good

## ROCKS RESEEDING - STUDY NO. 22-9

**Location Information**

USGS 7.5 min Map Info  
GPS (0' Stake)

Kane Canyon SE; Township 30S, Range 6W, Section 34  
NAD 83 UTM ZONE 12, 366401 East 4224123 North

**Transect Information**

Browse Tag # (0' Stake)	7050
Transect Bearing	175° magnetic (Lines 3-4: 116° 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**

Begin on I-15 at exit #100, 9 miles south of Beaver. On the east side of the freeway there is a frontage road and a road going east. Travel east for 6.3 miles up Fremont Wash to a faint road on the left. Turn left and proceed for 0.6 miles up the road (there will be several switchbacks) to the top to a gate. Pass through the gate and continue straight for 0.7 miles to a four-way intersection. Go straight for 0.65 miles to a fork. Take the middle fork and drive for 0.8 miles to a fork with Roads #1002 and #1003. Go right for 1 mile on #1002 to a stock pond. Proceed up a steep hill 0.1 miles to a fork, turn left (Road #1005), and go 0.2 miles to another fork. Stay right and travel for another 0.1 mile to a witness post on the left side of the road; the witness post marks the start of a pellet group transect. From the witness post, walk 34 paces at 41 degrees magnetic along the transect. There are small rebar posts every 30 feet. The baseline starts 10 feet south of the fifth small rebar (150 feet from the fencepost). The frequency baseline is marked by 2-3 foot rebar and the 0-foot stake is tagged #7050. The 200, 300 and 400 foot stakes are half-high fenceposts.

**Site Information**

Land Ownership	Federal
Land Administrator	USFS
Allotment	South Beaver Allotment
Elevation	7,150ft (2,179m)
Aspect	West
Slope	4-6%
Sample Dates	06/19/1998, 06/17/2003, 06/11/2008, 06/03/2013, 06/12/2018

**Table 22-09.1 Disturbance History.** Recorded history of major disturbances.

Treatment/Disturbance	Name	WRI DB#	Date	Size (acres)
Harrow - Dixie Harrow Unknown	-	-	1962	-
Seeding - Seed Unknown	-	-	1962	-
Hand Crew - Lop and Scatter	South Beaver Lop and Scatter	4655	2019 (Proposed)	4657

**Wildlife Habitat and Vegetation History****Table 22-09.3 - Wildlife Seasonal Habitat.** UDWR wildlife habitat and seasonality.

Species	Habitat	Season
Deer	crucial	winter
Elk	substantial	winter
Greater Sage Grouse	occupied	year-long

**Table 22-09.4 - 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/Bitterbrush	Phase I
1991	Mountain Big Sagebrush/Bitterbrush	Phase I
1998	Mountain Big Sagebrush/Bitterbrush/Pinyon-Juniper	Phase I transitioning to Phase II
2003	Mountain Big Sagebrush/Bitterbrush/Pinyon-Juniper	Phase I transitioning to Phase II
2008	Mountain Big Sagebrush/Bitterbrush/Pinyon-Juniper	Phase I transitioning to Phase II
2013	Mountain Big Sagebrush/Bitterbrush/Pinyon-Juniper	Phase I transitioning to Phase II
2018	Mountain Big Sagebrush/Bitterbrush/Pinyon-Juniper	Phase I transitioning to Phase II

**Site Notes**

A water trough is located about one third of a mile from the site.

**Soils****Table 22-09.5 - 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
Clay Loam	6.6	38.0	31.4	30.6	2.5	9.0	185.6	0.7	06/19/1998
Clay Loam	6.6	38.0	29.4	32.6	2.6	9.8	185.6	0.6	06/19/1998

**Site Potential**

1981 - 2010 Average Annual Precipitation	17 inches
NRCS Ecological Site	Upland Loam (Mountain Big Sagebrush-Indian Ricegrass)
NRCS Ecological Site #	R047XB308UT
States and Transitions	No state and transition model is available for this ecological site.

The browse component of this site has been dominated by mountain big sagebrush (*Artemisia tridentata* ssp. *vaseyana*) and antelope bitterbrush (*Purshia tridentata*) since study establishment in 1985 (Pre-1992 Data, Photos, Table 22-09.12, Table 22-09.13). The herbaceous understory has remained abundant through the sample years, with the introduced grass species crested wheatgrass (*Agropyron cristatum*) contributing a majority of the cover; native forb and grass species have remained sparse in comparison (Table 22-09.7, Table 22-09.10, Table 22-09.11). Twoneedle pinyon (*Pinus edulis*) and Utah juniper (*Juniperus osteosperma*) have increased in cover and density over time (Photos, Table 22-09.12, Table 22-09.13, Table 22-09.14) and became co-dominant components of the plant community in 1998 (Table 22-09.4). Without a tree-removing disturbance, pinyon and juniper will likely continue to increase in size and abundance. This continued encroachment may cause a decrease in understory shrub and herbaceous species, causing the community to transition to one dominated solely by trees.

**Trend Summary Tables****Table 22-09.6 - 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
1998	26.7	-	0.1	-	-	0.1
2003	22.4	-	0.6	24.5	-	2.3
2008	12.7	-	1.5	20.3	-	3.9
2013	11.7	-	1.4	32.5	-	4.9
2018	18.6	-	3.9	24.5	-	8.6

**Table 22-09.7 - 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
1998	-	368	14	55	-	22.8	0.0	0.8
2003	1	317	200	60	0.0	15.1	1.7	0.3
2008	1	299	40	61	0.0	18.2	0.1	0.3
2013	3	336	172	62	0.0	23.5	0.6	0.7
2018	-	331	102	26	-	32.2	0.4	0.2

**Table 22-09.8 - 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
1998	21.1	0.5	42.6	11.1	11.5	39.7
2003	30.2	0.2	26.9	9.0	10.5	40.2
2008	21.0	0.4	34.9	14.3	9.9	36.3
2013	16.0	0.1	47.1	8.6	8.6	38.2
2018	23.7	0.3	46.2	12.8	15.0	42.3

**Table 22-09.9 - Pellet Group Data.** Quadrat frequency and pellet group transect data for animal pellets. Rabbit pellet groups are not sampled in the pellet group transect.

Year	Cattle	Coyote	Mule Deer	Rocky Mountain Elk	Rabbit
	Quadrat Frequency				
1998	18	-	21	2	21
2003	9	-	7	-	4
2008	7	-	16	2	80
2013	1	-	6	2	1
2018	3	-	11	1	55
Year	Days Use Per Acre (ha)				
1998	20.3 (50.2)	8.7 (21.5)*	18.1 (44.7)	1.3 (3.3)	-
2003	18.9 (46.6)	-	22.8 (56.3)	6.0 (14.9)	-
2008	31.9 (78.9)	-	19.4 (48.0)	-	-
2013	28.3 (69.9)	-	14.7 (36.4)	4.7 (11.6)	-
2018	4.4 (10.8)	8.7 (21.5)*	10.7 (26.5)	2.7 (6.6)	-

\*Pellets per acre (ha)

**Table 22-09.10 - Grass Species.** Nested frequency and modified Daubenmire average cover by year.

GRASS SPECIES											
Achnatherum hymenoides (Indian ricegrass)											
Agropyron cristatum <sup>i</sup> (crested wheatgrass)											
Aristida purpurea (purple threeawn)											
Bouteloua gracilis (blue grama)											
Bromus tectorum <sup>ai</sup> (cheatgrass)											
Elymus elymoides (squirreltail)											
Koeleria macrantha (prairie Junegrass)											
Pleuraphis jamesii (James' galleta)											
Poa fendleriana (muttongrass)											
Poa secunda (Sandberg bluegrass)											
Pseudoroegneria spicata (bluebunch wheatgrass)											
year	Nested Frequency										
1998	1	365	2	-	-	-	-	3	3	-	11
2003	1	314	1	-	1	-	4	-	1	3	3
2008	3	297	-	-	1	-	-	3	-	5	-
2013	-	334	-	4	3	-	-	-	1	11	2
2018	0	326	-	12	-	1	1	1	1	4	-
year	Average Cover (%)										
1998	0.0	22.0	0.0	-	-	-	-	0.0	0.1	-	0.6
2003	0.0	14.9	0.0	-	0.0	-	0.0	-	0.0	0.1	0.0
2008	0.0	18.0	-	-	0.0	-	-	0.1	-	0.0	-
2013	-	23.2	-	0.2	0.0	-	-	-	0.0	0.1	0.0
2018	0.0	31.1	-	0.7	-	0.0	0.0	0.0	0.0	0.3	-

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

**Table 22-09.11 - Forb Species.** Nested frequency and modified Daubenmire average cover by year.

FORB SPECIES																	
Agoseris glauca (pale agoseris)																	
Alyssum desertorum <sup>ai</sup> (desert madwort)																	
Arabis demissa (nodding rockress)																	
Astragalus (milkvetch)																	
Astragalus convallarius (lesser rushy milkvetch)																	
Calochortus nuttallii (sego lily)																	
Ceratocephala testiculata <sup>ai</sup> (curveseed butterwort)																	
Chaenactis douglasii (Douglas' dusty maiden)																	
Collinsia parviflora <sup>a</sup> (maiden blue eyed Mary)																	
Crepis acuminata (tapertip hawksbeard)																	
Cryptantha (cryptantha)																	
Cymopterus (springparsley)																	
Delphinium nuttallianum (two-lobed larkspur)																	
Descurainia pinnata <sup>a</sup> (western tansymustard)																	
Draba <sup>a</sup> (draba)																	
Erigeron eatonii (Eatons' fleabane)																	
Eriogonum racemosum (redroot buckwheat)																	
year	Nested Frequency																
1998	1	-	3	6	3	-	-	-	1	-	-	2	5	2	2	-	2
2003	1	2	3	6	-	4	9	1	19	1	1	12	6	-	2	-	-
2008	-	6	-	5	-	-	7	-	26	3	-	9	0	-	-	4	1
2013	3	125	-	7	-	-	34	-	28	1	-	26	-	-	-	-	1
2018	-	71	-	2	-	1	20	-	35	0	4	-	-	-	-	-	-
year	Average Cover (%)																
1998	0.0	-	0.0	0.3	0.1	-	-	-	0.0	-	-	0.0	0.0	0.0	0.0	-	0.0
2003	0.0	0.0	0.0	0.0	-	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	-	0.0	-	-
2008	-	0.0	-	0.0	-	-	0.0	-	0.1	0.0	-	0.0	0.0	-	-	0.0	0.0
2013	0.0	0.4	-	0.2	-	-	0.1	-	0.1	0.2	-	0.1	-	-	-	-	0.0
2018	-	0.2	-	0.0	-	0.0	0.0	-	0.1	0.0	0.0	-	-	-	-	-	-

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

FORB SPECIES	Gayophytum ramosissimum <sup>a</sup> (pinyon groundsmoke)	Lactuca serriola <sup>ai</sup> (prickly lettuce)	Lomatium (desertparsley)	Microsteris gracilis <sup>a</sup> (slender phlox)	Navarretia intertexta <sup>a</sup> (needleleaf navarretia)	Phlox longifolia (longleaf phlox)	Trifolium (clover)	Vicia americana (American vetch)	Zigadenus paniculatus (foothill deathcamas)
year	Nested Frequency								
1998	-	1	4	9	-	33	-	3	3
2003	5	-	-	184	1	31	1	-	-
2008	3	-	8	4	-	35	-	-	1
2013	-	-	2	26	-	28	-	-	-
2018	3	-	6	8	-	14	-	-	-
year	Average Cover (%)								
1998	-	0.0	0.0	0.0	-	0.2	-	0.0	0.0
2003	0.0	-	-	1.6	0.0	0.1	0.0	-	-
2008	0.0	-	0.1	0.0	-	0.1	-	-	0.0
2013	-	-	0.0	0.1	-	0.1	-	-	-
2018	0.0	-	0.0	0.0	-	0.1	-	-	-

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

**Table 22-09.12 - Shrub and Tree Species.** Average modified Daubenmire quadrat and line intercept cover by year.

SHRUB SPECIES	Artemisia tridentata ssp. vaseyana <sup>p</sup> (mountain big sagebrush)	Juniperus osteosperma <sup>t</sup> (Utah juniper)	Pinus edulis <sup>t</sup> (twoneedle pinyon)	Purshia tridentata <sup>p</sup> (antelope bitterbrush)
year	Line Intercept Cover (%)			
1998	-	-	-	-
2003	13.7	2.1	0.2	10.8
2008	9.5	3.9	-	10.8
2013	14.5	4.9	-	18
2018	10.1	8.6	-	14.4
year	Quadrat Cover (%)			
1998	14.5	0.1	-	12.2
2003	12.7	0.5	0.1	9.7
2008	6.4	1.5	-	6.3
2013	4.8	1.4	-	7.0
2018	7.1	3.8	0.1	11.5

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



**Table 22-09.13 - 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 (%)				
<b>Artemisia tridentata ssp. vaseyana<sup>p</sup> -- (mountain big sagebrush)</b>									
1998	3420	340	26	66	8	18	1	3	67/93
2003	2880	20	12	71	17	21	8	3	64/78
2008	3140	60	13	41	46	37	14	31	49/74
2013	2540	60	11	72	17	35	9	17	63/90
2018	2460	-	3	64	33	0	2	20	56/70
<b>Cylindropuntia whipplei -- (Whipple cholla)</b>									
1998	-	-	-	-	-	-	-	-	15/20
2003	-	-	-	-	-	-	-	-	-/-
2008	-	-	-	-	-	-	-	-	-/-
2013	-	-	-	-	-	-	-	-	-/-
2018	-	-	-	-	-	-	-	-	-/-
<b>Juniperus osteosperma<sup>t</sup> -- (Utah juniper)</b>									
1998	100	20	60	40	0	0	0	0	-/-
2003	100	-	40	60	0	0	0	0	-/-
2008	100	20	60	40	0	0	20	20	-/-
2013	120	-	33	67	0	0	0	0	-/-
2018	120	-	50	50	0	0	0	0	-/-
<b>Opuntia -- (pricklypear)</b>									
1998	-	-	-	-	-	-	-	-	-/-
2003	-	-	-	-	-	-	-	-	-/-
2008	20	-	0	100	0	0	0	0	11/4
2013	-	-	-	-	-	-	-	-	-/-
2018	-	-	-	-	-	-	-	-	-/-
<b>Pinus edulis<sup>t</sup> -- (twoneedle pinyon)</b>									
1998	20	-	100	0	0	0	0	0	-/-
2003	20	-	100	0	0	0	0	0	-/-
2008	-	-	-	-	-	-	-	-	-/-
2013	20	-	100	0	0	0	0	0	-/-
2018	20	-	100	0	0	0	0	0	-/-
<b>Purshia tridentata<sup>p</sup> -- (antelope bitterbrush)</b>									
1998	1440	100	7	83	10	57	3	0	104/134
2003	1080	20	6	35	59	22	76	13	97/125
2008	1140	100	5	42	53	42	37	26	106/129
2013	1240	80	18	74	8	45	2	5	116/149
2018	1220	-	2	79	20	10	18	10	120/132
<b>Ribes<sup>p</sup> -- (currant)</b>									
1998	-	-	-	-	-	-	-	-	-/-
2003	-	-	-	-	-	-	-	-	-/-
2008	-	-	-	-	-	-	-	-	-/-
2013	-	-	-	-	-	-	-	-	67/100

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

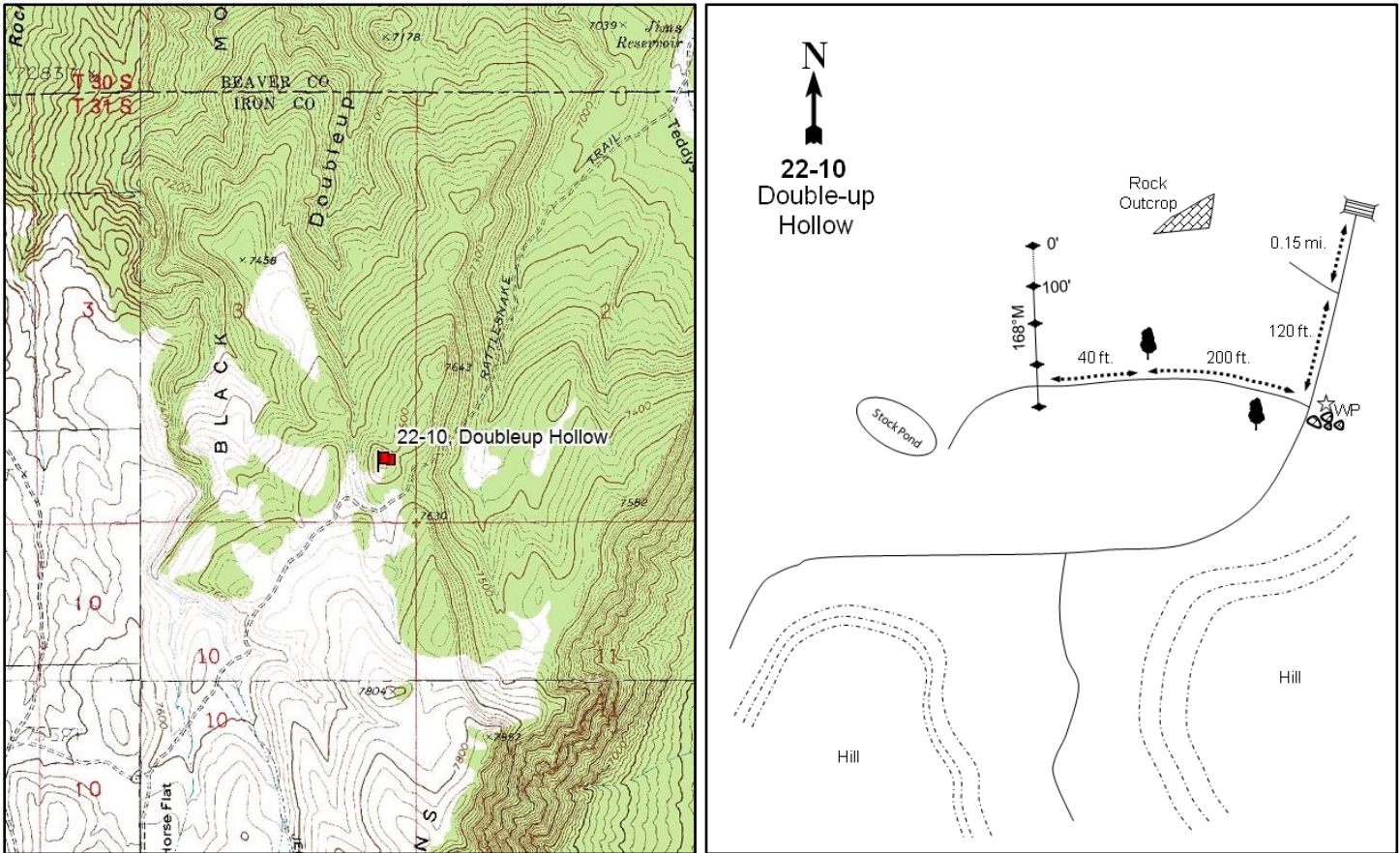
**Table 22-09.14 - Tree Characteristics.** Point-quarter tree density, size class distribution, and average diameter.

Year	Density	Size Class Distribution					Average Diameter (cm)
	Trees per Acre	Seedling (%)	1-4' (%)	4-8' (%)	8-12' (%)	>12' (%)	
<b>Juniperus osteosperma (Utah juniper)</b>							
1998	52	-	-	-	-	-	12.6
2003	59	-	24	29	35	12	11.9
2008	63	5	16	42	37	-	14.0
2013	67	6	11	28	22	33	18.3
2018	83	-	21	26	11	42	15.5
<b>Juniperus scopulorum (Rocky Mountain juniper)</b>							
2018	13	-	50	50	-	-	3.5
<b>Pinus edulis (twoneedle pinyon)</b>							
1998	2	-	-	-	-	-	8.0
2018	19	-	50	50	-	-	4.7

**Table -22-09.15 - Deer Desirable Components Index: Mid Potential Scale.**

Year	Preferred Browse Cover	Preferred Browse Decadence	Preferred Browse Young	Perennial Grass Cover	Annual Grass Cover	Perennial Forb Cover	Noxious Weeds	Total Score	Ranking
1998	30	12.3	8.7	30	0	1.7	0	<b>82.7</b>	Excellent
2003	30	4.2	4.5	30	0	0.6	0	<b>69.3</b>	Good
2008	28.1	0.2	4.5	30	0	0.5	0	<b>63.3</b>	Fair-Good
2013	30	11.4	7.4	30	0	1.3	0	<b>80.1</b>	Good-Excellent
2018	30	7.5	1.2	30	0	0.4	0	<b>69</b>	Good

## DOUBLEUP HOLLOW - STUDY NO. 22-10



### Location Information

USGS 7.5 min Map Info  
GPS (0' Stake)

Greenville Bench SW; Township 31S, Range 8W, Section 03  
NAD 83 UTM ZONE 12, 347594 East 4222016 North

### Transect Information

Browse Tag # (0' Stake)	7075
Transect Bearing	168° 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

Start from the cattle guard in front of the Chevron station on the west side of the I-15 interchange at the south end of Beaver. Turn left onto the frontage road (2550 South) and go 0.7 miles south, then proceed for 1.6 miles west. Go past the turnoff to the Beaver International Airport for 0.2 miles to a corner and then continue another 0.2 miles south to an intersection. Turn right, driving parallel to a fenceline, and proceed 1.7 miles west to an intersection. At the intersection, turn left onto a major dirt road and follow this main road (also known as the Rattlesnake Trail) for 6.7 miles, keeping to the right at all forks, to a junction. From the junction, drive 1.65 miles to a cattle guard. Continue for 0.15 miles to a half-high fencepost marked by a rock pile. From the half-high post, go 72 paces at 310 degrees to the 0-foot stake. The 300-foot stake is rebar and tagged #7075.

**Site Information**

Land Ownership	Federal
Land Administrator	BLM
Allotment	BALD HILLS
Elevation	7,620ft (2,323m)
Aspect	south
Slope	10-15%
Sample Dates	06/25/1998, 06/16/2003, 06/04/2008, 05/29/2013, 06/12/2018

**Table 22-10.1 Disturbance History.** Recorded history of major disturbances.

Treatment/Disturbance	Name	WRI DB#	Date	Size (acres)
Fire - Wildfire	Greenville Fire	-	May-July 2007	14716
Seeding - Aerial	Greenville Bench Aerial Seeding	993	December 2007-January 2008	11048

**Table 22-10.2 Seed Mix.** List of known seeded plant species and rates (if available).

Mix Name		Application Type	Application Date	Acres	
Greenville Bench Mix #2		Aerial	Dec 2007	4030	
Type	Species	Common Name	Cultivar/Source ID	Bulk lbs/acre	PLS
		SITLA MIX**		0.13	0.00
G	Achnatherum hymenoides	Indian Ricegrass		0.19	0.00
G	Achnatherum hymenoides	Indian Ricegrass		0.12	0.00
G	Agropyron cristatum	Crested Wheatgrass	Hycrest	1.00	0.93
G	Dactylis glomerata	Orchardgrass	Paiute	0.22	0.19
G	Dactylis glomerata	Orchardgrass	Paiute	0.74	0.63
G	Elymus elymoides	Bottlebrush Squirreltail	Toe Jam	0.31	0.29
G	Elymus elymoides	Bottlebrush Squirreltail		0.01	0.00
G	Elymus lanceolatus	Thickspike Wheatgrass	Bannock	0.21	0.00
G	Pascopyrum smithii	Western Wheatgrass	Arriba	0.24	0.00
G	Pascopyrum smithii	Western Wheatgrass	Arriba	0.06	0.00
G	Pascopyrum smithii	Western Wheatgrass	Arriba	0.66	0.53
G	Poa secunda	Canby Bluegrass	Canbar	0.43	0.32
G	Psathyrostachys juncea	Russian Wildrye		0.04	0.00
G	Pseudoroegneria spicata	Bluebunch Wheatgrass	P-7	0.81	0.75
G	Sporobolus cryptandrus	Sand Dropseed		0.04	0.00
G	Thinopyrum intermedium	Intermediate Wheatgrass	Rush	0.26	0.00
G	Thinopyrum intermedium	Pubescent Wheatgrass	Luna	0.60	0.00
G	Thinopyrum intermedium	Pubescent Wheatgrass		0.66	0.58
F	Achillea millefolium	Western Yarrow		0.02	0.00
F	Linum perenne	Blue Flax		0.02	0.00
F	Linum perenne	Blue Flax	Maple Grove	0.20	0.19
F	Medicago sativa	Alfalfa	Ladak	0.81	0.77
F	Medicago sativa	Alfalfa	Ladak	0.10	0.00
F	Melilotus officinalis	Yellow Sweetclover		0.37	0.00
F	Melilotus officinalis	Yellow Sweetclover		0.62	0.51
F	Onobrychis viciifolia	Sainfoin	Eski	2.01	1.77
F	Penstemon palmeri	Palmer Penstemon		0.02	0.00
F	Penstemon palmeri	Palmer Penstemon	Carbon/Washington/Iron	0.05	0.04
F	Sanguisorba minor	Small Burnet	Delar	2.01	1.86
F	Sanguisorba minor	Small Burnet		0.60	0.00
F	Sphaeralcea grossulariifolia	Gooseberryleaf Globemallow		0.01	0.00
S	Atriplex canescens	Fourwing Saltbush		0.04	0.00

**Wildlife Habitat and Vegetation History****Table 22-10.3 - Wildlife Seasonal Habitat.** UDWR wildlife habitat and seasonality.

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

**Table 22-10.4 - 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/Bitterbrush/Pinyon-Juniper	Phase I transitioning to Phase II
1991	Mountain Big Sagebrush/Bitterbrush/Pinyon-Juniper	Phase I transitioning to Phase II
1998	Mountain Big Sagebrush/Bitterbrush/Pinyon-Juniper	Phase I transitioning to Phase II
2003	Mountain Big Sagebrush/Bitterbrush/Pinyon-Juniper	Phase I transitioning to Phase II
2008	Perennial Grass	Phase I
2013	Perennial Grass	Phase I
2018	Perennial Grass	Phase I

**Site Notes**

No Notes

**Soils****Table 22-10.5 - Soil Analysis Data.** List of chemical and textural soil characteristics determined by laboratory analysis.

Texture	pH	%sand	%silt	%clay	%OM	PPM P	PPM K	ds/m	Sample Date
Clay Loam	6.5	44.0	27.4	28.6	2.7	7.1	204.8	0.8	06/24/1998

**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 1985, the plant community on this study site was dominated by mountain big sagebrush (*Artemisia tridentata* ssp. *vaseyana*) and antelope bitterbrush (*Purshia tridentata*) with a limited herbaceous understory (Pre-1992 Data, Photos). Bitterbrush and sagebrush remained relatively stable on the site until a 2007 wildfire (Table 22-10.1) removed nearly all of the shrubs (Table 22-10.12, Table 22-10.13). Twoneedle pinyon (*Pinus edulis*) and Utah juniper (*Juniperus osteosperma*) were co-dominant site components, but were also removed from the site by the wildfire (Photos, Table 22-10.12, Table 22-10.13, Table 22-10.14). As part of fire rehabilitation efforts, this site was seeded with a diverse seed mix of native and introduced plant species. As such, this study site has transitioned to one dominated by introduced perennial grass with intermediate wheatgrass (*Thinopyrum intermedium*) contributing much of the cover. Cheatgrass has varied in nested frequency since 1998 and was considered to be abundant in 2013, but has generally remained rare overall (Table 22-10.10). Densities of mountain big sagebrush and black sagebrush (*A. nova*) have gradually increased following the burn, but remain low (Table 22-10.13). This study site is expected to remain in a similar state in the future with the potential for sagebrush to increase in abundance.

## Trend Summary Tables

**Table 22-10.6 - 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
1998	32.7	0.0	7.8	-	-	0.9
2003	29.1	0.0	11.4	27.6	-	13.4
2008	0.0	0.2	-	-	-	-
2013	0.2	0.6	-	0.9	0.6	-
2018	0.7	0.7	-	1.1	1.5	-

**Table 22-10.7 - 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
1998	105	134	19	73	1.8	2.3	0.1	2.2
2003	70	99	45	24	0.7	1.5	0.3	0.4
2008	6	4	7	9	0.1	0.1	0.0	0.1
2013	355	313	65	215	6.0	21.0	0.7	12.7
2018	11	426	6	49	0.1	50.0	0.0	1.2

**Table 22-10.8 - 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
1998	6.0	0.2	48.8	20.0	12.2	45.4
2003	7.1	0.4	51.5	13.5	10.6	40.3
2008	20.4	0.9	6.2	60.7	19.9	0.4
2013	5.5	-	40.6	13.1	15.4	44.0
2018	13.5	0.1	57.6	7.5	9.6	52.5

**Table 22-10.9 - 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					
1998	-	-	34	2	-	25
2003	-	-	8	-	-	20
2008	1	-	-	-	-	9
2013	3	-	1	-	-	5
2018	1	-	5	-	-	3
Year	Days Use Per Acre (ha)					
1998	-	8.7 (21.5)*	18.1 (44.7)	-	8.7 (21.5)*	-
2003	-	-	28.8 (71.2)	-	-	-
2008	-	-	-	-	-	-
2013	7.2 (17.9)	-	6.0 (14.9)	-	-	-
2018	1.5 (3.6)	-	19.4 (48.0)	0.7 (1.7)	17.4 (43.0)*	-

\*Pellets per acre (ha)

**Table 22-10.10 - Grass Species.** Nested frequency and modified Daubenmire average cover by year.

GRASS SPECIES	Achnatherum hymenoides (Indian ricegrass)	Agropyron cristatum <sup>i</sup> (crested wheatgrass)	Bouteloua gracilis (blue grama)	Bromus porteri (Porter brome)	Bromus tectorum <sup>ai</sup> (cheatgrass)	Carex (sedge)	Dactylis glomerata <sup>i</sup> (orchardgrass)	Elymus elymoides (squirreltail)	Elymus lanceolatus (thickspike wheatgrass)	Koeleria macrantha (prairie Junegrass)	Poa fendleriana (muttongrass)	Poa secunda (Sandberg bluegrass)	Pseudoroegneria spicata (bluebunch wheatgrass)	Sporobolus cryptandrus (sand dropseed)	Thinopyrum intermedium <sup>i</sup> (intermediate wheatgrass)	Vulpia octoflora <sup>a</sup> (sixweeks fescue)
year	Nested Frequency															
1998	10	-	7	-	105	19	-	84	-	3	6	-	20	-	-	-
2003	-	-	-	-	70	14	-	70	-	11	4	0	9	-	-	-
2008	-	-	1	-	6	-	-	-	-	1	2	-	-	-	-	-
2013	35	28	2	3	355	10	35	85	29	-	3	2	59	1	172	2
2018	33	45	2	7	11	6	2	65	9	2	-	-	80	3	334	-
year	Average Cover (%)															
1998	0.0	-	0.0	-	1.8	0.3	-	1.5	-	0.0	0.2	-	0.4	-	-	-
2003	-	-	-	-	0.7	0.2	-	1.0	-	0.1	0.1	0.0	0.2	-	-	-
2008	-	-	0.0	-	0.1	-	-	-	-	0.0	0.0	-	-	-	-	-
2013	0.6	1.0	0.1	0.4	6.0	0.3	0.9	3.8	0.7	-	0.0	0.0	2.6	0.0	10.6	0.0
2018	1.4	3.3	0.1	0.0	0.1	0.2	0.1	3.1	0.9	0.1	-	-	6.3	0.0	34.3	-

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

**Table 22-10.11 - Forb Species.** Nested frequency and modified Daubenmire average cover by year.

FORB SPECIES	Achillea millefolium (Common yarrow)	Arabis demissa (nodding rockcress)	Astragalus newberryi (Newberry's milkvetch)	Calochortus nuttallii (sego lily)	Castilleja linariifolia (Wyoming Indian paintbrush)	Ceratocephala testiculata <sup>ai</sup> (curvseed butterwort)	Chaenactis douglasii (Douglas' dustymaiden)	Chenopodium album <sup>a</sup> (lambsquarters)	Cirsium (thistle)	Collinsia parviflora <sup>a</sup> (maiden blue eyed Mary)	Cryptantha (cryptantha)	Cymopterus (springparsley)	Descurainia pinnata <sup>a</sup> (western tansymustard)	Dracocephalum parviflorum (American dragonhead)	Epilobium brachycarpum <sup>a</sup> (tall annual willowherb)	Erigeron pumilus (shaggy fleabane)	Eriogonum umbellatum (sulphur-flower buckwheat)
year	Nested Frequency																
1998	-	14	1	-	-	-	6	-	-	-	12	7	3	-	9	3	-
2003	-	3	1	-	-	-	-	-	-	-	1	4	10	-	-	-	3
2008	-	-	-	3	-	-	-	1	-	6	-	0	-	-	-	-	-
2013	8	-	-	-	-	2	3	-	10	-	1	1	-	3	-	2	-
2018	-	-	-	2	3	-	-	-	5	-	1	-	-	-	-	-	-
year	Average Cover (%)																
1998	-	0.1	0.0	-	-	-	0.1	-	-	-	0.1	0.0	0.0	-	0.1	0.0	-
2003	-	0.0	0.0	-	-	-	-	-	-	-	0.0	0.0	0.2	-	-	-	0.0
2008	-	-	-	0.0	-	-	-	0.0	-	0.0	-	0.0	-	-	-	-	-
2013	0.4	-	-	-	-	0.0	0.0	-	0.1	-	0.0	0.0	-	0.0	-	0.0	-
2018	-	-	-	0.0	0.0	-	-	-	0.1	-	0.0	-	-	-	-	-	-

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



FORB SPECIES	Gayophytum ramosissimum <sup>a</sup> (pinyon groundsmoke)	Lactuca serriola <sup>ai</sup> (prickly lettuce)	Lappula occidentalis <sup>ai</sup> (flatspine stickseed)	Linum perenne <sup>i</sup> (blue flax)	Lupinus argenteus (silvery lupine)	Machaeranthera canescens (hoary tansyaster)	Medicago sativa <sup>i</sup> (alfalfa)	Melilotus officinalis <sup>i</sup> (sweetclover)	Microsteris gracilis <sup>ai</sup> (slender phlox)	Oenothera caespitosa (tufted evening primrose)	Packera multilobata (lobeleaf groundsel)	Penstemon (beardtongue)	Petradoria pumila (rock goldenrod)	Phlox longifolia (longleaf phlox)	Physalis (groundcherry)	Pleiacanthus spinosus (thorn skeletonweed)	Sanguisorba minor <sup>i</sup> (small burnet)
year	Nested Frequency																
1998	-	-	-	-	25	4	-	-	7	-	-	4	4	2	-	-	-
2003	36	-	-	-	-	-	-	-	-	-	-	6	1	3	-	2	-
2008	-	-	-	-	0	-	-	-	-	-	1	4	-	1	-	-	-
2013	-	7	13	14	25	121	37	1	3	1	52	-	2	-	-	6	7
2018	-	-	-	-	10	3	13	-	3	-	-	-	-	-	5	15	-
year	Average Cover (%)																
1998	-	-	-	-	1.4	0.0	-	-	0.0	-	-	0.0	0.4	0.0	-	-	-
2003	0.1	-	-	-	-	-	-	-	-	-	-	0.2	0.0	0.0	-	0.0	-
2008	-	-	-	-	0.0	-	-	-	-	-	0.0	0.0	-	0.0	-	-	-
2013	-	0.0	0.0	0.1	0.6	5.3	4.6	0.0	0.0	0.1	1.1	-	0.0	-	-	0.2	0.1
2018	-	-	-	-	0.3	0.0	0.2	-	0.0	-	-	-	-	-	0.0	0.5	-

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

FORB SPECIES	Sisymbrium altissimum <sup>ai</sup> (tall tumblemustard)	Sphaeralcea grossularifolia (gooseberryleaf globemallow)	Taraxacum officinale (common dandelion)	Tragopogon dubius <sup>ai</sup> (yellow salsify)
year	Nested Frequency			
1998	-	-	-	-
2003	-	-	-	-
2008	-	-	-	-
2013	9	4	5	34
2018	-	0	-	3
year	Average Cover (%)			
1998	-	-	-	-
2003	-	-	-	-
2008	-	-	-	-
2013	0.0	0.0	0.0	0.6
2018	-	0.0	-	0.0

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

**Table 22-10.12 - Shrub and Tree Species.** Average modified Daubenmire quadrat and line intercept cover by year.

SHRUB SPECIES	Line Intercept Cover (%)										
	year	1998	2003	2008	2013	2018	1998	2003	2008	2013	2018
<i>Artemisia nova</i> <sup>p</sup> (black sagebrush)	-	-	-	-	-	-	-	-	-	-	-
<i>Artemisia tridentata</i> ssp. <i>vaseyana</i> <sup>p</sup> (mountain big sagebrush)	-	13.9	0.4	-	2.1	-	-	11.3	12	1.3	
<i>Cercocarpus ledifolius</i> <sup>p</sup> (curl-leaf mountain mahogany)	-	-	-	-	-	-	-	-	-	-	
<i>Gutierrezia sarothrae</i> (broom snakeweed)	-	-	-	0.2	-	0.1	0.3	-	-	0.9	
<i>Juniperus osteosperma</i> <sup>i</sup> (Utah juniper)	0.1	-	-	1.3	-	0.1	0.1	-	0.4	0.6	
<i>Mahonia repens</i> (creeping barberry)	-	-	-	-	-	-	-	-	-	-	
<i>Opuntia</i> (pricklypear)	-	-	-	-	-	-	-	-	-	-	
<i>Pinus edulis</i> <sup>i</sup> (twoneedle pinyon)	-	-	-	-	-	-	-	6.1	10.6	1.3	
<i>Purshia tridentata</i> <sup>p</sup> (antelope bitterbrush)	-	-	-	-	-	-	-	11.0	11.0	1.1	
<i>Symphoricarpos oreophilus</i> <sup>p</sup> (mountain snowberry)	-	-	-	0.6	-	0.1	0.1	-	-	0.1	
	0.4	-	-	0.6	-	0.1	0.0	-	0.0	0.3	
year	Quadrat Cover (%)										
1998	0.0	20.4	0.4	-	1.7	0.0	-	6.1	10.6	1.3	
2003	-	16.6	0.4	0.0	0.4	0.0	-	11.0	11.0	1.1	
2008	-	-	-	0.0	-	-	0.1	-	-	0.0	
2013	-	0.2	-	0.6	-	0.0	0.1	-	-	0.1	
2018	0.4	-	-	0.6	-	0.1	0.0	-	0.0	0.3	

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

**Table 22-10.13 - 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 (%)				
<b><i>Artemisia nova</i><sup>p</sup> -- (black sagebrush)</b>									
1998	120	-	0	50	50	0	0	33	24/32
2003	-	-	-	-	-	-	-	-	-/-
2008	-	-	-	-	-	-	-	-	-/-
2013	-	-	-	-	-	-	-	-	-/-
2018	40	-	0	100	0	0	0	0	17/32
<b><i>Artemisia tridentata</i> ssp. <i>vaseyana</i><sup>p</sup> -- (mountain big sagebrush)</b>									
1998	3900	220	3	72	25	22	0	11	57/77
2003	4100	-	1	59	41	22	3	14	61/71
2008	-	-	-	-	-	-	-	-	-/-
2013	40	20	50	50	0	50	0	0	39/71
2018	80	-	0	100	0	0	0	0	38/61
<b><i>Cercocarpus ledifolius</i><sup>p</sup> -- (curl-leaf mountain mahogany)</b>									
1998	20	-	0	100	0	0	0	0	121/134
2003	40	-	50	50	0	0	0	0	146/130
2008	-	-	-	-	-	-	-	-	-/-
2013	-	-	-	-	-	-	-	-	-/-
2018	-	-	-	-	-	-	-	-	-/-
<b><i>Ericameria nauseosa</i> -- (rubber rabbitbrush)</b>									
1998	-	-	-	-	-	-	-	-	-/-
2003	-	-	-	-	-	-	-	-	-/-
2008	-	-	-	-	-	-	-	-	-/-
2013	-	-	-	-	-	-	-	-	-/-
2018	-	-	-	-	-	-	-	-	82/124

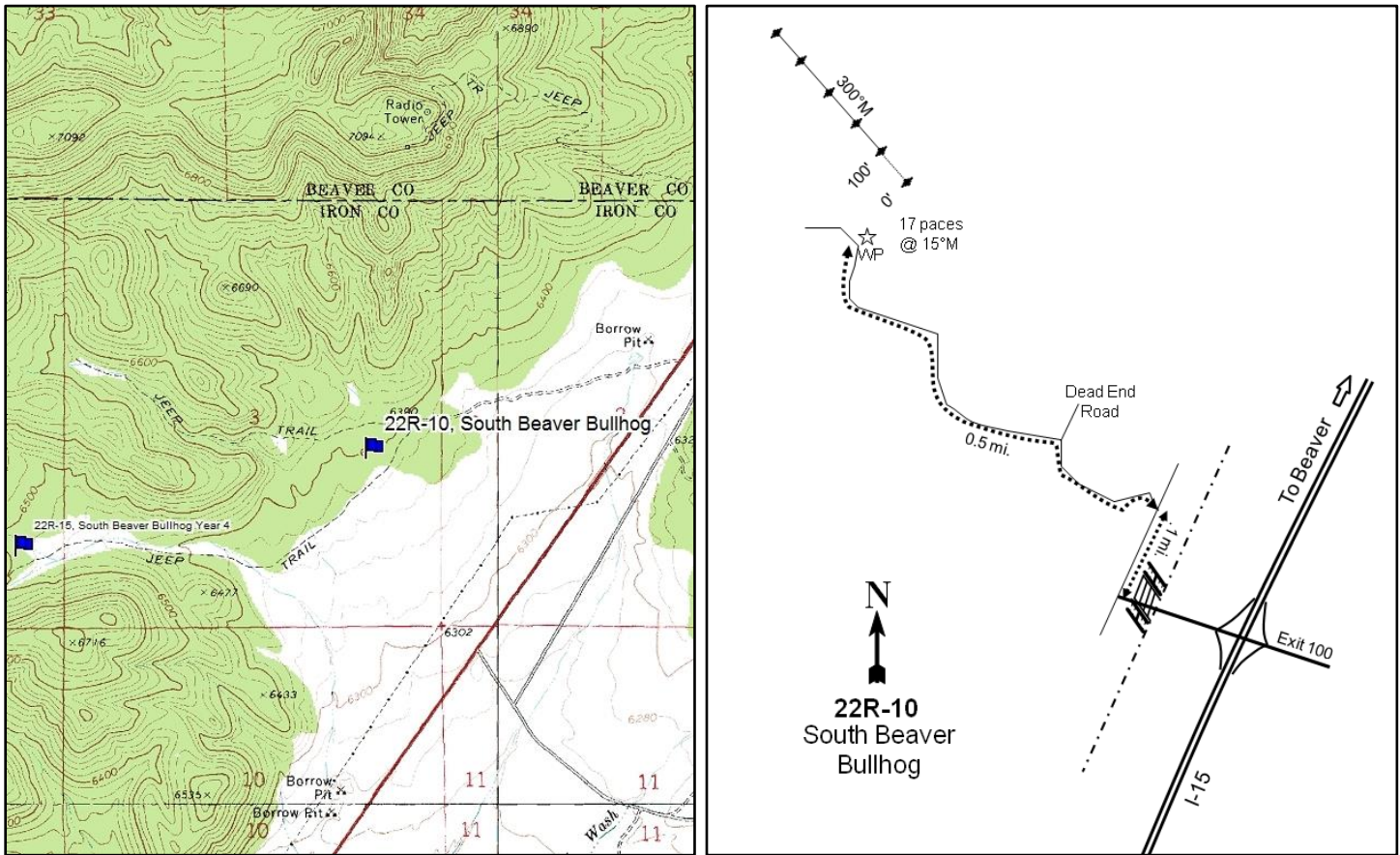
Year	Density		Age Class Distribution			Utilization		Poor Vigor (%)	Average Height Crown (cm)
	Plants Per Acre		Excluding Seedlings			Moderate (%)	Heavy (%)		
	Excluding Seedlings	Seedling	Young (%)	Mature (%)	Decadent (%)				
<b>Gutierrezia sarothrae -- (broom snakeweed)</b>									
1998	20	-	100	0	0	0	0	0	- / -
2003	100	-	0	100	0	0	0	0	21/25
2008	-	20	0	0	0	0	0	0	- / -
2013	140	220	14	86	0	0	0	0	20/29
2018	1080	-	4	91	6	0	0	0	22/34
<b>Juniperus osteosperma<sup>1</sup> -- (Utah juniper)</b>									
1998	40	-	50	50	0	0	0	0	- / -
2003	40	-	50	50	0	0	0	0	- / -
2008	-	-	-	-	-	-	-	-	- / -
2013	-	-	-	-	-	-	-	-	- / -
2018	-	-	-	-	-	-	-	-	- / -
<b>Mahonia repens -- (creeping barberry)</b>									
1998	120	-	17	83	0	0	0	0	- / -
2003	140	-	0	100	0	0	0	0	7/14
2008	120	-	67	0	33	0	0	0	- / -
2013	100	-	20	80	0	0	0	0	7/10
2018	260	-	100	0	0	0	0	0	- / -
<b>Opuntia -- (pricklypear)</b>									
1998	80	-	25	75	0	0	0	0	14/35
2003	140	-	0	57	43	0	0	43	18/32
2008	160	-	38	63	0	0	0	0	12/23
2013	60	-	0	100	0	0	0	0	11/31
2018	40	-	0	100	0	0	0	0	18/55
<b>Pediocactus simpsonii -- (mountain ball cactus)</b>									
1998	-	-	-	-	-	-	-	-	- / -
2003	20	-	0	100	0	0	0	0	9/11
2008	-	-	-	-	-	-	-	-	- / -
2013	-	-	-	-	-	-	-	-	- / -
2018	-	-	-	-	-	-	-	-	- / -
<b>Pinus edulis<sup>t</sup> -- (twoneedle pinyon)</b>									
1998	60	-	100	0	0	0	0	0	- / -
2003	100	-	60	40	0	0	0	0	- / -
2008	-	-	-	-	-	-	-	-	- / -
2013	-	-	-	-	-	-	-	-	- / -
2018	-	-	-	-	-	-	-	-	- / -
<b>Purshia tridentata<sup>p</sup> -- (antelope bitterbrush)</b>									
1998	1540	180	13	82	5	33	1	1	85/117
2003	1360	-	9	75	16	28	3	6	87/127
2008	-	20	0	0	0	0	0	0	- / -
2013	20	-	0	100	0	100	0	0	46/82
2018	20	-	0	100	0	0	0	0	54/103
<b>Quercus gambelii<sup>p</sup> -- (Gambel oak)</b>									
1998	-	-	-	-	-	-	-	-	- / -
2003	-	-	-	-	-	-	-	-	81/66
2008	-	-	-	-	-	-	-	-	- / -
2013	-	-	-	-	-	-	-	-	61/61
2018	-	-	-	-	-	-	-	-	100/104
<b>Symphoricarpos oreophilus<sup>p</sup> -- (mountain snowberry)</b>									
1998	160	-	0	100	0	13	0	0	30/64
2003	260	-	46	54	0	39	0	0	53/103
2008	100	-	100	0	0	60	0	0	- / -
2013	120	-	50	50	0	0	0	0	37/72
2018	240	40	25	75	0	0	0	0	36/72

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

**Table 22-10.14 - 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' (%)	
<b>Juniperus osteosperma (Utah juniper)</b>							
1998	16	-	-	-	-	-	13.5
2003	19	-	33	33	11	22	14.4
<b>Pinus edulis (twoneedle pinyon)</b>							
1998	125	-	-	-	-	-	10.9
2003	132	-	15	30	15	40	13.8

## SOUTH BEAVER BULLHOG - STUDY NO. 22R-10

**Location Information**

USGS 7.5 min Map Info  
GPS (0' Stake)

Greenville Bench SE; Township 31S, Range 7W, Section 03  
NAD 83 UTM ZONE 12, 356966 East 4222402 North

**Transect Information**

Browse Tag # (0' Stake)	238
Transect Bearing	300° magnetic
Length	500ft
Belt Placement	Line 1 (11ft), Line 2 (34ft), Line 3 (59ft), Line 4 (71ft), Line 5 (95ft)
Belt Marker Placement	Standard

**Directions to Site**

Take exit 100 from I-15. From the off-ramp, turn right and proceed to a gate: go through the gate and turn right. Drive 0.1 miles to a fork. Turn left and drive 0.5 miles on a two-track road through a harrow project to a witness post on the right (north) side of the road. Walk 17 paces at 15 degrees magnetic from the witness post to the 0-foot stake marked with browse tag #238.

**Site Information**

Land Ownership	Federal
Land Administrator	BLM
Allotment	FREMONT
Elevation	6,400ft (1,951m)
Aspect	East
Slope	4-6%
Sample Dates	07/28/2006, 07/14/2010, 08/12/2014, 08/13/2018

**Table 22R-10.1 Disturbance History.** Recorded history of major disturbances.

Treatment/Disturbance	Name	WRI DB#	Date	Size (acres)
Mechanical - Bullhog	South Beaver Vegetation Enhancement Yr 4	1224	Fall 2008-Summer 2009	1520
Seeding - Aerial Before	South Beaver Vegetation Enhancement Yr 4	1224	December 2008	1358
Hand Crew - Lop and Scatter	Project Maintenance - South Beaver	3296	September-October 2015	4251

**Table 22R-10.2 Seed Mix.** List of known seeded plant species and rates (if available).

Mix Name			Application Type	Application Date	Acres
S Beaver Veg Enhancement			Aerial	Dec 2008	1224
Type	Species	Common Name	Cultivar/Source ID	Bulk lbs/acre	PLS
G	Achnatherum hymenoides	Indian Ricegrass	Rimrock	1.23	1.13
G	Agropyron cristatum	Crested Wheatgrass	Douglas	0.94	0.77
G	Agropyron cristatum	Crested Wheatgrass	Nordan	0.12	0.11
G	Agropyron cristatum	Crested Wheatgrass	Nordan	0.82	0.77
G	Agropyron fragile	Siberian Wheatgrass	Vavilov	1.84	1.55
G	Elymus wawawaiensis	Snake River Wheatgrass	Secar	1.84	1.69
G	Poa secunda	Sandberg Bluegrass	Toole MT	0.33	0.28
G	Pseudoroegneria spicata	Bluebunch Wheatgrass	Anatone	1.17	0.96
G	Pseudoroegneria spicata	Bluebunch Wheatgrass	Goldar	0.04	0.03
G	Thinopyrum intermedium	Intermediate Wheatgrass	Oahe	0.61	0.56
G	Thinopyrum intermedium	Pubescent Wheatgrass	Luna	2.45	2.21
F	Linum perenne	Blue Flax	Appar	0.61	0.55
F	Medicago sativa	Alfalfa	Ladak 65	0.61	0.54
F	Medicago sativa	Alfalfa	Ranger	0.61	0.56
F	Melilotus officinalis	Yellow Sweetclover		0.61	0.55
F	Onobrychis viciifolia	Sainfoin	Eski	0.61	0.59
F	Penstemon palmeri	Palmer Penstemon	White Pine NV	0.12	0.09
F	Sanguisorba minor	Small Burnet	Delar	0.53	0.50
F	Sanguisorba minor	Small Burnet	Delar	0.69	0.64

**Wildlife Habitat and Vegetation History****Table 22R-10.3 - Wildlife Seasonal Habitat.** UDWR wildlife habitat and seasonality.

Species	Habitat	Season
Deer	crucial	winter

**Table 22R-10.4 - 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	Mountain Big Sagebrush	Phase I
2014	Mountain Big Sagebrush/Perennial Grass	Phase I
2018	Mountain Big Sagebrush/Perennial Grass	Phase I

**Site Notes**

Rebar is placed right where belts will be secured into the ground.

**Soils****Table 22R-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	38.0	39.1	22.9	1.5	22.7	182.4	0.6	07/27/2006

**Site Potential**

1981 - 2010 Average Annual Precipitation	13 inches
NRCS Ecological Site	Upland Loam (Mountain Big Sagebrush)
NRCS Ecological Site #	R028AY310UT
States and Transitions	No state and transition model is available for this ecological site.

When established in 2006, this site was a mixed stand of twoneedle pinyon (*Pinus edulis*) and Utah juniper (*Juniperus osteosperma*) trees and was considered to be in Phase III of woodland succession. There were also other browse species present such as mountain big sagebrush (*Artemisia tridentata* ssp. *vaseyana*), but they provided lesser amounts of cover (Table 22R-10.4, Table 22R-10.12, Table 22R-10.13, Table 22R-10.14). The herbaceous understory was abundant. However, almost all herbaceous cover was contributed by the introduced annual grass species cheatgrass (*Bromus tectorum*); cheatgrass can pose a threat to the ecological resilience of a community when found in high amounts (Table 22R-10.7). Tree cover decreased substantially following a bullhog and seeding treatment in 2008 and 2009 (Table 22R-10.1, Table 22R-10.6). Shrub and herbaceous cover exhibited an initial decrease, but has increased over time; sagebrush has provided the most cover of any shrub in recent years (Table 22R-10.12). The herbaceous understory was primarily composed of a mixture of native and introduced perennial grass species in the 2018 sample year, with most of the cover provided by purple threeawn (*Aristida purpurea*), squirreltail (*Elymus elymoides*), and intermediate wheatgrass (*Thinopyrum intermedium*) (Table 22R-10.10). Some juniper and pinyon trees have remained following treatment (Table 22R-10.14), and although the site is now in Phase I of woodland succession, they may have the potential for infilling in future years.



**Trend Summary Tables****Table 22R-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
2006	7.0	1.1	11.6	8.0	1.5	31.1
2010	4.2	0.4	-	3.5	-	-
2014	6.9	1.0	0.0	6.5	1.4	-
2018	7.1	0.0	-	7.5	-	-

**Table 22R-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
2006	346	71	9	12	12.9	1.2	0.0	0.1
2010	119	127	144	20	1.6	2.9	2.5	0.1
2014	121	282	5	14	1.8	19.2	0.0	0.1
2018	80	315	-	39	0.6	21.1	-	0.5

**Table 22R-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
2006	18.7	0.0	45.5	14.5	8.0	32.9
2010	16.3	0.1	60.5	14.4	2.2	10.9
2014	8.1	0.0	54.4	11.7	4.0	32.8
2018	18.8	0.0	58.9	6.6	5.3	26.8

**Table 22R-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			
2006	-	-	-	51
2010	-	1	-	3
2014	3	2	1	32
2018	4	4	-	33
Year	Days Use Per Acre (ha)			
2006	-	-	-	-
2010	-	0.7 (1.7)	-	-
2014	9.4 (23.3)	1.3 (3.3)	-	-
2018	5.1 (12.6)	-	-	-

**Table 22R-10.10 - Grass Species.** Nested frequency and modified Daubenmire average cover by year.

GRASS SPECIES	Achnatherum hymenoides (Indian ricegrass)	Achnatherum lettermanii (Letterman's needlegrass)	Agropyron cristatum <sup>i</sup> (crested wheatgrass)	Aristida purpurea (purple threeawn)	Bouteloua gracilis (blue grama)	Bromus tectorum <sup>ai</sup> (cheatgrass)	Elymus elymoides (squirreltail)	Hesperostipa comata (needle and thread)	Leymus cinereus (basin wildrye)	Pascopyrum smithii (western wheatgrass)	Poa secunda (Sandberg bluegrass)	Pseudoroegneria spicata (bluebunch wheatgrass)	Thinopyrum intermedium <sup>i</sup> (intermediate wheatgrass)	Vulpia octoflora <sup>a</sup> (sixweeks fescue)
year	Nested Frequency													
2006	12	9	-	-	12	340	37	-	-	-	5	-	-	64
2010	5	-	15	34	8	110	67	5	-	-	1	-	3	13
2014	15	4	67	39	15	121	161	14	0	13	3	8	55	-
2018	2	10	75	75	28	80	119	0	-	4	-	22	132	-
year	Average Cover (%)													
2006	0.2	0.1	-	-	0.1	12.6	0.8	-	-	-	0.0	-	-	0.3
2010	0.0	-	0.1	0.4	0.5	1.5	1.7	0.2	-	-	0.0	-	0.0	0.1
2014	0.8	0.0	3.6	2.0	0.9	1.8	7.9	0.6	0.0	0.7	0.0	0.2	2.4	-
2018	0.2	0.3	3.0	5.1	1.1	0.6	5.1	0.0	-	0.0	-	1.1	5.0	-

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

**Table 22R-10.11 - Forb Species.** Nested frequency and modified Daubenmire average cover by year.

FORB SPECIES	Alyssum desertorum <sup>ai</sup> (desert madwort)	Astragalus (milkvetch)	Caulanthus crassicaulis <sup>a</sup> (thickstem wild cabbage)	Ceratocephala testiculata <sup>ai</sup> (curvedseed butterwort)	Chaenactis douglasii (Douglas' dustymaiden)	Chamaesyce (sandmat)	Cirsium (thistle)	Gayophytum ramosissimum <sup>a</sup> (pinyon groundsmoke)	Gilia inconspicua <sup>a</sup> (shy gilia)	Hedysarum boreale (Utah sweetvetch)	Ipomopsis aggregata (scarlet gilia)	Lactuca serriola <sup>ai</sup> (prickly lettuce)	Linum perenne <sup>i</sup> (blue flax)	Lygodesmia (skeletonplant)	Melilotus officinalis <sup>i</sup> (sweetclover)	Microsteris gracilis <sup>a</sup> (slender phlox)	Orobanche fasciculata (clustered broomrape)
year	Nested Frequency																
2006	5	-	4	-	5	5	-	-	-	-	1	-	-	-	-	-	-
2010	-	-	-	3	-	-	-	55	65	2	-	21	13	1	1	34	-
2014	-	2	-	-	3	-	-	-	-	2	-	-	1	-	-	5	-
2018	-	-	-	-	4	32	2	-	-	-	-	-	-	-	-	-	1
year	Average Cover (%)																
2006	0.0	-	0.0	-	0.0	0.0	-	-	-	-	0.0	-	-	-	-	-	-
2010	-	-	-	0.0	-	-	-	0.6	1.5	0.0	-	0.3	0.0	0.0	0.0	0.1	-
2014	-	0.0	-	-	0.0	-	-	-	-	0.0	-	-	0.0	-	-	0.0	-
2018	-	-	-	-	0.0	0.4	0.0	-	-	-	-	-	-	-	-	-	0.0

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

FORB SPECIES			
Polygonum douglasii <sup>a</sup> (Douglas' knotweed)			
Sanguisorba minor <sup>i</sup> (small burnet)			
Sphaeralcea coccinea (scarlet globemallow)			
year	Nested Frequency		
2006	-	-	1
2010	2	2	1
2014	-	2	4
2018	-	-	3
year	Average Cover (%)		
2006	-	-	0.0
2010	0.0	0.0	0.0
2014	-	0.0	0.0
2018	-	-	0.0

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

**Table 22R-10.12 - Shrub and Tree Species.** Average modified Daubenmire quadrat and line intercept cover by year.

SHRUB SPECIES					
Artemisia tridentata ssp. vaseyana <sup>p</sup> (mountain big sagebrush)					
Gutierrezia sarothrae (broom snakeweed)					
Juniperus osteosperma <sup>t</sup> (Utah juniper)					
Linanthus pungens (granite prickly phlox)					
Pinus edulis <sup>t</sup> (twoneedle pinyon)					
year	Line Intercept Cover (%)				
2006	8	1.4	9.8	0.1	21.3
2010	3.5	-	-	-	-
2014	6.5	1.1	-	0.3	-
2018	7.5	-	-	-	-
year	Quadrat Cover (%)				
2006	7.0	0.8	1.6	0.3	10.0
2010	4.2	0.2	-	0.1	-
2014	6.9	0.8	0.0	0.2	-
2018	7.1	0.0	-	0.0	-

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

**Table 22R-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.

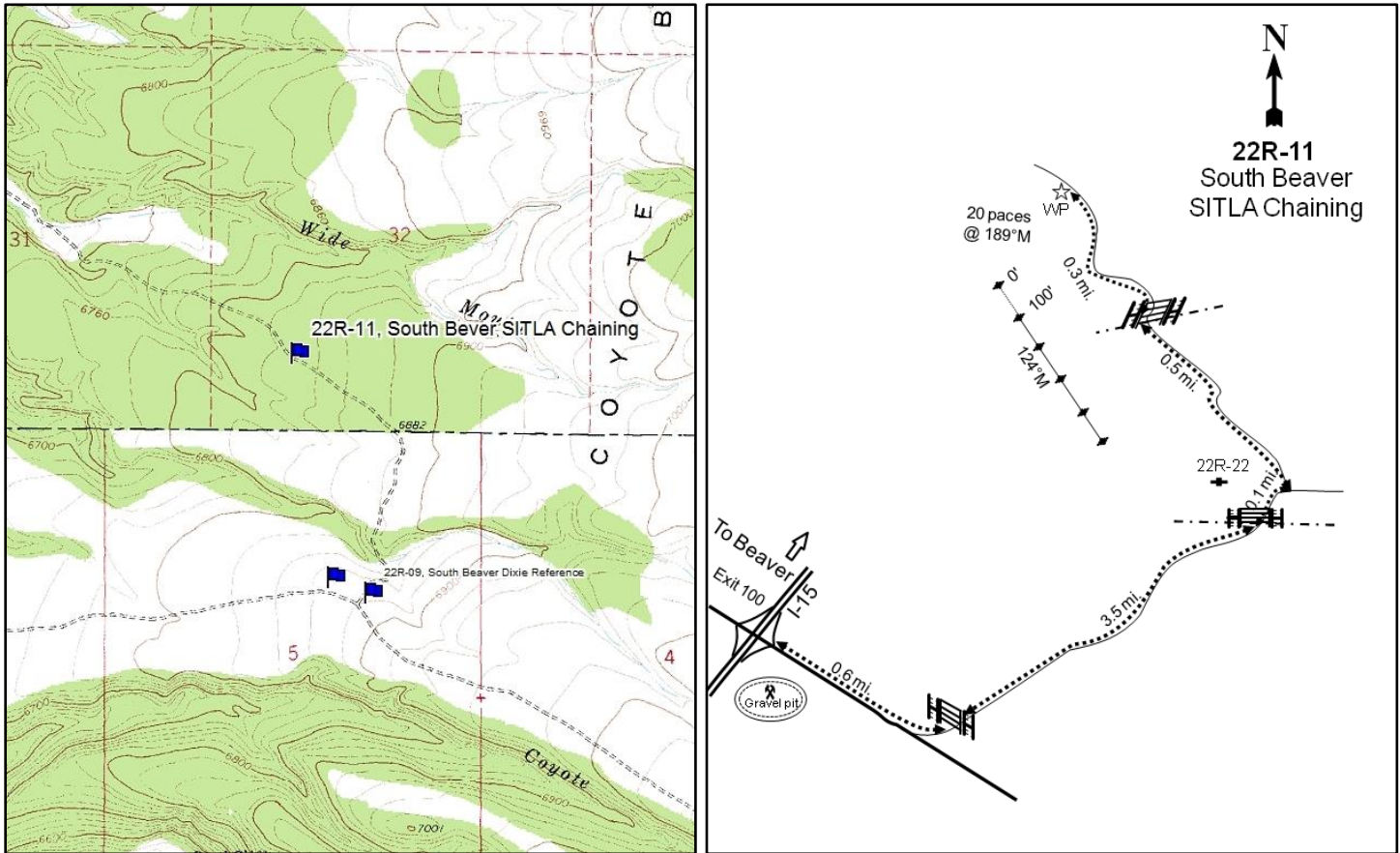
Year	Density		Age Class Distribution			Utilization		Poor Vigor (%)	Average Height Crown (cm)
	Plants Per Acre		Excluding Seedlings			Moderate (%)	Heavy (%)		
	Excluding Seedlings	Seedling	Young (%)	Mature (%)	Decadent (%)				
<b>Artemisia tridentata ssp. vaseyana<sup>p</sup> -- (mountain big sagebrush)</b>									
2006	2460	840	5	55	41	2	2	25	58/75
2010	1700	20	48	49	2	9	5	2	41/65
2014	1740	140	8	91	1	46	39	1	47/76
2018	1520	40	7	80	13	7	1	17	56/82
<b>Gutierrezia sarothrae -- (broom snakeweed)</b>									
2006	1800	20	7	90	3	0	1	0	23/26
2010	180	40	0	100	0	0	0	0	23/29
2014	960	40	4	90	6	6	2	6	19/32
2018	180	-	11	78	11	0	0	44	15/15
<b>Juniperus osteosperma<sup>i</sup> -- (Utah juniper)</b>									
2006	20	40	0	100	0	0	0	0	- / -
2010	-	20	0	0	0	0	0	0	- / -
2014	-	20	0	0	0	0	0	0	- / -
2018	-	-	-	-	-	-	-	-	- / -
<b>Linanthus pungens -- (granite prickly phlox)</b>									
2006	100	20	0	100	0	20	0	0	15/27
2010	80	-	0	100	0	0	0	0	16/25
2014	180	60	0	100	0	0	0	0	19/31
2018	100	-	20	80	0	0	0	0	9/21
<b>Opuntia -- (pricklypear)</b>									
2006	-	-	-	-	-	-	-	-	10/25
2010	-	-	-	-	-	-	-	-	7/13
2014	-	-	-	-	-	-	-	-	10/17
2018	-	-	-	-	-	-	-	-	11/20
<b>Pediocactus simpsonii -- (mountain ball cactus)</b>									
2006	-	-	-	-	-	-	-	-	5/8
2010	-	-	-	-	-	-	-	-	- / -
2014	-	-	-	-	-	-	-	-	- / -
2018	-	-	-	-	-	-	-	-	3/5
<b>Pinus edulis<sup>t</sup> -- (twoneedle pinyon)</b>									
2006	220	220	55	46	0	0	0	0	- / -
2010	-	20	0	0	0	0	0	0	- / -

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

**Table 22R-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' (%)	
<b>Juniperus osteosperma (Utah juniper)</b>							
2006	54	11	28	11	11	39	18.2
2014	3	33	67	-	-	-	4.3
2018	8	60	40	-	-	-	2.4
<b>Pinus edulis (twoneedle pinyon)</b>							
2006	177	25	30	10	25	10	9.6
2014	12	100	-	-	-	-	1.5
2018	15	-	100	-	-	-	1.7

## SOUTH BEAVER SITLA CHAINING - STUDY NO. 22R-11

**Location Information**

USGS 7.5 min Map Info  
GPS (0' Stake)

Kane Canyon SE; Township 30S, Range 6W, Section 32  
NAD 83 UTM ZONE 12, 363187 East 4223621 North

**Transect Information**

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

187  
124° magnetic  
400ft  
Line 1 (11ft & 95ft), Line 2 (34ft), Line 3 (59ft), Line 4 (71ft)  
Belt 1: No Rebar

**Directions to Site**

Take exit 100 from I-15; from the northbound on-ramp, drive east for 0.6 miles to a fork. Turn left and drive through a gate, then continue 3.5 miles to a fence. From the fence drive 0.1 miles to another fork and a witness post between the forks. From the post take the left fork and travel for 0.5 miles to a gate. Proceed through the gate and continue for 0.3 miles to a witness post on the left (west) side of the road. From the witness post the 0-foot stake is 20 paces away at 189 degrees magnetic and is marked with browse tag #187.

**Site Information**

Land Ownership	State
Land Administrator	SITLA
Allotment	SOUTH CREEK
Elevation	6,800ft (2,073m)
Aspect	Northwest
Slope	3-4%
Sample Dates	06/20/2007, 07/14/2010, 08/12/2014, 08/15/2018

**Table 22R-11.1 Disturbance History.** Recorded history of major disturbances.

Treatment/Disturbance	Name	WRI DB#	Date	Size (acres)
Chaining - Two-Way Ely	South Beaver SITLA vegetation enhancement	918	November-December 2008	402
Seeding - Aerial Before	South Beaver SITLA vegetation enhancement	918	December 2008	402
Seeding - Dribbler	South Beaver SITLA vegetation enhancement	918	December 2008	402
Hand Crew - Lop (No Scatter)	Panguitch Creek/South Beaver Dedicated Hunter Habitat Projects maintenance	1801	April-June 2011	402
Hand Crew - Lop and Scatter	Project Maintenance - South Beaver	3296	September-October 2015	4251

**Table 22R-11.2 Seed Mix.** List of known seeded plant species and rates (if available).

Mix Name			Application Type	Application Date	Acres
South Beaver SITLA vegetation enhancement			Aerial	Dec 2008	450
Type	Species	Common Name	Cultivar/Source ID	Bulk lbs/acre	PLS
G	Agropyron cristatum	Crested Wheatgrass	Nordan	1.00	0.89
G	Agropyron fragile	Siberian Wheatgrass	Vavilov	1.00	0.84
G	Dactylis glomerata	Orchardgrass	Paiute	0.44	0.36
G	Elymus wawawaiensis	Snake River Wheatgrass	Secar	1.00	0.92
G	Poa secunda	Sandberg Bluegrass	Toole MT	0.33	0.28
G	Pseudoroegneria spicata	Bluebunch Wheatgrass	Anatone	1.00	0.82
G	Thinopyrum intermedium	Pubescent Wheatgrass	Luna	2.00	1.80
F	Linum perenne	Blue Flax	Appar	0.22	0.20
F	Medicago sativa	Alfalfa	Ladak	0.33	0.30
F	Medicago sativa	Alfalfa	Ranger	0.33	0.31
F	Melilotus officinalis	Yellow Sweetclover		0.33	0.30
F	Onobrychis viciifolia	Sainfoin	Eski	2.00	1.94
F	Sanguisorba minor	Small Burnet	Delar	2.00	1.89
S	Bassia prostrata	Forage Kochia	Humbolt/Lander NV	0.44	0.30
Mix Name			Application Type	Application Date	Acres
South Beaver SITLA Dribbler			Dribbler	Dec 2008	450
Type	Species	Common Name	Cultivar/Source ID	Bulk lbs/acre	PLS
F	Sanguisorba minor	Small Burnet	Delar	0.22	0.21
S	Purshia tridentata	Bitterbrush	Lincoln NV	0.22	0.18

**Wildlife Habitat and Vegetation History****Table 22R-11.3 - Wildlife Seasonal Habitat.** UDWR wildlife habitat and seasonality.

Species	Habitat	Season
Deer	crucial	winter
Elk	substantial	winter
Greater Sage Grouse	occupied	year-long

**Table 22R-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	Pinyon-Juniper	Phase II transitioning to Phase III
2010	Perennial Forbs	Phase I
2014	Perennial Grass	Phase I
2018	Perennial Grass	Phase I

**Site Notes**

The area is used heavily by deer and elk, and also once served as sage-grouse habitat.

**Soils****Table 22R-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	7.3	43.4	35.0	21.6	2.1	8.7	156.8	0.5	06/20/2007

### 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.

When established in 2007, this site was encroached by twoneedle pinyon (*Pinus edulis*) and Utah juniper (*Juniperus osteosperma*) trees and was considered to be within Phase II transitioning to Phase III of woodland succession. A small number of shrub species were also present, but offered limited cover (Table 22R-11.4, Table 22R-11.12, Table 22R-11.13, Table 22R-11.14). In addition, the herbaceous understory was depauperate in both quantity and diversity (Table 22R-11.7). The study was chained and seeded in 2008, removing much of the tree cover and augmenting the understory (Table 22R-11.1, Table 22R-11.6). Perennial forbs diversified and increased in cover, becoming the dominant vegetation type on the site in 2010. In 2014, however, introduced and native perennial grasses such as crested wheatgrass (*Agropyron cristatum*), squirreltail (*Elymus elymoides*), and bluebunch wheatgrass (*Pseudoroegneria spicata*) increased in cover and became the dominant vegetation component; the study site remained dominated by perennial grasses in the 2018 sample year (Table 22R-11.10, Table 22R-11.11). Although it exhibited an initial decrease, cover and density of mountain big sagebrush (*Artemisia tridentata* ssp. *vaseyana*) have gradually increased over time, indicating that sagebrush will likely become (co-)dominant on the site should this trend continue (Table 22R-11.12, Table 22R-11.13).



**Trend Summary Tables****Table 22R-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	1.1	0.6	13.0	2.3	0.6	27.3
2010	1.8	0.1	0.5	1.6	0.2	1.2
2014	2.7	1.5	0.0	2.8	1.8	0.4
2018	4.7	1.1	0.0	4.3	1.3	0.3

**Table 22R-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	27	157	150	128	0.1	3.6	0.5	3.6
2010	1	135	190	145	0.0	2.8	7.8	5.0
2014	7	257	10	102	0.1	18.0	0.8	2.2
2018	4	256	2	82	0.0	22.7	0.0	3.2

**Table 22R-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	24.0	1.6	33.9	19.8	15.0	22.7
2010	23.0	0.1	53.8	5.8	6.0	18.6
2014	18.5	0.0	50.2	11.0	9.8	27.2
2018	24.0	2.0	44.5	6.0	12.1	30.9

**Table 22R-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	Rabbit
	Quadrat Frequency			
2007	-	-	-	52
2010	-	2	-	21
2014	1	2	5	16
2018	1	2	12	30
Year	Days Use Per Acre (ha)			
2007	-	8.1 (19.9)	-	-
2010	-	2.7 (6.6)	2.0 (5.0)	-
2014	4.4 (10.8)	2.0 (5.0)	11.4 (28.1)	-
2018	4.4 (10.8)	3.4 (8.3)	0.7 (1.7)	-

**Table 22R-11.10 - Grass Species.** Nested frequency and modified Daubenmire average cover by year.

GRASS SPECIES	Nested Frequency										
Achnatherum hymenoides (Indian ricegrass)											
Agropyron cristatum <sup>i</sup> (crested wheatgrass)											
Aristida purpurea (purple threeawn)											
Bromus tectorum <sup>ai</sup> (cheatgrass)											
Dactylis glomerata <sup>i</sup> (orchardgrass)											
Elymus elymoides (squirreltail)											
Elymus lanceolatus (thickspike wheatgrass)											
Hesperostipa comata (needle and thread)											
Poa secunda (Sandberg bluegrass)											
Pseudoroegneria spicata (bluebunch wheatgrass)											
Thinopyrum intermedium <sup>i</sup> (intermediate wheatgrass)											
year	Average Cover (%)										
2007	36	-	-	27	-	1	-	6	-	127	-
2010	6	20	-	1	5	40	5	7	2	50	19
2014	38	58	5	7	0	102	3	2	1	84	60
2018	23	79	-	4	-	98	4	6	-	60	76
year	Average Cover (%)										
2007	0.4	-	-	0.1	-	0.0	-	0.0	-	3.1	-
2010	0.3	0.4	-	0.0	0.2	0.4	0.1	0.1	0.0	1.3	0.1
2014	2.5	2.5	0.1	0.1	0.0	3.9	0.0	0.2	0.1	5.7	3.0
2018	2.2	6.9	-	0.0	-	5.6	0.0	0.5	-	4.9	2.5

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

**Table 22R-11.11 - Forb Species.** Nested frequency and modified Daubenmire average cover by year.

FORB SPECIES	Nested Frequency																
Agoseris glauca (pale agoseris)																	
Antennaria (pussytoes)																	
Arabis (rockcress)																	
Astragalus lentiginosus (freckled milkvetch)																	
Calochortus nuttallii (sego lily)																	
Castilleja linariifolia (Wyoming Indian paintbrush)																	
Ceratocephala testiculata <sup>ai</sup> (curvseed butterwort)																	
Chaenactis douglasii (Douglas' dustymaiden)																	
Collinsia parviflora <sup>a</sup> (maiden blue eyed Mary)																	
Cryptantha (cryptantha)																	
Erigeron (fleabane)																	
Erigeron pumilus (shaggy fleabane)																	
Eriogonum umbellatum (sulphur-flower buckwheat)																	
Gayophytum ramosissimum <sup>a</sup> (pinyon groundsmoke)																	
Geranium <sup>a</sup> (geranium)																	
Gilia inconspicua <sup>a</sup> (shy gilia)																	
Hedysarum boreale (Utah sweetvetch)																	
year	Average Cover (%)																
2007	-	3	11	9	-	-	82	6	1	-	-	-	5	-	-	65	-
2010	1	-	3	39	3	0	51	15	-	2	1	4	2	53	3	101	5
2014	-	-	-	22	-	-	-	4	-	2	-	2	4	-	-	4	4
2018	-	-	-	18	-	-	-	-	-	-	-	1	3	-	-	-	-
year	Average Cover (%)																
2007	-	0.0	0.0	0.0	-	-	0.2	0.0	0.0	-	-	-	0.3	-	-	0.1	-
2010	0.0	-	0.0	2.6	0.0	0.0	0.7	0.2	-	0.1	0.0	0.0	0.0	2.1	0.0	3.8	0.0
2014	-	-	-	0.7	-	-	-	0.0	-	0.0	-	0.0	0.1	-	-	0.0	0.2
2018	-	-	-	1.0	-	-	-	-	-	-	-	0.1	0.0	-	-	-	-

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

FORB SPECIES	Lactuca serriola <sup>ai</sup> (prickly lettuce)	Lesquerella (bladderpod)	Linum lewisii (Lewis flax)	Melilotus officinalis <sup>i</sup> (sweetclover)	Microsteris gracilis <sup>a</sup> (slender phlox)	Oenothera (evening primrose)	Onobrychis viciifolia <sup>i</sup> (sainfoin)	Packera multilobata (lobeleaf groundsel)	Penstemon (beardtongue)	Phlox austromontana (mountain phlox)	Physaria (twinpod)	Pleiocanthus spinosus (thorn skeletonweed)	Polygonum douglasii <sup>a</sup> (Douglas' knotweed)	Sanguisorba minor <sup>i</sup> (small burnet)	Sisymbrium altissimum <sup>ai</sup> (tall tumbleweed)	Sphaeralcea coccinea (scarlet globemallow)	Tetradeneis acaulis (stemless four-nerve daisy)
year	Nested Frequency																
2007	-	6	-	-	54	-	-	-	-	96	-	3	-	-	-	-	17
2010	52	4	20	7	14	-	48	8	2	33	-	16	2	1	-	-	-
2014	2	4	11	0	-	-	-	9	8	29	31	4	-	1	4	2	-
2018	1	19	3	-	-	2	-	3	5	40	-	3	-	-	-	1	-
year	Average Cover (%)																
2007	-	0.0	-	-	0.1	-	-	-	-	3.1	-	0.0	-	-	-	-	0.1
2010	1.1	0.1	0.4	0.3	0.1	-	0.4	0.0	0.1	0.3	-	0.1	0.0	0.1	-	-	-
2014	0.0	0.0	0.1	0.1	-	-	-	0.1	0.0	0.6	0.2	0.1	-	0.0	0.8	0.0	-
2018	0.0	0.3	0.0	-	-	0.0	-	0.0	0.0	1.6	-	0.1	-	-	-	0.0	-

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

FORB SPECIES	Tragopogon dubius <sup>ai</sup> (yellow salsify)
year	Nested Frequency
2007	-
2010	-
2014	-
2018	1
year	Average Cover (%)
2007	-
2010	-
2014	-
2018	0.0

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

**Table 22R-11.12 - 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 <sup>p</sup> (mountain big sagebrush)	2007	2.3	0	-	0.2	10.5	0.4	-	16.8	-
Chrysothamnus viscidiflorus ssp. viscidiflorus var. stenophyllus (yellow rabbitbrush)	2010	1.6	-	0.1	0.1	1	-	0	0.2	-
Chrysothamnus viscidiflorus ssp. viscidiflorus var. viscidiflorus (yellow rabbitbrush)	2014	2.8	-	-	1.8	0.2	-	-	0.2	-
Gutierrezia sarothrae (broom snakeweed)	2018	4.3	-	-	1.2	0.3	0.1	0	-	-
Juniperus osteosperma <sup>i</sup> (Utah juniper)	year	Quadrat Cover (%)								
Linanthus pungens (granite prickly phlox)	2007	1.1	0.0	-	0.2	4.2	0.4	-	8.9	-
Opuntia (pricklypear)	2010	1.8	-	0.0	0.0	0.5	0.0	0.0	0.0	-
Pinus edulis <sup>i</sup> (twoneedle pinyon)	2014	2.6	-	-	1.5	0.0	0.0	-	0.0	0.0
Purshia tridentata <sup>p</sup> (antelope bitterbrush)	2018	4.7	-	-	1.1	0.0	0.0	0.0	-	-

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

**Table 22R-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 (%)				
<b>Artemisia tridentata ssp. vaseyana<sup>p</sup> -- (mountain big sagebrush)</b>									
2007	1540	20	1	46	53	12	39	40	42/55
2010	500	20	0	88	12	0	0	4	44/60
2014	1180	220	34	64	2	50	28	3	49/73
2018	1960	320	39	55	6	14	1	5	49/70
<b>Bassia prostrata<sup>pi</sup> -- (forage kochia)</b>									
2007	-	-	-	-	-	-	-	-	-/-
2010	20	-	0	100	0	0	0	0	25/39
2014	-	-	-	-	-	-	-	-	-/-
2018	-	-	-	-	-	-	-	-	56/67
<b>Chrysothamnus viscidiflorus ssp. viscidiflorus var. stenophyllus -- (yellow rabbitbrush)</b>									
2007	240	-	0	83	17	25	58	8	14/16
2010	-	-	-	-	-	-	-	-	-/-
2014	-	-	-	-	-	-	-	-	25/31
2018	20	-	0	0	100	0	0	100	27/50
<b>Chrysothamnus viscidiflorus ssp. viscidiflorus var. viscidiflorus -- (yellow rabbitbrush)</b>									
2007	-	-	-	-	-	-	-	-	-/-
2010	40	-	0	100	0	0	0	0	29/31
2014	-	-	-	-	-	-	-	-	-/-
2018	20	-	100	0	0	0	0	0	22/27
<b>Ericameria nauseosa -- (rubber rabbitbrush)</b>									
2007	-	-	-	-	-	-	-	-	-/-
2010	-	-	-	-	-	-	-	-	-/-
2014	-	-	-	-	-	-	-	-	72/70
2018	-	-	-	-	-	-	-	-	55/60

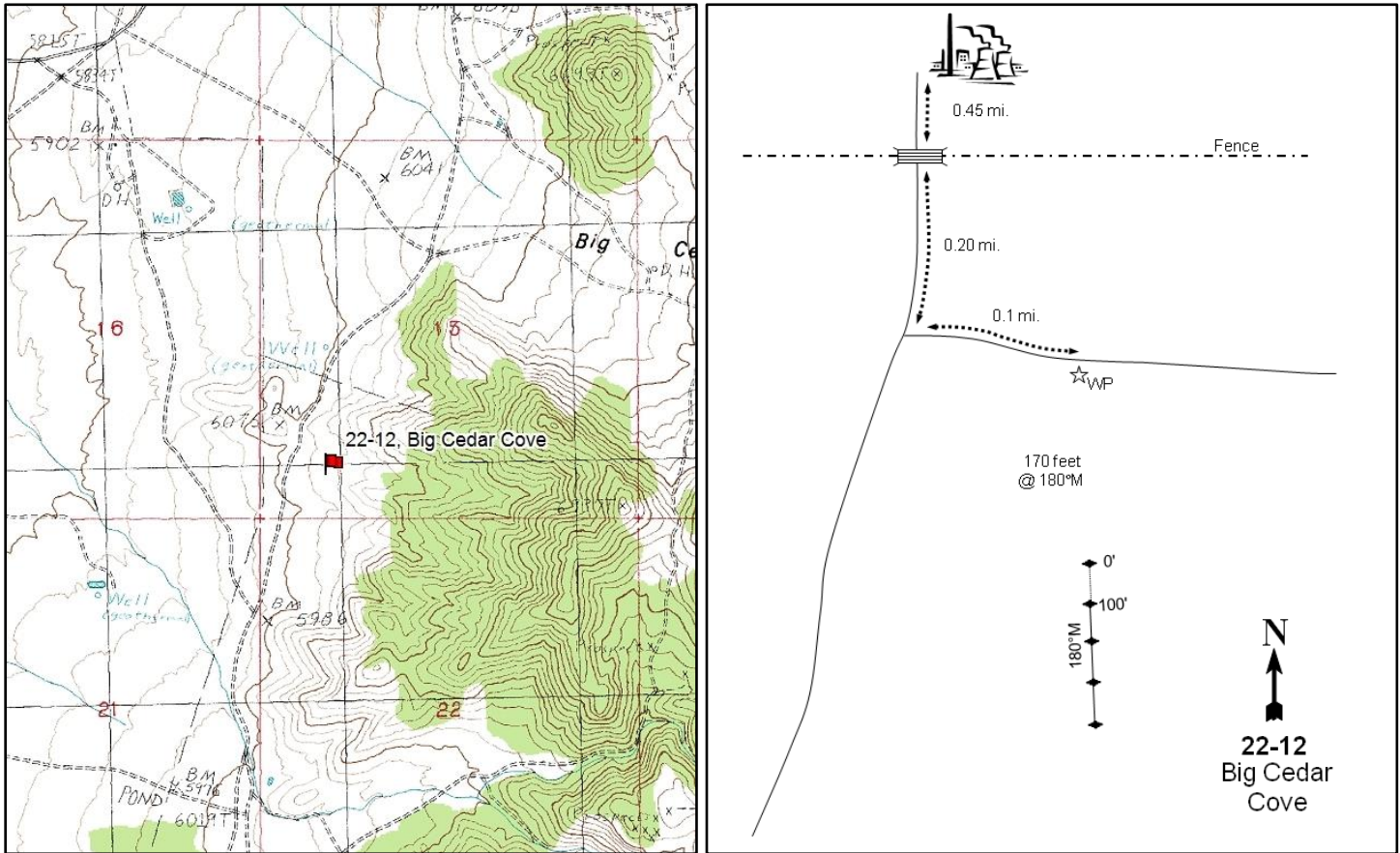
Year	Density		Age Class Distribution			Utilization		Poor Vigor (%)	Average Height Crown (cm)
	Plants Per Acre		Excluding Seedlings			Moderate (%)	Heavy (%)		
	Excluding Seedlings	Seedling	Young (%)	Mature (%)	Decadent (%)				
<b>Gutierrezia sarothrae -- (broom snakeweed)</b>									
2007	240	-	8	92	0	0	0	0	20/15
2010	100	-	0	100	0	0	0	0	27/29
2014	2060	240	22	77	1	18	0	1	25/35
2018	2060	20	6	79	16	0	0	14	16/23
<b>Juniperus osteosperma<sup>1</sup> -- (Utah juniper)</b>									
2007	120	100	17	83	0	0	0	0	- / -
2010	80	80	75	25	0	0	0	0	- / -
2014	100	40	100	0	0	0	0	0	- / -
2018	200	-	100	0	0	0	0	0	- / -
<b>Linanthus pungens -- (granite prickly phlox)</b>									
2007	820	20	0	98	2	0	0	2	11/21
2010	60	-	0	100	0	0	0	0	16/35
2014	120	-	17	83	0	0	0	0	18/34
2018	220	-	9	91	0	0	0	0	12/29
<b>Opuntia -- (pricklypear)</b>									
2007	20	-	0	100	0	0	0	0	10/19
2010	20	-	0	100	0	0	0	0	11/19
2014	-	-	-	-	-	-	-	-	11/39
2018	40	-	0	100	0	0	0	0	10/24
<b>Pinus edulis<sup>1</sup> -- (twoneedle pinyon)</b>									
2007	300	100	47	53	0	0	0	0	- / -
2010	80	-	75	25	0	0	0	0	- / -
2014	40	60	100	0	0	0	0	0	- / -
2018	20	-	100	0	0	0	0	0	- / -
<b>Purshia tridentata<sup>p</sup> -- (antelope bitterbrush)</b>									
2007	-	-	-	-	-	-	-	-	72/122
2010	-	-	-	-	-	-	-	-	46/90
2014	-	-	-	-	-	-	-	-	60/121
2018	-	-	-	-	-	-	-	-	64/126

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

**Table 22R-11.14 - Tree Characteristics.** Point-quarter tree density, size class distribution, and average diameter.

Year	Density	Size Class Distribution					Average Diameter (cm)
	Trees per Acre	Seedling (%)	1-4' (%)	4-8' (%)	8-12' (%)	>12' (%)	
<b>Juniperus osteosperma (Utah juniper)</b>							
2007	259	35	25	20	15	5	13.3
2010	74	11	78	11	-	-	4.3
2014	130	61	39	-	-	-	2.5
2018	77	44	56	-	-	-	2.2
<b>Pinus edulis (twoneedle pinyon)</b>							
2007	169	10	30	30	20	10	13.6
2010	36	13	80	-	7	-	3.0
2014	15	86	14	-	-	-	1.6
2018	26	50	50	-	-	-	2.3

## BIG CEDAR COVE - STUDY NO. 22-12

**Location Information**

USGS 7.5 min Map Info  
GPS (0' Stake)

Bearskin Mountain NW; Township 27S, Range 9W, Section 15  
NAD 83 UTM ZONE 12, 337870 East 4258163 North

**Transect Information**

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

661  
180° magnetic  
400ft  
Line 1 (11ft & 95ft), Line 2 (34ft), Line 3 (59ft), Line 4 (71ft)  
Standard

**Directions to Site**

From mile marker 4 on S.R. 257 north of Milford, drive 0.4 miles north. Turn right at Roosevelt Hot Springs Road (Blundell Geothermal Plant) and drive for 2.65 miles to a major fork. Continue straight and proceed for 5.0 miles. Just across the cattle guards, turn right and travel 1.0 miles to a four-way fork. Turn right and continue 0.45 miles (past Phillips Oil well-head on the right) to another cattle guard. Go another 0.20 miles to a junction, then turn left and drive 0.1 miles to a witness post. The transect starts 170 feet south of the road. The 0-foot baseline stake is a steel rebar three feet tall with a browse tag #661 attached.

**Site Information**

Land Ownership	Federal
Land Administrator	BLM
Allotment	MINERAL RANGE
Elevation	6,050ft (1,844m)
Aspect	Southwest
Slope	9%
Sample Dates	06/17/1998, 06/24/2003, 06/09/2008, 09/28/2011, 06/05/2013, 06/13/2018

**Table 22-12.1 Disturbance History.** Recorded history of major disturbances.

Treatment/Disturbance	Name	WRI DB#	Date	Size (acres)
Fire - Wildfire	Milford Flat	-	July 2007	356665
Chaining - One-Way Ely	Milford Flat Fire Rehabilitation and Contracting	1218	Fall 2007	76454
Seeding - Aerial Before	Milford Flat Fire Rehabilitation and Contracting	1218	Fall 2007	76454
Seeding - Aerial After	Milford Flat Fire Rehabilitation and Contracting	1218	Fall 2007	76454

**Table 22-12.2 Seed Mix.** List of known seeded plant species and rates (if available).

Mix Name			Application Type	Application Date	Acres
Milford BLM Mix 2			Aerial	Oct 2007	12917
Type	Species	Common Name	Cultivar/Source ID	Bulk lbs/acre	PLS
G	Achnatherum hymenoides	Indian Ricegrass	Rimrock	0.84	0.00
G	Agropyron cristatum	Crested Wheatgrass	Hycrest	2.05	0.00
G	Agropyron fragile	Siberian Wheatgrass	Vavilov	0.12	0.00
G	Agropyron fragile	Siberian Wheatgrass	P-27	0.09	0.00
G	Elymus lanceolatus	Thickspike Wheatgrass	Bannock	1.27	0.00
G	Pascopyrum smithii	Western Wheatgrass	Arriba	1.34	0.00
G	Pascopyrum smithii	Western Wheatgrass	Arriba	0.24	0.00
G	Thinopyrum intermedium	Intermediate Wheatgrass	Rush	0.09	0.00
G	Thinopyrum intermedium	Intermediate Wheatgrass	Rush	0.70	0.00
G	Thinopyrum intermedium	Pubescent Wheatgrass	Luna	1.25	0.00
F	Linum perenne	Blue Flax	Appar	0.28	0.00
F	Medicago sativa	Alfalfa	Ladak	0.55	0.00
F	Onobrychis viciifolia	Eski Sainfoin	Eski	0.17	0.00
F	Sanguisorba minor	Small Burnet	Delar	1.51	0.00
Mix Name			Application Type	Application Date	Acres
Milford Mix 2 Wyo Sage (Lot A)			Aerial	Oct 2007	7100
Type	Species	Common Name	Cultivar/Source ID	Bulk lbs/acre	PLS
F	Medicago sativa	Alfalfa	Ladak	0.24	0.23
F	Medicago sativa	Alfalfa	Ladak	0.26	0.24
S	Artemisia tridentata ssp. wyomingensis	Wyoming Big Sagebrush	Beaver UT	0.50	0.08

**Wildlife Habitat and Vegetation History****Table 22-12.3 - Wildlife Seasonal Habitat.** UDWR wildlife habitat and seasonality.

Species	Habitat	Season
Deer	crucial	winter
Pronghorn	crucial	year-long

**Table 22-12.4 - 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	Phase I
1991	Wyoming Big Sagebrush	Phase I
1998	Wyoming Big Sagebrush	Phase I
2003	Wyoming Big Sagebrush	Phase I
2008	Annual-Perennial Grass	Phase I
2013	Annual-Perennial Grass	Phase I
2018	Annual-Perennial Grass	No Encroachment



**Site Notes**

Fire rehabilitation efforts in the fall of 2007 included aerial seeding with a mixture of grasses and forbs, followed by a chaining with an Ely chain to cover the seed. After chaining was completed, Wyoming big sagebrush (*Artemisia tridentata* ssp. *wyomingensis*) was aerially seeded. This study site was close to the border of the mid elevation mix 2 and the low elevation mix 3. Forage kochia (*Bassia prostrata*) was flown onto the low elevation area. There was likely some overlap of seeding in this area as kochia was sampled in 2008. Only shrub data and pictures were taken in 2011 to monitor the effects of the Milford Flat Fire, herbaceous data and basic ground cover was not collected.

**Soils**

**Table 22-12.5 - Soil Analysis Data.** List of chemical and textural soil characteristics determined by laboratory analysis.

Texture	pH	%sand	%silt	%clay	%OM	PPM P	PPM K	ds/m	Sample Date
Sandy Loam	6.7	62.7	20.7	16.6	1.8	7.5	96.0	0.6	06/17/1998

**Site Potential**

1981 - 2010 Average Annual Precipitation	14 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 plant community on this study site was a mixed stand of mountain big sagebrush (*Artemisia tridentata* ssp. *vaseyana*) with scattered twoneedle pinyon (*Pinus edulis*) and Utah juniper (*Juniperus osteosperma*) trees from study establishment in 1985 through the 2003 sample year (Pre-1992 Data, Photos, Table 22-12.12, Table 22-12.13). The herbaceous understory fluctuated during this time period, but the introduced annual grass cheatgrass (*Bromus tectorum*) was a major component in most sample years (Pre-1992 Data, Photos, Table 22-12.7, Table 22-12.10). Following a wildfire that removed the browse and tree component and a seeding treatment in 2007 (Table 22-12.1), the site transitioned to an introduced perennial grass dominated state with cheatgrass persisting as a co-dominant species. Sagebrush and other shrub species have begun to reestablish on the site, albeit contributing low (but gradually increasing) cover; density, however, has decreased over the post-fire sample years (Table 22-12.12, Table 22-12.13). Without further disturbance, it is possible that sagebrush will become a co-dominant component of the site along with an herbaceous understory dominated by introduced perennial grass species.

**Trend Summary Tables****Table 22-12.6 - 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
1998	17.1	4.4	0.6	-	-	-
2003	15.9	5.1	1.6	18.1	5.8	0.7
2008	0.1	0.0	-	0.1	-	-
2011	-	-	-	1.2	3.0	-
2013	1.4	1.1	-	2.4	2.6	-
2018	3.2	3.1	-	2.7	1.4	-

**Table 22-12.7 - 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
1998	369	248	14	51	4.6	7.2	0.1	0.8
2003	329	254	70	107	4.5	5.5	0.2	0.5
2008	67	198	45	55	3.1	3.9	1.4	0.5
2013	391	299	46	40	-	-	-	-
2018	411	242	170	6	7.9	15.1	0.8	0.9

**Table 22-12.8 - 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
1998	13.1	1.4	36.2	43.4	5.4	31.2
2003	8.2	0.3	22.1	42.2	2.8	34.1
2008	27.2	-	5.5	56.9	6.6	9.5
2013	21.2	-	40.2	11.8	6.5	33.5
2018	19.3	-	52.1	13.5	6.4	32.9

**Table 22-12.9 - 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/Pronghorn	Horse	Rabbit
	Quadrat Frequency				
1998	1	-	20	-	27
2003	2	-	9	-	21
2008	-	-	-	-	3
2013	2	-	3	-	-
2018	5	-	1	-	8
Days Use Per Acre (ha)					
1998	5.8 (14.3)	-	12.1 (29.8)	-	-
2003	4.4 (10.8)	-	26.8 (66.2)	1.2 (2.9)	-
2008	-	-	-	-	-
2013	5.1 (12.6)	8.7 (21.5)*	5.3 (13.2)	-	-
2018	1.5 (3.6)	-	1.3 (3.3)	-	-

\*Pellets per acre (ha)

**Table 22-12.10 - Grass Species.** Nested frequency and modified Daubenmire average cover by year.

GRASS SPECIES	Achnatherum hymenoides (Indian ricegrass)	Agropyron cristatum <sup>i</sup> (crested wheatgrass)	Aristida purpurea (purple threeawn)	Bromus tectorum <sup>ai</sup> (cheatgrass)	Elymus elymoides (squirreltail)	Elymus lanceolatus (thickspike wheatgrass)	Hesperostipa comata (needle and thread)	Pleuraphis jamesii (James' galleta)	Poa fendleriana (muttongrass)	Poa secunda (Sandberg bluegrass)	Pseudoroegneria spicata (bluebunch wheatgrass)	Thinopyrum intermedium <sup>i</sup> (intermediate wheatgrass)
year	Nested Frequency											
1998	5	-	22	369	72	-	15	71	-	150	-	-
2003	3	-	17	329	84	-	9	47	-	159	-	-
2008	14	84	-	67	5	-	7	30	3	28	-	109
2011	-	-	-	-	-	-	-	-	-	-	-	-
2013	26	138	6	391	14	41	10	51	5	27	6	113
2018	2	131	2	411	3	9	7	92	4	66	8	24
year	Average Cover (%)											
1998	0.2	-	0.7	4.6	1.9	-	0.2	1.2	-	3.1	-	-
2003	0.1	-	0.3	4.5	2.4	-	0.2	0.3	-	2.2	-	-
2008	0.1	1.4	-	3.1	0.1	-	0.1	0.3	0.0	0.2	-	1.9
2011	-	-	-	-	-	-	-	-	-	-	-	-
2013	1.0	6.5	0.0	7.9	0.1	1.4	0.5	1.3	0.0	0.5	0.2	3.7
2018	0.2	5.4	0.0	19.0	0.0	0.2	0.1	2.0	0.0	1.0	0.2	0.7

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

**Table 22-12.11 - Forb Species.** Nested frequency and modified Daubenmire average cover by year.

FORB SPECIES	Agoseris glauca (pale agoseris)	Alyssum desertorum <sup>ai</sup> (desert madwort)	Arabis demissa (nodding rockcross)	Astragalus (milkvetch)	Calochortus nuttallii (sego lily)	Castilleja angustifolia (northwestern Indian paintbrush)	Ceratocephala testiculata <sup>ai</sup> (curvseed butterwort)	Chenopodium album <sup>a</sup> (lambsquarters)	Cryptantha (cryptantha)	Draba <sup>a</sup> (draba)	Erigeron pumilus (shaggy fleabane)	Erodium cicutarium <sup>ai</sup> (redstem stork's bill)	Gayophytum ramosissimum <sup>a</sup> (pinyon groundsmoke)	Gilia inconspicua <sup>a</sup> (sly gilia)	Helianthus annuus <sup>a</sup> (common sunflower)	Lappula occidentalis <sup>a</sup> (flatspine stickseed)	Linum perenne <sup>i</sup> (blue flax)
year	Nested Frequency																
1998	-	-	2	8	1	3	-	-	-	-	11	-	-	-	-	-	-
2003	4	6	-	-	-	-	3	-	-	11	-	-	-	26	-	-	-
2008	7	4	-	1	1	-	-	3	-	4	2	0	0	21	5	2	3
2011	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
2013	-	21	-	-	-	-	-	-	1	-	-	16	-	9	-	-	-
2018	-	82	-	3	-	-	-	-	-	3	-	110	-	-	-	-	-
year	Average Cover (%)																
1998	-	-	0.0	0.1	0.0	0.0	-	-	-	-	0.6	-	-	-	-	-	-
2003	0.0	0.0	-	-	-	-	0.0	-	-	0.0	-	-	-	0.1	-	-	-
2008	0.1	0.0	-	0.0	0.0	-	-	0.0	-	0.0	0.0	0.0	0.0	1.1	0.2	0.0	0.0
2011	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
2013	-	0.1	-	-	-	-	-	-	0.0	-	-	0.6	-	0.0	-	-	-
2018	-	0.2	-	0.0	-	-	-	-	-	0.1	-	2.3	-	-	-	-	-

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

FORB SPECIES												
Lomatium (desertparsley)												
Lupinus argenteus (silvery lupine)												
Medicago sativa <sup>i</sup> (alfalfa)												
Mentzelia <sup>a</sup> (blazingstar)												
Microsteris gracilis <sup>a</sup> (slender phlox)												
Navaretia intertexta <sup>a</sup> (needleleaf navaretia)												
Onobrychis vicifolia <sup>i</sup> (sainfoin)												
Phlox hoodii (spiny phlox)												
Phlox longifolia (longleaf phlox)												
Sanguisorba minor <sup>i</sup> (small burnet)												
Sisymbrium altissimum <sup>at</sup> (tall tumblemustard)												
Sphaeralcea coccinea (scarlet globemallow)												
year	Nested Frequency											
1998	2	1	-	-	1	13	-	-	24	-	-	0
2003	-	-	-	-	-	28	-	94	9	-	-	-
2008	-	-	24	0	-	7	1	4	11	7	-	-
2011	-	-	-	-	-	-	-	-	-	-	-	-
2013	3	-	17	-	-	-	-	-	13	10	5	-
2018	-	-	-	-	-	-	-	-	-	-	-	3
year	Average Cover (%)											
1998	0.0	0.0	-	-	0.0	0.1	-	-	0.1	-	-	0.0
2003	-	-	-	-	-	0.1	-	0.5	0.0	-	-	-
2008	-	-	0.1	0.0	-	0.0	0.0	0.0	0.1	0.1	-	-
2011	-	-	-	-	-	-	-	-	-	-	-	-
2013	0.0	-	0.5	-	-	-	-	-	0.0	0.4	0.2	-
2018	-	-	-	-	-	-	-	-	-	-	-	0.0

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

**Table 22-12.12 - Shrub and Tree Species.** Average modified Daubenmire quadrat and line intercept cover by year.

SHRUB SPECIES										
Artemisia tridentata ssp. vaseyana <sup>p</sup> (mountain big sagebrush)										
Bassia prostrata <sup>pi</sup> (forage kochia)										
Chrysothamnus viscidiflorus ssp. viscidiflorus var. stenophyllus (yellow rabbitbrush)										
Ephedra nevadensis <sup>p</sup> (Nevada jointfir)										
Ericameria nauseosa (rubber rabbitbrush)										
Ericameria parryi var. parryi (Parry's rabbitbrush)										
Gutierrezia sarothrae (broom snakeweed)										
Juniperus osteosperma <sup>i</sup> (Utah juniper)										
Opuntia (pricklypear)										
Pinus edulis <sup>i</sup> (twoneedle pinyon)										
year	Line Intercept Cover (%)									
1998	-	-	-	-	-	-	-	-	-	-
2003	16.8	-	1.2	1.3	-	-	4.5	0	0.1	0.7
2008	-	0.1	-	-	-	-	-	-	-	-
2011	0.5	-	-	0.7	0.4	-	2.6	-	-	-
2013	1.6	-	-	0.8	0.5	-	2.1	-	-	-
2018	2.3	-	-	0.4	0.8	-	0.6	-	-	-
year	Quadrat Cover (%)									
1998	16.4	-	1.0	0.7	-	-	3.4	-	-	0.6
2003	14.2	-	1.8	1.7	-	-	3.4	0.0	0.0	1.6
2008	0.0	0.1	-	-	-	-	0.0	-	-	-
2011	0.0	-	-	0.0	0.0	-	0.0	-	-	-
2013	0.9	-	-	0.4	0.0	-	1.1	-	-	-
2018	2.6	-	-	0.5	0.8	0.0	2.3	-	-	-

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

**Table 22-12.13 - 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 (%)				
<b>Amelanchier utahensis<sup>P</sup> -- (Utah serviceberry)</b>									
1998	20	-	0	100	0	0	0	0	- / -
2003	-	-	-	-	-	-	-	-	-/-
2008	-	-	-	-	-	-	-	-	-/-
2011	-	-	-	-	-	-	-	-	-/-
2013	-	-	-	-	-	-	-	-	-/-
2018	-	-	-	-	-	-	-	-	-/-
<b>Artemisia tridentata ssp. vaseyana<sup>P</sup> -- (mountain big sagebrush)</b>									
1998	3480	100	1	62	37	31	2	13	56/86
2003	3420	-	0	48	52	18	1	25	54/86
2008	40	60	100	0	0	0	0	0	- / -
2011	320	-	25	75	0	0	0	6	40/45
2013	260	-	23	77	0	8	0	8	39/56
2018	240	-	8	83	8	0	0	17	56/95
<b>Bassia prostrata<sup>P</sup> -- (forage kochia)</b>									
1998	-	-	-	-	-	-	-	-	-/-
2003	-	-	-	-	-	-	-	-	-/-
2008	540	100	82	19	0	0	0	0	17/17
2011	-	-	-	-	-	-	-	-	-/-
2013	-	-	-	-	-	-	-	-	-/-
2018	-	-	-	-	-	-	-	-	-/-
<b>Chrysothamnus viscidiflorus ssp. viscidiflorus var. stenophyllus -- (yellow rabbitbrush)</b>									
1998	900	-	0	89	11	0	0	7	28/40
2003	900	-	0	82	18	0	0	7	29/44
2008	60	-	100	0	0	0	0	0	- / -
2011	-	-	-	-	-	-	-	-	-/-
2013	-	-	-	-	-	-	-	-	44/56
2018	-	-	-	-	-	-	-	-	-/-
<b>Ephedra nevadensis<sup>P</sup> -- (Nevada jointfir)</b>									
1998	320	40	50	44	6	44	25	25	49/62
2003	200	20	10	80	10	50	20	10	55/86
2008	-	-	-	-	-	-	-	-	31/47
2011	60	-	33	67	0	0	0	0	51/117
2013	40	-	0	100	0	0	0	0	54/108
2018	80	-	0	100	0	25	25	0	51/113
<b>Ericameria nauseosa -- (rubber rabbitbrush)</b>									
1998	-	-	-	-	-	-	-	-	-/-
2003	-	-	-	-	-	-	-	-	-/-
2008	-	-	-	-	-	-	-	-	-/-
2011	20	-	0	100	0	0	0	0	65/77
2013	20	-	0	100	0	0	0	0	58/93
2018	100	-	0	100	0	0	0	0	71/105
<b>Ericameria parryi var. parryi -- (Parry's rabbitbrush)</b>									
1998	-	-	-	-	-	-	-	-	-/-
2003	-	-	-	-	-	-	-	-	-/-
2008	-	-	-	-	-	-	-	-	-/-
2011	-	-	-	-	-	-	-	-	-/-
2013	-	-	-	-	-	-	-	-	38/53
2018	20	-	0	100	0	0	0	0	5/12
<b>Gutierrezia sarothrae -- (broom snakeweed)</b>									
1998	10080	160	20	79	1	0	0	0	19/22
2003	5040	20	0	86	14	0	0	21	23/33

Year	Density		Age Class Distribution			Utilization		Poor Vigor (%)	Average Height Crown (cm)
	Plants Per Acre		Excluding Seedlings			Moderate (%)	Heavy (%)		
	Excluding Seedlings	Seedling	Young (%)	Mature (%)	Decadent (%)				
2008	20	20	100	0	0	100	0	0	- / -
2011	200	-	0	100	0	0	0	0	36/62
2013	300	40	27	73	0	0	0	0	27/49
2018	1840	-	1	90	9	0	0	3	18/29
<b>Juniperus osteosperma<sup>1</sup> -- (Utah juniper)</b>									
1998	20	-	100	0	0	0	0	0	- / -
2003	-	-	-	-	-	-	-	-	- / -
2008	-	-	-	-	-	-	-	-	- / -
2011	-	-	-	-	-	-	-	-	- / -
2013	-	-	-	-	-	-	-	-	- / -
2018	-	-	-	-	-	-	-	-	- / -
<b>Linanthus pungens -- (granite prickly phlox)</b>									
1998	20	-	100	0	0	0	0	0	22/25
2003	160	-	0	100	0	25	0	0	17/13
2008	-	-	-	-	-	-	-	-	- / -
2011	-	-	-	-	-	-	-	-	- / -
2013	-	-	-	-	-	-	-	-	- / -
2018	-	-	-	-	-	-	-	-	- / -
<b>Mahonia repens -- (creeping barberry)</b>									
1998	-	-	-	-	-	-	-	-	- / -
2003	-	-	-	-	-	-	-	-	15/29
2008	-	-	-	-	-	-	-	-	- / -
2011	-	-	-	-	-	-	-	-	- / -
2013	-	-	-	-	-	-	-	-	- / -
2018	-	-	-	-	-	-	-	-	- / -
<b>Opuntia -- (pricklypear)</b>									
1998	140	-	0	100	0	0	0	0	14/26
2003	140	-	0	100	0	0	0	0	16/45
2008	-	-	-	-	-	-	-	-	- / -
2011	-	-	-	-	-	-	-	-	- / -
2013	-	-	-	-	-	-	-	-	- / -
2018	-	-	-	-	-	-	-	-	19/71
<b>Pinus edulis<sup>1</sup> -- (twoneedle pinyon)</b>									
1998	60	-	67	33	0	0	0	0	- / -
2003	80	-	100	0	0	0	0	0	- / -
2008	-	-	-	-	-	-	-	-	- / -
2011	-	-	-	-	-	-	-	-	- / -
2013	-	-	-	-	-	-	-	-	- / -
2018	-	-	-	-	-	-	-	-	- / -
<b>Purshia tridentata<sup>p</sup> -- (antelope bitterbrush)</b>									
1998	-	-	-	-	-	-	-	-	- / -
2003	-	-	-	-	-	-	-	-	- / -
2008	-	20	0	0	0	0	0	0	- / -
2011	-	-	-	-	-	-	-	-	- / -
2013	-	-	-	-	-	-	-	-	- / -
2018	-	-	-	-	-	-	-	-	- / -
<b>Ribes cereum var. cereum<sup>p</sup> -- (wax currant)</b>									
1998	120	-	0	100	0	0	0	0	- / -

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

**Table 22-12.14 - Tree Characteristics.** Point-quarter tree density, size class distribution, and average diameter.

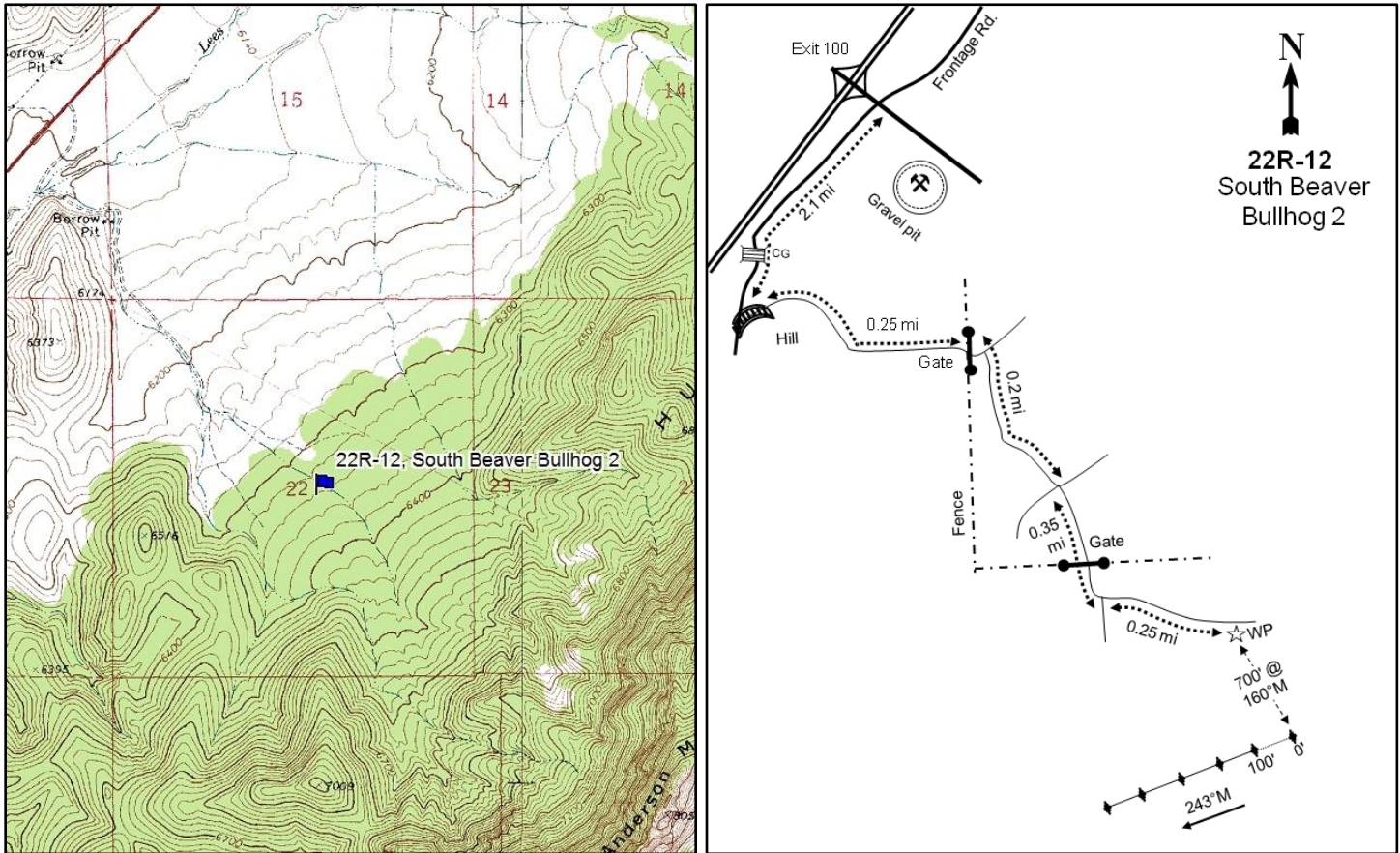
Year	Density	Size Class Distribution					Average Diameter (cm)
	Trees per Acre	Seedling (%)	1-4' (%)	4-8' (%)	8-12' (%)	>12' (%)	
<b>Juniperus osteosperma (Utah juniper)</b>							
1998	19	-	-	-	-	-	12.4
2003	30	-	8	33	8	50	15.7
<b>Pinus edulis (twoneedle pinyon)</b>							
1998	37	-	-	-	-	-	7.0
2003	72	42	37	11	5	5	4.4

**Table -22-12.15 - Deer Desirable Components Index: Mid Potential Scale.**

Year	Preferred Browse Cover	Preferred Browse Decadence	Preferred Browse Young	Perennial Grass Cover	Annual Grass Cover	Perennial Forb Cover	Noxious Weeds	Total Score	Ranking
1998	21.4	4.2	1.6	14.4	-3.4	1.7	0	<b>39.8</b>	Poor
2003	22.6	0.3	0.4	11	-3.4	1	0	<b>31.9</b>	Very Poor
2008	0.2	0	0	7.8	-2.4	1	0	<b>6.5</b>	Very Poor
2011	1.5	0	0	0	0	0	0	<b>1.5</b>	Very Poor
2013	3	0	0	30	-6	1.8	0	<b>28.9</b>	Very Poor
2018	3.4	0	0	19.9	-14.2	0.1	0	<b>9.1</b>	Very Poor



## SOUTH BEAVER BULLHOG 2 - STUDY NO. 22R-12

**Location Information**

USGS 7.5 min Map Info  
GPS (0' Stake)

Buckhorn Flat NE; Township 31S, Range 7W, Section 22  
NAD 83 UTM ZONE 12, 356565 East 4217544 North

**Transect Information**

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

113  
243° magnetic  
400ft  
Line 1 (11ft & 95ft), Line 2 (34ft), Line 3 (59ft), Line 4 (71ft)  
No Rebar

**Directions to Site**

From I-15, take exit 100 and go east to the frontage road running parallel and just east of the Interstate. Travel south on the frontage road for 2.1 miles to a small bridge: here you will see a faint road on the left. Turn left (east) and drive 0.25 miles around a hill and pass through a gate to a fork. Take the right (south) fork and continue for 0.2 miles to another fork. Take the left fork and drive 0.35 miles, passing through another gate and to another fork. Go left and proceed 0.25 miles to a witness post on the right (south) side of the road. From the witness post the 0-foot stake is 700 feet away at 160 degrees magnetic and is marked with browse tag #113.

**Site Information**

Land Ownership	Federal
Land Administrator	BLM
Allotment	BONE HOLLOW
Elevation	6,350ft (1,935m)
Aspect	Northwest
Slope	6-7%
Sample Dates	08/22/2007, 07/12/2010, 07/29/2015, 08/16/2018

**Table 22R-12.1 Disturbance History.** Recorded history of major disturbances.

Treatment/Disturbance	Name	WRI DB#	Date	Size (acres)
Seeding - Rangeland Drill	South Beaver Vegetation Enhancement Project Year 3	895	August 2007-March 2008	385
Mechanical - Bullhog	South Beaver Vegetation Enhancement Project Year 3	895	August 2007-March 2008	385
Seeding - Aerial After	South Beaver Vegetation Enhancement Project Year 3	895	February-March 2008	385

**Table 22R-12.2 Seed Mix.** List of known seeded plant species and rates (if available).

Mix Name			Application Type	Application Date	Acres
South Beaver Veg Enhancement YR3			Aerial	Feb 2008	300
Type	Species	Common Name	Cultivar/Source ID	Bulk lbs/acre	PLS
G	Agropyron desertorum	Crested Wheatgrass	Hycrest	1.00	0.80
G	Agropyron fragile	Siberian Wheatgrass	Vavilov	0.67	0.52
G	Dactylis glomerata	Orchardgrass	Paiute	0.50	0.39
G	Elymus trachycaulus	Pubescent Wheatgrass		2.00	1.75
G	Elymus wawawaiensis	Snake River Wheatgrass	Secar	1.50	1.35
G	Poa secunda	Sandberg Bluegrass	Mountain Home ID	0.33	0.31
G	Pseudoroegneria spicata	Bluebunch Wheatgrass	Anatone	1.00	0.87
F	Linum perenne	Blue Flax	Appar	0.50	0.39
F	Medicago sativa	Alfalfa	Ladak	0.67	0.62
F	Medicago sativa	Alfalfa	Ranger	0.67	0.59
F	Melilotus officinalis	Yellow Sweetclover		0.17	0.15
F	Onobrychis viciifolia	Sainfoin	Eski	2.17	1.89
F	Sanguisorba minor	Small Burnet	Delar	2.00	1.85
S	Purshia tridentata	Bitterbrush	Millard/Iron UT	0.17	0.13

**Wildlife Habitat and Vegetation History****Table 22R-12.3 - Wildlife Seasonal Habitat.** UDWR wildlife habitat and seasonality.

Species	Habitat	Season
Deer	crucial	winter
Elk	substantial	winter

**Table 22R-12.4 - 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	Annual Forb/Pinyon-Juniper	Phase I
2015	Perennial Grass/Pinyon-Juniper	Phase I
2018	Perennial Grass/Pinyon-Juniper	Phase I

**Site Notes**

No Notes

**Soils****Table 22R-12.5 - Soil Analysis Data.** List of chemical and textural soil characteristics determined by laboratory analysis.

Texture	pH	%sand	%silt	%clay	%OM	PPM P	PPM K	ds/m	Sample Date
Sandy Clay Loam	6.7	53.4	19.0	27.6	1.7	11.3	256.0	0.5	08/22/2007

**Site Potential**

1981 - 2010 Average Annual Precipitation	13 inches
NRCS Ecological Site	Upland Loam (Mountain Big Sagebrush)
NRCS Ecological Site #	R028AY310UT
States and Transitions	No state and transition model is available for this ecological site.

When this site was established in 2007, it was in Phase III of woodland succession and dominated by twoneedle pinyon (*Pinus edulis*) and Utah juniper (*Juniperus osteosperma*). Cover decreased in the sample years following the bullhog and seeding treatment in 2008 (Table 22R-12.1), but the two species have retained co-dominance since 2010; the study site is considered to fall within Phase I of woodland succession as of 2018 (Table 22R-12.4, Table 22R-12.12). The herbaceous understory was very limited in 2007, but the overall plant community was co-dominated by annual forbs in 2010 with prickly lettuce (*Lactuca serriola*) contributing the most cover of any single species (Table 22R-12.11). However, perennial grasses -- namely squirreltail (*Elymus elymoides*) -- increased in cover and replaced annual forbs as the dominant herbaceous component in 2015 (Table 22R-12.7). The introduced annual grass species cheatgrass (*Bromus tectorum*) has been recorded on the site in all post-treatment sample years in moderate abundance (Table 22R-12.10), and could potentially increase in the future. While juniper and pinyon remain scattered on the site and could infill over time, there was little to no recruitment of young plants in 2010, 2015, and 2018 (Table 22R-12.14).

**Trend Summary Tables****Table 22R-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
2007	-	-	5.3	0.2	-	40.2
2010	0.0	0.2	5.6	-	0.1	12.4
2015	0.0	-	2.0	0.1	-	3.1
2018	1.0	-	5.3	0.1	-	11.9

**Table 22R-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
2007	116	24	174	48	0.9	0.1	0.5	0.2
2010	172	26	343	113	5.3	0.2	13.1	3.8
2015	168	228	51	69	4.0	8.8	0.6	3.1
2018	222	225	41	62	5.1	9.8	0.3	1.9

**Table 22R-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
2007	4.0	7.5	51.9	25.6	16.8	6.7
2010	8.1	0.2	62.0	8.8	7.1	29.2
2015	1.6	0.0	69.0	8.8	10.1	21.5
2018	4.7	0.8	70.7	6.3	10.1	25.9

**Table 22R-12.9 - Pellet Group Data.** Quadrat frequency and pellet group transect data for animal pellets. Rabbit pellet groups are not sampled in the pellet group transect.

Year	Cattle	Mule Deer	Rocky Mountain Elk	Rabbit
	Quadrat Frequency			
2007	-	3	-	82
2010	-	5	2	7
2015	4	1	3	76
2018	5	6	6	51
Year	Days Use Per Acre (ha)			
2007	-	0.7 (1.7)	-	-
2010	-	2.7 (6.6)	0.7 (1.7)	-
2015	0.7 (1.8)	-	2.7 (6.6)	-
2018	1.5 (3.6)	8.1 (19.9)	9.4 (23.2)	-

**Table 22R-12.10 - Grass Species.** Nested frequency and modified Daubenmire average cover by year.

GRASS SPECIES	Agropyron cristatum <sup>i</sup> (crested wheatgrass)	Aristida purpurea (purple threeawn)	Bouteloua gracilis (blue grama)	Bromus tectorum <sup>ai</sup> (cheatgrass)	Dactylis glomerata <sup>i</sup> (orchardgrass)	Elymus elymoides (squirreltail)	Poa fendleriana (muttongrass)	Pseudoroegneria spicata (bluebunch wheatgrass)	Thinopyrum intermedium <sup>i</sup> (intermediate wheatgrass)
year	Nested Frequency								
2007	-	-	2	116	-	22	-	-	-
2010	-	-	-	172	-	16	2	-	8
2015	15	-	-	168	2	204	-	2	33
2018	49	5	4	222	-	190	5	4	20
year	Average Cover (%)								
2007	-	-	0.0	0.9	-	0.1	-	-	-
2010	-	-	-	5.3	-	0.2	0.0	-	0.0
2015	0.4	-	-	4.0	0.0	7.6	-	0.1	0.7
2018	2.0	0.2	0.0	5.1	-	6.4	0.0	1.0	0.1

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

**Table 22R-12.11 - Forb Species.** Nested frequency and modified Daubenmire average cover by year.

FORB SPECIES	Arabis (rockcross)	Astragalus (milkvetch)	Ceratocephala testiculata <sup>ai</sup> (curvseed butterwort)	Chaenactis douglasii (Douglas' dustymaiden)	Chamaesyce (sandmat)	Cirsium (thistle)	Cryptantha (cryptantha)	Descurainia pinnata <sup>a</sup> (western tansymustard)	Draba <sup>a</sup> (draba)	Eriogonum cernuum <sup>a</sup> (nodding buckwheat)	Eriogonum umbellatum (sulphur-flower buckwheat)	Erodium cicutarium <sup>ai</sup> (redstem stork's bill)	Gayophytum ramosissimum <sup>a</sup> (pinyon groundsmoke)	Gilia inconspicua <sup>a</sup> (shy gilia)	Hymenopappus filifolius (fineleaf hymenopappus)	Hymenoxys richardsonii (pingue rubberweed)	Ipomopsis aggregata (scarlet gilia)
year	Nested Frequency																
2007	6	1	10	-	3	-	5	41	-	6	7	-	1	31	-	-	11
2010	-	-	-	5	-	-	2	38	1	63	38	28	82	90	-	12	7
2015	-	-	-	-	-	2	2	-	-	6	21	-	-	1	42	-	-
2018	-	-	-	1	8	-	4	16	-	5	26	0	-	-	31	-	1
year	Average Cover (%)																
2007	0.0	0.0	0.0	-	0.0	-	0.0	0.1	-	0.0	0.1	-	0.0	0.1	-	-	0.0
2010	-	-	-	0.0	-	-	0.0	0.5	0.0	0.9	0.3	0.4	1.2	1.1	-	0.6	0.0
2015	-	-	-	-	-	0.0	0.1	-	-	0.2	0.7	-	-	0.0	1.4	-	-
2018	-	-	-	0.0	0.0	-	0.0	0.1	-	0.0	0.5	0.0	-	-	1.1	-	0.0

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

FORB SPECIES																	
<i>Lactuca serriola</i> <sup>ai</sup> (prickly lettuce)																	
<i>Lappula occidentalis</i> <sup>a</sup> (flatspine stickseed)																	
<i>Linum lewisii</i> (Lewis flax)																	
<i>Lotus utahensis</i> (Utah bird's-foot trefoil)																	
<i>Lygodesmia</i> (skeletonplant)																	
<i>Machaeranthera grindelioides</i> (rayless tansyaster)																	
<i>Medicago sativa</i> <sup>i</sup> (alfalfa)																	
<i>Melilotus officinalis</i> <sup>i</sup> (sweetclover)																	
<i>Mentzelia albicaulis</i> <sup>a</sup> (whitestem blazingstar)																	
<i>Microsteris gracilis</i> <sup>a</sup> (slender phlox)																	
<i>Polygonum douglasii</i> <sup>a</sup> (Douglas' knotweed)																	
<i>Sanguisorba minor</i> <sup>i</sup> (small burnet)																	
<i>Sisymbrium altissimum</i> <sup>ai</sup> (tall tumbled mustard)																	
<i>Sphaeralcea coccinea</i> (scarlet globemallow)																	
<i>Streptanthus cordatus</i> (heartleaf twistflower)																	
<i>Tragopogon dubius</i> <sup>ai</sup> (yellow salsify)																	
<i>Verbascum thapsus</i> <sup>ai</sup> (common mullein)																	
year	Nested Frequency																
2007	-	-	-	11	-	-	-	-	-	57	108	-	-	-	9	-	-
2010	280	7	6	19	14	17	3	9	12	84	59	-	-	-	-	-	-
2015	23	-	-	15	-	-	-	-	4	-	9	1	8	0	-	2	1
2018	2	-	-	8	-	-	-	-	3	-	8	2	8	-	-	3	-
year	Average Cover (%)																
2007	-	-	-	0.0	-	-	-	-	-	0.1	0.2	-	-	-	0.0	-	-
2010	7.3	0.1	0.0	2.1	0.1	0.1	0.1	0.3	0.1	1.1	0.4	-	-	-	-	-	-
2015	0.1	-	-	0.8	-	-	-	-	0.0	-	0.0	0.0	0.2	0.0	-	0.0	0.0
2018	0.0	-	-	0.3	-	-	-	-	0.0	-	0.0	0.0	0.1	-	-	0.0	-

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

**Table 22R-12.12 - Shrub and Tree Species.** Average modified Daubenmire quadrat and line intercept cover by year.

SHRUB SPECIES							
<i>Artemisia tridentata</i> ssp. <i>vaseyana</i> <sup>p</sup> (mountain big sagebrush)							
<i>Bassia prostrata</i> <sup>pi</sup> (forage kochia)							
<i>Eriogonum corymbosum</i> (crisp-leaf buckwheat)							
<i>Eriogonum microthecum</i> <sup>p</sup> (slender buckwheat)							
<i>Juniperus osteosperma</i> <sup>i</sup> (Utah juniper)							
<i>Pinus edulis</i> <sup>i</sup> (two-needle pinyon)							
<i>Sambucus</i> <sup>p</sup> (elderberry)							
year	Line Intercept Cover (%)						
2007	0.2	-	-	-	15.3	24.9	-
2010	-	-	0.1	-	6.5	5.9	-
2015	0.1	-	-	-	-	3.1	-
2018	0.1	-	-	-	7.5	4.4	-
year	Quadrat Cover (%)						
2007	0.0	-	-	-	2.2	3.0	-
2010	0.0	-	0.2	0.0	4.8	0.9	-
2015	0.0	-	-	-	1.0	1.0	-
2018	0.0	0.0	-	-	4.3	1.0	1.0

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

**Table 22R-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 (%)				
<b>Artemisia tridentata ssp. vaseyana<sup>P</sup> -- (mountain big sagebrush)</b>									
2007	40	-	0	0	100	0	100	100	100/140
2010	60	20	0	100	0	33	0	0	45/43
2015	120	-	67	33	0	17	0	17	52/63
2018	80	-	0	50	50	25	25	50	47/61
<b>Bassia prostrata<sup>Pi</sup> -- (forage kochia)</b>									
2007	-	-	-	-	-	-	-	-	-/-
2010	-	-	-	-	-	-	-	-	40/40
2015	-	-	-	-	-	-	-	-	-/-
2018	-	20	0	0	0	0	0	0	-/-
<b>Eriogonum corymbosum -- (crispleaf buckwheat)</b>									
2007	-	-	-	-	-	-	-	-	-/-
2010	80	-	0	100	0	0	0	0	22/35
2015	-	-	-	-	-	-	-	-	43/54
2018	-	-	-	-	-	-	-	-	-/-
<b>Eriogonum microthecum<sup>P</sup> -- (slender buckwheat)</b>									
2007	20	-	0	100	0	0	0	0	15/14
2010	20	-	100	0	0	0	0	0	-/-
2015	20	-	0	100	0	0	0	0	17/40
2018	20	-	0	100	0	0	0	0	20/16
<b>Ericameria nauseosa -- (rubber rabbitbrush)</b>									
2007	-	-	-	-	-	-	-	-	-/-
2010	-	-	-	-	-	-	-	-	36/41
2015	-	-	-	-	-	-	-	-	95/157
2018	-	-	-	-	-	-	-	-	85/122
<b>Juniperus osteosperma<sup>t</sup> -- (Utah juniper)</b>									
2007	100	-	20	80	0	0	0	0	-/-
2010	20	-	0	100	0	0	0	0	-/-
2015	20	-	0	100	0	0	0	0	-/-
2018	20	-	0	100	0	0	0	0	-/-
<b>Opuntia -- (pricklypear)</b>									
2007	-	-	-	-	-	-	-	-	15/38
2010	-	-	-	-	-	-	-	-	12/27
2015	20	-	0	100	0	0	0	0	12/24
2018	-	-	-	-	-	-	-	-	11/31
<b>Pinus edulis<sup>t</sup> -- (twoneedle pinyon)</b>									
2007	420	100	29	67	5	0	0	0	-/-
2010	20	-	0	100	0	0	0	0	-/-
2015	20	-	0	100	0	0	0	0	-/-
2018	20	-	0	100	0	0	0	0	-/-
<b>Sambucus<sup>P</sup> -- (elderberry)</b>									
2007	-	-	-	-	-	-	-	-	-/-
2010	-	-	-	-	-	-	-	-	-/-
2015	-	-	-	-	-	-	-	-	162/191
2018	-	-	-	-	-	-	-	-	173/170

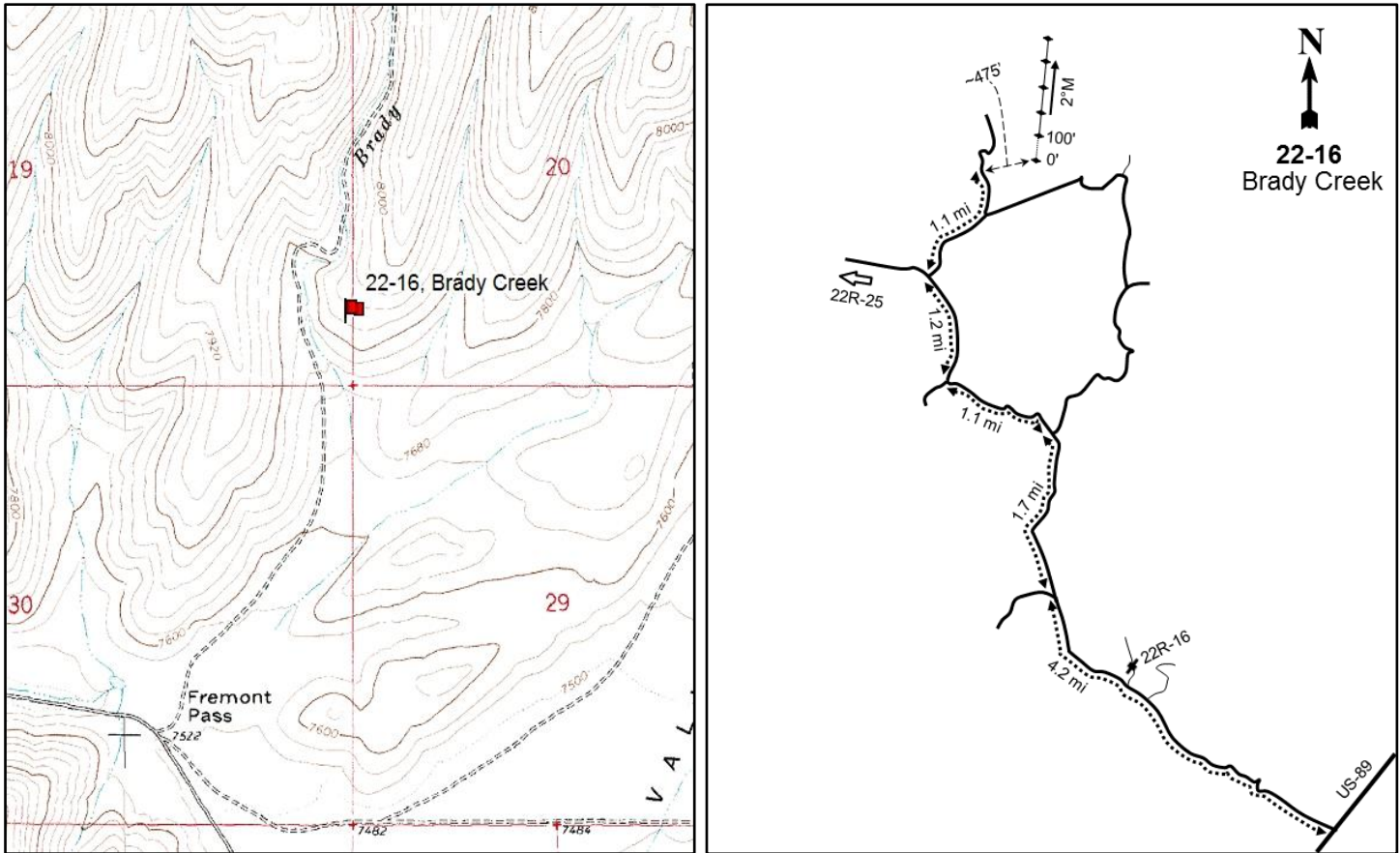
t - Tree Species; p - Preferred Browse; i - Introduced Species

**Table 22R-12.14 - Tree Characteristics.** Point-quarter tree density, size class distribution, and average diameter.

Year	Density	Size Class Distribution					Average Diameter (cm)
	Trees per Acre	Seedling (%)	1-4' (%)	4-8' (%)	8-12' (%)	>12' (%)	
<b>Juniperus osteosperma (Utah juniper)</b>							
2007	76	-	5	11	21	63	24.4
2010	2	-	33	-	-	67	52.3
2015	27	43	29	7	-	21	15.4
2018	8	-	-	-	-	100	45.8
<b>Pinus edulis (twoneedle pinyon)</b>							
2007	171	20	5	10	20	45	15.9
2010	7	-	50	-	-	50	12.5
2015	8	-	-	-	-	100	30.3
2018	24	-	-	-	-	100	38.0



## BRADY CREEK - STUDY NO. 22-16

**Location Information**

USGS 7.5 min Map Info  
GPS (0' Stake)

Fremont Pass NW; Township 31S, Range 5W, Section 19  
NAD 83 UTM ZONE 12, 372923 East 4217581 North

**Transect Information**

Browse Tag # (0' Stake)	519
Transect Bearing	2° magnetic
Length	500ft
Belt Placement	Line 1 (11ft), Line 2 (34ft), Line 3 (59ft), Line 4 (71ft), Line 5 (95ft)
Belt Marker Placement	Belt 1: 4ft

**Directions to Site**

From US-89 just south of Spry, turn right (northwest) onto Dog Valley Road. Travel for 4.2 miles, passing a few minor roads (one leads to the 22R-16 study), to a fork: stay right (the road to the left leads to Red Cedar Spring). Travel 1.7 miles until another fork is reached. Proceed to the left and drive for 1.1 miles to yet another fork. Stay left again and proceed for 1.2 miles to a four-way intersection (the road going to the west leads to study 22R-25). Turn right onto the road with the most northerly azimuth, travel for 1.1 miles, and park; there is no witness post. The 0-foot stake is approximately 475 feet from the road and is marked by browse tag #519.

**Site Information**

Land Ownership	Federal
Land Administrator	BLM
Allotment	FREMONT
Elevation	No data
Aspect	South-Southwest
Slope	15%
Sample Dates	06/13/2018

**Table 22-16.1 Disturbance History.** Recorded history of major disturbances.

Treatment/Disturbance	Name	WRI DB#	Date	Size (acres)
Hand Crew - Lop and Scatter	Dog Valley Hand Thinning	3265	September-November 2015	9768

**Wildlife Habitat and Vegetation History****Table 22-16.3 - Wildlife Seasonal Habitat.** UDWR wildlife habitat and seasonality.

Species	Habitat	Season
Deer	substantial	summer
Elk	substantial	summer
Greater Sage Grouse		

**Table 22-16.4 - Vegetation History.** The dominant vegetation type(s) and phase of woodland succession (Tausch, Miller, Roundy, & Chambers, 2009).

Year	Vegetation Type	Woodland Succession
2018	Mountain Big Sagebrush	Phase I

**Site Notes**

No Notes

**Soils****Table 22-16.5 - 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	6.6	48.2	31.4	20.4	4.5	22.0	309.0	0.5	06/13/2018

**Site Potential**

1981 - 2010 Average Annual Precipitation	19 inches
NRCS Ecological Site	Upland Stony Loam (Mountain Big Sagebrush)
NRCS Ecological Site #	R047XB336UT
States and Transitions	No state and transition model is available for this ecological site.

Upon study establishment in 2018, the plant community on this site was dominated by mountain big sagebrush (*Artemisia tridentata* ssp. *vaseyana*) with other preferred browse species such as antelope bitterbrush (*Purshia tridentata*) and curl-leaf mountain mahogany (*Cercocarpus ledifolius* var. *ledifolius*) present in lesser amounts (Table 22-16.12, Table 22-16.13). The herbaceous understory was abundant, with most cover being contributed by native perennial graminoids such as Geyer's sedge (*Carex geyeri*), bluebunch wheatgrass (*Pseudoroegneria spicata*), and muttongrass (*Poa fendleriana*), among others (Table 22-16.7, Table 22-16.10). The introduced annual grass species cheatgrass (*Bromus tectorum*) was also present, but contributed low cover in comparison (Table 22-16.10). However, should cheatgrass amounts increase in future sample years, it could pose a threat to the resiliency of the community. Forb species were moderately diverse, with most cover being provided by the perennial species Carruth's sagewort (*A. carruthii*) and the annual species maiden blue eyed Mary (*Collinsia parviflora*) (Table 22-16.11). Rocky Mountain juniper (*Juniperus scopulorum*) was the only tree species sampled on site (Table 22-16.13), placing this site in Phase I of woodland succession (Table 22-16.4).

**Trend Summary Tables****Table 22-16.6 - 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
2018	33.8	2.9	0.0	48.5	1.3	-

**Table 22-16.7 - 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
2018	167	271	310	160	2.2	11.9	3.3	3.5

**Table 22-16.8 - 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
2018	10.3	1.8	60.3	1.4	28.0	51.2

**Table 22-16.9 - 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			
2018	1	25	-	54
Year	Days Use Per Acre (ha)			
2018	6.5 (16.1)	91.1 (225.1)	3.4 (8.3)	-

**Table 22-16.10 - Grass Species.** Nested frequency and modified Daubenmire average cover by year.

GRASS SPECIES										
Bouteloua gracilis (blue grama)										
Bromus tectorum <sup>ai</sup> (cheatgrass)										
Carex geyeri (Geyer's sedge)										
Elymus elymoides (squirreltail)										
Hesperostipa comata (needle and thread)										
Koeleria macrantha (prairie Junegrass)										
Pascopyrum smithii (western wheatgrass)										
Poa fendleriana (muttongrass)										
Pseudoroegneria spicata (bluebunch wheatgrass)										
Thinopyrum intermedium <sup>i</sup> (intermediate wheatgrass)										
year	Nested Frequency									
2018	36	167	70	20	36	18	37	52	78	7
year	Average Cover (%)									
2018	0.7	2.2	3.5	0.7	1.3	0.8	0.6	1.6	2.6	0.1

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

**Table 22-16.11 - Forb Species.** Nested frequency and modified Daubenmire average cover by year.

FORB SPECIES																	
Agoseris glauca (pale agoseris)																	
Agoseris grandiflora (bigflower agoseris)																	
Artemisia carruthii (Caruth's sawwort)																	
Astragalus calycosus (Torrey's milkvetch)																	
Collinsia parviflora <sup>a</sup> (maiden blue eyed Mary)																	
Comandra umbellata (bastard roadflax)																	
Crepis acuminata (tapertip hawkbeard)																	
Erigeron pumilus (shaggy fleabane)																	
Eriogonum racemosum (redroot buckwheat)																	
Eriogonum umbellatum (sulphur-flower buckwheat)																	
Gayophytum ramosissimum <sup>a</sup> (pinyon groundsmoke)																	
Hymenopappus filifolius (fineleaf hymenopappus)																	
Lomatium (desertparsley)																	
Microsteris gracilis <sup>a</sup> (slender phlox)																	
Packera multilobata (lobeleaf groundsel)																	
Petradoria pumila (rock goldenrod)																	
Trifolium (clover)																	
year	Nested Frequency																
2018	13	3	115	4	287	5	3	1	4	0	31	3	10	109	2	6	9
year	Average Cover (%)																
2018	0.1	0.0	2.8	0.0	2.6	0.0	0.0	0.0	0.2	0.0	0.2	0.0	0.0	0.5	0.0	0.1	0.1

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

FORB SPECIES																	
Zigadenus paniculatus (foothill deathcamas)																	
year	Nested Frequency																
2018	11																
year	Average Cover (%)																
2018	0.2																

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

**Table 22-16.12 - Shrub and Tree Species.** Average modified Daubenmire quadrat and line intercept cover by year.

SHRUB SPECIES	Line Intercept Cover (%)										
	year	Line Intercept Cover (%)									
<i>Artemisia tridentata</i> ssp. <i>vaseyana</i> <sup>p</sup> (mountain big sagebrush)	28	4.3	0.4	0.4	-	0.4	0.1	11.7	0.4	4.1	
<i>Cercocarpus ledifolius</i> var. <i>ledifolius</i> <sup>p</sup> (curl-leaf mountain mahogany)	19.3	1.1	1.7	0.5	0.0	0.7	0.1	10.4	0.0	2.9	
<i>Chrysothamnus viscidiflorus</i> ssp. <i>viscidiflorus</i> var. <i>viscidiflorus</i> (yellow rabbitbrush)											
<i>Gutierrezia sarothrae</i> (broom snakeweed)											
<i>Juniperus scopulorum</i> <sup>t</sup> (Rocky Mountain juniper)											
<i>Mahonia repens</i> (creeping barberry)											
<i>Opuntia polyacantha</i> (plains pricklypear)											
<i>Purshia tridentata</i> <sup>p</sup> (antelope bitterbrush)											
<i>Quercus gambelii</i> <sup>p</sup> (Gambel oak)											
<i>Symphoricarpos oreophilus</i> <sup>p</sup> (mountain snowberry)											

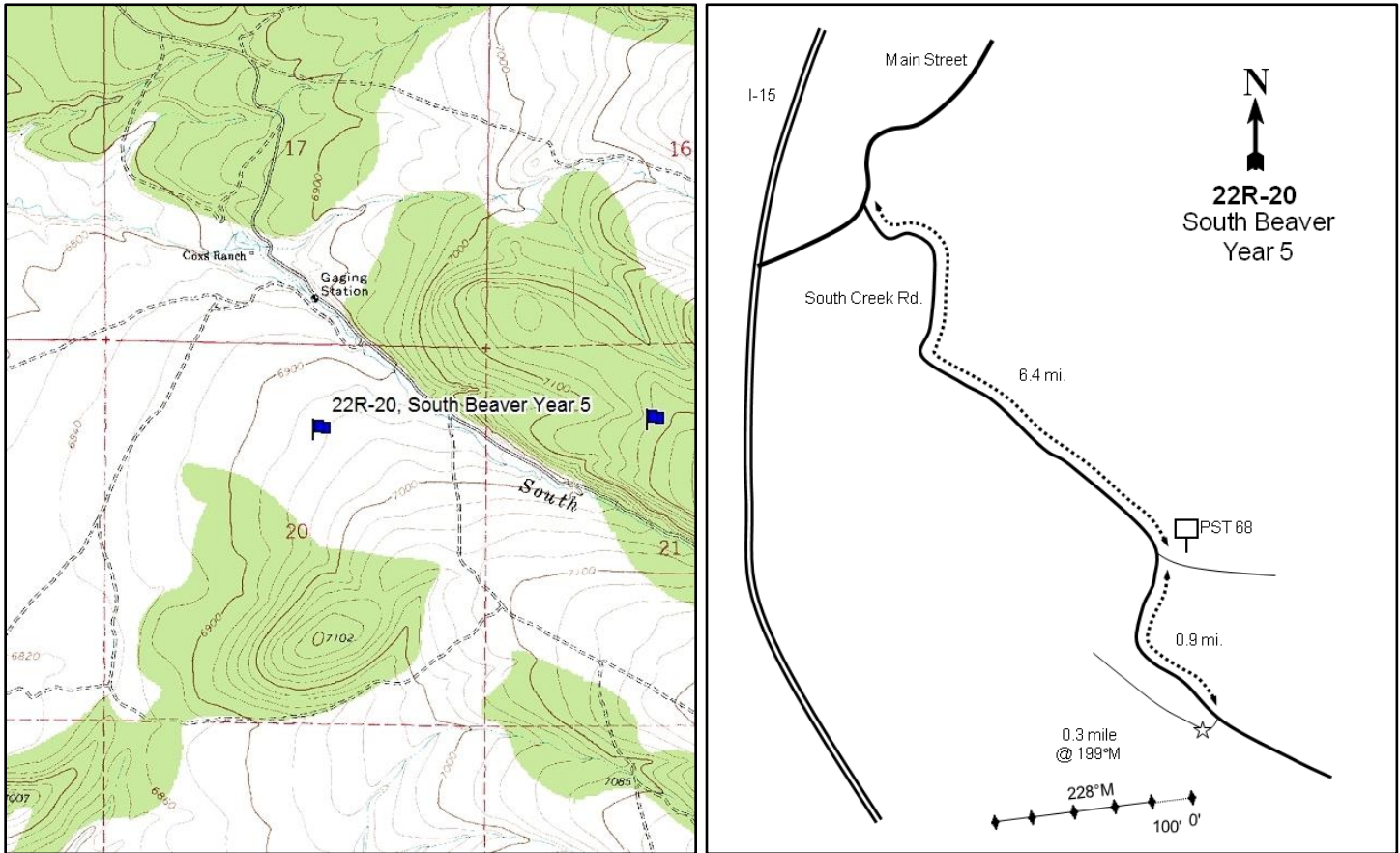
t - Tree Species; p - Preferred Browse; i - Introduced Species

**Table 22-16.13 - 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 (%)				
<i>Artemisia tridentata</i> ssp. <i>vaseyana</i> <sup>p</sup> -- (mountain big sagebrush)									
2018	2860	-	1	83	16	3	1	9	74/93
<i>Cercocarpus ledifolius</i> var. <i>ledifolius</i> <sup>p</sup> -- (curl-leaf mountain mahogany)									
2018	160	-	0	100	0	0	0	0	164/118
<i>Chrysothamnus viscidiflorus</i> ssp. <i>viscidiflorus</i> var. <i>viscidiflorus</i> -- (yellow rabbitbrush)									
2018	1280	-	0	98	2	2	20	5	27/33
<i>Ericameria parryi</i> -- (Parry's rabbitbrush)									
2018	20	-	100	0	0	0	0	0	14/13
<i>Gutierrezia sarothrae</i> -- (broom snakeweed)									
2018	960	-	2	98	0	0	0	0	20/20
<i>Juniperus scopulorum</i> <sup>t</sup> -- (Rocky Mountain juniper)									
2018	20	-	100	0	0	0	0	0	- / -
<i>Mahonia repens</i> -- (creeping barberry)									
2018	3980	-	2	99	0	0	0	0	13/14
<i>Opuntia polyacantha</i> -- (plains pricklypear)									
2018	160	-	25	75	0	25	0	0	12/31
<i>Purshia tridentata</i> <sup>p</sup> -- (antelope bitterbrush)									
2018	3380	-	9	88	3	21	40	2	53/75
<i>Quercus gambelii</i> <sup>p</sup> -- (Gambel oak)									
2018	220	-	36	64	0	0	0	0	65/60
<i>Symphoricarpos oreophilus</i> <sup>p</sup> -- (mountain snowberry)									
2018	1320	-	5	96	0	12	14	0	37/76

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

## SOUTH BEAVER YEAR 5 - STUDY NO. 22R-20



### Location Information

USGS 7.5 min Map Info  
GPS (0' Stake)

Kane Canyon SE; Township 30S, Range 6W, Section 20  
NAD 83 UTM ZONE 12, 363811 East 4227750 North

### Transect Information

Browse Tag # (0' Stake)	198
Transect Bearing	228° 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 Main Street in Beaver, travel south towards the I-15 interchange. Before Main Street bends to the west, turn east onto South Creek Road. Stay on the main road for 6.4 miles to a "PST 68" sign: from the sign, travel for 0.9 miles to a turn to the west. Cross the stream and park at a bend in the road that is about 100 feet past the stream. Walk 0.29 miles at 199 degrees magnetic to the 0-foot post. A new 200-foot stake needs to be placed during the next sample year.



**Site Information**

Land Ownership	Federal
Land Administrator	BLM
Allotment	SOUTH CREEK
Elevation	6,930ft (2,112m)
Aspect	West-Northwest
Slope	1-5%
Sample Dates	07/13/2010, 06/03/2013, 08/13/2018

**Table 22R-20.1 Disturbance History.** Recorded history of major disturbances.

Treatment/Disturbance	Name	WRI DB#	Date	Size (acres)
Mechanical - Bullhog	South Beaver Vegetation Enhancement Year 5	1711	October 2010-January 2011	1761
Seeding - Aerial Before	South Beaver Vegetation Enhancement Year 5	1711	October 2010	1761
Hand Crew - Lop and Scatter	Project Maintenance - South Beaver Phase II (Proposed)	4831	2019	6248

**Table 22R-20.2 Seed Mix.** List of known seeded plant species and rates (if available).

Mix Name			Application Type	Application Date	Acres
South Beaver Vegetation Enhancement Year 5			Aerial	Oct 2010	1771
Type	Species	Common Name	Cultivar/Source ID	Bulk lbs/acre	PLS
G	Achnatherum hymenoides	Indian Ricegrass	Rimrock	1.02	0.87
G	Agropyron cristatum	Crested Wheatgrass	Hycrest	1.50	1.33
G	Agropyron fragile	Siberian Wheatgrass	Vavilov	1.50	1.16
G	Elymus wawawaiensis	Snake River Wheatgrass	Secar	1.50	1.34
G	Poa secunda	Sandberg Bluegrass	Mountain Home	0.25	0.23
G	Pseudoroegneria spicata	Bluebunch Wheatgrass	Anatone	0.95	0.85
G	Pseudoroegneria spicata	Bluebunch Wheatgrass	Anatone	0.54	0.49
G	Thinopyrum intermedium	Intermediate Wheatgrass	Oahe	0.48	0.43
G	Thinopyrum intermedium	Pubescent Wheatgrass	Luna	2.00	1.84
F	Linum perenne	Blue Flax	Appar	0.51	0.40
F	Medicago sativa	Alfalfa	Ladak	0.99	0.92
F	Melilotus officinalis	Yellow Sweetclover		0.23	0.20
F	Melilotus officinalis	Yellow Sweetclover		0.28	0.25
F	Onobrychis viciifolia	Sainfoin	Eski	1.02	0.96
F	Penstemon palmeri	Palmer Penstemon	Iron UT	0.10	0.09
F	Sanguisorba minor	Small Burnet	Delar	1.02	0.97

**Wildlife Habitat and Vegetation History****Table 22R-20.3 - Wildlife Seasonal Habitat.** UDWR wildlife habitat and seasonality.

Species	Habitat	Season
Deer	crucial	winter
Elk	substantial	winter
Greater Sage Grouse	occupied	year-long

**Table 22R-20.4 - Vegetation History.** The dominant vegetation type(s) and phase of woodland succession (Tausch, Miller, Roundy, & Chambers, 2009).

Year	Vegetation Type	Woodland Succession
2010	Pinyon-Juniper	Phase III
2013	Perennial Grass/Mountain Big Sagebrush	Phase I
2018	Mountain Big Sagebrush/Perennial Grass	Phase I

**Site Notes**

There is no 200-foot stake. An untreated site, South Beaver Year 5 Reference (22R-21), was established as a reference study.



**Site Potential**

1981 - 2010 Average Annual Precipitation	16 inches
NRCS Ecological Site	Upland Loam (Mountain Big Sagebrush-Indian Ricegrass)
NRCS Ecological Site #	R047XB308UT
States and Transitions	No state and transition model is available for this ecological site.

This site was dominated by encroaching twoneedle pinyon (*Pinus edulis*) and Utah juniper (*Juniperus osteosperma*) and in Phase III of woodland succession upon study establishment in 2010 (Table 22R-20.4). Mountain big sagebrush (*Artemisia tridentata* ssp. *vaseyana*) was the dominant shrub species, but provided substantially less cover than pinyon and juniper (Table 22R-20.12). The herbaceous understory was limited in cover and diversity. After a 2010 bullhog and seeding treatment (Table 22R-20.1) removed a majority of the trees, the site transitioned to one dominated by native and introduced perennial grasses and mountain big sagebrush. Annual grasses were present in low amounts in 2010 and 2013, but were not observed in 2018 (Photos, Table 22R-20.7, Table 22R-20.10, Table 22R-20.12, Table 22R-20.13). Without further disturbance, sagebrush on this site will likely increase in cover, retaining co-dominance in the plant community. Although most trees were removed by the treatment, density increased between 2013 and 2018, indicating the potential for future infilling (Table 22R-20.14).

**Trend Summary Tables****Table 22R-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
2010	3.5	0.2	28.3	3.5	1.2	47.5
2013	1.6	0.5	0.4	2.5	1.0	0.3
2018	4.7	1.2	0.5	8.4	0.8	1.1

**Table 22R-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
2010	58	114	110	110	0.7	1.5	0.6	1.2
2013	27	299	21	167	0.1	13.2	0.1	4.7
2018	-	339	7	101	-	16.3	0.0	1.5

**Table 22R-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
2010	19.7	0.2	53.4	13.4	7.6	34.9
2013	10.0	0.1	70.6	1.7	4.0	23.6
2018	25.0	-	58.3	2.1	8.1	24.6

**Table 22R-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	Rabbit
	Quadrat Frequency			
2010	-	11	1	27
2013	-	1	1	-
2018	3	5	6	13
Year	Days Use Per Acre (ha)			
2010	-	39.6 (97.7)	1.3 (3.3)	-
2013	23.2 (57.4)	-	5.3 (13.2)	-
2018	17.4 (43.0)	0.7 (1.7)	2.7 (6.6)	-

**Table 22R-20.10 - Grass Species.** Nested frequency and modified Daubenmire average cover by year.

GRASS SPECIES									
Achnatherum hymenoides (Indian ricegrass)									
Agropyron cristatum <sup>i</sup> (crested wheatgrass)									
Bromus tectorum <sup>ai</sup> (cheatgrass)									
Elymus elymoides (squirreltail)									
Hesperostipa comata (needle and thread)									
Poa fendleriana (muttongrass)									
Poa secunda (Sandberg bluegrass)									
Pseudoroegneria spicata (bluebunch wheatgrass)									
Thinopyrum intermedium <sup>i</sup> (intermediate wheatgrass)									
year	Nested Frequency								
2010	-	-	58	101	-	3	20	-	-
2013	43	58	27	104	-	-	4	104	140
2018	21	27	-	72	7	9	1	59	268
year	Average Cover (%)								
2010	-	-	0.7	1.4	-	0.0	0.1	-	-
2013	0.5	2.2	0.1	3.5	-	-	0.0	3.2	3.8
2018	0.4	1.1	-	1.5	0.2	0.1	0.0	1.2	11.8

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

**Table 22R-20.11 - Forb Species.** Nested frequency and modified Daubenmire average cover by year.

FORB SPECIES																		
Agoseris glauca (pale agoseris)																		
Allium (onion)																		
Arabis (rockcress)																		
Astragalus (milkvetch)																		
Astragalus utahensis (Utah milkvetch)																		
Ceratocephala testiculata <sup>ai</sup> (curveseed butterwort)																		
Chaenactis douglasii (Douglas' dustymaiden)																		
Collinsia parviflora <sup>a</sup> (maiden blue eyed Mary)																		
Comandra umbellata (bastard toadflax)																		
Crepis acuminata (tapertip hawksbeard)																		
Cryptantha (cryptantha)																		
Cymopterus (springparsley)																		
Erigeron pumilus (shaggy fleabane)																		
Eriogonum (buckwheat)																		
Eriogonum umbellatum (sulphur-flower buckwheat)																		
Gayophytum ramosissimum <sup>a</sup> (pinyon groundsmoke)																		
Gilia inconspicua <sup>a</sup> (shy gilia)																		
year	Nested Frequency																	
2010	-	-	-	8	3	8	10	1	20	-	4	-	14	3	3	42	4	
2013	9	1	1	13	-	7	20	-	3	9	16	4	22	-	1	-	-	
2018	-	-	-	-	-	-	22	-	4	-	10	-	15	-	-	-	-	
year	Average Cover (%)																	
2010	-	-	-	0.0	0.0	0.0	0.0	0.0	0.1	-	0.0	-	0.1	0.0	0.0	0.3	0.0	
2013	0.2	0.0	0.0	0.2	-	0.0	0.1	-	0.2	0.1	0.2	0.1	0.4	-	0.0	-	-	
2018	-	-	-	-	-	-	0.1	-	0.0	-	0.1	-	0.1	-	-	-	-	

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

FORB SPECIES	Hedysarum boreale (Utah sweetvetch)	Lactuca serriola <sup>ai</sup> (prickly lettuce)	Linum perenne <sup>i</sup> (blue flax)	Lupinus argenteus (silvery lupine)	Medicago sativa <sup>i</sup> (alfalfa)	Melilotus officinalis <sup>i</sup> (sweetclover)	Microsteris gracilis <sup>a</sup> (slender phlox)	Oenothera (evening primrose)	Packera multilobata (lobeleaf groundsel)	Penstemon (beardtongue)	Penstemon palmeri (Palmer's penstemon)	Phlox austromontana (mountain phlox)	Phlox longifolia (longleaf phlox)	Physaria (twinpod)	Polygonum douglasii <sup>a</sup> (Douglas' knotweed)	Sanguisorba minor <sup>i</sup> (small burnet)	Schoenocrambe linifolia (flaxleaf plainsmustard)
year	Nested Frequency																
2010	2	-	-	-	-	-	50	-	7	1	-	54	3	-	45	-	3
2013	-	13	60	0	4	1	-	1	2	-	4	51	2	1	1	6	6
2018	-	-	2	5	1	3	-	1	3	-	7	32	1	4	2	1	-
year	Average Cover (%)																
2010	0.0	-	-	-	-	-	0.2	-	0.0	0.0	-	0.6	0.0	-	0.1	-	0.0
2013	-	0.0	2.1	0.0	0.0	0.0	-	0.0	0.0	-	0.0	0.8	0.0	0.0	0.0	0.1	0.0
2018	-	-	0.0	0.0	0.0	0.0	-	0.0	0.0	-	0.0	1.0	0.0	0.0	0.0	0.0	-

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

FORB SPECIES	Streptanthus cordatus (heartleaf twistflower)	Taraxacum officinale (common dandelion)	Tragopogon dubius <sup>ai</sup> (yellow salsify)
year	Nested Frequency		
2010	27	-	-
2013	17	-	-
2018	16	5	5
year	Average Cover (%)		
2010	0.1	-	-
2013	0.1	-	-
2018	0.0	0.0	0.0

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

**Table 22R-20.12 - Shrub and Tree Species.** Average modified Daubenmire quadrat and line intercept cover by year.

SHRUB SPECIES	Artemisia tridentata ssp. vaseyana <sup>p</sup> (mountain big sagebrush)	Ericameria nauseosa ssp. nauseosa var. speciosa <sup>p</sup> (rubber rabbitbrush)	Gutierrezia sarothrae (broom snakeweed)	Juniperus osteosperma <sup>i</sup> (Utah juniper)	Linanthus pungens (granite prickly phlox)	Opuntia (pricklypear)	Pinus edulis <sup>i</sup> (twoneedle pinyon)	Yucca (yucca)
year	Line Intercept Cover (%)							
2010	3.5	-	-	29.2	0.8	-	18.3	0.4
2013	2.5	-	-	-	0.8	0.1	0.3	0.1
2018	7.4	1	-	-	0.6	-	1.1	0.2
year	Quadrat Cover (%)							
2010	3.5	-	-	17.3	0.2	0.0	11.0	0.0
2013	1.6	-	-	0.0	0.5	0.0	0.3	0.0
2018	4.3	0.4	0.2	0.0	0.9	0.0	0.5	0.1

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

**Table 22R-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 (%)				
<b>Artemisia tridentata ssp. vaseyana<sup>p</sup> -- (mountain big sagebrush)</b>									
2010	1600	20	10	60	30	13	1	38	45/62
2013	1340	-	28	69	3	3	0	3	39/53
2018	1300	40	12	85	3	9	3	2	48/72
<b>Chrysothamnus viscidiflorus ssp. viscidiflorus var. viscidiflorus -- (yellow rabbitbrush)</b>									
2010	-	-	-	-	-	-	-	-	-/-
2013	-	-	-	-	-	-	-	-	-/-
2018	-	-	-	-	-	-	-	-	53/92
<b>Ericameria nauseosa ssp. nauseosa var. speciosa<sup>p</sup> -- (rubber rabbitbrush)</b>									
2010	-	-	-	-	-	-	-	-	-/-
2013	20	-	0	100	0	0	0	0	46/33
2018	20	-	0	100	0	0	0	0	63/52
<b>Gutierrezia sarothrae -- (broom snakeweed)</b>									
2010	-	-	-	-	-	-	-	-	19/17
2013	-	-	-	-	-	-	-	-	33/43
2018	80	-	25	75	0	0	0	0	21/27
<b>Juniperus osteosperma<sup>i</sup> -- (Utah juniper)</b>									
2010	220	80	27	73	0	0	0	0	-/-
2013	20	60	100	0	0	0	0	0	-/-
2018	200	40	90	10	0	0	0	10	-/-
<b>Linanthus pungens -- (granite prickly phlox)</b>									
2010	340	-	12	88	0	0	0	0	18/25
2013	620	-	3	97	0	0	0	29	17/35
2018	1040	-	2	96	2	0	0	2	13/28
<b>Opuntia -- (pricklypear)</b>									
2010	40	-	50	50	0	0	0	0	9/20
2013	20	-	0	100	0	0	0	0	16/35
2018	40	-	0	50	50	0	0	100	7/16

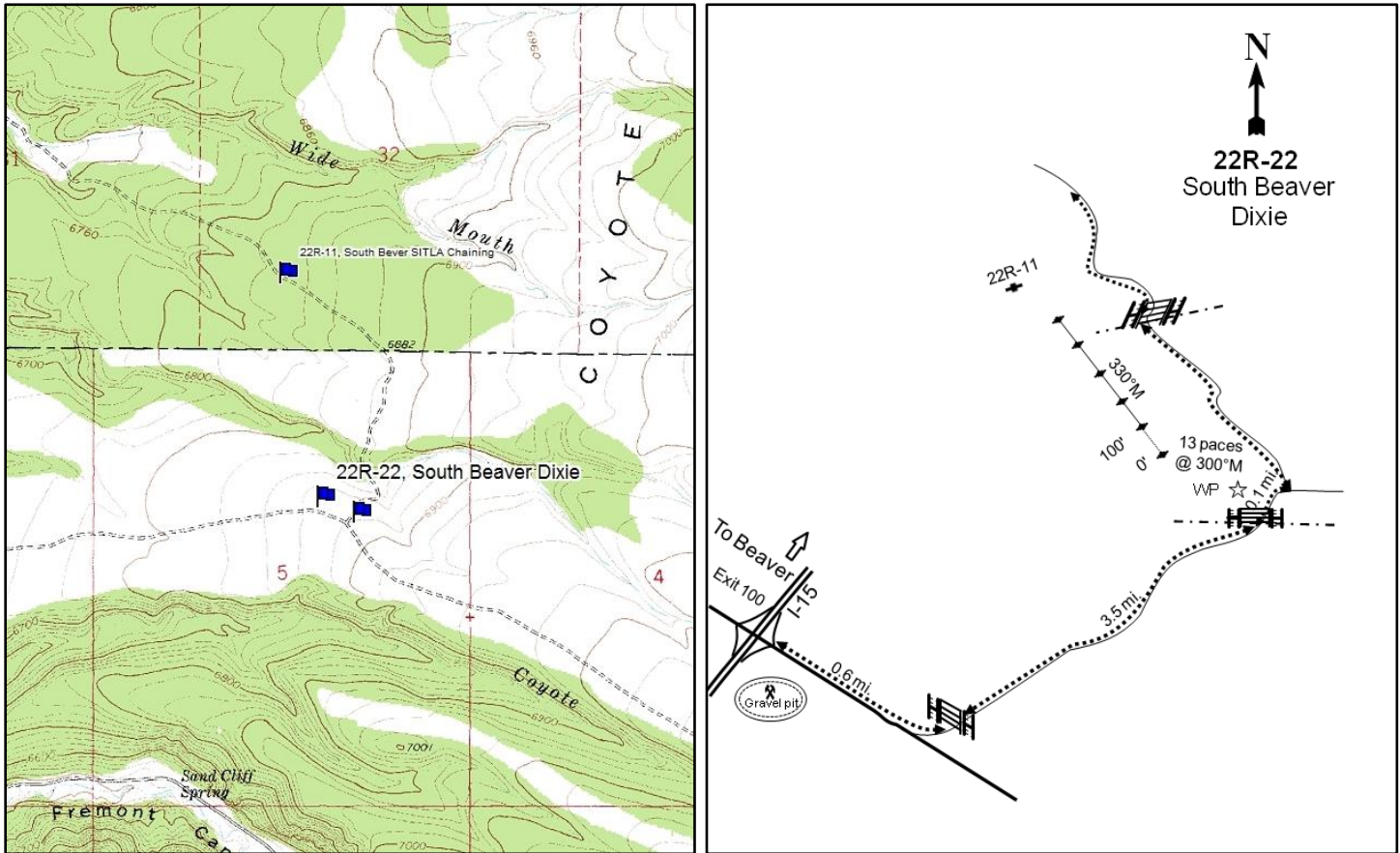
Year	Density		Age Class Distribution			Utilization		Poor Vigor (%)	Average Height Crown (cm)
	Plants Per Acre		Excluding Seedlings			Moderate (%)	Heavy (%)		
	Excluding Seedlings	Seedling	Young (%)	Mature (%)	Decadent (%)				
<b>Pediocactus simpsonii -- (mountain ball cactus)</b>									
2010	-	-	-	-	-	-	-	-	-/-
2013	-	-	-	-	-	-	-	-	-/-
2018	-	-	-	-	-	-	-	-	3/3
<b>Pinus edulis<sup>t</sup> -- (twoneedle pinyon)</b>									
2010	400	80	55	45	0	0	0	0	- / -
2013	100	140	80	20	0	0	0	20	- / -
2018	260	20	92	8	0	0	0	0	- / -
<b>Purshia stansburiana<sup>p</sup> -- (Stansbury cliffrose)</b>									
2010	-	-	-	-	-	-	-	-	94/177
2013	-	-	-	-	-	-	-	-	-/-
2018	-	-	-	-	-	-	-	-	-/-
<b>Purshia tridentata<sup>p</sup> -- (antelope bitterbrush)</b>									
2010	-	-	-	-	-	-	-	-	54/126
2013	-	-	-	-	-	-	-	-	45/120
2018	-	-	-	-	-	-	-	-	59/143
<b>Yucca -- (yucca)</b>									
2010	20	-	0	100	0	0	0	0	45/66
2013	40	-	100	0	0	0	0	0	40/78
2018	100	-	20	80	0	0	0	0	32/47

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

**Table 22R-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' (%)	
<b>Juniperus osteosperma (Utah juniper)</b>							
2010	232	15	10	20	25	30	14.3
2013	7	17	83	-	-	-	2.2
2018	220	60	40	-	-	-	2.1
<b>Pinus edulis (twoneedle pinyon)</b>							
2010	413	35	55	-	5	5	4.3
2013	7	-	100	-	-	-	2.7
2018	208	55	45	-	-	-	2.6

## SOUTH BEAVER DIXIE - STUDY NO. 22R-22

**Location Information**

USGS 7.5 min Map Info  
GPS (0' Stake)

Kane Canyon SE; Township 31S, Range 6W, Section 05  
NAD 83 UTM ZONE 12, 363328 East 4222667 North

**Transect Information**

Browse Tag # (0' Stake)	200
Transect Bearing	330° magnetic
Length	400ft
Belt Placement	Line 1 (11ft & 95ft), Line 2 (34ft), Line 3 (59ft), Line 4 (71ft)
Belt Marker Placement	No Rebar

**Directions to Site**

Take exit 100 from I-15; from the northbound on-ramp drive east for 0.6 miles to a fork. Turn left and drive through a gate, then continue 3.5 miles to a point just before a fence. You will see a witness post on the north side of the road: park here. From the witness post walk 14 paces at 300 degrees magnetic to the 0-foot stake which is marked with browse tag #200.

**Site Information**

Land Ownership	Federal
Land Administrator	BLM
Allotment	FREMONT
Elevation	6,799ft (2,072m)
Aspect	North
Slope	3%
Sample Dates	07/14/2010, 08/12/2014, 08/15/2018

**Table 22R-22.1 Disturbance History.** Recorded history of major disturbances.

Treatment/Disturbance	Name	WRI DB#	Date	Size (acres)
Hand Crew - Lop and Scatter	Project Maintenance - South Beaver Phase II (Proposed)	4831	2019	6248
Chaining - Two-Way Unknown	Coyote Bench Seeding	LTDL	July 1964-November 1965	2905
Seeding - Aerial Unknown	Coyote Bench Seeding	LTDL	July 1964-November 1965	2905
Harrow - One-Way Dixie	South Beaver Vegetation Enhancement Project Year 1	104	December 2005-March 2006	1646
Seeding - Broadcast Before	South Beaver Vegetation Enhancement Project Year 1	104	December 2005-March 2006	1646

**Table 22R-22.2 Seed Mix.** List of known seeded plant species and rates (if available).

Mix Name			Application Type	Application Date	Acres
Coyote Bench Aerial Seeding			Aerial	Jul 1964	2905
Type	Species	Common Name	Cultivar/Source ID	Bulk lbs/acre	PLS
G	Agropyron desertorum	Desert Wheatgrass		8.00	0.00
Mix Name			Application Type	Application Date	Acres
South Beaver			Broadcast	Dec 2005	1900
Type	Species	Common Name	Cultivar/Source ID	Bulk lbs/acre	PLS
G	Achnatherum hymenoides	Indian Ricegrass	Rimrock	0.50	0.48
G	Agropyron cristatum	Crested Wheatgrass	Douglas	0.58	0.47
G	Agropyron fragile	Siberian Wheatgrass	Vavilov	0.21	0.20
G	Agropyron fragile	Siberian Wheatgrass	Vavilov	0.79	0.72
G	Dactylis glomerata	Orchardgrass	Paiute	0.50	0.46
G	Elymus wawawaiensis	Snake River Wheatgrass	Secar	1.00	0.92
G	Poa secunda	Sandberg Bluegrass	Toole MT	0.26	0.24
G	Pseudoroegneria spicata	Bluebunch Wheatgrass	Goldar	1.00	0.92
G	Thinopyrum intermedium	Pubescent Wheatgrass		2.00	1.69
F	Linum perenne	Blue Flax		0.16	0.14
F	Medicago sativa	Alfalfa	Spreader 4	1.00	0.93
F	Melilotus officinalis	Yellow Sweetclover		0.50	0.35
F	Penstemon palmeri	Palmer Penstemon	Washington UT	0.11	0.08
F	Sanguisorba minor	Small Burnet	Delar	1.05	0.95
S	Purshia tridentata	Bitterbrush	Millard UT	0.11	0.10
Mix Name			Application Type	Application Date	Acres
South Beaver			Broadcast	Dec 2005	1900
Type	Species	Common Name	Cultivar/Source ID	Bulk lbs/acre	PLS
S	Artemisia tridentata ssp. wyomingensis	Wyoming Big Sagebrush	Sanpete UT	0.50	0.11
S	Bassia prostrata	Forage Kochia	Millard UT	0.50	0.38

**Wildlife Habitat and Vegetation History****Table 22R-22.3 - Wildlife Seasonal Habitat.** UDWR wildlife habitat and seasonality.

Species	Habitat	Season
Deer	crucial	winter
Elk	substantial	winter
Greater Sage Grouse	occupied	year-long



**Table 22R-22.4 - Vegetation History.** The dominant vegetation type(s) and phase of woodland succession (Tausch, Miller, Roundy, & Chambers, 2009).

Year	Vegetation Type	Woodland Succession
2010	Mountain Big Sagebrush/Perennial Grass	Phase I
2014	Mountain Big Sagebrush/Perennial Grass	Phase I
2018	Mountain Big Sagebrush/Perennial Grass	Phase I

**Site Notes**

Study 22R-9 was established prior to treatment, but was not within the treatment polygon and is now a reference study for this site.

**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.

Since study establishment in 2010, this site has remained dominated by mountain big sagebrush (*Artemisia tridentata* ssp. *vaseyana*), which has gradually increased in cover (Photos, Table 22R-22.12), and perennial grasses -- mainly the introduced species crested wheatgrass (*Agropyron cristatum*). The introduced annual grass cheatgrass (*Bromus tectorum*) has been observed in all sample years, but in low amounts (Table 22R-22.7, Table 22R-22.10). Twoneedle pinyon (*Pinus edulis*) and Utah juniper (*Juniperus osteosperma*) are present on this study as of the 2018 sample year (Table 22R-22.14); although this site is classified as being in Phase I of woodland succession (Table 22R-22.4), there could be potential for further tree encroachment in the future.

**Trend Summary Tables****Table 22R-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
2010	8.6	0.3	0.2	8.1	0.5	0.5
2014	7.7	3.7	0.0	9.0	6.2	0.2
2018	9.3	1.1	0.0	10.5	0.9	0.3

**Table 22R-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
2010	182	263	255	180	1.6	14.0	4.7	3.2
2014	31	333	134	133	0.2	16.4	0.7	2.6
2018	11	275	112	167	0.1	16.3	0.6	4.4

**Table 22R-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
2010	24.3	0.4	40.3	5.8	11.3	32.5
2014	24.4	-	35.8	6.4	14.9	32.2
2018	37.8	0.2	37.5	4.8	17.3	32.5

**Table 22R-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			
2010	1	8	5	32
2014	2	3	11	7
2018	5	3	2	27
Days Use Per Acre (ha)				
2010	6.5 (16.1)	6.0 (14.9)	10.0 (24.8)	-
2014	1.5 (3.6)	3.4 (8.3)	6.7 (16.6)	-
2018	21.1 (52.0)	0.7 (1.7)	0.7 (1.7)	-

**Table 22R-22.10 - Grass Species.** Nested frequency and modified Daubenmire average cover by year.

GRASS SPECIES										
Achnatherum hymenoides (Indian ricegrass)										
Agropyron cristatum <sup>i</sup> (crested wheatgrass)										
Bromus tectorum <sup>ai</sup> (cheatgrass)										
Elymus elymoides (squirreltail)										
Elymus lanceolatus (thickspike wheatgrass)										
Hesperostipa comata (needle and thread)										
Munroa squarrosa <sup>a</sup> (false buffalograss)										
Poa secunda (Sandberg bluegrass)										
Pseudoroegneria spicata (bluebunch wheatgrass)										
Thinopyrum intermedium <sup>i</sup> (intermediate wheatgrass)										
year	Nested Frequency									
2010	2	225	182	53	5	1	-	15	26	9
2014	9	271	31	67	11	12	-	2	20	8
2018	11	199	7	66	-	30	4	-	8	46
year	Average Cover (%)									
2010	0.3	11.5	1.6	0.9	0.2	0.0	-	0.1	0.9	0.1
2014	0.2	12.7	0.2	2.2	0.1	0.2	-	0.0	0.8	0.2
2018	0.1	11.7	0.0	1.7	-	0.9	0.0	-	0.2	1.6

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

**Table 22R-22.11 - Forb Species.** Nested frequency and modified Daubenmire average cover by year.

FORB SPECIES																	
Alyssum desertorum <sup>ai</sup> (desert madwort)																	
Amaranthus <sup>ai</sup> (pigweed)																	
Androsace septentrionalis <sup>a</sup> (pygmyflower rockjasmine)																	
Astragalus (milkvetch)																	
Calochortus nuttallii (sego lily)																	
Castilleja flava (yellow Indian paintbrush)																	
Ceratocephala testiculata <sup>ai</sup> (curveseed butterwort)																	
Chaenactis douglasii (Douglas' dustymaiden)																	
Chamaesyce (sandmat)																	
Cirsium (thistle)																	
Collinsia parviflora <sup>a</sup> (maiden blue eyed Mary)																	
Comandra umbellata (bastard toadflax)																	
Cryptantha (cryptantha)																	
Erigeron pumilus (shaggy fleabane)																	
Eriogonum cernuum <sup>a</sup> (nodding buckwheat)																	
Gayophytum ramosissimum <sup>a</sup> (pinyon groundsmoke)																	
Geranium <sup>a</sup> (geranium)																	
year	Nested Frequency																
2010	106	-	1	2	9	1	162	123	-	1	3	3	2	26	4	13	5
2014	131	-	3	5	2	2	-	3	30	2	-	7	-	23	6	-	-
2018	53	11	0	4	-	-	3	13	64	-	-	6	-	14	2	-	-
year	Average Cover (%)																
2010	2.2	-	0.1	0.0	0.0	0.0	1.9	0.8	-	0.0	0.1	0.0	0.0	0.4	0.0	0.1	0.0
2014	0.7	-	0.0	0.0	0.0	0.0	-	0.0	0.1	0.1	-	0.1	-	0.1	0.0	-	-
2018	0.1	0.1	0.0	0.0	-	-	0.0	0.1	1.3	-	-	0.0	-	0.1	0.0	-	-

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

FORB SPECIES												
<i>Gilia inconspicua</i> <sup>a</sup> (shy gilia)												
<i>Hedysarum boreale</i> (Utah sweetvetch)												
<i>Linum perenne</i> <sup>i</sup> (blue flax)												
<i>Lygodesmia</i> (skeletonplant)												
<i>Machaeranthera grindeltooides</i> (rayless tansyaster)												
<i>Medicago sativa</i> <sup>i</sup> (alfalfa)												
<i>Melilotus officinalis</i> <sup>i</sup> (sweetclover)												
<i>Microsteris gracilis</i> <sup>a</sup> (slender phlox)												
<i>Packera multilobata</i> (lobeleaf groundsel)												
<i>Phlox austromontana</i> (mountain phlox)												
<i>Sphaeralcea coccinea</i> (scarlet globemallow)												
unknown annual forb <sup>a</sup> (unknown forb)												
year	Nested Frequency											
2010	7	5	11	1	-	1	-	52	-	58	-	-
2014	-	5	1	-	3	2	3	-	3	72	1	-
2018	3	-	12	-	-	-	-	-	-	87	-	66
year	Average Cover (%)											
2010	0.0	0.0	0.3	0.0	-	0.0	-	0.2	-	1.5	-	-
2014	-	0.1	0.0	-	0.0	0.0	0.0	-	0.0	1.8	0.0	-
2018	0.0	-	0.1	-	-	-	-	-	-	2.8	-	0.3

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

**Table 22R-22.12 - Shrub and Tree Species.** Average modified Daubenmire quadrat and line intercept cover by year.

SHRUB SPECIES						
<i>Artemisia tridentata</i> ssp. <i>vaseyana</i> <sup>p</sup> (mountain big sagebrush)						
<i>Gutierrezia sarothrae</i> (broom snakeweed)						
<i>Juniperus osteosperma</i> <sup>t</sup> (Utah Juniper)						
<i>Opuntia</i> (pricklypear)						
<i>Pinus edulis</i> <sup>t</sup> (twoneedle pinyon)						
<i>Purshia tridentata</i> <sup>p</sup> (antelope bitterbrush)						
year	Line Intercept Cover (%)					
2010	8.1	0.5	-	-	0.5	-
2014	8.5	6.2	0.2	-	-	0.5
2018	9.8	0.9	0.2	-	0.1	0.7
year	Quadrat Cover (%)					
2010	8.4	0.3	-	0.0	0.2	0.2
2014	7.3	3.7	0.0	-	-	0.4
2018	8.4	1.1	0.0	-	0.0	0.9

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

**Table 22R-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.

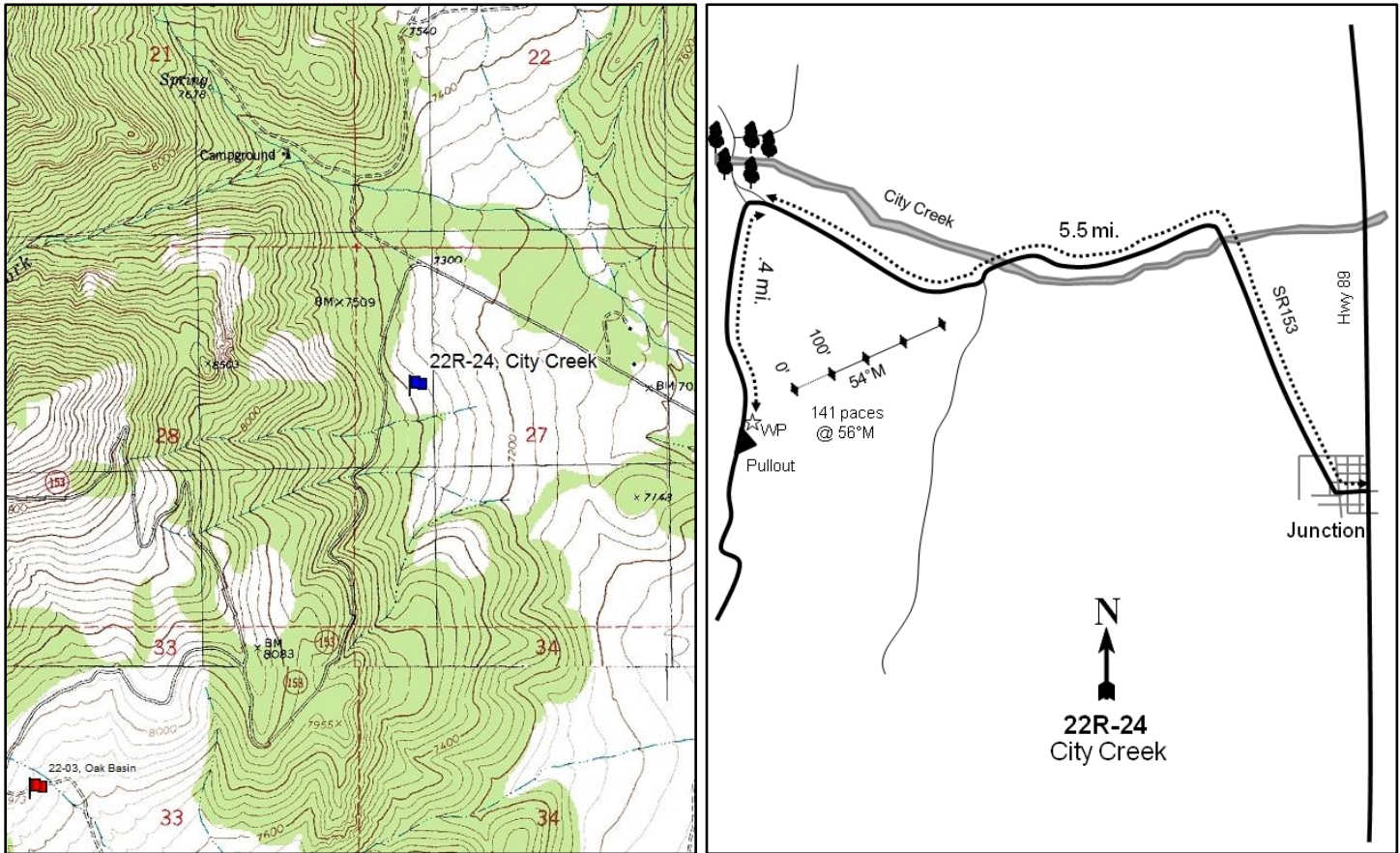
Year	Density		Age Class Distribution			Utilization		Poor Vigor (%)	Average Height Crown (cm)
	Plants Per Acre		Excluding Seedlings			Moderate (%)	Heavy (%)		
	Excluding Seedlings	Seedling	Young (%)	Mature (%)	Decadent (%)				
<b>Artemisia tridentata ssp. vaseyana<sup>p</sup> -- (mountain big sagebrush)</b>									
2010	2340	40	9	82	9	17	2	10	45/57
2014	2860	100	13	78	10	55	29	3	41/68
2018	3040	100	16	73	11	2	0	13	45/74
<b>Gutierrezia sarothrae -- (broom snakeweed)</b>									
2010	800	-	15	85	0	0	0	0	22/22
2014	6480	2760	20	80	1	22	0	1	24/34
2018	2140	40	2	89	9	2	0	13	15/16
<b>Juniperus osteosperma<sup>i</sup> -- (Utah juniper)</b>									
2010	-	-	-	-	-	-	-	-	-/-
2014	20	-	0	100	0	0	0	100	-/-
2018	40	-	50	50	0	0	0	0	-/-
<b>Opuntia -- (pricklypear)</b>									
2010	20	-	0	100	0	0	0	0	11/23
2014	60	-	33	67	0	0	0	0	5/3
2018	120	-	0	100	0	0	0	0	8/13
<b>Pinus edulis<sup>t</sup> -- (twoneedle pinyon)</b>									
2010	60	-	67	0	33	0	33	33	-/-
2014	40	-	100	0	0	0	0	0	-/-
2018	20	-	0	100	0	0	0	0	-/-
<b>Purshia tridentata<sup>p</sup> -- (antelope bitterbrush)</b>									
2010	20	-	100	0	0	0	0	0	58/129
2014	20	-	0	100	0	100	0	0	107/142
2018	20	-	0	100	0	100	0	0	95/183

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

**Table 22R-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' (%)	
<b>Juniperus osteosperma (Utah juniper)</b>							
2010	5	-	67	33	-	-	7.3
2014	8	-	100	-	-	-	4.5
2018	7	-	33	67	-	-	4.7
<b>Pinus edulis (twoneedle pinyon)</b>							
2010	115	29	71	-	-	-	2.3
2014	43	15	85	-	-	-	2.2
2018	65	6	94	-	-	-	3.2

## CITY CREEK - STUDY NO. 22R-24

**Location Information**

USGS 7.5 min Map Info  
GPS (0' Stake)

Delano Peak SE; Township 29S, Range 4W, Section 27  
NAD 83 UTM ZONE 12, 385836 East 4235496 North

**Transect Information**

Browse Tag # (0' Stake)	192
Transect Bearing	54° magnetic
Length	400ft
Belt Placement	Line 1 (11ft & 95ft), Line 2 (34ft), Line 3 (59ft), Line 4 (71ft)
Belt Marker Placement	No Rebar

**Directions to Site**

From the town of Junction turn onto State Road 153 (Center Street). Travel west for 5.5 miles. Stay left heading towards Puffer Lake and go another 0.4 miles to a pullout on the east side of the road; the transect is located east of the pullout. The 0-foot stake is 141 paces at 56 degrees magnetic from the witness post and is marked with browse tag #192.

**Site Information**

Land Ownership	Federal
Land Administrator	USFS
Allotment	Circleville Allotment
Elevation	7,341ft (2,238m)
Aspect	Northeast
Slope	10%
Sample Dates	07/13/2011, 08/14/2014, 08/13/2018

**Table 22R-24.1 Disturbance History.** Recorded history of major disturbances.

Treatment/Disturbance	Name	WRI DB#	Date	Size (acres)
Chaining - Chain Unknown	-	-	Historic	-
Seeding - Seed Unknown	-	-	Historic	-
Mechanical - Bullhog	City Creek Sagebrush-steppe Enhancement Year 1	1995	September 2011-June 2012	1080

**Wildlife Habitat and Vegetation History****Table 22R-24.3 - Wildlife Seasonal Habitat.** UDWR wildlife habitat and seasonality.

Species	Habitat	Season
Deer	crucial	winter
Elk	substantial	winter

**Table 22R-24.4 - 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/Mountain Big Sagebrush/Gambel Oak	Phase II transitioning to Phase III
2014	Mountain Big Sagebrush/Perennial Grass/Gambel Oak	Phase I
2018	Mountain Big Sagebrush/Gambel Oak	Phase I

**Site Notes**

No Notes

**Site Potential**

1981 - 2010 Average Annual Precipitation	18 inches
NRCS Ecological Site	Mountain Stony Loam (Mountain Big Sagebrush)
NRCS Ecological Site #	R047XB462UT
States and Transitions	No state and transition model is available for this ecological site.

When established in 2011, this site was in Phase II transitioning to Phase III of encroachment by twoneedle pinyon (*Pinus edulis*) and Utah juniper (*Juniperus osteosperma*) (Table 22R-24.4, Table 22R-24.14). Mountain big sagebrush (*Artemisia tridentata* ssp. *vaseyana*) and Gambel oak (*Quercus gambelii*) were major browse components (Table 22R-24.12) and the herbaceous understory was sparse (Table 22R-24.7). During the first post-treatment sample year, shrubs such as mountain big sagebrush and Gambel oak as well as perennial grasses -- mainly muttongrass (*Poa fendleriana*) and squirreltail (*Elymus elymoides*) -- were co-dominant vegetation components, while cover of other herbaceous species remained low. Cover of sagebrush and oak continued to increase, and in 2018 they surpassed perennial grass to become the dominant vegetation components (Table 22R-24.7, Table 22R-24.10, Table 22R-24.11, Table 22R-24.12). Without disturbance, it is likely that these shrubs will continue to increase and retain dominance. Some trees have remained on site following treatment and could infill the area in the future (Table 22R-24.14).

**Trend Summary Tables****Table 22R-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
2011	22.0	0.0	13.7	25.8	0.3	29.4
2014	11.7	0.5	1.2	15.5	-	2.0
2018	21.5	1.2	1.1	29.3	0.6	2.4

**Table 22R-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
2011	21	174	113	90	0.1	5.5	0.4	0.7
2014	42	276	25	76	1.4	12.8	0.2	0.6
2018	18	350	-	49	0.0	20.4	-	0.5

**Table 22R-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
2011	12.9	0.7	45.1	3.7	26.5	37.9
2014	7.8	0.0	49.9	3.2	22.5	30.6
2018	5.3	0.1	58.5	2.7	21.9	43.4

**Table 22R-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			
2011	1	20	-	2
2014	-	11	2	5
2018	2	21	5	17
Days Use Per Acre (ha)				
2011	0.7 (1.8)	45.6 (112.6)	2.0 (5.0)	-
2014	2.9 (7.2)	28.8 (71.2)	3.4 (8.3)	-
2018	-	20.1 (49.7)	9.4 (23.2)	-



**Table 22R-24.10 - Grass Species.** Nested frequency and modified Daubenmire average cover by year.

GRASS SPECIES											
Achnatherum hymenoides (Indian ricegrass)											
Achnatherum lettermanii (Letterman's needlegrass)											
Agropyron cristatum <sup>i</sup> (crested wheatgrass)											
Bouteloua gracilis (blue grama)											
Bromus tectorum <sup>ai</sup> (cheatgrass)											
Carex rossii (Ross' sedge)											
Elymus elymoides (squirreltail)											
Hesperostipa comata (needle and thread)											
Poa fendleriana (muttongrass)											
Pseudoroegneria spicata (bluebunch wheatgrass)											
Thinopyrum intermedium <sup>i</sup> (intermediate wheatgrass)											
year	Nested Frequency										
2011	-	13	3	-	21	48	30	-	109	3	19
2014	-	26	12	2	42	26	82	-	186	16	26
2018	4	25	10	5	18	46	123	10	204	3	94
year	Average Cover (%)										
2011	-	0.1	0.1	-	0.1	1.6	0.2	-	3.0	0.0	0.4
2014	-	0.7	0.1	0.0	1.4	1.6	2.8	-	6.4	0.8	0.3
2018	0.0	0.9	0.1	0.0	0.0	1.3	4.4	0.3	9.6	0.2	3.6

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

**Table 22R-24.11 - Forb Species.** Nested frequency and modified Daubenmire average cover by year.

FORB SPECIES																	
Agoseris glauca (pale agoseris)																	
Alyssum desertorum <sup>ai</sup> (desert madwort)																	
Arabis holboellii <sup>a</sup> (Holboell's rockcress)																	
Artemisia ludoviciana (white sagebrush)																	
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 fremontii <sup>a</sup> (Fremont's goosefoot)																	
Collinsia parviflora <sup>a</sup> (maiden blue eyed Mary)																	
Comandra umbellata (bastard toadflax)																	
Conyza canadensis <sup>a</sup> (Canadian horseweed)																	
Erigeron pumilus (shaggy fleabane)																	
Eriogonum racemosum (redroot buckwheat)																	
Gayophytum ramosissimum <sup>a</sup> (pinyon groundsmoke)																	
year	Nested Frequency																
2011	3	-	15	-	3	0	6	3	-	4	3	14	-	-	1	6	90
2014	-	3	-	-	-	-	11	-	5	-	3	-	3	12	15	9	-
2018	-	-	-	2	-	-	-	-	-	5	-	-	-	-	3	7	-
year	Average Cover (%)																
2011	0.1	-	0.1	-	0.0	0.0	0.0	0.0	-	0.0	0.0	0.0	-	-	0.0	0.1	0.2
2014	-	0.0	-	-	-	-	0.1	-	0.0	-	0.0	-	0.0	0.2	0.2	0.1	-
2018	-	-	-	0.1	-	-	-	-	-	0.0	-	-	-	-	0.0	0.0	-

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

FORB SPECIES													
Hymenopappus filifolius (fineleaf hymenopappus)													
Lactuca serriolai <sup>ai</sup> (prickly lettuce)													
Linum lewisii (Lewis flax)													
Lomatium (desertparsley)													
Lotus utahensis (Utah bird's-foot trefoil)													
Machaeranthera canescens (hoary tansyaster)													
Packera multilobata (lobeleaf groundsel)													
Penstemon (beardtongue)													
Penstemon comarrhenus (dusty beardtongue)													
Phlox longifolia (longleaf phlox)													
Polygonum douglasii <sup>a</sup> (Douglas' knotweed)													
Trifolium gymnocarpon (hollyleaf clover)													
Zigadenus paniculatus (foothill deathcamas)													
year	Nested Frequency												
2011	2	1	-	20	30	-	4	-	1	6	6	4	18
2014	-	4	3	4	15	7	-	9	-	-	3	1	7
2018	0	-	1	-	4	-	-	-	-	-	-	-	31
year	Average Cover (%)												
2011	0.0	0.0	-	0.0	0.2	-	0.0	-	0.0	0.0	0.0	0.0	0.1
2014	-	0.0	0.0	0.0	0.1	0.0	-	0.1	-	-	0.0	0.0	0.1
2018	0.0	-	0.0	-	0.0	-	-	-	-	-	-	-	0.2

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

**Table 22R-24.12 - Shrub and Tree Species.** Average modified Daubenmire quadrat and line intercept cover by year.

SHRUB SPECIES											
Artemisia tridentata ssp. vaseyana <sup>p</sup> (mountain big sagebrush)											
Cercocarpus ledifolius <sup>p</sup> (curl-leaf mountain mahogany)											
Cercocarpus montanus <sup>p</sup> (alderleaf mountain mahogany)											
Chrysothamnus viscidiflorus ssp. viscidiflorus var. viscidiflorus (yellow rabbitbrush)											
Gutierrezia sarothrae (broom snakeweed)											
Juniperus osteosperma <sup>t</sup> (Utah juniper)											
Opuntia (pricklypear)											
Pediocactus simpsonii (mountain ball cactus)											
Pinus edulis <sup>t</sup> (twoneedle pinyon)											
Purshia tridentata <sup>p</sup> (antelope bitterbrush)											
Quercus gambelii <sup>p</sup> (Gambel oak)											
year	Line Intercept Cover (%)										
2011	11.2	0.1	0.5	0.2	-	11.5	0.1	-	17.9	4.5	9.5
2014	6.4	-	-	-	-	2	-	-	-	2.2	6.9
2018	12.2	0.1	1.1	0.5	0.1	1	-	-	1.4	4.4	11.5
year	Quadrat Cover (%)										
2011	11.6	0.0	0.8	0.0	-	7.9	0.0	-	5.8	3.5	6.2
2014	3.8	-	0.6	0.1	0.2	1.0	0.1	0.1	0.2	2.6	4.8
2018	10.6	0.9	1.0	0.0	1.1	1.1	0.0	-	0.0	2.2	6.7

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

**Table 22R-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 (%)				
<b>Artemisia tridentata ssp. vaseyana<sup>p</sup> -- (mountain big sagebrush)</b>									
2011	3880	40	6	39	55	37	5	31	57/77
2014	2980	60	13	69	17	63	10	15	45/59
2018	3660	120	11	84	6	8	2	16	45/60
<b>Cercocarpus ledifolius<sup>p</sup> -- (curl-leaf mountain mahogany)</b>									
2011	40	-	0	100	0	0	50	0	54/60
2014	-	-	-	-	-	-	-	-	42/61
2018	40	-	0	100	0	50	50	0	48/72

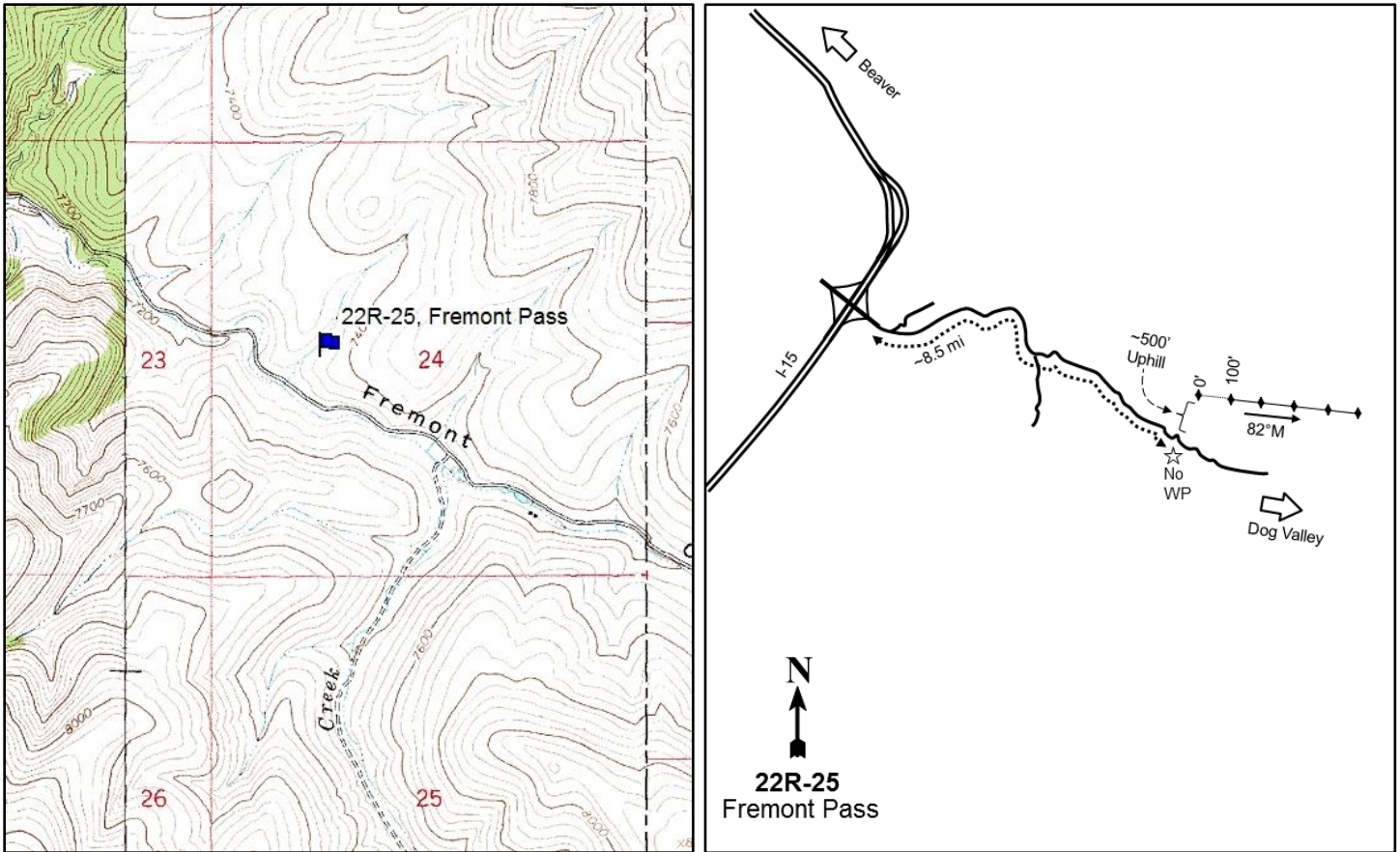
Year	Density		Age Class Distribution			Utilization		Poor Vigor (%)	Average Height Crown (cm)
	Plants Per Acre		Excluding Seedlings			Moderate (%)	Heavy (%)		
	Excluding Seedlings	Seedling	Young (%)	Mature (%)	Decadent (%)				
<b>Cercocarpus montanus<sup>p</sup> -- (alderleaf mountain mahogany)</b>									
2011	80	-	0	100	0	25	50	25	83/87
2014	60	-	0	100	0	33	0	0	58/74
2018	40	-	0	100	0	100	0	0	86/89
<b>Chrysothamnus viscidiflorus ssp. viscidiflorus var. viscidiflorus -- (yellow rabbitbrush)</b>									
2011	120	-	0	100	0	0	0	0	18/28
2014	60	-	67	33	0	33	0	0	22/37
2018	140	-	0	100	0	86	0	43	18/41
<b>Gutierrezia sarothrae -- (broom snakeweed)</b>									
2011	-	-	-	-	-	-	-	-	-/-
2014	100	-	0	100	0	0	0	0	18/42
2018	100	-	0	100	0	0	0	0	21/36
<b>Juniperus osteosperma<sup>i</sup> -- (Utah juniper)</b>									
2011	180	-	0	100	0	0	0	0	-/-
2014	80	-	75	25	0	25	0	50	-/-
2018	40	-	50	50	0	0	0	0	-/-
<b>Opuntia -- (pricklypear)</b>									
2011	200	-	0	80	20	0	0	20	15/34
2014	80	-	0	100	0	0	0	0	15/24
2018	20	-	0	100	0	0	0	0	13/34
<b>Pediocactus simpsonii -- (mountain ball cactus)</b>									
2011	20	-	0	100	0	0	0	0	8/8
2014	20	-	0	0	100	0	0	100	50/56
2018	-	-	-	-	-	-	-	-	-/-
<b>Pinus edulis<sup>t</sup> -- (twoneedle pinyon)</b>									
2011	240	60	50	33	17	0	0	0	-/-
2014	80	40	100	0	0	0	0	25	-/-
2018	120	-	50	50	0	0	0	17	-/-
<b>Purshia tridentata<sup>p</sup> -- (antelope bitterbrush)</b>									
2011	420	-	0	76	24	43	48	29	60/106
2014	560	-	4	93	4	25	54	18	50/96
2018	580	-	0	100	0	38	21	0	61/110
<b>Quercus gambelii<sup>p</sup> -- (Gambel oak)</b>									
2011	1340	-	24	70	6	24	2	6	84/87
2014	1180	120	25	75	0	39	3	0	67/69
2018	2080	20	18	82	0	0	0	0	90/86

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

**Table 22R-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' (%)	
<b>Juniperus osteosperma (Utah juniper)</b>							
2011	131	-	5	30	30	35	17.0
2014	52	-	87	13	-	-	4.0
2018	46	-	59	41	-	-	4.9
<b>Juniperus scopulorum (Rocky Mountain juniper)</b>							
2011	1	-	-	-	100	-	12.0
<b>Pinus edulis (twoneedle pinyon)</b>							
2011	228	10	20	20	10	40	9.9
2014	76	19	75	6	-	-	2.3
2018	95	30	60	5	5	-	3.3

## FREMONT PASS - STUDY NO. 22R-25



### Location Information

USGS 7.5 min Map Info  
GPS (0' Stake)

Fremont Pass NW; Township 31S, Range 6W, Section 24  
NAD 83 UTM ZONE 12, 369210 East 4217227 North

### Transect Information

Browse Tag # (0' Stake)	619
Transect Bearing	82° 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, Line 5: 98ft Long

### Directions to Site

From exit 100 on I-15, turn onto Fremont Road. Travel east on Fremont Road for 8.5 miles, then park on the side of the road; there is no witness post. The 0-foot stake is 500 feet north of and uphill from the road and is marked by browse tag #619.

**Site Information**

Land Ownership	Private
Land Administrator	Private
Allotment	FREMONT
Elevation	No data
Aspect	West
Slope	10-15%
Sample Dates	08/15/2018

**Table 22R-25.1 Disturbance History.** Recorded history of major disturbances.

Treatment/Disturbance	Name	WRI DB#	Date	Size (acres)
Hand Crew - Lop and Scatter	Little Bear Valley to Fremont Canyon Sagebrush Steppe Habitat Restoration (Proposed)	4402	Fall 2018	2284

**Wildlife Habitat and Vegetation History****Table 22R-25.3 - Wildlife Seasonal Habitat.** UDWR wildlife habitat and seasonality.

Species	Habitat	Season
Deer	crucial	winter
Elk	substantial	summer
Greater Sage Grouse		undefined & undefined

**Table 22R-25.4 - Vegetation History.** The dominant vegetation type(s) and phase of woodland succession (Tausch, Miller, Roundy, & Chambers, 2009).

Year	Vegetation Type	Woodland Succession
2018	Pinyon-Juniper/Black Sagebrush	Phase II transitioning to Phase III

**Site Notes**

No Notes

**Site Potential**

1981 - 2010 Average Annual Precipitation	18 inches
NRCS Ecological Site	Upland Stony Loam (Black Sagebrush)
NRCS Ecological Site #	R047XB332UT
States and Transitions	No state and transition model is available for this ecological site.

This study site was established in 2018 to monitor a lop and scatter treatment scheduled for later that year. When established, this study site was dominated by both two-needle pinyon (*Pinus edulis*) and Utah juniper (*Juniperus osteosperma*). A small amount of shrub cover was provided in the open areas by black sagebrush (*Artemisia nova*) and mountain big sagebrush (*A. tridentata* ssp. *vaseyana*) (Table 22R-25.12, Table 22R-25.13, Table 22R-25.14). The understory provided limited cover, being dominated by the perennial grass blue grama (*Bouteloua gracilis*) with other native species found in small amounts (Table 22R-25.6, Table 22R-25.10, Table 22R-25.13). Cheatgrass (*Bromus tectorum*) was observed in cover and frequency data, but in small amounts (Table 22R-25.10). Annual and perennial forb species were also present, but they contributed very little cover and frequency (Table 22R-25.11). If a tree-removing treatment or disturbance does not take place, the site will likely continue to remain dominated by pinyon and juniper.

**Trend Summary Tables**

**Table 22R-25.6 - Shrub/Tree Summary.** Average modified Daubenmire quadrat and line intercept cover by year for shrubs/trees

Year	Quadrat Cover (%)			Line-intercept Cover (%)		
	Preferred Shrub	Other Shrub	Tree	Preferred Shrub	Other Shrub	Tree
2018	1.0	0.4	17.2	0.7	0.4	34.5

**Table 22R-25.7 - Herbaceous Summary.** Nested frequency and average modified Daubenmire quadrat cover by year for herbaceous functional groups

Year	Nested Frequency				Quadrat Cover (%)			
	Annual Grass	Perennial Grass	Annual/Biennial Forb	Perennial Forb	Annual Grass	Perennial Grass	Annual/Biennial Forb	Perennial Forb
2018	35	207	37	67	0.1	6.9	0.2	0.3

**Table 22R-25.8 - 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
2018	24.4	0.5	38.2	8.0	31.2	26.1

**Table 22R-25.9 - Pellet Group Data.** Quadrat frequency and pellet group transect data for animal pellets. Rabbit pellet groups are not sampled in the pellet group transect.

Year	Cattle	Mule Deer	Rocky Mountain Elk	Rabbit
	Quadrat Frequency			
2018	-	6	1	20
Year	Days Use Per Acre (ha)			
2018	2.2 (5.4)	8.7 (21.5)	0.7 (1.7)	-

**Table 22R-25.10 - Grass Species.** Nested frequency and modified Daubenmire average cover by year.

GRASS SPECIES	Achnatherum hymenoides (Indian ricegrass)	Achnatherum lettermanii (Letterman's needlegrass)	Bouteloua gracilis (blue grama)	Bromus tectorum <sup>a</sup> (cheatgrass)	Carex (sedge)	Elymus elymoides (squirreltail)	Hesperostipa comata (needle and thread)	Pascopyrum smithii (western wheatgrass)	Poa fendleriana (muttongrass)	Poa secunda (Sandberg bluegrass)
year	Nested Frequency									
2018	4	1	123	35	10	9	4	3	74	4
year	Average Cover (%)									
2018	0.0	0.0	5.2	0.1	0.3	0.0	0.0	0.0	1.3	0.0

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

**Table 22R-25.11 - Forb Species.** Nested frequency and modified Daubenmire average cover by year.

FORB SPECIES	Nested Frequency																
year	Average Cover (%)																
Alyssum desertorum <sup>ai</sup> (desert madwort)	19	3	3	2	29	4	2	6	6	1	13	4	8	2	4	1	2
Arabis (rockcress)	0.1	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.1	0.0	0.1	0.0	0.0	0.0	0.0
Artemisia ludoviciana (white sagebrush)																	
Astragalus (milkvetch)																	
Chamaesyce (sandmat)																	
Collinsia parviflora <sup>a</sup> (maiden blue eyed Mary)																	
Erigeron eatonii (Eaton's fleabane)																	
Erigeron flagellaris (trailing fleabane)																	
Erigeron pumilus (shaggy fleabane)																	
Erysimum capitatum <sup>a</sup> (sanddune wallflower)																	
Microsteris gracilis <sup>a</sup> (slender phlox)																	
Packera multilobata (lobeleaf groundsel)																	
Penstemon (beardtongue)																	
Phlox longifolia (longleaf phlox)																	
Polygonum douglasii <sup>a</sup> (Douglas' knotweed)																	
Portulaca oleracea <sup>ai</sup> (little hogweed)																	
Taraxacum officinale (common dandelion)																	

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

**Table 22R-25.12 - Shrub and Tree Species.** Average modified Daubenmire quadrat and line intercept cover by year.

SHRUB SPECIES	Line Intercept Cover (%)									
year	Quadrat Cover (%)									
Artemisia nova <sup>p</sup> (black sagebrush)	0.4	0.1	-	0.4	9.4	-	25.1	0.2	-	
Artemisia tridentata ssp. vaseyana <sup>p</sup> (mountain big sagebrush)	0.4	0.4	0.0	0.4	4.5	0.0	12.7	0.1	0.0	
Cercocarpus ledifolius var. ledifolius <sup>p</sup> (curl-leaf mountain mahogany)										
Gutierrezia sarothrae (broom snakeweed)										
Juniperus osteosperma <sup>i</sup> (Utah juniper)										
Pediocactus simpsonii (mountain ball cactus)										
Pinus edulis <sup>i</sup> (twoneedle pinyon)										
Purshia tridentata <sup>p</sup> (antelope bitterbrush)										
Symphoricarpos oreophilus <sup>p</sup> (mountain snowberry)										

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



**Table 22R-25.13 - Shrub/Tree Characteristics.** Population characteristics of shrub/tree species populations including density reproduction (seedlings), age distribution, utilization, vigor and average size (height/crown) of plants.

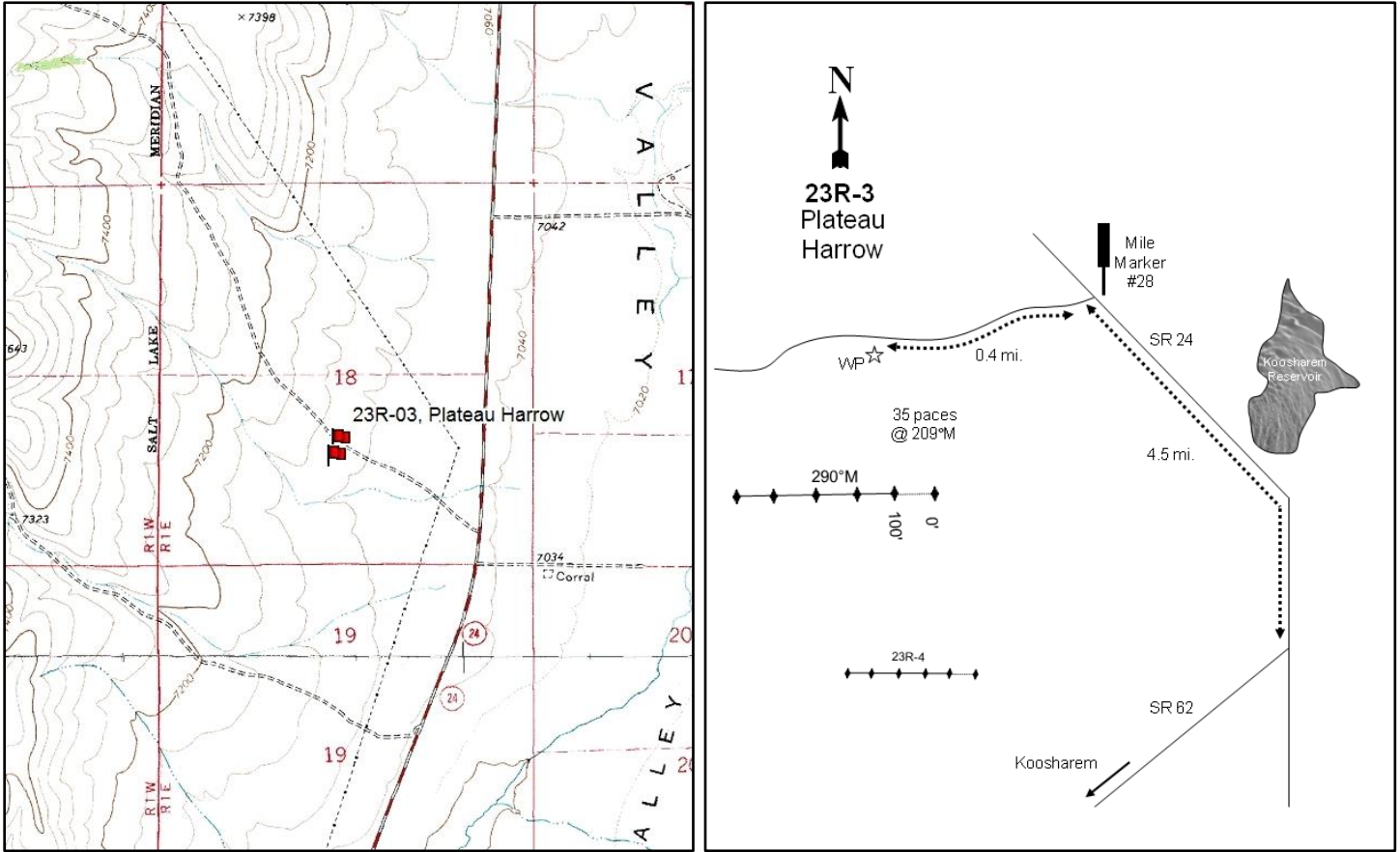
Year	Density		Age Class Distribution			Utilization		Poor Vigor (%)	Average Height Crown (cm)
	Plants Per Acre		Excluding Seedlings			Moderate (%)	Heavy (%)		
	Excluding Seedlings	Seedling	Young (%)	Mature (%)	Decadent (%)				
<b>Artemisia nova<sup>p</sup> -- (black sagebrush)</b>									
2018	320	20	13	38	50	13	0	50	27/38
<b>Artemisia tridentata ssp. vaseyana<sup>p</sup> -- (mountain big sagebrush)</b>									
2018	640	20	13	41	47	3	0	44	30/48
<b>Gutierrezia sarothrae -- (broom snakeweed)</b>									
2018	1300	-	5	88	8	0	0	6	15/14
<b>Juniperus osteosperma<sup>t</sup> -- (Utah juniper)</b>									
2018	100	20	40	60	0	0	0	0	- / -
<b>Opuntia -- (pricklypear)</b>									
2018	20	-	0	100	0	0	0	0	8/27
<b>Pediocactus simpsonii -- (mountain ball cactus)</b>									
2018	20	-	0	100	0	0	0	0	3/6
<b>Pinus edulis<sup>t</sup> -- (twoneedle pinyon)</b>									
2018	120	40	50	50	0	0	0	0	- / -
<b>Purshia tridentata<sup>p</sup> -- (antelope bitterbrush)</b>									
2018	60	-	0	100	0	0	67	0	40/78
<b>Symphoricarpos oreophilus<sup>p</sup> -- (mountain snowberry)</b>									
2018	40	-	0	100	0	0	0	0	21/26

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

**Table 22R-25.14 - Tree Characteristics.** Point-quarter tree density, size class distribution, and average diameter.

Year	Density	Size Class Distribution					Average Diameter (cm)
	Trees per Acre	Seedling (%)	1-4' (%)	4-8' (%)	8-12' (%)	>12' (%)	
<b>Juniperus osteosperma (Utah juniper)</b>							
2018	50	5	16	16	16	47	32.5
<b>Pinus edulis (twoneedle pinyon)</b>							
2018	77	28	33	11	11	17	6.1

## PLATEAU HARROW - STUDY NO. 23R-3



### Location Information

USGS 7.5 min Map Info  
GPS (0' Stake)

Boobe Hole Reservoir; Township 25S, Range 1E, Section 18  
NAD 83 UTM ZONE 12, 426873 East 4276341 North

### Transect Information

Browse Tag # (0' Stake)	447
Transect Bearing	293° 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

Start at the intersection of SR-62 and SR-24 in Koosharem. Drive north on SR-24 for 4.5 miles to mile marker 28. Near mile marker 28, turn left onto a road going west. Travel 0.4 mile to a witness post on the left (south) side of the road. From the witness post, walk 35 paces at 209 degrees magnetic to the 0-foot stake which is marked with browse tag #447.

**Site Information**

Land Ownership	Federal
Land Administrator	BLM
Allotment	PLATEAU
Elevation	7,100ft (2,164m)
Aspect	East
Slope	2-5%
Sample Dates	08/03/1999, 08/21/2003, 08/20/2008, 08/08/2012, 07/30/2018

**Table 23R-03.1 Disturbance History.** Recorded history of major disturbances.

Treatment/Disturbance	Name	WRI DB#	Date	Size (acres)
Harrow - Two-Way Dixie	-	-	1999	-
Seeding - Unknown	-	-	1999	-
Chaining - Two-Way Unknown	Plateau Brush Control #2	LTDL	July-October 1966	1200

**Wildlife Habitat and Vegetation History****Table 23R-03.3 - 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-03.4 - Vegetation History.** The dominant vegetation type(s) and phase of woodland succession (Tausch, Miller, Roundy, & Chambers, 2009).

Year	Vegetation Type	Woodland Succession
1999	Perennial Grass/Annual Grass	No Encroachment
2003	Perennial Grass	No Encroachment
2008	Mountain Big Sagebrush/Perennial Grass	No Encroachment
2012	Mountain Big Sagebrush/Perennial Grass	No Encroachment
2018	Mountain Big Sagebrush/Perennial Grass	No Encroachment

**Site Notes**

It was noted in 2012 that a salt lick was located near the end of the transect.

**Soils****Table 23R-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	7.1	63.6	19.8	16.6	1.6	10.8	198.4	0.5	08/03/1999

**Site Potential**

1981 - 2010 Average Annual Precipitation	13 inches
NRCS Ecological Site	Upland Loam (Mountain Big Sagebrush-Indian Ricegrass)
NRCS Ecological Site #	R047XB308UT
States and Transitions	No state and transition model is available for this ecological site.

This site has transitioned through time from a perennial/annual grass dominated state to a mountain big sagebrush and perennial grass dominated state. This site was established after a harrow treatment was conducted to improve the sagebrush stand. The understory has been dominated by perennial grasses, primarily needle and thread (*Hesperostipa comata*), since 2003 (Table 23R-03.7, Table 23R-03.10). In 1999, cheatgrass (*Bromus tectorum*) provided moderate cover but has not contributed significant cover in any subsequent samplings (Table 23R-03.10). Perennial forb cover was high in the initial sample years but has decreased steadily over time; the dominant perennial forbs are western stoneseed (*Lithospermum ruderales*) and Utah bird's-foot trefoil (*Lotus utahensis*) as of 2018 (Table 23R-03.7, Table 23R-03.11). Mountain big sagebrush (*Artemisia tridentata* ssp. *vaseyana*) has generally increased in cover and became a co-dominant component of the site in 2008, while other browse species are present in very small amounts (Table 23R-03.6, Table 23R-03.12, Table 23R-03.13). Pellet data has exhibited an increase and cattle presence was high in 2012 and 2018 (Table 23R-03.9).

**Trend Summary Tables****Table 23R-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
1999	3.7	-	-	-	-	-
2003	4.6	0.0	-	5.0	0.1	-
2008	7.1	0.0	-	9.1	0.5	-
2012	9.9	0.0	-	10.9	0.4	-
2018	8.6	0.1	-	10.8	0.5	-

**Table 23R-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
1999	389	193	237	138	8.6	8.2	1.5	9.7
2003	126	305	-	74	1.4	21.8	-	8.1
2008	282	304	129	97	1.5	16.3	0.3	5.1
2012	68	325	212	125	1.0	21.2	0.4	1.6
2018	186	346	155	65	2.9	24.1	0.6	0.9

**Table 23R-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
1999	22.3	0.0	28.9	15.6	0.6	35.4
2003	10.4	-	40.9	20.5	1.2	35.0
2008	19.7	0.0	51.2	9.6	0.2	34.2
2012	11.9	0.5	46.0	23.3	1.2	34.4
2018	24.1	0.0	38.9	24.1	1.2	32.9

**Table 23R-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/Pronghorn	Rocky Mountain Elk	Rabbit
	Quadrat Frequency			
1999	-	-	1	12
2003	-	-	1	84
2008	14	1	-	60
2012	14	1	-	20
2018	21	-	1	54
Year	Days Use Per Acre (ha)			
1999	-	-	-	-
2003	-	4.0 (9.9)	2.7 (6.6)	-
2008	21.1 (52.0)	4.0 (9.9)	-	-
2012	47.9 (118.4)	10.7 (26.5)	0.7 (1.7)	-
2018	57.4 (141.7)	-	-	-

**Table 23R-03.10 - Grass Species.** Nested frequency and modified Daubenmire average cover by year.

GRASS SPECIES	Achnatherum hymenoides (Indian ricegrass)	Achnatherum lettermanii (Letterman's needlegrass)	Achnatherum nelsonii (Columbia needlegrass)	Bromus tectorum <sup>ai</sup> (cheatgrass)	Carex (sedge)	Elymus elymoides (squirreltail)	Hesperostipa comata (needle and thread)	Pseudoroegneria spicata (bluebunch wheatgrass)
year	Nested Frequency							
1999	6	-	-	389	-	8	165	35
2003	13	22	-	126	-	26	276	11
2008	12	25	4	282	3	13	286	4
2012	19	4	7	68	18	-	309	1
2018	3	5	-	186	-	8	343	1
year	Average Cover (%)							
1999	0.3	-	-	8.6	-	0.0	7.0	0.9
2003	1.1	0.4	-	1.4	-	0.5	19.2	0.5
2008	0.6	0.3	0.1	1.5	0.0	0.1	14.9	0.2
2012	0.3	0.1	0.2	1.0	0.2	-	20.3	0.0
2018	0.1	0.2	-	2.9	-	0.2	23.6	0.0

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

**Table 23R-03.11 - Forb Species.** Nested frequency and modified Daubenmire average cover by year.

FORB SPECIES	Alyssum desertorum <sup>ai</sup> (desert madwort)	Astragalus (milkvetch)	Astragalus convallarius (lesser rushy milkvetch)	Astragalus lentiginosus (freckled milkvetch)	Astragalus purshii (woollypod milkvetch)	Ceratocephala testiculata <sup>ai</sup> (curvseed butterwort)	Cryptantha (cryptantha)	Descurainia pinnata <sup>a</sup> (western tansymustard)	Eriogonum racemosum (redroot buckwheat)	Eriogonum umbellatum (sulphur-flower buckwheat)	Gayophytum ramosissimum <sup>a</sup> (pinyon groundsmoke)	Ipomopsis aggregata (scarlet gilia)	Linum lewisii (Lewis flax)	Lithospermum ruderale (western stone seed)	Lotus utahensis (Utah bird's-foot trefoil)	Lupinus argenteus (silvery lupine)	Medicago sativa <sup>a</sup> (alfalfa)
year	Nested Frequency																
1999	237	-	6	-	-	-	5	-	14	3	-	1	3	43	61	23	7
2003	-	-	3	-	-	-	0	-	12	-	-	-	-	41	5	15	-
2008	129	1	9	-	1	-	9	-	16	-	-	1	0	46	5	10	-
2012	209	-	-	-	3	-	17	6	13	1	-	-	1	12	43	6	3
2018	142	2	2	3	2	15	0	2	12	-	1	-	1	13	18	6	-
year	Average Cover (%)																
1999	1.5	-	0.0	-	-	-	0.2	-	0.2	0.0	-	0.0	0.0	3.4	1.3	4.4	0.0
2003	-	-	0.1	-	-	-	0.0	-	0.1	-	-	-	-	4.5	0.2	3.1	-
2008	0.3	0.0	0.2	-	0.0	-	0.1	-	0.1	-	-	0.0	0.0	3.1	0.0	1.5	-
2012	0.4	-	-	-	0.0	-	0.1	0.0	0.1	0.0	-	-	0.0	0.1	0.3	0.6	0.0
2018	0.5	0.0	0.0	0.0	0.0	0.1	0.0	0.0	0.1	-	0.0	-	0.0	0.3	0.3	0.0	-

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

FORB SPECIES											
Melilotus officinalis <sup>i</sup> (sweetclover)											
Oenothera pallida ssp. pallida (pale evening primrose)											
Onobrychis vicifolia <sup>i</sup> (sainfoin)											
Penstemon comarrhenus (dusty beardtongue)											
Phlox longifolia (longleaf phlox)											
Polygonum douglasii <sup>a</sup> (Douglas' knotweed)											
Sanguisorba minor <sup>i</sup> (small burnet)											
Sphaeralcea grossularifolia (gooseberry/leaf globemallow)											
Streptanthus cordatus (heartleaf twistflower)											
Tragopogon dubius <sup>at</sup> (yellow salsify)											
Trifolium (clover)											
year	Nested Frequency										
1999	1	-	11	-	-	-	9	1	-	3	-
2003	-	-	-	-	3	-	-	-	2	-	-
2008	1	-	-	-	3	-	-	0	3	-	-
2012	-	25	-	-	13	2	-	1	-	-	1
2018	-	-	-	5	-	-	-	2	-	-	-
year	Average Cover (%)										
1999	0.0	-	0.0	-	-	-	0.1	0.0	-	0.0	-
2003	-	-	-	-	0.0	-	-	-	0.0	-	-
2008	0.0	-	-	-	0.0	-	-	0.0	0.0	-	-
2012	-	0.4	-	-	0.0	0.0	-	0.0	-	-	0.0
2018	-	-	-	0.0	-	-	-	0.0	-	-	-

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

**Table 23R-03.12 - Shrub and Tree Species.** Average modified Daubenmire quadrat and line intercept cover by year.

SHRUB SPECIES			
Artemisia tridentata ssp. vaseyana <sup>p</sup> (mountain big sagebrush)			
Linanthus pungens (granite prickly phlox)			
Opuntia (pricklypear)			
year	Line Intercept Cover (%)		
1999	-	-	-
2003	5	-	0.1
2008	9.1	0.1	0.4
2012	10.9	0	0.4
2018	10.8	-	0.5
year	Quadrat Cover (%)		
1999	3.7	-	-
2003	4.6	-	0.0
2008	7.1	0.0	0.0
2012	9.9	0.0	0.0
2018	8.6	-	0.1

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

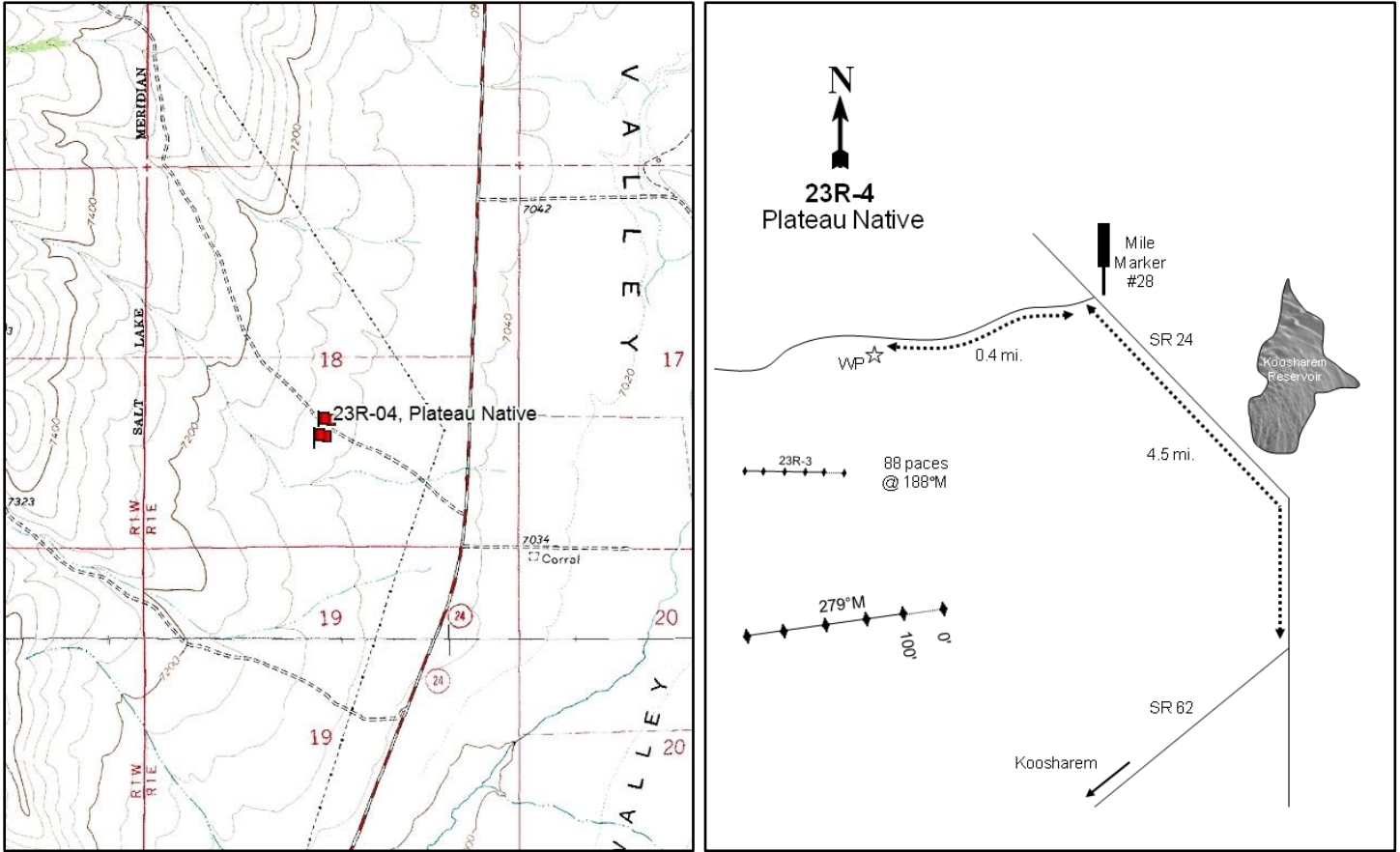
**Table 23R-03.13 - Shrub/Tree Characteristics.** Population characteristics of shrub/tree species populations including density reproduction (seedlings), age distribution, utilization, vigor and average size (height/crown) of plants.

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 (%)				
<b>Amelanchier utahensis<sup>P</sup> -- (Utah serviceberry)</b>									
1999	-	-	-	-	-	-	-	-	-/-
2003	-	-	-	-	-	-	-	-	24/31
2008	-	-	-	-	-	-	-	-	43/55
2012	-	-	-	-	-	-	-	-	47/43
2018	-	-	-	-	-	-	-	-	-/-
<b>Artemisia tridentata ssp. vaseyana<sup>P</sup> -- (mountain big sagebrush)</b>									
1999	840	-	5	88	7	7	0	5	53/83
2003	700	20	9	74	17	6	0	9	61/84
2008	840	-	5	64	31	41	0	24	61/104
2012	1380	440	42	55	3	19	14	3	62/111
2018	960	20	13	67	21	2	0	13	65/96
<b>Linanthus pungens -- (granite prickly phlox)</b>									
1999	-	-	-	-	-	-	-	-	-/-
2003	20	-	0	100	0	0	0	0	14/23
2008	40	-	0	50	50	0	0	0	20/34
2012	100	-	0	100	0	0	60	20	9/22
2018	20	-	0	100	0	0	0	0	7/13
<b>Opuntia -- (pricklypear)</b>									
1999	80	-	50	25	25	0	0	25	10/33
2003	100	-	0	100	0	0	0	0	12/31
2008	220	-	0	91	9	0	0	9	10/35
2012	160	60	0	88	13	0	0	25	12/34
2018	180	-	11	89	0	0	0	11	12/44
<b>Symphoricarpos oreophilus<sup>P</sup> -- (mountain snowberry)</b>									
1999	-	-	-	-	-	-	-	-	-/-
2003	-	-	-	-	-	-	-	-	44/62
2008	-	-	-	-	-	-	-	-	54/129
2012	-	-	-	-	-	-	-	-	44/93
2018	-	-	-	-	-	-	-	-	35/59

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



## PLATEAU NATIVE - STUDY NO. 23R-4



### Location Information

USGS 7.5 min Map Info  
GPS (0' Stake)

Boobe Hole Reservoir; Township 25S, Range 1E, Section 18  
NAD 83 UTM ZONE 12, 426856 East 4276267 North

### Transect Information

Browse Tag # (0' Stake)	448
Transect Bearing	279° 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

Start at the intersection of SR-62 and SR-24 in Koosharem. Drive north on SR-24 for 4.5 miles to mile marker 28. Near mile marker 28, turn left onto a road going west. Travel 0.4 mile to the witness on the left (south) side of the road. From the witness post, walk 88 paces at 188 degrees magnetic to the 0-foot stake which is marked by browse tag #448.

**Site Information**

Land Ownership	Federal
Land Administrator	BLM
Allotment	PLATEAU
Elevation	7,090ft (2,161m)
Aspect	East
Slope	2-5%
Sample Dates	08/03/1999, 08/21/2003, 08/08/2012, 07/30/2018

**Table 23R-04.1 Disturbance History.** Recorded history of major disturbances.

Treatment/Disturbance	Name	WRI DB#	Date	Size (acres)
Chaining - Two-Way Unknown	Plateau Brush Control #2	LTDL	July-October 1966	1200

**Wildlife Habitat and Vegetation History****Table 23R-04.3 - 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-04.4 - Vegetation History.** The dominant vegetation type(s) and phase of woodland succession (Tausch, Miller, Roundy, & Chambers, 2009).

Year	Vegetation Type	Woodland Succession
1999	Mountain Big Sagebrush	No Encroachment
2003	Mountain Big Sagebrush	No Encroachment
2012	Mountain Big Sagebrush	No Encroachment
2018	Mountain Big Sagebrush	No Encroachment

**Site Notes**

No Notes

**Site Potential**

1981 - 2010 Average Annual Precipitation	13 inches
NRCS Ecological Site	Upland Loam (Mountain Big Sagebrush-Indian Ricegrass)
NRCS Ecological Site #	R047XB308UT
States and Transitions	No state and transition model is available for this ecological site.

Mountain big sagebrush (*Artemisia tridentata* ssp. *vaseyana*) has dominated this site since study establishment in 1999. Other browse species such as slender buckwheat (*Eriogonum microthecum*) and mountain snowberry (*Symphoricarpos oreophilus*) have also been present, but as minimal components of the shrub layer (Table 23R-04.6, Table 23R-04.12, Table 23R-04.13). Perennial grass cover has exhibited a slight increase over time, with most of the cover provided by needle and thread (*Hesperostipa comata*) (Table 23R-04.7, Table 23R-04.10). Other perennial native grass species have been present, but have contributed little cover in comparison. Perennial forbs have remained moderately diverse, with cover data displaying a decreasing trend over the sample years; the dominant perennial forb species is western stoneseed (*Lithospermum ruderale*) as of 2018 (Table 23R-04.11). This site will likely remain in the current ecological state provided that a disturbance does not take place.

**Trend Summary Tables****Table 23R-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
1999	16.8	0.2	-	-	-	-
2003	22.0	0.1	-	23.5	-	-
2012	20.9	0.2	-	28.8	0.2	-
2018	19.0	0.2	-	28.9	-	-

**Table 23R-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
1999	248	221	368	169	2.7	7.8	1.9	5.2
2003	81	211	5	149	0.6	8.9	0.0	5.8
2012	169	211	237	185	3.0	8.4	0.7	3.5
2018	240	230	154	101	7.8	10.5	0.3	1.4

**Table 23R-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
1999	20.2	4.0	22.7	29.9	0.6	30.8
2003	10.0	0.9	30.3	39.6	0.9	33.3
2012	16.2	2.1	40.2	29.4	0.1	35.3
2018	31.7	2.2	43.7	20.5	0.7	31.6

**Table 23R-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	Rocky Mountain Elk	Rabbit
	Quadrat Frequency			
1999	-	2	5	35
2003	-	-	-	86
2012	5	2	-	15
2018	1	-	-	63
Year	Days Use Per Acre (ha)			
1999	-	-	-	-
2003	-	-	-	-
2012	2.2 (5.4)	2.0 (5.0)	0.7 (1.7)	-
2018	9.4 (23.3)	1.3 (3.3)	-	-

**Table 23R-04.10 - Grass Species.** Nested frequency and modified Daubenmire average cover by year.

GRASS SPECIES	Achnatherum hymenoides (Indian ricegrass)	Achnatherum lettermanii (Letterman's needlegrass)	Bromus tectorum <sup>ai</sup> (cheatgrass)	Carex (sedge)	Dactylis glomerata <sup>i</sup> (orchardgrass)	Elymus elymoides (squirreltail)	Hesperostipa comata (needle and thread)	Poa secunda (Sandberg bluegrass)	Pseudoroegneria spicata (bluebunch wheatgrass)
year	Nested Frequency								
1999	32	-	248	-	-	2	165	2	63
2003	17	27	81	-	-	54	153	8	22
2012	11	-	169	3	2	2	185	-	24
2018	10	12	240	-	2	31	200	-	11
year	Average Cover (%)								
1999	0.9	-	2.7	-	-	0.0	5.6	0.0	1.3
2003	0.5	0.4	0.6	-	-	1.2	6.2	0.2	0.5
2012	0.5	-	3.0	0.0	0.0	0.0	6.8	-	1.0
2018	0.3	0.3	7.8	-	0.0	0.8	8.4	-	0.6

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

**Table 23R-04.11 - Forb Species.** Nested frequency and modified Daubenmire average cover by year.

FORB SPECIES	Agoseris glauca (pale agoseris)	Allium (onion)	Alyssum desertorum <sup>ai</sup> (desert madwort)	Arabis (rockcress)	Astragalus convallarius (lesser rushy milkvetch)	Astragalus utahensis (Utah milkvetch)	Chaenactis douglasii (Douglas' dustymaiden)	Cirsium (thistle)	Cryptantha (cryptantha)	Descurainia pinnata <sup>a</sup> (western tansymustard)	Eriogonum racemosum (redroot buckwheat)	Linum lewisii (Lewis flax)	Lithospermum ruderale (western stoneseed)	Lotus utahensis (Utah bird's-foot trefoil)	Lupinus argenteus (silvery lupine)	Medicago sativa <sup>i</sup> (alfalfa)	Melilotus officinalis <sup>i</sup> (sweetclover)
year	Nested Frequency																
1999	2	-	368	9	7	-	-	-	-	-	44	4	69	54	22	-	-
2003	-	-	5	-	31	-	-	-	13	-	35	-	56	16	19	-	-
2012	3	-	234	-	7	3	-	3	30	8	47	17	20	66	16	3	3
2018	-	0	154	1	4	-	1	3	1	-	26	-	34	11	11	-	-
year	Average Cover (%)																
1999	0.0	-	1.9	0.0	0.0	-	-	-	-	-	0.4	0.0	2.8	0.7	1.2	-	-
2003	-	-	0.0	-	0.4	-	-	-	0.1	-	0.3	-	3.5	0.1	1.3	-	-
2012	0.0	-	0.6	-	0.1	0.0	-	0.0	0.6	0.0	0.8	0.1	0.5	0.8	0.4	0.1	0.0
2018	-	0.0	0.3	0.0	0.0	-	0.0	0.1	0.0	-	0.1	-	0.8	0.1	0.1	-	-

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

FORB SPECIES								
Oenothera pallida ssp. pallida (pale evening primrose)								
Penstemon comarrhenus (dusty beardtongue)								
Phlox longifolia (longleaf phlox)								
Polygonum douglasii <sup>a</sup> (Douglas' knotweed)								
Sphaeralcea grossulariifolia (gooseberryleaf globemallow)								
Streptanthus cordatus (heartleaf twistflower)								
Tragopogon dubius <sup>at</sup> (yellow salsify)								
Trifolium (clover)								
year	Nested Frequency							
1999	-	5	-	-	-	2	0	-
2003	-	-	8	-	-	-	-	3
2012	3	-	24	1	3	6	3	-
2018	-	10	-	1	3	8	-	-
year	Average Cover (%)							
1999	-	0.0	-	-	-	0.0	0.0	-
2003	-	-	0.0	-	-	-	-	0.0
2012	0.0	-	0.1	0.0	0.0	0.0	0.0	-
2018	-	0.1	-	0.0	0.0	0.1	-	-

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

**Table 23R-04.12 - Shrub and Tree Species.** Average modified Daubenmire quadrat and line intercept cover by year.

SHRUB SPECIES				
Artemisia tridentata ssp. vaseyana <sup>p</sup> (mountain big sagebrush)				
Linanthus pungens (granite prickly phlox)				
Opuntia (pricklypear)				
Symphoricarpos oreophilus <sup>p</sup> (mountain snowberry)				
year	Line Intercept Cover (%)			
1999	-	-	-	-
2003	23.5	-	-	-
2012	28.8	0.2	-	-
2018	28.9	-	-	-
year	Quadrat Cover (%)			
1999	16.8	0.2	-	-
2003	22.0	0.1	-	-
2012	20.8	0.2	0.0	0.1
2018	19.0	0.2	0.0	-

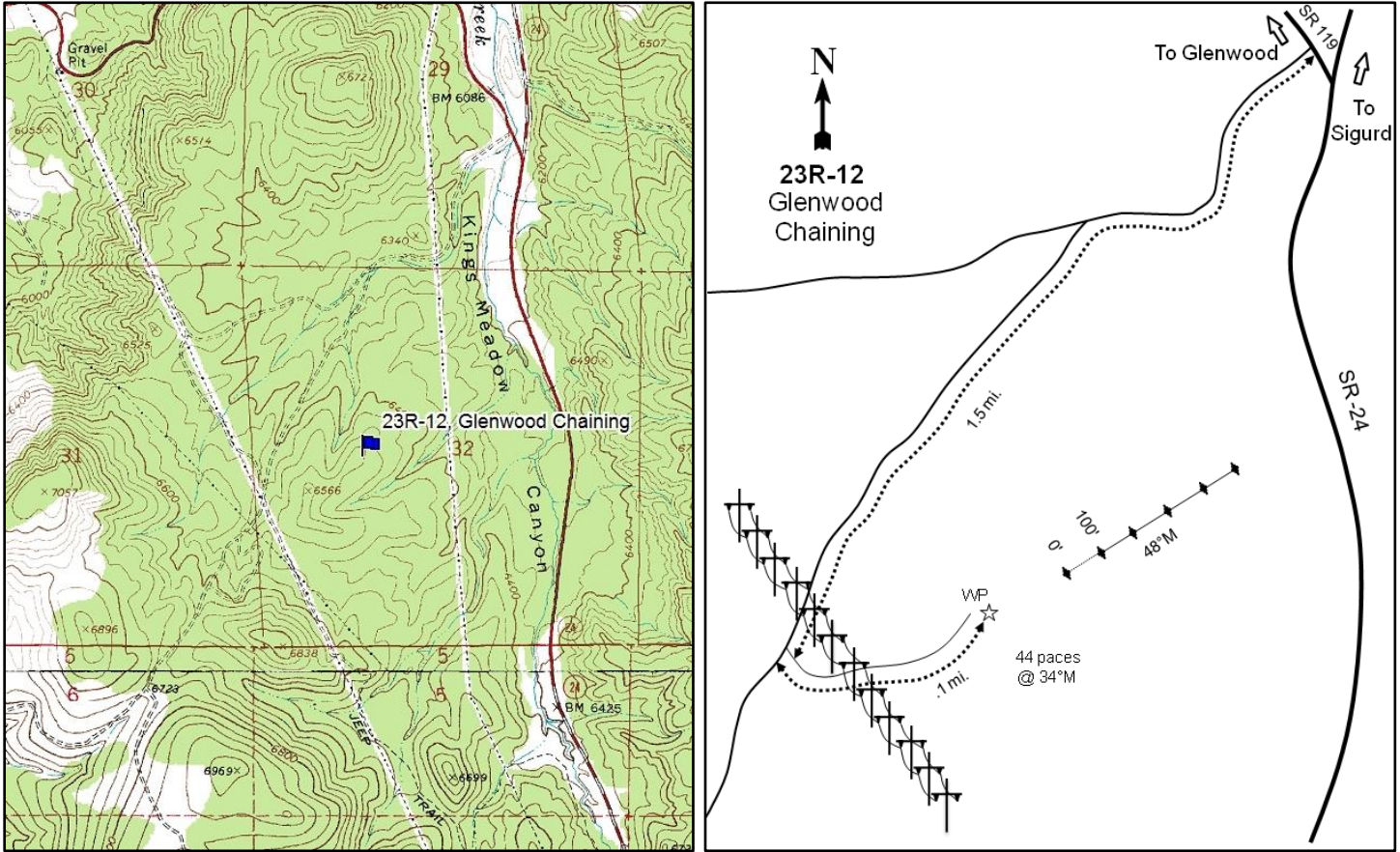
t - Tree Species; p - Preferred Browse; i - Introduced Species

**Table 23R-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 (%)				
<b>Artemisia tridentata ssp. vaseyana<sup>P</sup> -- (mountain big sagebrush)</b>									
1999	1920	-	5	74	21	40	29	15	88/131
2003	2000	-	0	73	27	30	1	9	95/126
2012	2360	220	19	64	17	28	46	37	90/139
2018	2200	-	0	76	25	16	0	10	88/120
<b>Eriogonum microthecum<sup>P</sup> -- (slender buckwheat)</b>									
1999	-	-	-	-	-	-	-	-	-/-
2003	-	-	-	-	-	-	-	-	-/-
2012	-	-	-	-	-	-	-	-	15/26
2018	-	-	-	-	-	-	-	-	14/17
<b>Linanthus pungens -- (granite prickly phlox)</b>									
1999	140	-	0	100	0	0	0	0	15/28
2003	140	-	0	100	0	0	43	0	11/15
2012	220	-	0	91	9	9	18	18	11/29
2018	220	-	0	91	9	18	27	55	10/18
<b>Opuntia -- (pricklypear)</b>									
1999	20	-	0	100	0	0	0	0	7/40
2003	120	-	0	100	0	0	0	0	12/28
2012	100	-	0	100	0	0	0	0	12/45
2018	60	-	0	100	0	0	0	0	11/25
<b>Symphoricarpos oreophilus<sup>P</sup> -- (mountain snowberry)</b>									
1999	-	-	-	-	-	-	-	-	-/-
2003	-	-	-	-	-	-	-	-	-/-
2012	20	-	0	100	0	100	0	0	11/13

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

## GLENWOOD CHAINING - STUDY NO. 23R-12



### Location Information

USGS 7.5 min Map Info  
GPS (0' Stake)

Sigurd SE; Township 23S, Range 1W, Section 32  
NAD 83 UTM ZONE 12, 418699 East 4290353 North

### Transect Information

Browse Tag # (0' Stake)	Not Available
Transect Bearing	50° 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 SR-24 and SR-119, turn onto the dirt road heading southwest and travel 1.5 miles. Just past the powerpoles turn left, traveling east up to the top of a hill. Continue for 0.1 miles and park on the top of the hill near a witness post on the left (east) side of the road. The 0-foot stake is 44 paces at 35 degrees magnetic from the witness post; there is no browse tag.



**Site Information**

Land Ownership	State
Land Administrator	SITLA
Allotment	NORTH COVE MOUNTAIN
Elevation	6,449ft (1,966m)
Aspect	Northeast
Slope	10-15%
Sample Dates	07/14/2011, 08/20/2014, 07/30/2018

**Table 23R-12.1 Disturbance History.** Recorded history of major disturbances.

Treatment/Disturbance	Name	WRI DB#	Date	Size (acres)
Hand Crew - Lop and Scatter	Central Utah Chaining Maintenance Project Phase I (Proposed)	4582	2019	4776
Chaining - Two-Way Ely	Glenwood Habitat Enhancement	1941	November 2011	303
Seeding - Aerial Before	Glenwood Habitat Enhancement	1941	November 2011	303
Seeding - Dribbler	Glenwood Habitat Enhancement	1941	November 2011	303
Seeding - Aerial After	Glenwood Habitat Enhancement	1941	February 2012	303

**Table 23R-12.2 Seed Mix.** List of known seeded plant species and rates (if available).

Mix Name			Application Type	Application Date	Acres
Glenwood Habitat Enhancement - Chaining			Aerial	Nov 2011	317
Type	Species	Common Name	Cultivar/Source ID	Bulk lbs/acre	PLS
G	Achnatherum hymenoides	Indian Ricegrass	Rimrock	1.26	1.20
G	Agropyron cristatum	Crested Wheatgrass	Ephraim	1.74	1.67
G	Hesperostipa comata	Needle and Threadgrass	Beaver UT	0.47	0.37
G	Poa secunda	Sandberg Bluegrass	Mountain Home	0.47	0.42
G	Psathyrostachys juncea	Russian Wildrye		0.95	0.74
G	Pseudoroegneria spicata	Bluebunch Wheatgrass	P-7	1.26	1.09
G	Thinopyrum intermedium	Pubescent Wheatgrass	Luna	0.95	0.77
F	Helianthus annuus	Annual Sunflower		0.03	0.03
F	Helianthus annuus	Annual Sunflower		0.95	0.90
F	Linum perenne	Blue Flax	Appar	0.95	0.84
F	Medicago sativa	Alfalfa	Nomad	0.95	0.85
F	Melilotus officinalis	Yellow Sweetclover		0.95	0.89
F	Penstemon palmeri	Palmer Penstemon	Lincoln NV	0.24	0.21
F	Sanguisorba minor	Small Burnet	Delar	2.21	2.04
Mix Name			Application Type	Application Date	Acres
Glenwood Habitat Enhancement Chaining- Dribbler Mix			Dribbler	Nov 2011	210
Type	Species	Common Name	Cultivar/Source ID	Bulk lbs/acre	PLS
F	Sanguisorba minor	Small Burnet	Delar	0.48	0.44
S	Purshia tridentata	Bitterbrush	Elko NV	0.36	0.30
Mix Name			Application Type	Application Date	Acres
Glenwood Habitat Enhancement - Browse 3			Aerial	Feb 2012	500
Type	Species	Common Name	Cultivar/Source ID	Bulk lbs/acre	PLS
F	Sanguisorba minor	Small Burnet	Delar	1.00	0.92
S	Artemisia tridentata ssp. wyomingensis	Wyoming Big Sagebrush	Sevier UT	0.50	0.08
S	Bassia prostrata	Forage Kochia	Beaver UT	0.50	0.29

**Wildlife Habitat and Vegetation History****Table 23R-12.3 - Wildlife Seasonal Habitat.** UDWR wildlife habitat and seasonality.

Species	Habitat	Season
Deer	crucial	winter
Elk	substantial	winter

**Table 23R-12.4 - 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 II transitioning to Phase III
2014	Annual Grass	Phase I
2018	Perennial Grass	Phase I

**Site Notes**

No Notes

**Site Potential**

1981 - 2010 Average Annual Precipitation	11 inches
NRCS Ecological Site	Upland Loam (Mountain Big Sagebrush-Indian Ricegrass)
NRCS Ecological Site #	R047XB308UT
States and Transitions	No state and transition model is available for this ecological site.

When established in 2011, this study site was considered to be within Phase II transitioning to Phase III of woodland succession and encroached by twoneedle pinyon (*Pinus edulis*) and Utah juniper (*Juniperus osteosperma*); almost no other browse species were present in the understory. Tree cover decreased following treatment (Table 23R-12.1), but browse species have remained rare (Photos, Table 23R-12.12, Table 23R-12.13). The herbaceous understory was very sparse prior to the chaining project. While grasses and forbs increased in cover during the first post-treatment sampling, the annual grass cheatgrass (*Bromus tectorum*) increased substantially and was the dominant cover type in 2014. However, annual grass cover decreased while perennial grasses increased and became the dominant vegetation component in 2018 (Table 23R-12.7, Table 23R-12.10). Pinyon and juniper trees have maintained a presence in all post-treatment sample years, indicating that there may be potential for future infilling (Table 23R-12.14).

**Trend Summary Tables****Table 23R-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
2011	0.4	0.1	10.5	-	-	26.8
2014	0.2	0.4	-	0.1	-	-
2018	0.8	0.2	0.2	0.1	0.1	-

**Table 23R-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
2011	150	41	137	12	1.2	0.2	0.8	0.1
2014	319	181	24	74	11.1	5.5	0.1	1.9
2018	96	279	5	39	1.3	20.1	0.1	1.0

**Table 23R-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
2011	12.8	0.4	24.4	41.6	19.1	12.6
2014	10.7	0.1	48.4	14.9	15.6	18.8
2018	20.3	0.2	47.4	15.7	16.9	23.9

**Table 23R-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	Rabbit
	Quadrat Frequency				
2011	1	-	3	1	11
2014	-	-	18	1	38
2018	-	-	5	1	54
Year	Days Use Per Acre (ha)				
2011	-	-	2.7 (6.6)	2.0 (5.0)	-
2014	-	-	17.4 (43.0)	3.4 (8.3)	-
2018	-	8.7 (21.5)*	6.7 (16.6)	2.0 (5.0)	-

\*Pellets per acre (ha)

**Table 23R-12.10 - Grass Species.** Nested frequency and modified Daubenmire average cover by year.

GRASS SPECIES	Achnatherum hymenoides (Indian ricegrass)	Agropyron cristatum <sup>i</sup> (crested wheatgrass)	Bromus tectorum <sup>ai</sup> (cheatgrass)	Elymus elymoides (squirreltail)	Poa fendleriana (muttongrass)	Poa secunda (Sandberg bluegrass)	Psathyrostachys juncea <sup>i</sup> (Russian wildrye)	Pseudoroegneria spicata (bluebunch wheatgrass)	Thinopyrum intermedium <sup>i</sup> (intermediate wheatgrass)
year	Nested Frequency								
2011	1	-	150	34	5	1	-	-	-
2014	19	58	319	71	-	-	-	49	31
2018	7	126	96	84	-	3	2	70	101
year	Average Cover (%)								
2011	0.0	-	1.2	0.2	0.0	0.0	-	-	-
2014	0.2	1.7	11.1	2.0	-	-	-	1.0	0.6
2018	0.6	6.9	1.3	3.4	-	0.4	0.1	4.2	4.4

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

**Table 23R-12.11 - Forb Species.** Nested frequency and modified Daubenmire average cover by year.

FORB SPECIES	Alyssum desertorum <sup>ai</sup> (desert madwort)	Arabis holboellii <sup>a</sup> (Holboell's rockcress)	Astragalus calycosus (Torrey's milkvetch)	Astragalus lentiginosus (freckled milkvetch)	Astragalus purshii (woollypod milkvetch)	Calochortus nuttallii (sego lily)	Ceratocephala testiculata <sup>ai</sup> (curveseed butterwort)	Chaenactis douglasii (Douglas' dustymaiden)	Cryptantha (cryptantha)	Eriogonum cernuum <sup>a</sup> (nodding buckwheat)	Gayophytum ramosissimum <sup>a</sup> (pinyon groundsmoke)	Gilia inconspicua <sup>a</sup> (shy gilia)	Helianthus annuus <sup>a</sup> (common sunflower)	Lactuca serriola <sup>ai</sup> (prickly lettuce)	Linum perenne <sup>i</sup> (blue flax)	Medicago sativa <sup>i</sup> (alfalfa)	Packera multilobata (lobeleaf groundsel)
year	Nested Frequency																
2011	-	5	3	-	-	2	14	1	4	5	1	117	-	5	-	-	-
2014	-	-	6	3	2	-	-	3	-	6	0	-	9	9	19	11	1
2018	3	-	-	-	-	-	-	1	2	0	-	-	-	2	-	5	6
year	Average Cover (%)																
2011	-	0.0	0.0	-	-	0.0	0.1	0.0	0.0	0.0	0.0	0.7	-	0.0	-	-	-
2014	-	-	0.0	0.0	0.0	-	-	0.0	-	0.0	0.0	-	0.1	0.0	0.2	0.0	0.0
2018	0.0	-	-	-	-	-	-	0.0	0.0	0.0	-	-	-	0.0	-	0.0	0.0

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

FORB SPECIES			
	Penstemon palmeri (Palmer's penstemon)		
	Sanguisorba minor <sup>i</sup> (small burnet)		
	Streptanthus cordatus (heartleaf twistflower)		
year	Nested Frequency		
2011	-	-	3
2014	10	30	-
2018	10	10	8
year	Average Cover (%)		
2011	-	-	0.0
2014	0.5	1.1	-
2018	0.5	0.3	0.1

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

**Table 23R-12.12 - Shrub and Tree Species.** Average modified Daubenmire quadrat and line intercept cover by year.

SHRUB SPECIES						
	Artemisia tridentata ssp. vaseyana <sup>p</sup> (mountain big sagebrush)					
	Bassia prostrata <sup>ni</sup> (forage kochia)					
	Juniperus osteosperma <sup>t</sup> (Utah Juniper)					
	Opuntia (pricklypear)					
	Pinus edulis <sup>t</sup> (twoneedle pinyon)					
	Purshia tridentata <sup>p</sup> (antelope bitterbrush)					
year	Line Intercept Cover (%)					
2011	0	-	14.2	-	12.6	-
2014	0.1	-	-	-	-	-
2018	-	-	-	0.1	-	0.1
year	Quadrat Cover (%)					
2011	0.0	-	7.1	0.1	3.3	0.4
2014	0.0	0.0	-	0.4	-	0.1
2018	-	0.0	0.2	0.2	-	0.8

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

**Table 23R-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.

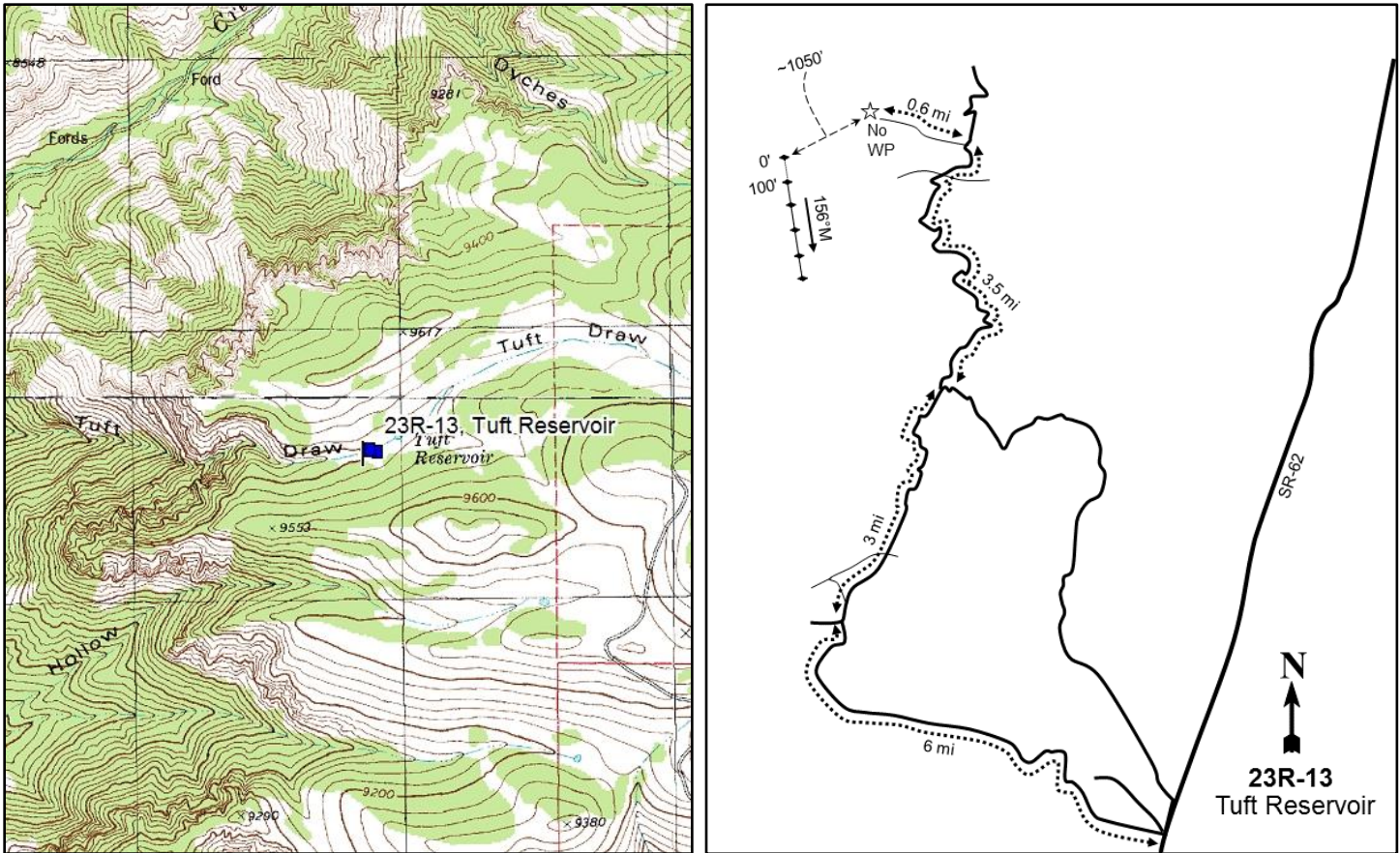
Year	Density		Age Class Distribution			Utilization		Poor Vigor (%)	Average Height Crown (cm)
	Plants Per Acre		Excluding Seedlings			Moderate (%)	Heavy (%)		
	Excluding Seedlings	Seedling	Young (%)	Mature (%)	Decadent (%)				
<b>Artemisia tridentata ssp. vaseyana<sup>p</sup> -- (mountain big sagebrush)</b>									
2011	40	-	0	0	100	0	0	100	55/35
2014	20	-	100	0	0	100	0	0	31/33
2018	-	-	-	-	-	-	-	-	41/46
<b>Bassia prostrata<sup>pi</sup> -- (forage kochia)</b>									
2011	-	-	-	-	-	-	-	-	-/-
2014	60	-	67	33	0	33	0	0	7/9
2018	20	-	0	100	0	0	100	0	4/18
<b>Juniperus osteosperma<sup>i</sup> -- (Utah juniper)</b>									
2011	140	80	29	43	29	0	0	0	-/-
2014	-	20	0	0	0	0	0	0	-/-
2018	20	20	100	0	0	0	0	100	-/-
<b>Opuntia -- (pricklypear)</b>									
2011	40	-	0	100	0	0	0	0	14/39
2014	80	-	25	75	0	0	0	0	10/30
2018	140	-	14	86	0	0	0	14	15/46
<b>Pinus edulis<sup>t</sup> -- (twoneedle pinyon)</b>									
2011	40	40	0	100	0	0	0	0	-/-
2014	-	-	-	-	-	-	-	-	-/-
2018	-	-	-	-	-	-	-	-	-/-
<b>Purshia tridentata<sup>p</sup> -- (antelope bitterbrush)</b>									
2011	20	-	0	0	100	0	100	0	101/142
2014	40	-	0	100	0	50	50	0	25/36
2018	60	-	0	100	0	0	33	0	54/120

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

**Table 23R-12.14 - Tree Characteristics.** Point-quarter tree density, size class distribution, and average diameter.

Year	Density	Size Class Distribution					Average Diameter (cm)
	Trees per Acre	Seedling (%)	1-4' (%)	4-8' (%)	8-12' (%)	>12' (%)	
<b>Juniperus osteosperma (Utah juniper)</b>							
2011	212	35	10	15	15	25	16.9
2014	113	11	50	39	-	-	5.6
2018	75	-	59	41	-	-	8.1
<b>Pinus edulis (twoneedle pinyon)</b>							
2011	52	11	17	22	22	28	17.8
2014	14	13	63	25	-	-	3.0
2018	15	-	75	25	-	-	4.3

## TUFT RESERVOIR - STUDY NO. 23R-13

**Location Information**

USGS 7.5 min Map Info  
GPS (0' Stake)

Malmsten Peak NE; Township 28S, Range 2W, Section 41  
NAD 83 UTM ZONE 12, 407789 East 4247704 North

**Transect Information**

Browse Tag # (0' Stake)	559
Transect Bearing	156° 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 south on SR-62, turn right (east) onto Pole Canyon Road. Continue on this road for 6 miles to a 'T' junction, then turn right (north) onto Forshea Monroe Mountain Road. Proceed for 3 miles to a fork and stay left to continue onto Langdon Monroe Mountain Road (the right fork, Rock Canyon road, leads back to SR-62). Travel for 3.5 miles, then turn left (west) onto a minor road. Continue for 0.6 miles and park; there is no witness post. The transect is approximately 1050 feet west of the road.

**Site Information**

Land Ownership	Federal
Land Administrator	USFS
Allotment	Dry Lake Allotment
Elevation	No data
Aspect	North
Slope	20-25%
Sample Dates	07/31/2018

**Table 23R-13.1 Disturbance History.** Recorded history of major disturbances.

Treatment/Disturbance	Name	WRI DB#	Date	Size (acres)
Fire - Prescribed	Monroe Mountain Aspen Ecosystems Restoration Project Phase 3	4396	May 2018	4611

**Wildlife Habitat and Vegetation History****Table 23R-13.3 - Wildlife Seasonal Habitat.** UDWR wildlife habitat and seasonality.

Species	Habitat	Season
Deer	substantial	summer
Elk	substantial	summer

**Table 23R-13.4 - Vegetation History.** The dominant vegetation type(s) and phase of woodland succession (Tausch, Miller, Roundy, & Chambers, 2009).

Year	Vegetation Type	Woodland Succession
2018	Perennial Forb	NA

**Site Notes**

No Notes

**Site Potential**

1981 - 2010 Average Annual Precipitation	23 inches
NRCS Ecological Site	High Mountain Loam (Aspen)
NRCS Ecological Site #	R047XB508UT
States and Transitions	No state and transition model is available for this ecological site.

This study site was established in 2018 soon after a prescribed burn (Table 23R-13.1). Vegetation cover in general was low, with the perennial forb common dandelion (*Taraxacum officinale*) contributing the most cover of any single species (Table 23R-13.8, Table 23R-13.11). The shrub component was sparse and mainly dominated by grayleaf red raspberry (*Rubus idaeus* ssp. *strigosus*) and creeping barberry (*Mahonia repens*) (Table 23R-13.12, Table 23R-13.13). Quaking aspen (*Populus tremuloides*) was beginning to regenerate, with all of the plants considered to be either Class I or Class II (Table 23R-13.13a). However, one-third of the aspen plants exhibited heavy utilization (Table 23R-13.13); sustained heavy browsing may affect long-term establishment of the aspen stand.



**Trend Summary Tables****Table 23R-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
2018	0.4	2.3	0.2	0.3	1.7	0.5

**Table 23R-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
2018	-	26	1	93	-	0.4	0.0	3.5

**Table 23R-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
2018	42.3	0.4	48.9	1.6	19.6	6.2

**Table 23R-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	Rocky Mountain Elk
	Quadrat Frequency	
2018	-	-
Year	Days Use Per Acre (ha)	
2018	0.7 (1.8)	4.0 (9.9)

**Table 23R-13.10 - Grass Species.** Nested frequency and modified Daubenmire average cover by year.

GRASS SPECIES	Nested Frequency			
	year	year	year	year
Achnatherum nelsonii (Columbia needlegrass)	11	15	2	3
Carex rossii (Ross' sedge)	0.2	0.2	0.0	0.0
Elymus trachycaulus (slender wheatgrass)				
Thinopyrum intermedium <sup>i</sup> (intermediate wheatgrass)				
Average Cover (%)				
2018	0.2	0.2	0.0	0.0

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

**Table 23R-13.11 - Forb Species.** Nested frequency and modified Daubenmire average cover by year.

FORB SPECIES	Achillea millefolium (Common yarrow)	Aquilegia coerulea (Colorado blue columbine)	Arnica mollis (hairy arnica)	Chamerion angustifolium (fireweed)	Corydalis <sup>a</sup> (fumewort)	Senecio (ragwort)	Taraxacum officinale (common dandelion)
year	Nested Frequency						
2018	7	4	27	15	1	2	58
year	Average Cover (%)						
2018	0.0	0.0	0.6	0.4	0.0	0.0	2.5

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

**Table 23R-13.12 - Shrub and Tree Species.** Average modified Daubenmire quadrat and line intercept cover by year.

SHRUB SPECIES	Mahonia repens (creeping barberry)	Populus tremuloides <sup>i</sup> (quaking aspen)	Rosa woodsii <sup>p</sup> (Woods' rose)	Rubus idaeus ssp. strigosus (grayleaf red raspberry)
year	Line Intercept Cover (%)			
2018	0.5	0.5	0.3	1.2
year	Quadrat Cover (%)			
2018	0.7	0.2	0.4	1.6

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

**Table 23R-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 (%)				
Mahonia repens -- (creeping barberry)									
2018	3100	-	18	82	0	0	0	0	8/13
Pseudotsuga menziesii <sup>i</sup> -- (Douglas-fir)									
2018	20	-	0	100	0	0	0	0	- / -
Ribes cereum <sup>p</sup> -- (wax currant)									
2018	20	-	100	0	0	0	0	0	27/29
Rosa woodsii <sup>p</sup> -- (Woods' rose)									
2018	760	-	90	11	0	63	0	0	19/17
Rubus idaeus ssp. strigosus -- (grayleaf red raspberry)									
2018	1920	5240	89	12	0	12	23	0	13/16
Symphoricarpos oreophilus <sup>p</sup> -- (mountain snowberry)									
2018	-	-	-	-	-	-	-	-	17/21

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

**Table 23R-13.13a - Aspen Characteristics.** Characteristics of aspen populations including density, size class distribution, and vigor of plants.

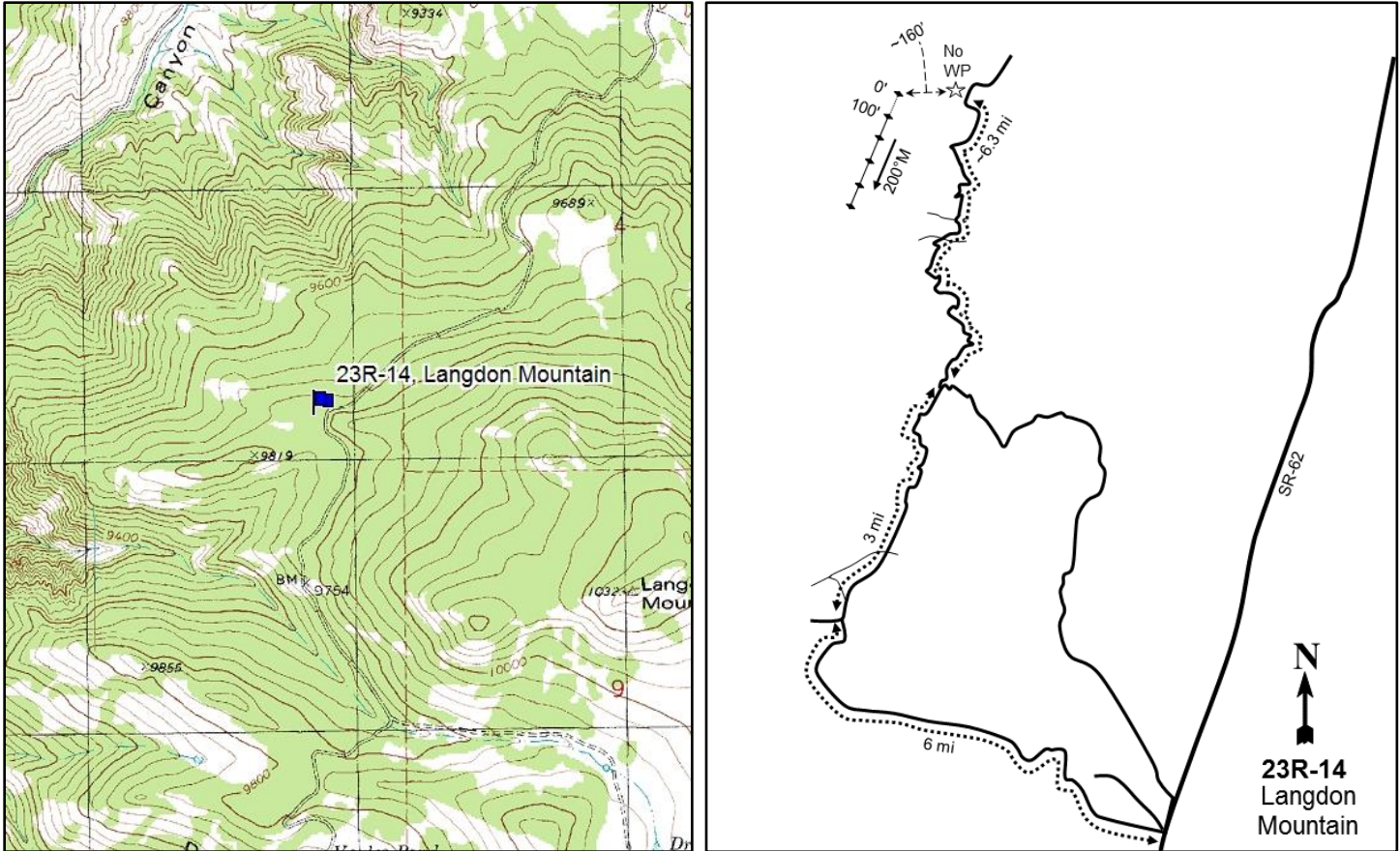
Year	Density	Size Class Distribution				Utilization		Poor Vigor (%)
	Plants per Acre	Class I (%)	Class II (%)	Class III (%)	Class IV (%)	Moderate (%)	Heavy (%)	
Populus tremuloides (quaking aspen)								
2018	1000	84	16	-	-	0	38	0

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 IV - > 1 in diameter at breast height (dbh)

**Table 23R-13.14 - Tree Characteristics.** Point-quarter tree density, size class distribution, and average diameter.

Year	Density	Size Class Distribution					Average Diameter (cm)
	Trees per Acre	Seedling (%)	1-4' (%)	4-8' (%)	8-12' (%)	>12' (%)	
Populus tremuloides (quaking aspen)							
2018	326	100	-	-	-	-	0.7

## LANGDON MOUNTAIN - STUDY NO. 23R-14

**Location Information**

USGS 7.5 min Map Info  
GPS (0' Stake)

Marysvale Peak SE; Township 28S, Range 2W, Section 37  
NAD 83 UTM ZONE 12, 409800 East 4250349 North

**Transect Information**

Browse Tag # (0' Stake)	Not Available
Transect Bearing	200° magnetic
Length	500ft
Belt Placement	Line 1 (11ft), Line 2 (34ft), Line 3 (59ft), Line 4 (71ft), Line 5 (95ft)
Belt Marker Placement	No Rebar or Stakes

**Directions to Site**

Traveling south on SR-62, turn right (east) onto Pole Canyon Road. Continue on this road for 6 miles to a 'T' junction, then turn right (north) onto Forshea Monroe Mountain Road. Proceed for 3 miles to a fork and stay left to continue onto Langdon Monroe Mountain Road (the right fork, Rock Canyon road, leads back to SR-62). Travel for about 6.3 miles and park. The transect is about 160 feet west of the road; there are no stakes or rebar.

**Site Information**

Land Ownership	Federal
Land Administrator	USFS
Allotment	Dry Lake Allotment
Elevation	No data
Aspect	Southeast
Slope	2-10%
Sample Dates	07/30/2018

**Wildlife Habitat and Vegetation History****Table 23R-14.3 - Wildlife Seasonal Habitat.** UDWR wildlife habitat and seasonality.

Species	Habitat	Season
Deer	substantial	summer
Elk	substantial	summer

**Table 23R-14.4 - Vegetation History.** The dominant vegetation type(s) and phase of woodland succession (Tausch, Miller, Roundy, & Chambers, 2009).

Year	Vegetation Type	Woodland Succession
2018	Quaking Aspen-Conifer Encroached	NA

**Site Notes**

No Notes

**Site Potential**

1981 - 2010 Average Annual Precipitation	26 inches
NRCS Ecological Site	High Mountain Loam (Aspen)
NRCS Ecological Site #	R047XB508UT
States and Transitions	No state and transition model is available for this ecological site.

This study site was established in 2018 and was dominated by subalpine fir (*Abies lasiocarpa*) with a lesser component of quaking aspen (*Populus tremuloides*); other tree and shrub species were rare (Table 23R-14.12, Table 23R-14.13, Table 23R-14.13a, Table 23R-14.14). The herbaceous understory was abundant and diverse, with native perennial forbs contributing most of the cover (Table 23R-14.7, Table 23R-14.11). Without a tree-removing disturbance, conifers will likely continue to encroach on this study site.

**Trend Summary Tables**

**Table 23R-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
2018	0.8	4.6	34.6	0.8	3.6	109.0

**Table 23R-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
2018	-	114	3	214	-	4.2	0.0	16.9

**Table 23R-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
2018	0.3	0.2	90.0	-	0.0	52.7

**Table 23R-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
	Quadrat Frequency		
2018	-	1	-
Year	Days Use Per Acre (ha)		
2018	0.7 (1.8)	11.4 (28.1)	6.0 (14.9)

**Table 23R-14.10 - Grass Species.** Nested frequency and modified Daubenmire average cover by year.

GRASS SPECIES	Achnatherum lemmonii (Lemmon's needlegrass)	Achnatherum nelsonii (Columbia needlegrass)	Bromus porteri (Porter brome)	Carex rossii (Ross' sedge)	Deschampsia cespitosa (tufted hairgrass)	Elymus trachycaulus (slender wheatgrass)	Hesperostipa comata (needle and thread)	Poa secunda (Sandberg bluegrass)
year	Nested Frequency							
2018	0	23	78	41	7	9	8	7
year	Average Cover (%)							
2018	0.0	0.5	2.4	0.6	0.1	0.1	0.6	0.1

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

**Table 23R-14.11 - Forb Species.** Nested frequency and modified Daubenmire average cover by year.

FORB SPECIES	Nested Frequency																
year	Average Cover (%)																
Achillea millefolium (Common yarrow)	86	1	16	3	3	82	3	36	7	44	83	33	8	9	50	2	2
Agoseris glauca (pale agoseris)	1.8	0.0	0.6	0.1	0.0	2.6	0.0	0.8	0.1	3.1	2.0	1.1	0.1	0.4	1.2	0.0	0.3
Antennaria microphylla (littelleaf pussytoes)																	
Aquilegia coerulea (Colorado blue columbine)																	
Arabis (rockcress)																	
Astragalus miser (timber milkvetch)																	
Collomia linearis <sup>a</sup> (tiny trumpet)																	
Fragaria virginiana (Virginia strawberry)																	
Helioneris multiflora (showy goldeneye)																	
Lupinus argenteus (silvery lupine)																	
Maianthemum (mayflower)																	
Osmorhiza depauperata (bluntseed sweetroot)																	
Potentilla gracilis (slender cinquefoil)																	
Pseudocymopterus montanus (alpine false springparsley)																	
Senecio (ragwort)																	
Silene drummondii (Drummond's campion)																	
Symphotrichum (aster)																	

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

FORB SPECIES	Nested Frequency		
year	Average Cover (%)		
Symphotrichum ascendens (western aster)	2	57	36
Taraxacum officinale (common dandelion)	0.0	1.9	0.7
Trifolium longipes (longstalk clover)			

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



**Table 23R-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 (%)					
Abies lasiocarpa <sup>t</sup> (subalpine fir)	2018	62.4	3.6	44.6	2	0.2	0.6
Juniperus communis (common juniper)	2018	32.0	4.6	2.6	0.0	0.2	0.6
Populus tremuloides <sup>t</sup> (quaking aspen)							
Pseudotsuga menziesii <sup>t</sup> (Douglas-fir)							
Rosa woodsii <sup>p</sup> (Woods' rose)							
Symphoricarpos oreophilus <sup>p</sup> (mountain snowberry)							

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

**Table 23R-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 (%)				
Abies lasiocarpa <sup>t</sup> -- (subalpine fir)									
2018	3120	940	81	19	1	0	0	10	- / -
Juniperus communis -- (common juniper)									
2018	200	-	20	80	0	0	0	0	69/113
Mahonia repens -- (creeping barberry)									
2018	40	-	0	100	0	0	0	0	11/18
Pseudotsuga menziesii <sup>t</sup> -- (Douglas-fir)									
2018	20	-	0	100	0	0	0	0	- / -
Rosa woodsii <sup>p</sup> -- (Woods' rose)									
2018	320	-	25	75	0	6	0	0	35/21
Symphoricarpos oreophilus <sup>p</sup> -- (mountain snowberry)									
2018	320	20	19	81	0	0	0	0	60/63

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

**Table 23R-14.13a - Aspen Characteristics.** Characteristics of aspen populations including density, size class distribution, and vigor of plants.

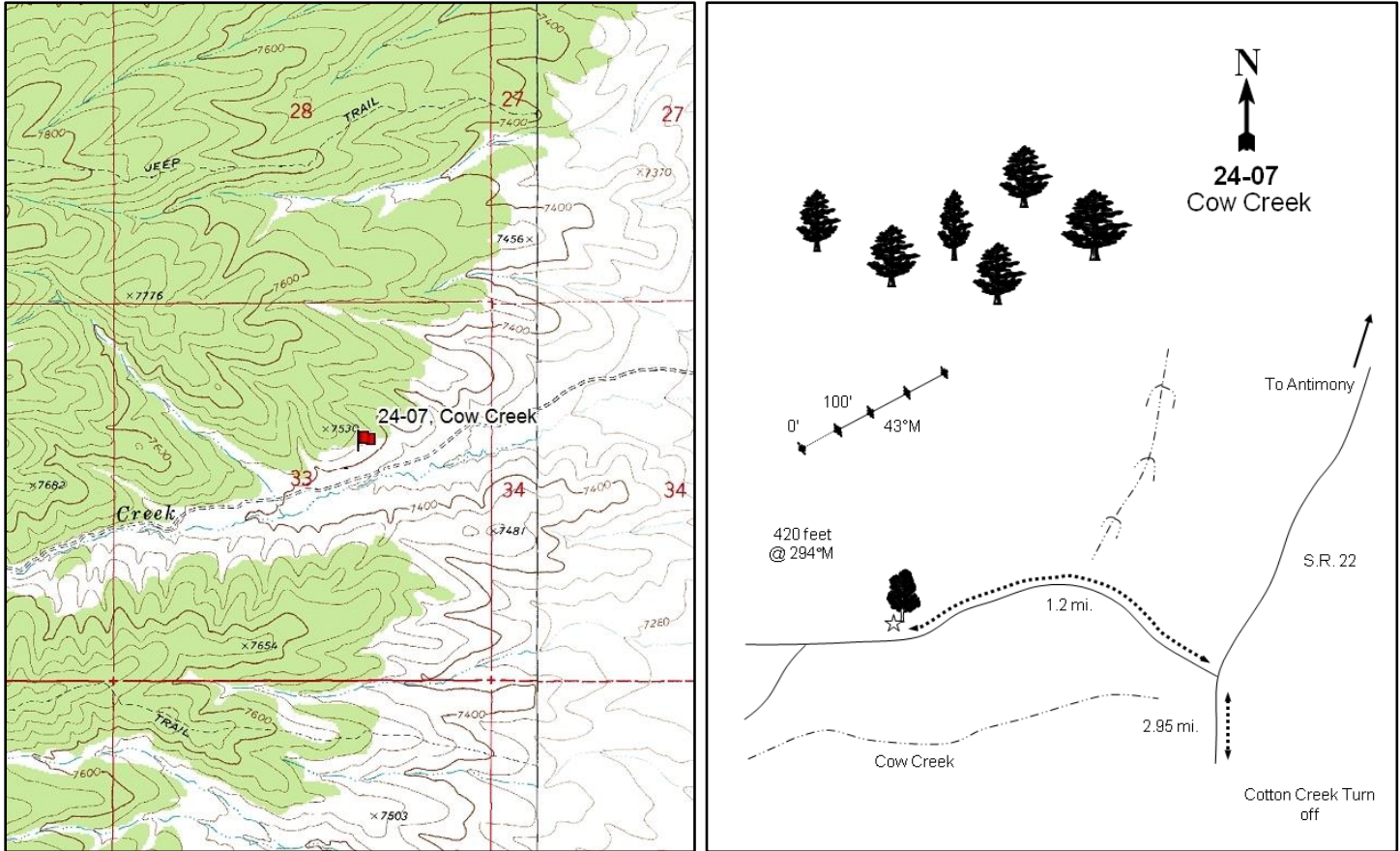
Year	Density	Size Class Distribution				Utilization		Poor Vigor (%)
	Plants per Acre	Class I (%)	Class II (%)	Class III (%)	Class IV (%)	Moderate (%)	Heavy (%)	
Populus tremuloides (quaking aspen)								
2018	2260	19	66	-	15	16	0	17

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 IV - > 1 in diameter at breast height (dbh)

**Table 23R-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' (%)
Abies lasiocarpa (subalpine fir)							
2018	1253	15	35	25	5	20	5.3
Populus tremuloides (quaking aspen)							
2018	1684	25	25	5	-	45	9.9

## COW CREEK - STUDY NO. 24-7

**Location Information**

USGS 7.5 min Map Info  
GPS (0' Stake)

Cow Creek NE; Township 32S, Range 2W, Section 33  
NAD 83 UTM ZONE 12, 411352 East 4204129 North

**Transect Information**

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

9002  
43° magnetic  
400ft  
Line 1 (11ft & 95ft), Line 2 (34ft), Line 3 (59ft), Line 4 (71ft)  
Belt 5: 1ft

**Directions to Site**

From the Cottonwood Creek turnoff of SR-22 south of Antimony, proceed north on the highway for 2.95 miles to a gate by Cow Creek. Turn west and drive through the seeded pasture up Cow Creek for 1.2 miles to a lone, mature juniper tree near the road (if you go too far (0.2 more miles) you will come to a fork by a fence). Stop by the lone juniper and walk up the hill about 140 yards at a bearing of 294 degrees magnetic to the start of the baseline and the 0-foot stake, a short fencepost with browse tag #9002 attached. The transect runs east-northeast along the top edge of the seeding.

**Site Information**

Land Ownership	State
Land Administrator	SITLA
Allotment	No data
Elevation	7,450ft (2,271m)
Aspect	South
Slope	12-20%
Sample Dates	08/14/1997, 07/22/2003, 08/12/2008, 08/01/2013, 07/02/2018

**Table 24-07.1 Disturbance History.** Recorded history of major disturbances.

Treatment/Disturbance	Name	WRI DB#	Date	Size (acres)
Disk - Disk Unknown	-	-	Prior to 1987	-
Seeding - Rangeland Drill	-	-	Prior to 1987	-
Hand Crew - Lop and Scatter	Cow and Cottonwood Creek Lop and Scatter	1794	November 2011	2100

**Wildlife Habitat and Vegetation History****Table 24-07.3 - Wildlife Seasonal Habitat.** UDWR wildlife habitat and seasonality.

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

**Table 24-07.4 - Vegetation History.** The dominant vegetation type(s) and phase of woodland succession (Tausch, Miller, Roundy, & Chambers, 2009).

Year	Vegetation Type	Woodland Succession
1987	Mountain Big Sagebrush/Perennial Grass	Phase I
1991	Mountain Big Sagebrush/Perennial Grass	Phase I
1997	Mountain Big Sagebrush/Perennial Grass	Phase I
2003	Mountain Big Sagebrush/Perennial Grass	Phase I
2008	Mountain Big Sagebrush/Perennial Grass	Phase I
2013	Mountain Big Sagebrush/Perennial Grass	Phase I
2018	Mountain Big Sagebrush/Perennial Grass	Phase I

**Site Notes**

Pronghorn may be present in the area year-round. Due to the difficulties in distinguishing between pronghorn and deer pellet groups, pronghorn pellet groups have been included in deer pellet group counts.

**Soils****Table 24-07.5 - 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	7.4	65.0	20.1	14.9	2.7	19.1	54.4	0.5	08/11/1997

**Site Potential**

1981 - 2010 Average Annual Precipitation	12 inches
NRCS Ecological Site	Upland Loam (Mountain Big Sagebrush-Indian Ricegrass)
NRCS Ecological Site #	R047XB308UT
States and Transitions	No state and transition model is available for this ecological site.

This site has featured a stand of mountain big sagebrush (*Artemisia tridentata* ssp. *vaseyana*) since study establishment in 1987 (Pre-1992 Data, Photos, Table 24-07.12, Table 24-07.13). The perennial grass species crested wheatgrass (*Agropyron cristatum*), squirreltail (*Elymus elymoides*), and blue grama (*Bouteloua gracilis*) have dominated the herbaceous understory throughout the study period; perennial and annual forbs have remained rare (Table 24-07.7, Table 24-07.10, Table 24-07.11). Twoneedle pinyon (*Pinus edulis*) and Utah juniper (*Juniperus osteosperma*) have been observed and the site has been considered to be within Phase I of woodland succession in all sample years (Photos, Table 24-07.12, Table 24-07.14). A lop and scatter treatment in 2011 removed some of the trees (Table 24-07.1), but the close proximity to mature stands of pinyon and juniper indicates that this site has the potential for future infilling.

**Trend Summary Tables****Table 24-07.6 - 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
1997	6.5	0.1	6.0	-	-	-
2003	7.1	0.6	5.2	6.3	0.6	9.3
2008	3.2	0.1	4.1	10.9	-	10.5
2013	5.3	0.2	0.6	8.2	0.2	6.2
2018	5.9	0.6	3.3	8.0	0.3	6.7

**Table 24-07.7 - 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
1997	-	343	29	67	-	11.5	0.3	0.7
2003	-	314	41	11	-	12.4	0.2	0.0
2008	1	326	60	42	0.0	12.4	0.3	0.6
2013	-	327	6	25	-	18.2	0.0	0.3
2018	-	330	2	28	-	17.9	0.0	0.5

**Table 24-07.8 - 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
1997	9.9	-	33.5	27.5	3.9	26.6
2003	11.8	-	36.2	36.0	5.7	24.7
2008	10.4	-	32.7	35.8	6.1	25.0
2013	6.2	-	32.2	29.9	7.0	27.8
2018	15.0	-	33.5	34.7	5.5	28.4

**Table 24-07.9 - 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			
1997	4	17	31	13
2003	1	6	32	39
2008	2	10	4	97
2013	2	11	14	31
2018	5	5	6	44
Year	Days Use Per Acre (ha)			
1997	-	-	-	-
2003	1.5 (3.6)	24.1 (59.6)	34.9 (86.1)	-
2008	0.7 (1.8)	8.1 (19.9)	0.7 (1.7)	-
2013	-	15.4 (38.1)	25.5 (62.9)	-
2018	5.8 (14.3)	5.3 (13.2)	11.4 (28.1)	-

**Table 24-07.10 - Grass Species.** Nested frequency and modified Daubenmire average cover by year.

GRASS SPECIES	Achnatherum hymenoides (Indian ricegrass)	Agropyron cristatum <sup>i</sup> (crested wheatgrass)	Bouteloua gracilis (blue grama)	Bromus inermis <sup>i</sup> (smooth brome)	Bromus tectorum <sup>ai</sup> (cheatgrass)	Elymus elymoides (squirreltail)	Hesperostipa comata (needle and thread)	Poa fendleriana (muttongrass)	Poa secunda (Sandberg bluegrass)	Thinopyrum intermedium <sup>i</sup> (intermediate wheatgrass)
year	Nested Frequency									
1997	7	220	171	-	-	58	21	-	2	10
2003	3	166	169	-	-	70	34	18	-	-
2008	26	93	214	-	1	63	88	2	5	-
2013	12	176	180	1	-	54	94	4	3	-
2018	32	90	236	-	-	17	139	2	-	-
year	Average Cover (%)									
1997	0.1	6.1	4.4	-	-	0.7	0.2	-	0.0	0.0
2003	0.0	4.8	6.2	-	-	0.5	0.7	0.1	-	-
2008	0.5	1.5	8.4	-	0.0	0.8	1.3	0.0	0.0	-
2013	0.4	6.4	5.6	0.0	-	1.1	4.6	0.0	0.0	-
2018	0.9	2.3	9.8	-	-	0.5	4.2	0.0	-	-

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

**Table 24-07.11 - Forb Species.** Nested frequency and modified Daubenmire average cover by year.

FORB SPECIES	Antennaria (pussytoes)	Astragalus lentiginosus (freckled milkvetch)	Astragalus newberryi (Newberry's milkvetch)	Chamaesyce (sandmat)	Chenopodium <sup>a</sup> (goosefoot)	Cryptantha (cryptantha)	Descurainia pinnata <sup>a</sup> (western tansymustard)	Erigeron pumilus (shaggy fleabane)	Gayophytum ramosissimum <sup>a</sup> (pinyon grounds moke)	Gilia inconspicua <sup>a</sup> (shy gilia)	Lappula occidentalis <sup>a</sup> (flatspine stickseed)	Sphaeralcea coccinea (scarlet globemallow)	Streptanthus cordatus (heartleaf twistflower)
year	Nested Frequency												
1997	-	-	27	-	4	42	-	-	25	-	-	7	2
2003	4	-	-	-	-	1	23	-	-	14	5	7	-
2008	2	12	14	-	3	10	30	1	3	-	39	4	4
2013	-	-	-	2	6	12	-	-	-	-	-	11	-
2018	-	6	6	-	-	10	2	-	-	-	-	9	-
year	Average Cover (%)												
1997	-	-	0.1	-	0.0	0.6	-	-	0.3	-	-	0.0	0.0
2003	0.0	-	-	-	-	0.0	0.1	-	-	0.1	0.0	0.0	-
2008	0.0	0.3	0.1	-	0.0	0.1	0.1	0.0	0.0	-	0.2	0.0	0.0
2013	-	-	-	0.0	0.0	0.1	-	-	-	-	-	0.2	-
2018	-	0.1	0.4	-	-	0.0	0.0	-	-	-	-	0.0	-

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

**Table 24-07.12 - Shrub and Tree Species.** Average modified Daubenmire quadrat and line intercept cover by year.

SHRUB SPECIES	Line Intercept Cover (%)				
	Artemisia tridentata ssp. vaseyana <sup>p</sup> (mountain big sagebrush)	Gutierrezia sarothrae (broom snakeweed)	Opuntia (pricklypear)	Pediocactus simpsonii (mountain ball cactus)	Pinus edulis <sup>i</sup> (twoneedle pinyon)
year	Line Intercept Cover (%)				
1997	-	-	-	-	-
2003	6.3	0.4	0.2	-	9.3
2008	10.9	0	-	-	10.5
2013	8.2	0.2	-	-	6.2
2018	8	0.3	-	-	6.7
year	Quadrat Cover (%)				
1997	6.5	0.0	0.0	-	6.0
2003	7.1	0.6	0.0	-	5.2
2008	3.2	0.1	-	0.0	4.1
2013	5.3	0.2	0.0	0.0	0.6
2018	5.9	0.4	0.1	-	3.3

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

**Table 24-07.13 - 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 (%)				
<b>Artemisia tridentata ssp. vaseyana<sup>p</sup> -- (mountain big sagebrush)</b>									
1997	2280	40	8	58	34	28	3	21	58/78
2003	1920	-	1	40	59	35	5	32	58/78
2008	1420	80	3	28	69	37	11	42	53/78
2013	1800	340	32	58	10	30	21	16	61/91
2018	2100	-	17	72	11	10	6	8	54/76
<b>Echinocereus -- (hedgehog cactus)</b>									
1997	-	-	-	-	-	-	-	-	-/-
2003	-	-	-	-	-	-	-	-	-/-
2008	-	-	-	-	-	-	-	-	-/-
2013	-	-	-	-	-	-	-	-	23/42
2018	-	-	-	-	-	-	-	-	-/-
<b>Gutierrezia sarothrae -- (broom snakeweed)</b>									
1997	220	-	9	91	0	0	0	0	21/21
2003	1800	-	43	57	0	0	0	0	19/19
2008	940	140	21	79	0	0	2	0	15/14
2013	700	-	14	86	0	0	0	3	15/20
2018	980	-	4	67	29	0	0	22	9/10
<b>Juniperus osteosperma<sup>i</sup> -- (Utah juniper)</b>									
1997	20	-	100	0	0	0	0	0	-/-
2003	-	-	-	-	-	-	-	-	-/-
2008	-	-	-	-	-	-	-	-	-/-
2013	20	-	100	0	0	0	0	0	-/-
2018	-	-	-	-	-	-	-	-	-/-

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 (%)				
<b>Opuntia -- (pricklypear)</b>									
1997	40	-	0	100	0	0	0	0	13/26
2003	80	-	0	100	0	0	0	0	9/30
2008	-	-	-	-	-	-	-	-	12/31
2013	40	-	50	50	0	0	0	0	10/31
2018	80	-	0	100	0	0	0	0	9/24
<b>Pediocactus simpsonii -- (mountain ball cactus)</b>									
1997	-	-	-	-	-	-	-	-	-/-
2003	-	-	-	-	-	-	-	-	7/32
2008	20	-	0	100	0	0	0	0	-/-
2013	80	-	50	50	0	0	0	0	2/5
2018	-	-	-	-	-	-	-	-	-/-
<b>Pinus edulis<sup>t</sup> -- (twoneedle pinyon)</b>									
1997	60	-	33	67	0	0	0	0	-/-
2003	80	20	75	25	0	0	0	0	-/-
2008	40	20	50	50	0	0	0	0	-/-
2013	80	-	75	25	0	0	25	25	-/-
2018	40	-	100	0	0	0	0	0	-/-
<b>Sclerocactus -- (fishhook cactus)</b>									
1997	-	-	-	-	-	-	-	-	7/27
2003	-	-	-	-	-	-	-	-	-/-
2008	-	20	0	0	0	0	0	0	10/31

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

**Table 24-07.14 - Tree Characteristics.** Point-quarter tree density, size class distribution, and average diameter.

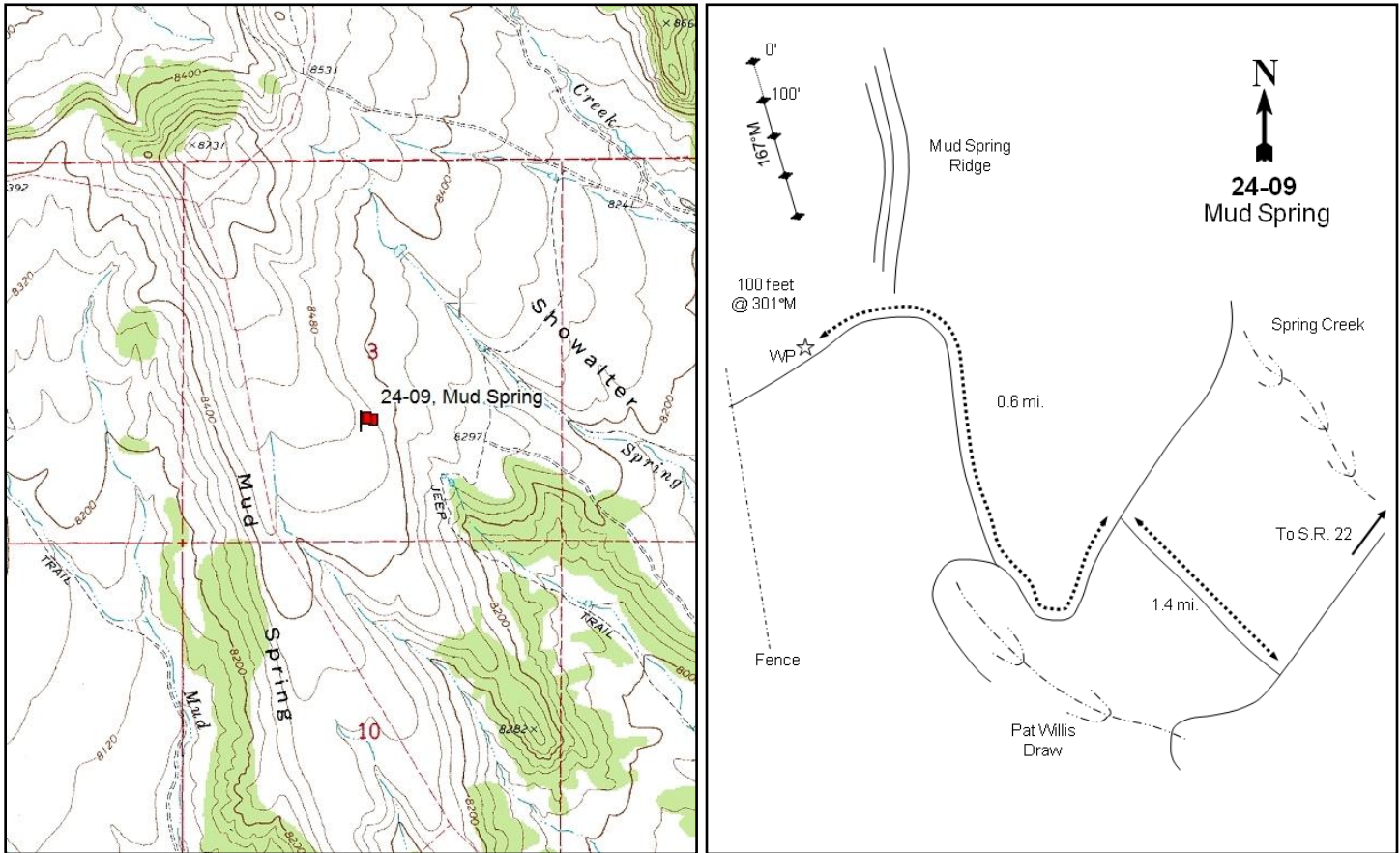
Year	Density	Size Class Distribution					Average Diameter (cm)
	Trees per Acre	Seedling (%)	1-4' (%)	4-8' (%)	8-12' (%)	>12' (%)	
<b>Juniperus osteosperma (Utah juniper)</b>							
2003	38	20	67	7	-	7	8.3
2008	46	7	57	21	-	14	8.8
2013	16	-	100	-	-	-	2.3
2018	16	22	78	-	-	-	3.9
<b>Pinus edulis (twoneedle pinyon)</b>							
2003	23	-	40	20	7	33	16.1
2008	25	-	47	13	7	33	13.7
2013	12	-	75	13	-	13	8.8
2018	32	36	55	9	-	-	2.5

**Table -24-07.15 - Deer Desirable Components Index: Mid Potential Scale.**

Year	Preferred Browse Cover	Preferred Browse Decadence	Preferred Browse Young	Perennial Grass Cover	Annual Grass Cover	Perennial Forb Cover	Noxious Weeds	Total Score	Ranking
1997	8.2	4.8	4	22.9	0	1.4	0	<b>41.2</b>	Poor
2003	7.9	-2.8	0.5	24.7	0	0.1	0	<b>30.4</b>	Very Poor
2008	13.6	-5.7	1.4	24.8	0	1.2	0	<b>35.3</b>	Very Poor-Poor
2013	10.3	12	15	30	0	0.6	0	<b>67.9</b>	Good
2018	10	11.9	8.6	30	0	1	0	<b>61.4</b>	Fair



## MUD SPRING - STUDY NO. 24-9

**Location Information**

USGS 7.5 min Map Info  
GPS (0' Stake)

Flake Mountain West ; Township 35S, Range 4W, Section 03  
NAD 83 UTM ZONE 12, 393113 East 4182844 North

**Transect Information**

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

Not Available  
167° magnetic  
400ft  
Line 1 (11ft & 95ft), Line 2 (34ft), Line 3 (59ft), Line 4 (71ft)  
Belt 2: 1ft

**Directions to Site**

From SR-22 about 1.5 miles south of Widtsoe Junction, turn west onto the road leading to Tom Best Spring and Highway 12. Proceed 4.2 miles to the U.S. Forest Service boundary, then continue on the main road for 5.3 miles to an intersection at Showalter Creek. Continue on the main road for 1 mile to a faint road on the right. Turn right and go up towards Mud Spring Ridge 1.4 miles to a T-intersection. Turn left and travel 0.6 miles up a faint, rough road to the top of the ridge and a witness post on the right (north) side of the road identifying the study area. The 400-foot stake is 100 feet northwest of the witness post. The start of the transect is 400 feet north and runs back south towards the road. Study markers are 1-foot tall fence posts; there is no browse tag.

**Site Information**

Land Ownership	Federal
Land Administrator	USFS
Allotment	East Pines C&H
Elevation	8,470ft (2,582m)
Aspect	Southeast
Slope	3-5%
Sample Dates	08/07/1997, 07/22/2003, 07/07/2008, 07/18/2013, 07/09/2018

**Table 24-09.1 Disturbance History.** Recorded history of major disturbances.

Treatment/Disturbance	Name	WRI DB#	Date	Size (acres)
Lop and Scatter - Hand Crew	Powell - Mud Springs Phase I (Proposed)	4635	2019	2462
Harrow - One-Way Dixie	Sevier Plateau Dixie Harrow	461	Fall 2006	500
Seeding - Seed Unknown	Sevier Plateau Dixie Harrow	461	Fall 2006	500

**Wildlife Habitat and Vegetation History****Table 24-09.3 - Wildlife Seasonal Habitat.** UDWR wildlife habitat and seasonality.

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

**Table 24-09.4 - Vegetation History.** The dominant vegetation type(s) and phase of woodland succession (Tausch, Miller, Roundy, & Chambers, 2009).

Year	Vegetation Type	Woodland Succession
1987	Black Sagebrush	No Encroachment
1997	Black Sagebrush	No Encroachment
2003	Black Sagebrush	No Encroachment
2008	Black Sagebrush	No Encroachment
2013	Black Sagebrush	Phase I
2018	Black Sagebrush	Phase I

**Site Notes**

Pronghorn may be present in the area year-round. Due to the difficulties in distinguishing between pronghorn and deer pellet groups, pronghorn pellet groups have been included in the deer pellet group counts. Sage-grouse feathers were observed on the site in 2013.

**Soils****Table 24-09.5 - 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 Clay Loam	6.1	48.7	25.4	25.8	2.7	1.9	275.2	0.5	08/07/1997

**Site Potential**

1981 - 2010 Average Annual Precipitation	18 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 study site has remained in a stable state since establishment in 1987 with black sagebrush (*Artemisia nova*) as the dominant shrub species (Pre-1992 Data, Photos, Table 24-09.12, Table 24-09.13). The herbaceous understory has been diverse and abundant, with the perennial grass muttongrass (*Poa fendleriana*) contributing the most cover of any single species in 2018. Perennial forbs have remained moderately abundant, introduced annual grasses have been absent, and annual forb species have been limited throughout the duration of the study (Table 24-09.7, Table 24-09.10, Table 24-09.11). Rocky Mountain juniper (*Juniperus scopulorum*) was observed in 2013 and 2018, placing the site within Phase I of woodland succession (Photos, Table 24-09.4). Tree density is low as of 2018 (Table 24-09.14), but there could be potential for further encroachment in future sample years.

**Trend Summary Tables****Table 24-09.6 - 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
1997	17.1	2.0	-	-	-	-
2003	26.3	3.0	-	22.1	1.2	-
2008	13.7	4.7	-	15.3	4.4	-
2013	19.3	2.3	-	27.1	3.2	-
2018	22.7	7.0	-	24.5	5.6	-

**Table 24-09.7 - 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
1997	-	358	28	308	-	13.5	0.1	6.8
2003	-	367	26	276	-	13.6	0.1	5.3
2008	-	333	34	300	-	16.9	0.2	10.4
2013	-	353	36	295	-	14.7	0.3	11.4
2018	-	373	10	238	-	27.2	0.0	6.2

**Table 24-09.8 - 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
1997	22.7	0.1	30.5	6.8	8.1	28.8
2003	24.9	0.1	28.1	5.7	10.6	46.4
2008	24.4	-	27.7	5.3	10.4	43.3
2013	23.9	0.0	26.8	1.2	13.9	48.1
2018	31.1	0.0	36.3	5.1	13.2	48.5

**Table 24-09.9 - 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	Greater Sage-Grouse	Horse	Rabbit
	Quadrat Frequency					
1997	8	22	34	-	-	8
2003	5	10	14	2	-	20
2008	3	7	2	7	-	92
2013	5	2	3	1	-	3
2018	2	23	11	9	-	31
Year	Days Use Per Acre (ha)					
1997	-	-	-	-	-	-
2003	15.3 (37.7)	32.8 (81.1)	32.2 (79.5)	-	-	-
2008	0.7 (1.8)	6.7 (16.6)	8.1 (19.9)	104.5 (258.2)*	1.2 (2.9)	-
2013	16.0 (39.5)	3.4 (8.3)	15.4 (38.1)	26.2 (64.6)*	-	-
2018	2.2 (5.4)	36.2 (89.4)	16.1 (39.7)	26.2 (64.6)*	-	-

\*Pellets per acre (ha)

**Table 24-09.10 - Grass Species.** Nested frequency and modified Daubenmire average cover by year.

GRASS SPECIES	Achnatherum lettermanii (Letterman's needlegrass)	Achnatherum nelsonii (Columbia needlegrass)	Bouteloua gracilis (blue grama)	Carex geyeri (Geyer's sedge)	Elymus elymoides (squirreltail)	Elymus trachycaulus (slender wheatgrass)	Hesperostipa comata (needle and thread)	Pascopyrum smithii (western wheatgrass)	Poa fendleriana (muttongrass)	Poa secunda (Sandberg bluegrass)	Pseudoroegneria spicata (bluebunch wheatgrass)
year	Nested Frequency										
1997	242	-	22	89	34	8	44	6	174	49	-
2003	199	5	24	64	34	-	30	8	282	-	-
2008	121	7	28	72	39	-	76	36	227	24	-
2013	179	11	18	68	65	-	40	19	204	21	-
2018	89	11	22	86	42	-	12	8	322	-	0
year	Average Cover (%)										
1997	5.2	-	0.1	2.2	0.2	0.2	0.9	0.2	3.3	1.3	-
2003	3.7	0.0	0.3	1.2	0.2	-	0.3	0.0	7.8	-	-
2008	2.2	0.1	0.8	1.1	0.6	-	3.1	0.4	8.6	0.2	-
2013	4.1	0.2	0.5	1.8	1.1	-	0.5	0.4	5.8	0.4	-
2018	2.3	0.5	1.2	3.1	1.1	-	0.1	0.1	18.8	-	0.0

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

**Table 24-09.11 - Forb Species.** Nested frequency and modified Daubenmire average cover by year.

FORB SPECIES	Achillea millefolium (Common yarrow)	Androsace septentrionalis <sup>a</sup> (pygmy/flower rockjasmine)	Antennaria microphylla (littleleaf pussytoes)	Arabis (rockcross)	Astragalus humistratus (groundcover milkvetch)	Astragalus newberryi (Newberry's milkvetch)	Balsamorhiza hookeri (Hooker's balsamroot)	Castilleja linariifolia (Wyoming Indian paintbrush)	Chaenactis douglasii (Douglas' dustymaiden)	Cirsium (thistle)	Cordylanthus <sup>a</sup> (bird's-beak)	Crepis acuminata (tapertip hawkbeard)	Cryptantha (cryptantha)	Erigeron eatonii (Eatons' fleabane)	Erigeron pumilus (shaggy fleabane)	Eriogonum racemosum (redroot buckwheat)	Eriogonum umbellatum (sulphur-flower buckwheat)
year	Nested Frequency																
1997	-	-	47	1	103	-	-	3	5	26	-	-	1	33	16	197	58
2003	-	-	49	-	3	-	-	9	-	19	-	9	-	32	31	180	49
2008	10	5	43	12	57	-	-	1	-	28	-	16	7	32	-	214	47
2013	16	1	42	-	68	4	1	7	1	44	21	1	2	22	13	180	75
2018	19	4	51	3	46	-	-	7	-	25	-	12	-	39	2	145	58
year	Average Cover (%)																
1997	-	-	1.3	0.0	0.7	-	-	0.0	0.0	0.4	-	-	0.0	0.2	0.1	1.4	0.6
2003	-	-	0.7	-	0.0	-	-	0.0	-	0.3	-	0.1	-	0.2	0.3	1.7	0.7
2008	0.2	0.0	0.8	0.0	0.5	-	-	0.0	-	1.3	-	0.0	0.0	0.2	-	3.1	0.5
2013	0.5	0.0	1.5	-	1.8	0.0	0.0	0.1	0.0	1.0	0.2	0.0	0.0	0.1	0.1	3.1	0.9
2018	0.3	0.0	2.9	0.0	0.7	-	-	0.0	-	0.2	-	0.0	-	0.3	0.0	0.9	0.5

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

FORB SPECIES	Galium boreale (northern bedstraw)	Gayophytum ramosissimum <sup>a</sup> (pinyon groundsmoke)	Hymenopappus filifolius (fineleaf hymenopappus)	Linum lewisii (Lewis flax)	Lotus utahensis (Utah bird's-foot trefoil)	Lupinus pusillus <sup>d</sup> (rusty lupine)	Lupinus sericeus (silky lupine)	Microsteris gracilis <sup>a</sup> (slender phlox)	Orthocarpus <sup>a</sup> (owl's-clover)	Packera multilobata (lobeleaf groundsel)	Penstemon comarrhenus (dusty beardtongue)	Phlox longifolia (longleaf phlox)	Pleiocanthus spinosus (thorn skeletonweed)	Polygonum douglasii <sup>a</sup> (Douglas' knotweed)	Potentilla diversifolia (varileaf cinquefoil)	Sphaeralcea coccinea (scarlet globemallow)	Symphotrichum (aster)
year	Nested Frequency																
1997	5	-	-	1	1	-	54	2	2	21	5	20	16	24	10	12	3
2003	-	7	2	-	22	-	29	-	19	53	-	11	5	-	9	4	1
2008	-	6	-	-	80	15	18	-	11	42	9	55	8	2	4	7	-
2013	-	2	2	6	65	10	16	-	-	23	13	23	4	3	8	5	3
2018	-	3	-	-	11	3	3	-	-	10	6	9	1	-	-	6	-
year	Average Cover (%)																
1997	0.0	-	-	0.0	0.0	-	1.3	0.0	0.0	0.2	0.0	0.0	0.1	0.1	0.2	0.0	0.0
2003	-	0.0	0.0	-	0.1	-	0.3	-	0.1	0.4	-	0.0	0.2	-	0.1	0.0	0.0
2008	-	0.0	-	-	1.8	0.1	0.9	-	0.1	0.2	0.2	0.1	0.0	0.0	0.3	0.0	-
2013	-	0.0	0.2	0.0	1.1	0.1	0.4	-	-	0.1	0.0	0.1	0.0	0.0	0.2	0.0	0.2
2018	-	0.0	-	-	0.1	0.0	0.1	-	-	0.0	0.0	0.0	0.1	-	-	0.0	-

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

FORB SPECIES	Taraxacum officinale (common dandelion)	Tetranæuris acaulis (stemless four-nerve daisy)
year	Nested Frequency	
1997	3	6
2003	-	-
2008	-	7
2013	-	2
2018	-	2
year	Average Cover (%)	
1997	0.0	0.0
2003	-	-
2008	-	0.0
2013	-	0.0
2018	-	0.0

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

**Table 24-09.12 - Shrub and Tree Species.** Average modified Daubenmire quadrat and line intercept cover by year.

SHRUB SPECIES											
Artemisia nova <sup>p</sup> (black sagebrush)											
Artemisia tridentata ssp. vaseyana <sup>p</sup> (mountain big sagebrush)											
Chrysothamnus depressus <sup>p</sup> (longflower rabbitbrush)											
Chrysothamnus viscidiflorus ssp. viscidiflorus var. viscidiflorus (yellow rabbitbrush)											
Ericameria nauseosa ssp. nauseosa var. hololeuca <sup>p</sup> (rubber rabbitbrush)											
Ericameria parryi var. parryi (Parry's rabbitbrush)											
Gutierrezia sarothrae (broom snakeweed)											
Linanthus pungens (granite prickly phlox)											
Purshia tridentata <sup>p</sup> (antelope bitterbrush)											
Symphoricarpos oreophilus <sup>p</sup> (mountain snowberry)											
Tetradymia canescens (spineless horsebrush)											
year	Line Intercept Cover (%)										
1997	-	-	-	-	-	-	-	-	-	-	-
2003	18	1.5	1.1	1	1.1	0.1	-	0.1	0.1	0.3	-
2008	14.2	0.9	-	3.9	-	0.3	-	0.2	0.2	-	0
2013	20.4	2	3.9	0.3	-	1.9	-	1	0.6	0.2	0
2018	20.9	2.3	-	4.3	-	0.5	0.2	0.6	0.9	0.4	0
year	Quadrat Cover (%)										
1997	12.1	1.6	3.4	1.9	0.0	0.0	-	0.0	-	0.0	-
2003	20.9	1.7	2.6	2.0	0.9	0.4	-	0.4	0.0	0.0	0.1
2008	12.9	0.4	-	3.5	-	0.6	-	0.6	0.4	0.0	0.0
2013	13.8	2.6	2.5	0.1	-	1.3	-	0.8	0.4	0.0	0.0
2018	19.6	2.0	0.2	5.3	-	0.7	0.0	1.0	0.8	0.1	0.0

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

**Table 24-09.13 - 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 (%)				
<b>Artemisia nova<sup>p</sup> -- (black sagebrush)</b>									
1997	9920	480	14	69	17	4	0	12	32/50
2003	18820	80	12	75	13	3	0	4	32/45
2008	13780	4440	11	59	30	40	1	19	27/39
2013	10220	620	5	93	2	49	7	5	24/42
2018	12800	80	8	89	3	19	0	16	25/40
<b>Artemisia tridentata ssp. vaseyana<sup>p</sup> -- (mountain big sagebrush)</b>									
1997	340	80	0	65	35	18	0	6	55/80
2003	460	-	4	78	17	61	0	4	60/81
2008	420	80	10	71	19	5	14	19	38/49
2013	860	20	9	91	0	49	14	2	29/46
2018	780	20	36	62	3	21	3	15	42/61
<b>Chrysothamnus depressus<sup>p</sup> -- (longflower rabbitbrush)</b>									
1997	3040	20	19	81	0	0	0	0	14/25
2003	3980	-	0	100	0	0	0	0	11/22
2008	440	20	18	59	23	9	5	0	10/20
2013	4000	120	4	97	0	1	0	0	13/27
2018	120	-	17	83	0	50	33	0	12/18
<b>Chrysothamnus viscidiflorus ssp. viscidiflorus var. viscidiflorus -- (yellow rabbitbrush)</b>									
1997	1880	-	0	99	1	2	0	1	22/37
2003	2960	-	3	94	3	0	0	1	16/29
2008	7700	140	9	89	2	13	4	3	13/22
2013	200	-	40	60	0	0	0	0	26/35
2018	7680	40	7	93	0	29	4	13	13/25

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 (%)				
<b>Ericameria nauseosa ssp. nauseosa var. hololeuca<sup>p</sup> -- (rubber rabbitbrush)</b>									
1997	180	-	56	44	0	0	0	0	18/25
2003	1280	-	0	95	5	8	0	2	12/25
2008	-	-	-	-	-	-	-	-	-/-
2013	-	-	-	-	-	-	-	-	-/-
2018	-	-	-	-	-	-	-	-	-/-
<b>Ericameria parryi var. parryi -- (Parry's rabbitbrush)</b>									
1997	80	-	25	75	0	0	0	0	22/25
2003	1480	-	1	99	0	18	26	0	14/20
2008	1360	-	6	91	3	10	3	2	15/21
2013	2840	-	1	99	0	1	0	0	18/26
2018	1680	20	1	99	0	46	21	0	13/17
<b>Gutierrezia sarothrae -- (broom snakeweed)</b>									
1997	20	-	0	100	0	0	0	0	16/16
2003	-	-	-	-	-	-	-	-	-/-
2008	-	-	-	-	-	-	-	-	-/-
2013	-	-	-	-	-	-	-	-	11/19
2018	120	-	0	100	0	0	0	0	12/14
<b>Linanthus pungens -- (granite prickly phlox)</b>									
1997	460	20	0	96	4	0	0	4	15/19
2003	880	-	0	89	11	0	0	5	15/18
2008	1120	180	5	88	7	7	0	2	10/14
2013	740	-	8	92	0	8	0	8	18/23
2018	700	-	9	91	0	3	17	29	15/19
<b>Opuntia -- (pricklypear)</b>									
1997	-	-	-	-	-	-	-	-	4/13
2003	-	-	-	-	-	-	-	-	-/-
2008	-	-	-	-	-	-	-	-	-/-
2013	-	-	-	-	-	-	-	-	-/-
2018	-	-	-	-	-	-	-	-	9/16
<b>Purshia tridentata<sup>p</sup> -- (antelope bitterbrush)</b>									
1997	-	-	-	-	-	-	-	-	-/-
2003	100	-	0	80	20	0	100	20	25/55
2008	60	20	33	67	0	0	0	0	29/41
2013	60	20	0	100	0	33	67	0	51/83
2018	160	-	0	100	0	13	88	0	40/107
<b>Symphoricarpos oreophilus<sup>p</sup> -- (mountain snowberry)</b>									
1997	20	-	0	100	0	100	0	0	31/75
2003	40	-	0	100	0	0	0	0	25/60
2008	-	-	-	-	-	-	-	-	34/87
2013	40	-	0	100	0	0	0	0	43/65
2018	100	-	20	60	20	20	20	40	28/39
<b>Tetradymia canescens -- (spineless horsebrush)</b>									
1997	20	-	100	0	0	0	0	0	- / -
2003	80	-	0	100	0	0	0	0	18/24
2008	20	-	0	0	100	0	0	100	23/15
2013	20	-	0	100	0	100	0	0	28/35
2018	20	-	0	100	0	0	0	0	27/30

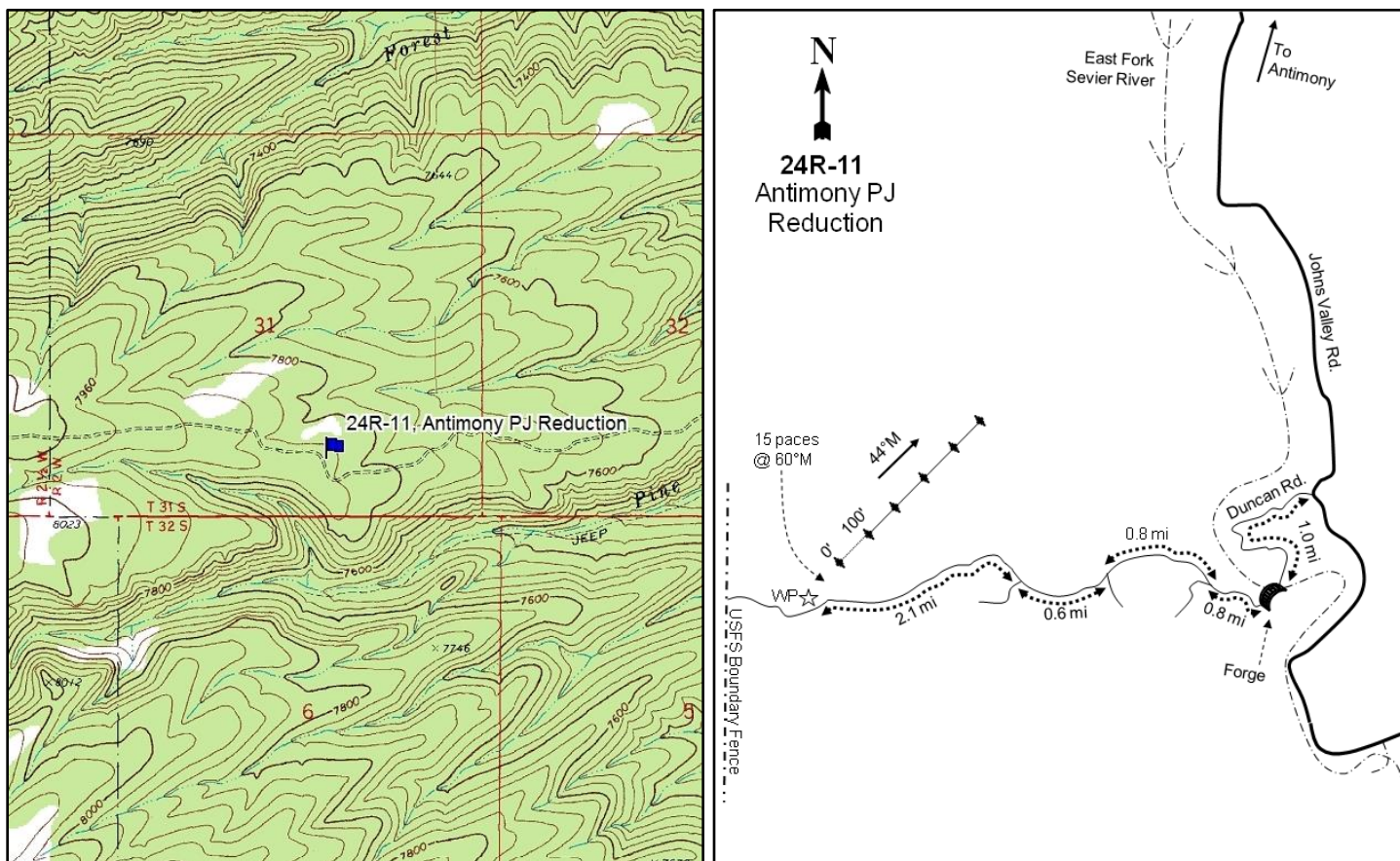
t - Tree Species; p - Preferred Browse; i - Introduced Species



**Table 24-09.14 - Tree Characteristics.** Point-quarter tree density, size class distribution, and average diameter.

Year	Density	Size Class Distribution					Average Diameter (cm)
	Trees per Acre	Seedling (%)	1-4' (%)	4-8' (%)	8-12' (%)	>12' (%)	
Juniperus scopulorum (Rocky Mountain juniper)							
2018	7	-	-	100	-	-	7.0

## ANTIMONY PJ REDUCTION - STUDY NO. 24R-11

**Location Information**

USGS 7.5 min Map Info  
GPS (0' Stake)

Deep Creek SE; Township 31S, Range 2W, Section 31  
NAD 83 UTM ZONE 12, 408097 East 4213076 North

**Transect Information**

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

9156  
42° magnetic  
500ft  
Line 1 (11ft), Line 2 (34ft), Line 3 (59ft), Line 4 (71ft), Line 5 (95ft)  
Standard

**Directions to Site**

From Johns Valley Road south of Antimony, travel to Duncan Road. From there, drive 1.0 miles to the forge crossing the Sevier River. Continue for 0.8 miles and stay left, then proceed for 0.6 miles and stay left again. Travel 2.1 miles to the witness post on the right (north) side of the road. From the witness post, walk 15 paces at 60 degrees magnetic to the 0-foot stake, which is marked with browse tag #9156.

**Site Information**

Land Ownership	Federal
Land Administrator	BLM
Allotment	PINE CREEK ANTIMONY
Elevation	7,841ft (2,390m)
Aspect	Northeast
Slope	4-5%
Sample Dates	08/08/2012, 08/18/2015, 06/21/2018

**Table 24R-11.1 Disturbance History.** Recorded history of major disturbances.

Treatment/Disturbance	Name	WRI DB#	Date	Size (acres)
Mechanical - Bullhog	Antimony PJ Reduction and Riparian Improvement (Phase V)	2239	Fall 2012	1005
Seeding - Aerial Before	Antimony PJ Reduction and Riparian Improvement (Phase V)	2239	Fall 2012	1005

**Table 24R-11.2 Seed Mix.** List of known seeded plant species and rates (if available).

Mix Name			Application Type	Application Date	Acres
Antimony PJ Reduction			Aerial	Sep 2012	1207
Type	Species	Common Name	Cultivar/Source ID	Bulk lbs/acre	PLS
G	<i>Festuca ovina</i>	Sheep Fescue	Covar	0.25	0.21
G	<i>Pseudoroegneria spicata</i>	Bluebunch Wheatgrass	Anatone	0.21	0.19
F	<i>Helianthus annuus</i>	Annual Sunflower		0.75	0.71
F	<i>Linum perenne</i>	Blue Flax	Appar	0.50	0.44
F	<i>Medicago sativa</i>	Alfalfa	Ladak DL	0.50	0.46
F	<i>Melilotus officinalis</i>	Yellow Sweetclover		0.50	0.47
F	<i>Onobrychis viciifolia</i>	Sainfoin	Eski	2.03	1.59
F	<i>Sanguisorba minor</i>	Small Burnet	Delar	2.03	1.81

**Wildlife Habitat and Vegetation History****Table 24R-11.3 - Wildlife Seasonal Habitat.** UDWR wildlife habitat and seasonality.

Species	Habitat	Season
Deer	crucial	winter
Elk	crucial	winter

**Table 24R-11.4 - 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 III
2015	Mixed Shrub/Perennial Grass/Annual Forb	Phase I
2018	Mixed Shrub/Perennial Grass	Phase I

**Site Notes**

Elk shed antlers were found on site in 2012 and 2018.

**Site Potential**

1981 - 2010 Average Annual Precipitation	13 inches
NRCS Ecological Site	Upland Stony Loam (Mountain Big Sagebrush)
NRCS Ecological Site #	R047XB336UT
States and Transitions	No state and transition model is available for this ecological site.

Upon establishment in 2012, this site was in Phase III of woodland succession and dominated by twoneedle pinyon (*Pinus edulis*) and Utah juniper (*Juniperus osteosperma*) (Photos, Table 24R-11.4, Table 24R-11.14) with minimal herbaceous cover (Table 24R 11.7). Following a bullhog treatment later in 2012 (Table 24R-11.1), the plant community transitioned to a mixed shrub community type, with black sagebrush (*Artemisia nova*), broom snakeweed (*Gutierrezia sarothrae*), and mountain big sagebrush (*A. tridentata* ssp. *vaseyana*) being the dominant shrubs (Table 24R-11.12). The herbaceous understory improved following the treatment, with a substantial increase in perennial grasses, mainly blue grama (*Bouteloua gracilis*) and squirreltail (*Elymus elymoides*) (Table 24R-11.7, Table 24R-11.10, Table 24R-11.11). It is likely that this site will remain in a similar state in future sample years.

**Trend Summary Tables****Table 24R-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
2012	6.1	0.0	18.9	8.2	-	36.6
2015	5.8	1.7	0.0	6.3	3.4	1.9
2018	7.2	0.7	0.2	6.7	2.3	0.1

**Table 24R-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
2012	-	109	4	24	-	1.9	0.0	0.1
2015	-	254	80	95	-	14.2	4.8	2.3
2018	-	329	-	34	-	18.6	-	0.5

**Table 24R-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
2012	3.3	1.2	55.1	25.6	12.9	27.8
2015	3.7	0.1	72.4	8.8	5.6	26.0
2018	10.1	-	69.7	9.4	3.5	24.4

**Table 24R-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	Rabbit
	Quadrat Frequency			
2012	-	-	-	2
2015	3	3	1	9
2018	5	10	4	33
Days Use Per Acre (ha)				
2012	-	4.0 (9.9)	2.0 (5.0)	-
2015	0.7 (1.8)	4.0 (9.9)	-	-
2018	9.4 (23.3)	5.3 (13.2)	9.4 (23.2)	-

**Table 24R-11.10 - Grass Species.** Nested frequency and modified Daubenmire average cover by year.

GRASS SPECIES	Achnatherum hymenoides (Indian ricegrass)	Agropyron cristatum <sup>i</sup> (crested wheatgrass)	Bouteloua gracilis (blue grama)	Elymus elymoides (squirreltail)	Festuca idahoensis (Idaho fescue)	Hesperostipa comata (needle and thread)	Pascopyrum smithii (western wheatgrass)	Poa fendleriana (muttongrass)	Poa secunda (Sandberg bluegrass)	Pseudoroegneria spicata (bluebunch wheatgrass)
year	Nested Frequency									
2012	4	3	66	3	-	3	1	30	3	-
2015	1	9	72	144	13	5	1	45	-	29
2018	1	9	80	218	38	8	5	41	28	55
year	Average Cover (%)									
2012	0.0	0.1	1.2	0.0	-	0.0	0.0	0.5	0.0	-
2015	0.1	0.1	5.3	5.0	0.4	0.2	0.0	2.3	-	0.9
2018	0.0	0.3	3.9	7.5	1.3	0.2	0.2	1.8	1.1	2.2

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

**Table 24R-11.11 - Forb Species.** Nested frequency and modified Daubenmire average cover by year.

FORB SPECIES	Arabis (rockcress)	Astragalus (milkvetch)	Astragalus calycosus (Torrey's milkvetch)	Astragalus lentiginosus (freckled milkvetch)	Astragalus newberryi (Newberry's milkvetch)	Chaenactis douglasii (Douglas' dustymaiden)	Chamaesyce (sandmat)	Chenopodium fremontii <sup>a</sup> (Fremont's goosefoot)	Chenopodium leptophyllum <sup>a</sup> (narrowleaf goosefoot)	Cryptantha (cryptantha)	Descurainia pinnata <sup>a</sup> (western tansymustard)	Eriogonum alatum (winged buckwheat)	Gayophytum ramosissimum <sup>a</sup> (pinyon groundsmoke)	Helianthus annuus <sup>a</sup> (common sunflower)	Ipomopsis aggregata (scarlet gilia)	Lappula occidentalis <sup>a</sup> (flatspine stickseed)	Linum perenne <sup>i</sup> (blue flax)
year	Nested Frequency																
2012	14	1	-	-	-	-	1	-	-	-	4	3	-	-	3	-	-
2015	-	-	-	0	-	6	-	2	1	4	8	-	2	70	-	4	56
2018	1	3	1	1	3	4	-	-	-	4	-	-	-	-	-	-	7
year	Average Cover (%)																
2012	0.0	0.0	-	-	-	-	0.0	-	-	-	0.0	0.0	-	-	0.0	-	-
2015	-	-	-	0.0	-	0.0	-	0.0	0.0	0.0	0.1	-	0.0	4.6	-	0.0	1.5
2018	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	Machaeranthera canescens (hoary tansyaster)	Medicago sativa <sup>i</sup> (alfalfa)	Melilotus officinalis <sup>i</sup> (sweetclover)	Packera multilobata (lobeleaf groundsel)	Penstemon (beardtongue)	Phlox longifolia (longleaf phlox)	Sanguisorba minor <sup>i</sup> (small burnet)	Solanum triflorum <sup>a</sup> (cutleaf nightshade)	Sphaeralcea grossulariifolia (gooseberry/leaf globemallow)	Trifolium (clover)
year	Nested Frequency									
2012	-	-	-	1	1	-	-	-	-	1
2015	2	4	3	12	-	4	23	4	0	3
2018	-	1	-	-	-	-	10	-	1	5
year	Average Cover (%)									
2012	-	-	-	0.0	0.0	-	-	-	-	0.0
2015	0.0	0.0	0.0	0.2	-	0.0	0.4	0.0	0.1	0.0
2018	-	0.0	-	-	-	-	0.1	-	0.0	0.0

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

**Table 24R-11.12 - Shrub and Tree Species.** Average modified Daubenmire quadrat and line intercept cover by year.

SHRUB SPECIES	Artemisia nova <sup>p</sup> (black sagebrush)	Artemisia tridentata ssp. vaseyana <sup>p</sup> (mountain big sagebrush)	Ericameria nauseosa (rubber rabbitbrush)	Gutierrezia sarothrae (broom snakeweed)	Juniperus osteosperma <sup>t</sup> (Utah juniper)	Pinus edulis <sup>t</sup> (twoneedle pinyon)	Purshia tridentata <sup>p</sup> (antelope bitterbrush)
year	Line Intercept Cover (%)						
2012	1.5	1.1	-	-	2.7	33.9	5.6
2015	3.4	1.9	0.6	2.8	1.9	-	1
2018	3.1	3	0.5	1.8	-	0.1	0.6
year	Quadrat Cover (%)						
2012	1.2	1.6	-	0.0	1.9	17.1	3.3
2015	1.3	3.3	0.0	1.7	0.0	0.0	1.2
2018	1.9	3.4	0.0	0.7	0.1	0.0	1.8

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

**Table 24R-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 (%)				
<b>Artemisia nova<sup>p</sup> -- (black sagebrush)</b>									
2012	820	-	2	88	10	12	7	20	23/43
2015	920	-	2	98	0	28	4	7	28/51
2018	840	-	7	91	2	0	0	0	32/59
<b>Artemisia tridentata ssp. vaseyana<sup>p</sup> -- (mountain big sagebrush)</b>									
2012	680	-	18	68	15	15	9	47	32/52
2015	580	-	0	100	0	35	0	0	41/61
2018	600	-	0	97	3	0	0	3	43/75

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 (%)				
<b>Ericameria nauseosa -- (rubber rabbitbrush)</b>									
2012	-	-	-	-	-	-	-	-	-/-
2015	20	-	0	100	0	0	0	0	62/102
2018	80	-	0	100	0	0	0	0	53/67
<b>Gutierrezia sarothrae -- (broom snakeweed)</b>									
2012	40	-	100	0	0	0	0	0	20/13
2015	840	-	0	100	0	0	0	0	33/46
2018	900	-	4	91	4	0	0	2	20/31
<b>Juniperus osteosperma<sup>i</sup> -- (Utah juniper)</b>									
2012	160	220	50	50	0	0	0	0	-/-
2015	-	40	0	0	0	0	0	0	-/-
2018	40	-	100	0	0	0	0	0	-/-
<b>Opuntia -- (pricklypear)</b>									
2012	-	-	-	-	-	-	-	-	10/23
2015	-	-	-	-	-	-	-	-	-/-
2018	-	-	-	-	-	-	-	-	9/17
<b>Pediocactus simpsonii -- (mountain ball cactus)</b>									
2012	-	-	-	-	-	-	-	-	7/5
2015	-	-	-	-	-	-	-	-	-/-
2018	20	-	0	100	0	0	100	0	-/-
<b>Pinus edulis<sup>i</sup> -- (twoneedle pinyon)</b>									
2012	440	80	50	50	0	0	0	0	-/-
2015	-	320	0	0	0	0	0	0	-/-
2018	120	120	100	0	0	0	0	17	-/-
<b>Purshia tridentata<sup>p</sup> -- (antelope bitterbrush)</b>									
2012	360	-	6	50	44	22	6	28	71/108
2015	300	-	27	73	0	13	47	7	34/75
2018	500	-	20	80	0	28	60	16	32/60
<b>Tetradymia canescens -- (spineless horsebrush)</b>									
2012	20	-	0	100	0	0	0	0	20/17
2015	40	-	0	100	0	0	0	0	37/39
2018	20	-	0	0	100	0	0	100	70/94

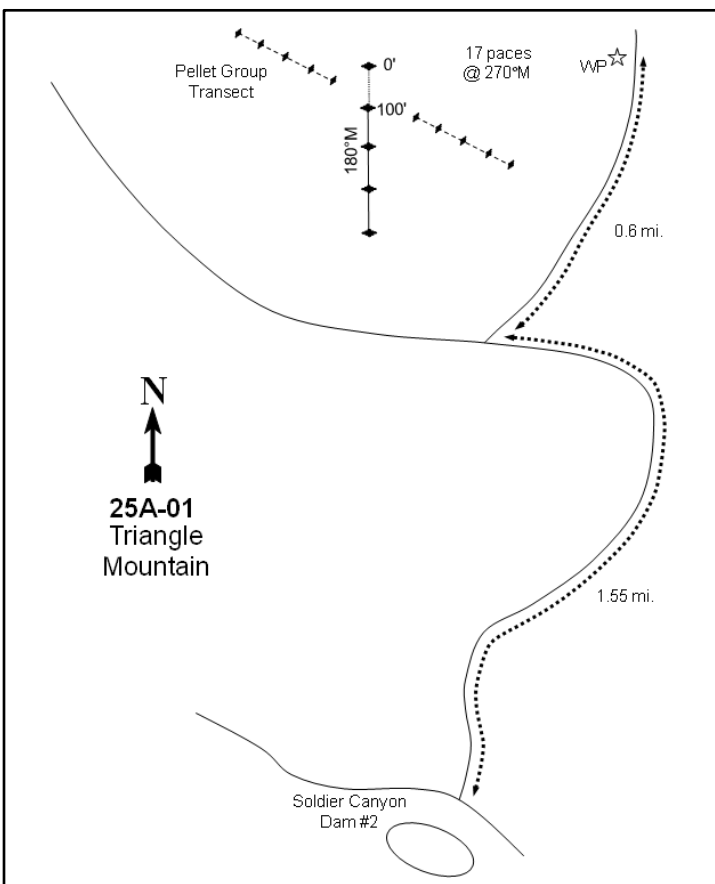
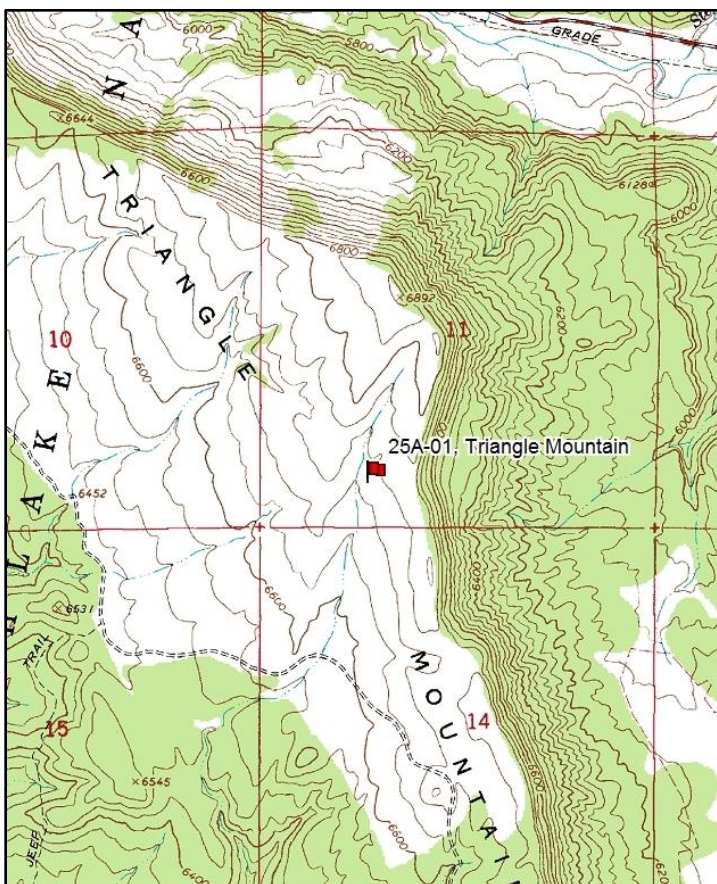
t - Tree Species; p - Preferred Browse; i - Introduced Species

**Table 24R-11.14 - Tree Characteristics.** Point-quarter tree density, size class distribution, and average diameter.

Year	Density	Size Class Distribution					Average Diameter (cm)
	Trees per Acre	Seedling (%)	1-4' (%)	4-8' (%)	8-12' (%)	>12' (%)	
<b>Juniperus osteosperma (Utah juniper)</b>							
2012	116	12	35	18	-	35	14.1
2015	27	62	31	-	-	8	5.0
2018	32	19	75	-	-	6	5.9
<b>Pinus edulis (twoneedle pinyon)</b>							
2012	229	10	15	15	20	40	17.1
2015	60	100	-	-	-	-	1.2
2018	68	82	18	-	-	-	1.2



## TRIANGLE MOUNTAIN - STUDY NO. 25A-1



### Location Information

USGS 7.5 min Map Info  
GPS (0' Stake)

Salina SE; Township 22S, Range 1E, Section 11  
NAD 83 UTM ZONE 12, 433160 East 4306455 North

### Transect Information

Browse Tag # (0' Stake)	278
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

From Gooseberry Creek Road outside of Salina, travel west on Soldier Canyon Road for approximately 2.5 miles to Soldier Canyon Dam #2. At the dam, turn right and proceed on the road to Triangle Mountain. Go 1.55 miles to a fork. Bear right at the fork and continue for 0.6 miles to the top of a low rise between two small draws. Walk 17 paces due west of the road to the 0-foot baseline stake, which is a 4-foot tall rebar marked with browse tag #278. A pellet group transect crosses the frequency baseline at the 100-foot mark.

**Site Information**

Land Ownership	Federal
Land Administrator	USFS
Allotment	Browns Hole Allotment
Elevation	6,700ft (2,042m)
Aspect	Southwest
Slope	5-10%
Sample Dates	08/12/1999, 08/24/2004, 06/11/2009, 08/22/2013, 07/03/2018

**Table 25A-01.1 Disturbance History.** Recorded history of major disturbances.

Treatment/Disturbance	Name	WRI DB#	Date	Size (acres)
Chaining - Chain Unknown	-	-	1970	-
Seeding - Seed Unknown	-	-	1970	-
Harrow - Two-Way Dixie	Fishlake NF PJ Maintenance-Sagebrush Enhancement - Year 1	216	Fall 2005	4079
Seeding - Broadcast	Fishlake NF PJ Maintenance-Sagebrush Enhancement - Year 1	216	Fall 2005	1600

**Table 25A-01.2 Seed Mix.** List of known seeded plant species and rates (if available).

Mix Name			Application Type	Application Date	Acres
Fishlake National Forest PJ Maintenance			Broadcast	Oct 2005	1600
Type	Species	Common Name	Cultivar/Source ID	Bulk lbs/acre	PLS
G	Bromus marginatus	Mountain Brome	Bromar	0.13	0.13
G	Bromus marginatus	Mountain Brome	Bromar	1.88	1.83
G	Elymus lanceolatus	Thickspike Wheatgrass	Critana	2.00	1.70
G	Elymus trachycaulus	Slender Wheatgrass	Pryor	1.45	1.40
G	Elymus trachycaulus	Slender Wheatgrass		0.56	0.50
F	Linum perenne	Blue Flax		0.88	0.76
F	Medicago sativa	Alfalfa	Nomad	1.00	0.93
F	Onobrychis viciifolia	Sainfoin	Eski	1.00	0.94
F	Sanguisorba minor	Small Burnet	Delar	1.00	0.94

**Wildlife Habitat and Vegetation History**

**Table 25A-01.3 - Wildlife Seasonal Habitat.** UDWR wildlife habitat and seasonality.

Species	Habitat	Season
Deer	crucial	winter
Elk	substantial	winter

**Table 25A-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	Perennial Grass	Phase I
1991	Perennial Grass	Phase I
1999	Perennial Grass/Pinyon-Juniper	Phase I transitioning to Phase II
2004	Perennial Grass/Pinyon-Juniper	Phase I transitioning to Phase II
2009	Perennial Grass	Phase I
2013	Perennial Grass	Phase I
2018	Perennial Grass	Phase I

**Site Notes**

The site may have been treated by a brush saw or lop and scatter.

**Soils**

**Table 25A-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	7.6	40.0	34.7	25.3	5.8	6.5	243.2	0.7	08/12/1999

**Site Potential**

1981 - 2010 Average Annual Precipitation	13 inches
NRCS Ecological Site	Upland Loam (Black Sagebrush)
NRCS Ecological Site #	R047XB309UT
States and Transitions	No state and transition model is available for this ecological site.

When established in 1985, this study site was dominated by seeded introduced perennial grass species such as crested wheatgrass (*Agropyron cristatum*) and intermediate wheatgrass (*Thinopyrum intermedium*) (Pre-1992 Data). Young twoneedle pinyon (*Pinus edulis*) and Utah juniper (*Juniperus osteosperma*) had begun to reestablish following a chaining treatment that took place in 1970, and the site began to transition from Phase I to Phase II of woodland succession as trees increased in size and abundance (Photos, Table 25A-01.14). However, the site was retreated in 2005, and the study has been considered to be within Phase I since 2009 (Table 25A-01.1, Table 25A-01.4). Introduced perennial grasses have maintained co-dominance in all sample years; forbs have remained rare (Table 25A-01.7, Table 25A-01.10, Table 25A-01.11). Shrubs have been a minor vegetation component throughout the duration of the study (Table 25A-01.12, Table 25A-01.13).

**Trend Summary Tables**

**Table 25A-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
1999	0.0	-	0.5	-	-	0.3
2004	0.2	0.1	1.2	0.9	0.5	1.4
2009	0.7	0.3	1.0	0.8	0.5	1.3
2013	0.7	0.2	1.3	0.9	0.5	2.0
2018	0.3	1.3	1.9	0.6	2.0	2.4

**Table 25A-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
1999	7	391	304	162	0.0	11.6	1.4	3.7
2004	21	335	313	35	0.1	20.0	3.5	0.5
2009	16	390	350	45	0.1	24.9	6.0	1.0
2013	-	425	369	39	-	24.3	1.9	0.6
2018	25	394	333	23	0.2	21.4	2.8	0.3

**Table 25A-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
1999	18.1	1.2	26.2	10.8	4.5	19.2
2004	18.4	2.3	30.8	23.0	6.7	26.1
2009	33.4	0.4	41.2	6.5	4.1	35.6
2013	13.1	0.1	54.1	7.9	2.6	31.7
2018	33.1	0.7	50.6	6.6	3.6	25.9

**Table 25A-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	Rocky Mountain Elk	Rabbit
	Quadrat Frequency			
1999	10	18	18	27
2004	12	16	12	44
2009	8	17	34	11
2013	4	5	35	14
2018	9	9	35	40
Year	Days Use Per Acre (ha)			
1999	48.6 (120.1)	21.5 (53.0)	59.0 (145.7)	-
2004	5.1 (12.6)	10.0 (24.8)	12.1 (29.8)	-
2009	37.7 (93.2)	4.0 (9.9)	50.9 (125.8)	-
2013	12.3 (30.5)	-	44.2 (109.2)	-
2018	16.0 (39.5)	-	54.3 (134.1)	-

**Table 25A-01.10 - Grass Species.** Nested frequency and modified Daubenmire average cover by year.

GRASS SPECIES	Achnatherum hymenoides (Indian ricegrass)	Agropyron cristatum <sup>i</sup> (crested wheatgrass)	Bromus inermis <sup>i</sup> (smooth brome)	Bromus tectorum <sup>ai</sup> (cheatgrass)	Leymus salinus (saline wildrye)	Poa secunda (Sandberg bluegrass)	Psathyrostachys juncea <sup>i</sup> (Russian wildrye)	Pseudoroegneria spicata (bluebunch wheatgrass)	Thinopyrum intermedium <sup>i</sup> (intermediate wheatgrass)
year	Nested Frequency								
1999	1	284	-	7	-	31	103	2	201
2004	2	236	-	21	19	20	26	-	180
2009	-	290	-	16	1	-	63	13	209
2013	1	332	5	-	-	26	65	7	199
2018	-	245	-	25	1	26	109	6	162
year	Average Cover (%)								
1999	0.0	7.2	-	0.0	-	0.2	1.8	0.0	2.5
2004	0.1	13.3	-	0.1	1.0	0.1	0.6	-	4.9
2009	-	15.6	-	0.1	0.1	-	2.6	0.1	6.4
2013	0.0	16.6	0.1	-	-	0.3	2.9	0.2	4.2
2018	-	11.2	-	0.2	0.0	0.3	4.1	0.2	5.7

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

**Table 25A-01.11 - Forb Species.** Nested frequency and modified Daubenmire average cover by year.

FORB SPECIES	Alyssum desertorum <sup>ai</sup> (desert madwort)	Antennaria (pussytoes)	Astragalus (milkvech)	Ceratocephala testiculata <sup>ai</sup> (curvseed butterwort)	Cryptantha (cryptantha)	Descurainia pinnata <sup>a</sup> (western tansymustard)	Erigeron pumilus (shaggy fleabane)	Gilia inconspicua <sup>a</sup> (shy gilia)	Linum lewisii (Lewis flax)	Lithospermum ruderale (western stone seed)	Medicago sativa <sup>i</sup> (alfalfa)	Melilotus officinalis <sup>i</sup> (sweetclover)	Penstemon (beardtongue)	Phlox austromontana (mountain phlox)	Salsola tragus <sup>ai</sup> (prickly Russian thistle)	Stenotus acaulis (stemless mock goldenweed)	Streptanthus cordatus (heartleaf twistflower)
year	Nested Frequency																
1999	300	7	6	4	61	-	-	-	-	3	108	-	-	1	-	-	-
2004	226	2	2	222	1	4	-	0	-	-	25	-	-	2	-	-	4
2009	340	2	14	136	-	-	-	4	-	-	25	-	3	2	-	-	-
2013	365	1	6	82	-	3	1	-	-	4	10	13	-	3	2	-	1
2018	333	-	8	1	-	-	-	1	-	1	14	-	-	-	-	2	-
year	Average Cover (%)																
1999	1.4	0.0	0.2	0.0	0.9	-	-	-	-	0.0	2.4	-	-	0.0	-	-	-
2004	1.1	0.0	0.0	2.4	0.0	0.0	-	0.0	-	-	0.5	-	-	0.0	-	-	0.0
2009	4.1	0.0	0.2	2.0	-	-	-	0.0	-	-	0.7	-	0.0	0.0	-	-	-
2013	1.7	0.0	0.0	0.2	-	0.0	0.0	-	-	0.1	0.2	0.2	-	0.1	0.0	-	0.0
2018	2.7	-	0.0	0.0	-	-	-	0.0	-	0.0	0.1	-	-	-	-	0.1	-

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

FORB SPECIES		
Symphotrichum (aster)		
Tragopogon dubius <sup>ai</sup> (yellow salsify)		
year	Nested Frequency	
1999	1	-
2004	-	-
2009	-	-
2013	-	2
2018	-	-
year	Average Cover (%)	
1999	0.0	-
2004	-	-
2009	-	-
2013	-	0.0
2018	-	-

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

**Table 25A-01.12 - Shrub and Tree Species.** Average modified Daubenmire quadrat and line intercept cover by year.

SHRUB SPECIES							
Artemisia nova <sup>p</sup> (black sagebrush)							
Chrysothamnus viscidiflorus (yellow rabbitbrush)							
Ericameria nauseosa (rubber rabbitbrush)							
Gutierrezia sarothrae (broom snakeweed)							
Juniperus osteosperma <sup>t</sup> (Utah juniper)							
Linanthus pungens (granite prickly phlox)							
Pinus edulis <sup>t</sup> (twoneedle pinyon)							
year	Line Intercept Cover (%)						
1999	-	-	-	-	-	-	-
2004	0.9	0	-	0.5	1.4	-	-
2009	0.8	-	-	0.5	1.3	-	-
2013	0.9	-	-	0.4	2	0.1	-
2018	0.6	-	-	1.9	2.4	0.1	-
year	Quadrat Cover (%)						
1999	0.0	-	-	-	-	-	0.5
2004	0.2	0.1	-	0.0	1.2	-	-
2009	0.7	-	0.0	0.3	1.0	-	-
2013	0.7	-	0.0	0.2	1.3	0.0	-
2018	0.3	-	-	1.3	1.9	0.0	-

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

**Table 25A-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 (%)				
<b>Artemisia nova<sup>P</sup> -- (black sagebrush)</b>									
1999	480	40	38	63	0	29	0	4	34/49
2004	420	-	0	81	19	19	0	5	27/44
2009	420	-	14	86	0	5	0	5	30/59
2013	380	-	5	95	0	11	16	0	30/63
2018	420	60	10	91	0	14	0	0	38/69
<b>Chrysothamnus viscidiflorus -- (yellow rabbitbrush)</b>									
1999	40	-	0	100	0	0	0	0	20/21
2004	60	-	0	100	0	0	0	0	15/19
2009	40	-	0	100	0	100	0	100	20/19
2013	-	-	-	-	-	-	-	-	29/44
2018	-	-	-	-	-	-	-	-	-/-
<b>Ericameria nauseosa -- (rubber rabbitbrush)</b>									
1999	40	-	50	50	0	0	0	0	46/40
2004	-	-	-	-	-	-	-	-	44/49
2009	20	-	0	100	0	0	0	0	60/78
2013	20	-	100	0	0	0	0	0	92/134
2018	20	-	100	0	0	0	0	0	68/118
<b>Ericameria nauseosa ssp. nauseosa var. hololeuca<sup>P</sup> -- (rubber rabbitbrush)</b>									
1999	-	-	-	-	-	-	-	-	-/-
2004	-	-	-	-	-	-	-	-	66/102
2009	-	-	-	-	-	-	-	-	-/-
2013	-	-	-	-	-	-	-	-	-/-
2018	240	-	0	100	0	0	0	0	79/110
<b>Gutierrezia sarothrae -- (broom snakeweed)</b>									
1999	20	-	0	100	0	0	0	0	23/18
2004	120	-	0	100	0	0	0	0	28/36
2009	460	-	4	96	0	0	0	0	19/27
2013	780	-	8	90	3	3	0	85	15/18
2018	2880	20	0	96	4	0	0	2	20/26
<b>Juniperus osteosperma<sup>I</sup> -- (Utah juniper)</b>									
1999	-	-	-	-	-	-	-	-	-/-
2004	20	-	0	100	0	0	0	0	-/-
2009	40	-	0	0	100	0	0	100	-/-
2013	20	-	0	100	0	0	0	0	-/-
2018	40	-	0	100	0	0	0	0	-/-
<b>Linanthus pungens -- (granite prickly phlox)</b>									
1999	60	-	0	100	0	0	0	0	11/32
2004	40	-	0	100	0	0	0	0	14/27
2009	-	-	-	-	-	-	-	-	-/-
2013	20	-	0	100	0	0	0	100	15/34
2018	80	-	0	100	0	0	0	0	7/23
<b>Pinus edulis<sup>I</sup> -- (twoneedle pinyon)</b>									
1999	60	-	0	100	0	0	0	0	-/-

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

**Table 25A-01.14 - Tree Characteristics.** Point-quarter tree density, size class distribution, and average diameter.

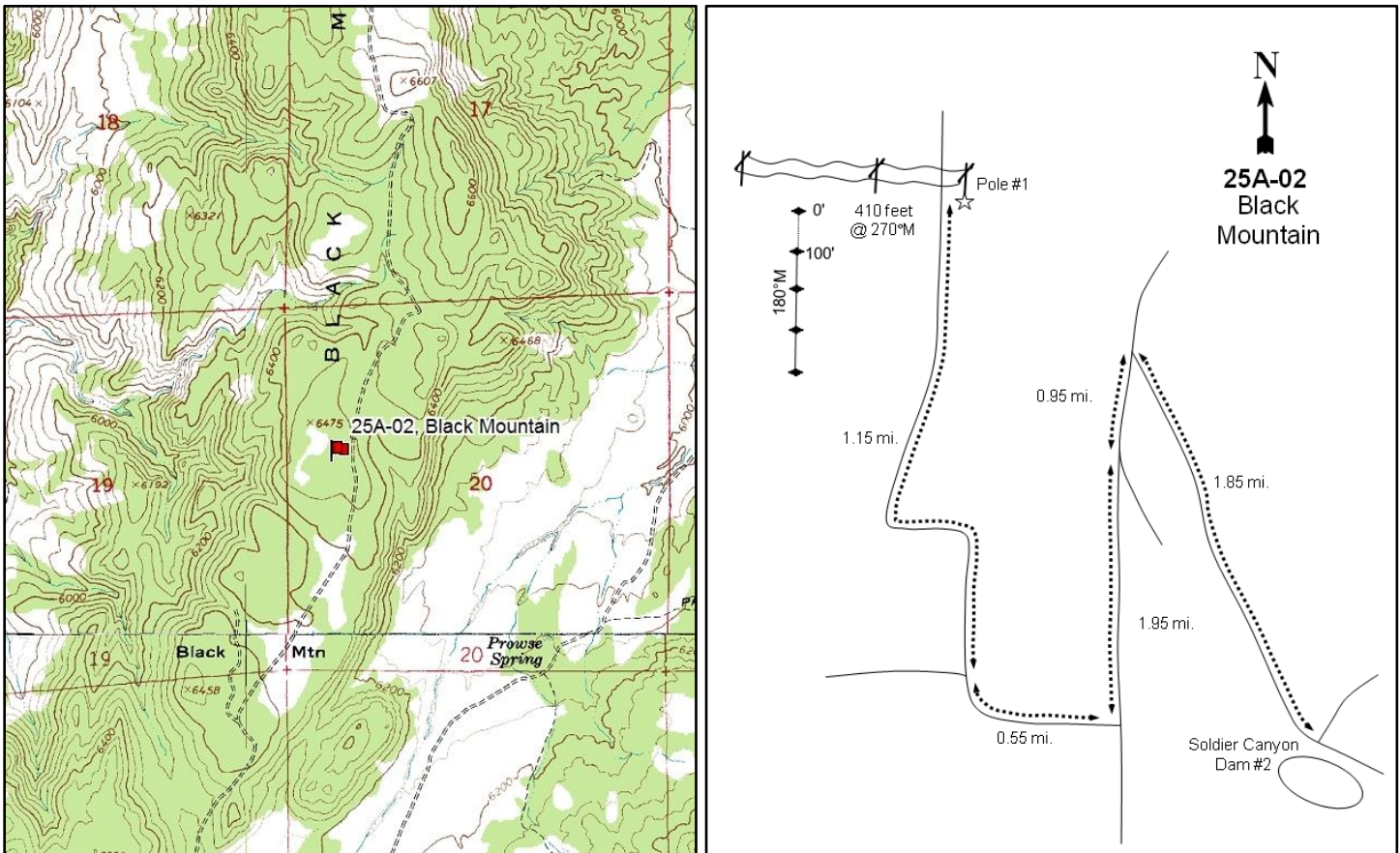
Year	Density	Size Class Distribution					Average Diameter (cm)
	Trees per Acre	Seedling (%)	1-4' (%)	4-8' (%)	8-12' (%)	>12' (%)	
<b>Juniperus osteosperma (Utah juniper)</b>							
1999	27	-	-	-	-	-	13.4
2004	28	-	31	23	23	23	11.6
2009	11	-	57	43	-	-	10.9
2013	14	13	50	25	-	13	7.0
2018	15	11	44	33	11	-	8.7
<b>Pinus edulis (twoneedle pinyon)</b>							
1999	41	-	-	-	-	-	10.9
2004	40	-	-	75	13	13	11.9
2009	3	-	-	67	-	33	12.0
2013	6	-	25	50	25	-	8.0
2018	13	50	50	-	-	-	2.5

**Table -25A-01.15 - Deer Desirable Components Index: Mid Potential Scale.**

Year	Preferred Browse Cover	Preferred Browse Decadence	Preferred Browse Young	Perennial Grass Cover	Annual Grass Cover	Perennial Forb Cover	Noxious Weeds	Total Score	Ranking
1999	0	0	0	23.2	0	7.3	0	<b>30.5</b>	Very Poor
2004	1.1	0	0	30	-0.1	1.1	0	<b>32.1</b>	Very Poor
2009	1	0	0	30	0	2	0	<b>32.9</b>	Very Poor
2013	1.1	0	0	30	0	1.3	0	<b>32.4</b>	Very Poor
2018	0.8	0	0	30	-0.2	0.6	0	<b>31.2</b>	Very Poor



## BLACK MOUNTAIN - STUDY NO. 25A-2

**Location Information**

USGS 7.5 min Map Info  
GPS (0' Stake)

Salina SW; Township 22S, Range 1E, Section 20  
NAD 83 UTM ZONE 12, 428021 East 4303957 North

**Transect Information**

Browse Tag # (0' Stake)	7028
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**

From Soldier Canyon Dam #2, proceed 1.85 miles west on Soldier Canyon Road to Black Mountain Road. Make a sharp left turn onto this road and travel south-southeast for 0.95 miles to a junction. Take the right fork and continue for 0.85 miles to the double high-tension powerlines. The transect starts under these lines on the mesa to the right. Continue 1.1 miles beyond the powerlines to a 90-degree fork to the right. Turn right and go 0.55 miles to another fork. Stay to the right and proceed 1.15 miles up the hill and across a chaining until you are between the powerlines. Starting from the pole (#1) east of the road, walk 410 feet west directly under the lines to the start of the frequency baseline which is marked by browse tag #7028. A new 400-foot rebar stake was placed in 2018 as the original was more than 100 feet from the 300-foot stake. As a result, there are two stakes near the 400-foot mark: use the stake closest to the 300-foot stake to set up transect.

**Site Information**

Land Ownership	Federal
Land Administrator	USFS
Allotment	Browns Hole Allotment
Elevation	6,400ft (1,951m)
Aspect	South
Slope	5%
Sample Dates	08/12/1999, 08/24/2004, 06/11/2009, 08/26/2013, 07/02/2018

**Table 25A-02.1 Disturbance History.** Recorded history of major disturbances.

Treatment/Disturbance	Name	WRI DB#	Date	Size (acres)
Chaining - Chain Unknown	-	-	1984	-
Seeding - Seed Unknown	-	-	1984	-
Harrow - Two-Way Dixie	Fishlake NF PJ Maintenance-Sagebrush Enhancement - Year 1	216	Fall 2005	4079
Mechanical - Bullhog	-	-	Between 1999 and 2004	-

**Wildlife Habitat and Vegetation History****Table 25A-02.3 - Wildlife Seasonal Habitat.** UDWR wildlife habitat and seasonality.

Species	Habitat	Season
Deer	crucial	winter
Elk	substantial	winter

**Table 25A-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	Perennial Grass	Phase I
1991	Perennial Grass	Phase I
1999	Perennial Grass	Phase I
2004	Perennial Grass/Yellow Rabbitbrush	Phase I
2009	Perennial Grass/Yellow Rabbitbrush	Phase I
2013	Perennial Grass/Yellow Rabbitbrush	Phase I
2018	Perennial Grass/Yellow Rabbitbrush	Phase I

**Site Notes**

The site may have been treated by a brush saw or lop and scatter. The nearest water source is approximately one and a half to two miles away.

**Soils****Table 25A-02.5 - Soil Analysis Data.** List of chemical and textural soil characteristics determined by laboratory analysis.

Texture	pH	%sand	%silt	%clay	%OM	PPM P	PPM K	ds/m	Sample Date
Sandy Clay Loam	7.6	50.0	25.1	24.9	3.5	5.7	316.8	0.6	08/12/1999

**Site Potential**

1981 - 2010 Average Annual Precipitation	12 inches
NRCS Ecological Site	Upland Loam (Black Sagebrush)
NRCS Ecological Site #	R047XB309UT
States and Transitions	No state and transition model is available for this ecological site.

When established in 1985, this study site was dominated by perennial grasses (Pre-1992 Data). The area was chained in 1984, but young twoneedle pinyon (*Pinus edulis*) and Utah juniper (*Juniperus osteosperma*) had begun to reestablish in the area (Photos). Following a bullhog treatment between 1999 and 2004 and a harrow treatment in 2005 (Table 25A-02.1), the site transitioned into a seeded introduced perennial grass state with yellow rabbitbrush (*Chrysothamnus viscidiflorus* ssp. *viscidiflorus* var. *viscidiflorus*) as a co-dominant component. Forbs and other shrub species have been minor components over the sample years (Table 25A-02.10, Table 25A-02.11, Table 25A-02.12, Table 25A-02.13).

**Trend Summary Tables****Table 25A-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
1999	1.7	2.1	1.9	-	-	-
2004	1.2	2.0	2.4	1.5	3.3	1.8
2009	0.9	2.4	1.9	1.1	3.8	2.0
2013	1.4	4.6	2.3	1.6	8.0	2.0
2018	1.6	5.8	3.5	2.0	7.2	2.2

**Table 25A-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
1999	144	289	222	16	1.3	8.1	0.6	0.1
2004	15	286	251	-	0.2	12.2	2.5	-
2009	26	263	360	9	0.5	10.5	6.0	0.2
2013	67	311	406	23	0.4	16.6	2.8	0.1
2018	91	281	352	9	0.6	11.4	4.5	0.0

**Table 25A-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
1999	29.7	0.1	21.7	11.5	4.7	18.3
2004	26.5	1.0	29.6	31.4	4.8	19.8
2009	27.0	1.0	34.1	16.2	5.6	22.3
2013	26.2	1.7	32.0	11.8	5.3	30.8
2018	45.6	0.7	37.0	7.5	4.8	25.4

**Table 25A-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			
1999	16	24	15	18
2004	6	39	16	56
2009	16	37	8	42
2013	11	19	14	12
2018	4	16	7	42
Year	Days Use Per Acre (ha)			
1999	24.0 (59.2)	77.7 (192.0)	37.5 (92.7)	-
2004	12.3 (30.5)	51.6 (127.5)	20.1 (49.7)	-
2009	36.3 (89.7)	43.6 (107.6)	14.7 (36.4)	-
2013	39.2 (96.8)	21.5 (53.0)	28.8 (71.2)	-
2018	2.9 (7.2)	26.8 (66.2)	5.3 (13.2)	-

**Table 25A-02.10 - Grass Species.** Nested frequency and modified Daubenmire average cover by year.

GRASS SPECIES	Achnatherum hymenoides (Indian ricegrass)	Agropyron cristatum <sup>i</sup> (crested wheatgrass)	Bromus inermis <sup>i</sup> (smooth brome)	Bromus tectorum <sup>ai</sup> (cheatgrass)	Elymus elymoides (squirreltail)	Festuca idahoensis (Idaho fescue)	Hesperostipa comata (needle and thread)	Pascopyrum smithii (western wheatgrass)	Poa fendleriana (muttongrass)	Poa secunda (Sandberg bluegrass)	Psathyrostachys juncea <sup>i</sup> (Russian wildrye)	Pseudoroegneria spicata (bluebunch wheatgrass)	Thinopyrum intermedium <sup>i</sup> (intermediate wheatgrass)
year	Nested Frequency												
1999	105	42	83	144	85	30	-	-	7	5	12	7	47
2004	117	108	11	15	83	2	-	-	2	5	6	11	63
2009	148	82	11	26	33	-	-	2	-	5	11	16	65
2013	138	160	17	67	30	1	2	-	-	12	8	21	72
2018	38	167	21	91	41	8	10	-	5	16	28	21	47
year	Average Cover (%)												
1999	2.9	0.8	1.2	1.3	1.6	0.4	-	-	0.1	0.1	0.1	0.1	0.9
2004	4.1	3.3	0.1	0.2	2.7	0.0	-	-	0.0	0.0	0.2	0.5	1.3
2009	5.7	2.5	0.1	0.5	0.7	-	-	0.0	-	0.0	0.2	0.4	0.7
2013	5.6	6.1	0.4	0.4	1.2	0.2	0.0	-	-	0.2	0.4	0.7	1.9
2018	0.8	6.0	0.5	0.6	0.8	0.1	0.2	-	0.1	0.1	1.2	0.8	1.0

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

**Table 25A-02.11 - Forb Species.** Nested frequency and modified Daubenmire average cover by year.

FORB SPECIES	Agoseris glauca (pale agoseris)	Alyssum desertorum <sup>ai</sup> (desert madwort)	Arabis (rockcress)	Astragalus (milkvetch)	Ceratocephala testiculata <sup>ai</sup> (curvseed butterwort)	Chaenactis douglasii (Douglas' dustymaiden)	Cryptantha (cryptantha)	Eriogonum ovalifolium (cushion buckwheat)	Erodium cicutarium <sup>ai</sup> (redstem stork's bill)	Gilia inconspicua <sup>a</sup> (shy gilia)	Tragopogon dubius <sup>ai</sup> (yellow salsify)
year	Nested Frequency										
1999	-	216	-	15	-	-	1	-	-	-	10
2004	-	145	-	-	198	-	-	-	-	10	-
2009	-	234	-	7	312	-	-	2	-	-	-
2013	-	357	3	14	335	1	3	3	-	-	-
2018	4	351	-	-	39	1	4	-	6	-	-
year	Average Cover (%)										
1999	-	0.6	-	0.1	-	-	0.0	-	-	-	0.0
2004	-	1.3	-	-	1.1	-	-	-	-	0.0	-
2009	-	1.9	-	0.2	4.0	-	-	0.0	-	-	-
2013	-	1.6	0.0	0.1	1.2	0.0	0.0	0.0	-	-	-
2018	0.0	4.4	-	-	0.1	0.0	0.0	-	0.0	-	-

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

**Table 25A-02.12 - Shrub and Tree Species.** Average modified Daubenmire quadrat and line intercept cover by year.

SHRUB SPECIES	Line Intercept Cover (%)							
	year							
Artemisia nova <sup>p</sup> (black sagebrush)	1999	-	-	-	-	-	-	-
Artemisia tridentata ssp. vaseyana <sup>p</sup> (mountain big sagebrush)	2004	1.5	-	-	3.3	-	-	1.8
Chrysothamnus depressus <sup>p</sup> (longflower rabbitbrush)	2009	1.1	-	-	3.8	-	-	2
Chrysothamnus viscidiflorus ssp. viscidiflorus var. viscidiflorus (yellow rabbitbrush)	2013	1.6	-	-	8	-	0	2
Ericameria nauseosa (rubber rabbitbrush)	2018	1.9	0.1	-	7.1	-	0.1	2.2
Gutierrezia sarothrae (broom snakeweed)	year	Quadrat Cover (%)						
Juniperus osteosperma <sup>i</sup> (Utah juniper)	1999	1.7	-	-	2.1	-	-	1.8
Pinus edulis <sup>i</sup> (twoneedle pinyon)	2004	1.0	0.1	-	2.0	-	-	2.3
	2009	0.9	-	-	2.4	-	-	1.9
	2013	1.4	0.0	-	4.6	0.0	0.0	2.3
	2018	0.9	0.6	0.1	5.8	-	0.0	3.5

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

**Table 25A-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 (%)				
<b>Artemisia nova<sup>p</sup> -- (black sagebrush)</b>									
1999	860	20	21	74	5	40	0	0	28/45
2004	540	-	0	37	63	22	15	48	28/47
2009	480	-	8	50	42	38	21	8	23/38
2013	440	80	5	91	5	55	27	5	22/44
2018	740	-	27	70	3	14	0	0	21/39
<b>Artemisia tridentata ssp. vaseyana<sup>p</sup> -- (mountain big sagebrush)</b>									
1999	40	-	100	0	0	100	0	0	32/42
2004	40	-	0	50	50	50	50	50	28/38
2009	-	-	-	-	-	-	-	-	47/112
2013	100	-	0	80	20	20	20	20	42/64
2018	240	-	83	17	0	0	8	0	51/82
<b>Chrysothamnus depressus<sup>p</sup> -- (longflower rabbitbrush)</b>									
1999	-	-	-	-	-	-	-	-	-/-
2004	-	-	-	-	-	-	-	-	-/-
2009	-	-	-	-	-	-	-	-	13/22
2013	-	-	-	-	-	-	-	-	-/-
2018	60	-	0	100	0	0	0	0	-/-
<b>Chrysothamnus viscidiflorus ssp. viscidiflorus var. viscidiflorus -- (yellow rabbitbrush)</b>									
1999	2200	40	25	73	3	20	16	16	37/58
2004	1400	-	0	96	4	0	6	3	33/58
2009	4600	40	42	57	1	16	13	2	23/38
2013	4720	520	24	72	4	24	0	5	29/61
2018	8820	100	42	55	3	13	6	4	22/34

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 (%)				
<b>Ericameria nauseosa -- (rubber rabbitbrush)</b>									
1999	-	-	-	-	-	-	-	-	-/-
2004	-	-	-	-	-	-	-	-	-/-
2009	-	-	-	-	-	-	-	-	32/39
2013	20	-	100	0	0	0	0	0	54/64
2018	20	-	100	0	0	0	0	0	36/51
<b>Gutierrezia sarothrae -- (broom snakeweed)</b>									
1999	-	-	-	-	-	-	-	-	-/-
2004	-	-	-	-	-	-	-	-	-/-
2009	-	-	-	-	-	-	-	-	-/-
2013	20	-	0	100	0	0	0	0	20/28
2018	20	-	0	100	0	0	0	0	13/17
<b>Juniperus osteosperma<sup>t</sup> -- (Utah juniper)</b>									
1999	160	20	75	25	0	0	0	0	- / -
2004	80	-	25	75	0	25	0	0	- / -
2009	-	-	-	-	-	-	-	-	-/-
2013	80	20	50	50	0	0	0	0	- / -
2018	100	-	40	60	0	0	0	0	- / -
<b>Pediocactus simpsonii -- (mountain ball cactus)</b>									
1999	-	-	-	-	-	-	-	-	-/-
2004	-	-	-	-	-	-	-	-	-/-
2009	-	-	-	-	-	-	-	-	-/-
2013	-	-	-	-	-	-	-	-	5/11
2018	-	-	-	-	-	-	-	-	-/-
<b>Pinus edulis<sup>t</sup> -- (twoneedle pinyon)</b>									
1999	20	-	100	0	0	0	0	100	- / -
2004	-	-	-	-	-	-	-	-	- / -

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

**Table 25A-02.14 - Tree Characteristics.** Point-quarter tree density, size class distribution, and average diameter.

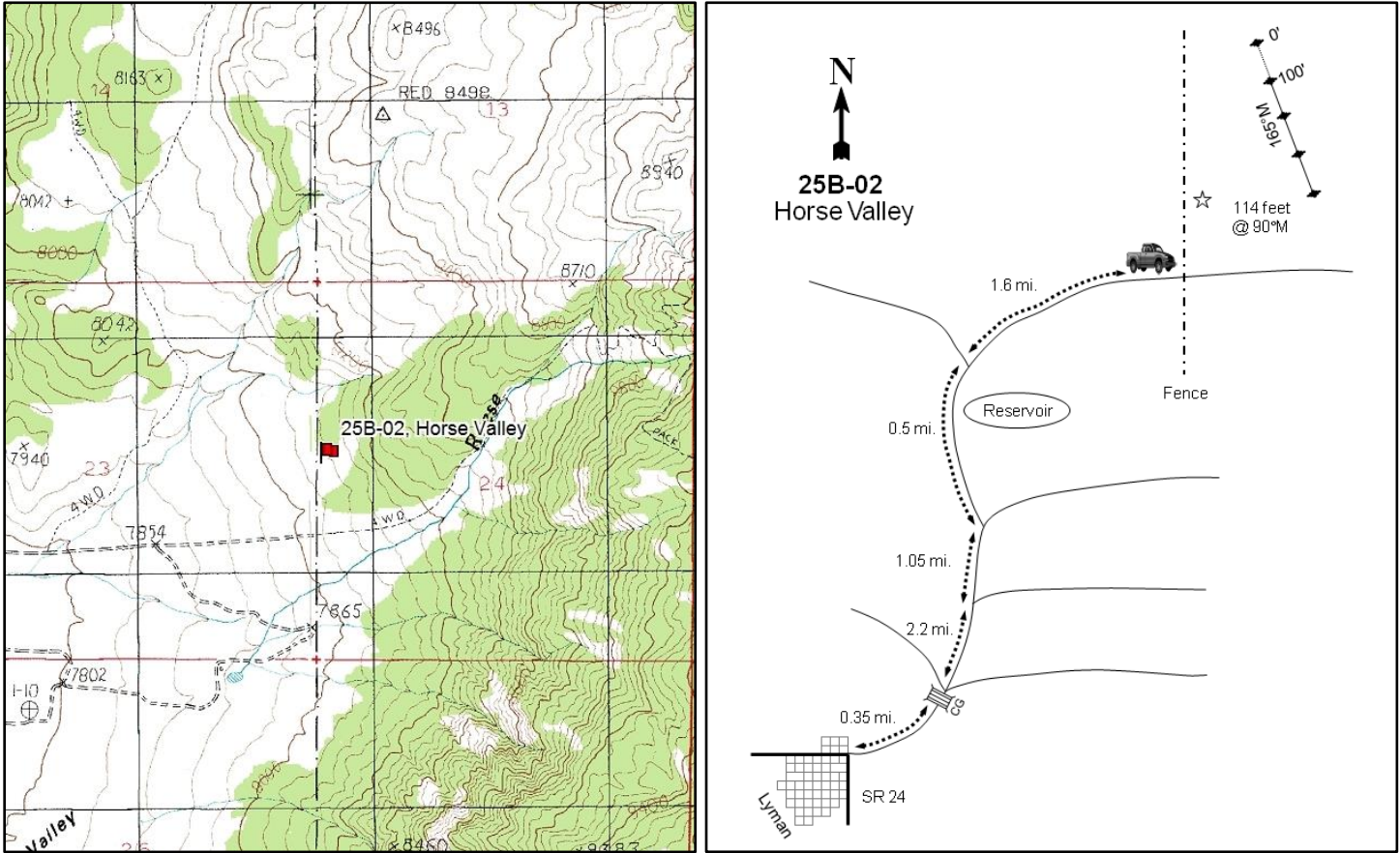
Year	Density	Size Class Distribution					Average Diameter (cm)
	Trees per Acre	Seedling (%)	1-4' (%)	4-8' (%)	8-12' (%)	>12' (%)	
<b>Juniperus osteosperma (Utah juniper)</b>							
1999	75	-	-	-	-	-	5.8
2009	32	-	40	60	-	-	11.9
2013	32	13	40	27	13	7	6.5
2018	29	21	43	36	-	-	7.9
<b>Pinus edulis (twoneedle pinyon)</b>							
1999	8	-	-	-	-	-	4.2
2009	3	-	100	-	-	-	9.0
2013	3	-	100	-	-	-	9.0
2018	18	-	50	50	-	-	3.0

**Table -25A-02.15 - Deer Desirable Components Index: Mid Potential Scale.**

Year	Preferred Browse Cover	Preferred Browse Decadence	Preferred Browse Young	Perennial Grass Cover	Annual Grass Cover	Perennial Forb Cover	Noxious Weeds	Total Score	Ranking
1999	2.1	0	0	16.1	-1	0.2	0	<b>17.5</b>	Very Poor
2004	1.9	0	0	24.5	-0.1	0	0	<b>26.2</b>	Very Poor
2009	1.4	0	0	21	-0.4	0.3	0	<b>22.3</b>	Very Poor
2013	2	0	0	30	-0.3	0.3	0	<b>32</b>	Very Poor
2018	2.5	0	0	22.8	-0.5	0	0	<b>24.9</b>	Very Poor



## HORSE VALLEY - STUDY NO. 25B-2

**Location Information**

USGS 7.5 min Map Info  
GPS (0' Stake)

Lyman NE; Township 27S, Range 3E, Section 24  
NAD 83 UTM ZONE 12, 452723 East 4255665 North

**Transect Information**

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

7065  
165° magnetic  
400ft  
Line 1 (11ft & 95ft), Line 2 (34ft), Line 3 (59ft), Line 4 (71ft)  
Standard

**Directions to Site**

At the north end of Main Street (SR-24) in Lyman, SR-24 turns west towards Loa. Turn east here and travel 0.35 miles to a three-way split just beyond a cattle guard. Take the middle fork (the main road) and continue for 2.2 miles to a fork. Stay left and continue for 1.05 miles on the main road to another fork. Stay left again and proceed 0.5 miles north just past a small reservoir to an intersection: take the right fork toward Neffs Reservoir. On the main road, travel 1.6 miles up and east across the top of some private land to a cattle guard at the Forest Service boundary. Park here, then walk 532 feet north along the east side of the fence to a witness post (rebar) next to the fence. The 400-foot stake is 114 feet east of the witness post. The 0-foot baseline stake lies 400 feet north, and has a red browse tag #7065 attached.



**Site Information**

Land Ownership	Federal
Land Administrator	USFS
Allotment	Thousand Lake Allotment
Elevation	8,020ft (2,444m)
Aspect	Southwest
Slope	5-10%
Sample Dates	07/20/1994, 08/26/1999, 08/11/2004, 08/19/2009, 08/21/2013, 07/16/2018

**Table 25B-02.1 Disturbance History.** Recorded history of major disturbances.

Treatment/Disturbance	Name	WRI DB#	Date	Size (acres)
Mechanical - Bullhog	Cedar Creek Winter Range Enhancement	818	Fall 2012	3569

**Wildlife Habitat and Vegetation History****Table 25B-02.3 - Wildlife Seasonal Habitat.** UDWR wildlife habitat and seasonality.

Species	Habitat	Season
Deer	crucial	winter
Elk	substantial	winter

**Table 25B-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	Mountain Big Sagebrush	Phase I
1991	Mountain Big Sagebrush	Phase I
1994	Mountain Big Sagebrush	Phase I
1999	Mountain Big Sagebrush	Phase I
2004	Mountain Big Sagebrush	Phase I
2009	Mountain Big Sagebrush	Phase I
2013	Mountain Big Sagebrush	Phase I
2018	Mountain Big Sagebrush	Phase I

**Site Notes**

This site is thought to be a winter deer concentration area with many moving into the lower fields in late winter or early spring.

**Soils****Table 25B-02.5 - Soil Analysis Data.** List of chemical and textural soil characteristics determined by laboratory analysis.

Texture	pH	%sand	%silt	%clay	%OM	PPM P	PPM K	ds/m	Sample Date
Sandy Clay Loam	7.6	50.9	27.8	21.3	2.2	7.7	112.0	0.5	08/26/1999

**Site Potential**

1981 - 2010 Average Annual Precipitation	13 inches
NRCS Ecological Site	Upland Stony Loam (Mountain Big Sagebrush)
NRCS Ecological Site #	R047XB336UT
States and Transitions	No state and transition model is available for this ecological site.

Since establishment in 1985, this study site has remained dominated by mountain big sagebrush (*Artemisia tridentata* ssp. *vaseyana*) (Pre-1992 Data, Photos, Table 25B-02.12, Table 25B-02.13). The herbaceous understory has been limited throughout the duration of the study and has consisted of mainly native perennial grasses and forbs (Table 25B-02.7, Table 25B-02.10, Table 25B-02.11). Twoneedle pinyon (*Pinus edulis*) has been observed in all sample years. A 2012 bullhog treatment (Table 25B-02.1) removed most trees, but infilling is occurring as of the 2018 sample year. In addition, the areas surrounding the site are mostly pinyon and Utah juniper (*Juniperus osteosperma*) dominated (Photos, Table 25B-02.14). The proximity to pinyon and juniper dominated areas and infilling on the site itself indicates that further tree encroachment may be possible in future sample years without additional treatments.

**Trend Summary Tables****Table 25B-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
1994	15.0	1.3	-	-	-	-
1999	18.8	1.8	0.1	-	-	-
2004	17.7	5.4	0.2	18.3	5.6	0.7
2009	16.4	0.5	0.2	20.4	0.5	1.0
2013	16.7	1.6	0.2	21.6	1.4	0.4
2018	17.4	4.7	0.5	22.5	2.3	1.2

**Table 25B-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
1994	-	118	-	58	-	1.5	-	1.2
1999	-	121	7	61	-	2.2	0.0	2.2
2004	-	101	-	18	-	1.5	-	0.2
2009	-	89	-	19	-	1.6	-	0.1
2013	-	99	-	57	-	1.9	-	1.4
2018	-	84	-	54	-	3.3	-	1.4

**Table 25B-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
1994	34.5	1.2	16.7	8.7	18.8	18.7
1999	24.2	2.4	21.8	22.4	12.7	24.6
2004	25.6	1.5	23.1	27.3	16.3	24.3
2009	31.5	0.4	20.6	23.7	12.7	19.1
2013	28.1	1.0	21.2	21.9	10.3	20.5
2018	36.8	2.0	24.4	24.2	17.2	23.5

**Table 25B-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			
1994	-	8	-	14
1999	-	3	-	9
2004	-	-	-	3
2009	-	2	1	37
2013	-	-	-	1
2018	-	1	1	17
Year	Days Use Per Acre (ha)			
1994	-	-	-	-
1999	0.7 (1.8)	0.7 (1.7)	-	-
2004	-	1.3 (3.3)	1.3 (3.3)	-
2009	-	16.8 (41.4)	0.7 (1.7)	-
2013	-	1.3 (3.3)	-	-
2018	-	1.3 (3.3)	-	-

**Table 25B-02.10 - Grass Species.** Nested frequency and modified Daubenmire average cover by year.

GRASS SPECIES	Achnatherum hymenoides (Indian ricegrass)	Agropyron cristatum <sup>i</sup> (crested wheatgrass)	Bouteloua gracilis (blue grama)	Carex (sedge)	Elymus elymoides (squirreltail)	Hesperostipa comata (needle and thread)
year	Nested Frequency					
1994	-	-	69	-	59	0
1999	1	-	69	-	55	1
2004	14	-	61	-	30	-
2009	3	-	51	-	43	-
2013	14	6	57	2	29	-
2018	7	5	50	-	29	1
year	Average Cover (%)					
1994	-	-	1.2	-	0.3	0.0
1999	0.0	-	1.7	-	0.6	0.0
2004	0.1	-	1.2	-	0.2	-
2009	0.0	-	1.1	-	0.4	-
2013	0.3	0.1	1.1	0.0	0.5	-
2018	0.2	0.1	2.6	-	0.4	0.0

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

**Table 25B-02.11 - Forb Species.** Nested frequency and modified Daubenmire average cover by year.

FORB SPECIES	Androsace septentrionalis <sup>a,i</sup> (pygmyflower rockjasmine)	Arabis demissa (nodding rockcress)	Astragalus convallarius (lesser rushy milkvetch)	Cryptantha (cryptantha)	Cryptantha cinerea var. jamesii (James' cryptantha)	Erigeron pumilus (shaggy fleabane)	Hymenoxys richardsonii (pingue rubberweed)	Phlox longifolia (longleaf phlox)
year	Nested Frequency							
1994	-	-	3	3	6	3	44	-
1999	7	-	3	-	-	3	54	3
2004	-	-	-	-	11	-	7	-
2009	-	-	1	-	10	-	8	-
2013	-	13	-	-	25	1	19	-
2018	-	11	-	19	-	9	26	0
year	Average Cover (%)							
1994	-	-	0.0	0.0	0.0	0.0	1.2	-
1999	0.0	-	0.0	-	-	0.0	2.2	0.0
2004	-	-	-	-	0.1	-	0.2	-
2009	-	-	0.0	-	0.1	-	0.1	-
2013	-	0.0	-	-	0.2	0.0	1.2	-
2018	-	0.0	-	0.5	-	0.1	0.8	0.0

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

**Table 25B-02.12 - Shrub and Tree Species.** Average modified Daubenmire quadrat and line intercept cover by year.

SHRUB SPECIES	Line Intercept Cover (%)								
	year								
Artemisia nova <sup>p</sup> (black sagebrush)	1994	-	-	-	-	-	-	-	-
Artemisia tridentata ssp. vaseyana <sup>p</sup> (mountain big sagebrush)	1994	-	-	-	-	-	-	-	-
Chrysothamnus viscidiflorus ssp. viscidiflorus var. stenophyllus (yellow rabbitbrush)	1994	-	-	-	-	-	-	-	-
Gutierrezia sarothrae (broom snakeweed)	1994	-	-	-	-	-	-	-	-
Linanthus pungens (granite prickly phlox)	1994	-	-	-	-	-	-	-	-
Opuntia (pricklypear)	1994	-	-	-	-	-	-	-	-
Opuntia fragilis (brittle pricklypear)	1994	-	-	-	-	-	-	-	-
Opuntia polyacantha (plains pricklypear)	1994	-	-	-	-	-	-	-	-
Pinus edulis <sup>i</sup> (twoneedle pinyon)	1994	-	-	-	-	-	-	-	-
year	Line Intercept Cover (%)								
1994	-	-	-	-	-	-	-	-	-
1999	-	-	-	-	-	-	-	-	-
2004	-	18.3	0.8	4.8	-	-	-	-	0.7
2009	0.2	20.2	0.2	0.3	-	-	-	-	1
2013	0.3	21.3	0.4	0.6	0.2	0.2	-	-	0.4
2018	0.3	22.2	0.1	2.1	-	-	0.1	-	1.2
year	Quadrat Cover (%)								
1994	-	15.0	1.1	0.2	-	0.0	-	-	-
1999	-	18.8	0.5	1.2	-	0.1	-	-	0.1
2004	-	17.7	1.7	3.4	-	0.2	-	-	0.2
2009	0.0	16.4	0.3	0.1	-	0.0	-	-	0.2
2013	0.0	16.7	0.9	0.3	0.1	0.2	-	-	0.2
2018	0.0	17.4	0.6	4.0	-	-	0.2	0.0	0.5

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

**Table 25B-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 (%)				
<b>Artemisia nova<sup>p</sup> -- (black sagebrush)</b>									
1994	-	-	-	-	-	-	-	-	-/-
1999	-	-	-	-	-	-	-	-	-/-
2004	-	-	-	-	-	-	-	-	-/-
2009	20	-	0	100	0	0	0	0	21/36
2013	20	-	0	100	0	0	0	0	19/45
2018	60	-	0	67	33	0	0	0	24/58
<b>Artemisia tridentata ssp. vaseyana<sup>p</sup> -- (mountain big sagebrush)</b>									
1994	3940	580	3	55	43	25	3	27	48/86
1999	4520	60	10	50	41	28	3	14	49/75
2004	4400	100	4	59	37	7	0	23	46/73
2009	4760	-	2	38	60	28	13	37	40/65
2013	3960	-	5	57	38	67	19	31	47/83
2018	4460	-	3	63	34	6	0	27	46/80
<b>Atriplex canescens<sup>p</sup> -- (fourwing saltbush)</b>									
1994	-	-	-	-	-	-	-	-	-/-
1999	80	-	0	75	25	25	0	25	-/-
2004	-	-	-	-	-	-	-	-	-/-
2009	-	-	-	-	-	-	-	-	-/-
2013	-	-	-	-	-	-	-	-	-/-
2018	-	-	-	-	-	-	-	-	-/-
<b>Chrysothamnus viscidiflorus ssp. viscidiflorus var. stenophyllus -- (yellow rabbitbrush)</b>									
1994	2940	-	0	69	31	30	8	12	11/16
1999	1180	20	15	63	22	0	0	12	14/27

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 (%)				
2004	1480	-	5	64	31	8	7	12	17/28
2009	1300	40	5	77	19	0	0	17	28/17
2013	1040	20	6	90	4	15	10	12	16/27
2018	620	-	7	55	39	13	61	32	10/17
<b>Echinocereus coccineus var. coccineus -- (scarlet hedgehog cactus)</b>									
1994	-	-	-	-	-	-	-	-	-/-
1999	20	-	0	100	0	0	0	0	9/15
2004	20	-	0	100	0	0	0	0	7/16
2009	20	-	100	0	0	0	0	0	-/-
2013	20	-	0	100	0	0	0	0	12/22
2018	20	-	0	100	0	0	0	0	7/18
<b>Gutierrezia sarothrae -- (broom snakeweed)</b>									
1994	1420	-	14	79	7	0	0	1	18/16
1999	4980	2340	64	26	10	0	0	0	18/21
2004	5920	-	2	98	0	0	0	0	19/24
2009	940	-	17	70	13	0	2	9	15/13
2013	1160	440	38	60	2	0	0	2	17/21
2018	6340	-	4	93	4	0	0	9	14/16
<b>Juniperus osteosperma<sup>1</sup> -- (Utah juniper)</b>									
1994	-	-	-	-	-	-	-	-	-/-
1999	-	-	-	-	-	-	-	-	-/-
2004	-	-	-	-	-	-	-	-	-/-
2009	60	-	100	0	0	0	0	0	-/-
2013	-	-	-	-	-	-	-	-	-/-
2018	-	-	-	-	-	-	-	-	-/-
<b>Linanthus pungens -- (granite prickly phlox)</b>									
1994	-	-	-	-	-	-	-	-	-/-
1999	40	-	100	0	0	0	0	0	-/-
2004	-	-	-	-	-	-	-	-	-/-
2009	-	-	-	-	-	-	-	-	-/-
2013	40	-	0	100	0	0	0	0	12/17
2018	-	-	-	-	-	-	-	-	-/-
<b>Opuntia fragilis -- (brittle pricklypear)</b>									
1994	-	-	-	-	-	-	-	-	-/-
1999	-	-	-	-	-	-	-	-	-/-
2004	-	-	-	-	-	-	-	-	-/-
2009	-	-	-	-	-	-	-	-	-/-
2013	-	-	-	-	-	-	-	-	-/-
2018	160	-	0	100	0	0	0	0	6/18
<b>Opuntia polyacantha -- (plains pricklypear)</b>									
1994	-	-	-	-	-	-	-	-	-/-
1999	-	-	-	-	-	-	-	-	-/-
2004	-	-	-	-	-	-	-	-	-/-
2009	-	-	-	-	-	-	-	-	-/-
2013	-	-	-	-	-	-	-	-	-/-
2018	120	20	0	100	0	0	0	0	11/28
<b>Opuntia -- (pricklypear)</b>									
1994	160	-	0	88	13	0	0	0	7/18
1999	600	20	27	53	20	0	0	23	9/25
2004	400	-	0	100	0	0	0	0	9/30
2009	240	-	0	100	0	0	0	0	8/26
2013	440	40	14	86	0	0	0	5	8/26
2018	80	-	0	100	0	0	0	0	10/23
<b>Pinus edulis<sup>1</sup> -- (twoneedle pinyon)</b>									

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 (%)				
1994	-	-	-	-	-	-	-	-	-/-
1999	80	40	100	0	0	0	0	0	-/-
2004	120	20	83	17	0	0	0	0	-/-
2009	120	20	50	50	0	0	17	0	-/-
2013	120	20	100	0	0	0	17	0	-/-
2018	160	200	75	25	0	0	0	0	-/-
<b>Ulmus pumila<sup>i</sup> -- (Siberian elm)</b>									
1994	-	-	-	-	-	-	-	-	-/-
1999	-	-	-	-	-	-	-	-	-/-
2004	-	-	-	-	-	-	-	-	-/-
2009	-	-	-	-	-	-	-	-	-/-
2013	-	-	-	-	-	-	-	-	-/-
2018	20	-	100	0	0	0	0	100	-/-

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

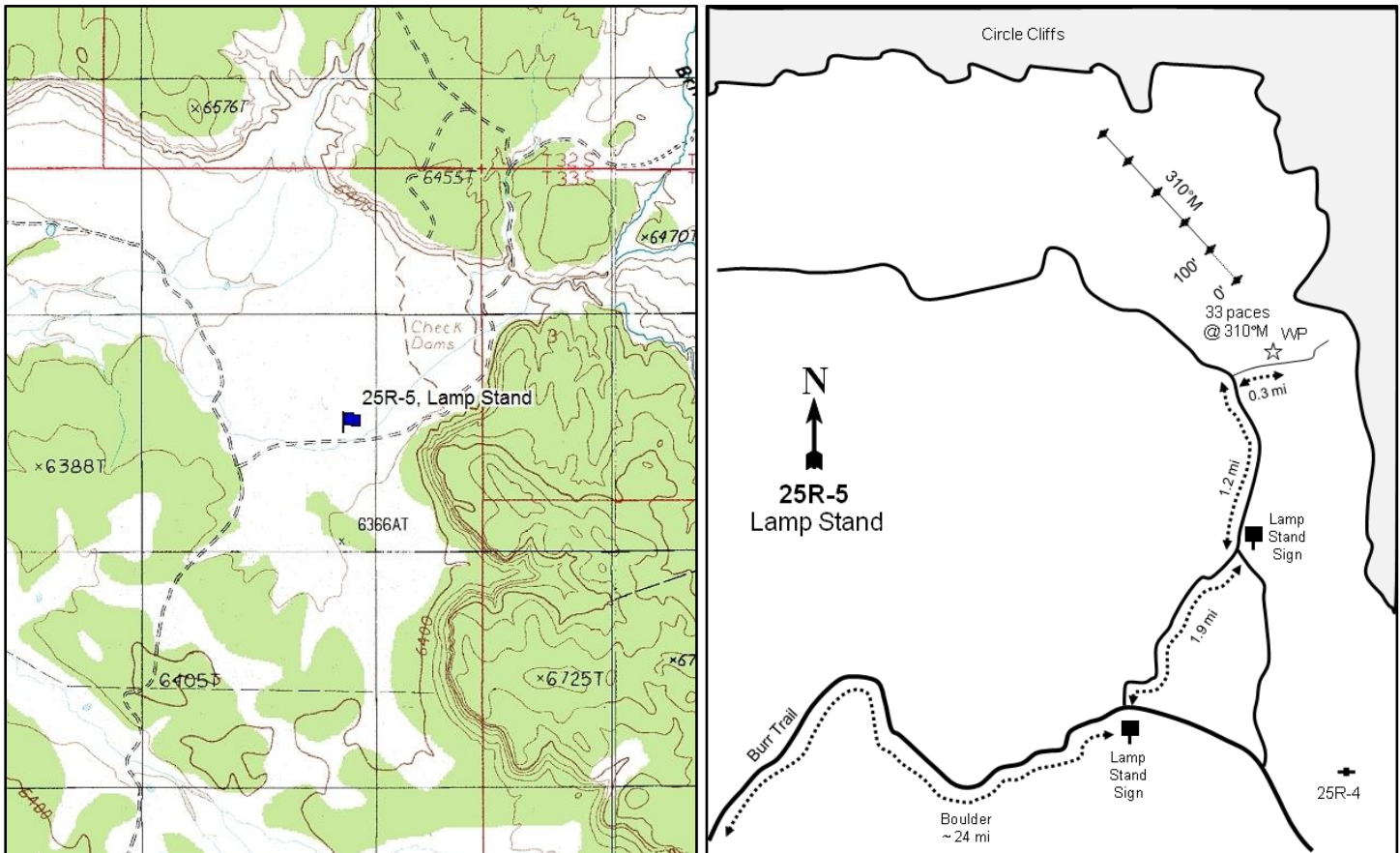
**Table 25B-02.14 - Tree Characteristics.** Point-quarter tree density, size class distribution, and average diameter.

Year	Density	Size Class Distribution					Average Diameter (cm)
	Trees per Acre	Seedling (%)	1-4' (%)	4-8' (%)	8-12' (%)	>12' (%)	
<b>Juniperus osteosperma (Utah juniper)</b>							
2018	12	-	100	-	-	-	3.0
<b>Pinus edulis (twoneedle pinyon)</b>							
1994	19	-	-	-	-	-	5.7
1999	50	-	-	-	-	-	5.9
2004	122	74	16	-	11	-	2.6
2009	117	16	58	16	-	11	4.1
2013	96	29	64	7	-	-	4.5
2018	254	50	45	5	-	-	2.1

**Table -25B-02.15 - Deer Desirable Components Index: Mid Potential Scale.**

Year	Preferred Browse Cover	Preferred Browse Decadence	Preferred Browse Young	Perennial Grass Cover	Annual Grass Cover	Perennial Forb Cover	Noxious Weeds	Total Score	Ranking
1994	18.8	2.2	1.3	3	0	2.5	0	<b>27.7</b>	Very Poor
1999	23.6	2.8	4.9	4.4	0	4.4	0	<b>40</b>	Poor
2004	22.9	4	2.1	3.1	0	0.4	0	<b>32.4</b>	Very Poor
2009	25.5	-2.7	1	3.1	0	0.3	0	<b>27.2</b>	Very Poor
2013	27	3.6	2.5	3.8	0	2.8	0	<b>39.8</b>	Poor
2018	28.1	4.9	1.5	6.5	0	2.7	0	<b>43.8</b>	Poor

## LAMP STAND - STUDY NO. 25R-5

**Location Information**

USGS 7.5 min Map Info  
GPS (0' Stake)

Lamp Stand NE; Township 33S, Range 7E, Section 04  
NAD 83 UTM ZONE 12, 487802 East 4201697 North

**Transect Information**

Browse Tag # (0' Stake)	53
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 Burr Trail take the turnoff to Lamp Stand. Travel 1.9 miles to another sign for Lamp Stand. Continue north for 1.2 miles to a road on the right: turn onto this road and travel 0.3 miles to a witness post on the left (north) side of the road. From here the 0-foot stake is 100 feet away at 310 degrees magnetic and is marked with browse tag #53.



**Site Information**

Land Ownership	Federal
Land Administrator	BLM
Allotment	CIRCLE CLIFFS
Elevation	6,360ft (1,939m)
Aspect	Northwest
Slope	0-5%
Sample Dates	08/04/2004, 06/26/2007, 06/27/2012, 08/06/2018

**Table 25R-05.1 Disturbance History.** Recorded history of major disturbances.

Treatment/Disturbance	Name	WRI DB#	Date	Size (acres)
Seeding - Truax	Circle Cliffs-Year 1	PDB	November 2004	1000
Seeding - Aerial Unknown	Lamp Stand Seeding	LTDL	1970	650
Chaining - Unknown	Lamp Stand Seeding	LTDL	1970	650

**Table 25R-05.2 Seed Mix.** List of known seeded plant species and rates (if available).

Mix Name			Application Type	Application Date	Acres
Lampstand Seeding			Aerial	Jan 1970	650
Type	Species	Common Name	Cultivar/Source ID	Bulk lbs/acre	PLS
G	Agropyron cristatum	Crested Wheatgrass		0.00	0.00
F	Medicago sativa	Alfalfa		0.00	0.00
Mix Name			Application Type	Application Date	Acres
Circle Cliffs			Drill	Nov 2004	1080
Type	Species	Common Name	Cultivar/Source ID	Bulk lbs/acre	PLS
G	Achnatherum hymenoides	Indian Ricegrass	Rimrock	1.23	0.00
G	Agropyron cristatum	Crested Wheatgrass	Nordan	2.46	0.00
G	Elymus lanceolatus	Thickspike Wheatgrass	Critana	0.09	0.00
G	Elymus lanceolatus	Thickspike Wheatgrass	Schwendimar	0.09	0.00
G	Leymus cinereus	Great Basin Wildrye	Megnar	0.32	0.00
G	Pascopyrum smithii	Western Wheatgrass	Arriba	3.69	0.00
G	Psathyrostachys juncea	Siberian Wheatgrass	P-27	2.46	0.00
G	Sporobolus cryptandrus	Sand Dropseed		0.59	0.00
F	Linum perenne	Blue Flax	Appar	0.09	0.08
F	Medicago sativa	Alfalfa	Ladak +	0.25	0.00
F	Medicago sativa	Alfalfa	Nomad	0.28	0.26
F	Melilotus officinalis	Yellow Sweetclover	Madrid	0.54	0.00
F	Penstemon palmeri	Palmer Penstemon	Washington UT	0.04	0.04
F	Sanguisorba minor	Small Burnet	Delar	0.08	0.00
F	Sphaeralcea munroana	Munro Globemallow	Elbow Ranch	0.06	0.05
S	Atriplex canescens	Fourwing Saltbush		0.09	0.00
S	Atriplex canescens	Fourwing Saltbush		1.14	0.00
S	Ephedra viridis	Green Ephedra		0.03	0.02
S	Ephedra viridis	Green Ephedra		0.02	0.02
S	Purshia tridentata	Bitterbrush	Ada/Boise ID	0.09	0.08
S	Purshia tridentata	Bitterbrush		0.09	0.00
Mix Name			Application Type	Application Date	Acres
Circle Cliffs Shrubs			Drill	Nov 2004	1100
Type	Species	Common Name	Cultivar/Source ID	Bulk lbs/acre	PLS
S	Artemisia tridentata ssp. wyomingensis	Wyoming Big Sagebrush		0.25	0.00
S	Artemisia tridentata ssp. wyomingensis	Wyoming Big Sagebrush	Beaver UT	0.25	0.08
S	Krascheninnikovia lanata	Winterfat		0.27	0.00
S	Krascheninnikovia lanata	Winterfat		0.04	0.00

**Wildlife Habitat and Vegetation History****Table 25R-05.3 - Wildlife Seasonal Habitat.** UDWR wildlife habitat and seasonality.

Species	Habitat	Season
Deer	crucial	winter
Elk	substantial	winter

**Table 25R-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	No Encroachment
2007	Annual Forb	No Encroachment
2012	Perennial Grass	No Encroachment
2018	Perennial Grass	No Encroachment

#### Site Notes

No Notes

#### Soils

**Table 25R-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	7.9	54.3	23.5	22.2	0.8	10.9	534.4	1.0	08/04/2004

#### Site Potential

1981 - 2010 Average Annual Precipitation                      10 inches  
 NRCS Ecological Site    Semidesert Loam (Wyoming Big Sagebrush)  
 NRCS Ecological Site #    R035XY209UT  
 States and Transitions    No state and transition model is available for this ecological site.

This study site was dominated by annual forbs from study establishment in 2004 through the 2007 sample year; prickly Russian thistle (*Salsola tragus*) contributed the most cover in 2004 while woolly plantain (*Plantago patagonica*), crossflower (*Chorispora tenella*), and flatspine stickseed (*Lappula occidentalis*) dominated in 2007. Perennial grasses have been the dominant vegetation component since 2012. However, the herbaceous understory has remained sparse in general in both 2012 and 2018 (Table 25R-05.7, Table 25R-05.10, Table 25R-05.11). Shrubs are also lacking in diversity and abundance, with Wyoming big sagebrush (*Artemisia tridentata* ssp. *wyomingensis*) contributing only 0.2 percent cover in 2018 (Table 25R-05.12, Table 25R-05.13). Without further treatment, this study site will likely remain in a degraded ecological state in future sample years.

**Trend Summary Tables****Table 25R-05.6 - Shrub/Tree Summary.** Average modified Daubenmire quadrat and line intercept cover by year for shrubs/trees

Year	Quadrat Cover (%)			Line-intercept Cover (%)		
	Preferred Shrub	Other Shrub	Tree	Preferred Shrub	Other Shrub	Tree
2004	-	0.1	-	-	-	-
2007	0.0	0.4	-	-	-	-
2012	0.6	-	-	0.3	-	-
2018	-	0.4	-	0.2	0.1	-

**Table 25R-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	0	14	418	44	0.0	0.2	28.3	0.7
2007	118	251	459	200	1.7	11.9	25.8	1.4
2012	2	198	205	1	0.0	6.8	3.8	0.0
2018	3	233	85	54	0.0	3.2	1.7	0.5

**Table 25R-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	63.2	-	10.0	3.4	0.0	30.5
2007	41.6	-	30.6	1.1	0.0	37.5
2012	43.8	0.0	51.2	0.5	0.0	11.8
2018	57.8	-	50.5	1.7	0.2	5.9

**Table 25R-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	Coyote	Mule Deer	Rocky Mountain Elk	Rabbit
	Quadrat Frequency				
2004	6	-	-	-	46
2007	2	-	-	17	86
2012	-	-	1	13	1
2018	3	-	1	6	61
Days Use Per Acre (ha)					
2004	-	-	-	-	-
2007	2.9 (7.2)	8.7 (21.5)*	-	16.1 (39.7)	-
2012	5.8 (14.3)	-	-	8.7 (21.5)	-
2018	24.7 (61.0)	-	-	8.1 (19.9)	-

Pellets per acre (ha)

**Table 25R-05.10 - Grass Species.** Nested frequency and modified Daubenmire average cover by year.

GRASS SPECIES	Achnatherum hymenoides (Indian ricegrass)	Agropyron cristatum <sup>i</sup> (crested wheatgrass)	Bouteloua gracilis (blue grama)	Bromus tectorum <sup>ai</sup> (cheatgrass)	Elymus elymoides (squirreltail)	Elymus trachycaulus (slender wheatgrass)	Pascopyrum smithii (western wheatgrass)	Sporobolus cryptandrus (sand dropseed)	Vulpia octoflora <sup>a</sup> (sixweeks fescue)
year	Nested Frequency								
2004	4	-	10	0	-	-	-	-	-
2007	17	228	30	106	2	-	-	-	13
2012	13	131	46	-	-	3	14	50	2
2018	-	26	72	3	5	-	6	145	-
year	Average Cover (%)								
2004	0.0	-	0.2	0.0	-	-	-	-	-
2007	0.7	10.5	0.6	1.7	0.2	-	-	-	0.1
2012	0.3	3.3	1.5	-	-	0.0	0.2	1.5	0.0
2018	-	0.3	1.2	0.0	0.1	-	0.1	1.5	-

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

**Table 25R-05.11 - Forb Species.** Nested frequency and modified Daubenmire average cover by year.

FORB SPECIES	Alyssum desertorum <sup>ai</sup> (desert madwort)	Calochortus nuttallii (sego lily)	Ceratocephala testiculata <sup>ai</sup> (curveseed butterwort)	Chenopodium fremontii <sup>ai</sup> (Fremont's goosefoot)	Chenopodium leptophyllum <sup>a</sup> (narrowleaf goosefoot)	Chorispora tenella <sup>ai</sup> (crossflower)	Cryptantha <sup>a</sup> (annual cryptantha)	Descurainia pinnata <sup>a</sup> (western tansymustard)	Gilia inconspicua <sup>a</sup> (shy gilia)	Helianthus annuus <sup>a</sup> (common sunflower)	Lactuca serriola <sup>ai</sup> (prickly lettuce)	Lappula occidentalis <sup>a</sup> (flatspine stickseed)	Machaeranthera canescens (hoary tansyaster)	Menzelia albicaulis <sup>a</sup> (whitestem blazingstar)	Plantago patagonica <sup>a</sup> (woolly plantain)	Salsola tragus <sup>ai</sup> (prickly Russian thistle)	Sphaeralcea parvifolia (smallflower globemallow)	
year	Nested Frequency																	
2004	-	-	-	33	7	44	-	4	2	24	-	195	-	34	23	404	44	
2007	2	0	2	2	-	187	-	211	3	-	3	338	159	-	380	177	74	
2012	2	-	5	-	-	104	5	7	-	-	-	2	-	-	15	80	1	
2018	6	-	-	1	-	5	-	-	-	-	-	6	-	-	9	65	54	
year	Average Cover (%)																	
2004	-	-	-	0.2	0.0	0.9	-	0.0	0.0	0.1	-	3.1	-	0.3	0.1	23.4	0.7	
2007	0.0	0.0	0.0	0.0	-	6.7	-	3.0	0.0	-	0.0	6.3	0.8	-	9.3	0.6	0.7	
2012	0.0	-	0.0	-	-	2.3	0.0	0.0	-	-	-	0.0	-	-	0.1	1.3	0.0	
2018	0.0	-	-	0.0	-	0.0	-	-	-	-	-	0.0	-	-	0.0	1.6	0.5	

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

**Table 25R-05.12 - Shrub and Tree Species.** Average modified Daubenmire quadrat and line intercept cover by year.

SHRUB SPECIES	Line Intercept Cover (%)			
	Artemisia tridentata ssp. wyomingensis <sup>p</sup> (Wyoming big sagebrush)	Chrysothamnus viscidiflorus (yellow rabbitbrush)	Ericameria nauseosa (rubber rabbitbrush)	Opuntia (pricklypear)
year	Line Intercept Cover (%)			
2004	-	-	-	-
2007	-	-	-	-
2012	0.3	-	-	-
2018	0.2	-	0.1	0
year	Quadrat Cover (%)			
2004	-	0.1	-	-
2007	0.0	0.4	-	-
2012	0.6	-	-	-
2018	0.0	0.2	0.0	0.2

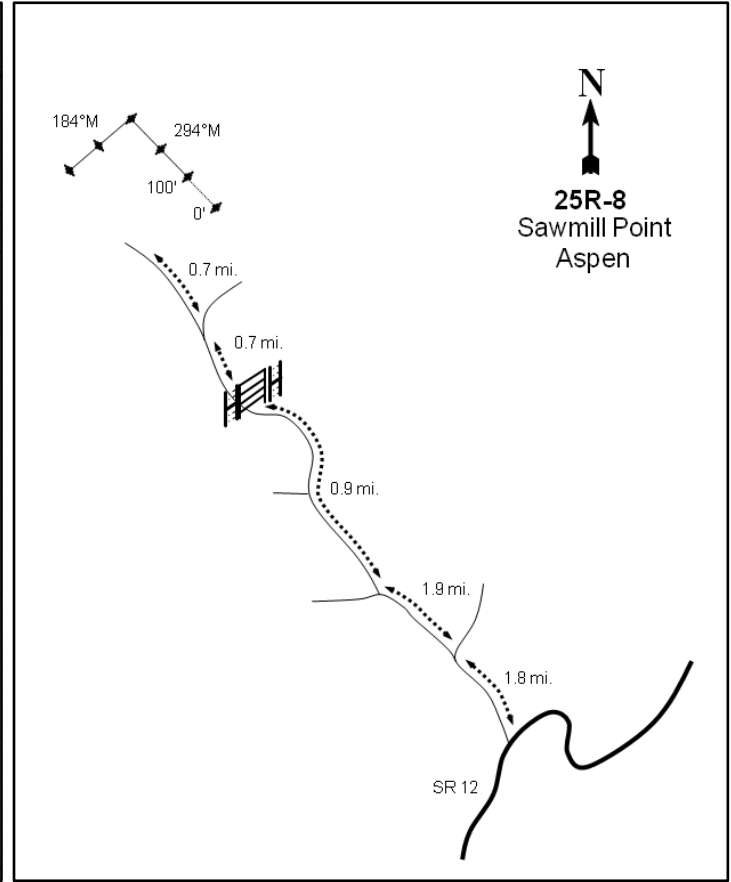
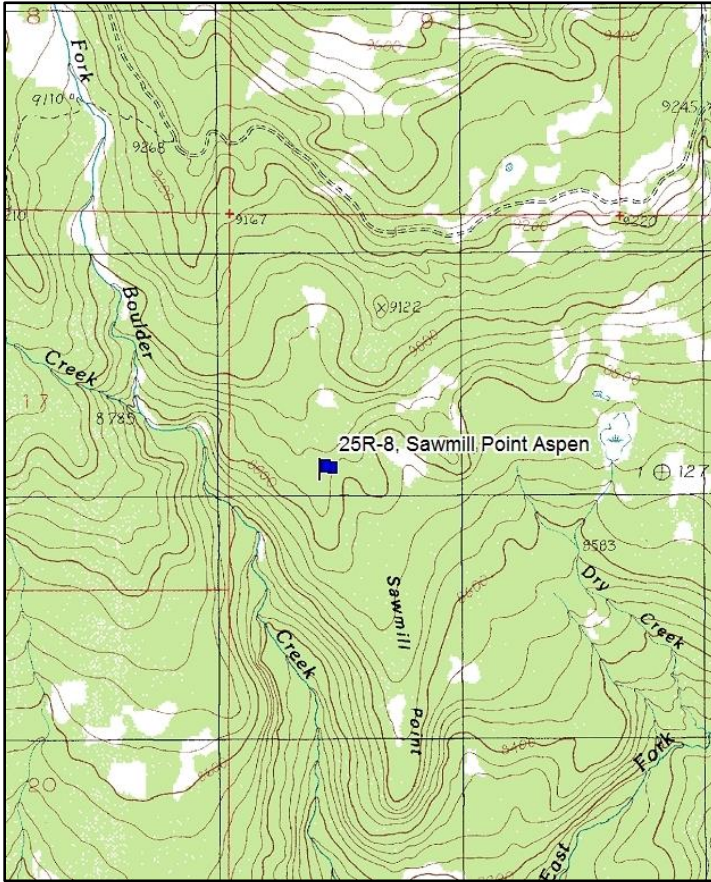
t - Tree Species; p - Preferred Browse; i - Introduced Species

**Table 25R-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 (%)				
<b>Artemisia tridentata ssp. wyomingensis<sup>p</sup> -- (Wyoming big sagebrush)</b>									
2004	-	-	-	-	-	-	-	-	-/-
2007	40	20	100	0	0	0	0	0	- / -
2012	80	-	25	25	50	0	50	75	46/62
2018	20	-	0	100	0	0	100	0	37/75
<b>Atriplex canescens<sup>p</sup> -- (fourwing saltbush)</b>									
2004	-	-	-	-	-	-	-	-	83/75
2007	-	-	-	-	-	-	-	-	73/75
2012	-	-	-	-	-	-	-	-	74/127
2018	-	-	-	-	-	-	-	-	62/85
<b>Chrysothamnus viscidiflorus -- (yellow rabbitbrush)</b>									
2004	20	-	0	100	0	0	0	0	34/35
2007	20	-	0	100	0	0	0	0	83/102
2012	-	-	-	-	-	-	-	-	-/-
2018	40	-	0	50	50	0	50	50	40/41
<b>Ericameria nauseosa -- (rubber rabbitbrush)</b>									
2004	-	-	-	-	-	-	-	-	-/-
2007	-	-	-	-	-	-	-	-	-/-
2012	20	-	0	0	100	0	0	100	66/87
2018	40	-	0	100	0	50	50	0	41/50
<b>Opuntia -- (pricklypear)</b>									
2004	20	-	0	100	0	0	0	0	10/56
2007	-	-	-	-	-	-	-	-	11/59
2012	-	-	-	-	-	-	-	-	13/52
2018	140	-	14	86	0	0	0	0	11/38

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

## SAWMILL POINT ASPEN - STUDY NO. 25R-8

**Location Information**

USGS 7.5 min Map Info  
GPS (0' Stake)

Deer Creek Lake SW; Township 32S, Range 4E, Section 49  
NAD 83 UTM ZONE 12, 458359 East 4208268 North

**Transect Information**

Browse Tag # (0' Stake)	Not Available
Transect Bearing	45° magnetic (Lines 3-5: 130° 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 the Boulder Highway travel 0.1 miles north of mile marker 92 and turn left (west) towards the Garkane power plant. Continue 1.8 miles to a fork towards Bear Creek, then stay left on Forest Service Road #166. Continue for 1.9 miles to a road on the right. Turn and go 0.9 miles, passing through a Forest Service gate shortly after turning right at a fork. Drive for 0.7 miles to another fork and bear left. Travel for another 0.7 miles to a witness post on the right (east) side of the road. The witness post is actually the 0-foot stake; there is no browse tag.

**Site Information**

Land Ownership	Federal
Land Administrator	USFS
Allotment	Boulder
Elevation	8,745ft (2,665m)
Aspect	East
Slope	3-21%
Sample Dates	08/18/2010, 08/14/2013, 08/08/2018

**Table 25R-08.1 Disturbance History.** Recorded history of major disturbances.

Treatment/Disturbance	Name	WRI DB#	Date	Size (acres)
Hand Crew - Lop (No Scatter)	Sawmill Point/Baldy's Ridge Aspen Improvement Stewardship	1691	July 2010-June 2011	940

**Wildlife Habitat and Vegetation History****Table 25R-08.3 - Wildlife Seasonal Habitat.** UDWR wildlife habitat and seasonality.

Species	Habitat	Season
Deer	crucial	summer
Elk	substantial	summer

**Table 25R-08.4 - Vegetation History.** The dominant vegetation type(s) and phase of woodland succession (Tausch, Miller, Roundy, & Chambers, 2009).

Year	Vegetation Type	Woodland Succession
2010	Quaking Aspen-Conifer Encroached	NA
2013	Quaking Aspen	NA
2018	Quaking Aspen	NA

**Site Notes**

No Notes

**Site Potential**

1981 - 2010 Average Annual Precipitation	22 inches
NRCS Ecological Site	High Mountain Loam (Aspen)
NRCS Ecological Site #	R047XB508UT
States and Transitions	No state and transition model is available for the above ecological site.

When established in 2010, the plant community on this study site was composed mainly of quaking aspen (*Populus tremuloides*) with some conifer encroachment by ponderosa pine (*Pinus ponderosa*) and Douglas-fir (*Pseudotsuga menziesii*). Conifer cover and density decreased following a lop (no scatter) treatment (Table 25R-08.1), and aspen has been the sole dominant vegetation component since 2013 (Table 25R-08.12, Table 25R-08.13, Table 25R-08.14). There was a robust herbaceous understory consisting of both perennial grasses and forbs in 2010, with perennial forbs being especially diverse. Understory cover exhibited an initial decrease in the first sample year following treatment, but recovered to pre-treatment levels in 2018 (Table 25R-08.7, Table 25R-08.10, Table 25R-08.11). Although conifer density and cover are low as of the 2018 sample year (Table 25R-08.12, Table 25R-08.14), the post-treatment presence of these trees indicates that infilling may be possible in future sample years.



**Trend Summary Tables****Table 25R-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
2010	7.3	-	3.6	8.4	-	59.5
2013	2.6	-	0.9	4.3	-	24.6
2018	4.8	-	3.1	7.6	-	40.3

**Table 25R-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
2010	-	305	17	254	-	12.3	0.1	14.8
2013	-	259	16	188	-	6.0	0.1	4.8
2018	-	358	24	232	-	19.4	0.3	11.7

**Table 25R-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
2010	4.4	0.1	71.4	0.1	3.3	34.4
2013	11.9	0.2	72.3	0.1	3.9	15.2
2018	12.4	0.4	71.0	1.1	5.3	33.8

**Table 25R-08.9 - Pellet Group Data.** Quadrat frequency and pellet group transect data for animal pellets. Rabbit pellet groups are not sampled in the pellet group transect.

Year	Cattle	Mule Deer	Rocky Mountain Elk	Rabbit
	Quadrat Frequency			
2010	1	-	-	-
2013	1	1	-	-
2018	3	1	2	1
Days Use Per Acre (ha)				
2010	10.2 (25.1)	1.3 (3.3)	-	-
2013	6.5 (16.1)	4.7 (11.6)	0.7 (1.7)	-
2018	13.1 (32.3)	8.1 (19.9)	8.7 (21.5)	-

**Table 25R-08.10 - Grass Species.** Nested frequency and modified Daubenmire average cover by year.

GRASS SPECIES												
Achnatherum (needlegrass)												
Bouteloua gracilis (blue grama)												
Bromus porteri (Porter brome)												
Carex rossii (Ross' sedge)												
Elymus elymoides (squirreltail)												
Festuca idahoensis (Idaho fescue)												
Hesperostipa comata (needle and thread)												
Koeleria macrantha (prairie Junegrass)												
Muhlenbergia montana (mountain muhly)												
Poa fendleriana (muttongrass)												
Poa pratensis <sup>i</sup> (Kentucky bluegrass)												
Poa secunda (Sandberg bluegrass)												
year	Nested Frequency											
2010	15	-	-	55	109	-	23	16	-	29	200	2
2013	17	-	6	84	76	-	-	2	-	110	92	1
2018	13	10	24	143	191	33	42	3	1	148	60	-
year	Average Cover (%)											
2010	0.2	-	-	1.3	2.6	-	1.0	0.7	-	0.7	5.9	0.0
2013	0.2	-	0.0	1.3	0.7	-	-	0.0	-	2.0	1.8	0.0
2018	0.3	0.2	0.7	3.0	6.2	0.7	2.2	0.1	0.0	4.1	2.1	-

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

**Table 25R-08.11 - Forb Species.** Nested frequency and modified Daubenmire average cover by year.

FORB SPECIES																	
Achillea millefolium (Common yarrow)																	
Androsace septentrionalis <sup>a</sup> (pygmyflower rockjasmine)																	
Antennaria parvifolia (small-leaf pussytoes)																	
Arabis holboellii <sup>a</sup> (Holboell's rockcress)																	
Artemisia canthi (Carruth's sagewort)																	
Ceratocephala testiculata <sup>a</sup> (curveseed butterwort)																	
Chaenactis douglasii (Douglas' dustymaiden)																	
Clematis (leather flower)																	
Crepis acuminata (tapertip hawkbeard)																	
Cryptantha (cryptantha)																	
Erigeron eatonii (Eaton's fleabane)																	
Erigeron flagellaris (trailing fleabane)																	
Eriogonum racemosum (redroot buckwheat)																	
Gayophytum ramosissimum <sup>a</sup> (pinyon groundsmoke)																	
Geranium richardsonii (Richardson's geranium)																	
Hieracium fendleri (yellow hawkweed)																	
Hymenoxys richardsonii (pinque rubberweed)																	
year	Nested Frequency																
2010	64	-	143	-	-	-	3	-	-	1	-	58	10	3	-	9	7
2013	29	-	82	-	4	3	-	-	2	10	-	43	6	-	3	3	6
2018	39	10	89	7	-	-	-	3	-	-	7	91	3	-	5	3	-
year	Average Cover (%)																
2010	1.2	-	4.4	-	-	-	0.0	-	-	0.0	-	1.3	0.0	0.0	-	0.1	0.0
2013	0.6	-	1.2	-	0.0	0.0	-	-	0.0	0.0	-	0.5	0.1	-	0.0	0.0	0.0
2018	0.9	0.0	2.3	0.0	-	-	-	0.1	-	-	0.0	3.8	0.0	-	0.0	0.1	-

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

FORB SPECIES															
Lathyrus lanszwertii (Nevada pea)															
Lomatium (desertparsley)															
Lupinus argenteus (silvery lupine)															
Packera multilobata (lobeleaf groundsel)															
Penstemon strictus (Rocky Mountain penstemon)															
Polygonum douglasii <sup>a</sup> (Douglas' knotweed)															
Potentilla hippiana (woolly cinquefoil)															
Pseudocymopterus montanus (alpine false springparsley)															
Silene drummondii (Drummond's campion)															
Streptanthus cordatus (heartleaf twistflower)															
Taraxacum officinale (common dandelion)															
Tetraneuris acaulis (stemless four-nerve daisy)															
Trifolium longipes (longstalk clover)															
Verbascum thapsus <sup>at</sup> (common mullein)															
year	Nested Frequency														
2010	-	5	38	16	10	14	52	36	2	2	69	1	-	-	
2013	2	18	39	7	21	13	33	-	-	-	27	-	2	-	
2018	-	-	45	38	2	6	27	24	2	-	68	-	-	2	
year	Average Cover (%)														
2010	-	0.0	3.4	1.1	0.1	0.0	1.6	0.5	0.0	0.0	0.9	0.0	-	-	
2013	0.0	0.1	1.2	0.0	0.3	0.0	0.5	-	-	-	0.2	-	0.0	-	
2018	-	-	1.2	0.2	0.0	0.0	0.9	0.5	0.0	-	1.6	-	-	0.2	

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

**Table 25R-08.12 - Shrub and Tree Species.** Average modified Daubenmire quadrat and line intercept cover by year.

SHRUB SPECIES					
Pinus ponderosa <sup>t</sup> (ponderosa pine)					
Populus tremuloides <sup>t</sup> (quaking aspen)					
Pseudotsuga menziesii <sup>t</sup> (Douglas-fir)					
Purshia tridentata <sup>p</sup> (antelope bitterbrush)					
Symphoricarpos oreophilus <sup>p</sup> (mountain snowberry)					
year	Line Intercept Cover (%)				
2010	21.7	37.6	0.2	-	8.4
2013	0.5	24.1	-	-	4.3
2018	0.2	40.1	-	-	7.6
year	Quadrat Cover (%)				
2010	3.2	0.2	0.1	-	7.3
2013	0.2	0.7	-	0.1	2.4
2018	0.1	2.9	0.0	0.1	4.7

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

**Table 25R-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 (%)				
<b>Juniperus communis -- (common juniper)</b>									
2010	-	-	-	-	-	-	-	-	-/-
2013	-	-	-	-	-	-	-	-	-/-
2018	-	-	-	-	-	-	-	-	57/338
<b>Pinus ponderosa<sup>t</sup> -- (ponderosa pine)</b>									
2010	260	20	62	39	0	0	0	0	-/-
2013	40	20	100	0	0	0	0	0	-/-
2018	40	-	100	0	0	0	0	50	-/-
<b>Populus tremuloides<sup>t</sup> -- (quaking aspen)</b>									
2010	400	-	65	35	0	0	0	0	-/-
2013	See table 13a - Aspen Characteristics								
2018	See table 13a - Aspen Characteristics								
<b>Pseudotsuga menziesii<sup>t</sup> -- (Douglas-fir)</b>									
2010	-	20	0	0	0	0	0	0	-/-
2013	-	-	-	-	-	-	-	-	-/-
2018	-	-	-	-	-	-	-	-	-/-
<b>Purshia tridentata<sup>p</sup> -- (antelope bitterbrush)</b>									
2010	40	-	50	50	0	0	100	0	10/26
2013	40	-	0	100	0	50	50	0	15/31
2018	20	-	100	0	0	0	100	0	31/33
<b>Symphoricarpos oreophilus<sup>p</sup> -- (mountain snowberry)</b>									
2010	1940	-	27	73	0	16	0	0	46/85
2013	1980	20	33	67	0	5	0	3	43/61
2018	2760	-	9	91	0	10	11	0	39/66

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

**Table 25R-08.13a - Aspen Characteristics.** Characteristics of aspen populations including density, size class distribution, and vigor of plants.

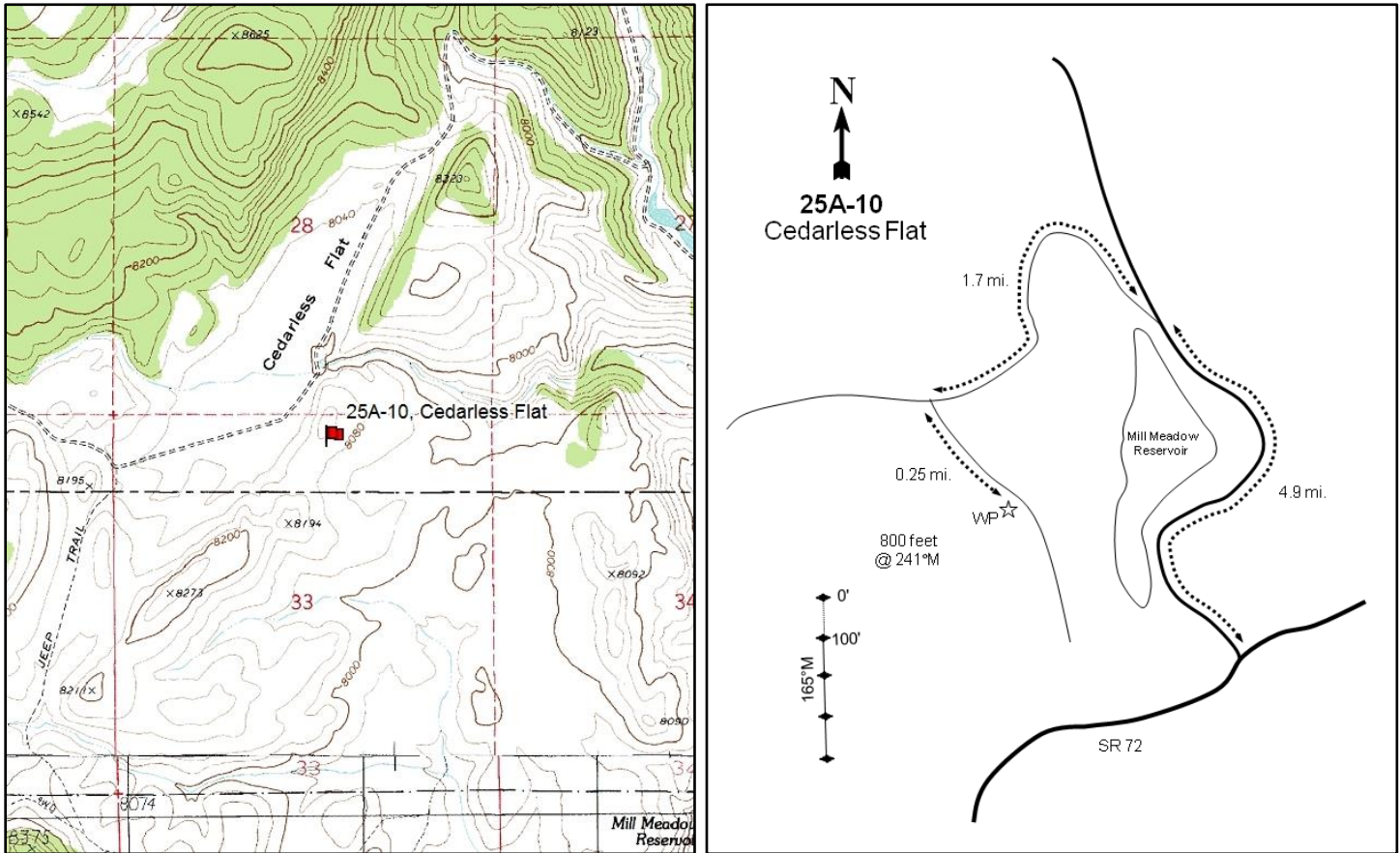
Year	Density	Size Class Distribution				Utilization		Poor Vigor (%)
	Plants per Acre	Class I (%)	Class II (%)	Class III (%)	Class IV (%)	Moderate (%)	Heavy (%)	
<b>Populus tremuloides (quaking aspen)</b>								
2013	820	54	37	10	-	11	42	5
2018	1640	38	49	4	10	26	8	4

Class I - &lt;= 1.5 feet; Class II - &gt; 1.5 feet to 5 feet; Class III - &gt; 5 feet and up to 1 inch diameter at breast height (dbh); Class IV - &gt; 1 in diameter at breast height (dbh)

**Table 25R-08.14 - Tree Characteristics.** Point-quarter tree density, size class distribution, and average diameter.

Year	Density	Size Class Distribution					Average Diameter (cm)
	Trees per Acre	Seedling (%)	1-4' (%)	4-8' (%)	8-12' (%)	>12' (%)	
<b>Pinus ponderosa (ponderosa pine)</b>							
2010	196	-	10	15	15	60	18.9
2013	22	50	-	50	-	-	3.5
2018	30	14	57	14	14	-	3.6
<b>Populus tremuloides (quaking aspen)</b>							
2010	127	20	-	5	-	75	16.4
2013	304	50	35	-	5	10	2.8
2018	1288	30	50	5	10	5	2.3

## CEDARLESS FLAT - STUDY NO. 25A-10

**Location Information**

USGS 7.5 min Map Info  
GPS (0' Stake)

Forsyth Reservoir SW; Township 26S, Range 3E, Section 33  
NAD 83 UTM ZONE 12, 448784 East 4262764 North

**Transect Information**

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

407  
165° magnetic  
400ft  
Line 1 (11ft & 95ft), Line 2 (34ft), Line 3 (59ft), Line 4 (71ft)  
Standard

**Directions to Site**

From Fremont, travel northeast on SR-72 for 2.25 miles to a major fork (there is a sign that says "Mill Meadow Reservoir"). Turn left and proceed 4.5 miles past the reservoir to Fremont Creek. Cross the bridge and go 0.4 miles to a fork. Bear left on the Mytoge Road and proceed for 1.1 miles to a cattle guard in Cedarless Flat. From the cattleguard, go 0.6 miles to a fork. Proceed to the left and go exactly 0.25 miles to a witness post on the right (southwest) side of the road. From the witness post, walk 800 feet at 241 degrees magnetic to the 0-ft baseline stake which is marked with a red browse tag #407.

**Site Information**

Land Ownership	Federal
Land Administrator	USFS
Allotment	UM Allotment
Elevation	8,200ft (2,499m)
Aspect	Southeast
Slope	12%
Sample Dates	08/25/1999, 08/10/2004, 08/18/2009, 08/12/2013, 07/16/2018

**Table 25A-10.1 Disturbance History.** Recorded history of major disturbances.

Treatment/Disturbance	Name	WRI DB#	Date	Size (acres)
Hand Crew - Lop and Scatter	Mytoge-Tidwell Sage Grouse Habitat Improvement Phase 1 (Proposed)	3995	August 2017-June 2018	8942
Chaining - Chain Unknown	-	-	1987	-
Seeding - Seed Unknown	-	-	1987	-

**Wildlife Habitat and Vegetation History****Table 25A-10.3 - 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	brood-rearing
Pronghorn	crucial	winter	

**Table 25A-10.4 - 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
1999	Mountain Big Sagebrush	Phase I
2004	Mountain Big Sagebrush	Phase I
2009	Mountain Big Sagebrush	Phase I
2013	Mountain Big Sagebrush	Phase I
2018	Mountain Big Sagebrush	Phase I

**Site Notes**

The ridgeline to the southwest is covered by twoneedle pinyon (*Pinus edulis*) and Utah juniper (*Juniperus osteosperma*).

**Soils****Table 25A-10.5 - Soil Analysis Data.** List of chemical and textural soil characteristics determined by laboratory analysis.

Texture	pH	%sand	%silt	%clay	%OM	PPM P	PPM K	ds/m	Sample Date
Clay Loam	7.4	43.3	25.4	31.3	2.6	7.0	112.0	0.6	08/25/1999

**Site Potential**

1981 - 2010 Average Annual Precipitation	13 inches
NRCS Ecological Site	Upland Loam (Mountain Big Sagebrush-Indian Ricegrass)
NRCS Ecological Site #	R047XB308UT
States and Transitions	No state and transition model is available for this ecological site.

Since study establishment in 1985, this site has remained in a stable state with mountain big sagebrush (*Artemisia tridentata* ssp. *vaseyana*) as the dominant shrub; sagebrush exhibited an initial decrease following a 1987 chaining treatment, but has since recovered (Pre-1992 Data, Table 25A-10.12, Table 25A-10.13). The herbaceous understory has been dominated by native perennial grasses, mainly blue grama (*Bouteloua gracilis*), in most sample years (Table 25A-10.7, Table 25A-10.10, Table 25A-10.11). Twoneedle pinyon (*Pinus edulis*) and Utah juniper (*Juniperus osteosperma*) have been present in the vicinity throughout the duration of the study. A 2018 lop and scatter treatment removed many of the trees in the area (Table 25A-10.1), but they were still observed in low amounts in 2018 (Photos, Table 25A-10.14). Barring a major disturbance, sagebrush will likely remain as the dominant vegetation component on this site in future sample years.

**Trend Summary Tables****Table 25A-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
1999	9.2	0.6	-	-	-	-
2004	7.7	0.5	-	11.5	0.3	-
2009	9.6	0.2	-	15.2	0.2	-
2013	11.3	0.5	-	12.6	6.0	-
2018	14.0	1.4	-	18.7	1.4	-

**Table 25A-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
1999	-	293	11	11	-	13.3	0.0	0.1
2004	-	197	264	3	-	4.3	6.7	0.0
2009	-	218	26	1	-	5.9	0.1	0.0
2013	-	274	-	6	-	10.4	-	0.0
2018	-	329	-	7	-	20.7	-	0.0

**Table 25A-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
1999	20.1	0.0	13.7	27.3	9.0	23.0
2004	23.5	-	19.3	43.7	7.6	18.5
2009	16.0	0.0	18.3	45.9	3.8	16.1
2013	10.7	0.0	17.5	40.0	17.7	25.6
2018	8.7	0.1	23.9	46.4	13.8	37.0

**Table 25A-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/Pronghorn	Rocky Mountain Elk	Rabbit
	Quadrat Frequency				
1999	3	-	8	6	9
2004	1	-	19	2	40
2009	1	-	14	5	59
2013	-	-	7	2	13
2018	2	-	11	2	6
Days Use Per Acre (ha)					
1999	4.4 (10.8)	-	7.4 (18.2)	20.8 (51.3)	-
2004	2.9 (7.2)	8.7 (21.5)*	32.8 (81.1)	4.7 (11.6)	-
2009	2.2 (5.4)	-	50.9 (125.8)	14.7 (36.4)	-
2013	9.4 (23.3)	-	36.2 (89.4)	7.4 (18.2)	-
2018	0.7 (1.8)	-	28.1 (69.5)	1.3 (3.3)	-

\*Pellets per acre (ha)



**Table 25A-10.10 - Grass Species.** Nested frequency and modified Daubenmire average cover by year.

GRASS SPECIES	Achnatherum hymenoides (Indian ricegrass)	Achnatherum lettermanii (Letterman's needlegrass)	Agropyron cristatum <sup>i</sup> (crested wheatgrass)	Bouteloua gracilis (blue grama)	Bromus inermis <sup>i</sup> (smooth brome)	Carex (sedge)	Elymus elymoides (squirreltail)	Poa fendleriana (muttongrass)	Psathyrostachys juncea <sup>i</sup> (Russian wildrye)
year	Nested Frequency								
1999	37	4	42	221	13	16	29	-	63
2004	19	-	29	108	-	16	19	-	53
2009	10	1	21	117	0	17	13	3	68
2013	3	7	19	162	-	29	17	6	97
2018	0	24	30	226	8	55	22	23	67
year	Average Cover (%)								
1999	0.7	0.0	1.1	8.3	0.2	0.1	0.2	-	2.6
2004	0.1	-	0.7	1.9	-	0.1	0.1	-	1.4
2009	0.0	0.0	0.3	3.4	0.0	0.1	0.2	0.0	1.9
2013	0.0	0.1	0.7	5.3	-	0.1	0.5	0.0	3.7
2018	0.0	0.5	1.6	14.7	0.1	1.3	0.3	0.2	2.1

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

**Table 25A-10.11 - Forb Species.** Nested frequency and modified Daubenmire average cover by year.

FORB SPECIES	Androsace septentrionalis <sup>a</sup> (pygmyflower rockjasmine)	Arabis demissa (nodding rockcress)	Astragalus lentiginosus (freckled milkvetch)	Chenopodium fremontii <sup>a</sup> (Fremont's goosefoot)	Chenopodium leptophyllum <sup>a</sup> (narrowleaf goosefoot)	Cryptantha (cryptantha)	Descurainia pinnata <sup>a</sup> (western tansymustard)	Erigeron pumilus (shaggy fleabane)	Eriogonum cernuum <sup>a</sup> (nodding buckwheat)	Phlox longifolia (longleaf phlox)
year	Nested Frequency									
1999	11	4	5	-	-	1	-	-	-	1
2004	-	-	1	25	258	-	3	-	3	2
2009	-	-	1	1	26	-	-	-	-	-
2013	-	-	-	-	-	3	-	-	-	3
2018	-	-	1	-	-	3	-	3	-	-
year	Average Cover (%)									
1999	0.0	0.0	0.0	-	-	0.0	-	-	-	0.0
2004	-	-	0.0	0.3	6.4	-	0.0	-	0.0	0.0
2009	-	-	0.0	0.0	0.1	-	-	-	-	-
2013	-	-	-	-	-	0.0	-	-	-	0.0
2018	-	-	0.0	-	-	0.0	-	0.0	-	-

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

**Table 25A-10.12 - Shrub and Tree Species.** Average modified Daubenmire quadrat and line intercept cover by year.

SHRUB SPECIES	Artemisia nova <sup>p</sup> (black sagebrush)	Artemisia tridentata ssp. vaseyana <sup>p</sup> (mountain big sagebrush)	Chrysothamnus viscidiflorus ssp. viscidiflorus var. viscidiflorus (yellow rabbitbrush)	Cylindropuntia (cholla)	Gutierrezia sarothrae (broom snakeweed)	Opuntia (pricklypear)	Pediocactus simpsonii (mountain ball cactus)
year	Line Intercept Cover (%)						
1999	-	-	-	-	-	-	-
2004	-	11.5	-	-	0.3	0	-
2009	0.2	15	0.1	-	0	0.1	-
2013	-	12.6	5.4	-	0.4	0.2	-
2018	0.9	17.8	0.6	-	0.8	-	-
year	Quadrat Cover (%)						
1999	-	9.2	0.1	-	0.4	0.0	0.0
2004	0.0	7.7	0.2	-	0.3	0.0	0.0
2009	0.0	9.6	0.2	-	0.0	0.0	-
2013	-	11.3	0.2	-	0.2	0.1	0.0
2018	0.7	13.3	0.5	0.0	0.9	0.0	0.0

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

**Table 25A-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 (%)				
<b>Artemisia nova<sup>p</sup> -- (black sagebrush)</b>									
1999	80	-	0	100	0	0	0	0	16/37
2004	200	-	0	100	0	10	0	0	24/50
2009	120	20	0	67	33	0	0	17	22/35
2013	-	-	-	-	-	-	-	-	-/-
2018	120	-	0	83	17	17	0	0	19/35
<b>Artemisia tridentata ssp. vaseyana<sup>p</sup> -- (mountain big sagebrush)</b>									
1999	5440	40	31	65	4	52	15	3	34/55
2004	4320	320	5	57	38	36	10	27	32/57
2009	5240	220	10	75	14	33	11	8	33/58
2013	5040	680	21	68	10	42	23	20	35/70
2018	5080	160	10	71	19	23	2	13	35/64
<b>Chrysothamnus viscidiflorus ssp. viscidiflorus var. viscidiflorus -- (yellow rabbitbrush)</b>									
1999	240	-	0	92	8	17	8	8	17/32
2004	240	80	0	100	0	0	0	0	18/34
2009	260	20	8	92	0	0	0	0	16/28
2013	280	-	14	79	7	7	0	14	18/36
2018	720	-	11	89	0	0	0	0	17/30
<b>Cylindropuntia -- (cholla)</b>									
1999	-	-	-	-	-	-	-	-	-/-
2004	-	-	-	-	-	-	-	-	-/-
2009	-	-	-	-	-	-	-	-	-/-
2013	-	-	-	-	-	-	-	-	-/-
2018	-	-	-	-	-	-	-	-	3/1

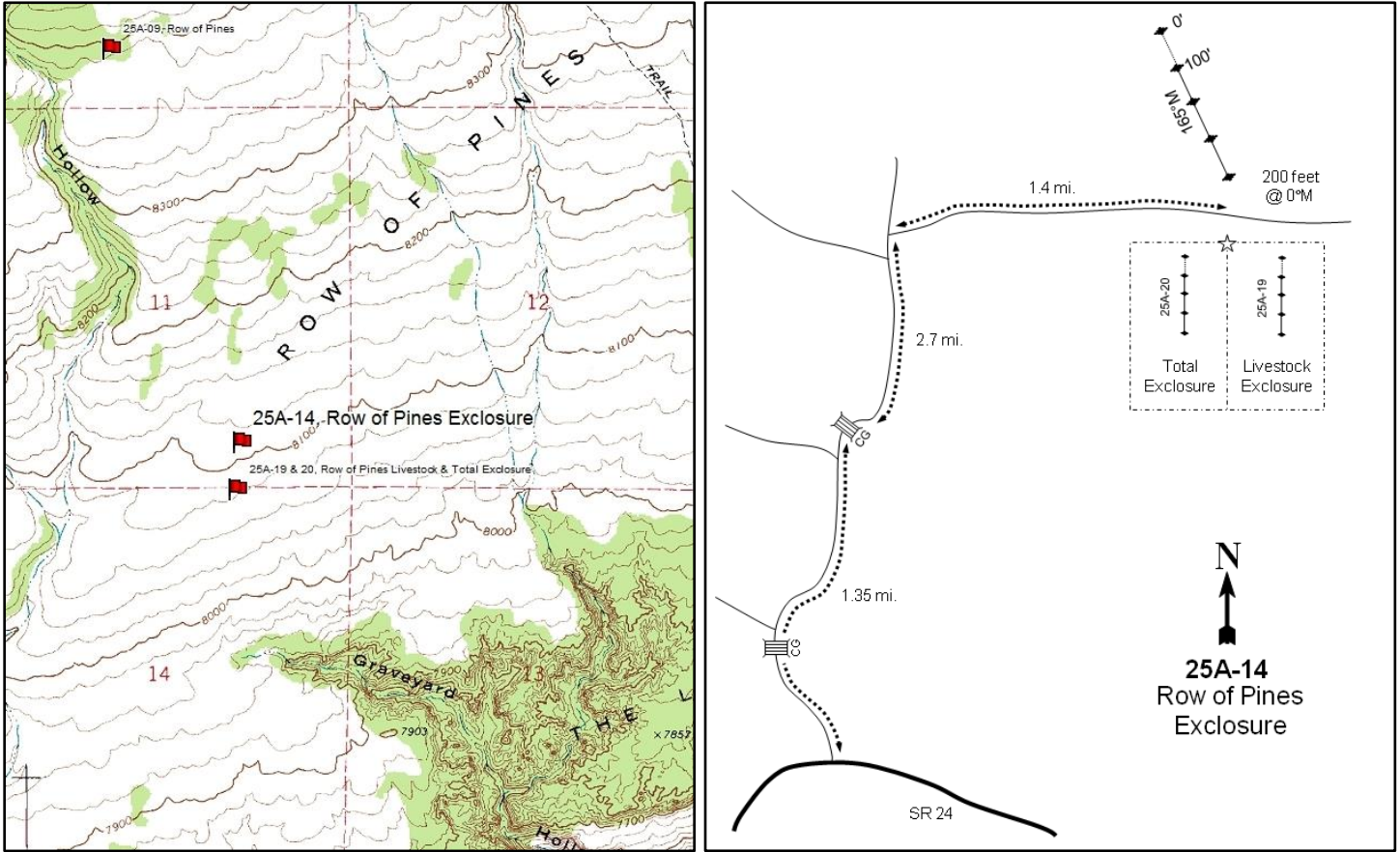
Year	Density		Age Class Distribution			Utilization		Poor Vigor (%)	Average Height Crown (cm)
	Plants Per Acre		Excluding Seedlings			Moderate (%)	Heavy (%)		
	Excluding Seedlings	Seedling	Young (%)	Mature (%)	Decadent (%)				
<b>Gutierrezia sarothrae -- (broom snakeweed)</b>									
1999	4240	100	52	48	0	0	0	0	11/11
2004	1720	-	5	95	0	0	0	0	13/17
2009	160	-	13	88	0	0	0	0	12/13
2013	960	-	44	56	0	0	0	0	11/15
2018	1860	140	7	91	2	2	0	2	10/15
<b>Linanthus pungens -- (granite prickly phlox)</b>									
1999	-	-	-	-	-	-	-	-	-/-
2004	-	-	-	-	-	-	-	-	-/-
2009	-	-	-	-	-	-	-	-	-/-
2013	-	-	-	-	-	-	-	-	21/38
2018	-	-	-	-	-	-	-	-	25/38
<b>Opuntia -- (pricklypear)</b>									
1999	80	-	25	75	0	0	0	0	7/26
2004	100	-	20	80	0	0	0	0	7/24
2009	40	-	50	50	0	0	0	100	6/23
2013	80	-	25	75	0	0	0	0	6/22
2018	20	-	0	100	0	0	0	0	5/26
<b>Pediocactus simpsonii -- (mountain ball cactus)</b>									
1999	60	-	33	67	0	0	0	0	4/9
2004	40	-	0	100	0	0	0	0	2/7
2009	-	-	-	-	-	-	-	-	-/-
2013	40	-	0	100	0	0	0	0	1/5
2018	20	-	0	100	0	0	0	0	2/6
<b>Pinus edulis<sup>t</sup> -- (twoneedle pinyon)</b>									
1999	-	-	-	-	-	-	-	-	-/-
2004	-	-	-	-	-	-	-	-	-/-
2009	-	-	-	-	-	-	-	-	-/-
2013	-	20	0	0	0	0	0	0	-/-
2018	-	20	0	0	0	0	0	0	-/-

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

**Table 25A-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' (%)	
<b>Pinus edulis (twoneedle pinyon)</b>							
2018	9	100	-	-	-	-	1.0

## ROW OF PINES EXCLOSURE - STUDY NO. 25A-14



### Location Information

USGS 7.5 min Map Info  
GPS (0' Stake)

Loa NE; Township 27S, Range 2E, Section 11  
NAD 83 UTM ZONE 12, 442669 East 4258250 North

### Transect Information

Browse Tag # (0' Stake)	Not Available
Transect Bearing	10° magnetic
Length	400ft
Belt Placement	Line 1 (11ft & 95ft), Line 2 (34ft), Line 3 (59ft), Line 4 (71ft)
Belt Marker Placement	Standard

### Directions to Site

From the Chappell Cheese Factory northwest of Loa on SR-24, travel 2.6 miles west to a side road on the north where the highway makes a sharp turn (0.95 miles west of mile marker #49). Travel on this road for 0.65 miles and turn right after crossing a cattle guard. After 0.7 more miles, turn right at the fork and cross another cattle guard. Drive 2.7 miles to another fork where you will again turn right. After about 60 feet, turn right (east) and go 1.4 miles to an exclosure. Stop at the middle of the exclosure and walk 200 feet at an azimuth of 0 degrees magnetic to the 400-foot stake. The 0-foot stake is 400 feet to the north in front of a large rock; there is no browse tag.

**Site Information**

Land Ownership	Federal
Land Administrator	BLM
Allotment	SEVEN MILE
Elevation	8,050ft (2,454m)
Aspect	South
Slope	3-5%
Sample Dates	08/24/1999, 08/11/2004, 08/13/2009, 08/15/2013, 07/18/2018

**Table 25A-14.1 Disturbance History.** Recorded history of major disturbances.

Treatment/Disturbance	Name	WRI DB#	Date	Size (acres)
Chaining - Two-Way Unknown	Roe Pine Bench Chaining and Seeding 1983	LTDL	August-November 1983	2345
Seeding - Aerial Unknown	Roe Pine Bench Chaining and Seeding 1983	LTDL	August-November 1983	2345
Harrow - Two-Way Dixie	Seven Mile Dixie Harrow 2006	LTDL	October-December 2006	4275
Seeding - Broadcast Before	Seven Mile Dixie Harrow 2006	LTDL	November-December 2006	4275
Seeding - Aerial Unknown	Seven Mile Dixie Harrow 2006	LTDL	January 2007	2000

**Table 25A-14.2 Seed Mix.** List of known seeded plant species and rates (if available).

Mix Name			Application Type	Application Date	Acres
Roe Pine Bench Aerial Seeding			Aerial	Sep 1983	2345
Type	Species	Common Name	Cultivar/Source ID	Bulk lbs/acre	PLS
G	Agropyron desertorum	Desert Wheatgrass		1.00	0.00
G	Bromus inermis	Smooth Brome		1.00	0.00
G	Psathyrostachys juncea	Russian Wildrye		1.00	0.00
G	Thinopyrum intermedium	Pubescent Wheatgrass	Luna	1.00	0.00
F	Medicago sativa	Alfalfa		3.00	0.00
F	Melilotus officinalis	Yellow Sweetclover		2.00	0.00
F	Sanguisorba minor	Small Burnet		2.00	0.00
S	Atriplex canescens	Fourwing Saltbush		0.00	0.00
Mix Name			Application Type	Application Date	Acres
Seven Mile - Low elevation			Broadcast	Nov 2006	4400
Type	Species	Common Name	Cultivar/Source ID	Bulk lbs/acre	PLS
G	Agropyron cristatum	Crested Wheatgrass	Ephraim	0.50	0.45
G	Agropyron cristatum	Crested Wheatgrass	Hycrest	0.29	0.26
G	Agropyron cristatum	Crested Wheatgrass	Hycrest	0.22	0.19
G	Festuca ovina	Sheep Fescue		0.25	0.24
G	Leymus cinereus	Great Basin Wildrye	Trailhead	0.35	0.29
G	Leymus cinereus	Great Basin Wildrye	Trailhead	0.45	0.40
G	Poa secunda	Sandberg Bluegrass	Toole MT	0.23	0.19
G	Poa secunda	Sandberg Bluegrass	Toole MT	0.02	0.02
G	Poa secunda	Big Bluegrass	Sherman	0.15	0.12
G	Poa secunda	Big Bluegrass	Sherman	0.11	0.09
G	Psathyrostachys juncea	Russian Wildrye		0.99	0.91
G	Psathyrostachys juncea	Russian Wildrye		0.02	0.02
G	Thinopyrum intermedium	Pubescent Wheatgrass		0.50	0.42
F	Helianthus annuus	Annual Sunflower	Millard UT	0.03	0.03
F	Linum perenne	Blue Flax	Appar	0.20	0.19
F	Linum perenne	Blue Flax		0.12	0.11
F	Medicago sativa	Alfalfa	Ladak	0.50	0.47
F	Melilotus officinalis	Yellow Sweetclover		0.25	0.21
F	Sanguisorba minor	Small Burnet	Delar	2.00	1.86
Mix Name			Application Type	Application Date	Acres
Seven Mile - Browse Low Elevation			Aerial	Jan 2007	2000
Type	Species	Common Name	Cultivar/Source ID	Bulk lbs/acre	PLS
S	Artemisia tridentata ssp. wyomingensis	Wyoming Big Sagebrush	Beaver UT	0.50	0.11
S	Bassia prostrata	Forage Kochia	Elko/Lander NV	1.50	0.71

**Wildlife Habitat and Vegetation History****Table 25A-14.3 - Wildlife Seasonal Habitat.** UDWR wildlife habitat and seasonality.

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

**Table 25A-14.4 - Vegetation History.** The dominant vegetation type(s) and phase of woodland succession (Tausch, Miller, Roundy, & Chambers, 2009).

Year	Vegetation Type	Woodland Succession
1991	Mountain Big Sagebrush	No Encroachment
1999	Mountain Big Sagebrush	No Encroachment
2004	Mountain Big Sagebrush	No Encroachment
2009	Perennial Grass/Mountain Big Sagebrush	No Encroachment
2013	Perennial Grass/Mountain Big Sagebrush	No Encroachment
2018	Perennial Grass/Mountain Big Sagebrush	No Encroachment

#### Site Notes

Large amounts of sage grouse droppings were encountered in the area during site establishment in 1991. Escape cover is located about one half of a mile from the study transect.

#### Soils

**Table 25A-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	7.0	47.3	27.4	25.3	1.6	8.5	163.2	0.6	08/24/1999

#### Site Potential

1981 - 2010 Average Annual Precipitation                      15 inches  
 NRCS Ecological Site    Upland Loam (Mountain Big Sagebrush-Indian Ricegrass)  
 NRCS Ecological Site #    R047XB308UT  
 States and Transitions    No state and transition model is available for this ecological site.

When established in 1991, this study site was dominated by a mixed stand of mountain big sagebrush (*Artemisia tridentata* ssp. *vaseyana*) and broom snakeweed (*Gutierrezia sarothrae*). The herbaceous understory consisted of a mixture of native and introduced perennial grasses and a few forbs that were not abundant (Pre-1992 Data, Photos). Since the harrow treatment in the Fall of 2006 (Table 25A-14.1), both native and introduced grasses have increased in cover (Table 25A-14.7, Table 25A-14.10). Shrubs and forbs, however, decreased in cover in 2009, but exhibited a subsequent increase in 2013 (Table 25A-14.11, Table 25A-14.12). Density of sagebrush has increased since 2004 (Table 25A-14.13), and the community will likely transition to a solely sagebrush dominated state with time.

**Trend Summary Tables****Table 25A-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
1999	13.0	3.9	-	-	-	-
2004	11.1	0.8	-	9.6	1.2	-
2009	2.2	2.7	-	4.3	2.7	-
2013	8.7	1.1	-	9.3	0.4	-
2018	10.1	3.6	-	12.0	2.4	-

**Table 25A-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
1999	-	298	16	76	-	8.8	0.0	0.6
2004	-	242	11	28	-	5.7	0.2	0.2
2009	-	233	14	13	-	10.3	0.1	0.0
2013	-	340	2	30	-	20.3	0.0	0.2
2018	-	347	-	8	-	22.8	-	0.0

**Table 25A-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
1999	21.4	0.2	17.9	29.0	13.6	25.5
2004	34.8	0.1	20.9	26.5	13.1	18.2
2009	31.4	0.0	24.0	16.4	14.8	17.2
2013	20.1	0.0	22.5	25.5	15.8	29.2
2018	14.8	0.1	30.4	30.0	20.3	38.1

**Table 25A-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/Pronghorn	Rocky Mountain Elk	Greater Sage-Grouse	Rabbit
	Quadrat Frequency				
1999	3	16	5	-	34
2004	4	29	3	2	45
2009	1	11	-	-	65
2013	2	10	1	-	18
2018	2	16	-	-	10
Year	Days Use Per Acre (ha)				
1999	14.5 (35.9)	28.8 (71.2)	15.4 (38.1)	-	-
2004	4.4 (10.8)	77.1 (190.4)	2.7 (6.6)	34.9 (86.1)*	-
2009	5.1 (12.6)	28.1 (69.5)	-	-	-
2013	8.0 (19.7)	8.7 (21.5)	2.0 (5.0)	-	-
2018	8.7 (21.5)	17.4 (43.0)	0.7 (1.7)	-	-

\*Pellets per acre (ha)



**Table 25A-14.10 - Grass Species.** Nested frequency and modified Daubenmire average cover by year.

GRASS SPECIES	Achnatherum hymenoides (Indian ricegrass)	Achnatherum lettermanii (Letterman's needlegrass)	Agropyron cristatum <sup>i</sup> (crested wheatgrass)	Bouteloua gracilis (blue grama)	Bromus inermis <sup>i</sup> (smooth brome)	Elymus elymoides (squirreltail)	Hesperostipa comata (needle and thread)	Poa secunda (Sandberg bluegrass)	Psathyrostachys juncea <sup>a</sup> (Russian wildrye)
year	Nested Frequency								
1999	19	-	37	169	9	163	1	-	20
2004	19	-	8	176	4	48	-	-	10
2009	31	-	2	167	-	42	-	-	23
2013	26	8	13	252	-	42	2	3	81
2018	28	18	21	309	-	79	6	1	16
year	Average Cover (%)								
1999	0.1	-	0.2	6.5	0.1	1.7	0.0	-	0.2
2004	0.1	-	0.1	4.8	0.0	0.5	-	-	0.2
2009	0.5	-	0.0	9.1	-	0.4	-	-	0.3
2013	0.6	0.2	0.3	15.0	-	1.0	0.0	0.0	3.2
2018	0.3	0.2	1.0	19.0	-	1.5	0.2	0.0	0.5

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

**Table 25A-14.11 - Forb Species.** Nested frequency and modified Daubenmire average cover by year.

FORB SPECIES	Androsace septentrionalis <sup>a</sup> (pygmyflower rockjasmine)	Arabis demissa (nodding rockcress)	Astragalus lentiginosus (freckled milkvetch)	Chenopodium fremontii <sup>a</sup> (Fremont's goosefoot)	Chenopodium leptophyllum <sup>a</sup> (narrowleaf goosefoot)	Descurainia pinnata <sup>a</sup> (western tansymustard)	Erigeron pumilus (shaggy fleabane)	Eriogonum ovalifolium (cushion buckwheat)	Phlox longifolia (longleaf phlox)	Sphaeralcea coccinea (scarlet globemallow)
year	Nested Frequency									
1999	12	-	6	-	-	4	67	3	5	5
2004	-	3	17	2	4	5	-	-	4	4
2009	-	2	2	-	-	14	6	-	-	3
2013	-	4	-	-	-	2	19	1	1	9
2018	-	2	-	-	-	-	3	-	-	3
year	Average Cover (%)									
1999	0.0	-	0.0	-	-	0.0	0.4	0.2	0.0	0.0
2004	-	0.1	0.0	0.1	0.0	0.0	-	-	0.0	0.0
2009	-	0.0	0.0	-	-	0.1	0.0	-	-	0.0
2013	-	0.0	-	-	-	0.0	0.1	0.0	0.0	0.0
2018	-	0.0	-	-	-	-	0.0	-	-	0.0

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

**Table 25A-14.12 - Shrub and Tree Species.** Average modified Daubenmire quadrat and line intercept cover by year.

SHRUB SPECIES	Line Intercept Cover (%)					
	Artemisia frigida <sup>p</sup> (prairie sagewort)	Artemisia tridentata ssp. vaseyana <sup>p</sup> (mountain big sagebrush)	Chrysothamnus viscidiflorus ssp. viscidiflorus var. stenophyllus (yellow rabbitbrush)	Eriogonum microthecum <sup>p</sup> (slender buckwheat)	Gutierrezia sarothrae (broom snakeweed)	Opuntia fragilis (brittle pricklypear)
year	Line Intercept Cover (%)					
1999	-	-	-	-	-	-
2004	-	9.6	0.4	-	0.7	0.1
2009	-	4.3	0.1	-	2.6	-
2013	-	9.3	0.2	-	0.2	-
2018	-	12	0.1	-	2.3	-
year	Quadrat Cover (%)					
1999	-	13.0	0.5	-	3.2	0.2
2004	-	11.1	0.5	-	0.3	0.1
2009	0.0	2.2	0.1	-	2.7	0.0
2013	0.0	8.6	0.4	-	0.6	0.1
2018	0.0	10.1	0.2	0.0	3.3	0.1

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

**Table 25A-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 (%)				
<b>Artemisia frigida<sup>p</sup> -- (prairie sagewort)</b>									
1999	200	-	10	90	0	20	40	0	12/16
2004	60	-	0	100	0	0	67	0	7/7
2009	20	-	0	100	0	0	0	0	14/16
2013	20	-	0	100	0	0	0	0	16/40
2018	20	-	0	100	0	0	0	0	13/23
<b>Artemisia tridentata ssp. vaseyana<sup>p</sup> -- (mountain big sagebrush)</b>									
1999	5580	60	6	65	29	45	17	14	34/60
2004	4780	360	2	56	42	44	22	19	32/64
2009	6640	440	38	56	6	7	0	8	21/27
2013	7020	9460	20	77	3	39	0	14	29/42
2018	10840	60	31	63	6	24	0	6	28/43
<b>Bassia prostrata<sup>pi</sup> -- (forage kochia)</b>									
1999	-	-	-	-	-	-	-	-	-/-
2004	-	-	-	-	-	-	-	-	-/-
2009	-	-	-	-	-	-	-	-	-/-
2013	-	-	-	-	-	-	-	-	-/-
2018	20	-	0	100	0	0	0	0	9/16
<b>Chrysothamnus viscidiflorus ssp. viscidiflorus var. stenophyllus -- (yellow rabbitbrush)</b>									
1999	1100	-	2	75	24	7	0	13	11/24
2004	1060	60	6	85	9	8	0	6	14/28
2009	160	-	0	100	0	25	0	0	12/17
2013	380	-	5	74	21	11	5	47	13/20
2018	240	-	8	92	0	0	0	0	9/13

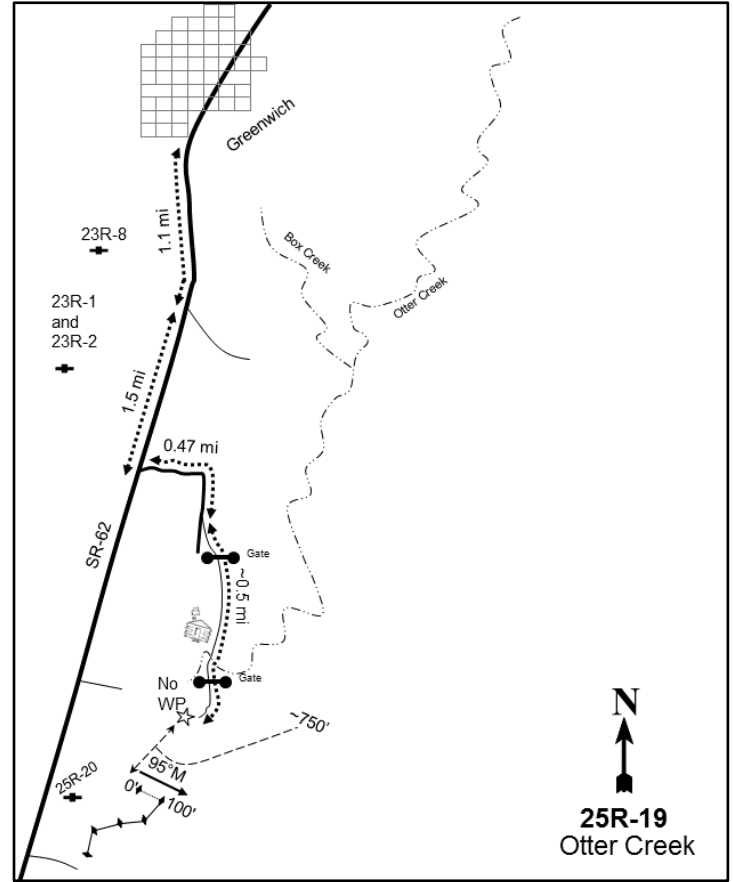
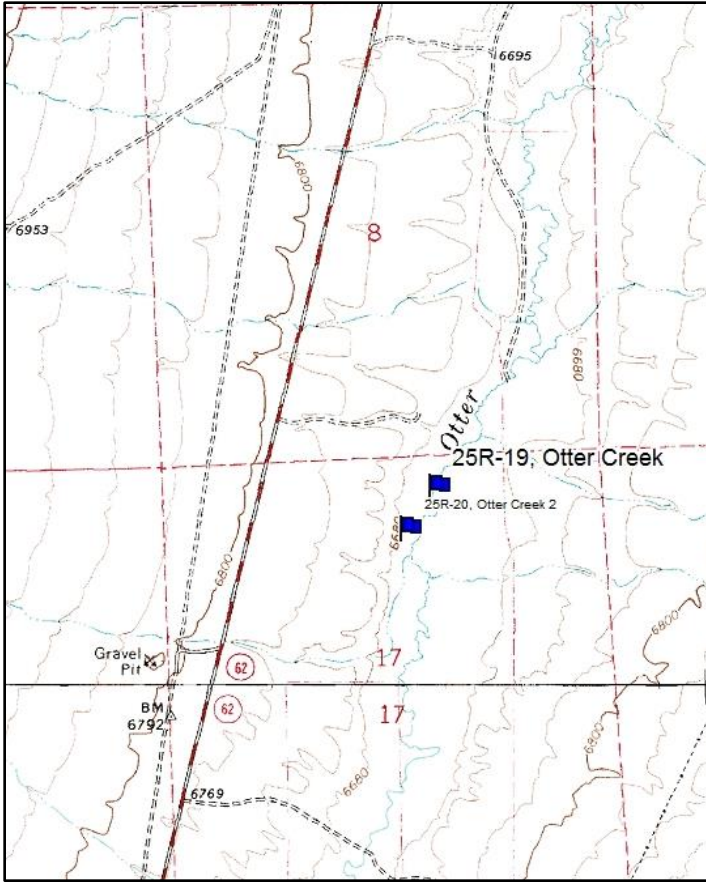
Year	Density		Age Class Distribution			Utilization		Poor Vigor (%)	Average Height Crown (cm)
	Plants Per Acre		Excluding Seedlings			Moderate (%)	Heavy (%)		
	Excluding Seedlings	Seedling	Young (%)	Mature (%)	Decadent (%)				
<b>Chrysothamnus viscidiflorus ssp. viscidiflorus var. viscidiflorus -- (yellow rabbitbrush)</b>									
1999	-	-	-	-	-	-	-	-	-/-
2004	-	-	-	-	-	-	-	-	-/-
2009	-	-	-	-	-	-	-	-	-/-
2013	20	-	0	100	0	0	0	0	-/-
2018	20	-	0	100	0	0	0	0	8/12
<b>Eriogonum microthecum<sup>p</sup> -- (slender buckwheat)</b>									
1999	-	-	-	-	-	-	-	-	-/-
2004	-	-	-	-	-	-	-	-	10/15
2009	-	-	-	-	-	-	-	-	-/-
2013	-	-	-	-	-	-	-	-	-/-
2018	60	-	0	100	0	0	0	0	-/-
<b>Gutierrezia sarothrae -- (broom snakeweed)</b>									
1999	10000	520	10	88	2	0	0	1	18/20
2004	1420	-	1	99	0	0	0	0	14/19
2009	8640	40	8	92	0	0	1	0	16/17
2013	1920	1860	30	56	14	5	1	18	11/16
2018	13100	100	7	92	2	0	0	6	8/11
<b>Opuntia fragilis -- (brittle pricklypear)</b>									
1999	540	-	7	89	4	0	0	4	5/20
2004	720	-	6	94	0	0	0	0	5/17
2009	20	20	0	100	0	0	0	0	4/14
2013	220	20	46	55	0	0	0	18	5/19
2018	220	-	0	100	0	0	0	0	5/14
<b>Pediocactus simpsonii -- (mountain ball cactus)</b>									
1999	20	-	100	0	0	0	0	0	-/-
2004	40	-	0	100	0	0	0	0	2/6
2009	-	-	-	-	-	-	-	-	-/-
2013	-	-	-	-	-	-	-	-	-/-
2018	-	-	-	-	-	-	-	-	-/-
<b>Purshia tridentata<sup>p</sup> -- (antelope bitterbrush)</b>									
1999	-	-	-	-	-	-	-	-	-/-
2004	-	-	-	-	-	-	-	-	-/-
2009	-	-	-	-	-	-	-	-	-/-
2013	80	-	0	100	0	0	0	0	-/-

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

**Table -25A-14.15 - Deer Desirable Components Index: Mid Potential Scale.**

Year	Preferred Browse Cover	Preferred Browse Decadence	Preferred Browse Young	Perennial Grass Cover	Annual Grass Cover	Perennial Forb Cover	Noxious Weeds	Total Score	Ranking
1999	16.3	6.3	3.1	17.6	0	1.2	0	<b>44.5</b>	Poor
2004	12	2.5	0.9	11.4	0	0.4	0	<b>27.1</b>	Very Poor
2009	5.4	0	0	20.6	0	0.1	0	<b>26</b>	Very Poor
2013	11.6	14.1	9.9	30	0	0.4	0	<b>65.9</b>	Fair-Good
2018	15	13.2	15	30	0	0	0	<b>73.3</b>	Good

## OTTER CREEK - STUDY NO. 25R-19



### Location Information

USGS 7.5 min Map Info  
GPS (0' Stake)

Greenwich SE; Township 28S, Range 1W, Section 17  
NAD 83 UTM ZONE 12, 418890 East 4248490 North

### Transect Information

Browse Tag # (0' Stake)  
Transect Bearing  
magnetic, Line 5: 180° magnetic)  
Length  
Belt Placement  
Belt Marker Placement

Not Available  
95° magnetic (Line 1: 95° magnetic Line 2: 210° magnetic, Line 3: 250° magnetic, Line 4: 240°  
500ft  
Read Baseline  
No Rebar or Stakes

### Directions to Site

Travel south on SR-62 from the town of Greenwich for approximately 2.6 miles to a road to the left (east). Turn onto this road and proceed for 0.47 miles to a fork in the road: bear left. Continue for about 0.5 miles, passing through two gates, to the end of the road and park; there is no witness post. Use a GPS to navigate roughly 750 feet southwest to the transect.

**Site Information**

Land Ownership	Private
Land Administrator	Private
Allotment	No data
Elevation	No data
Aspect	South
Slope	1%
Sample Dates	07/12/2018

**Table 25R-19.1 Disturbance History.** Recorded history of major disturbances.

Treatment/Disturbance	Name	WRI DB#	Date	Size (acres)
Herbicide - Herbicide Unknown	Otter Creek Stream Restoration Phase III (Proposed)	4398	Fall 2018	81
Seeding - Seed Unknown	Otter Creek Stream Restoration Phase III (Proposed)	4398	Fall 2018	81

**Wildlife Habitat and Vegetation History**

**Table 25R-19.3 - Wildlife Seasonal Habitat.** UDWR wildlife habitat and seasonality.

Species	Habitat	Season
Deer	crucial	winter
Greater Sage Grouse		

**Table 25R-19.4 - Vegetation History.** The dominant vegetation type(s) and phase of woodland succession (Tausch, Miller, Roundy, & Chambers, 2009).

Year	Vegetation Type	Woodland Succession
2018	Perennial Grass	NA

**Site Notes**

In 2018, it was noted that grasses exhibited signs of heavy livestock grazing. Erosion was also observed along the streambank adjacent to the site.

**Site Potential**

1981 - 2010 Average Annual Precipitation	9 inches
NRCS Ecological Site	Semiwet (Fresh Meadow)
NRCS Ecological Site #	R047XB004UT
States and Transitions	No state and transition model is available for this ecological site.

When established in 2018, this study site was dominated by perennial grasses and graminoids, particularly Kentucky bluegrass (*Poa pratensis*) and arctic rush (*Juncus balticus*). Perennial and annual forbs were also abundant, with much of the cover being provided by meadow thistle (*Cirsium scariosum*) and western aster (*Symphotrichum ascendens*) (Table 25R-19.7, Table 25R-19.10, Table 25R-19.11). Shrubs were rare, with only dwarf goldenbush (*Ericameria nana*) providing any cover, although rubber rabbitbrush (*Ericameria nauseosa*) was observed in height crown measurements (Table 25R-19.12, Table 25R-19.13). A herbicide and seeding treatment in the Fall of 2018 likely helped to stabilize the streambank adjacent to the site and may increase available forage for wildlife (Table 25R-19.1).

**Trend Summary Tables**

**Table 25R-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
2018	-	0.2	-	-	0.2	-

**Table 25R-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
2018	-	475	211	373	-	65.6	13.6	16.7

**Table 25R-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
2018	4.0	0.0	38.2	-	0.8	75.8

**Table 25R-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
	Quadrat Frequency	
2018	57	1
Year	Days Use Per Acre (ha)	
	2018	79.1 (195.5)

**Table 25R-19.10 - Grass Species.** Nested frequency and modified Daubenmire average cover by year.

GRASS SPECIES	Nested Frequency										
Agrostis stolonifera <sup>i</sup> (creeping bentgrass)	103	95	226	119	43	26	12	399	2	13	366
Carex elynoides (blackroot sedge)											
Carex nebrascensis (Nebraska sedge)											
Carex utriculata (Northwest Territory sedge)											
Deschampsia cespitosa (tufted hairgrass)											
Elymus trachycaulus (slender wheatgrass)											
Hordeum brachyantherum (meadow barley)											
Juncus arcticus (arctic rush)											
Melica bulbosa (ontongrass)											
Phleum alpinum (alpine timothy)											
Poa pratensis <sup>i</sup> (Kentucky bluegrass)											
year	Average Cover (%)										
2018	2.0	1.5	6.1	3.5	3.0	0.5	0.1	22.9	0.0	0.2	25.9

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

**Table 25R-19.11 - Forb Species.** Nested frequency and modified Daubenmire average cover by year.

FORB SPECIES													
Achillea millefolium (Common yarrow)													
Asteraceae (null)													
Astragalus (milk vetch)													
Cirsium scariosum <sup>a</sup> (meadow thistle)													
Equisetum laevigatum (smooth horsetail)													
Polygonum aviculare <sup>i</sup> (prostrate knotweed)													
Potentilla gracilis (slender cinquefoil)													
Potentilla hippiana (woolly cinquefoil)													
Sidalcea neomexicana (salt spring checkerbloom)													
Symphyotrichum ascendens (western aster)													
Taraxacum officinale (common dandelion)													
Thermopsis montana (mountain goldenbanner)													
Trifolium (clover)													
year	Nested Frequency												
2018	137	46	10	211	11	7	4	6	18	231	93	33	101
year	Average Cover (%)												
2018	1.8	0.6	0.1	13.6	0.0	0.3	0.2	0.1	0.3	6.6	1.7	3.1	2.1

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

**Table 25R-19.12 - Shrub and Tree Species.** Average modified Daubenmire quadrat and line intercept cover by year.

SHRUB SPECIES	
Ericameria nana (dwarf goldenbush)	
year	Line Intercept Cover (%)
2018	0.2
year	Quadrat Cover (%)
2018	0.2

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

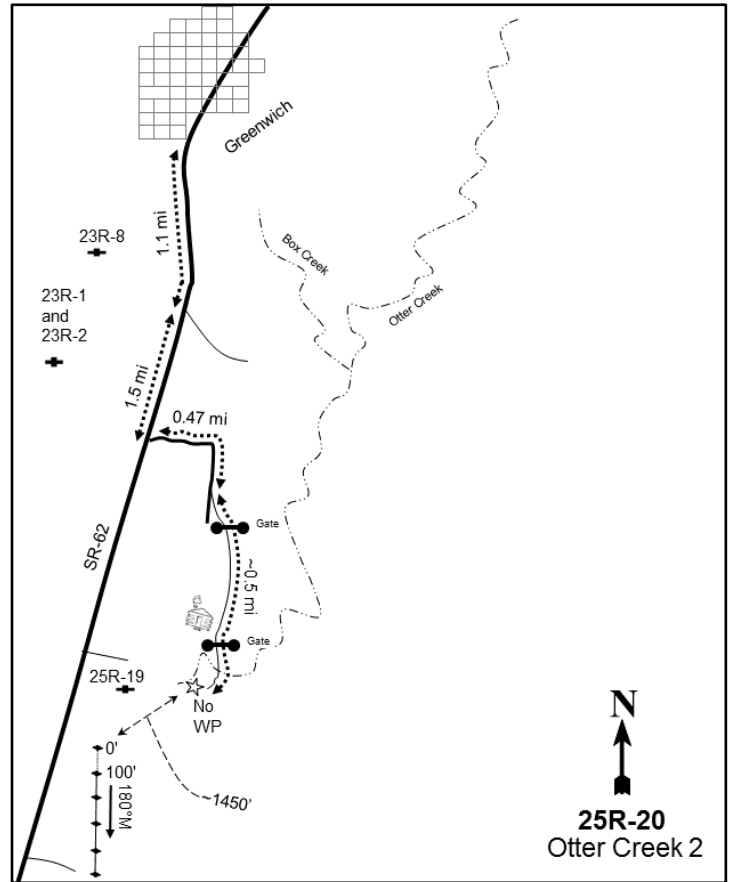
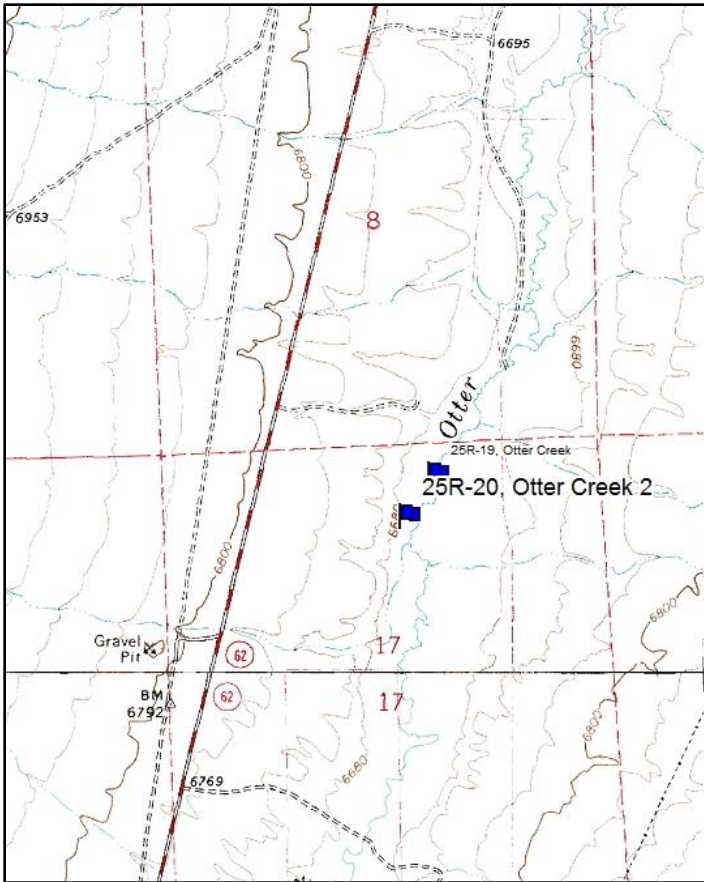
**Table 25R-19.13 - Shrub/Tree Characteristics.** Population characteristics of shrub/tree species populations including density reproduction (seedlings), age distribution, utilization, vigor and average size (height/crown) of plants.

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 (%)				
Ericameria nauseosa -- (rubber rabbitbrush)									
2018	-	-	-	-	-	-	-	-	73/116
Ericameria nana -- (dwarf goldenbush)									
2018	20	-	0	100	0	0	0	0	91/108

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



## OTTER CREEK 2 - STUDY NO. 25R-20



### Location Information

USGS 7.5 min Map Info  
GPS (0' Stake)

Greenwich SE; Township 28S, Range 1W, Section 17  
NAD 83 UTM ZONE 12, 418779 East 4248344 North

### Transect Information

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

Not Available  
180° magnetic  
500ft

### Directions to Site

Travel south on SR-62 from the town of Greenwich for approximately 2.6 miles to a road to the left (east). Turn onto this road and proceed for 0.47 miles to a fork in the road: bear left. Continue for about 0.5 miles, passing through two gates, to the end of the road and park; there is no witness post. Use a GPS to navigate roughly 1450 feet southwest to the transect.

**Site Information**

Land Ownership	Private
Land Administrator	Private
Allotment	No data
Elevation	No data
Aspect	South
Slope	13%
Sample Dates	07/12/2018

**Table 25R-20.1 Disturbance History.** Recorded history of major disturbances.

Treatment/Disturbance	Name	WRI DB#	Date	Size (acres)
Herbicide - Herbicide Unknown	Otter Creek Stream Restoration Phase III (Proposed)	4398	Fall 2018	81
Mechanical - Mower	Otter Creek Stream Restoration Phase III (Proposed)	4398	Fall 2018	81

**Wildlife Habitat and Vegetation History**

**Table 25R-20.3 - Wildlife Seasonal Habitat.** UDWR wildlife habitat and seasonality.

Species	Habitat	Season
Deer	crucial	winter
Deer	crucial	winter
Greater Sage Grouse		
Greater Sage Grouse		
Greater Sage Grouse		
Greater Sage Grouse		

**Table 25R-20.4 - Vegetation History.** The dominant vegetation type(s) and phase of woodland succession (Tausch, Miller, Roundy, & Chambers, 2009).

Year	Vegetation Type	Woodland Succession
2018	Rubber Rabbitbrush	NA

**Site Notes**

Signs of moderate to heavy livestock grazing of grasses were observed in 2018.

**Site Potential**

1981 - 2010 Average Annual Precipitation	9 inches
NRCS Ecological Site	Upland Loam (Mountain Big Sagebrush-Indian Ricegrass)
NRCS Ecological Site #	R047XB308UT
States and Transitions	No state and transition model is available for this ecological site.

Rubber rabbitbrush (*Ericameria nauseosa*) was the dominant vegetation component of the plant community on this site upon study establishment in 2018. Basin big sagebrush (*Artemisia tridentata* ssp. *tridentata*) was the only other shrub species observed, and in much lower amounts (Table 25R-20.12, Table 25R-20.13). The herbaceous understory was also abundant. Much of the cover was provided by a diverse number of perennial grasses and graminoids, particularly blackroot sedge (*Carex elymoides*), tufted hairgrass (*Deschampsia cespitosa*), and saltgrass (*Distichlis spicata*). The introduced annual grass species cheatgrass (*Bromus tectorum*) was also observed, but in low abundance. Perennial forbs were moderately abundant, but not very diverse; annual forbs were absent (Table 25R-20.7, Table 25R-20.10, Table 25R-20.11). A herbicide treatment in the Fall of 2018 (Table 25R-20.1) likely removed much of the rabbitbrush.

**Trend Summary Tables**

**Table 25R-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
2018	1.3	22.6	-	1.2	31.6	-

**Table 25R-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
2018	4	369	8	156	0.0	32.5	0.1	4.5

**Table 25R-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
2018	25.9	0.6	46.0	4.0	1.4	52.2

**Table 25R-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	Cattle/Bison	Rocky Mountain Elk	Rabbit
	Quadrat Frequency			
2018	22	1	-	23
Year	Days Use Per Acre (ha)			
2018	31.9 (78.9)	-	1.3 (3.3)	-

**Table 25R-20.10 - Grass Species.** Nested frequency and modified Daubenmire average cover by year.

GRASS SPECIES	Nested Frequency											
Agrostis stolonifera <sup>i</sup> (creeping bentgrass)	8	4	212	111	176	5	5	109	34	4	86	2
Bromus tectorum <sup>ai</sup> (cheatgrass)												
Carex elynoides (blackroot sedge)												
Deschampsia cespitosa (tufted hairgrass)												
Distichlis spicata (saltgrass)												
Elymus elymoides (squirreltail)												
Hesperostipa comata (needle and thread)												
Juncus arcticus (arctic rush)												
Pascopyrum smithii (western wheatgrass)												
Poa fendleriana (muttongrass)												
Poa pratensis <sup>i</sup> (Kentucky bluegrass)												
Poa secunda (Sandberg bluegrass)												
year	Average Cover (%)											
2018	0.2	0.0	11.4	6.4	6.3	0.2	0.1	1.7	0.3	0.4	5.5	0.0

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

**Table 25R-20.11 - Forb Species.** Nested frequency and modified Daubenmire average cover by year.

FORB SPECIES						
Asteraceae (null)						
Astragalus argophyllus (silvertleaf milkvetch)						
Equisetum laevigatum (smooth horsetail)						
Malacothrix <sup>a</sup> (desertdandelion)						
Symphoricarum ascendens (western aster)						
Taraxacum officinale (common dandelion)						
year	Nested Frequency					
2018	40	6	132	8	9	3
year	Average Cover (%)					
2018	1.2	0.3	2.6	0.1	0.2	0.1

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

**Table 25R-20.12 - Shrub and Tree Species.** Average modified Daubenmire quadrat and line intercept cover by year.

SHRUB SPECIES		
Artemisia tridentata ssp. tridentata <sup>p</sup> (basin big sagebrush)		
Ericameria nauseosa (rubber rabbitbrush)		
year	Line Intercept Cover (%)	
2018	1.2	31.6
year	Quadrat Cover (%)	
2018	1.3	22.6

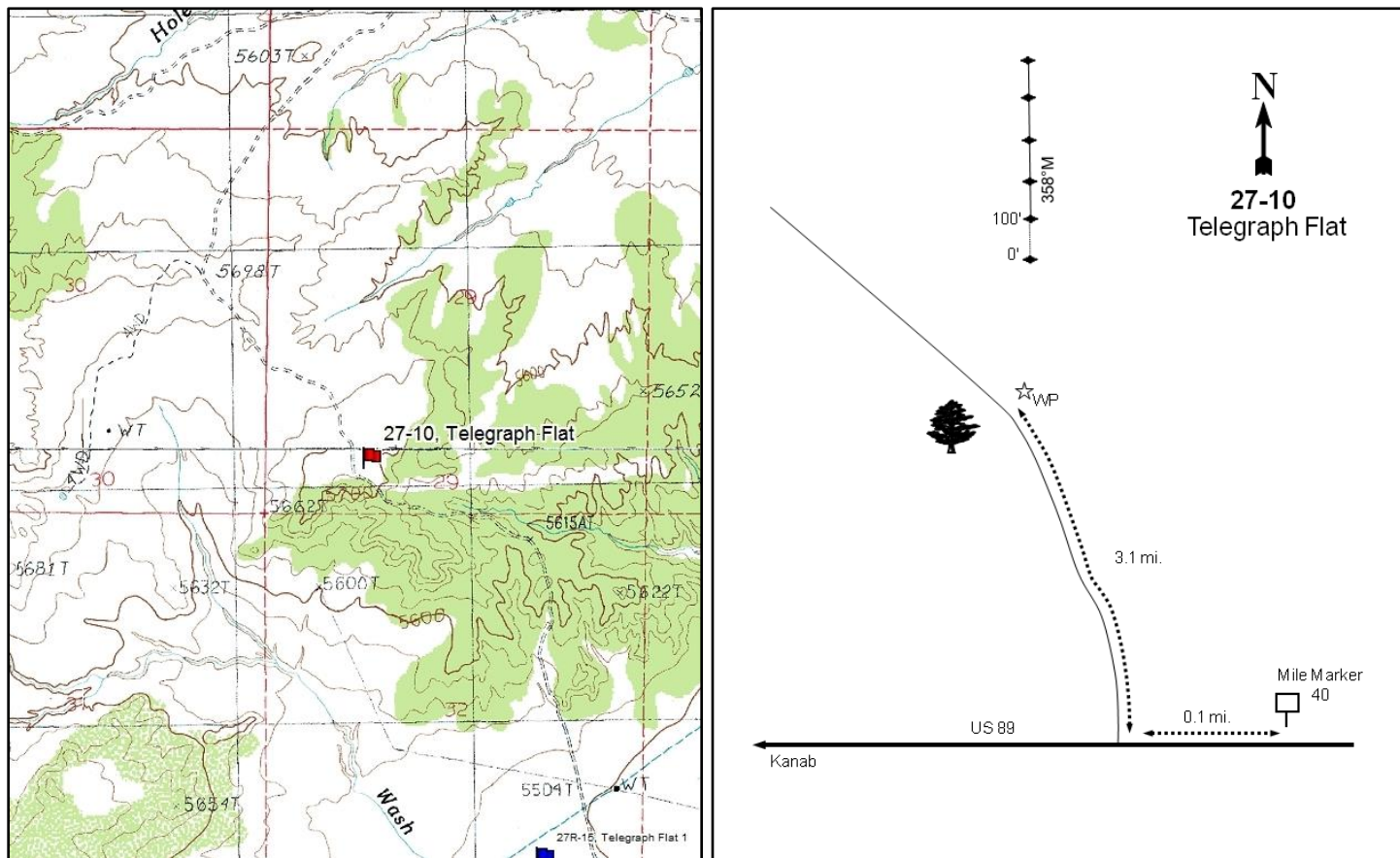
t - Tree Species; p - Preferred Browse; i - Introduced Species

**Table 25R-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. tridentata <sup>p</sup> -- (basin big sagebrush)									
2018	200	-	10	90	0	0	0	0	94/66
Ericameria nauseosa -- (rubber rabbitbrush)									
2018	3400	-	19	75	7	12	4	8	97/122

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

## TELEGRAPH FLAT - STUDY NO. 27-10

**Location Information**

USGS 7.5 min Map Info  
GPS (0' Stake)

Petrified Hollow NE; Township 42S, Range 3W, Section 29  
NAD 83 UTM ZONE 12, 397490 East 4109264 North

**Transect Information**

Browse Tag # (0' Stake)	664
Transect Bearing	0° magnetic
Length	500ft
Belt Placement	Line 1 (11ft), Line 2 (34ft), Line 3 (59ft), Line 4 (71ft), Line 5 (95ft)
Belt Marker Placement	Standard

**Directions to Site**

From mile marker #40 on Highway 89 east of Kanab, go 0.1 mile east to a road on the north side of the highway. Turn right (north) and travel for 2.7 miles to a witness post on the right side of the road. From the witness post walk 14 paces at 0 degrees magnetic to the 0-foot stake marked with browse tag #664. The study runs north and is marked by green, steel fenceposts approximately 12-18 inches in height.

**Site Information**

Land Ownership	Federal
Land Administrator	BLM
Allotment	MOLLIES NIPPLE
Elevation	5,710ft (1,740m)
Aspect	Northwest
Slope	2%
Sample Dates	08/12/1997, 08/05/2003, 07/28/2008, 08/06/2013, 07/11/2018

**Table 27-10.1 Disturbance History.** Recorded history of major disturbances.

Treatment/Disturbance	Name	WRI DB#	Date	Size (acres)
Chaining - Two-Way Ely	Jenny Clay Flex Harrow	3786	December 2017-February 2018	1342
Seeding - Aerial Before	Jenny Clay Flex Harrow	3786	December 2017-February 2018	1342
Chaining - Two-Way Chain Unknown	Clay Hole Chaining	-	1966	-
Seeding - Aerial Before	Clay Hole Chaining	-	1966	-
Hand Crew - Lop and Scatter	Five Mile Mountain Habitat Restoration Phase III	1169	Fall 2008-Spring 2009	1043

**Table 27-10.2 Seed Mix.** List of known seeded plant species and rates (if available).

Mix Name			Application Type	Application Date	Acres
Jenny Clay			Aerial	Feb 2018	1550
Type	Species	Common Name	Cultivar/Source ID	Bulk lbs/acre	PLS
G	Achnatherum hymenoides	Indian Ricegrass	Paloma	1.03	1.00
G	Achnatherum hymenoides	Indian Ricegrass	Emery UT	1.97	1.89
G	Elymus trachycaulus	Thickspike Wheatgrass	Bannock	2.00	1.90
G	Elymus wawawaiensis	Snake River Wheatgrass	Discovery	2.00	1.76
G	Pascopyrum smithii	Western Wheatgrass	Recovery	2.00	1.78
G	Sporobolus cryptandrus	Sand Dropseed		0.10	0.09
F	Achillea millefolium	Western Yarrow	Eagle	0.10	0.09
F	Linum perenne	Blue Flax	Appar	0.26	0.22
F	Melilotus officinalis	Yellow Sweetclover		0.52	0.48
F	Penstemon palmeri	Palmer Penstemon	Carbon UT	0.01	0.01
F	Penstemon palmeri	Palmer Penstemon	Sevier UT	0.06	0.05
S	Atriplex canescens	Fourwing Saltbush	Kane UT	0.26	0.15
S	Purshia tridentata	Bitterbrush	Elko NV	0.45	0.44
S	Purshia tridentata	Bitterbrush	Elko NV	0.06	0.04

**Wildlife Habitat and Vegetation History****Table 27-10.3 - Wildlife Seasonal Habitat.** UDWR wildlife habitat and seasonality.

Species	Habitat	Season
Deer	crucial	winter
Deer	crucial	winter

**Table 27-10.4 - 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	Phase I
2003	Wyoming Big Sagebrush/Pinyon-Juniper	Phase I transitioning to Phase II
2008	Wyoming Big Sagebrush/Pinyon-Juniper	Phase I transitioning to Phase II
2013	Wyoming Big Sagebrush/Stansbury Cliffrose	Phase I
2018	Wyoming Big Sagebrush	Phase I

**Site Notes**

In 2018 it was found that the area had been chained and that nearly all stakes had been removed. New stakes were placed (where necessary) using photos and GPS points to match the original transect as closely as possible.

**Soils****Table 27-10.5 - 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	7.2	62.4	19.1	18.6	1.3	20.2	124.8	0.6	08/11/1997

**Site Potential**

1981 - 2010 Average Annual Precipitation	10 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.

From study establishment in 1997 through the 2013 sample year, this site was dominated by Wyoming big sagebrush (*Artemisia tridentata* ssp. *wyomingensis*) with a minor component of Stansbury cliffrose (*Purshia stansburiana*). Twoneedle pinyon (*Pinus edulis*) and Utah juniper (*Juniperus osteosperma*) were also present, and the study was considered to be within Phase I transitioning to Phase II of woodland succession in 2003 and 2008. Most of the trees were removed by a 2008/2009 lop and scatter treatment (Table 27-10.1), and the site was classified as being in Phase I of woodland succession in 2013. A chaining and seeding treatment in the winter of 2017/2018 further removed the tree component and a majority of the shrubs; although shrubs were still the dominant vegetation component, Wyoming big sagebrush exhibited a marked decrease in both cover and density (Table 27-10.4, Table 27-10.12, Table 27-10.13, Table 27-10.14). The herbaceous understory was comprised mostly of the introduced perennial grass species crested wheatgrass (*Agropyron cristatum*) in 1997, but crested wheatgrass was not observed and understory vegetation has been limited in subsequent sample years (Table 27-10.7, Table 27-10.10, Table 27-10.11). A limited number of small trees have remained following the chaining, indicating the potential for future infilling (Table 27-10.14).



**Trend Summary Tables****Table 27-10.6 - 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
1997	13.4	0.4	2.9	-	-	-
2003	15.6	0.2	4.6	17.5	-	6.6
2008	14.9	0.0	6.0	23.9	-	7.8
2013	16.4	0.0	0.1	29.4	0.1	0.7
2018	2.3	0.3	-	1.8	-	-

**Table 27-10.7 - 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
1997	12	264	11	15	0.0	6.1	0.0	0.2
2003	-	33	108	15	-	0.3	3.5	0.1
2008	4	13	20	5	0.0	0.1	0.0	0.0
2013	3	13	-	3	0.0	0.2	-	0.0
2018	-	-	4	7	-	-	0.0	0.0

**Table 27-10.8 - 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
1997	49.4	4.7	28.0	0.1	-	22.5
2003	48.3	6.7	34.1	0.1	-	24.4
2008	49.4	3.3	38.4	0.1	-	21.5
2013	50.9	3.1	37.0	1.0	0.1	16.3
2018	79.3	0.0	29.2	0.3	0.1	3.0

**Table 27-10.9 - 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	Rabbit
	Quadrat Frequency				
1997	-	-	19	3	18
2003	7	-	24	-	19
2008	7	-	20	1	78
2013	2	-	13	-	13
2018	-	-	3	-	3
Days Use Per Acre (ha)					
1997	-	-	-	-	-
2003	16.7 (41.2)	-	28.1 (69.5)	-	-
2008	2.2 (5.4)	8.7 (21.5)*	28.8 (71.2)	-	-
2013	1.5 (3.6)	-	7.4 (18.2)	-	-
2018	-	-	-	-	-

\*Pellets per acre (ha)

**Table 27-10.10 - Grass Species.** Nested frequency and modified Daubenmire average cover by year.

GRASS SPECIES	Achnatherum hymenoides (Indian ricegrass)	Agropyron cristatum <sup>i</sup> (crested wheatgrass)	Aristida purpurea (purple threeawn)	Bromus tectorum <sup>ai</sup> (cheatgrass)	Elymus elymoides (squirreltail)	Festuca idahoensis (Idaho fescue)	Hesperostipa comata (needle and thread)	Vulpia octoflora <sup>a</sup> (sixweeks fescue)
year	Nested Frequency							
1997	8	252	8	2	3	8	-	10
2003	6	-	21	-	6	-	-	-
2008	1	-	-	-	12	-	-	4
2013	1	-	-	-	8	-	4	3
2018	-	-	-	-	-	-	-	-
year	Average Cover (%)							
1997	0.1	5.8	0.2	0.0	0.0	0.0	-	0.0
2003	0.0	-	0.2	-	0.0	-	-	-
2008	0.0	-	-	-	0.1	-	-	0.0
2013	0.0	-	-	-	0.1	-	0.2	0.0
2018	-	-	-	-	-	-	-	-

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

**Table 27-10.11 - Forb Species.** Nested frequency and modified Daubenmire average cover by year.

FORB SPECIES	Agoseris glauca (pale agoseris)	Astragalus (milkvetch)	Calochortus nuttallii (sego lily)	Castilleja (Indian paintbrush)	Chamaesyce (sandmat)	Eriogonum umbellatum (sulphur-flower buckwheat)	Frasera albomarginata (desert frasera)	Gilia inconspicua <sup>a</sup> (shy gilia)	Linum perenne <sup>i</sup> (blue flax)	Machaeranthera canescens (hoary tansyaster)	Melilotus officinalis <sup>i</sup> (sweetclover)	Microsteris gracilis <sup>a</sup> (slender phlox)	Navaretia intertexta <sup>a</sup> (needleleaf navaretia)	Phlox austromontana (mountain phlox)	Salsola tragus <sup>ai</sup> (prickly Russian thistle)	Silene antirrhina <sup>a</sup> (sleepy silene)	Sphaeralcea grossularifolia (gooseberry/leaf globemallow)
year	Nested Frequency																
1997	1	5	0	1	-	-	-	2	-	-	-	3	-	8	-	3	-
2003	-	-	3	-	-	1	-	29	-	1	-	-	89	7	-	-	1
2008	-	-	-	-	-	1	4	-	-	-	-	2	18	-	-	-	-
2013	-	-	1	-	-	1	-	-	-	-	-	-	-	-	-	-	1
2018	-	2	-	-	2	1	-	-	1	-	1	-	3	-	1	-	-
year	Average Cover (%)																
1997	0.0	0.0	0.0	0.0	-	-	-	0.0	-	-	-	0.0	-	0.2	-	0.0	-
2003	-	-	0.0	-	-	0.0	-	1.0	-	0.0	-	-	2.5	0.1	-	-	0.0
2008	-	-	-	-	-	0.0	0.0	-	-	-	-	0.0	0.0	-	-	-	-
2013	-	-	0.0	-	-	0.0	-	-	-	-	-	-	-	-	-	-	0.0
2018	-	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		
Stephanomeria exigua (small wirelettuce)		
unknown annual forb <sup>a</sup> (unknown forb)		
year	Nested Frequency	
1997	-	3
2003	2	-
2008	-	-
2013	-	-
2018	-	-
year	Average Cover (%)	
1997	-	0.0
2003	0.0	-
2008	-	-
2013	-	-
2018	-	-

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

**Table 27-10.12 - Shrub and Tree Species.** Average modified Daubenmire quadrat and line intercept cover by year.

SHRUB SPECIES									
Amelanchier utahensis <sup>p</sup> (Utah serviceberry)									
Artemisia tridentata ssp. wyomingensis <sup>p</sup> (Wyoming big sagebrush)									
Ephedra viridis <sup>p</sup> (mormon tea)									
Gutierrezia sarothrae (broom snakeweed)									
Juniperus osteosperma <sup>t</sup> (Utah juniper)									
Pinus edulis <sup>t</sup> (twoneedle pinyon)									
Purshia stansburiana <sup>p</sup> (Stansbury cliffrose)									
Yucca (yucca)									
year	Line Intercept Cover (%)								
1997	-	-	-	-	-	-	-	-	-
2003	-	13.6	-	-	2.6	4	3.9	-	-
2008	-	19.5	-	-	3.4	4.4	4.4	-	-
2013	-	21.2	-	0.1	0.7	-	8.2	-	-
2018	-	1.7	-	-	-	-	0.1	-	-
year	Quadrat Cover (%)								
1997	0.0	11.5	-	-	1.3	1.7	1.9	0.4	-
2003	-	13.2	-	0.2	2.0	2.6	2.3	-	-
2008	-	13.4	0.0	0.0	3.1	2.9	1.5	-	-
2013	-	14.2	0.4	0.0	0.1	-	1.9	-	-
2018	-	2.3	-	0.3	-	-	0.0	-	-

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

**Table 27-10.13 - 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 (%)				
<b>Amelanchier utahensis<sup>P</sup> -- (Utah serviceberry)</b>									
1997	-	-	-	-	-	-	-	-	-/-
2003	-	-	-	-	-	-	-	-	-/-
2008	-	-	-	-	-	-	-	-	30/28
2013	-	-	-	-	-	-	-	-	109/105
2018	-	-	-	-	-	-	-	-	-/-
<b>Artemisia frigida<sup>P</sup> -- (prairie sagewort)</b>									
1997	-	-	-	-	-	-	-	-	-/-
2003	-	-	-	-	-	-	-	-	-/-
2008	-	-	-	-	-	-	-	-	-/-
2013	-	-	-	-	-	-	-	-	60/53
2018	-	-	-	-	-	-	-	-	33/58
<b>Artemisia tridentata ssp. wyomingensis<sup>P</sup> -- (Wyoming big sagebrush)</b>									
1997	12760	140	50	40	10	55	12	4	49/71
2003	8340	-	1	57	42	13	30	21	43/57
2008	9180	1480	12	37	50	48	30	10	52/68
2013	6960	20	28	63	9	66	12	10	58/93
2018	2200	40	8	56	36	0	0	24	25/32
<b>Ephedra viridis<sup>P</sup> -- (mormon tea)</b>									
1997	-	-	-	-	-	-	-	-	-/-
2003	20	-	0	100	0	0	0	0	55/40
2008	20	-	0	0	100	0	0	100	57/36
2013	40	-	50	50	0	0	0	0	69/48
2018	-	-	-	-	-	-	-	-	42/46
<b>Ericameria nauseosa -- (rubber rabbitbrush)</b>									
1997	80	-	100	0	0	100	0	0	- / -
2003	-	-	-	-	-	-	-	-	-/-
2008	-	-	-	-	-	-	-	-	-/-
2013	-	-	-	-	-	-	-	-	-/-
2018	-	-	-	-	-	-	-	-	-/-
<b>Gutierrezia sarothrae -- (broom snakeweed)</b>									
1997	100	-	0	80	20	0	0	0	24/26
2003	280	-	7	93	0	0	0	0	19/22
2008	100	-	20	60	20	0	0	0	20/22
2013	100	100	20	80	0	0	0	0	23/23
2018	240	-	0	100	0	0	0	0	14/17
<b>Juniperus osteosperma<sup>1</sup> -- (Utah juniper)</b>									
1997	80	-	25	75	0	0	0	0	- / -
2003	60	-	0	100	0	0	0	0	- / -
2008	80	-	50	50	0	0	0	0	- / -
2013	40	-	100	0	0	0	0	0	- / -
2018	-	-	-	-	-	-	-	-	-/-
<b>Opuntia -- (pricklypear)</b>									
1997	-	-	-	-	-	-	-	-	-/-
2003	-	-	-	-	-	-	-	-	9/22
2008	-	-	-	-	-	-	-	-	-/-
2013	-	-	-	-	-	-	-	-	-/-
2018	-	-	-	-	-	-	-	-	-/-

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 (%)				
<b>Pinus edulis<sup>t</sup> -- (twoneedle pinyon)</b>									
1997	40	-	0	100	0	0	0	0	- / -
2003	40	-	0	100	0	0	0	0	- / -
2008	20	-	0	100	0	0	0	0	- / -
2013	-	-	-	-	-	-	-	-	- / -
2018	-	-	-	-	-	-	-	-	- / -
<b>Purshia stansburiana<sup>p</sup> -- (Stansbury cliffrose)</b>									
1997	400	-	55	40	5	60	0	0	143/160
2003	320	-	25	56	19	13	69	0	128/150
2008	380	-	5	26	68	26	53	21	120/138
2013	360	-	22	44	33	22	33	28	136/151
2018	120	-	50	17	33	0	0	33	37/65
<b>Yucca -- (yucca)</b>									
1997	-	-	-	-	-	-	-	-	- / -
2003	-	-	-	-	-	-	-	-	48/60
2008	-	-	-	-	-	-	-	-	54/58
2013	-	-	-	-	-	-	-	-	59/73
2018	-	-	-	-	-	-	-	-	27/41

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

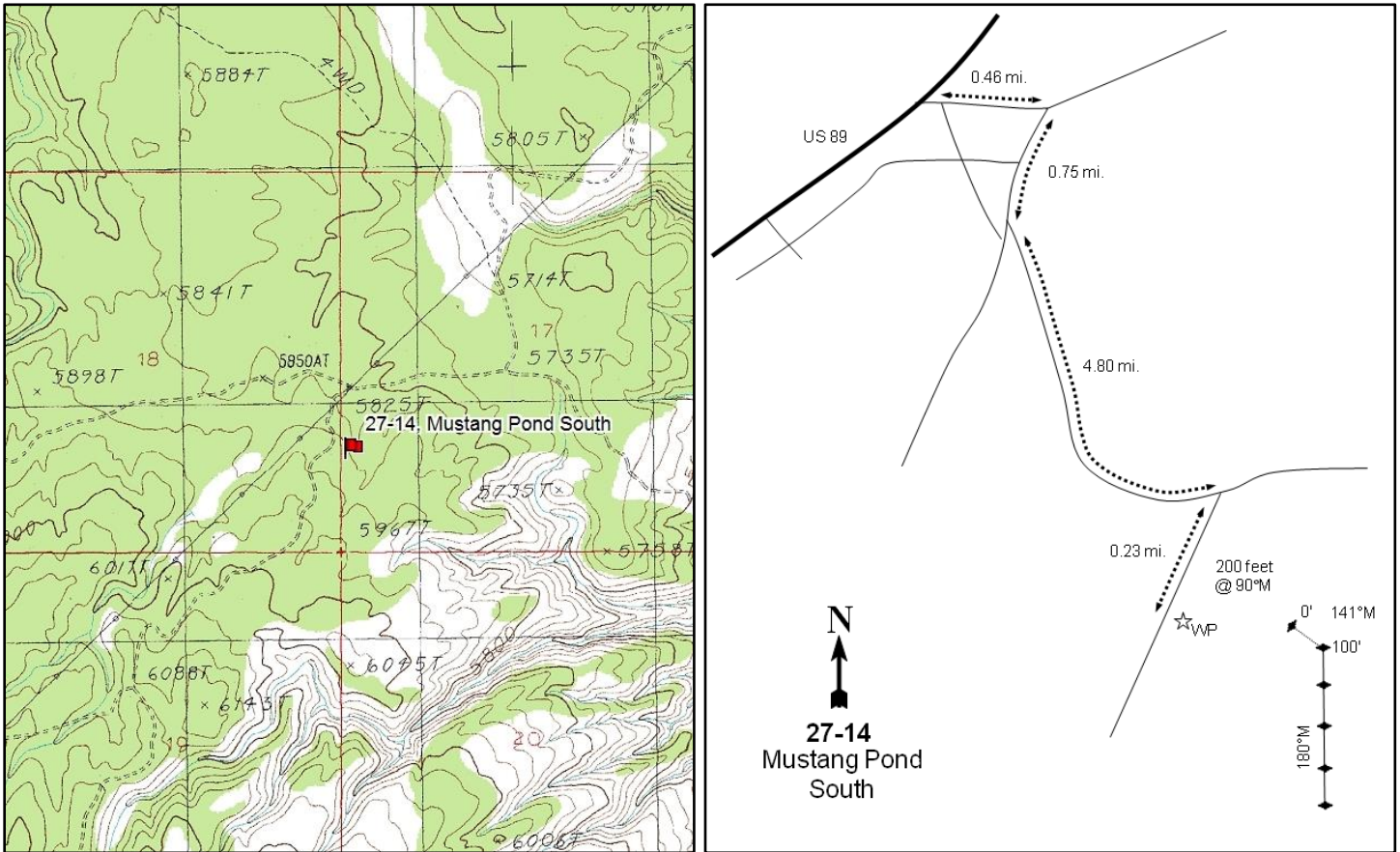
**Table 27-10.14 - Tree Characteristics.** Point-quarter tree density, size class distribution, and average diameter.

Year	Density	Size Class Distribution					Average Diameter (cm)
	Trees per Acre	Seedling (%)	1-4' (%)	4-8' (%)	8-12' (%)	>12' (%)	
<b>Juniperus osteosperma (Utah juniper)</b>							
2003	28	21	36	43	-	-	6.8
2008	26	-	62	31	8	-	15.1
2018	12	-	100	-	-	-	3.0
<b>Pinus edulis (twoneedle pinyon)</b>							
2003	16	-	-	82	18	-	13.7
2008	17	-	23	46	31	-	12.8
2018	5	-	100	-	-	-	6.0

**Table -27-10.15 - Deer Desirable Components Index: Mid Potential Scale.**

Year	Preferred Browse Cover	Preferred Browse Decadence	Preferred Browse Young	Perennial Grass Cover	Annual Grass Cover	Perennial Forb Cover	Noxious Weeds	Total Score	Ranking
1997	17.3	12.2	15	12.3	0	0.5	0	<b>57.2</b>	Fair
2003	22.9	3.9	3.2	0.6	0	0.2	0	<b>30.7</b>	Very Poor
2008	30	-1.1	5.5	0.2	0	0.1	0	<b>34.7</b>	Very Poor-Poor
2013	30	10.3	13.3	0.5	0	0.1	0	<b>54.1</b>	Fair
2018	2.3	0	0	0	0	0.1	0	<b>2.3</b>	Very Poor

## MUSTANG POND SOUTH - STUDY NO. 27-14



### Location Information

USGS 7.5 min Map Info  
GPS (0' Stake)

Pine Hollow Canyon N; Township 43S, Range 2W, Section 17  
NAD 83 UTM ZONE 12, 406627 East 4102963 North

### Transect Information

Browse Tag # (0' Stake)	600
Transect Bearing	141° magnetic (Lines 2-5: 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 junction of 100 East and 300 South on US-89 in Kanab, drive north for 24.1 miles. Turn left and travel south on a dirt road. After passing the cattle guard, turn left onto County Road #4153. Keep right on this road for 0.6 miles, then turn right onto County Road #4150. Follow this road for approximately 5.5 miles and turn right onto County Road #4130. Drive 0.2 miles to a witness post on the left (south) side of the road. The transect is approximately 200 feet from the witness post at a 90 degree bearing. The 0-foot stake is marked with a browse tag #600, and the transect doglegs at the 100 foot stake.

**Site Information**

Land Ownership	Federal
Land Administrator	BLM
Allotment	MOLLIES NIPPLE
Elevation	5,888ft (1,795m)
Aspect	East
Slope	15-25%
Sample Dates	08/06/2013, 07/11/2018

**Table 27-14.1 Disturbance History.** Recorded history of major disturbances.

Treatment/Disturbance	Name	WRI DB#	Date	Size (acres)
Hand Crew - Lop and Scatter	Buckskin Lop and Scatter FY12	2002	September-December 2011	604

**Wildlife Habitat and Vegetation History****Table 27-14.3 - Wildlife Seasonal Habitat.** UDWR wildlife habitat and seasonality.

Species	Habitat	Season
Deer	crucial	winter

**Table 27-14.4 - Vegetation History.** The dominant vegetation type(s) and phase of woodland succession (Tausch, Miller, Roundy, & Chambers, 2009).

Year	Vegetation Type	Woodland Succession
2013	Black Sagebrush	Phase I
2018	Black Sagebrush	Phase I

**Site Notes**

The first 100 feet of the transect is an annual habitat monitoring site. Soil data was not sampled for this study, but will be collected in the future.

**Site Potential**

1981 - 2010 Average Annual Precipitation	11 inches
NRCS Ecological Site	Upland Shallow Loam (Cliffrose)
NRCS Ecological Site #	R035XY313UT
States and Transitions	No state and transition model is available for this ecological site.

This site has been dominated by black sagebrush (*Artemisia nova*) with a minor component of Stansbury cliffrose (*Purshia stansburiana*) and Wyoming big sagebrush (*A. tridentata* ssp. *wyomingensis*) since study establishment in 2013; cover and density of both sagebrush species increased between 2013 and 2018 (Table 27-14.12, Table 27-14.13). The herbaceous understory also increased between 2013 and 2018, but the introduced annual grass species cheatgrass (*Bromus tectorum*) provided most of the cover in both sample years; high amounts of cheatgrass may pose a risk to the ecological resilience of the plant community. Perennial grasses and both annual and perennial forbs have remained rare in comparison (Table 27-14.7, Table 27-14.10, Table 27-14.11). Twoneedle pinyon (*Pinus edulis*) and Utah juniper (*Juniperus osteosperma*) were removed with a lop and scatter treatment prior to study establishment (Table 27-14.1). However, trees were recorded in 2018 point-quarter measurements, indicating the potential for infilling in future sample years (Table 27-14.14).



**Trend Summary Tables**

**Table 27-14.6 - 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
2013	6.9	0.3	0.4	9.2	0.5	-
2018	10.3	0.7	0.4	16.8	0.7	0.2

**Table 27-14.7 - 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
2013	243	92	7	10	3.8	1.5	0.2	0.5
2018	302	104	28	5	13.0	2.2	0.6	0.1

**Table 27-14.8 - 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
2013	18.1	0.2	47.5	13.1	17.9	14.0
2018	16.6	0.3	49.9	17.1	20.1	26.4

**Table 27-14.9 - 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	Rabbit
	Quadrat Frequency		
2013	7	44	3
2018	7	25	22
Year	Days Use Per Acre (ha)		
2013	5.8 (14.3)	108.6 (268.2)	-
2018	2.9 (7.2)	52.3 (129.1)	-

**Table 27-14.10 - Grass Species.** Nested frequency and modified Daubenmire average cover by year.

GRASS SPECIES	Achnatherum hymenoides (Indian ricegrass)	Bouteloua gracilis (blue grama)	Bromus tectorum <sup>a</sup> (cheatgrass)	Elymus elymoides (squirreltail)	Hesperostipa comata (needle and thread)	Poa fendleriana (muttongrass)	Poa secunda (Sandberg bluegrass)
year	Nested Frequency						
2013	1	1	243	34	9	4	50
2018	6	4	302	28	25	-	45
year	Average Cover (%)						
2013	0.0	0.0	3.8	0.3	1.0	0.0	0.2
2018	0.2	0.0	13.0	0.4	0.7	-	0.9

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

**Table 27-14.11 - Forb Species.** Nested frequency and modified Daubenmire average cover by year.

FORB SPECIES							
Astragalus (milkvetch)							
Chamaesyce (sandmat)							
Draba <sup>a</sup> (draba)							
Eriogonum cernuum <sup>a</sup> (nodding buckwheat)							
Lactuca serriola <sup>ai</sup> (prickly lettuce)							
Salsola tragus <sup>ai</sup> (prickly Russian thistle)							
Sphaeralcea parvifolia (smallflower globemallow)							
year	Nested Frequency						
2013	3	3	2	6	-	-	4
2018	3	2	-	9	3	16	-
year	Average Cover (%)						
2013	0.0	0.0	0.0	0.2	-	-	0.5
2018	0.0	0.0	-	0.2	0.0	0.4	-

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

**Table 27-14.12 - Shrub and Tree Species.** Average modified Daubenmire quadrat and line intercept cover by year.

SHRUB SPECIES								
Artemisia nova <sup>p</sup> (black sagebrush)								
Artemisia tridentata ssp. vaseyana <sup>p</sup> (mountain big sagebrush)								
Chrysothamnus viscidiflorus (yellow rabbitbrush)								
Ephedra viridis <sup>p</sup> (mormon tea)								
Gutierrezia sarothrae (broom snakeweed)								
Juniperus osteosperma <sup>t</sup> (Utah juniper)								
Opuntia (pricklypear)								
Purshia stansburiana <sup>p</sup> (Stansbury cliffrose)								
year	Line Intercept Cover (%)							
2013	7.8	1.1	0.4	-	0.1	-	0	0.3
2018	10.8	5	0.6	0.1	-	0.2	0.1	0.9
year	Quadrat Cover (%)							
2013	5.5	1.1	0.2	-	0.1	0.4	0.0	0.3
2018	6.3	3.4	0.4	0.0	0.1	0.4	0.2	0.6

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

**Table 27-14.13 - 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 (%)				
<b>Artemisia nova<sup>p</sup> -- (black sagebrush)</b>									
2013	2740	60	10	64	26	27	34	18	30/65
2018	3560	220	21	70	10	22	10	7	34/63
<b>Artemisia tridentata ssp. vaseyana<sup>p</sup> -- (mountain big sagebrush)</b>									
2013	540	-	33	44	22	7	37	19	42/65
2018	1000	20	20	56	24	14	18	26	43/72
<b>Chrysothamnus viscidiflorus -- (yellow rabbitbrush)</b>									
2013	100	-	0	100	0	0	0	20	34/66
2018	160	-	0	100	0	0	0	63	37/71
<b>Cylindropuntia whipplei -- (Whipple cholla)</b>									
2013	-	-	-	-	-	-	-	-	-/-
2018	-	-	-	-	-	-	-	-	46/164
<b>Ephedra viridis<sup>p</sup> -- (mormon tea)</b>									
2013	100	-	40	60	0	0	0	20	59/98
2018	120	-	17	83	0	0	50	0	49/52
<b>Gutierrezia sarothrae -- (broom snakeweed)</b>									
2013	220	-	0	100	0	0	0	0	22/37
2018	320	-	0	50	50	0	0	63	12/19
<b>Juniperus osteosperma<sup>t</sup> -- (Utah juniper)</b>									
2013	40	-	100	0	0	0	0	0	-/-
2018	40	-	50	50	0	0	0	0	-/-
<b>Opuntia -- (pricklypear)</b>									
2013	160	-	13	75	13	0	0	13	22/48
2018	160	-	0	100	0	0	0	0	22/55
<b>Purshia stansburiana<sup>p</sup> -- (Stansbury cliffrose)</b>									
2013	120	-	0	50	50	33	17	67	189/134
2018	120	-	0	100	0	17	33	0	195/158
<b>Sclerocactus -- (fishhook cactus)</b>									
2013	-	-	-	-	-	-	-	-	-/-
2018	-	-	-	-	-	-	-	-	10/22
<b>Yucca baccata -- (banana yucca)</b>									
2013	-	-	-	-	-	-	-	-	62/75
2018	-	-	-	-	-	-	-	-	53/67

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

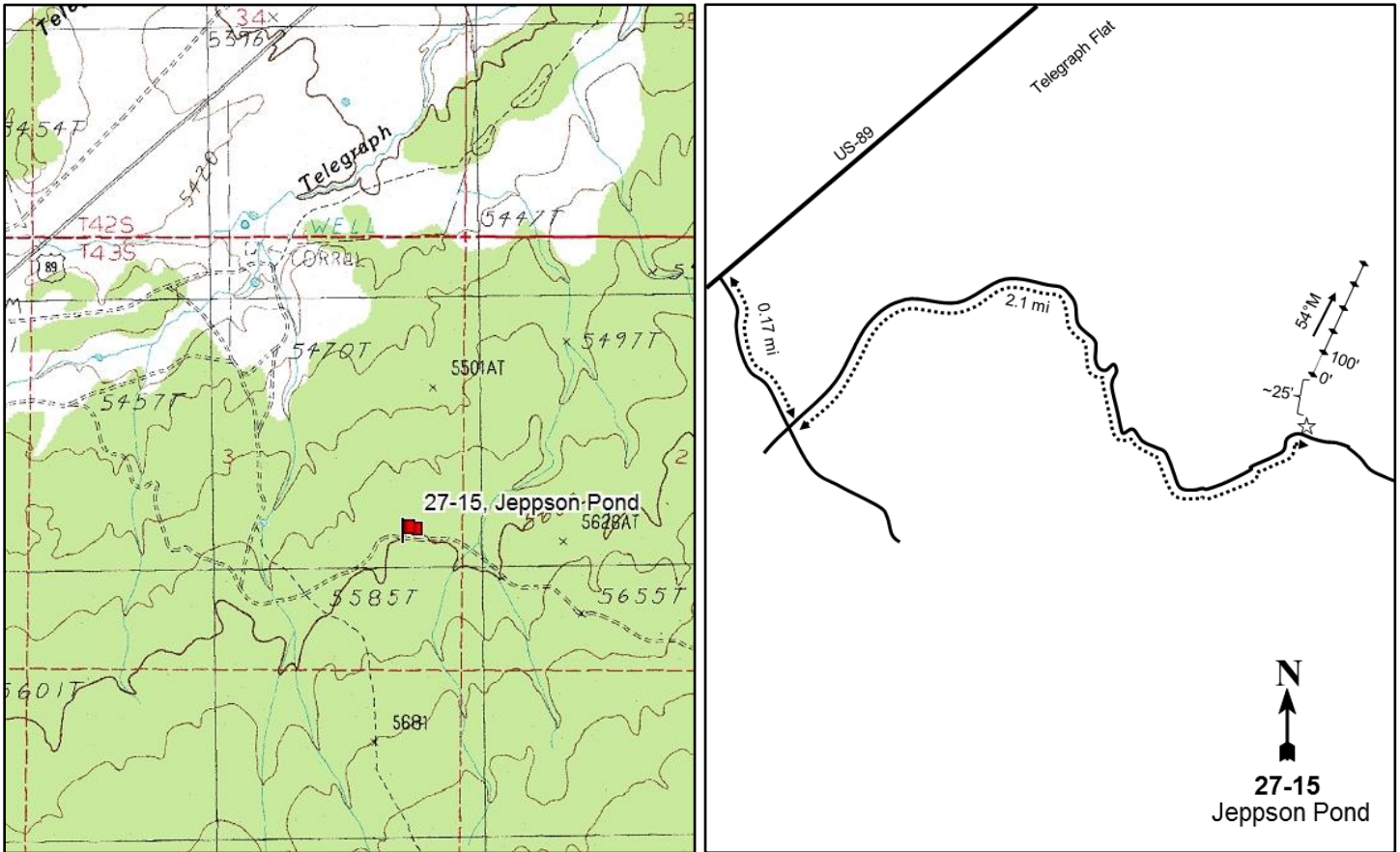
**Table 27-14.14 - Tree Characteristics.** Point-quarter tree density, size class distribution, and average diameter.

Year	Density	Size Class Distribution					Average Diameter (cm)
	Trees per Acre	Seedling (%)	1-4' (%)	4-8' (%)	8-12' (%)	>12' (%)	
<b>Juniperus osteosperma (Utah juniper)</b>							
2018	59	-	69	31	-	-	13.9
<b>Pinus edulis (twoneedle pinyon)</b>							
2018	18	-	50	50	-	-	7.0

**Table -27-14.15 - Deer Desirable Components Index: Mid Potential Scale.**

Year	Preferred Browse Cover	Preferred Browse Decadence	Preferred Browse Young	Perennial Grass Cover	Annual Grass Cover	Perennial Forb Cover	Noxious Weeds	Total Score	Ranking
2013	11.6	7.2	6.3	3.1	-2.8	1	0	<b>26.4</b>	Very Poor
2018	21.2	11	9.7	4.4	-9.8	0.1	0	<b>36.7</b>	Very Poor-Poor

## JEPPSON POND - STUDY NO. 27-15



### Location Information

USGS 7.5 min Map Info	Pine Hollow Canyon N; Township 43S, Range 3W, Section 03
GPS (0' Stake)	NAD 83 UTM ZONE 12, 401648 East 4106337 North

### Transect Information

Browse Tag # (0' Stake)	547
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	Standard

### Directions to Site

From US-89 near Telegraph Flat, turn right (south) onto a dirt road. Drive for approximately 0.17 miles to an intersection, then turn left (west). Drive for 1.0 mile to a fork. Proceed to the right, then travel for 0.6 miles to another fork; stay to the right again. Drive for 0.2 miles to a four-way intersection. Continue straight, proceed for 0.3 miles, and park; there is no witness post. The 0-foot stake is approximately 25 feet north of the road and is marked with browse tag #547.

**Site Information**

Land Ownership	Federal
Land Administrator	BLM
Allotment	MOLLIES NIPPLE
Elevation	No data
Aspect	North
Slope	3%
Sample Dates	07/11/2018

**Table 27-15.1 Disturbance History.** Recorded history of major disturbances.

Treatment/Disturbance	Name	WRI DB#	Date	Size (acres)
Hand Crew - Lop and Scatter	Buckskin Lop and Scatter	823	August-December 2008	500

**Wildlife Habitat and Vegetation History****Table 27-15.3 - Wildlife Seasonal Habitat.** UDWR wildlife habitat and seasonality.

Species	Habitat	Season
Deer	crucial	winter

**Table 27-15.4 - Vegetation History.** The dominant vegetation type(s) and phase of woodland succession (Tausch, Miller, Roundy, & Chambers, 2009).

Year	Vegetation Type	Woodland Succession
2018	Black Sagebrush	Phase I

**Site Notes**

No Notes

**Soils****Table 27-15.5 - 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
Loam	7.7	44.2	35.4	20.4	2.8	21.0	205.0	0.5	07/11/2018

**Site Potential**

1981 - 2010 Average Annual Precipitation	10 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 2018, this study site was dominated by black sagebrush (*Artemisia nova*) with a minor component of mountain big sagebrush (*A. tridentata* ssp. *vaseyana*) and Stansbury cliffrose (*Purshia stansburiana*) (Table 27-15.12, Table 27-15.13). The herbaceous understory was depauperate in both quantity and species diversity, with the introduced annual grass species cheatgrass (*Bromus tectorum*) as the most abundant species; although cheatgrass contributed little cover, it may affect the ecological resiliency of the study site if amounts increase in future sample years (Table 27-15.7, Table 27-15.10, Table 27-15.11). Utah juniper (*Juniperus osteosperma*) trees were scattered across the site, placing it in Phase I of woodland succession (Table 27-15.4, Table 27-15.12, Table 27-15.14). In addition, dense stands of juniper surround the transect (Photos), indicating that further encroachment may be possible over time.

**Trend Summary Tables**

**Table 27-15.6 - 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
2018	14.1	6.5	0.4	22.3	5.8	0.4

**Table 27-15.7 - 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
2018	176	4	14	-	0.8	0.1	0.1	-

**Table 27-15.8 - 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
2018	33.5	1.5	37.8	14.8	19.5	23.2

**Table 27-15.9 - 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	Rabbit
	Quadrat Frequency		
2018	3	43	24
Year	Days Use Per Acre (ha)		
2018	2.2 (5.4)	77.7 (192.0)	-

**Table 27-15.10 - Grass Species.** Nested frequency and modified Daubenmire average cover by year.

GRASS SPECIES	Nested Frequency			
Bromus tectorum <sup>ai</sup> (cheatgrass)	176	1	1	2
Elymus elymoides (squirreltail)				
Hesperostipa comata (needle and thread)				
Poa secunda (Sandberg bluegrass)				
year	Average Cover (%)			
2018	0.8	0.0	0.0	0.0

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

**Table 27-15.11 - Forb Species.** Nested frequency and modified Daubenmire average cover by year.

FORB SPECIES			
	Ceratocephala testiculata <sup>ai</sup> (curvseed butterwort)		
	Erodium cicutarium <sup>ai</sup> (redstem stork's bill)		
	Salsola tragus <sup>ai</sup> (prickly Russian thistle)		
year	Nested Frequency		
2018	3	11	1
year	Average Cover (%)		
2018	0.0	0.1	0.0

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

**Table 27-15.12 - Shrub and Tree Species.** Average modified Daubenmire quadrat and line intercept cover by year.

SHRUB SPECIES								
	Artemisia nova <sup>p</sup> (black sagebrush)		Artemisia tridentata ssp. vaseyana <sup>p</sup> (mountain big sagebrush)		Cylindropuntia whipplei (Whipple cholla)		Echinocereus (hedgehog cactus)	
	Gutierrezia sarothrae (broom snakeweed)		Juniperus osteosperma <sup>i</sup> (Utah juniper)		Pediocactus simpsonii (mountain ball cactus)		Purshia stansburiana <sup>p</sup> (Stansbury cliffrose)	
year	Line Intercept Cover (%)							
2018	17.8	3.3	2.4	-	3.4	0.4	-	1.2
year	Quadrat Cover (%)							
2018	10.0	2.8	2.6	0.1	3.8	0.4	0.0	1.3

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



**Table 27-15.13 - 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 (%)				
<b>Artemisia nova<sup>P</sup> -- (black sagebrush)</b>									
2018	3940	-	6	76	19	32	8	27	36/64
<b>Artemisia tridentata ssp. vaseyana<sup>P</sup> -- (mountain big sagebrush)</b>									
2018	1160	-	22	67	10	35	47	17	39/63
<b>Cylindropuntia whipplei -- (Whipple cholla)</b>									
2018	800	-	5	85	10	0	0	5	24/89
<b>Echinocereus -- (hedgehog cactus)</b>									
2018	20	-	0	100	0	0	0	0	20/31
<b>Eriogonum corymbosum -- (crispleaf buckwheat)</b>									
2018	20	-	0	100	0	0	100	0	10/10
<b>Gutierrezia sarothrae -- (broom snakeweed)</b>									
2018	4500	-	2	88	9	4	0	75	17/27
<b>Juniperus osteosperma<sup>I</sup> -- (Utah juniper)</b>									
2018	40	-	100	0	0	0	0	0	- / -
<b>Opuntia polyacantha -- (plains pricklypear)</b>									
2018	20	-	0	100	0	0	0	0	23/95
<b>Pediocactus simpsonii -- (mountain ball cactus)</b>									
2018	-	-	-	-	-	-	-	-	4/5
<b>Purshia stansburiana<sup>P</sup> -- (Stansbury cliffrose)</b>									
2018	1500	60	29	69	1	9	85	0	71/80

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

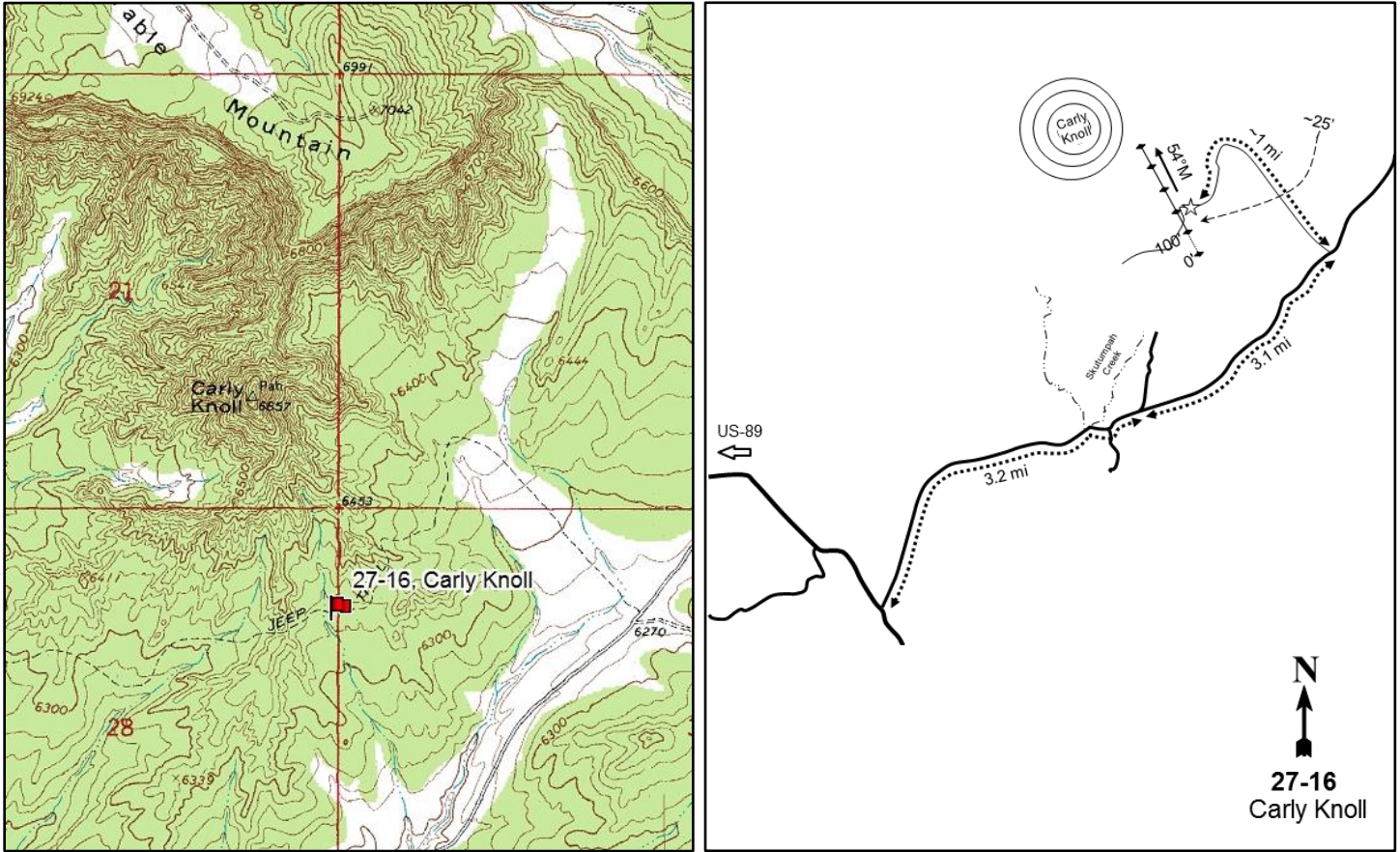
**Table 27-15.14 - Tree Characteristics.** Point-quarter tree density, size class distribution, and average diameter.

Year	Density	Size Class Distribution					Average Diameter (cm)
	Trees per Acre	Seedling (%)	1-4' (%)	4-8' (%)	8-12' (%)	>12' (%)	
<b>Juniperus osteosperma (Utah juniper)</b>							
2018	27	7	60	27	-	7	8.7

**Table -27-15.15 - Deer Desirable Components Index: Mid Potential Scale.**

Year	Preferred Browse Cover	Preferred Browse Decadence	Preferred Browse Young	Perennial Grass Cover	Annual Grass Cover	Perennial Forb Cover	Noxious Weeds	Total Score	Ranking
2018	28.2	10	4.7	0.1	-0.6	0	0	<b>42.4</b>	Poor

## CARLY KNOLL - STUDY NO. 27-16



### Location Information

USGS 7.5 min Map Info  
GPS (0' Stake)

Skutumpah Creek SE; Township 40S, Range 4W, Section 28  
NAD 83 UTM ZONE 12, 384245 East 4129811 North

### Transect Information

Browse Tag # (0' Stake)	567
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

From North Johnson Canyon Road east of Glendale, turn left (east) onto Skutumpah Road. Stay on this road for 6.3 miles, passing numerous intersections. At this point there will be a two-track on the left (north) side of the road. Turn left and travel for about 1.0 mile, then park; there is no witness post. The 0-foot stake is approximately 25 feet south of the road and is marked with browse tag #567.

**Site Information**

Land Ownership	Federal
Land Administrator	BLM
Allotment	MILL CREEK
Elevation	No data
Aspect	South
Slope	5%
Sample Dates	06/25/2018

**Table 27-16.1 Disturbance History.** Recorded history of major disturbances.

Treatment/Disturbance	Name	WRI DB#	Date	Size (acres)
Seeding - Aerial Before	UKC - Carly Knoll/Mill Creek	3279	Winter 2015-Spring 2016	548
Seeding - Aerial After	UKC - Carly Knoll/Mill Creek	3279	Winter 2016	548
Mechanical - Bullhog	UKC - Carly Knoll/Mill Creek	3279	Winter 2015-2016	548

**Wildlife Habitat and Vegetation History**

**Table 27-16.3 - Wildlife Seasonal Habitat.** UDWR wildlife habitat and seasonality.

Species	Habitat	Season
Deer	substantial	winter
Elk	substantial	year-long

**Table 27-16.4 - Vegetation History.** The dominant vegetation type(s) and phase of woodland succession (Tausch, Miller, Roundy, & Chambers, 2009).

Year	Vegetation Type	Woodland Succession
2018	Bitterbrush	Phase I

**Site Notes**

No Notes

**Soils**

**Table 27-16.5 - 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
Sandy Loam	7.8	74.2	9.4	16.4	0.9	7.0	166.0	0.3	06/25/2018

**Site Potential**

1981 - 2010 Average Annual Precipitation	14 inches
NRCS Ecological Site	Upland Loam (Mountain Big Sagebrush)
NRCS Ecological Site #	R035XY308UT
States and Transitions	No state and transition model is available for this ecological site.

This site was dominated by antelope bitterbrush (*Purshia tridentata*) upon establishment in 2018. Other browse species such as mountain big sagebrush (*Artemisia tridentata* ssp. *vaseyana*) and forage kochia (*Bassia prostrata*) were also observed, but in lesser amounts (Table 27-16.12, Table 27-16.13). The herbaceous understory was moderately diverse and abundant, with the perennial forb species roundspike cryptantha (*Cryptantha humilis*) and alfalfa (*Medicago sativa*) contributing the most cover (Table 27-16.7, Table 27-16.10, Table 27-16.11). The area was bullhogged and seeded during the winter of 2015/2016 (Table 27-16.1), but small twoneedle pinyon (*Pinus edulis*) and Utah juniper (*Juniperus osteosperma*) trees were recorded in cover and point-quarter measurements (Table 27-16.12, Table 27-16.14). The presence of these trees indicates that the study site is within Phase I of woodland succession (Table 27-16.4) and may be prone to infilling in future sample years.

**Trend Summary Tables**

**Table 27-16.6 - 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
2018	22.7	0.9	0.9	23.7	1.0	0.2

**Table 27-16.7 - 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
2018	10	41	29	107	0.3	2.1	0.6	6.3

**Table 27-16.8 - 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
2018	34.9	0.4	54.6	0.0	1.0	32.1

**Table 27-16.9 - 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	Mule Deer	Rocky Mountain Elk	Rabbit
	Quadrat Frequency		
2018	13	2	28
Days Use Per Acre (ha)			
2018	15.4 (38.1)	6.0 (14.9)	-

**Table 27-16.10 - Grass Species.** Nested frequency and modified Daubenmire average cover by year.

GRASS SPECIES							
Agropyron cristatum <sup>i</sup> (crested wheatgrass)							
Bromus tectorum <sup>ai</sup> (cheatgrass)							
Elymus elymoides (squirreltail)							
Poa fendleriana (muttongrass)							
Psathyrostachys juncea <sup>i</sup> (Russian wildrye)							
Pseudoroegneria spicata (bluebunch wheatgrass)							
Thinopyrum intermedium <sup>i</sup> (intermediate wheatgrass)							
year	Nested Frequency						
2018	12	10	6	1	3	1	18
year	Average Cover (%)						
2018	0.4	0.3	0.3	0.0	0.2	0.1	1.2

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

**Table 27-16.11 - Forb Species.** Nested frequency and modified Daubenmire average cover by year.

FORB SPECIES												
Achillea millefolium (Common yarrow)												
Astragalus convallarius (lesser rushy milkvetch)												
Chamaesyce (sandmat)												
Cryptantha humilis (roundspike cryptantha)												
Lactuca serriola <sup>ai</sup> (prickly lettuce)												
Linum perenne <sup>i</sup> (blue flax)												
Medicago sativa <sup>i</sup> (alfalfa)												
Onobrychis vicifolia <sup>i</sup> (sainfoin)												
Packera multilobata (lobeleaf groundsel)												
Penstemon eatonii (firecracker penstemon)												
Salsola tragus <sup>ai</sup> (prickly Russian thistle)												
Sanguisorba minor <sup>i</sup> (small burnet)												
year	Nested Frequency											
2018	5	2	14	38	21	4	34	7	10	0	12	8
year	Average Cover (%)											
2018	0.8	0.0	0.5	2.4	0.4	0.0	1.5	0.6	0.1	0.0	0.2	0.6

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

**Table 27-16.12 - Shrub and Tree Species.** Average modified Daubenmire quadrat and line intercept cover by year.

SHRUB SPECIES							
Artemisia tridentata ssp. vaseyana <sup>p</sup> (mountain big sagebrush)							
Bassia prostrata <sup>ai</sup> (forage kochia)							
Gutierrezia sarothrae (broom snakeweed)							
Juniperus osteosperma <sup>i</sup> (Utah juniper)							
Opuntia polyacantha (plains pricklypear)							
Pinus edulis <sup>i</sup> (twoneedle pinyon)							
Purshia tridentata <sup>p</sup> (antelope bitterbrush)							
year	Line Intercept Cover (%)						
2018	1.7	0.1	0.7	-	0.3	0.2	21.9
year	Quadrat Cover (%)						
2018	2.3	0.2	0.7	0.2	0.1	0.7	20.1

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

**Table 27-16.13 - 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 <sup>p</sup> -- (mountain big sagebrush)									
2018	1340	-	46	51	3	0	0	3	53/57
Bassia prostrata <sup>pi</sup> -- (forage kochia)									
2018	320	-	63	38	0	0	0	0	35/32
Cercocarpus montanus <sup>p</sup> -- (alderleaf mountain mahogany)									
2018	-	-	-	-	-	-	-	-	64/133
Ephedra viridis <sup>p</sup> -- (mormon tea)									
2018	20	-	0	100	0	100	0	0	69/119
Ericameria nauseosa -- (rubber rabbitbrush)									
2018	20	-	0	100	0	0	0	0	57/74
Gutierrezia sarothrae -- (broom snakeweed)									
2018	320	20	6	88	6	0	0	6	29/43
Juniperus osteosperma <sup>t</sup> -- (Utah juniper)									
2018	100	20	100	0	0	0	0	0	- / -
Opuntia polyacantha -- (plains pricklypear)									
2018	60	-	0	33	67	0	0	67	11/39
Pinus edulis <sup>t</sup> -- (twoneedle pinyon)									
2018	120	20	100	0	0	0	0	17	- / -
Purshia tridentata <sup>p</sup> -- (antelope bitterbrush)									
2018	1080	20	7	93	0	41	4	0	82/168
Quercus gambelii <sup>p</sup> -- (Gambel oak)									
2018	-	-	-	-	-	-	-	-	67/65
Yucca -- (yucca)									
2018	20	-	0	100	0	0	0	0	33/42

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

**Table 27-16.14 - Tree Characteristics.** Point-quarter tree density, size class distribution, and average diameter.

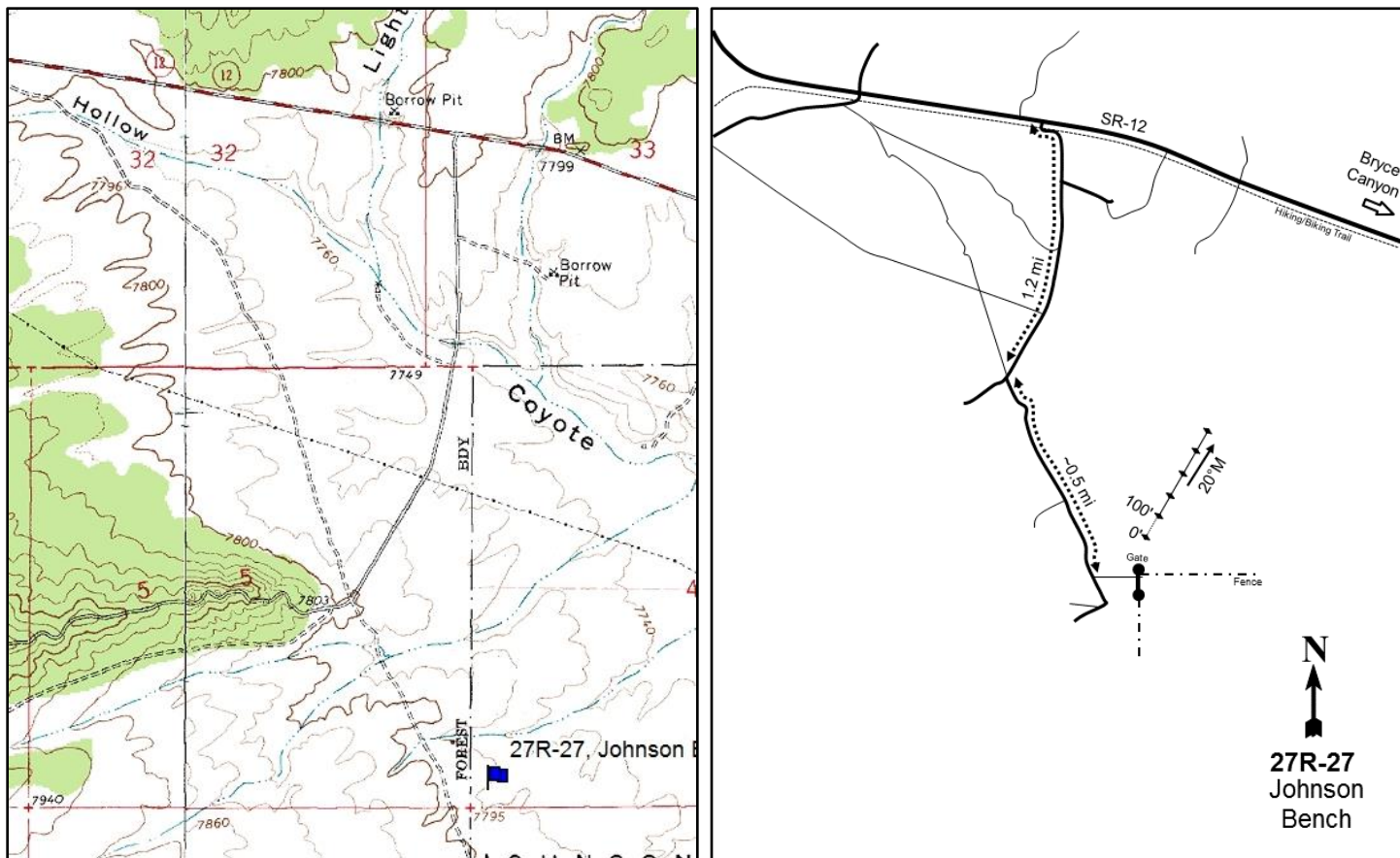
Year	Density	Size Class Distribution					Average Diameter (cm)
	Trees per Acre	Seedling (%)	1-4' (%)	4-8' (%)	8-12' (%)	>12' (%)	
Juniperus osteosperma (Utah juniper)							
2018	28	63	38	-	-	-	1.6
Pinus edulis (twoneedle pinyon)							
2018	59	17	83	-	-	-	2.7

**Table -27-16.15 - Deer Desirable Components Index: Mid Potential Scale.**

Year	Preferred Browse Cover	Preferred Browse Decadence	Preferred Browse Young	Perennial Grass Cover	Annual Grass Cover	Perennial Forb Cover	Noxious Weeds	Total Score	Ranking
2018	30	14.9	5.2	4.2	-0.2	10	0	<b>64.1</b>	Fair-Good



## JOHNSON BENCH - STUDY NO. 27R-27

**Location Information**

USGS 7.5 min Map Info  
GPS (0' Stake)

Bryce Canyon NW; Township 36S, Range 4W, Section 04  
NAD 83 UTM ZONE 12, 390833 East 4172797 North

**Transect Information**

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

587  
20° magnetic  
500ft  
Line 1 (11ft), Line 2 (34ft), Line 3 (59ft), Line 4 (71ft), Line 5 (95ft)  
Standard

**Directions to Site**

From SR-12, turn right onto a road that runs south. Continue on this road for 1.2 miles to an intersection. At the intersection, turn left and drive for 0.5 miles. Park here; there is no witness post. The 0-foot stake is north of a two-track and is marked by browse tag #587.



**Site Information**

Land Ownership	Private
Land Administrator	Private
Allotment	No data
Elevation	No data
Aspect	Northeast
Slope	2%
Sample Dates	07/10/2018

**Table 27R-27.1 Disturbance History.** Recorded history of major disturbances.

Treatment/Disturbance	Name	WRI DB#	Date	Size (acres)
Harrow - One-Way Chain	Johnson Bench UPD Habitat Enhancement Phase II	4429	October 2018 (Proposed)	263
Seeding - Broadcast Before	Johnson Bench UPD Habitat Enhancement Phase II	4429	October 2018 (Proposed)	263
Herbicide - Spike	-	-	2015	270

**Table 27R-27.2 Seed Mix.** List of known seeded plant species and rates (if available).

Mix Name		Application Type	Application Date	Acres	
Johnson Bench		Broadcast	Oct 2018	270	
Type	Species	Common Name	Cultivar/Source ID	Bulk lbs/acre	PLS
G	<i>Achnatherum hymenoides</i>	Indian Ricegrass	Rimrock	1.11	0.96
G	<i>Bouteloua gracilis</i>	Blue Grama	Hachita	0.36	0.27
G	<i>Bouteloua gracilis</i>	Blue Grama	Hachita	0.01	0.01
G	<i>Elymus trachycaulus</i>	Slender Wheatgrass	First Strike	0.56	0.52
G	<i>Koeleria macrantha</i>	Prairie junegrass	Blue Mtn	0.19	0.15
G	<i>Poa fendleriana</i>	Muttongrass	Montezuma CO	0.19	0.16
G	<i>Poa secunda</i>	Big Bluegrass	Sherman	0.50	0.38
F	<i>Achillea millefolium</i>	Western Yarrow	Eagle	0.05	0.04
F	<i>Gaillardia aristata</i>	Blanket Flower		0.19	0.17
F	<i>Hedysarum boreale</i>	Utah Sweetvetch	Timp	0.22	0.17
F	<i>Heliomeris multiflora</i>	Showy Goldeneye	White Pine NV	0.33	0.32
F	<i>Linum lewisii</i>	Lewis Flax	Maple Grove	0.37	0.34
F	<i>Penstemon comarrhenus</i>	Dusty Penstemon	Kane UT	0.19	0.17
F	<i>Ratibida columnifera</i>	Prairie Coneflower	Stillwater	0.13	0.11
F	<i>Ratibida columnifera</i>	Prairie Coneflower	Stillwater	0.24	0.21
F	<i>Sphaeralcea munroana</i>	Munro Globemallow	Washington UT	0.19	0.17

**Wildlife Habitat and Vegetation History****Table 27R-27.3 - Wildlife Seasonal Habitat.** UDWR wildlife habitat and seasonality.

Species	Habitat	Season
Deer	crucial	winter
Elk	crucial	winter
Greater Sage Grouse		
Pronghorn	crucial	year-long

**Table 27R-27.4 - Vegetation History.** The dominant vegetation type(s) and phase of woodland succession (Tausch, Miller, Roundy, & Chambers, 2009).

Year	Vegetation Type	Woodland Succession
2018	Perennial Grass/Yellow Rabbitbrush	Phase I

**Site Notes**

No Notes

**Site Potential**

1981 - 2010 Average Annual Precipitation	15 inches
NRCS Ecological Site	Upland Loam (Black Sagebrush)
NRCS Ecological Site #	R047XB309UT
States and Transitions	No state and transition model is available for this ecological site.

As of study establishment in 2018, yellow rabbitbrush (*Chrysothamnus viscidiflorus* ssp. *viscidiflorus* var. *viscidiflorus*) is the most abundant shrub (Table 27R-27.12, Table 27R-27.13). However, photos reveal that most shrubs are in poor health, likely due to a combination of a 2015 herbicide treatment and drought conditions in 2018 (Table 27R-27.1). The herbaceous understory is abundant and dominated by a diverse mixture of native and introduced perennial grasses, including crested wheatgrass (*Agropyron cristatum*), blue grama (*Bouteloua gracilis*), and muttongrass (*Poa fendleriana*). Annual and perennial forbs are scarce in comparison, and annual grasses were not observed (Table 27R-27.7, Table 27R-27.10, Table 27R-27.11). Although not reflected in the data, photos show that Utah juniper (*Juniperus osteosperma*) trees are present in low amounts in the study area, placing the site in Phase I of woodland succession (Table 27R-27.4). This study site is expected to transition into one solely dominated by perennial grasses, as a harrow and seeding treatment will be/is being implemented to remove the shrub component (Table 27R-27.1).

**Trend Summary Tables****Table 27R-27.6 - Shrub/Tree Summary.** Average modified Daubenmire quadrat and line intercept cover by year for shrubs/trees

Year	Quadrat Cover (%)			Line-intercept Cover (%)		
	Preferred Shrub	Other Shrub	Tree	Preferred Shrub	Other Shrub	Tree
2018	3.9	8.8	-	2.8	8.2	-

**Table 27R-27.7 - Herbaceous Summary.** Nested frequency and average modified Daubenmire quadrat cover by year for herbaceous functional groups

Year	Nested Frequency				Quadrat Cover (%)			
	Annual Grass	Perennial Grass	Annual/Biennial Forb	Perennial Forb	Annual Grass	Perennial Grass	Annual/Biennial Forb	Perennial Forb
2018	-	385	4	146	-	29.1	0.0	3.3

**Table 27R-27.8 - 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
2018	41.2	0.8	38.9	2.9	0.4	42.6

**Table 27R-27.9 - Pellet Group Data.** Quadrat frequency and pellet group transect data for animal pellets. Rabbit pellet groups are not sampled in the pellet group transect.

Year	Cattle	Mule Deer/Pronghorn/Big Horn Sheep	Mule Deer/Pronghorn	Rocky Mountain Elk	Horse	Rabbit
	Quadrat Frequency					
2018	5	1	9	-	1	4
Year	Days Use Per Acre (ha)					
2018	19.6 (48.4)	-	11.4 (28.1)	4.0 (9.9)	3.5 (8.6)	-

**Table 27R-27.10 - Grass Species.** Nested frequency and modified Daubenmire average cover by year.

GRASS SPECIES	
Achnatherum hymenoides (Indian ricegrass)	
Achnatherum lettermanii (Letterman's needlegrass)	
Agropyron cristatum <sup>i</sup> (crested wheatgrass)	
Bouteloua gracilis (blue grama)	
Bromus inermis <sup>i</sup> (smooth brome)	
Carex (sedge)	
Carex obtusata (obtuse sedge)	
Elymus elymoides (squirreltail)	
Hesperostipa comata (needle and thread)	
Koeleria macrantha (prairie Junegrass)	
Pascopyrum smithii (western wheatgrass)	
Poa fendleriana (muttongrass)	
Thinopyrum intermedium <sup>i</sup> (intermediate wheatgrass)	
year	Nested Frequency
2018	3 6 138 175 14 17 36 8 78 2 54 220 39
year	Average Cover (%)
2018	0.0 0.2 6.8 8.5 0.3 0.1 0.2 0.1 2.8 0.0 0.6 8.4 0.9

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

**Table 27R-27.11 - Forb Species.** Nested frequency and modified Daubenmire average cover by year.

FORB SPECIES	
Antennaria microphylla (littleaf pussytoes)	
Arabis (rockcross)	
Erigeron eatonii (Eaton's fleabane)	
Erigeron pumilus (shaggy fleabane)	
Erigonum alatum (winged buckwheat)	
Erigonum racemosum (redroot buckwheat)	
Erigonum umbellatum (sulphur-flower buckwheat)	
Gilia inconspicua <sup>a</sup> (shy gilia)	
Lotus utahensis (Utah bird's-foot trefoil)	
Microsteris gracilis <sup>a</sup> (slender phlox)	
Phlox austromontana (mountain phlox)	
Phlox longifolia (longleaf phlox)	
Trifolium (clover)	
year	Nested Frequency
2018	14 1 1 5 2 69 69 1 16 3 5 4 6
year	Average Cover (%)
2018	0.7 0.0 0.0 0.3 0.0 0.6 1.1 0.0 0.3 0.0 0.3 0.0 0.0

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

**Table 27R-27.12 - Shrub and Tree Species.** Average modified Daubenmire quadrat and line intercept cover by year.

SHRUB SPECIES	
Artemisia nova <sup>a</sup> (black sagebrush)	
Chrysothamnus depressus <sup>p</sup> (longflower rabbitbrush)	
Chrysothamnus viscidiflorus ssp. viscidiflorus var. viscidiflorus (slender buckwheat)	
Gutierrezia sarothrae (broom snakeweed)	
Linanthus pungens (granite prickly phlox)	
Tetradymia canescens (spineless horsebrush)	
year	Line Intercept Cover (%)
2018	2.7 0.1 6.4 - - 0.7 1.1
year	Quadrat Cover (%)
2018	3.9 0.0 6.7 0.0 0.0 1.2 0.9

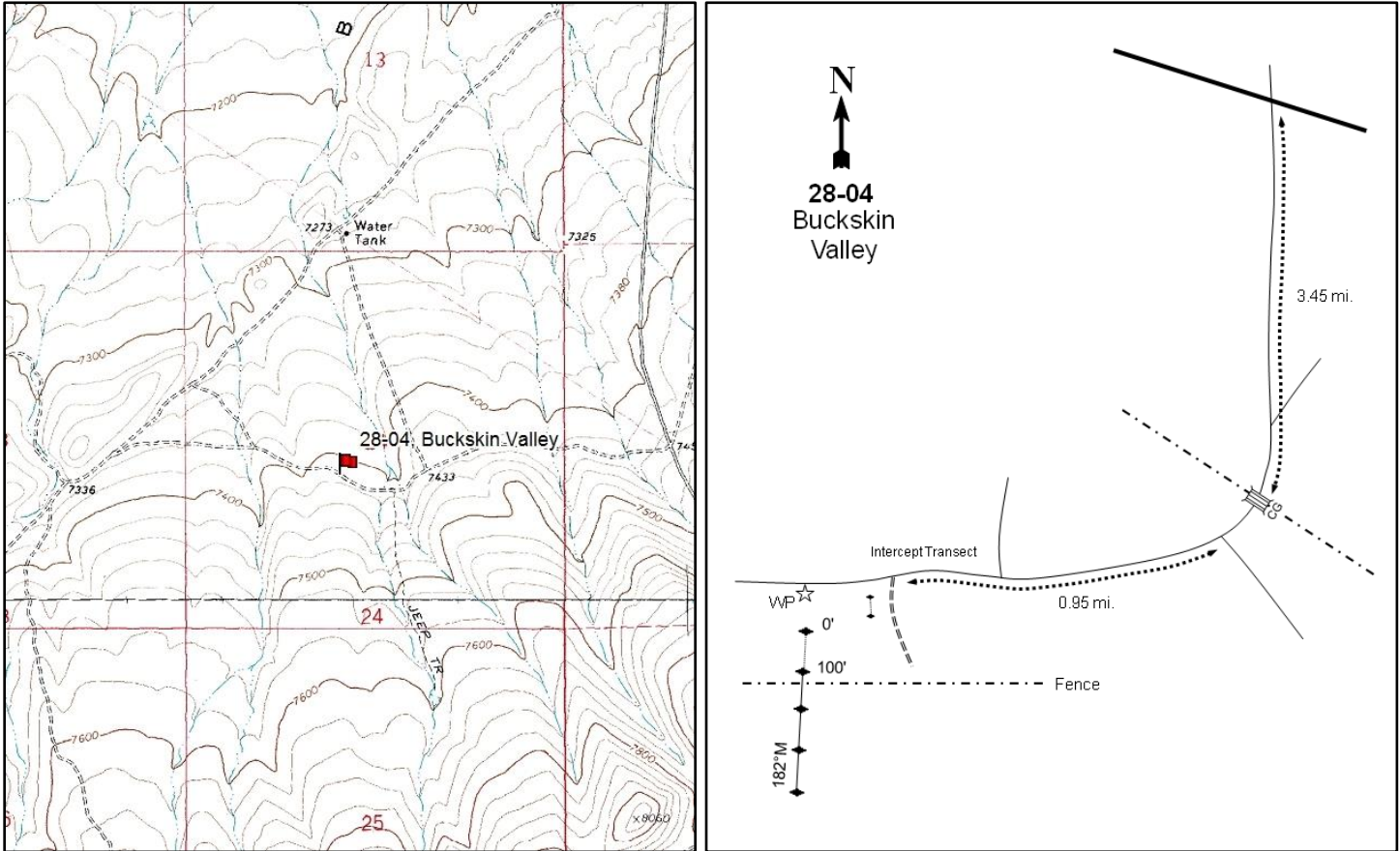
t - Tree Species; p - Preferred Browse; i - Introduced Species

**Table 27R-27.13 - Shrub/Tree Characteristics.** Population characteristics of shrub/tree species populations including density reproduction (seedlings), age distribution, utilization, vigor and average size (height/crown) of plants.

Year	Density		Age Class Distribution			Utilization		Poor Vigor (%)	Average Height Crown (cm)
	Plants Per Acre		Excluding Seedlings			Moderate (%)	Heavy (%)		
	Excluding Seedlings	Seedling	Young (%)	Mature (%)	Decadent (%)				
<b>Artemisia nova<sup>P</sup> -- (black sagebrush)</b>									
2018	5580	60	27	37	37	5	1	60	18/26
<b>Chrysothamnus depressus<sup>P</sup> -- (longflower rabbitbrush)</b>									
2018	220	-	9	64	27	55	36	27	8/11
<b>Chrysothamnus viscidiflorus ssp. viscidiflorus var. viscidiflorus -- (yellow rabbitbrush)</b>									
2018	8320	-	3	89	8	15	1	31	13/26
<b>Eriogonum microthecum<sup>P</sup> -- (slender buckwheat)</b>									
2018	-	-	-	-	-	-	-	-	13/11
<b>Gutierrezia sarothrae -- (broom snakeweed)</b>									
2018	20	-	0	100	0	0	0	0	6/10
<b>Linanthus pungens -- (granite prickly phlox)</b>									
2018	2140	20	7	84	9	0	0	63	11/16
<b>Tetradymia canescens -- (spineless horsebrush)</b>									
2018	740	-	11	51	38	27	0	62	24/39

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

## BUCKSKIN VALLEY - STUDY NO. 28-4

**Location Information**

USGS 7.5 min Map Info  
GPS (0' Stake)

Burnt Peak SW; Township 32S, Range 7W, Section 24  
NAD 83 UTM ZONE 12, 359445 East 4207552 North

**Transect Information**

Browse Tag # (0' Stake)	9005
Transect Bearing	182° magnetic
Length	400ft
Belt Placement	Line 1 (11ft & 71ft), Line 2 (34ft), Line 3 (59ft), Line 4 (95ft)
Belt Marker Placement	Belt 4: 10ft

**Directions to Site**

From SR-20 just west of mile marker 7, turn south onto Buckskin Valley Road and travel 3.45 miles to a cattle guard. Just beyond the fence and cattle guard, bear right and proceed west for 0.95 miles to an intersection where a very faint road goes to the south. About 60 feet west of this intersection is the witness post on the south (left) side of the road. The 0-foot stake, a 2-foot-tall green fencepost marked by a red browse tag #9005, is 6 feet southeast of the witness post. The frequency baseline runs south-southwest from here. The old line-intercept transect 57A-7-78 is marked by a red-painted steel fencepost 10 feet east of this study.

**Site Information**

Land Ownership	Federal
Land Administrator	BLM
Allotment	BUCKSKIN MOUNTAIN
Elevation	7,410ft (2,259m)
Aspect	North
Slope	4-5%
Sample Dates	08/02/1992, 07/07/1998, 06/26/2003, 06/04/2008, 06/04/2013, 06/14/2018

**Table 28-04.1 Disturbance History.** Recorded history of major disturbances.

Treatment/Disturbance	Name	WRI DB#	Date	Size (acres)
Hand Crew - Lop and Scatter	Little Bear Valley to Fremont Canyon Sagebrush Steppe Habitat Restoration (Proposed)	4402	2018	4095

**Wildlife Habitat and Vegetation History****Table 28-04.3 - Wildlife Seasonal Habitat.** UDWR wildlife habitat and seasonality.

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

**Table 28-04.4 - Vegetation History.** The dominant vegetation type(s) and phase of woodland succession (Tausch, Miller, Roundy, & Chambers, 2009).

Year	Vegetation Type	Woodland Succession
1987	Mountain Big Sagebrush	No Encroachment
1992	Mountain Big Sagebrush	Phase I
1998	Mountain Big Sagebrush	Phase I
2003	Mountain Big Sagebrush	Phase I
2008	Mountain Big Sagebrush	Phase I
2013	Mountain Big Sagebrush	Phase I
2018	Mountain Big Sagebrush	Phase I

**Site Notes**

The lower portions of the general area have been treated by the BLM to enhance livestock grazing.

**Soils****Table 28-04.5 - 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	5.9	44.2	30.0	25.8	3.8	22.7	236.8	0.4	07/07/1998

**Site Potential**

1981 - 2010 Average Annual Precipitation	17 inches
NRCS Ecological Site	Mountain Loam (Shrub)
NRCS Ecological Site #	R047XA434UT
States and Transitions	No state and transition model is available for this ecological site.

This site has remained in a stable state as a mountain big sagebrush (*Artemisia tridentata* ssp. *vaseyana*) dominated plant community mixed with lesser amounts of antelope bitterbrush (*Purshia tridentata*) since study establishment in 1987 (Pre-1992 Data, Photos, Table 28-04.12, Table 28-04.13). The understory has remained diverse and abundant, although composition has fluctuated over the study years. The introduced annual grass cheatgrass (*Bromus tectorum*) increased in cover from 1992 to 2013, when it contributed the most cover. In 2018, however, cheatgrass cover decreased while perennial grasses and forbs were the dominant herbaceous components (Table 28-04.7, Table 28-04.10, Table 28-04.11). The resilience of this sagebrush community may be at risk if cheatgrass cover increases in the future. Rocky Mountain juniper (*Juniperus scopulorum*) has been observed since 1992, placing this site in Phase I of woodland succession as of 2018 (Table 28-04.4). However, density has remained stable, indicating that further encroachment may not be a concern (Table 28-04.12, Table 28-04.13, Table 28-03.14).

**Trend Summary Tables****Table 28-04.6 - 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
1992	32.0	1.3	-	-	-	-
1998	36.7	1.0	0.0	-	-	-
2003	35.7	0.6	0.5	43.9	0.3	0.7
2008	25.9	1.9	0.6	42.8	1.4	0.9
2013	29.1	1.0	0.8	57.0	0.8	1.1
2018	37.6	1.7	1.2	47.2	1.2	1.3

**Table 28-04.7 - 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
1992	44	335	198	285	0.1	8.4	1.1	5.3
1998	193	303	311	240	2.9	6.4	2.6	6.0
2003	159	191	417	160	1.6	2.7	10.2	2.9
2008	195	279	371	266	2.7	6.4	4.8	8.1
2013	339	262	261	245	11.9	6.1	1.0	5.8
2018	160	306	244	272	1.2	10.1	0.9	9.4

**Table 28-04.8 - 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
1992	14.4	1.6	58.8	0.9	5.5	42.7
1998	16.1	1.0	66.3	1.7	4.9	49.7
2003	18.2	0.2	52.7	0.6	3.5	48.1
2008	19.0	0.5	56.8	0.9	4.2	44.4
2013	15.1	0.8	46.9	0.2	5.1	51.7
2018	12.3	0.3	70.3	0.6	4.3	51.7

**Table 28-04.9 - Pellet Group Data.** Quadrat frequency and pellet group transect data for animal pellets. Rabbit pellet groups are not sampled in the pellet group transect.

Year	Cattle	Coyote	Mule Deer/Domestic Sheep	Rocky Mountain Elk	Rabbit
	Quadrat Frequency				
1992	-	-	28	-	44
1998	2	-	36	1	22
2003	1	-	24	-	37
2008	4	-	26	-	69
2013	-	-	15	-	7
2018	-	-	34	2	39
Year	Days Use Per Acre (ha)				
1992	-	-	-	-	-
1998	7.2 (17.9)	-	48.9 (120.8)	-	-
2003	0.7 (1.8)	-	62.3 (153.9)	-	-
2008	5.8 (14.3)	8.7 (21.5)*	42.9 (105.9)	1.3 (3.3)	-
2013	4.4 (10.8)	-	50.2 (124.1)	-	-
2018	5.1 (12.6)	-	39.6 (97.7)	3.4 (8.3)	-

\*Pellets per acre (ha)



**Table 28-04.10 - Grass Species.** Nested frequency and modified Daubenmire average cover by year.

GRASS SPECIES	Achnatherum lettermanii (Letterman's needlegrass)	Agropyron cristatum <sup>i</sup> (crested wheatgrass)	Bromus ciliatus (fringed brome)	Bromus tectorum <sup>ai</sup> (cheatgrass)	Elymus elymoides (squirreltail)	Hesperostipa comata (needle and thread)	Pascopyrum smithii (western wheatgrass)	Poa fendleriana (muttongrass)	Poa pratensis <sup>i</sup> (Kentucky bluegrass)	Poa secunda (Sandberg bluegrass)	Pseudoroegneria spicata (bluebunch wheatgrass)
year	Nested Frequency										
1992	31	-	2	44	129	36	216	52	-	3	-
1998	36	8	-	193	95	2	154	35	51	2	2
2003	6	-	-	159	69	3	112	14	15	-	3
2008	4	7	-	195	26	3	208	19	63	6	-
2013	10	-	-	339	65	4	116	24	86	-	-
2018	25	2	-	160	69	1	190	20	72	6	-
year	Average Cover (%)										
1992	0.5	-	0.0	0.1	2.2	0.2	4.0	1.5	-	0.0	-
1998	0.2	0.1	-	2.9	1.4	0.0	1.6	0.9	2.2	0.0	0.0
2003	0.2	-	-	1.6	0.8	0.0	0.9	0.4	0.3	-	0.0
2008	0.2	0.1	-	2.7	0.4	0.0	3.7	0.3	1.7	0.0	-
2013	0.3	-	-	11.9	0.6	0.2	2.5	0.5	1.9	-	-
2018	0.6	0.0	-	1.2	1.2	0.0	5.0	0.8	2.4	0.2	-

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

**Table 28-04.11 - Forb Species.** Nested frequency and modified Daubenmire average cover by year.

FORB SPECIES	Agoseris glauca (pale agoseris)	Allium (onion)	Alyssum desertorum <sup>ai</sup> (desert madwort)	Arabis holboellii <sup>a</sup> (Holboell's rockcress)	Astragalus argophyllus var. panguicensis (silverleaf milkvetch)	Astragalus convallarius (lesser rushy milkvetch)	Astragalus oophorus (egg milkvetch)	Balsamorhiza sagittata (arrowleaf balsamroot)	Calochortus nuttallii (sego lily)	Ceratocephala testiculata <sup>ai</sup> (curvseed butterwort)	Chaenactis douglasii (Douglas' dustymaiden)	Cirsium wheeleri (Wheeler's thistle)	Collinsia parviflora <sup>a</sup> (maiden blue eyed Mary)	Comandra umbellata (bastard toadflax)	Cordylanthus kingii <sup>a</sup> (King's bird's-beak)	Crepis acuminata (tapertip hawksbeard)	Cryptantha (cryptantha)
year	Nested Frequency																
1992	-	3	-	30	9	9	17	-	-	-	34	26	122	9	-	9	-
1998	4	1	-	2	28	5	1	2	5	-	13	17	306	7	-	6	-
2003	6	-	-	-	-	10	-	-	4	-	-	1	400	12	5	5	1
2008	27	6	-	6	-	8	23	2	10	3	-	4	364	8	-	11	1
2013	33	6	10	3	-	4	36	3	7	7	-	20	185	5	-	30	-
2018	45	1	9	12	1	2	37	7	1	6	-	32	163	20	3	4	-
year	Average Cover (%)																
1992	-	0.0	-	0.1	0.0	0.7	0.1	-	-	-	0.2	0.4	0.6	0.0	-	0.0	-
1998	0.0	0.0	-	0.0	0.4	0.1	0.1	0.0	0.0	-	0.0	0.4	2.2	0.0	-	0.1	-
2003	0.1	-	-	-	-	0.1	-	-	0.0	-	-	0.0	9.0	0.1	0.0	0.1	0.0
2008	0.5	0.0	-	0.0	-	0.1	0.7	0.2	0.1	0.0	-	0.2	4.5	0.1	-	0.3	0.0
2013	0.3	0.0	0.0	0.0	-	0.0	1.2	0.0	0.0	0.0	-	0.6	0.5	0.0	-	0.2	-
2018	0.5	0.0	0.0	0.1	0.0	0.1	1.4	0.2	0.0	0.0	-	1.1	0.5	0.1	0.0	0.2	-

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

FORB SPECIES	Delphinium nuttallianum (two-lobed larkspur)	Erigeron eatonii (Eaton's fleabane)	Eriogonum alatum (winged buckwheat)	Eriogonum racemosum (redroot buckwheat)	Eriogonum umbellatum (sulphur-flower buckwheat)	Gayophytum ramosissimum <sup>a</sup> (pinyon groundsmoke)	Heterotheca villosa (hairy false goldenaster)	Ipomopsis aggregata (scarlet gilia)	Lappula occidentalis <sup>a</sup> (flatspine stickseed)	Linum lewisii (Lewis flax)	Lithospermum (stoneseed)	Lomatium (desertparsley)	Lupinus argenteus (silvery lupine)	Machaeranthera canescens (hoary tansyaster)	Microsteris gracilis <sup>a</sup> (slender phlox)	Navarretia intertexta <sup>a</sup> (needleleaf navarretia)	Packera multilobata (lobeleaf groundsel)
year	Nested Frequency																
1992	-	-	-	35	18	-	-	-	-	-	-	9	47	5	122	-	-
1998	-	2	-	24	8	-	-	-	-	2	4	-	59	2	73	-	1
2003	-	1	-	9	3	9	-	-	2	-	-	0	38	-	148	2	-
2008	21	-	-	23	11	13	-	-	12	2	-	61	24	-	51	1	-
2013	1	-	3	8	12	4	-	2	8	0	-	25	55	-	122	-	1
2018	-	4	-	16	5	-	2	-	-	-	-	16	45	1	148	-	-
year	Average Cover (%)																
1992	-	-	-	0.3	0.1	-	-	-	-	-	-	0.0	1.4	0.0	0.4	-	-
1998	-	0.0	-	0.1	0.1	-	-	-	-	0.0	0.0	-	3.2	0.0	0.3	-	0.0
2003	-	0.0	-	0.1	0.0	0.0	-	-	0.0	-	-	0.0	1.6	-	1.1	0.0	-
2008	0.1	-	-	0.2	0.1	0.0	-	-	0.0	0.0	-	0.5	0.9	-	0.2	0.0	-
2013	0.0	-	0.0	0.1	0.2	0.0	-	0.0	0.1	0.0	-	0.1	1.2	-	0.4	-	0.0
2018	-	0.0	-	0.1	0.0	-	0.0	-	-	-	-	0.1	3.0	0.0	0.3	-	-

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

FORB SPECIES	Penstemon (beardtongue)	Phlox longifolia (longleaf phlox)	Polygonum douglasii <sup>a</sup> (Douglas' knotweed)	Senecio spartioides var. multicapitatus (broom-like ragwort)	Sphaeralcea coccinea (scarlet globemallow)	Taraxacum officinale (common dandelion)	Tragopogon dubius <sup>ai</sup> (yellow salsify)	Trifolium (clover)	Zigadenus paniculatus (foothill deathcamas)
year	Nested Frequency								
1992	-	188	-	1	4	1	2	43	40
1998	-	127	4	-	4	-	7	45	6
2003	2	56	-	-	4	-	-	31	39
2008	2	109	5	-	-	-	-	70	79
2013	-	71	-	-	-	1	5	52	39
2018	-	76	-	-	5	20	1	84	78
year	Average Cover (%)								
1992	-	1.0	-	0.0	0.0	0.0	0.0	0.2	0.8
1998	-	1.0	0.0	-	0.0	-	0.0	0.3	0.0
2003	0.0	0.2	-	-	0.0	-	-	0.1	0.4
2008	0.0	0.9	0.0	-	-	-	-	0.8	2.6
2013	-	0.5	-	-	-	0.0	0.0	0.2	1.0
2018	-	0.6	-	-	0.1	0.3	0.0	0.4	1.3

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

**Table 28-04.12 - Shrub and Tree Species.** Average modified Daubenmire quadrat and line intercept cover by year.

SHRUB SPECIES	Artemisia tridentata ssp. vaseyana <sup>p</sup> (mountain big sagebrush)	Chrysothamnus viscidiflorus ssp. viscidiflorus var. viscidiflorus (yellow rabbitbrush)	Juniperus scopulorum <sup>t</sup> (Rocky Mountain juniper)	Mahonia repens (creeping barberry)	Opuntia polyacantha (plains pricklypear)	Purshia tridentata <sup>p</sup> (antelope bitterbrush)	Quercus gambelii <sup>p</sup> (Gambel oak)	Symphoricarpos oreophilus <sup>p</sup> (mountain snowberry)
year	Line Intercept Cover (%)							
1992	-	-	-	-	-	-	-	-
1998	-	-	-	-	-	-	-	-
2003	34.7	-	0.7	-	0.3	6.6	1	1.6
2008	30.7	-	0.9	-	1.4	8.3	0.8	3
2013	35.2	-	1.1	-	0.8	14.1	1.2	6.5
2018	32.7	-	1.3	-	1.2	8.6	1.5	4.4
year	Quadrat Cover (%)							
1992	24.1	-	-	-	1.3	5.5	1.6	0.8
1998	24.7	-	0.0	-	1.0	8.2	0.6	3.2
2003	27.2	-	0.5	0.0	0.6	6.4	0.4	1.7
2008	18.8	0.0	0.6	-	1.9	4.6	0.0	2.5
2013	19.2	-	0.8	-	1.0	6.4	0.2	3.3
2018	24.1	-	1.2	0.1	1.5	9.0	1.3	3.2

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

**Table 28-04.13 - 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 (%)				
<b>Artemisia tridentata ssp. vaseyana<sup>p</sup> -- (mountain big sagebrush)</b>									
1992	8980	160	3	41	56	49	32	18	- / -
1998	5160	200	4	71	26	40	5	9	73/93
2003	4620	-	1	55	44	10	3	13	88/94
2008	5620	460	3	47	51	5	3	18	85/89
2013	4020	140	6	68	26	35	15	10	91/97
2018	3800	40	1	83	16	1	0	10	94/102
<b>Cercocarpus ledifolius<sup>p</sup> -- (curl-leaf mountain mahogany)</b>									
1992	-	20	0	0	0	0	0	0	- / -
1998	-	-	-	-	-	-	-	-	- / -
2003	-	-	-	-	-	-	-	-	- / -
2008	-	-	-	-	-	-	-	-	- / -
2013	-	-	-	-	-	-	-	-	- / -
2018	-	-	-	-	-	-	-	-	- / -
<b>Chrysothamnus depressus<sup>p</sup> -- (longflower rabbitbrush)</b>									
1992	20	-	0	100	0	0	0	0	- / -
1998	-	-	-	-	-	-	-	-	21/71
2003	-	-	-	-	-	-	-	-	- / -
2008	-	-	-	-	-	-	-	-	- / -
2013	-	-	-	-	-	-	-	-	14/41
2018	-	-	-	-	-	-	-	-	9/20

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 (%)				
<b>Chrysothamnus viscidiflorus ssp. viscidiflorus var. viscidiflorus -- (yellow rabbitbrush)</b>									
1992	40	-	100	0	0	0	0	0	- / -
1998	-	-	-	-	-	-	-	-	- / -
2003	-	-	-	-	-	-	-	-	- / -
2008	-	60	0	0	0	0	0	0	15/26
2013	-	-	-	-	-	-	-	-	- / -
2018	-	-	-	-	-	-	-	-	- / -
<b>Juniperus scopulorum<sup>1</sup> -- (Rocky Mountain juniper)</b>									
1992	20	-	100	0	0	100	0	0	- / -
1998	20	-	0	100	0	0	0	0	- / -
2003	20	-	0	100	0	0	0	0	- / -
2008	-	-	-	-	-	-	-	-	- / -
2013	20	-	0	100	0	0	0	0	- / -
2018	20	-	0	100	0	0	0	0	- / -
<b>Mahonia repens -- (creeping barberry)</b>									
1992	-	-	-	-	-	-	-	-	- / -
1998	-	-	-	-	-	-	-	-	- / -
2003	20	-	0	100	0	0	0	0	7/10
2008	20	-	0	0	100	0	0	100	7/14
2013	-	-	-	-	-	-	-	-	- / -
2018	-	-	-	-	-	-	-	-	- / -
<b>Opuntia polyacantha -- (plains pricklypear)</b>									
1992	2140	100	38	52	9	0	2	20	- / -
1998	740	-	16	76	8	0	3	5	16/34
2003	840	-	5	79	17	0	2	5	16/33
2008	980	60	0	90	10	0	2	14	15/44
2013	580	20	0	97	3	7	7	14	13/42
2018	1160	-	3	97	0	2	0	0	17/48
<b>Purshia tridentata<sup>P</sup> -- (antelope bitterbrush)</b>									
1992	3080	140	34	55	10	34	53	3	- / -
1998	1900	180	15	82	3	36	47	2	56/89
2003	1860	-	3	73	24	13	72	4	56/89
2008	1760	140	0	68	32	22	57	7	56/84
2013	1640	80	10	72	18	18	40	44	72/100
2018	1860	-	9	85	7	28	58	4	68/93
<b>Quercus gambelii<sup>P</sup> -- (Gambel oak)</b>									
1992	460	120	22	70	9	44	0	9	- / -
1998	400	20	10	90	0	0	0	0	182/99
2003	380	-	47	0	53	0	0	0	150/78
2008	200	-	70	10	20	0	0	10	140/41
2013	220	-	9	91	0	0	0	0	111/42
2018	400	-	0	100	0	100	0	0	125/59
<b>Symphoricarpos oreophilus<sup>P</sup> -- (mountain snowberry)</b>									
1992	700	100	29	69	3	57	11	9	- / -
1998	720	-	17	83	0	33	0	0	40/65
2003	980	-	2	98	0	6	29	0	28/43
2008	780	80	10	90	0	3	8	0	34/53
2013	1000	-	0	100	0	2	0	2	44/93
2018	1120	-	21	79	0	9	2	0	49/75

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 (%)				
Yucca -- (yucca)									
1992	-	-	-	-	-	-	-	-	-/-
1998	-	-	-	-	-	-	-	-	-/-
2003	-	-	-	-	-	-	-	-	-/-
2008	-	-	-	-	-	-	-	-	-/-
2013	20	-	0	100	0	100	0	100	- / -

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

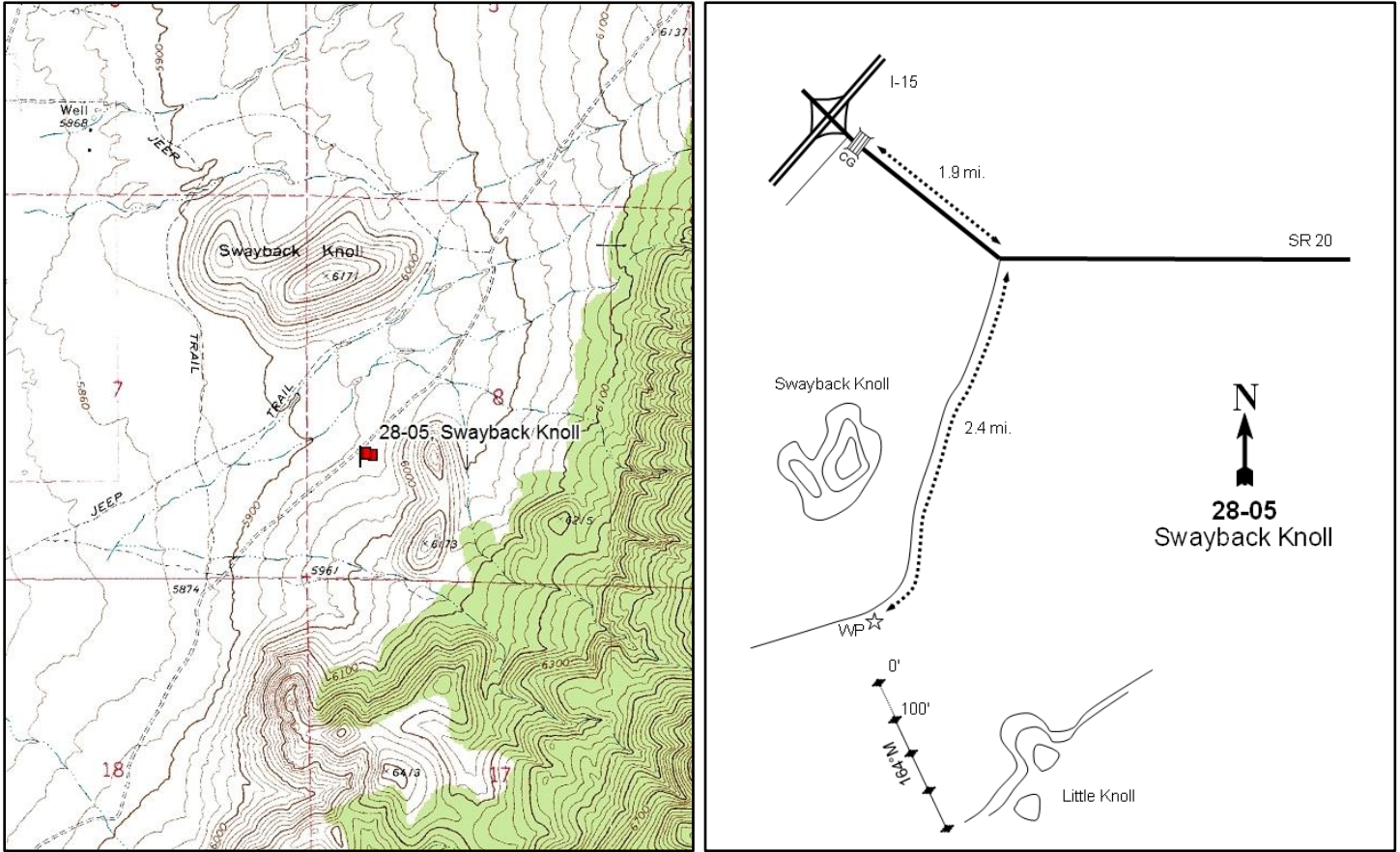
**Table 28-04.14 - Tree Characteristics.** Point-quarter tree density, size class distribution, and average diameter.

Year	Density	Size Class Distribution					Average Diameter (cm)
	Trees per Acre	Seedling (%)	1-4' (%)	4-8' (%)	8-12' (%)	>12' (%)	
Juniperus scopulorum (Rocky Mountain juniper)							
2018	1	-	-	100	-	-	23.0

**Table -28-04.15 - Deer Desirable Components Index: High Potential Scale.**

Year	Preferred Browse Cover	Preferred Browse Decadence	Preferred Browse Young	Perennial Grass Cover	Annual Grass Cover	Perennial Forb Cover	Noxious Weeds	Total Score	Ranking
1992	30	1.7	5.1	16.9	-0.1	10	0	<b>63.6</b>	Fair
1998	30	9.6	3.8	12.9	-2.2	10	0	<b>64.1</b>	Fair
2003	30	3.2	1.2	5.3	-1.2	5.7	0	<b>44.2</b>	Poor
2008	30	2.1	1.9	12.8	-2	10	0	<b>54.8</b>	Poor-Fair
2013	30	8.8	3.2	12.1	-8.9	10	0	<b>55.2</b>	Poor-Fair
2018	30	11.3	2	20.1	-0.9	10	0	<b>72.5</b>	Good

## SWAYBACK KNOLL - STUDY NO. 28-5



### Location Information

USGS 7.5 min Map Info  
GPS (0' Stake)

Buckhorn Flat SE; Township 32S, Range 7W, Section 08  
NAD 83 UTM ZONE 12, 352598 East 4210821 North

### Transect Information

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

477  
164° magnetic  
400ft  
Line 1 (11ft & 71ft), Line 2 (34ft), Line 3 (59ft), Line 4 (95ft)  
Standard

### Directions to Site

From the cattle guard off of SR-20 and I-15, travel 1.9 miles on SR-20 to a dirt road on the right. Turn onto this road and travel south for 2.4 miles to a sage flat west of rocky knolls; there is a witness post on the left (east) side of the road. The 0-foot baseline stake is 200 feet away from the witness post at a bearing of 118 degrees magnetic and is marked by browse tag #477.

**Site Information**

Land Ownership	Federal
Land Administrator	BLM
Allotment	BONE HOLLOW
Elevation	5,940ft (1,811m)
Aspect	Northwest
Slope	6%
Sample Dates	07/30/1992, 06/22/1998, 06/10/2003, 06/04/2008, 06/04/2013, 05/31/2018

**Table 28-05.1 Disturbance History.** Recorded history of major disturbances.

Treatment/Disturbance	Name	WRI DB#	Date	Size (acres)
Fire - Wildfire	Laub	-	Summer 2012	40
Seeding - Broadcast After	Laub and Cotton Fire Rehab	2469	August-September 2012	43
Seeding - Browse Seed Planter	Laub and Cotton Fire Rehab	2469	August-September 2012	43

**Table 28-05.2 Seed Mix.** List of known seeded plant species and rates (if available).

Mix Name			Application Type	Application Date	Acres
Leub Fire			Broadcast	Sep 2012	40
Type	Species	Common Name	Cultivar/Source ID	Bulk lbs/acre	PLS
G	Achnatherum hymenoides	Indian Ricegrass	Nezpar	0.50	0.47
F	Onobrychis viciifolia	Sainfoin	Eski	1.00	0.87
F	Sanguisorba minor	Small Burnet	Delar	1.00	0.89
S	Atriplex canescens	Fourwing Saltbush	Beaver UT	0.50	0.28
S	Purshia tridentata	Bitterbrush	Elko NV	2.50	2.12

**Wildlife Habitat and Vegetation History**

**Table 28-05.3 - Wildlife Seasonal Habitat.** UDWR wildlife habitat and seasonality.

Species	Habitat	Season
Deer	crucial	winter
Elk	substantial	winter

**Table 28-05.4 - Vegetation History.** The dominant vegetation type(s) and phase of woodland succession (Tausch, Miller, Roundy, & Chambers, 2009).

Year	Vegetation Type	Woodland Succession
1987	Wyoming Big Sagebrush	No Encroachment
1998	Wyoming Big Sagebrush	No Encroachment
2003	Wyoming Big Sagebrush	No Encroachment
2008	Wyoming Big Sagebrush	No Encroachment
2013	Annual Grass	No Encroachment
2018	Annual Grass	No Encroachment

**Site Notes**

This study is located on an alluvial fan which is at the base of the foothills east of I-15 and just south of Highway 20. This study samples one of the key wintering areas for mule deer on the east side of I-15, and has been used by as many as 400 deer during winter months. Winter range in this particular area is limited by the deer-proof fence along I-15 as well as agricultural land that is also being fenced to prevent deer depredation. This area is bordered by twoneedle pinyon (*Pinus edulis*) and Utah juniper (*Juniperus osteosperma*)-covered hills which provide the nearest protective cover.

**Soils**

**Table 28-05.5 - 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	6.7	49.8	30.4	19.8	1.1	9.7	67.2	0.4	06/22/1998



**Site Potential**

1981 - 2010 Average Annual Precipitation	12 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 1987, this site was predominantly a mountain big sagebrush (*Artemisia tridentata* ssp. *vaseyana*) community with a small component of perennial grass that provided limited cover (Pre-1992 Data, Photos). The introduced annual grass cheatgrass (*Bromus tectorum*) has varied in frequency and cover, but had particularly high cover in 1998, though perennial native shrubs, forbs, and grasses were still the dominant site components. However, a wildfire in 2012 removed a majority of the shrub cover (Table 28-05.12), allowing cheatgrass to increase and dominate the plant community despite rehabilitation efforts (Table 28-05.1, Table 28-05.7, Table 28-05.10, Table 28-05.11). These increased amounts of cheatgrass may pose a threat to the ecological resilience of the area and has the potential to influence fire regimes.

**Trend Summary Tables**

**Table 28-05.6 - 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
1992	11.0	1.2	-	-	-	-
1998	12.4	0.6	-	-	-	-
2003	18.6	1.1	-	16.3	1.2	-
2008	12.0	1.9	-	11.1	1.1	-
2013	0.5	-	-	0.8	-	-
2018	0.0	0.0	-	0.2	-	-

**Table 28-05.7 - 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
1992	246	154	206	25	1.2	3.2	0.6	0.1
1998	443	133	96	12	19.4	3.4	0.8	0.1
2003	217	124	85	4	2.2	3.2	0.7	0.0
2008	299	137	344	28	2.3	4.8	2.2	0.1
2013	404	80	293	8	20.0	1.9	3.2	0.2
2018	425	191	273	6	22.6	9.5	9.3	0.0

**Table 28-05.8 - 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
1992	31.5	0.2	21.9	9.9	17.9	15.7
1998	16.0	0.5	34.3	21.0	8.1	34.6
2003	21.5	0.1	25.3	25.6	13.0	28.2
2008	19.1	1.0	35.4	18.3	12.0	23.7
2013	43.4	0.0	12.1	12.6	13.0	26.8
2018	18.7	0.0	54.8	6.5	8.2	38.9

**Table 28-05.9 - 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
	Quadrat Frequency			
1992	-	59	-	68
1998	-	31	1	18
2003	-	38	1	30
2008	-	54	-	89
2013	-	13	-	33
2018	-	13	-	68
Year	Days Use Per Acre (ha)			
1992	-	-	-	-
1998	0.7 (1.8)	81.7 (201.9)	-	-
2003	-	83.8 (206.9)	0.7 (1.7)	-
2008	-	93.2 (230.1)	-	-
2013	-	14.1 (34.8)	-	-
2018	4.4 (10.8)	14.7 (36.4)	-	-

**Table 28-05.10 - Grass Species.** Nested frequency and modified Daubenmire average cover by year.

GRASS SPECIES	Achnatherum hymenoides (Indian ricegrass)	Aristida purpurea (purple threeawn)	Bouteloua gracilis (blue grama)	Bromus tectorum <sup>ai</sup> (cheatgrass)	Elymus elymoides (squirreltail)	Hesperostipa comata (needle and thread)	Pleuraphis jamesii (James' galleta)	Poa secunda (Sandberg bluegrass)	Vulpia octoflora <sup>a</sup> (sixweeks fescue)
year	Nested Frequency								
1992	5	46	-	184	77	11	52	-	146
1998	6	31	4	442	63	15	35	-	63
2003	9	30	1	110	63	12	27	-	181
2008	2	30	-	299	86	10	34	3	46
2013	3	5	9	401	37	4	29	-	144
2018	6	92	-	423	10	11	95	1	87
year	Average Cover (%)								
1992	0.1	1.3	-	0.7	0.7	0.2	0.9	-	0.5
1998	0.2	0.9	0.1	19.2	1.4	0.3	0.4	-	0.2
2003	0.2	0.6	0.0	1.0	1.3	0.4	0.8	-	1.2
2008	0.0	0.5	-	2.2	2.9	0.1	1.3	0.0	0.1
2013	0.0	0.1	0.2	19.6	0.9	0.0	0.6	-	0.5
2018	0.1	4.6	-	22.3	0.1	0.4	4.3	0.0	0.3

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

**Table 28-05.11 - Forb Species.** Nested frequency and modified Daubenmire average cover by year.

FORB SPECIES	Allium (onion)	Alyssum desertorum <sup>ai</sup> (desert madwort)	Calochortus flexuosus (winding mariposa lily)	Ceratocephala testiculata <sup>ai</sup> (curvseed butterwort)	Descurainia pinnata <sup>a</sup> (western tansymustard)	Draba <sup>a</sup> (draba)	Eriogonum cernuum <sup>a</sup> (nodding buckwheat)	Erodium cicutarium <sup>ai</sup> (redstem stork's bill)	Gayophytum ramosissimum <sup>a</sup> (pinyon groundsmoke)	Gilia inconspicua <sup>a</sup> (shy gilia)	Hackelia patens (spotted stickseed)	Lappula occidentalis <sup>a</sup> (flatspine stickseed)	Mentzelia <sup>a</sup> (blazingstar)	Mentzelia albicaulis <sup>a</sup> (whitestem blazingstar)	Microsteris gracilis <sup>a</sup> (slender phlox)	Navarretia intertexta <sup>a</sup> (needleleaf navarretia)	Orobanche fasciculata (clustered broomrape)
year	Nested Frequency																
1992	1	-	8	12	17	-	24	-	-	173	5	-	-	-	12	-	-
1998	-	-	2	50	2	3	-	-	-	-	-	1	-	-	-	-	1
2003	-	-	3	-	9	4	3	-	-	65	-	3	-	-	-	4	-
2008	-	-	20	328	7	-	14	-	25	11	-	36	0	-	-	12	-
2013	-	-	3	225	15	24	20	-	16	123	-	21	-	15	-	20	-
2018	-	3	3	68	-	-	5	14	-	-	-	110	-	-	-	-	-
year	Average Cover (%)																
1992	0.0	-	0.0	0.0	0.0	-	0.1	-	-	0.4	0.0	-	-	-	0.0	-	-
1998	-	-	0.0	0.3	0.0	0.0	-	-	-	-	-	0.0	-	-	-	-	0.0
2003	-	-	0.0	-	0.1	0.0	0.0	-	-	0.6	-	0.0	-	-	-	0.0	-
2008	-	-	0.1	1.8	0.0	-	0.1	-	0.1	0.0	-	0.1	0.0	-	-	0.0	-
2013	-	-	0.0	1.3	0.1	0.1	0.3	-	0.1	0.6	-	0.1	-	0.2	-	0.1	-
2018	-	0.0	0.0	0.3	-	-	0.2	0.1	-	-	-	2.0	-	-	-	-	-

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

FORB SPECIES					
Phlox longifolia (longleaf phlox)					
Plantago patagonica <sup>a</sup> (woolly plantain)					
Sisymbrium altissimum <sup>ai</sup> (tall tumblemustard)					
Sphaeralcea grossulariifolia (gooseberryleaf globemallow)					
Stephanomeria minor var. minor (narrowleaf wirelettuce)					
year	Nested Frequency				
1992	5	13	-	6	-
1998	5	57	-	4	-
2003	-	6	-	1	-
2008	5	5	9	4	-
2013	1	15	18	3	1
2018	-	45	188	3	-
year	Average Cover (%)				
1992	0.0	0.0	-	0.0	-
1998	0.0	0.4	-	0.1	-
2003	-	0.0	-	0.0	-
2008	0.0	0.0	0.1	0.0	-
2013	0.0	0.0	0.3	0.2	0.0
2018	-	0.1	6.6	0.0	-

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

**Table 28-05.12 - Shrub and Tree Species.** Average modified Daubenmire quadrat and line intercept cover by year.

SHRUB SPECIES			
Artemisia tridentata ssp. vaseyana <sup>p</sup> (mountain big sagebrush)			
Cylindropuntia whipplei (Whipple cholla)			
Opuntia (pricklypear)			
year	Line Intercept Cover (%)		
1992	-	-	-
1998	-	-	-
2003	16.3	1.2	-
2008	11.1	1.1	-
2013	0.8	-	-
2018	0.2	-	-
year	Quadrat Cover (%)		
1992	11.0	1.2	-
1998	12.4	0.6	-
2003	18.6	1.1	-
2008	12.0	1.8	0.1
2013	0.5	-	-
2018	0.0	0.0	-

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

**Table 28-05.13 - 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.

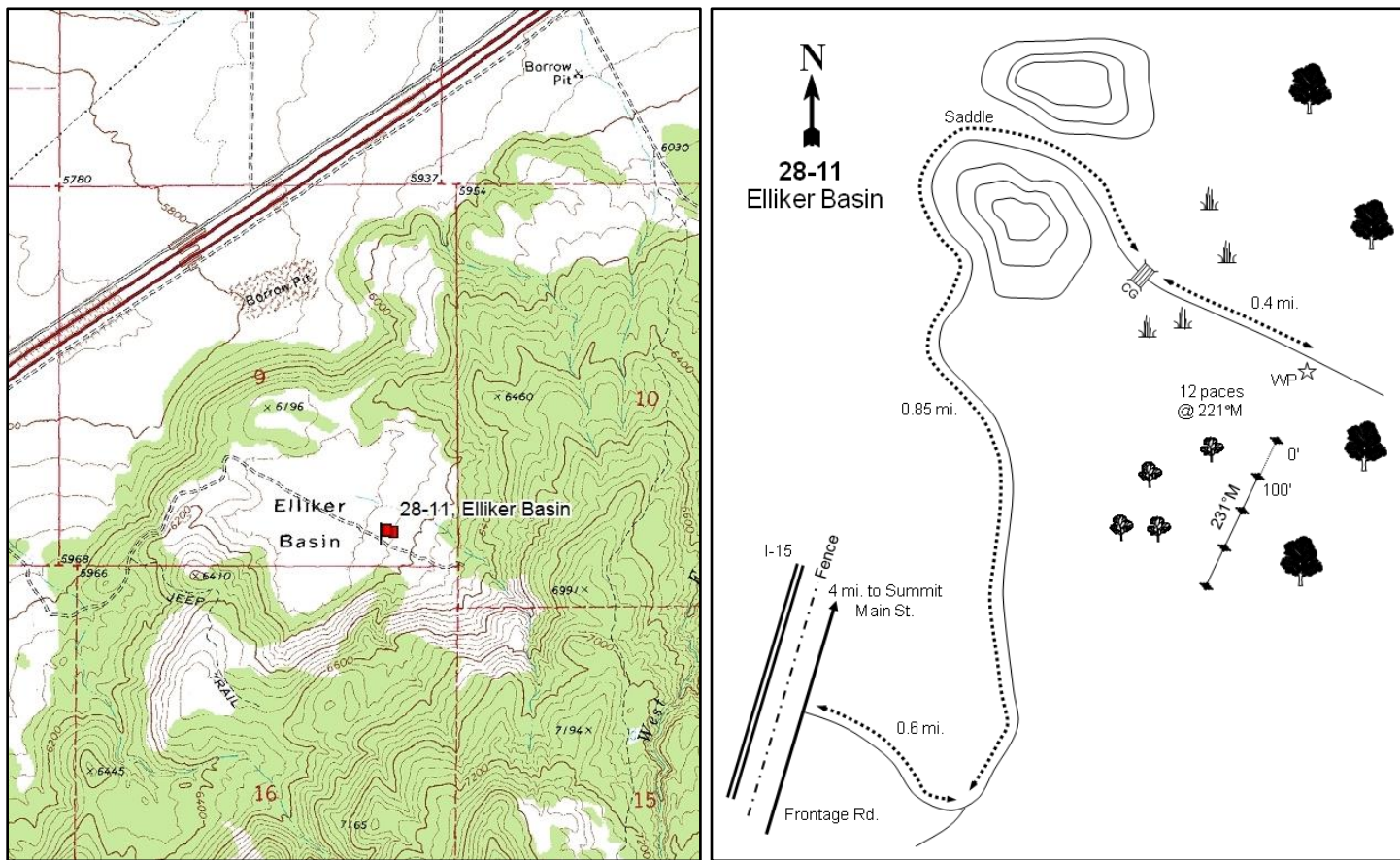
Year	Density		Age Class Distribution			Utilization		Poor Vigor (%)	Average Height Crown (cm)
	Plants Per Acre		Excluding Seedlings			Moderate (%)	Heavy (%)		
	Excluding Seedlings	Seedling	Young (%)	Mature (%)	Decadent (%)				
<b>Artemisia tridentata ssp. vaseyana<sup>p</sup> -- (mountain big sagebrush)</b>									
1992	5900	480	16	55	29	52	22	9	- / -
1998	4240	540	12	66	22	42	8	4	54/70
2003	5220	-	4	63	33	48	37	12	52/62
2008	4520	1260	7	42	51	42	44	20	47/65
2013	440	-	0	59	41	0	82	23	28/66
2018	220	-	0	0	100	0	100	36	41/52
<b>Cylindropuntia whipplei -- (Whipple cholla)</b>									
1992	660	100	3	88	9	0	0	0	- / -
1998	360	-	6	89	6	6	0	6	35/84
2003	320	-	0	75	25	0	0	13	31/66
2008	260	-	0	46	54	0	0	23	31/77
2013	20	-	0	100	0	0	0	0	19/77
2018	40	-	0	0	100	0	0	0	28/65
<b>Opuntia -- (pricklypear)</b>									
1992	-	-	-	-	-	-	-	-	-/-
1998	-	-	-	-	-	-	-	-	-/-
2003	40	-	0	100	0	0	0	0	11/16
2008	40	-	0	0	100	0	0	100	17/39
2013	-	-	-	-	-	-	-	-	-/-
2018	-	-	-	-	-	-	-	-	14/36

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

**Table -28-05.15 - Deer Desirable Components Index: Mid Potential Scale.**

Year	Preferred Browse Cover	Preferred Browse Decadence	Preferred Browse Young	Perennial Grass Cover	Annual Grass Cover	Perennial Forb Cover	Noxious Weeds	Total Score	Ranking
1992	13.8	6.3	8	6.3	-0.9	0.1	0	<b>33.6</b>	Very Poor-Poor
1998	15.5	8.3	5.9	6.8	-14.6	0.2	0	<b>22.1</b>	Very Poor
2003	20.4	5.2	2.1	6.4	-1.7	0	0	<b>32.4</b>	Very Poor
2008	13.9	-0.4	3.3	9.6	-1.7	0.3	0	<b>24.9</b>	Very Poor
2013	1	0	0	3.8	-15	0.5	0	<b>-9.7</b>	Very Poor
2018	0.3	0	0	18.9	-16.9	0	0	<b>2.3</b>	Very Poor

## ELLIKER BASIN - STUDY NO. 28-11



### Location Information

USGS 7.5 min Map Info  
GPS (0' Stake)

Summit SW; Township 35S, Range 10W, Section 09  
NAD 83 UTM ZONE 12, 325607 East 4181759 North

### Transect Information

Browse Tag # (0' Stake)	495
Transect Bearing	231° magnetic
Length	400ft
Belt Placement	Line 1 (11ft & 71ft), Line 2 (34ft), Line 3 (59ft), Line 4 (95ft)
Belt Marker Placement	Belts 1, 2, 4: 3ft; Belts 3, 5: 1ft

### Directions to Site

At the I-15 interchange (exit #71) in Summit, travel south on the frontage road (Summer Tree Drive) on the east side of the freeway for 4.0 miles. Turn left onto a dirt road, proceed through a gate, and drive east for 0.6 miles. Bear left at the fork and continue for 1.25 miles to Elliker Basin and up to a half-high witness post in the sagebrush on the right (south) side of the road. The transect starts 12 paces away from the witness post at a bearing of 221 degrees magnetic. The 0-foot stake is marked with browse tag #495.

**Site Information**

Land Ownership	State
Land Administrator	UDWR
Allotment	WEST FORK
Elevation	6,170ft (1,881m)
Aspect	West
Slope	15%
Sample Dates	07/31/1992, 06/03/1998, 06/11/2003, 06/03/2008, 06/06/2013, 06/05/2018

**Table 28-11.1 Disturbance History.** Recorded history of major disturbances.

Treatment/Disturbance	Name	WRI DB#	Date	Size (acres)
Hand Crew - Lop and Scatter	Parowan Front WMA Arc for Bullhog and Lop and Scatter	3435	Fall 2017-Summer 2018	1674
Seeding - Seed Unknown	-	-	Historic	-
Hand Crew - Lop and Scatter	-	-	Spring 1992	-

**Wildlife Habitat and Vegetation History**

**Table 28-11.3 - Wildlife Seasonal Habitat.** UDWR wildlife habitat and seasonality.

Species	Habitat	Season
Deer	crucial	winter

**Table 28-11.4 - Vegetation History.** The dominant vegetation type(s) and phase of woodland succession (Tausch, Miller, Roundy, & Chambers, 2009).

Year	Vegetation Type	Woodland Succession
1987	Mountain Big Sagebrush	No Encroachment
1992	Mountain Big Sagebrush/Annual Grass	No Encroachment
1998	Mountain Big Sagebrush	No Encroachment
2003	Mountain Big Sagebrush/Annual Grass	Phase I
2008	Mountain Big Sagebrush	Phase I
2013	Mountain Big Sagebrush	Phase I
2018	Mountain Big Sagebrush/Perennial Grass	Phase I

**Site Notes**

The transect is located on the southeastern slope of the basin just below the line of twoneedle pinyon (*Pinus edulis*) and Utah juniper (*Juniperus osteosperma*) trees which continue up the cliffs.

**Soils**

**Table 28-11.5 - 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	5.8	50.7	31.4	17.8	2.8	10.6	99.2	0.5	06/03/1998

**Site Potential**

1981 - 2010 Average Annual Precipitation	13 inches
NRCS Ecological Site	Upland Loam (Mountain Big Sagebrush-Indian Ricegrass)
NRCS Ecological Site #	R047XB308UT
States and Transitions	No state and transition model is available for this ecological site.

The site has remained dominated by mountain big sagebrush (*Artemisia tridentata* ssp. *vaseyana*) since its establishment in 1987. Cover and density of sagebrush, however, have exhibited an overall decrease since 1998 (Pre-1992 Data, Photos, Table 28-11.12, Table 28-11.13). The herbaceous understory has fluctuated in abundance and composition, with the introduced annual grass cheatgrass (*Bromus tectorum*) as a significant component in 1992, 2003, and 2018. Perennial grasses contributed the most herbaceous cover in 2008, 2013 and 2018. Although native species were abundant in many sample years, the introduced species intermediate wheatgrass (*Thinopyrum intermedium*) contributed a majority of the perennial grass cover in 2018 (Table 28-11.7, Table 28-11.10, Table 28-11.11). Elevated amounts of cheatgrass may pose a threat to the resilience of this study site and could possibly influence the fire regime. An additional potential threat is posed by the presence of Utah juniper (*Juniperus osteosperma*) and twoneedle pinyon (*Pinus edulis*); although density was low in 2018 (Table 28-11.14), this tree presence indicates the possibility of further encroachment in future sample years.



**Trend Summary Tables**

**Table 28-11.6 - 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
1992	23.8	0.3	-	-	-	-
1998	23.2	0.3	-	-	-	-
2003	20.4	0.2	-	15.2	-	-
2008	13.9	0.0	-	12.0	0.1	-
2013	10.4	0.0	-	12.3	0.6	-
2018	13.0	1.3	-	14.0	1.0	-

**Table 28-11.7 - 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
1992	471	104	90	4	32.8	4.9	0.3	0.0
1998	409	136	104	32	8.0	7.6	0.3	0.4
2003	439	149	150	7	27.3	6.3	0.6	0.0
2008	29	226	67	26	0.2	12.4	0.1	0.2
2013	157	310	57	12	0.5	16.7	0.1	0.2
2018	330	324	10	6	16.9	26.0	0.1	0.2

**Table 28-11.8 - 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
1992	4.5	0.0	23.8	0.0	47.9	47.6
1998	9.8	0.1	40.9	27.2	11.0	37.8
2003	4.1	-	30.8	22.0	8.8	52.0
2008	6.1	0.3	51.7	24.2	9.3	26.4
2013	3.7	0.1	53.2	15.3	9.2	29.5
2018	2.0	0.0	60.7	16.2	10.8	53.8

**Table 28-11.9 - Pellet Group Data.** Quadrat frequency and pellet group transect data for animal pellets. Rabbit pellet groups are not sampled in the pellet group transect.

Year	Mule Deer	Rocky Mountain Elk	Greater Sage-Grouse	Rabbit
	Quadrat Frequency			
1992	27	-	-	26
1998	45	1	-	18
2003	31	1	-	13
2008	70	-	-	54
2013	50	-	1	18
2018	21	-	2	20
Year	Days Use Per Acre (ha)			
1992	-	-	-	-
1998	44.2 (109.2)	0.7 (1.7)	-	-
2003	151.5 (374.1)	-	-	-
2008	105.9 (261.5)	16.8 (41.4)	-	-
2013	153.5 (379.1)	3.4 (8.3)	-	-
2018	46.9 (115.9)	-	-	-

**Table 28-11.10 - Grass Species.** Nested frequency and modified Daubenmire average cover by year.

GRASS SPECIES	Nested Frequency											
Achnatherum hymenoides (Indian ricegrass)												
Aristida purpurea (purple threeawn)												
Bromus tectorum <sup>ai</sup> (cheatgrass)												
Elymus elymoides (squirreltail)												
Hesperostipa comata (needle and thread)												
Pleuraphis jamesii (James' galleta)												
Poa bulbosa <sup>i</sup> (bulbous bluegrass)												
Poa secunda (Sandberg bluegrass)												
Sporobolus cryptandrus (sand dropseed)												
Thinopyrum intermedium <sup>i</sup> (intermediate wheatgrass)												
Vulpia octoflora <sup>a</sup> (sixweeks fescue)												
year	Average Cover (%)											
1992	1	36	465	13	3	23	-	-	33	19	170	
1998	-	9	402	9	1	34	-	7	50	44	163	
2003	-	9	428	17	6	33	20	4	4	75	197	
2008	1	41	29	34	0	49	-	3	26	94	-	
2013	9	29	157	41	0	66	39	21	30	149	2	
2018	16	33	323	31	2	54	65	12	47	176	12	
1992	0.0	0.4	32.0	0.5	0.1	1.7	-	-	1.2	0.9	0.8	
1998	-	0.2	7.4	0.1	0.1	1.9	-	0.2	2.5	2.6	0.6	
2003	-	0.1	24.9	0.4	0.2	2.2	0.2	0.1	0.2	2.9	2.3	
2008	0.0	0.5	0.2	0.6	0.0	5.3	-	0.0	1.2	4.7	-	
2013	0.2	0.6	0.5	1.8	0.0	5.8	1.0	0.2	1.9	5.3	0.0	
2018	0.2	1.4	16.9	2.5	0.4	3.9	1.7	0.2	2.7	13.1	0.1	

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

**Table 28-11.11 - Forb Species.** Nested frequency and modified Daubenmire average cover by year.

FORB SPECIES	Nested Frequency																
Agoseris glauca (pale agoseris)																	
Artemisia ludoviciana (white sagebrush)																	
Astragalus (milkvetch)																	
Calochortus nuttallii (sego lily)																	
Ceratocephala testiculata <sup>ai</sup> (curvseed butterwort)																	
Chenopodium <sup>a</sup> (goosefoot)																	
Crepis acuminata (tapertip hawkbeard)																	
Draba <sup>a</sup> (draba)																	
Lappula occidentalis <sup>a</sup> (flatspine stickseed)																	
Microsteris gracilis <sup>a</sup> (slender phlox)																	
Orobanche fasciculata (clustered broomrape)																	
Phacelia heterophylla <sup>a</sup> (varileaf phacelia)																	
Phlox longifolia (longleaf phlox)																	
Physalis (groundcherry)																	
Plantago patagonica <sup>a</sup> (woolly plantain)																	
Polygonum douglasii <sup>a</sup> (Douglas' knotweed)																	
Tragopogon dubius <sup>ai</sup> (yellow salsify)																	
year	Average Cover (%)																
1992	-	1	2	-	-	1	-	-	-	85	1	-	-	-	9	-	-
1998	15	7	-	6	23	-	-	55	-	39	4	-	-	-	4	-	5
2003	6	-	-	-	20	-	1	75	7	103	-	-	-	-	-	-	-
2008	21	2	-	1	66	-	-	-	-	-	2	-	-	-	4	-	-
2013	3	6	1	-	50	-	-	3	-	2	-	2	2	-	-	-	-
2018	-	4	-	-	3	-	-	-	-	-	-	-	-	2	5	2	2
1992	-	0.0	0.0	-	-	0.0	-	-	-	0.2	0.0	-	-	-	0.0	-	-
1998	0.1	0.2	-	0.0	0.1	-	-	0.1	-	0.1	0.0	-	-	-	0.0	-	0.0
2003	0.0	-	-	-	0.0	-	0.0	0.2	0.0	0.3	-	-	-	-	-	-	-
2008	0.1	0.0	-	0.0	0.1	-	-	-	-	-	0.0	-	-	-	0.0	-	-
2013	0.0	0.2	0.0	-	0.1	-	-	0.0	-	0.0	-	0.0	0.0	-	-	-	-
2018	-	0.1	-	-	0.0	-	-	-	-	-	-	-	-	0.0	0.0	0.0	0.0

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

**Table 28-11.12 - Shrub and Tree Species.** Average modified Daubenmire quadrat and line intercept cover by year.

SHRUB SPECIES	Line Intercept Cover (%)			
	Artemisia tridentata ssp. vaseyana <sup>p</sup> (mountain big sagebrush)	Chrysothamnus viscidiflorus ssp. viscidiflorus var. viscidiflorus (yellow rabbitbrush)	Gutierrezia sarothrae (broom snakeweed)	Opuntia (pricklypear)
year	Line Intercept Cover (%)			
1992	-	-	-	-
1998	-	-	-	-
2003	15.2	-	-	-
2008	12	-	0	0.1
2013	12.3	-	0.2	0.4
2018	14	-	1	-
year	Quadrat Cover (%)			
1992	23.8	-	0.1	0.1
1998	23.2	0.1	0.0	0.1
2003	20.4	-	0.1	0.0
2008	13.9	-	0.0	0.0
2013	10.4	-	0.0	0.0
2018	13.0	-	1.2	0.2

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

**Table 28-11.13 - 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 (%)				
<b>Amelanchier utahensis<sup>p</sup> -- (Utah serviceberry)</b>									
1992	-	-	-	-	-	-	-	-	-/-
1998	-	-	-	-	-	-	-	-	-/-
2003	-	-	-	-	-	-	-	-	204/180
2008	-	-	-	-	-	-	-	-	126/134
2013	-	-	-	-	-	-	-	-	101/164
2018	-	-	-	-	-	-	-	-	159/174
<b>Artemisia tridentata ssp. vaseyana<sup>p</sup> -- (mountain big sagebrush)</b>									
1992	3400	20	6	44	51	44	16	31	- / -
1998	3120	3480	4	71	25	31	0	5	58/99
2003	2520	-	2	41	57	37	46	11	61/96
2008	2220	3000	3	33	64	38	30	39	52/87
2013	2840	360	35	37	28	21	42	19	68/95
2018	2940	40	23	58	19	17	3	9	57/90
<b>Chrysothamnus viscidiflorus ssp. viscidiflorus var. viscidiflorus -- (yellow rabbitbrush)</b>									
1992	-	-	-	-	-	-	-	-	-/-
1998	60	-	0	100	0	0	0	0	15/12
2003	-	-	-	-	-	-	-	-	-/-
2008	-	-	-	-	-	-	-	-	-/-
2013	-	-	-	-	-	-	-	-	-/-
2018	-	-	-	-	-	-	-	-	-/-

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 (%)				
<b>Ericameria nauseosa ssp. nauseosa var. hololeuca<sup>P</sup> -- (rubber rabbitbrush)</b>									
1992	-	-	-	-	-	-	-	-	-/-
1998	60	-	0	0	100	100	0	0	-/-
2003	-	-	-	-	-	-	-	-	-/-
2008	-	-	-	-	-	-	-	-	-/-
2013	-	-	-	-	-	-	-	-	-/-
2018	-	-	-	-	-	-	-	-	-/-
<b>Gutierrezia sarothrae -- (broom snakeweed)</b>									
1992	180	-	0	89	11	0	0	0	-/-
1998	160	-	38	63	0	0	0	0	18/22
2003	380	-	0	100	0	0	0	0	17/18
2008	140	-	14	71	14	0	0	14	17/21
2013	120	-	17	83	0	0	0	0	18/28
2018	720	-	6	94	0	0	0	0	24/33
<b>Juniperus osteosperma<sup>1</sup> -- (Utah juniper)</b>									
1992	-	-	-	-	-	-	-	-	-/-
1998	-	-	-	-	-	-	-	-	-/-
2003	20	-	0	100	0	0	0	0	-/-
2008	-	-	-	-	-	-	-	-	-/-
2013	-	-	-	-	-	-	-	-	-/-
2018	-	-	-	-	-	-	-	-	-/-
<b>Opuntia -- (pricklypear)</b>									
1992	40	-	50	50	0	0	0	0	-/-
1998	40	-	0	50	50	0	0	50	13/31
2003	40	-	0	100	0	0	0	0	13/22
2008	60	-	0	100	0	0	0	0	17/40
2013	80	-	0	100	0	0	0	25	15/54
2018	60	20	0	100	0	0	0	33	13/44
<b>Pediocactus simpsonii -- (mountain ball cactus)</b>									
1992	-	-	-	-	-	-	-	-	-/-
1998	-	-	-	-	-	-	-	-	-/-
2003	-	-	-	-	-	-	-	-	-/-
2008	-	-	-	-	-	-	-	-	11/10
2013	-	-	-	-	-	-	-	-	-/-
2018	-	-	-	-	-	-	-	-	-/-
<b>Purshia stansburiana<sup>P</sup> -- (Stansbury cliffrose)</b>									
1992	-	-	-	-	-	-	-	-	-/-
1998	-	-	-	-	-	-	-	-	-/-
2003	-	-	-	-	-	-	-	-	-/-
2008	-	-	-	-	-	-	-	-	56/101
2013	-	-	-	-	-	-	-	-	-/-
2018	-	-	-	-	-	-	-	-	71/103
<b>Purshia tridentata<sup>P</sup> -- (antelope bitterbrush)</b>									
1992	-	-	-	-	-	-	-	-	-/-
1998	-	-	-	-	-	-	-	-	21/69
2003	-	-	-	-	-	-	-	-	56/94
2008	-	-	-	-	-	-	-	-	-/-
2013	-	-	-	-	-	-	-	-	67/120
2018	-	-	-	-	-	-	-	-	-/-

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 (%)				
Yucca -- (yucca)									
1992	-	-	-	-	-	-	-	-	-/-
1998	-	-	-	-	-	-	-	-	-/-
2003	-	-	-	-	-	-	-	-	61/53
2008	-	-	-	-	-	-	-	-	59/75
2013	-	-	-	-	-	-	-	-	41/50

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

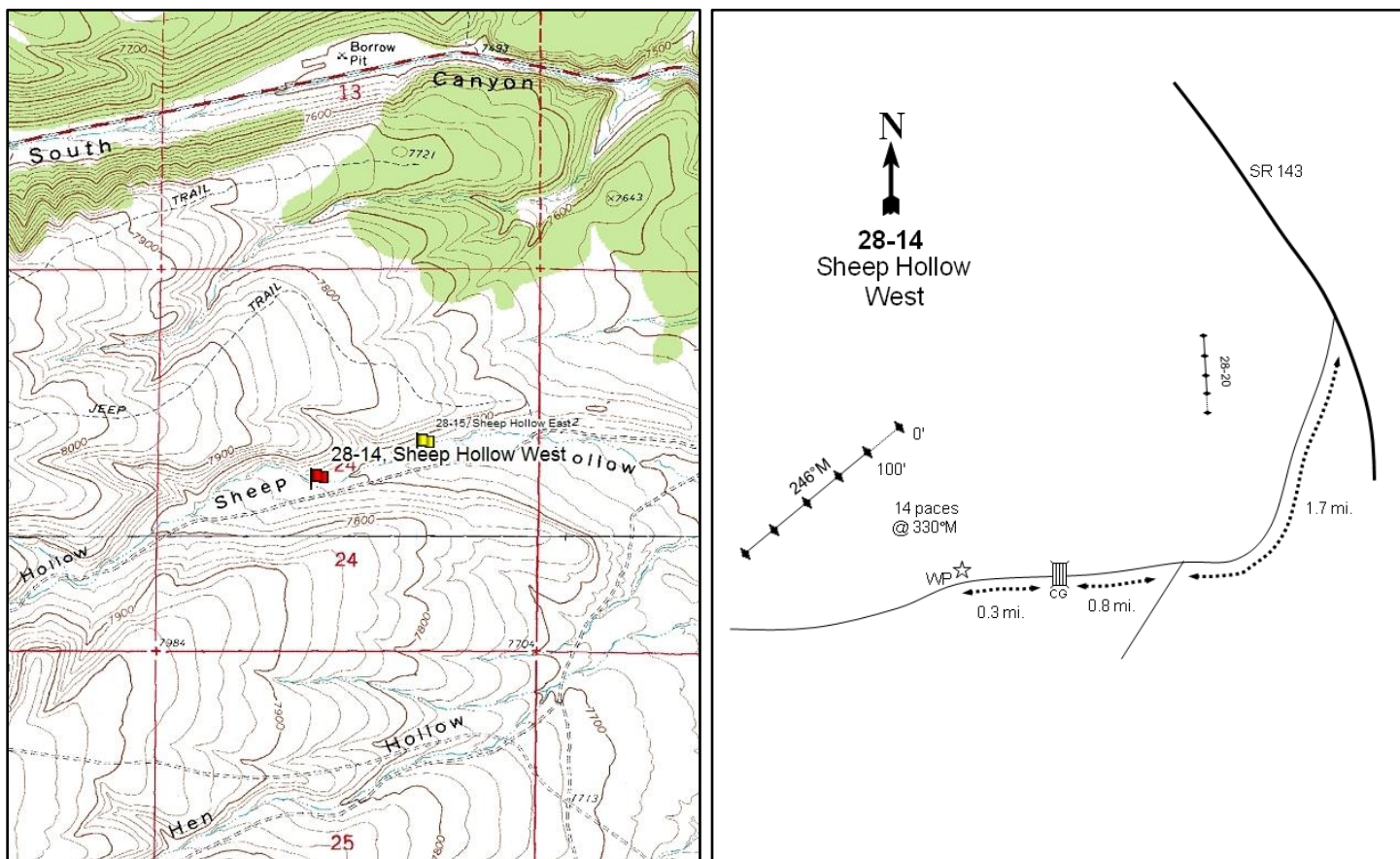
**Table 28-11.14 - Tree Characteristics.** Point-quarter tree density, size class distribution, and average diameter.

Year	Density	Size Class Distribution					Average Diameter (cm)
	Trees per Acre	Seedling (%)	1-4' (%)	4-8' (%)	8-12' (%)	>12' (%)	
Juniperus osteosperma (Utah juniper)							
2018	1	-	50	50	-	-	8.0
Pinus edulis (twoneedle pinyon)							
2018	2	50	50	-	-	-	2.0

**Table -28-11.15 - Deer Desirable Components Index: Mid Potential Scale.**

Year	Preferred Browse Cover	Preferred Browse Decadence	Preferred Browse Young	Perennial Grass Cover	Annual Grass Cover	Perennial Forb Cover	Noxious Weeds	Total Score	Ranking
1992	29.7	-0.2	2.9	9.8	-20	0.1	0	<b>22.4</b>	Very Poor
1998	29	7.5	1.9	15.3	-6	0.7	0	<b>48.4</b>	Poor-Fair
2003	19	-2.1	0.8	12	-20	0	0	<b>9.7</b>	Very Poor
2008	15	-4.2	1.4	24.8	-0.2	0.4	0	<b>37.2</b>	Poor
2013	15.4	6.8	15	30	-0.3	0.4	0	<b>67.2</b>	Good
2018	17.5	9.3	11.6	30	-12.7	0.3	0	<b>56</b>	Fair

## SHEEP HOLLOW WEST - STUDY NO. 28-14

**Location Information**

USGS 7.5 min Map Info  
GPS (0' Stake)

Panguitch SW; Township 35S, Range 6W, Section 24  
NAD 83 UTM ZONE 12, 369494 East 4179303 North

**Transect Information**

Browse Tag # (0' Stake)	500
Transect Bearing	246° magnetic
Length	500ft
Belt Placement	Line 1 (11ft), Line 2 (34ft), Line 3 (59ft), Line 4 (71ft), Line 5 (95ft)
Belt Marker Placement	Belt 4: 1ft

**Directions to Site**

Travel south on SR-143 from the town of Panguitch to mile marker 47. Travel 0.1 mile west of mile marker 47 and turn south onto a dirt road heading towards Sheep Hollow, then drive 1.7 miles to a fork. Stay right and continue for 0.8 miles to a fence and cattle guard. Cross the cattle guard and go 0.3 miles to a witness post on the right (north) side of the road. The 0-foot baseline stake is 14 paces from the witness post at 330 degrees magnetic and is marked by browse tag #500.

**Site Information**

Land Ownership	Federal
Land Administrator	BLM
Allotment	SAGEHEN HOLLOW
Elevation	7,730ft (2,356m)
Aspect	East
Slope	3%
Sample Dates	08/20/1998, 06/25/2003, 06/26/2008, 07/15/2013, 06/20/2018

**Table 28-14.1 Disturbance History.** Recorded history of major disturbances.

Treatment/Disturbance	Name	WRI DB#	Date	Size (acres)
Hand Crew - Lop and Scatter	South Canyon Lop and Scatter	2987	August 2014-October 2014	5390
Hand Crew - Lop and Scatter	-	-	Between 1996 and 1997	-

**Wildlife Habitat and Vegetation History****Table 28-14.3 - Wildlife Seasonal Habitat.** UDWR wildlife habitat and seasonality.

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

**Table 28-14.4 - Vegetation History.** The dominant vegetation type(s) and phase of woodland succession (Tausch, Miller, Roundy, & Chambers, 2009).

Year	Vegetation Type	Woodland Succession
1998	Black Sagebrush/Perennial Grass	Phase I
2003	Black Sagebrush/Perennial Grass	Phase I
2008	Black Sagebrush	Phase I
2013	Black Sagebrush	Phase I
2018	Black Sagebrush/Perennial Grass	Phase I

**Site Notes**

This site was established in 1998 to monitor important winter range on the east side of the management unit. Much of the winter range on this part of Unit 28 is being affected by twoneedle pinyon (*Pinus edulis*) and Utah juniper (*Juniperus osteosperma*) encroachment.

**Soils****Table 28-14.5 - 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
Clay Loam	6.3	40.7	27.5	31.8	2.2	18.4	131.2	0.3	08/20/1998

**Site Potential**

1981 - 2010 Average Annual Precipitation	18 inches
NRCS Ecological Site	Mountain Loam (Black Sagebrush)
NRCS Ecological Site #	R047XB426UT
States and Transitions	No state and transition model is available for this ecological site.

Since its establishment in 1998, this site has remained dominated by black sagebrush (*Artemisia nova*) with various other shrub species such as antelope bitterbrush (*Purshia tridentata*) providing less cover (Table 28-14.12, Table 28-14.13). The herbaceous understory has been diverse and has consisted mainly of perennial native grasses such as muttongrass (*Poa fendleriana*) and Letterman's needlegrass (*Achnatherum lettermanii*); perennial grasses were a co-dominant vegetation component in 2018. Annual grasses have never been particularly abundant and were not observed in 2008 or 2018 (Table 28-14.7, Table 28-14.10). Twoneedle pinyon (*Pinus edulis*) and Utah juniper (*Juniperus osteosperma*) have been present in low amounts since 2008 (Photos, Table 28-14.14). Although the site is considered to be within Phase I of woodland succession as of 2018 (Table 28-14.4), further tree encroachment is possible in future sample years.



**Trend Summary Tables****Table 28-14.6 - 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
1998	18.4	3.0	-	-	-	-
2003	20.8	4.5	-	20.3	2.0	-
2008	18.9	3.7	-	33.6	4.4	-
2013	22.6	3.4	-	51.1	5.4	-
2018	25.6	4.7	-	35.1	4.2	-

**Table 28-14.7 - 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
1998	-	368	15	246	-	15.9	0.1	4.8
2003	4	315	98	128	0.0	8.4	0.5	1.4
2008	-	321	37	202	-	15.0	0.1	3.0
2013	2	336	5	101	0.0	18.1	0.0	1.1
2018	-	362	3	117	-	31.0	0.0	2.0

**Table 28-14.8 - 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
1998	17.9	3.5	39.5	6.8	5.7	50.8
2003	35.1	1.5	34.2	3.7	5.8	34.8
2008	20.3	1.0	32.4	7.7	5.9	43.4
2013	27.3	0.9	32.7	3.1	5.8	43.5
2018	33.2	0.7	38.6	4.8	5.8	54.0

**Table 28-14.9 - 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/Pronghorn	Rocky Mountain Elk	Rabbit
	Quadrat Frequency			
1998	1	11	5	5
2003	3	11	2	2
2008	5	4	1	70
2013	-	5	1	10
2018	-	13	1	7
Year	Days Use Per Acre (ha)			
1998	11.6 (28.7)	16.8 (41.4)	7.4 (18.2)	-
2003	7.2 (17.9)	32.2 (79.5)	0.7 (1.7)	-
2008	4.4 (10.8)	16.1 (39.7)	0.7 (1.7)	-
2013	-	5.3 (13.2)	0.7 (1.7)	-
2018	-	22.1 (54.6)	-	-

**Table 28-14.10 - Grass Species.** Nested frequency and modified Daubenmire average cover by year.

GRASS SPECIES	Nested Frequency																
Achnatherum hymenoides (Indian ricegrass)	2	183	8	4	5	-	21	74	4	12	27	3	232	-	6	-	
Achnatherum lettermanii (Letterman's needlegrass)	4	102	-	7	-	4	-	71	3	13	64	4	186	-	-	8	
Achnatherum nelsonii (Columbia needlegrass)	5	186	6	6	-	-	53	24	-	8	48	2	163	-	-	-	
Bouteloua gracilis (blue grama)	14	68	5	7	5	2	22	14	-	20	16	2	285	-	4	-	
Bromus inermis <sup>i</sup> (smooth brome)	8	81	-	5	23	-	22	17	-	9	-	21	328	2	5	-	
Bromus tectorum <sup>ai</sup> (cheatgrass)	Average Cover (%)																
Carex (sedge)	1998	0.0	4.9	0.2	0.0	0.0	-	0.6	1.0	0.0	0.1	0.4	0.0	8.6	-	0.0	-
Elymus elymoides (squirreltail)	2003	0.2	1.1	-	0.1	-	0.0	-	0.9	0.0	0.3	1.5	0.0	4.2	-	-	0.1
Elymus trachycaulus (slender wheatgrass)	2008	0.0	5.9	0.0	0.0	-	-	1.1	0.2	-	0.1	0.7	0.0	6.9	-	-	-
Hesperostipa comata (needle and thread)	2013	0.4	1.6	0.0	0.0	0.1	0.0	0.2	0.2	-	0.3	0.1	0.0	15.0	-	0.1	-
Koeleria macrantha (prairie Junegrass)	2018	0.1	2.0	-	0.2	1.0	-	0.6	0.3	-	0.5	-	0.6	25.6	0.1	0.1	-
Pascopyrum smithii (western wheatgrass)	Nested Frequency																
Poa fendleriana (muttongrass)	1998	2	183	8	4	5	-	21	74	4	12	27	3	232	-	6	-
Poa pratensis <sup>i</sup> (Kentucky bluegrass)	2003	4	102	-	7	-	4	-	71	3	13	64	4	186	-	-	8
Pseudoroegneria spicata (bluebunch wheatgrass)	2008	5	186	6	6	-	-	53	24	-	8	48	2	163	-	-	-
Thinopyrum intermedium <sup>i</sup> (intermediate wheatgrass)	2013	14	68	5	7	5	2	22	14	-	20	16	2	285	-	4	-
	2018	8	81	-	5	23	-	22	17	-	9	-	21	328	2	5	-

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

**Table 28-14.11 - Forb Species.** Nested frequency and modified Daubenmire average cover by year.

FORB SPECIES	Nested Frequency																	
Antennaria rosea (rosy pussytoes)	16	1	3	8	-	-	49	-	-	63	9	25	55	46	-	1	-	
Arabis (rockcress)	9	-	-	-	-	-	2	15	-	5	-	-	54	33	87	-	-	
Astragalus (milkvetch)	1	2	-	20	22	-	37	3	1	28	-	3	70	30	-	2	1	
Astragalus convallarius (lesser rushy milkvetch)	7	6	-	-	-	-	9	-	-	11	-	6	36	18	-	5	5	
Calochortus nuttallii (sego lily)	2	4	-	11	-	13	4	-	7	6	20	4	24	28	-	3	-	
Castilleja angustifolia (northwestern Indian paintbrush)	Average Cover (%)																	
Castilleja linariifolia (Wyoming Indian paintbrush)	1998	0.4	0.0	0.0	0.2	-	-	1.2	-	-	0.6	0.1	0.0	0.5	0.8	-	0.0	-
Chenopodium leptophyllum <sup>a</sup> (narrowleaf goosefoot)	2003	0.0	-	-	-	-	-	0.0	0.1	-	0.0	-	-	0.5	0.6	0.4	-	-
Cirsium (thistle)	2008	0.0	0.0	-	0.5	0.1	-	0.6	0.0	0.0	0.1	-	0.0	0.6	0.4	-	0.0	0.0
Erigeron eatonii (Eaton's fleabane)	2013	0.1	0.0	-	-	-	-	0.1	-	-	0.1	-	0.1	0.3	0.1	-	0.0	0.0
Erigeron flagellaris (trailing fleabane)	2018	0.1	0.1	-	0.1	-	0.1	0.0	-	0.1	0.2	0.1	0.0	0.2	0.5	-	0.0	-
Erigeron pumilus (shaggy fleabane)	Nested Frequency																	
Erigeron racemosus (redroot buckwheat)	1998	16	1	3	8	-	-	49	-	-	63	9	25	55	46	-	1	-
Erigeron umbellatum (sulphur-flower buckwheat)	2003	9	-	-	-	-	-	2	15	-	5	-	-	54	33	87	-	-
Gayophytum ramosissimum <sup>a</sup> (pinyon groundsmoke)	2008	1	2	-	20	22	-	37	3	1	28	-	3	70	30	-	2	1
Hymenoxys richardsonii (pingue rubberweed)	2013	7	6	-	-	-	-	9	-	-	11	-	6	36	18	-	5	5
Lappula occidentalis <sup>a</sup> (flatspine stickseed)	2018	2	4	-	11	-	13	4	-	7	6	20	4	24	28	-	3	-

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

FORB SPECIES	Linum lewisii (Lewis flax)	Lomatium (desertparsley)	Lotus utahensis (Utah bird's-foot trefoil)	Lupinus kingii <sup>a</sup> (King's lupine)	Machaeranthera canescens (hoary tansyaster)	Microsteris gracilis <sup>a</sup> (slender phlox)	Packera multiflora (lobeleaf groundsel)	Penstemon (beardtongue)	Penstemon caespitosus (mat penstemon)	Phlox longifolia (longleaf phlox)	Polygonum douglasii <sup>a</sup> (Douglas' knotweed)	Silene drummondii (Drummond's campion)	Tragopogon dubius <sup>at</sup> (yellow salsify)	Trifolium (clover)
year	Nested Frequency													
1998	46	-	35	4	5	-	-	3	3	58	11	7	-	-
2003	14	-	-	-	-	-	-	4	-	56	5	-	-	-
2008	9	5	3	11	4	3	16	1	-	74	21	-	-	5
2013	-	-	-	-	10	-	5	-	1	13	-	-	-	-
2018	9	1	4	-	-	-	1	-	3	17	-	1	3	-
year	Average Cover (%)													
1998	0.3	-	0.4	0.0	0.1	-	-	0.0	0.0	0.2	0.0	0.0	-	-
2003	0.1	-	-	-	-	-	-	0.0	-	0.2	0.0	-	-	-
2008	0.1	0.0	0.0	0.0	0.0	0.0	0.1	0.0	-	0.2	0.1	-	-	0.0
2013	-	-	-	-	0.2	-	0.0	-	0.0	0.1	-	-	-	-
2018	0.1	0.0	0.0	-	-	-	0.0	-	0.0	0.4	-	0.0	0.0	-

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

**Table 28-14.12 - Shrub and Tree Species.** Average modified Daubenmire quadrat and line intercept cover by year.

SHRUB SPECIES	Artemisia nova <sup>p</sup> (black sagebrush)	Artemisia tridentata ssp. vaseyana <sup>p</sup> (mountain big sagebrush)	Chrysothamnus depressus <sup>p</sup> (longflower rabbitbrush)	Chrysothamnus viscidiflorus (yellow rabbitbrush)	Chrysothamnus viscidiflorus ssp. viscidiflorus var. viscidiflorus (yellow rabbitbrush)	Gutierrezia sarothrae (broom snakeweed)	Opuntia (pricklypear)	Purshia tridentata <sup>p</sup> (antelope bitterbrush)	Tetradymia canescens (spineless horsebrush)
year	Line Intercept Cover (%)								
1998	-	-	-	-	-	-	-	-	-
2003	16.7	-	0.1	-	1.9	0.1	-	3.5	-
2008	27.9	-	0.3	-	4.4	-	-	5.4	-
2013	35	-	0.2	-	5.4	-	-	15.9	-
2018	24.1	-	0.1	-	3.9	0.3	-	10.9	-
year	Quadrat Cover (%)								
1998	13.6	-	0.4	-	2.8	0.2	-	4.4	-
2003	16.9	0.4	0.1	-	4.2	0.3	-	3.4	-
2008	15.2	-	0.2	0.5	3.1	0.0	0.0	3.5	0.1
2013	17.4	-	0.2	-	3.4	-	-	5.0	-
2018	20.2	0.3	0.4	-	4.3	0.3	-	4.7	0.1

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

**Table 28-14.13 - 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 (%)				
<b>Amelanchier utahensis<sup>P</sup> -- (Utah serviceberry)</b>									
1998	-	-	-	-	-	-	-	-	-/-
2003	-	-	-	-	-	-	-	-	-/-
2008	-	-	-	-	-	-	-	-	29/31
2013	-	-	-	-	-	-	-	-	-/-
2018	-	-	-	-	-	-	-	-	-/-
<b>Artemisia nova<sup>P</sup> -- (black sagebrush)</b>									
1998	8560	380	7	55	39	43	13	3	40/56
2003	8160	-	5	61	34	25	2	14	37/51
2008	9440	540	5	54	41	27	13	13	36/59
2013	7760	300	4	87	9	37	4	6	35/64
2018	8520	-	4	77	19	12	12	12	33/51
<b>Artemisia tridentata ssp. vaseyana<sup>P</sup> -- (mountain big sagebrush)</b>									
1998	60	-	33	67	0	0	33	0	-/-
2003	560	-	0	57	43	21	0	25	50/67
2008	40	-	0	0	100	0	100	100	-/-
2013	-	-	-	-	-	-	-	-	-/-
2018	-	-	-	-	-	-	-	-	-/-
<b>Chrysothamnus depressus<sup>P</sup> -- (longflower rabbitbrush)</b>									
1998	240	20	17	83	0	0	0	0	19/27
2003	340	-	6	82	12	71	12	0	15/22
2008	380	-	5	79	16	21	47	0	14/19
2013	360	-	17	83	0	22	6	6	14/27
2018	360	-	17	83	0	61	11	0	14/18
<b>Chrysothamnus viscidiflorus -- (yellow rabbitbrush)</b>									
1998	-	-	-	-	-	-	-	-	-/-
2003	-	-	-	-	-	-	-	-	-/-
2008	-	-	-	-	-	-	-	-	-/-
2013	-	-	-	-	-	-	-	-	-/-
2018	200	-	0	100	0	10	0	0	14/28
<b>Chrysothamnus viscidiflorus ssp. viscidiflorus var. viscidiflorus -- (yellow rabbitbrush)</b>									
1998	2740	-	12	88	0	0	0	0	19/29
2003	4120	-	5	93	2	0	0	1	19/29
2008	3960	120	4	78	18	30	8	1	17/33
2013	3360	20	8	91	1	13	0	1	19/38
2018	4060	-	7	93	0	0	0	0	17/34
<b>Ericameria parryi var. parryi -- (Parry's rabbitbrush)</b>									
1998	-	-	-	-	-	-	-	-	-/-
2003	20	-	100	0	0	0	0	0	17/23
2008	-	-	-	-	-	-	-	-	-/-
2013	-	-	-	-	-	-	-	-	-/-
2018	20	-	0	100	0	0	0	0	23/39
<b>Gutierrezia sarothrae -- (broom snakeweed)</b>									
1998	80	-	0	100	0	0	0	0	17/23
2003	260	-	0	100	0	0	0	0	17/18
2008	100	60	20	60	20	0	0	0	14/11
2013	120	-	50	50	0	0	0	0	24/20
2018	360	-	0	100	0	0	0	0	19/21

Year	Density		Age Class Distribution			Utilization		Poor Vigor (%)	Average Height Crown (cm)
	Plants Per Acre		Excluding Seedlings			Moderate (%)	Heavy (%)		
	Excluding Seedlings	Seedling	Young (%)	Mature (%)	Decadent (%)				
<b>Opuntia -- (pricklypear)</b>									
1998	20	-	0	100	0	0	0	0	18/30
2003	40	-	0	100	0	0	0	0	14/25
2008	40	-	0	50	50	0	0	0	15/29
2013	20	-	0	100	0	0	0	0	10/24
2018	20	-	0	100	0	0	0	0	14/29
<b>Purshia tridentata<sup>p</sup> -- (antelope bitterbrush)</b>									
1998	540	-	15	82	4	59	19	0	60/99
2003	480	-	4	58	38	71	29	21	74/116
2008	460	20	9	61	30	48	35	52	69/121
2013	660	40	15	82	3	3	0	3	93/154
2018	1160	40	28	62	10	31	21	14	69/113
<b>Tetradymia canescens -- (spineless horsebrush)</b>									
1998	-	-	-	-	-	-	-	-	-/-
2003	-	-	-	-	-	-	-	-	-/-
2008	40	-	0	50	50	100	0	0	-/-
2013	-	-	-	-	-	-	-	-	-/-
2018	80	-	25	75	0	0	0	0	16/21

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

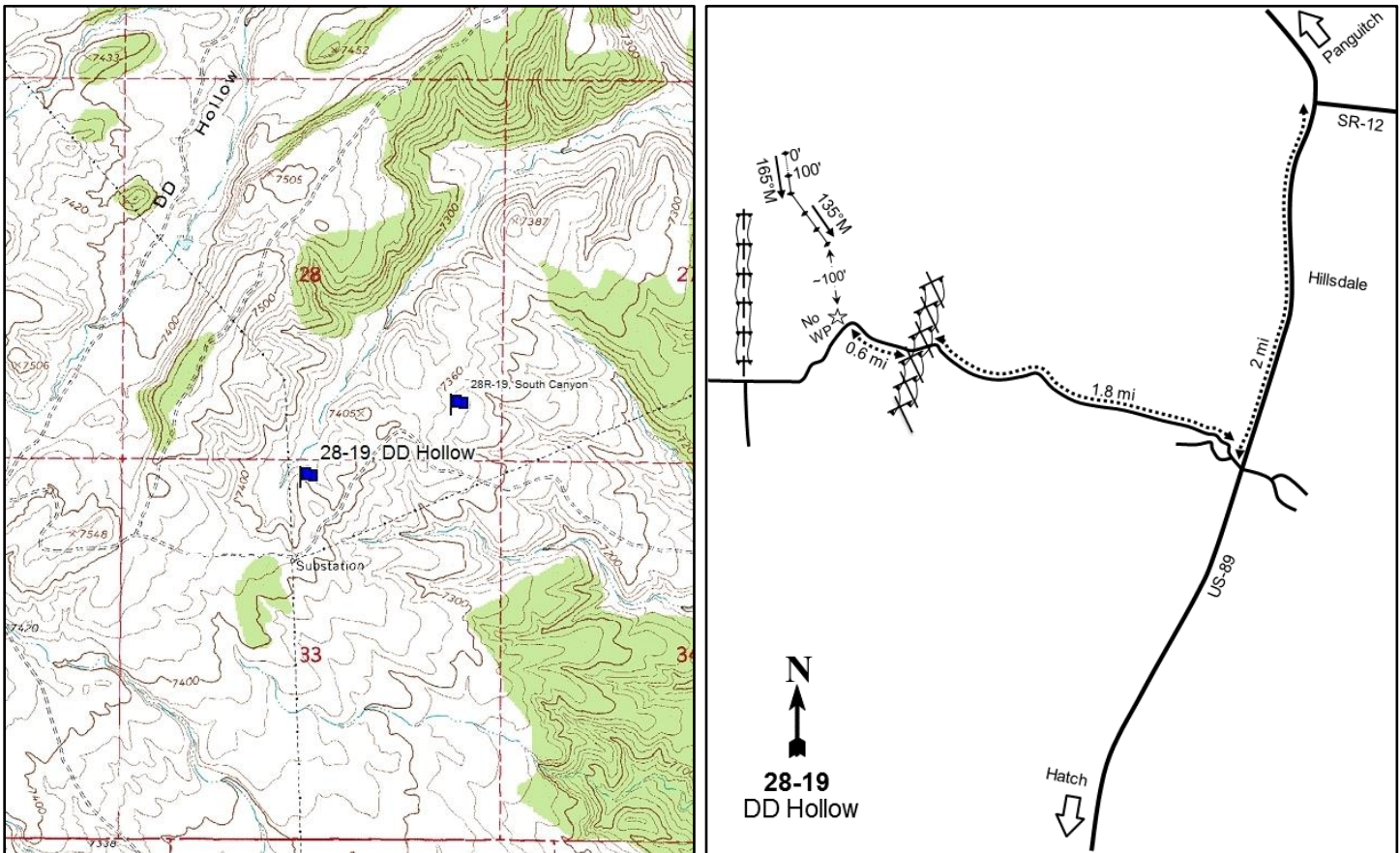
**Table 28-14.14 - Tree Characteristics.** Point-quarter tree density, size class distribution, and average diameter.

Year	Density	Size Class Distribution					Average Diameter (cm)
	Trees per Acre	Seedling (%)	1-4' (%)	4-8' (%)	8-12' (%)	>12' (%)	
<b>Juniperus scopulorum (Rocky Mountain juniper)</b>							
2018	6	-	100	-	-	-	3.0
<b>Pinus edulis (twoneedle pinyon)</b>							
2018	11	11	89	-	-	-	2.0

**Table -28-14.15 - Deer Desirable Components Index: Mid Potential Scale.**

Year	Preferred Browse Cover	Preferred Browse Decadence	Preferred Browse Young	Perennial Grass Cover	Annual Grass Cover	Perennial Forb Cover	Noxious Weeds	Total Score	Ranking
1998	24.1	6.2	4.5	30	0	9.6	0	<b>74.3</b>	Good
2003	26.3	4.6	2.4	16.8	0	2.9	0	<b>52.9</b>	Poor
2008	30	3.4	2.8	30	0	6	0	<b>72.1</b>	Good
2013	30	12.9	3.7	30	0	2.2	0	<b>78.8</b>	Good
2018	30	10.2	5.8	30	0	4	0	<b>80</b>	Good

## DD HOLLOW - STUDY NO. 28-19

**Location Information**

USGS 7.5 min Map Info  
GPS (0' Stake)

Hatch NE; Township 35S, Range 5W, Section 33  
NAD 83 UTM ZONE 12, 374402 East 4176769 North

**Transect Information**

Browse Tag # (0' Stake)	163
Transect Bearing	165° magnetic (Lines 3-5: 135° magnetic)
Length	500ft
Belt Placement	Line 1 (11ft), Line 2 (34ft), Line 3 (59ft), Line 4 (71ft), Line 5 (95ft)
Belt Marker Placement	Standard

**Directions to Site**

From the turnoff to Red Canyon, drive 2 miles south towards Hatch. Turn right, going west on road #730, then drive 1.8 miles to a road and powerlines. Continue on the same road for another 0.6 miles. The 0-foot stake is on the northwest side of the road and is marked with browse tag #163.

**Site Information**

Land Ownership	Federal
Land Administrator	BLM
Allotment	SOUTH CANYON
Elevation	7,400ft (2,256m)
Aspect	Southwest
Slope	7-10%
Sample Dates	07/23/2003, 07/12/2011, 08/13/2014, 08/14/2018

**Table 28-19.1 Disturbance History.** Recorded history of major disturbances.

Treatment/Disturbance	Name	WRI DB#	Date	Size (acres)
Mechanical - Bullhog	BLM Project	BLM	Fall 2003	765
Seeding - Seed Unknown	BLM Project	BLM	Fall 2003	765
Mechanical - Bullhog	BLM	-	2012	-

**Wildlife Habitat and Vegetation History****Table 28-19.3 - Wildlife Seasonal Habitat.** UDWR wildlife habitat and seasonality.

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

**Table 28-19.4 - Vegetation History.** The dominant vegetation type(s) and phase of woodland succession (Tausch, Miller, Roundy, & Chambers, 2009).

Year	Vegetation Type	Woodland Succession
2003	Pinyon	Phase II
2011	Black Sagebrush	Phase I
2014	Black Sagebrush	Phase I
2018	Black Sagebrush	Phase I

**Site Notes**

The study was established to monitor the effects of a prescribed fire project. In the fall of 2003, a total of 765 acres were bullhogged to protect the substation and other buildings around the project location and to help facilitate the South Canyon burn. The bullhog project consisted of two separate treatment polygon units: the northern unit (601 acres) was seeded while the southern unit (164 acres) was not. The study transect was located within the southern unit, although the study site appears to have been seeded based on the plant species sampled on the study site. The seed used on this project was surplus seed that the BLM contributed, and it is unknown what seed mixture was used. The area is important winter range for deer, and to a lesser extent elk, and pronghorn antelope use the surrounding open areas year-round.

**Site Potential**

1981 - 2010 Average Annual Precipitation	15 inches
NRCS Ecological Site	Upland Gravelly Loam (Black Sagebrush)
NRCS Ecological Site #	R047XB306UT
States and Transitions	No state and transition model is available for this ecological site.

When established in 2003, this site was in Phase II of woodland succession from encroachment of twoneedle pinyon (*Pinus edulis*); Utah juniper (*Juniperus osteosperma*) and Rocky Mountain juniper (*J. scopulorum*) were also present, but with much lower densities (Table 28-19.4, Table 28-19.14). The dominant browse species during this sample year was black sagebrush (*Artemisia nova*) with antelope bitterbrush (*Purshia tridentata*) contributing less cover (Table 28-19.12). The herbaceous understory was very sparse, and what little cover there was was mainly provided by perennial grasses (Table 28-19.7). Tree cover and density decreased substantially following a bullhog treatment in 2003; a few large trees remained scattered across the site, but were removed in 2012 (Table 28-19.1, Table 28-19.12, Table 28-19.14). Black sagebrush has become the dominant browse species following these tree-removing treatments (Table 28-19.12, Table 28-19.13). Perennial grasses increased in cover and diversity, but the cover of perennial forbs has shown a decreasing trend (Table 28-19.10, Table 28-19.11). Black sagebrush and other browse species will likely continue to increase in cover and density as time since treatment increases.



**Trend Summary Tables****Table 28-19.6 - 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
2003	8.4	-	23.3	7.3	-	38.5
2011	15.3	1.8	1.4	20.3	0.6	5.6
2014	15.2	1.2	-	20.7	1.9	-
2018	20.3	1.3	-	28.0	0.7	-

**Table 28-19.7 - 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
2003	-	49	20	-	-	0.6	0.1	-
2011	4	191	242	59	0.0	6.0	2.0	1.0
2014	-	266	24	72	-	13.1	0.5	0.8
2018	-	267	-	46	-	13.4	-	0.5

**Table 28-19.8 - 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
2003	14.9	0.8	55.3	15.5	8.4	31.7
2011	11.0	0.0	55.2	9.5	7.2	24.8
2014	7.0	-	47.9	16.2	9.4	32.7
2018	10.9	0.0	50.1	14.3	9.6	33.1

**Table 28-19.9 - 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	Rabbit
	Quadrat Frequency			
2003	2	9	1	20
2011	3	7	-	10
2014	1	1	1	15
2018	2	3	-	32
Year	Days Use Per Acre (ha)			
2003	-	21.5 (53.0)	-	-
2011	4.4 (10.8)	8.7 (21.5)	-	-
2014	3.6 (9.0)	6.7 (16.6)	0.7 (1.7)	-
2018	2.2 (5.4)	9.4 (23.2)	-	-

**Table 28-19.10 - Grass Species.** Nested frequency and modified Daubenmire average cover by year.

GRASS SPECIES	Achnatherum hymenoides (Indian ricegrass)	Achnatherum lettermanii (Letterman's needlegrass)	Agropyron cristatum <sup>i</sup> (crested wheatgrass)	Bouteloua gracilis (blue grama)	Bromus tectorum <sup>ai</sup> (cheatgrass)	Carex obtusata (obtuse sedge)	Dactylis glomerata <sup>i</sup> (orchardgrass)	Elymus elymoides (squirreltail)	Elymus lanceolatus (thickspike wheatgrass)	Festuca idahoensis (Idaho fescue)	Leymus cinereus (basin wildrye)	Pascopyrum smithii (western wheatgrass)	Poa fendleriana (muttongrass)	Poa secunda (Sandberg bluegrass)
year	Nested Frequency													
2003	-	7	-	29	-	-	-	10	-	-	-	-	-	3
2011	11	-	11	62	4	29	1	103	-	12	-	1	-	3
2014	21	-	38	87	-	19	2	130	0	12	6	3	5	13
2018	28	12	18	128	-	42	-	69	10	-	12	19	19	1
year	Average Cover (%)													
2003	-	0.0	-	0.5	-	-	-	0.1	-	-	-	-	-	0.0
2011	0.6	-	0.4	2.0	0.0	0.3	0.0	2.2	-	0.4	-	0.0	-	0.0
2014	1.4	-	0.6	2.3	-	1.1	0.2	5.7	0.0	0.8	0.4	0.0	0.2	0.2
2018	1.7	0.2	0.6	4.8	-	2.1	-	1.6	0.0	-	1.5	0.8	0.1	0.0

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

**Table 28-19.11 - Forb Species.** Nested frequency and modified Daubenmire average cover by year.

FORB SPECIES	Achillea millefolium (Common yarrow)	Arabis holboellii <sup>a</sup> (Holboell's rockcress)	Astragalus argophyllus (silverleaf milkvetch)	Carduus nutans <sup>smi</sup> (nodding plumeless thistle)	Chamaesyce (sandmat)	Chenopodium fremontii <sup>a</sup> (Fremont's goosefoot)	Chenopodium leptophyllum <sup>a</sup> (narrowleaf goosefoot)	Cirsium vulgare <sup>ai</sup> (bull thistle)	Cryptantha (cryptantha)	Descurainia pinnata <sup>a</sup> (western tansymustard)	Eriogonum cernuum <sup>a</sup> (nodding buckwheat)	Eriogonum racemosum (redroot buckwheat)	Gayophytum ramosissimum <sup>a</sup> (pinyon groundsmoke)	Gilia inconspicua <sup>a</sup> (shy gilia)	Hymenopappus filifolius (fineleaf hymenopappus)	Lactuca serriola <sup>ai</sup> (prickly lettuce)	Lappula occidentalis <sup>a</sup> (flatspine stickseed)
year	Nested Frequency																
2003	-	4	-	-	-	-	-	-	-	15	-	-	3	-	-	-	1
2011	3	4	5	1	-	62	8	4	12	37	117	3	160	-	3	3	27
2014	-	-	2	-	-	-	3	-	2	4	4	-	-	0	0	-	5
2018	-	-	1	-	4	-	-	-	4	-	-	-	-	-	7	-	-
year	Average Cover (%)																
2003	-	0.0	-	-	-	-	-	-	-	0.1	-	-	0.0	-	-	-	0.0
2011	0.0	0.0	0.0	0.0	-	0.3	0.0	0.0	0.0	0.2	0.3	0.0	0.7	-	0.0	0.0	0.2
2014	-	-	0.1	-	-	-	0.0	-	0.0	0.0	0.0	-	-	0.0	0.0	-	0.2
2018	-	-	0.0	-	0.0	-	-	-	0.0	-	-	-	-	-	0.1	-	-

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

FORB SPECIES	Linum lewisii (Lewis flax)	Lotus utahensis (Utah bird's-foot trefoil)	Machaeranthera canescens (hoary tansyaster)	Medicago sativa <sup>i</sup> (alfalfa)	Packera multilobata (lobeleaf groundsel)	Phlox longifolia (longleaf phlox)	Pleiocanthus spinosus (thorn skeletonweed)	Polygonum douglasii <sup>a</sup> (Douglas' knotweed)	Salsola tragus <sup>ai</sup> (prickly Russian thistle)	Sanguisorba minor <sup>i</sup> (small burnet)	Sphaeralcea coccinea (scarlet globemallow)	Verbascum thapsus <sup>ai</sup> (common mullein)
year	Nested Frequency											
2003	-	-	-	-	-	-	-	-	-	-	-	-
2011	4	5	1	10	-	15	5	4	3	2	5	1
2014	35	-	-	3	1	7	2	-	-	16	16	8
2018	-	-	-	-	1	-	4	-	-	5	25	-
year	Average Cover (%)											
2003	-	-	-	-	-	-	-	-	-	-	-	-
2011	0.0	0.2	0.0	0.4	-	0.1	0.2	0.0	0.0	0.0	0.1	0.1
2014	0.2	-	-	0.0	0.0	0.1	0.1	-	-	0.2	0.1	0.3
2018	-	-	-	-	0.0	-	0.3	-	-	0.0	0.1	-

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

**Table 28-19.12 - Shrub and Tree Species.** Average modified Daubenmire quadrat and line intercept cover by year.

SHRUB SPECIES	Artemisia nova <sup>p</sup> (black sagebrush)	Artemisia tridentata ssp. vaseyana <sup>p</sup> (mountain big sagebrush)	Chrysothamnus viscidiflorus sp. viscidiflorus var. viscidiflorus (yellow rabbitbrush)	Ericameria nauseosa (rubber rabbitbrush)	Gutierrezia sarothrae (broom snakeweed)	Juniperus osteosperma <sup>t</sup> (Utah juniper)	Opuntia (pricklypear)	Pinus edulis <sup>t</sup> (twoneedle pinyon)	Purshia tridentata <sup>p</sup> (antelope bitterbrush)
year	Line Intercept Cover (%)								
2003	4.5	-	-	-	-	-	-	38.5	2.8
2011	12.9	2.2	-	0.5	-	-	0.1	5.6	5.2
2014	12	2.1	-	1.6	0.3	-	-	-	6.6
2018	19.1	1.6	-	0.5	0.2	-	-	-	7.3
year	Quadrat Cover (%)								
2003	5.6	-	-	-	-	0.0	-	23.3	2.8
2011	10.3	1.3	-	1.8	0.0	-	0.0	1.4	3.7
2014	9.0	1.1	-	1.0	0.2	-	0.0	-	5.1
2018	13.9	1.4	0.0	1.1	0.1	-	0.0	-	5.0

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

**Table 28-19.13 - 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 (%)				
<b>Artemisia nova<sup>P</sup> -- (black sagebrush)</b>									
2003	3380	-	9	46	45	22	1	17	36/56
2011	12460	16240	77	22	1	2	0	3	34/62
2014	10780	2120	46	53	1	60	23	2	33/67
2018	16500	880	36	64	1	5	4	3	24/47
<b>Artemisia tridentata ssp. vaseyana<sup>P</sup> -- (mountain big sagebrush)</b>									
2003	-	-	-	-	-	-	-	-	-/-
2011	100	60	0	80	20	0	0	20	66/101
2014	1100	-	38	60	2	78	20	2	42/80
2018	1100	-	20	80	0	16	0	14	51/82
<b>Chrysothamnus viscidiflorus ssp. viscidiflorus var. viscidiflorus -- (yellow rabbitbrush)</b>									
2003	-	-	-	-	-	-	-	-	-/-
2011	-	-	-	-	-	-	-	-	48/96
2014	-	-	-	-	-	-	-	-	58/117
2018	-	-	-	-	-	-	-	-	26/27
<b>Ericameria nauseosa -- (rubber rabbitbrush)</b>									
2003	-	-	-	-	-	-	-	-	-/-
2011	1320	1000	68	32	0	0	0	2	56/71
2014	1140	-	30	63	7	11	4	14	61/74
2018	800	-	3	57	40	23	18	63	54/60
<b>Gutierrezia sarothrae -- (broom snakeweed)</b>									
2003	-	-	-	-	-	-	-	-	-/-
2011	80	400	0	100	0	0	0	0	26/29
2014	400	60	0	100	0	0	0	0	32/28
2018	580	20	0	97	3	0	0	3	13/9
<b>Juniperus osteosperma<sup>t</sup> -- (Utah juniper)</b>									
2003	-	-	-	-	-	-	-	-	-/-
2011	-	-	-	-	-	-	-	-	-/-
2014	20	-	100	0	0	0	0	0	-/-
2018	-	-	-	-	-	-	-	-	-/-
<b>Juniperus scopulorum<sup>t</sup> -- (Rocky Mountain juniper)</b>									
2003	-	-	-	-	-	-	-	-	-/-
2011	-	20	0	0	0	0	0	0	-/-
2014	-	-	-	-	-	-	-	-	-/-
2018	-	-	-	-	-	-	-	-	-/-
<b>Opuntia -- (pricklypear)</b>									
2003	60	-	0	100	0	0	0	0	13/29
2011	40	-	0	100	0	0	0	0	11/23
2014	60	-	0	100	0	0	0	0	9/30
2018	20	-	0	100	0	0	0	0	12/20
<b>Pinus edulis<sup>t</sup> -- (twoneedle pinyon)</b>									
2003	680	-	24	77	0	3	0	0	-/-
2011	60	80	67	0	33	0	0	0	-/-
2014	-	20	0	0	0	0	0	0	-/-
2018	20	-	0	100	0	0	0	0	-/-
<b>Purshia tridentata<sup>P</sup> -- (antelope bitterbrush)</b>									
2003	360	-	6	61	33	61	22	6	79/130
2011	420	-	14	81	5	33	24	0	50/115
2014	500	20	28	72	0	48	24	0	63/123
2018	980	-	25	76	0	31	14	0	62/121

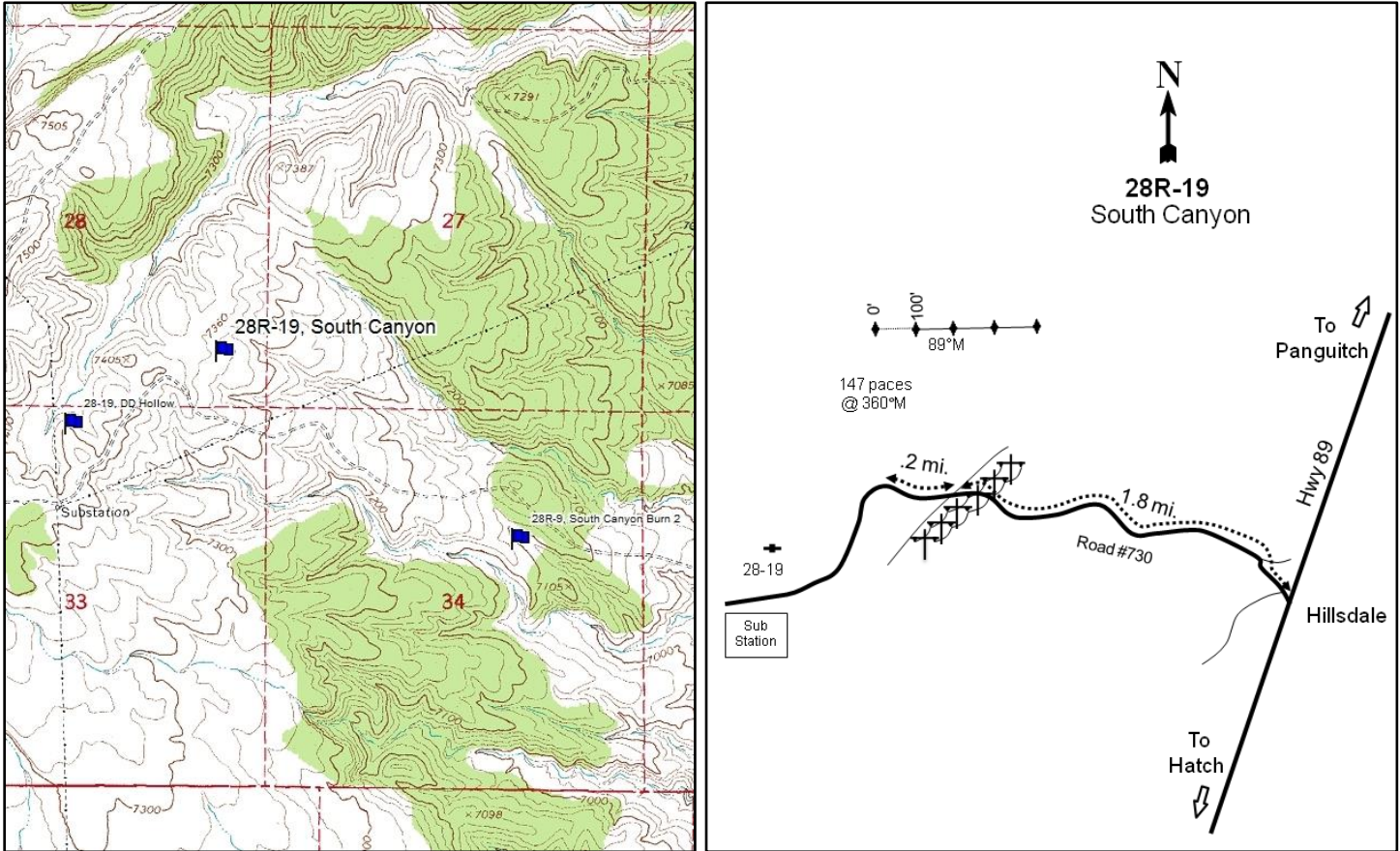
Year	Density		Age Class Distribution			Utilization		Poor Vigor (%)	Average Height Crown (cm)
	Plants Per Acre		Excluding Seedlings			Moderate (%)	Heavy (%)		
	Excluding Seedlings	Seedling	Young (%)	Mature (%)	Decadent (%)				
<b>Ribes<sup>p</sup> -- (currant)</b>									
2003	-	-	-	-	-	-	-	-	90/145
2011	-	-	-	-	-	-	-	-	85/193

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

**Table 28-19.14 - 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' (%)	
<b>Juniperus osteosperma (Utah juniper)</b>							
2003	8	-	-	100	-	-	13.0
2014	7	-	100	-	-	-	4.0
<b>Juniperus scopulorum (Rocky Mountain juniper)</b>							
2011	14	33	33	-	-	33	6.0
2014	3	-	100	-	-	-	3.0
2018	10	-	80	20	-	-	4.0
<b>Pinus edulis (twoneedle pinyon)</b>							
2003	298	-	26	26	32	16	13.8
2011	22	20	40	7	-	33	16.0
2014	7	17	50	33	-	-	4.7
2018	16	-	82	18	-	-	4.6

## SOUTH CANYON - STUDY NO. 28R-19

**Location Information**

USGS 7.5 min Map Info  
GPS (0' Stake)

Hatch NE; Township 35S, Range 5W, Section 28  
NAD 83 UTM ZONE 12, 375044 East 4177068 North

**Transect Information**

Browse Tag # (0' Stake)	193
Transect Bearing	89° magnetic
Length	400ft
Belt Placement	Line 1 (11ft & 95ft), Line 2 (34ft), Line 3 (59ft), Line 4 (71ft)
Belt Marker Placement	No Rebar

**Directions to Site**

From the turnoff to Red Canyon, drive south for 2 miles towards Hatch. Turn right and proceed west on road #730, then drive 1.8 miles to a road and powerlines: continue on the same road for another 0.2 miles. The 0-foot stake is about 147 paces north of the road and is marked with browse tag #193.

**Site Information**

Land Ownership	Federal
Land Administrator	BLM
Allotment	SOUTH CANYON
Elevation	7,278ft (2,218m)
Aspect	East
Slope	4-5%
Sample Dates	07/12/2011, 08/13/2014, 08/14/2018

**Table 28R-19.1 Disturbance History.** Recorded history of major disturbances.

Treatment/Disturbance	Name	WRI DB#	Date	Size (acres)
Mechanical - Bullhog	South Canyon Year 2	2027	October 2011-January 2012	1901
Seeding - Aerial Before	South Canyon Year 2	2027	October 2011	1901

**Table 28R-19.2 Seed Mix.** List of known seeded plant species and rates (if available).

Mix Name			Application Type	Application Date	Acres
South Canyon Year 2			Aerial	Oct 2011	1900
Type	Species	Common Name	Cultivar/Source ID	Bulk lbs/acre	PLS
G	Achnatherum hymenoides	Indian Ricegrass	Rimrock	1.95	1.85
G	Agropyron cristatum	Crested Wheatgrass	Hycrest II	2.45	2.16
G	Elymus wawawaiensis	Snake River Wheatgrass	Secar	0.58	0.46
G	Elymus wawawaiensis	Snake River Wheatgrass	Secar	0.92	0.85
G	Leymus cinereus	Great Basin Wildrye	Trailhead	0.11	0.11
G	Leymus cinereus	Great Basin Wildrye	Trailhead	0.53	0.39
G	Leymus cinereus	Great Basin Wildrye	Trailhead	0.82	0.75
G	Thinopyrum intermedium	Pubescent Wheatgrass	Luna	0.42	0.39
G	Thinopyrum intermedium	Pubescent Wheatgrass		1.58	1.47
F	Linum perenne	Blue Flax	Appar	1.00	0.73
F	Medicago sativa	Alfalfa	Nomad	0.23	0.21
F	Medicago sativa	Alfalfa	Nomad	0.26	0.24
F	Medicago sativa	Alfalfa	Ladak +	0.50	0.48
F	Onobrychis viciifolia	Sainfoin	Eski	1.00	0.95
F	Sanguisorba minor	Small Burnet	Delar	1.50	1.41

**Wildlife Habitat and Vegetation History****Table 28R-19.3 - Wildlife Seasonal Habitat.** UDWR wildlife habitat and seasonality.

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

**Table 28R-19.4 - Vegetation History.** The dominant vegetation type(s) and phase of woodland succession (Tausch, Miller, Roundy, & Chambers, 2009).

Year	Vegetation Type	Woodland Succession
2011	Pinyon	Phase III
2014	Black Sagebrush/Perennial Grass	Phase I
2018	Black Sagebrush/Perennial Grass	Phase I

**Site Notes**

No Notes



**Site Potential**

1981 - 2010 Average Annual Precipitation	14 inches
NRCS Ecological Site	Upland Loam (Black Sagebrush)
NRCS Ecological Site #	R047XB309UT
States and Transitions	No state and transition model is available for this ecological site.

When established in 2011, this study site was dominated by twoneedle pinyon (*Pinus edulis*) and considered to be within Phase III of woodland succession (Table 28R-19.4). Browse species such as black sagebrush (*Artemisia nova*) and antelope bitterbrush (*Purshia tridentata*) were present, but provided little cover (Table 28R-19.12). The herbaceous understory was sparse. A bullhog and seeding treatment in the Fall of 2011 removed most of the trees (Table 28R-19.1), and black sagebrush and mainly native perennial grasses became the major vegetation components in 2014 (Table 28R-19.10, Table 28R-19.12). Although the study site is considered to be within Phase I of woodland succession as of 2018, point-quarter density of pinyon exhibited a slight increase between 2014 and 2018, indicating that there may be potential for infilling over time (Table 28R-19.4, Table 28R-19.14).

**Trend Summary Tables****Table 28R-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
2011	7.1	0.0	11.6	9.9	-	32.0
2014	6.2	0.2	0.0	8.9	-	0.2
2018	7.0	0.6	1.0	8.2	0.5	1.0

**Table 28R-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
2011	1	101	167	15	0.0	1.4	0.5	0.4
2014	-	310	8	67	-	19.3	0.1	2.5
2018	4	332	-	28	0.0	16.4	-	0.3

**Table 28R-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
2011	20.0	0.6	52.8	16.4	4.8	21.3
2014	6.5	0.4	62.1	9.1	1.5	30.8
2018	14.3	-	63.0	8.0	3.5	27.5

**Table 28R-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	Rabbit
	Quadrat Frequency			
2011	1	1	-	17
2014	1	6	-	7
2018	3	3	-	44
Year	Days Use Per Acre (ha)			
2011	-	6.0 (14.9)	0.7 (1.7)	-
2014	-	12.8 (31.5)	-	-
2018	5.8 (14.3)	12.1 (29.8)	-	-

**Table 28R-19.10 - Grass Species.** Nested frequency and modified Daubenmire average cover by year.

GRASS SPECIES	Achnatherum hymenoides (Indian ricegrass)	Agropyron cristatum <sup>i</sup> (crested wheatgrass)	Bouteloua gracilis (blue grama)	Bromus tectorum <sup>ai</sup> (cheatgrass)	Carex obtusata (obtuse sedge)	Dactylis glomerata <sup>i</sup> (orchardgrass)	Elymus elymoides (squirreltail)	Elymus trachycaulus (slender wheatgrass)	Elymus wawawaiensis (Snake River wheatgrass)	Hesperostipa comata (needle and thread)	Leymus cinereus (basin wildrye)	Pascopyrum smithii (western wheatgrass)	Poa fendleriana (muttongrass)
year	Nested Frequency												
2011	-	-	30	1	-	-	75	-	-	-	-	-	3
2014	14	38	87	-	-	-	203	76	0	0	4	-	9
2018	10	20	81	4	9	1	233	97	7	4	8	1	7
year	Average Cover (%)												
2011	-	-	0.6	0.0	-	-	0.8	-	-	-	-	-	0.0
2014	0.4	1.4	2.9	-	-	-	11.8	2.3	0.1	0.0	0.1	-	0.1
2018	0.4	0.7	3.8	0.0	0.2	0.0	8.0	2.5	0.2	0.3	0.3	0.0	0.0

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

**Table 28R-19.11 - Forb Species.** Nested frequency and modified Daubenmire average cover by year.

FORB SPECIES	Astragalus lentiginosus (freckled milkvetch)	Chenopodium fremontii <sup>a</sup> (Fremont's goosefoot)	Cirsium (thistle)	Cryptantha (cryptantha)	Descurainia pinnata <sup>a</sup> (western tansymustard)	Eriogonum cernuum <sup>a</sup> (nodding buckwheat)	Gayophytum ramosissimum <sup>a</sup> (pinyon groundsmoke)	Lappula occidentalis <sup>a</sup> (flat-spine stickseed)	Linum perenne <sup>i</sup> (blue flax)	Lithospermum incisum (narrowleaf stoneseed)	Lotus utahensis (Utah bird's-foot trefoil)	Medicago sativa <sup>i</sup> (alfalfa)	Phlox longifolia (longleaf phlox)	Pleiacanthus spinosus (thorn skeletonweed)	Polygonum douglasii <sup>a</sup> (Douglas' knotweed)	Sanguisorba minor <sup>i</sup> (small burnet)	Sphaeralcea coccinea (scarlet globemallow)
year	Nested Frequency																
2011	3	2	6	2	49	7	120	3	-	-	-	-	3	-	10	-	-
2014	2	-	-	-	6	-	2	-	46	2	6	1	-	-	-	25	2
2018	2	-	-	4	-	-	-	-	4	-	1	-	-	3	-	10	5
year	Average Cover (%)																
2011	0.0	0.0	0.3	0.1	0.2	0.0	0.3	0.0	-	-	-	-	0.0	-	0.0	-	-
2014	0.0	-	-	-	0.0	-	0.0	-	1.9	0.1	0.0	0.0	-	-	-	0.4	0.0
2018	0.2	-	-	0.0	-	-	-	-	0.0	-	0.0	-	-	0.0	-	0.0	0.0

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

FORB SPECIES	Zigadenus paniculatus (foothill deathcamas)
year	Nested Frequency
2011	1
2014	-
2018	-
year	Average Cover (%)
2011	0.0
2014	-
2018	-

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

**Table 28R-19.12 - Shrub and Tree Species.** Average modified Daubenmire quadrat and line intercept cover by year.

SHRUB SPECIES	Artemisia frigida <sup>p</sup> (prairie sagewort)	Artemisia nova <sup>p</sup> (black sagebrush)	Artemisia tridentata ssp. vaseyana <sup>p</sup> (mountain big sagebrush)	Ericameria nauseosa (rubber rabbitbrush)	Gutierrezia sarothrae (broom snakeweed)	Juniperus scopulorum <sup>i</sup> (Rocky Mountain juniper)	Opuntia (pricklypear)	Pinus edulis <sup>i</sup> (twoneedle pinyon)	Purshia tridentata <sup>p</sup> (antelope bitterbrush)
year	Line Intercept Cover (%)								
2011	-	6.9	-	-	-	2.4	-	29.6	3
2014	-	8.1	-	-	-	0.2	-	-	0.8
2018	-	8	-	0.5	-	0.7	-	0.3	0.2
year	Quadrat Cover (%)								
2011	-	5.5	-	-	-	1.0	0.0	10.6	1.6
2014	-	5.9	-	-	0.0	0.0	0.1	0.0	0.4
2018	0.4	5.8	0.1	0.6	-	0.6	-	0.4	0.7

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

**Table 28R-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.

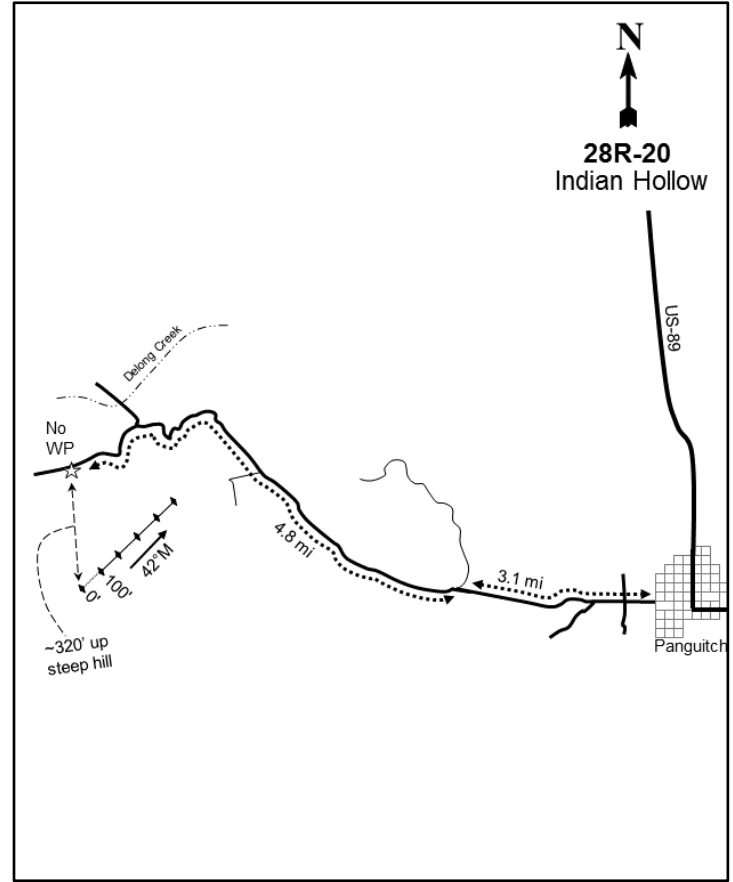
Year	Density		Age Class Distribution			Utilization		Poor Vigor (%)	Average Height Crown (cm)
	Plants Per Acre		Excluding Seedlings			Moderate (%)	Heavy (%)		
	Excluding Seedlings	Seedling	Young (%)	Mature (%)	Decadent (%)				
<b>Artemisia frigida<sup>P</sup> -- (prairie sagewort)</b>									
2011	-	-	-	-	-	-	-	-	15/22
2014	-	-	-	-	-	-	-	-	-/-
2018	-	-	-	-	-	-	-	-	-/-
<b>Artemisia nova<sup>P</sup> -- (black sagebrush)</b>									
2011	3400	1840	22	49	29	5	0	15	30/59
2014	3880	40	27	71	2	45	20	2	28/53
2018	5000	40	22	76	2	6	0	2	28/49
<b>Artemisia tridentata ssp. vaseyana<sup>P</sup> -- (mountain big sagebrush)</b>									
2011	20	-	0	100	0	0	0	0	61/78
2014	40	-	0	100	0	50	0	0	49/98
2018	20	-	0	100	0	0	0	0	26/51
<b>Ericameria nauseosa -- (rubber rabbitbrush)</b>									
2011	-	-	-	-	-	-	-	-	74/100
2014	20	-	0	100	0	0	0	0	37/32
2018	20	-	0	100	0	0	0	0	53/80
<b>Ericameria nauseosa ssp. nauseosa var. hololeuca<sup>P</sup> -- (rubber rabbitbrush)</b>									
2011	-	-	-	-	-	-	-	-	-/-
2014	-	-	-	-	-	-	-	-	-/-
2018	-	-	-	-	-	-	-	-	32/40
<b>Gutierrezia sarothrae -- (broom snakeweed)</b>									
2011	-	-	-	-	-	-	-	-	21/26
2014	20	-	0	100	0	0	0	0	27/40
2018	20	-	0	100	0	0	0	0	20/21
<b>Juniperus scopulorum<sup>t</sup> -- (Rocky Mountain juniper)</b>									
2011	20	-	0	100	0	0	0	0	-/-
2014	40	60	100	0	0	0	0	0	-/-
2018	20	-	100	0	0	0	0	0	-/-
<b>Opuntia -- (pricklypear)</b>									
2011	60	-	0	100	0	0	0	0	14/27
2014	40	-	0	100	0	0	0	0	10/17
2018	40	-	0	100	0	0	0	0	11/21
<b>Pinus edulis<sup>t</sup> -- (twoneedle pinyon)</b>									
2011	400	140	35	45	20	0	0	10	-/-
2014	60	-	100	0	0	0	0	0	-/-
2018	60	20	67	33	0	0	0	0	-/-
<b>Purshia tridentata<sup>P</sup> -- (antelope bitterbrush)</b>									
2011	420	-	57	33	10	43	0	5	93/160
2014	260	-	69	31	0	31	23	8	60/84
2018	340	-	12	88	0	24	53	0	42/77

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

**Table 28R-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' (%)	
<b>Juniperus scopulorum (Rocky Mountain juniper)</b>							
2011	4	-	-	-	-	100	17.0
<b>Pinus edulis (twoneedle pinyon)</b>							
2011	285	5	10	30	10	45	14.4
2014	21	14	86	-	-	-	3.0
2018	30	29	71	-	-	-	2.6

## INDIAN HOLLOW - STUDY NO. 28R-20



### Location Information

USGS 7.5 min Map Info  
GPS (0' Stake)

Fivemile Ridge NW; Township 34S, Range 6W, Section 18  
NAD 83 UTM ZONE 12, 362160 East 4190107 North

### Transect Information

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

Not Available  
42° 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 the town of Panguitch, travel west on West Pigweed Lane for 3.1 miles, passing through a four-way intersection and Penny Pond Road on the left (south) to a fork with Mud Spring road on the right (north). Stay to the left and drive for another 4.8 miles, staying right at the fork with Fivemile Ridge road, then turning left at a four-way intersection. Pull off of the road, park, and hike south up the steep hill about 320 feet to the transect; there are no baseline stakes or rebar markers.

**Site Information**

Land Ownership	Federal
Land Administrator	USFS
Allotment	Little Valleys
Elevation	No data
Aspect	northwest
Slope	40%
Sample Dates	09/04/2018

**Table 28R-20.1 Disturbance History.** Recorded history of major disturbances.

Treatment/Disturbance	Name	WRI DB#	Date	Size (acres)
Hand Crew - Lop and Pile	Brian Head Fire Rehabilitation Phase II	4532	Fall 2017	157
Fire - Prescribed	Brian Head Fire Rehabilitation Phase II (Proposed)	4532	Fall 2018	157

**Wildlife Habitat and Vegetation History**

**Table 28R-20.3 - Wildlife Seasonal Habitat.** UDWR wildlife habitat and seasonality.

Species	Habitat	Season
Deer	substantial	summer
Elk	substantial	summer

**Table 28R-20.4 - Vegetation History.** The dominant vegetation type(s) and phase of woodland succession (Tausch, Miller, Roundy, & Chambers, 2009).

Year	Vegetation Type	Woodland Succession
2018	Snowberry/Mixed Conifer Forest	Phase I

**Site Notes**

No Notes

**Site Potential**

1981 - 2010 Average Annual Precipitation	20 inches
NRCS Ecological Site	Mountain Shallow Loam (Ponderosa Pine)
NRCS Ecological Site #	R047XB450UT
States and Transitions	No state and transition model is available for this ecological site.

Mountain snowberry (*Symphoricarpos oreophilus*) was the most abundant shrub species on this site upon establishment in 2018, although a large number of other species were also present in lesser amounts. Mixed conifer species, including twoneedle pinyon (*Pinus edulis*), ponderosa pine (*P. ponderosa*), white fir (*Abies concolor*), and Douglas-fir (*Pseudotsuga menziesii*), provided the most vegetation cover and were co-dominant site components (Table 28R-20.12, Table 28R-20.13, Table 28R-20.14). The herbaceous understory was abundant and mainly composed of the native perennial grass species muttongrass (*Poa fendleriana*) and the perennial forb mountain phlox (*Phlox austromontana*) (Table 28R-20.7, Table 28R-20.10, Table 28R-20.11). A prescribed fire in the Fall of 2018 will likely burn tree litter left over by a 2017 lop and pile treatment (Table 28R-20.1), remove the shrub component, and facilitate the establishment of a robust native understory.

**Trend Summary Tables**

**Table 28R-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
2018	12.5	7.9	0.4	19.7	10.8	27.0

**Table 28R-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
2018	-	193	5	185	-	7.1	0.0	8.6

**Table 28R-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
2018	2.1	1.2	74.8	1.0	13.2	30.7

**Table 28R-20.9 - Pellet Group Data.** Quadrat frequency and pellet group transect data for animal pellets. Rabbit pellet groups are not sampled in the pellet group transect.

Year	Mule Deer	Rocky Mountain Elk	Rabbit
	Quadrat Frequency		
2018	9	1	3
Year	Days Use Per Acre (ha)		
	2018	8.1 (19.9)	1.3 (3.3)

**Table 28R-20.10 - Grass Species.** Nested frequency and modified Daubenmire average cover by year.

GRASS SPECIES	Achnatherum lettermanii (Letterman's needlegrass)	Carex rossii (Ross' sedge)	Elymus elymoides (squirreltail)	Pascopyrum smithii (western wheatgrass)	Poa fendleriana (muttongrass)
year	Nested Frequency				
2018	36	7	1	2	164
year	Average Cover (%)				
2018	0.9	0.1	0.0	0.0	6.1

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



**Table 28R-20.11 - Forb Species.** Nested frequency and modified Daubenmire average cover by year.

FORB SPECIES	Nested Frequency																
Achillea millefolium (Common yarrow)	6	4	23	9	1	15	13	24	9	13	34	131	1	1	5	12	3
Arabidopsis holboellii <sup>a</sup> (Holboell's rockcress)	Average Cover (%)																
Astragalus miser (timber milkvetch)	0.0	0.0	0.5	0.1	0.0	0.1	0.1	0.2	0.1	0.1	0.3	6.9	0.0	0.0	0.0	0.1	0.0
Castilleja linariaefolia (Wyoming Indian paintbrush)																	
Draba <sup>a</sup> (draba)																	
Eriogonum racemosum (redroot buckwheat)																	
Geranium richardsonii (Richardson's geranium)																	
Heuchera parvifolia (littleleaf alumroot)																	
Lathyrus brachycalyx (Bonneville pea)																	
Packera multilobata (lobeleaf groundsel)																	
Penstemon watsonii (Watson's penstemon)																	
Phlox austromontana (mountain phlox)																	
Potentilla diversifolia (varleaf cinquefoil)																	
Silene drummondii (Drummond's campion)																	
Symphoricarpos ascendens (western aster)																	
Taraxacum officinale (common dandelion)																	
Vicia americana (American vetch)																	

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

**Table 28R-20.12 - Shrub and Tree Species.** Average modified Daubenmire quadrat and line intercept cover by year.

SHRUB SPECIES	Line Intercept Cover (%)																
Abies concolor <sup>t</sup> (white fir)	-	1.2	0.7	-	-	0.5	7.1	0.2	3	-	1.9	0.8	25.1	1.1	0	0.2	15.7
Amelanchier utahensis <sup>p</sup> (Utah serviceberry)	Quadrat Cover (%)																
Artemisia tridentata ssp. vaseyana <sup>p</sup> (mountain big sagebrush)	0.2	0.9	0.0	0.0	0.0	0.2	4.6	0.7	2.4	0.0	0.0	1.0	0.2	1.0	0.3	0.0	9.1
Cercocarpus ledifolius <sup>p</sup> (curl-leaf mountain mahogany)																	
Chrysothamnus depressus <sup>p</sup> (longflower rabbitbrush)																	
Chrysothamnus viscidiflorus ssp. viscidiflorus var. viscidiflorus																	
Juniperus communis (common juniper)																	
Mahonia repens (creeping barberry)																	
Paxistima myrsinites (Oregon boxleaf)																	
Pinus edulis <sup>t</sup> (twoneedle pinyon)																	
Pinus ponderosa <sup>t</sup> (ponderosa pine)																	
Prunus virginiana <sup>p</sup> (chokecherry)																	
Pseudotsuga menziesii <sup>t</sup> (Douglas-fir)																	
Ribes cereum <sup>p</sup> (wax currant)																	
Rosa woodsii <sup>p</sup> (Woods' rose)																	
Sambucus racemosa <sup>p</sup> (red elderberry)																	
Symphoricarpos oreophilus <sup>p</sup> (mountain snowberry)																	

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

**Table 28R-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 (%)				
<b>Abies concolor<sup>t</sup> -- (white fir)</b>									
2018	-	-	-	-	-	-	-	-	-/-
<b>Amelanchier utahensis<sup>p</sup> -- (Utah serviceberry)</b>									
2018	760	-	13	82	5	29	8	13	60/45
<b>Artemisia tridentata ssp. vaseyana<sup>p</sup> -- (mountain big sagebrush)</b>									
2018	140	-	0	71	29	0	0	71	55/48
<b>Cercocarpus ledifolius<sup>p</sup> -- (curl-leaf mountain mahogany)</b>									
2018	60	-	100	0	0	67	0	0	148/74
<b>Chrysothamnus depressus<sup>p</sup> -- (longflower rabbitbrush)</b>									
2018	40	-	0	100	0	0	0	0	-/-
<b>Chrysothamnus viscidiflorus ssp. viscidiflorus var. viscidiflorus -- (yellow rabbitbrush)</b>									
2018	260	-	23	77	0	0	0	8	28/27
<b>Juniperus communis -- (common juniper)</b>									

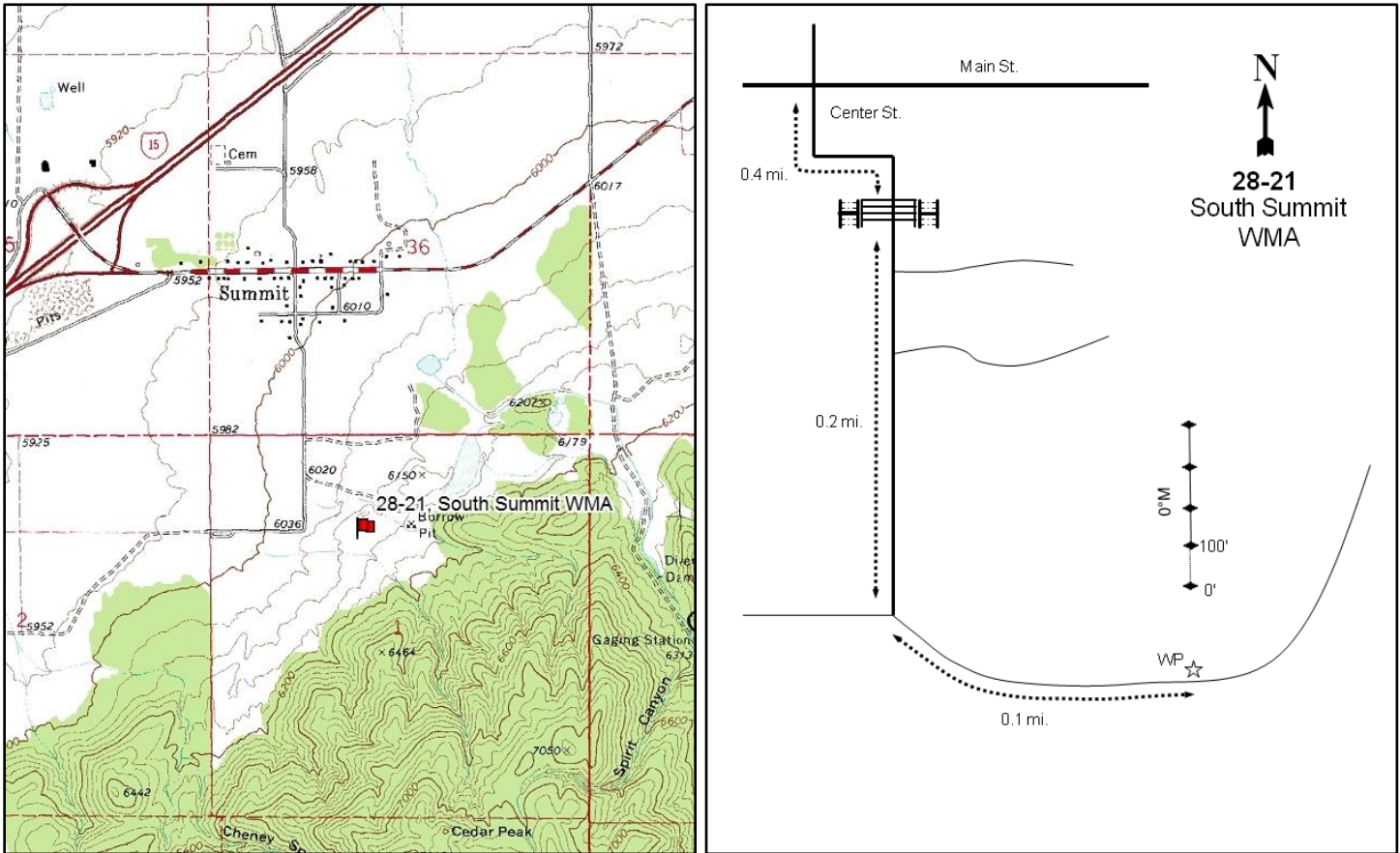
Year	Density		Age Class Distribution			Utilization		Poor Vigor (%)	Average Height Crown (cm)
	Plants Per Acre		Excluding Seedlings			Moderate (%)	Heavy (%)		
	Excluding Seedlings	Seedling	Young (%)	Mature (%)	Decadent (%)				
2018	500	20	8	92	0	0	0	75/167	
Mahonia repens -- (creeping barberry)									
2018	1320	-	0	100	0	0	0	17	8/12
Opuntia polyacantha -- (plains pricklypear)									
2018	100	-	0	100	0	0	0	20	9/17
Paxistima myrsinites -- (Oregon boxleaf)									
2018	4940	-	5	95	0	0	0	0	11/19
Pinus edulis <sup>t</sup> -- (twoneedle pinyon)									
2018	80	-	100	0	0	0	0	25	- / -
Pinus ponderosa <sup>t</sup> -- (ponderosa pine)									
2018	20	-	100	0	0	0	0	0	- / -
Prunus virginiana <sup>p</sup> -- (chokecherry)									
2018	1080	-	4	94	2	41	2	2	59/46
Pseudotsuga menziesii <sup>t</sup> -- (Douglas-fir)									
2018	160	-	25	63	13	0	0	13	- / -
Purshia tridentata <sup>p</sup> -- (antelope bitterbrush)									
2018	-	-	-	-	-	-	-	-	24/63
Ribes cereum <sup>p</sup> -- (wax currant)									
2018	60	-	0	100	0	0	0	0	118/99
Rosa woodsii <sup>p</sup> -- (Woods' rose)									
2018	220	-	27	73	0	0	0	0	22/15
Sambucus racemosa <sup>p</sup> -- (red elderberry)									
2018	-	-	-	-	-	-	-	-	162/100
Symphoricarpos oreophilus <sup>p</sup> -- (mountain snowberry)									
2018	6860	-	2	98	0	8	0	2	32/43

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

**Table 28R-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' (%)	
Abies concolor (white fir)							
2018	44	67	33	-	-	-	4.7
Juniperus osteosperma (Utah juniper)							
2018	45	100	-	-	-	-	3.0
Juniperus scopulorum (Rocky Mountain juniper)							
2018	48	75	25	-	-	-	1.8
Pinus edulis (twoneedle pinyon)							
2018	45	73	27	-	-	-	1.8
Pinus ponderosa (ponderosa pine)							
2018	14	-	-	-	40	60	24.0
Populus tremuloides (quaking aspen)							
2018	4	-	-	100	-	-	2.0
Pseudotsuga menziesii (Douglas-fir)							
2018	69	12	41	-	-	47	24.9

## SOUTH SUMMIT WMA - STUDY NO. 28-21

**Location Information**

USGS 7.5 min Map Info  
GPS (0' Stake)

Summit SE; Township 35S, Range 10W, Section 01  
NAD 83 UTM ZONE 12, 329793 East 4184348 North

**Transect Information**

Browse Tag # (0' Stake)	193
Transect Bearing	0° magnetic
Length	400ft
Belt Placement	Line 1 (11ft & 95ft), Line 2 (34ft), Line 3 (59ft), Line 4 (71ft)
Belt Marker Placement	No Rebar

**Directions to Site**

From the intersection of Center Street and Main Street in the city of Summit, travel south for 0.4 miles to a WMA gate. From the gate, continue for 0.2 miles to a "T" in the road. Take the fork on the left and travel for 0.1 miles to the witness post. From the witness post walk 12 paces at 25 degrees magnetic to the 0-ft stake which is marked by browse tag number #193.

**Site Information**

Land Ownership	State
Land Administrator	UDWR
Allotment	WEST FORK
Elevation	6,100ft (1,859m)
Aspect	southwest
Slope	10%
Sample Dates	07/14/2008, 06/06/2013, 06/05/2018

**Table 28-21.1 Disturbance History.** Recorded history of major disturbances.

Treatment/Disturbance	Name	WRI DB#	Date	Size (acres)
Hand Crew - Lop and Scatter	Parowan Front (Cottonwood and Summit) Chaining)	3070	July 2014-June 2015	1109
Chaining - Chain Unknown	-	-	Historic	-
Seeding - Seed Unknown	-	-	Historic	-
Herbicide - Herbicide Unknown	-	-	Historic	-
Hand Crew - Lop and Scatter	-	-	Historic	-
Hand Crew - Lop and Scatter	Parowan Front WMA Arc for Bullhog and Lop and Scatter	3435	September 2017-June 2018	1674

**Wildlife Habitat and Vegetation History****Table 28-21.3 - Wildlife Seasonal Habitat.** UDWR wildlife habitat and seasonality.

Species	Habitat	Season
Deer	crucial	winter
Elk	substantial	winter

**Table 28-21.4 - Vegetation History.** The dominant vegetation type(s) and phase of woodland succession (Tausch, Miller, Roundy, & Chambers, 2009).

Year	Vegetation Type	Woodland Succession
2008	Mountain Big Sagebrush	Phase I
2013	Mountain Big Sagebrush	Phase I
2018	Mountain Big Sagebrush	Phase I

**Site Notes**

The transect lies 1 mile south of Summit on a wildlife management area.

**Site Potential**

1981 - 2010 Average Annual Precipitation	12 inches
NRCS Ecological Site	Upland Loam (Mountain Big Sagebrush-Indian Ricegrass)
NRCS Ecological Site #	R047XB308UT
States and Transitions	No state and transition model is available for this ecological site.

Since establishment in 2008, this site has remained in a stable state with a plant community dominated by mountain big sagebrush (*Artemisia tridentata* ssp. *vaseyana*) (Table 28-21.12, Table 28-21.13). Introduced and native perennial grasses make up the majority of the herbaceous understory. Although the native species purple threeawn (*Aristida purpurea*) has provided the most cover of any single herbaceous species, the introduced perennial grass species bulbous bluegrass (*Poa bulbosa*) has increased over time and contributed significant cover in 2018 (Table 28-21.7, Table 28-21.10). Perennial and annual forbs have remained rare (Table 28-21.11). Utah juniper (*Juniperus osteosperma*) trees have been present in all sample years, placing the site within Phase I of woodland succession (Photos). Although density of trees is low as of 2018 (Table 28-21.14), further encroachment is possible over time.

**Trend Summary Tables****Table 28-21.6 - Shrub/Tree Summary.** Average modified Daubenmire quadrat and line intercept cover by year for shrubs/trees

Year	Quadrat Cover (%)			Line-intercept Cover (%)		
	Preferred Shrub	Other Shrub	Tree	Preferred Shrub	Other Shrub	Tree
2008	7.1	1.6	-	11.2	1.9	-
2013	7.2	1.1	-	12.6	1.6	-
2018	8.0	4.8	-	11.9	4.5	-

**Table 28-21.7 - Herbaceous Summary.** Nested frequency and average modified Daubenmire quadrat cover by year for herbaceous functional groups

Year	Nested Frequency				Quadrat Cover (%)			
	Annual Grass	Perennial Grass	Annual/Biennial Forb	Perennial Forb	Annual Grass	Perennial Grass	Annual/Biennial Forb	Perennial Forb
2008	121	402	11	5	0.9	21.5	0.0	0.0
2013	41	427	49	4	0.1	32.6	0.3	0.2
2018	85	438	15	9	1.1	41.0	0.1	0.3

**Table 28-21.8 - 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
2008	15.3	0.3	43.5	17.0	1.8	33.5
2013	13.5	0.9	45.1	9.5	1.7	42.7
2018	11.8	1.7	54.4	9.7	1.2	54.5

**Table 28-21.9 - 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	Coyote	Mule Deer	Rocky Mountain Elk	Rabbit
	Quadrat Frequency				
2008	5	-	32	-	94
2013	4	-	10	-	34
2018	6	-	5	-	54
Year	Days Use Per Acre (ha)				
2008	11.6 (28.7)	8.7 (21.5)*	91.8 (226.8)	0.7 (1.7)	-
2013	24.7 (61.0)	-	35.5 (87.7)	-	-
2018	7.2 (17.9)	-	12.8 (31.5)	-	-

\*Pellets per acre (ha)

**Table 28-21.10 - Grass Species.** Nested frequency and modified Daubenmire average cover by year.

GRASS SPECIES	Agropyron cristatum <sup>i</sup> (crested wheatgrass)	Aristida purpurea (purple threeawn)	Bromus tectorum <sup>ai</sup> (cheatgrass)	Elymus elymoides (squirreltail)	Elymus lanceolatus (thickspike wheatgrass)	Poa bulbosa <sup>i</sup> (bulbous bluegrass)	Sporobolus cryptandrus (sand dropseed)	Thinopyrum intermedium <sup>i</sup> (intermediate wheatgrass)	Vulpia octoflora <sup>a</sup> (sixweeks fescue)
year	Nested Frequency								
2008	135	243	121	3	0	144	62	69	-
2013	147	200	41	6	21	331	88	54	-
2018	130	249	81	-	5	324	120	79	7
year	Average Cover (%)								
2008	4.4	11.1	0.9	0.1	0.0	2.9	1.2	1.7	-
2013	4.8	12.4	0.1	0.0	0.2	11.9	2.1	1.2	-
2018	6.9	16.3	1.0	-	0.1	13.1	2.6	2.0	0.2

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

**Table 28-21.11 - Forb Species.** Nested frequency and modified Daubenmire average cover by year.

FORB SPECIES	Alyssum desertorum <sup>ai</sup> (desert madwort)	Astragalus lentiginosus (freckled milkvetch)	Ceratocephala testiculata <sup>ai</sup> (curveseed butterwort)	Erigeron (fleabane)	Erodium cicutarium <sup>ai</sup> (redstem stork's bill)	Phlox austromontana (mountain phlox)	Physalis (groundcherry)	Sphaeralcea coccinea (scarlet globemallow)	Tragopogon dubius <sup>ai</sup> (yellow salsify)
year	Nested Frequency								
2008	-	2	8	-	3	-	-	3	-
2013	-	2	-	-	49	2	-	-	-
2018	8	3	-	3	5	1	1	2	2
year	Average Cover (%)								
2008	-	0.0	0.0	-	0.0	-	-	0.0	-
2013	-	0.1	-	-	0.3	0.0	-	-	-
2018	0.0	0.3	-	0.0	0.0	0.0	0.0	0.0	0.0

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

**Table 28-21.12 - Shrub and Tree Species.** Average modified Daubenmire quadrat and line intercept cover by year.

SHRUB SPECIES				
Artemisia tridentata ssp. vaseyana <sup>p</sup> (mountain big sagebrush)				
Cylindropuntia whipplei (Whipple cholla)				
Gutierrezia sarothrae (broom snakeweed)				
Opuntia (pricklypear)				
year	Line Intercept Cover (%)			
2008	11.2	0.2	1.2	0.5
2013	12.6	1.3	0.3	-
2018	11.9	0.8	3.7	-
year	Quadrat Cover (%)			
2008	7.1	0.3	1.1	0.2
2013	7.2	0.9	0.2	-
2018	8.0	0.6	4.2	0.0

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



**Table 28-21.13 - 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 (%)				
<b>Artemisia nova<sup>P</sup> -- (black sagebrush)</b>									
2008	20	-	0	100	0	0	0	0	68/68
2013	-	-	-	-	-	-	-	-	26/63
2018	-	-	-	-	-	-	-	-	25/62
<b>Artemisia tridentata ssp. vaseyana<sup>P</sup> -- (mountain big sagebrush)</b>									
2008	2000	20	3	38	59	30	3	43	95/119
2013	1660	-	4	72	24	17	21	39	86/105
2018	1400	820	6	77	17	6	0	10	84/114
<b>Cylindropuntia whipplei -- (Whipple cholla)</b>									
2008	120	-	17	83	0	0	0	0	36/85
2013	140	-	0	100	0	0	0	0	39/106
2018	200	-	0	90	10	0	0	10	36/97
<b>Gutierrezia sarothrae -- (broom snakeweed)</b>									
2008	2720	-	21	72	7	2	0	2	18/23
2013	560	20	18	82	0	0	4	4	14/21
2018	4120	20	14	86	0	0	0	2	23/34
<b>Juniperus osteosperma<sup>i</sup> -- (Utah juniper)</b>									
2008	-	-	-	-	-	-	-	-	-/-
2013	-	-	-	-	-	-	-	-	-/-
2018	-	20	0	0	0	0	0	0	-/-
<b>Opuntia -- (pricklypear)</b>									
2008	40	-	0	50	50	0	0	50	30/80
2013	-	-	-	-	-	-	-	-	20/86
2018	-	-	-	-	-	-	-	-	18/55
<b>Pediocactus simpsonii -- (mountain ball cactus)</b>									
2008	20	-	0	100	0	0	0	0	-/-
2013	-	-	-	-	-	-	-	-	-/-
2018	-	-	-	-	-	-	-	-	-/-
<b>Purshia tridentata<sup>P</sup> -- (antelope bitterbrush)</b>									
2008	-	-	-	-	-	-	-	-	49/180

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

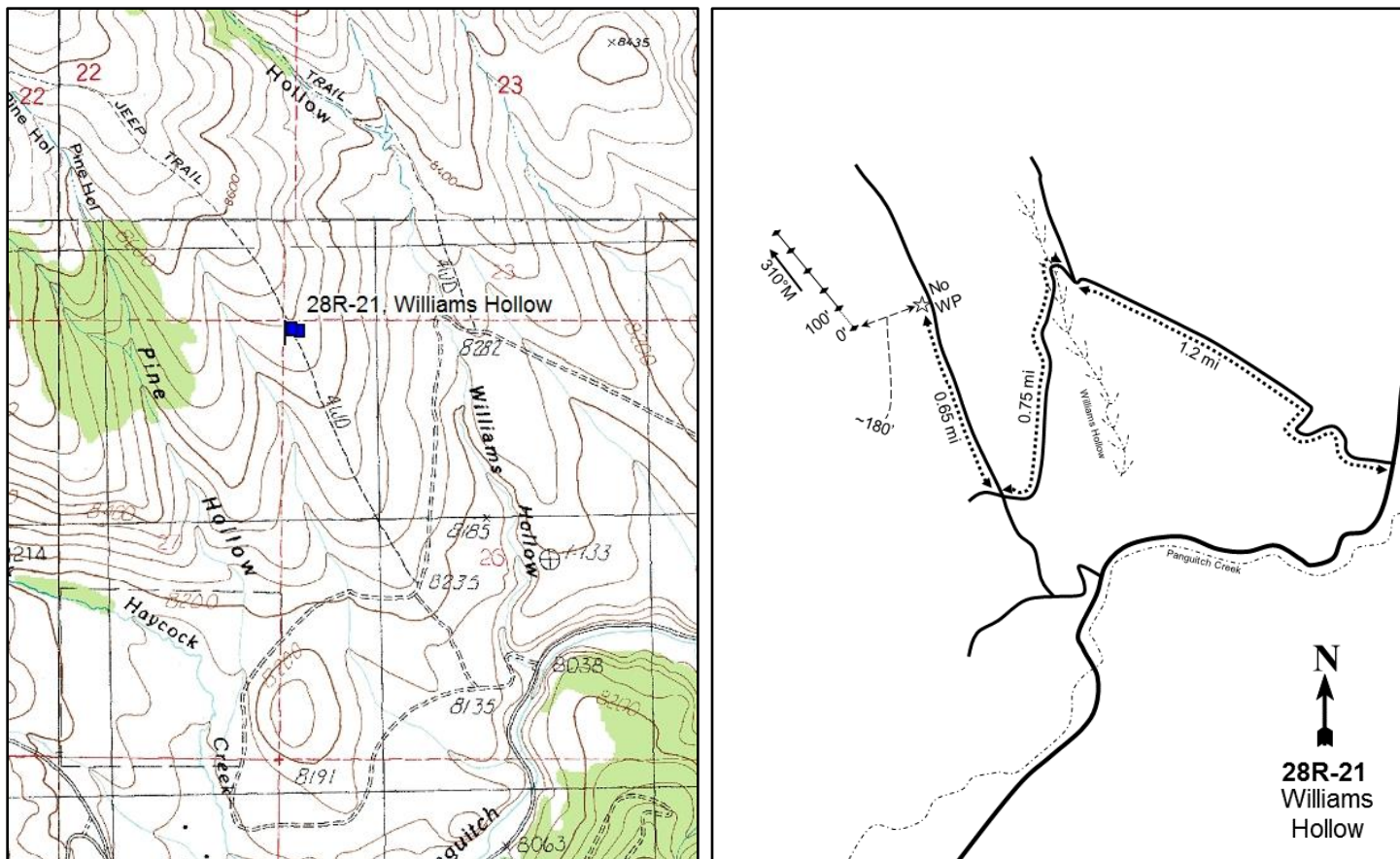
**Table 28-21.14 - Tree Characteristics.** Point-quarter tree density, size class distribution, and average diameter.

Year	Density	Size Class Distribution					Average Diameter (cm)
	Trees per Acre	Seedling (%)	1-4' (%)	4-8' (%)	8-12' (%)	>12' (%)	
<b>Juniperus osteosperma (Utah juniper)</b>							
2018	4	100	-	-	-	-	1.0

**Table -28-21.15 - Deer Desirable Components Index: Mid Potential Scale.**

Year	Preferred Browse Cover	Preferred Browse Decadence	Preferred Browse Young	Perennial Grass Cover	Annual Grass Cover	Perennial Forb Cover	Noxious Weeds	Total Score	Ranking
2008	14	-2.7	1.5	30	-0.7	0	0	<b>42.1</b>	Poor
2013	15.8	7.8	1.8	30	-0.1	0.3	0	<b>55.5</b>	Fair
2018	14.9	9.9	2.9	30	-0.9	0.7	0	<b>57.4</b>	Fair

## WILLIAMS HOLLOW - STUDY NO. 28R-21

**Location Information**

USGS 7.5 min Map Info  
GPS (0' Stake)

Haycock Mountain NW; Township 35S, Range 7W, Section 26  
NAD 83 UTM ZONE 12, 357581 East 4178853 North

**Transect Information**

Browse Tag # (0' Stake)	Not Available
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	No Rebar or Stakes

**Directions to Site**

Traveling northeast from Panguitch Lake on SR-143, turn left onto Forest Service Road #1864. Travel for 1.2 miles to a fork, then proceed left. Drive for 0.75 miles, passing Williams Hollow, to a four-way intersection. Turn left (north), drive for 0.65 miles, and park; there is no witness post. The transect is to the left (west) of the road and runs northwest. There are no baseline stakes or rebar markers.

**Site Information**

Land Ownership	Federal
Land Administrator	USFS
Allotment	Haycock Creek
Elevation	No data
Aspect	Southwest
Slope	5%
Sample Dates	09/05/2018

**Table 28R-21.1 Disturbance History.** Recorded history of major disturbances.

Treatment/Disturbance	Name	WRI DB#	Date	Size (acres)
Seeding - Aerial Before	Brian Head Fire Rehabilitation Phase II (Proposed)	4532	Fall 2018	2080
Chaining - Two-Way Ely	Brian Head Fire Rehabilitation Phase II (Proposed)	4532	Fall 2018	2080
Fire - Wildfire	Brian Head	-	June 2017	71693

**Wildlife Habitat and Vegetation History****Table 28R-21.3 - Wildlife Seasonal Habitat.** UDWR wildlife habitat and seasonality.

Species	Habitat	Season
Deer	substantial	summer
Elk	substantial	summer
Greater Sage Grouse		

**Table 28R-21.4 - Vegetation History.** The dominant vegetation type(s) and phase of woodland succession (Tausch, Miller, Roundy, & Chambers, 2009).

Year	Vegetation Type	Woodland Succession
2018	Perennial Grass	No Encroachment

**Site Notes**

No Notes

**Site Potential**

1981 - 2010 Average Annual Precipitation	22 inches
NRCS Ecological Site	Mountain Stony Loam (Antelope Bitterbrush)
NRCS Ecological Site #	R047XB456UT
States and Transitions	No state and transition model is available for this ecological site.

When established in 2018, this study site was dominated by introduced perennial grasses such as crested wheatgrass (*Agropyron cristatum*) and intermediate wheatgrass (*Thinopyrum intermedium*). Forbs were moderately diverse, but not abundant, with the annual forb spreading fleabane (*Erigeron divergens*) providing the most cover of any single species (Table 28R-21.7, Table 28R-21.10, Table 28R-21.11). The most abundant shrub was broom snakeweed (*Gutierrezia sarothrae*), but it provided little cover (Table 28R-21.12, Table 28R-21.13). Without treatment, this site will likely continue to remain in a perennial grass-dominated state.

**Trend Summary Tables**

**Table 28R-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
2018	-	1.2	-	-	1.5	-

**Table 28R-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
2018	1	226	75	90	0.1	21.0	4.3	1.3

**Table 28R-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
2018	38.9	-	12.0	23.9	14.0	25.4

**Table 28R-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/Pronghorn	Rocky Mountain Elk	Rabbit
	Quadrat Frequency			
2018	-	8	3	1
Year	Days Use Per Acre (ha)			
2018	0.7 (1.8)	6.0 (14.9)	23.4 (57.9)	-

**Table 28R-21.10 - Grass Species.** Nested frequency and modified Daubenmire average cover by year.

GRASS SPECIES	Agropyron cristatum <sup>i</sup> (crested wheatgrass)	Bromus inermis <sup>i</sup> (smooth brome)	Bromus tectorum <sup>ii</sup> (cheatgrass)	Hesperostipa comata (needle and thread)	Poa fendleriana (muttongrass)	Thinopyrum intermedium <sup>i</sup> (intermediate wheatgrass)
year	Nested Frequency					
2018	131	50	1	0	13	99
year	Average Cover (%)					
2018	8.8	3.8	0.1	0.0	0.5	7.9

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

**Table 28R-21.11 - Forb Species.** Nested frequency and modified Daubenmire average cover by year.

FORB SPECIES	Nested Frequency													
	year													
Arabis holboellii <sup>a</sup> (Holboell's rockcress)	3	4	3	14	52	61	1	7	5	8	0	12	12	
Chenopodium atrovirens <sup>a</sup> (pinyon goosefoot)														
Chenopodium leptophyllum <sup>a</sup> (narrowleaf goosefoot)														
Descurainia incana <sup>a</sup> (mountain tansymustard)														
Erigeron divergens <sup>a</sup> (spreading fleabane)														
Erigeron pumilus (shaggy fleabane)														
Euphorbia brachycera (horned spurge)														
Gayophytum ramosissimum <sup>a</sup> (pinyon groundsmoke)														
Linum kingii (King's flax)														
Lotus utahensis (Utah bird's-foot trefoil)														
Penstemon strictus (Rocky Mountain penstemon)														
Pleiacanthus spinosus (thorn skeletonweed)														
Sphaeralcea grossularifolia (gooseberry/leaf globemallow)														
year	Average Cover (%)													
2018	0.2	0.1	0.0	0.6	3.3	0.8	0.0	0.0	0.1	0.0	0.0	0.3	0.1	

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

**Table 28R-21.12 - Shrub and Tree Species.** Average modified Daubenmire quadrat and line intercept cover by year.

SHRUB SPECIES	Line Intercept Cover (%)		
	year		
Ericameria parryi (Parry's rabbitbrush)	0.2	1.3	-
Gutierrezia sarothrae (broom snakeweed)			
Tetradymia canescens (spineless horsebrush)			
year	Quadrat Cover (%)		
2018	0.1	1.1	0.0

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

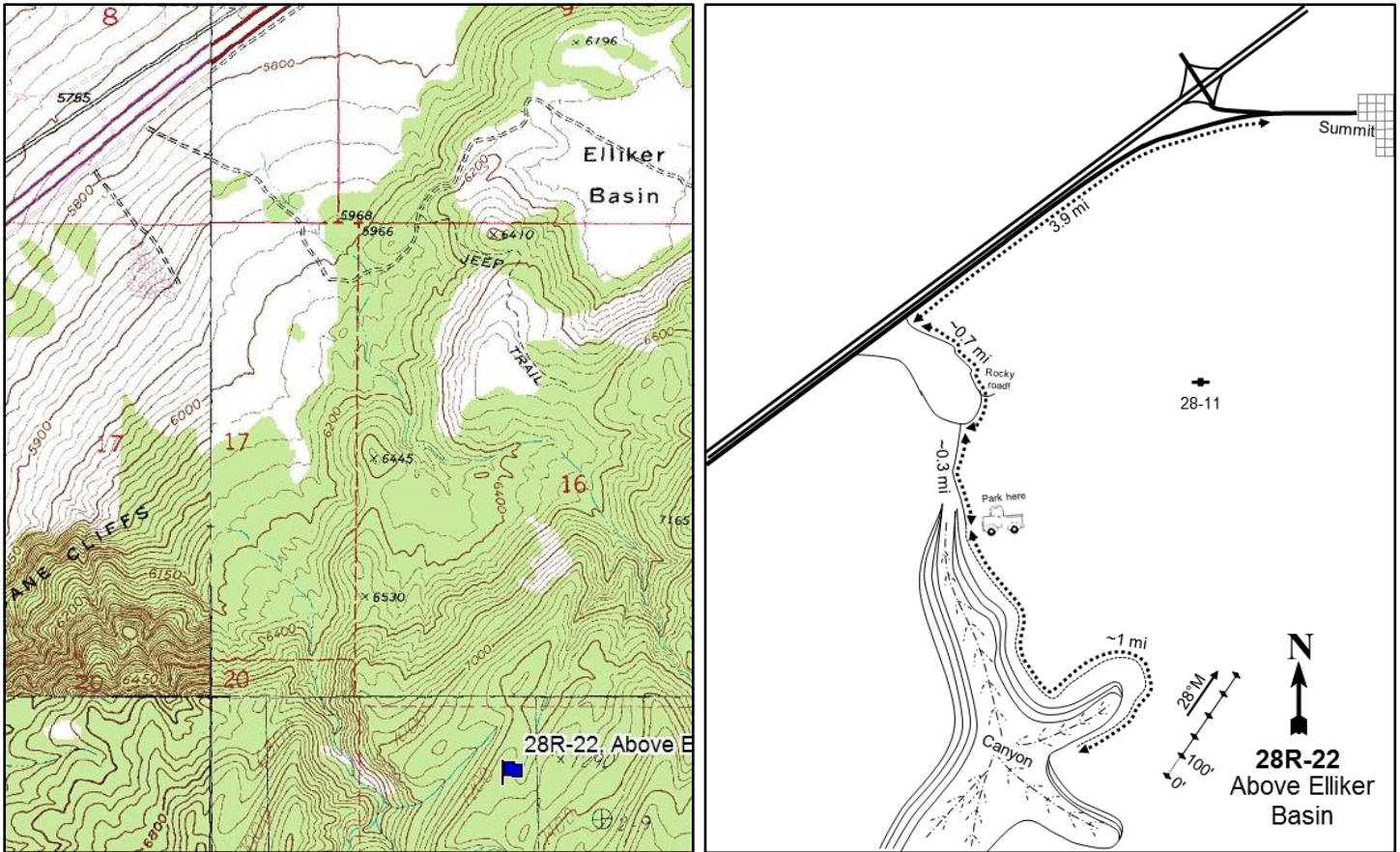
**Table 28R-21.13 - Shrub/Tree Characteristics.** Population characteristics of shrub/tree species populations including density reproduction (seedlings), age distribution, utilization, vigor and average size (height/crown) of plants.

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 (%)				
<b>Ericameria parryi -- (Parry's rabbitbrush)</b>									
2018	360	-	0	100	0	0	0	0	14/24
<b>Gutierrezia sarothrae -- (broom snakeweed)</b>									
2018	2800	-	4	96	0	1	0	0	14/18
<b>Opuntia polyacantha -- (plains pricklypear)</b>									
2018	20	-	0	100	0	0	0	0	5/22
<b>Purshia tridentata<sup>p</sup> -- (antelope bitterbrush)</b>									
2018	-	-	-	-	-	-	-	-	- / -
<b>Tetradymia canescens -- (spineless horsebrush)</b>									
2018	20	-	100	0	0	0	0	0	- / -

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



## ABOVE ELLIKER BASIN - STUDY NO. 28R-22



### Location Information

USGS 7.5 min Map Info  
GPS (0' Stake)

Flanigan Arch NW; Township 35S, Range 10W, Section 21  
NAD 83 UTM ZONE 12, 324805 East 4179601 North

### Transect Information

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

Not Available  
28° 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 Exit #71 in Summit, drive south on the frontage road for 3.9 miles to a dirt road to the left (southeast). Turn left onto this road and drive for 0.7 miles, staying right at the first two forks. At the third fork, turn left (south), drive for approximately 0.3 miles, and park. Hike up the canyon for about 1 mile onto the top of the mountain and use a GPS to locate the transect. There are no baseline stakes or rebar markers.

**Site Information**

Land Ownership	State
Land Administrator	UDWR
Allotment	WEST FORK
Elevation	No data
Aspect	North-Northeast
Slope	8%
Sample Dates	09/05/2018

**Table 28R-22.1 Disturbance History.** Recorded history of major disturbances.

Treatment/Disturbance	Name	WRI DB#	Date	Size (acres)
Seeding - Aerial Before	Parowan Front Mastication (Proposed)	4544	Fall 2019	1725
Mechanical - Bullhog	Parowan Front Mastication (Proposed)	4544	Fall 2019	1725

**Wildlife Habitat and Vegetation History**

**Table 28R-22.3 - Wildlife Seasonal Habitat.** UDWR wildlife habitat and seasonality.

Species	Habitat	Season
Deer	crucial	winter

**Table 28R-22.4 - Vegetation History.** The dominant vegetation type(s) and phase of woodland succession (Tausch, Miller, Roundy, & Chambers, 2009).

Year	Vegetation Type	Woodland Succession
2018	Pinyon-Juniper	Phase III

**Site Notes**

No Notes

**Site Potential**

1981 - 2010 Average Annual Precipitation	15 inches
NRCS Ecological Site	Upland Loam (Mountain Big Sagebrush-Indian Ricegrass)
NRCS Ecological Site #	R047XB308UT
States and Transitions	No state and transition model is available for this ecological site.

Upon establishment in 2018, this study site was dominated by twoneedle pinyon (*Pinus edulis*) and Utah juniper (*Juniperus osteosperma*) (Table 28R-22.14) and was considered to be within Phase III of woodland succession (Table 28R-22.4). Gambel oak (*Quercus gambelii*) contributed the most browse cover, but the browse component as a whole was lacking (Table 28R-22.12, Table 28R-22.13). The herbaceous understory was depauperate in both diversity and quantity, with the annual forb pinyon groundsmoke (*Gayophytum ramosissimum*) as the most abundant herbaceous species (Table 28R-22.7, Table 28R-22.10, Table 28R-22.11). A bullhog and seeding treatment scheduled for the Fall of 2019 (Table 28R-22.1) will likely remove most of the trees in the area and amplify and diversify the shrub and herbaceous understory.



**Trend Summary Tables**

**Table 28R-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
2018	7.8	0.5	14.6	8.4	0.8	64.0

**Table 28R-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
2018	3	2	17	20	0.0	0.0	0.4	0.2

**Table 28R-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
2018	5.6	0.7	75.9	11.6	9.0	21.7

**Table 28R-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	Mule Deer	Rabbit
	Quadrat Frequency	
2018	6	22
Year	Days Use Per Acre (ha)	
2018	12.1 (29.8)	
		-

**Table 28R-22.10 - Grass Species.** Nested frequency and modified Daubenmire average cover by year.

GRASS SPECIES	Nested Frequency	
	Bromus tectorum <sup>a</sup> (cheatgrass)	Carex (sedge)
year	Nested Frequency	
2018	3	2
year	Average Cover (%)	
2018	0.0	0.0

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

**Table 28R-22.11 - Forb Species.** Nested frequency and modified Daubenmire average cover by year.

FORB SPECIES	Nested Frequency								
Arabis (rockcress)	4	2	2	5	3	17	3	1	3
Arabis holboellii <sup>a</sup> (Holboell's rockcress)									
Chaenactis douglasii (Douglas' dustymaiden)									
Erigeron eatonii (Eaton's fleabane)									
Eriogonum racemosum (redroot buckwheat)									
Gayophytum ramosissimum <sup>a</sup> (pinyon groundsmoke)									
Phlox longifolia (longleaf phlox)									
Sisymbrium altissimum <sup>ii</sup> (tall tumbled mustard)									
Symphotrichum (aster)									
year	Average Cover (%)								
2018	0.0	0.0	0.0	0.0	0.1	0.4	0.0	0.0	0.0

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

**Table 28R-22.12 - Shrub and Tree Species.** Average modified Daubenmire quadrat and line intercept cover by year.

SHRUB SPECIES	Line Intercept Cover (%)							
Artemisia tridentata ssp. vaseyana <sup>p</sup> (mountain big sagebrush)	-	0.1	8.3	0.8	55.7	2.5	5.8	
Cercocarpus montanus var. montanus <sup>p</sup> (alderleaf mountain mahogany)								
Juniperus osteosperma <sup>t</sup> (Utah juniper)								
Opuntia polyacantha (plains pricklypear)								
Pinus edulis <sup>t</sup> (twoneedle pinyon)								
Purshia tridentata <sup>p</sup> (antelope bitterbrush)								
Quercus gambelii <sup>p</sup> (Gambel oak)								
year	Quadrat Cover (%)							
2018	0.1	0.4	1.2	0.5	13.3	1.5	5.8	

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

**Table 28R-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.

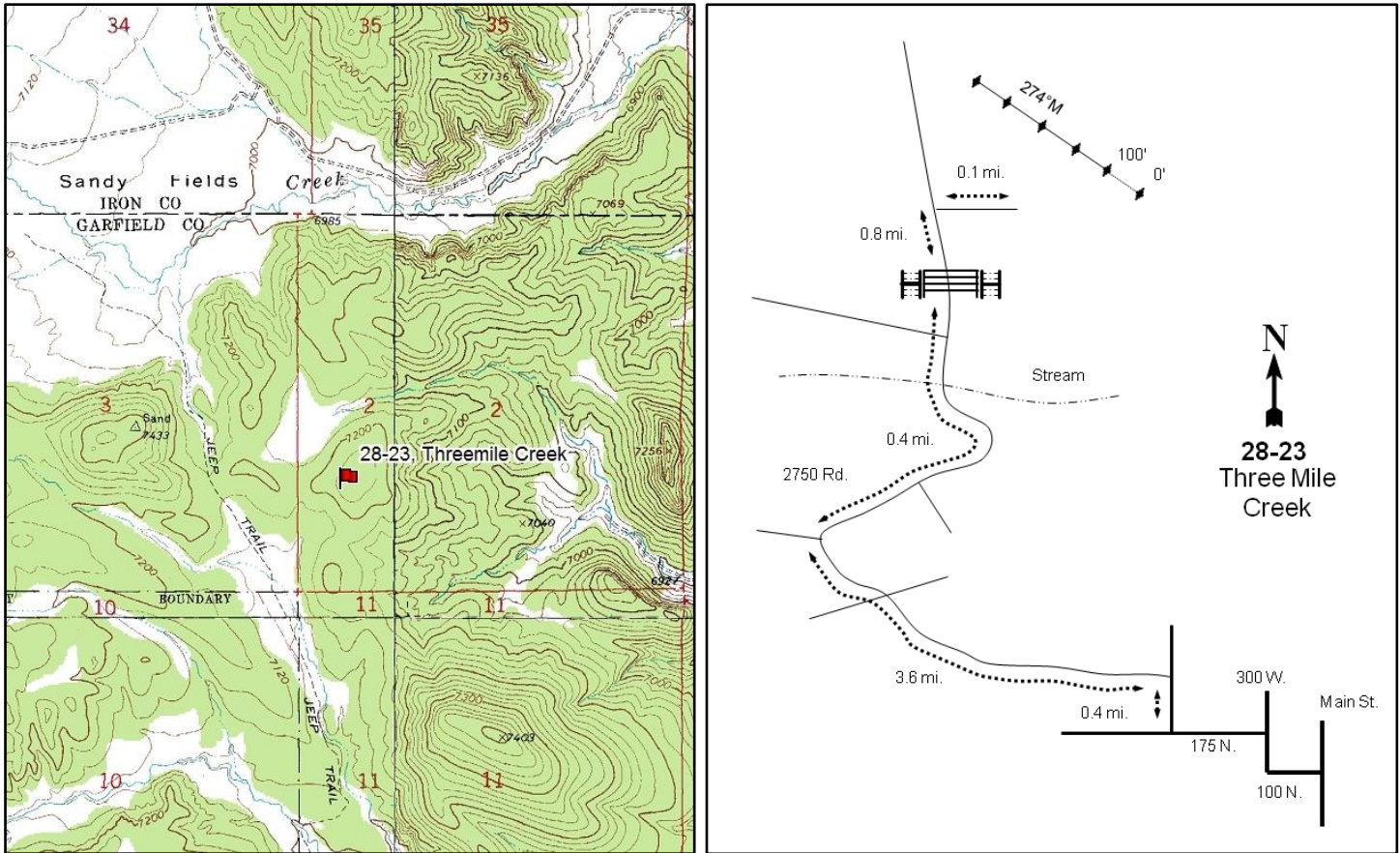
Year	Density		Age Class Distribution			Utilization		Poor Vigor (%)	Average Height Crown (cm)
	Plants Per Acre		Excluding Seedlings			Moderate (%)	Heavy (%)		
	Excluding Seedlings	Seedling	Young (%)	Mature (%)	Decadent (%)				
<b>Amelanchier utahensis<sup>p</sup> -- (Utah serviceberry)</b>									
2018	40	-	100	0	0	0	0	0	77/93
<b>Artemisia tridentata ssp. vaseyana<sup>p</sup> -- (mountain big sagebrush)</b>									
2018	100	-	0	0	100	0	0	100	22/18
<b>Cercocarpus montanus var. montanus<sup>p</sup> -- (alderleaf mountain mahogany)</b>									
2018	80	-	50	50	0	25	0	50	80/84
<b>Juniperus osteosperma<sup>t</sup> -- (Utah juniper)</b>									
2018	100	-	40	60	0	0	0	0	- / -
<b>Opuntia polyacantha -- (plains pricklypear)</b>									
2018	420	-	5	95	0	0	0	5	16/51
<b>Pinus edulis<sup>t</sup> -- (twoneedle pinyon)</b>									
2018	720	100	22	78	0	0	0	0	- / -
<b>Purshia tridentata<sup>p</sup> -- (antelope bitterbrush)</b>									
2018	560	-	0	64	36	46	18	21	35/72
<b>Quercus gambelii<sup>p</sup> -- (Gambel oak)</b>									
2018	1880	-	46	53	1	0	0	6	69/56
<b>Ribes cereum<sup>p</sup> -- (wax currant)</b>									
2018	-	-	-	-	-	-	-	-	70/73
<b>Ribes montigenum<sup>p</sup> -- (gooseberry currant)</b>									
2018	-	-	-	-	-	-	-	-	164/126

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

**Table 28R-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' (%)	
<b>Juniperus osteosperma (Utah juniper)</b>							
2018	87	11	16	5	26	42	20.6
<b>Pinus edulis (twoneedle pinyon)</b>							
2018	799	5	10	15	25	45	14.7

## THREEMILE CREEK - STUDY NO. 28-23

**Location Information**

USGS 7.5 min Map Info  
GPS (0' Stake)

Little Creek Peak SE; Township 34S, Range 6W, Section 02  
NAD 83 UTM ZONE 12, 367790 East 4193548 North

**Transect Information**

Browse Tag # (0' Stake)	149
Transect Bearing	274° magnetic
Length	500ft
Belt Placement	Line 1 (11ft), Line 2 (34ft), Line 3 (59ft), Line 4 (71ft), Line 5 (95ft)
Belt Marker Placement	Belt 1: 2ft

**Directions to Site**

Travel 0.4 miles from the town of Panguitch, and at the intersection of 175 North (Pigweed Lane) and 700 West, turn left onto Mud Spring Road. Travel 3.6 miles to an intersection and stay to the right. Drive 0.4 miles to a gate. Continue through the gate, travel 0.8 miles, and turn right. Proceed for another 0.1 miles and park. Navigate to the 0-foot stake using a GPS. The 0-foot stake is marked by browse tag #149.

**Site Information**

Land Ownership	State
Land Administrator	SITLA
Allotment	SANDY CREEK
Elevation	7,244ft (2,208m)
Aspect	Southwest
Slope	10-15%
Sample Dates	07/24/2013, 08/25/2016, 06/19/2018

**Table 28-23.1 Disturbance History.** Recorded history of major disturbances.

Treatment/Disturbance	Name	WRI DB#	Date	Size (acres)
Chaining - Two-Way Ely	Panguitch West Bench Habitat Improvement	2373	September-November 2012	276
Seeding - Aerial Before	Panguitch West Bench Habitat Improvement	2373	September 2012	276
Seeding - Dribbler	Panguitch West Bench Habitat Improvement	2373	September-November 2012	276
Seeding - Aerial After	Panguitch West Bench Habitat Improvement	2373	February 2013	276

**Table 28-23.2 Seed Mix.** List of known seeded plant species and rates (if available).

Mix Name			Application Type	Application Date	Acres
Panquitch West Bench			Aerial	Sep 2012	276
Type	Species	Common Name	Cultivar/Source ID	Bulk lbs/acre	PLS
G	Achnatherum hymenoides	Indian Ricegrass	Rimrock	0.72	0.68
G	Agropyron cristatum	Crested Wheatgrass	Douglas	0.54	0.52
G	Agropyron cristatum	Crested Wheatgrass	Hycrest II	0.54	0.48
G	Poa secunda	Canby Bluegrass	Canbar	0.49	0.26
G	Pseudoroegneria spicata	Bluebunch Wheatgrass	Anatone	0.54	0.53
G	Thinopyrum ponticum	Tall Wheatgrass	Alkar	1.00	0.94
F	Achillea millefolium	Western Yarrow	Eagle Mountain	0.09	0.08
F	Astragalus cicer	Cicer Milkvetch	Lutana	1.45	1.05
F	Medicago sativa	Alfalfa	Ladak DL	1.99	1.85
F	Melilotus officinalis	Yellow Sweetclover		0.54	0.51
F	Penstemon palmeri	Palmer Penstemon	Carbon/Emery UT	0.25	0.20
F	Sanguisorba minor	Small Burnet	Delar	1.63	1.46
Mix Name			Application Type	Application Date	Acres
Panquitch West Bench - Dribbler Mix			Dribbler	Sep 2012	276
Type	Species	Common Name	Cultivar/Source ID	Bulk lbs/acre	PLS
F	Balsamorhiza sagittata	Arrowleaf Balsamroot	Piute UT	0.04	0.03
F	Sanguisorba minor	Small Burnet	Delar	0.36	0.32
S	Ephedra viridis	Green Ephedra	Emery UT	0.11	0.10
S	Purshia tridentata	Bitterbrush	Garfield UT	0.18	0.15
Mix Name			Application Type	Application Date	Acres
Panquitch West Bench - Browse Mix			Aerial	Sep 2012	276
Type	Species	Common Name	Cultivar/Source ID	Bulk lbs/acre	PLS
		Rice Hulls		0.25	0.00
S	Artemisia tridentata ssp. vaseyana	Mountain Big Sagebrush	Sevier UT	0.22	0.06
S	Artemisia tridentata ssp. wyomingensis	Wyoming Big Sagebrush	Piute UT	0.43	0.13
S	Bassia prostrata	Forage Kochia	Beaver UT	0.22	0.15

**Wildlife Habitat and Vegetation History****Table 28-23.3 - Wildlife Seasonal Habitat.** UDWR wildlife habitat and seasonality.

Species	Habitat	Season
Deer	crucial	winter
Elk	substantial	winter

**Table 28-23.4 - Vegetation History.** The dominant vegetation type(s) and phase of woodland succession (Tausch, Miller, Roundy, & Chambers, 2009).

Year	Vegetation Type	Woodland Succession
2013	Perennial Grass	Phase I
2016	Perennial Grass	Phase I
2018	Perennial Grass	Phase I

**Site Notes**

The site was treated the year prior to establishment of the study.

**Site Potential**

1981 - 2010 Average Annual Precipitation	13 inches
NRCS Ecological Site	Upland Stony Loam (Black Sagebrush)
NRCS Ecological Site #	R047XB332UT
States and Transitions	No state and transition model is available for this ecological site.

When this study was established in 2013, twoneedle pinyon (*Pinus edulis*) and Utah juniper (*Juniperus osteosperma*) trees had recently undergone a chaining treatment and provided low cover, although many of the young trees were not affected by the treatment (Table 28-23.14). Total shrub cover has fluctuated, but cover of preferred browse species has remained low throughout the study years (Table 28-23.12). Herbaceous vegetation was initially sparse, but has exhibited a substantial increase overall. The native perennial grass species squirreltail (*Elymus elymoides*) and blue grama (*Bouteloua gracilis*) contributed a majority of the understory cover in 2018 (Table 28-23.7, 28-23.10). Trees have remained low in cover, but density has slightly increased since 2016. With the density of young pinyon and juniper trees which were not affected by or survived the treatment, this site has the potential for infilling (Table 28-23.12, Table 28-23.14).

**Trend Summary Tables****Table 28-23.6 - Shrub/Tree Summary.** Average modified Daubenmire quadrat and line intercept cover by year for shrubs/trees

Year	Quadrat Cover (%)			Line-intercept Cover (%)		
	Preferred Shrub	Other Shrub	Tree	Preferred Shrub	Other Shrub	Tree
2013	0.1	0.3	0.5	0.2	0.1	1.4
2016	1.1	3.0	0.6	0.3	5.3	0.9
2018	0.9	1.3	0.9	0.8	0.4	1.4

**Table 28-23.7 - Herbaceous Summary.** Nested frequency and average modified Daubenmire quadrat cover by year for herbaceous functional groups

Year	Nested Frequency				Quadrat Cover (%)			
	Annual Grass	Perennial Grass	Annual/Biennial Forb	Perennial Forb	Annual Grass	Perennial Grass	Annual/Biennial Forb	Perennial Forb
2013	-	72	35	20	-	1.5	0.3	0.2
2016	13	294	139	12	0.3	13.0	2.9	0.1
2018	3	239	5	2	0.0	11.9	0.0	0.1

**Table 28-23.8 - Basic Ground Cover.** Average modified Daubenmire quadrat cover by year for basic ground cover types.

Year	Cover Type (%)					
	Bare Ground	Cryptogams	Litter	Pavement	Rock	Vegetation
2013	20.6	0.2	52.7	5.3	21.0	2.7
2016	18.8	0.0	42.6	6.5	15.0	20.1
2018	28.3	0.0	50.2	5.6	18.5	13.9

**Table 28-23.9 - Pellet Group Data.** Quadrat frequency and pellet group transect data for animal pellets. Rabbit pellet groups are not sampled in the pellet group transect.

Year	Cattle	Mule Deer	Rocky Mountain Elk	Rabbit
	Quadrat Frequency			
2013	-	1	-	3
2016	-	18	2	54
2018	1	16	3	38
Year	Days Use Per Acre (ha)			
2013	-	0.7 (1.7)	-	-
2016	1.5 (3.6)	21.5 (53.0)	7.4 (18.2)	-
2018	5.8 (14.3)	18.1 (44.7)	0.7 (1.7)	-



**Table 28-23.10 - Grass Species.** Nested frequency and modified Daubenmire average cover by year.

GRASS SPECIES	Achnatherum hymenoides (Indian ricegrass)	Agropyron cristatum <sup>i</sup> (crested wheatgrass)	Bouteloua gracilis (blue grama)	Bromus tectorum <sup>ai</sup> (cheatgrass)	Carex (sedge)	Carex obtusata (obtusate sedge)	Elymus elymoides (squirreltail)	Pascopyrum smithii (western wheatgrass)	Poa fendleriana (muttongrass)	Poa secunda (Sandberg bluegrass)	Pseudoroegneria spicata (bluebunch wheatgrass)	Thinopyrum intermedium <sup>i</sup> (intermediate wheatgrass)
year	Nested Frequency											
2013	2	-	51	-	2	-	6	-	16	-	-	-
2016	16	10	85	13	-	15	212	1	15	8	21	3
2018	12	-	87	3	14	34	93	4	37	-	42	1
year	Average Cover (%)											
2013	0.0	-	1.2	-	0.0	-	0.0	-	0.3	-	-	-
2016	0.3	0.4	3.6	0.3	-	0.2	6.8	0.0	0.5	0.0	0.9	0.2
2018	0.7	-	3.8	0.0	0.2	0.5	4.0	0.2	0.9	-	1.6	0.0

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

**Table 28-23.11 - Forb Species.** Nested frequency and modified Daubenmire average cover by year.

FORB SPECIES	Ambrosia <sup>a</sup> (ragweed)	Astragalus (milkvetch)	Chenopodium fremontii <sup>a</sup> (Fremont's goosefoot)	Chenopodium leptophyllum <sup>a</sup> (narrowleaf goosefoot)	Cryptantha (cryptantha)	Descurainia pinnata <sup>a</sup> (western tansymustard)	Erigeron pumilus (shaggy fleabane)	Gayophytum ramosissimum <sup>a</sup> (pinyon groundsmoke)	Hedysarum boreale (Utah sweetvetch)	Lactuca scariola <sup>ai</sup> (prickly lettuce)	Lappula occidentalis <sup>ai</sup> (flatspine stickseed)	Penstemon caespitosus (mat penstemon)	Penstemon palmeri (Palmer's penstemon)	Polygonum douglasii <sup>a</sup> (Douglas' knotweed)	Portulaca oleracea <sup>ai</sup> (little hogweed)	Salsola tragus <sup>ai</sup> (prickly Russian thistle)	Sanguisorba minor <sup>i</sup> (small burnet)
year	Nested Frequency																
2013	-	-	-	-	1	3	-	1	-	-	-	7	4	3	30	-	8
2016	29	1	52	-	-	2	2	-	2	5	11	-	-	3	67	7	4
2018	-	1	-	2	-	-	-	-	-	-	-	-	-	-	-	3	-
year	Average Cover (%)																
2013	-	-	-	-	0.0	0.2	-	0.0	-	-	-	0.0	0.1	0.0	0.1	-	0.0
2016	0.2	0.0	1.1	-	-	0.0	0.0	-	0.0	0.0	0.1	-	-	0.0	0.6	0.9	0.1
2018	-	0.0	-	0.0	-	-	-	-	-	-	-	-	-	-	-	0.0	-

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

FORB SPECIES		
Sphaeralcea coccinea (scarlet globemallow)		
Taraxacum officinale (common dandelion)		
year	Nested Frequency	
2013	-	-
2016	-	3
2018	1	-
year	Average Cover (%)	
2013	-	-
2016	-	0.0
2018	0.0	-

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

**Table 28-23.12 - Shrub and Tree Species.** Average modified Daubenmire quadrat and line intercept cover by year.

SHRUB SPECIES								
Artemisia nova <sup>p</sup> (black sagebrush)								
Artemisia tridentata ssp. vaseyana <sup>p</sup> (mountain big sagebrush)								
Chrysothamnus viscidiflorus (yellow rabbitbrush)								
Gutierrezia sarothrae (broom snakeweed)								
Juniperus osteosperma <sup>t</sup> (Utah juniper)								
Opuntia (pricklypear)								
Pinus edulis <sup>t</sup> (twonneedle pinyon)								
Purshia tridentata <sup>p</sup> (antelope bitterbrush)								
year	Line Intercept Cover (%)							
2013	0.2	-	-	0.1	0.4	-	1	-
2016	0.2	0.1	0.5	4.8	0.5	0	0.4	0
2018	0.2	0.6	-	0.4	0.6	-	0.8	-
year	Quadrat Cover (%)							
2013	0.1	-	-	0.1	0.3	0.2	0.2	-
2016	1.1	0.0	0.3	2.7	0.1	0.0	0.4	0.0
2018	0.9	0.0	-	1.3	0.4	0.0	0.6	-

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

**Table 28-23.13 - Shrub/Tree Characteristics.** Population characteristics of shrub/tree species populations including density reproduction (seedlings), age distribution, utilization, vigor and average size (height/crown) of plants.

Year	Density		Age Class Distribution			Utilization		Poor Vigor (%)	Average Height Crown (cm)
	Plants Per Acre		Excluding Seedlings			Moderate (%)	Heavy (%)		
	Excluding Seedlings	Seedling	Young (%)	Mature (%)	Decadent (%)				
<b>Artemisia nova<sup>p</sup> -- (black sagebrush)</b>									
2013	180	-	0	44	56	11	0	22	27/47
2016	200	-	10	70	20	30	30	20	27/49
2018	160	-	13	75	13	25	13	0	20/39
<b>Artemisia tridentata ssp. vaseyana<sup>p</sup> -- (mountain big sagebrush)</b>									
2013	20	-	0	100	0	0	0	0	28/44
2016	20	-	0	100	0	0	0	0	37/74
2018	60	-	0	100	0	0	0	0	66/75

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 (%)				
<b>Cercocarpus ledifolius<sup>p</sup> -- (curl-leaf mountain mahogany)</b>									
2013	-	-	-	-	-	-	-	-	79/84
2016	-	-	-	-	-	-	-	-	86/150
2018	-	-	-	-	-	-	-	-	-/-
<b>Chrysothamnus viscidiflorus -- (yellow rabbitbrush)</b>									
2013	-	-	-	-	-	-	-	-	-/-
2016	180	-	0	100	0	0	0	0	35/58
2018	20	-	0	100	0	0	0	0	43/41
<b>Ericameria nauseosa ssp. nauseosa var. hololeuca<sup>p</sup> -- (rubber rabbitbrush)</b>									
2013	-	-	-	-	-	-	-	-	-/-
2016	-	-	-	-	-	-	-	-	-/-
2018	-	-	-	-	-	-	-	-	28/37
<b>Gutierrezia sarothrae -- (broom snakeweed)</b>									
2013	200	-	50	50	0	0	0	0	24/26
2016	4240	20	6	93	1	0	0	1	28/36
2018	1900	-	25	66	8	4	1	2	18/21
<b>Juniperus osteosperma<sup>t</sup> -- (Utah juniper)</b>									
2013	60	-	0	33	67	0	0	67	-/-
2016	40	-	0	50	50	0	0	0	-/-
2018	40	-	0	100	0	0	0	0	-/-
<b>Opuntia -- (pricklypear)</b>									
2013	120	20	0	83	17	0	0	17	12/29
2016	140	-	0	100	0	0	0	14	10/22
2018	60	-	0	100	0	0	0	0	10/21
<b>Pinus edulis<sup>t</sup> -- (twoneedle pinyon)</b>									
2013	180	40	67	33	0	0	0	44	-/-
2016	140	160	43	57	0	0	0	29	-/-
2018	200	80	80	20	0	0	0	0	-/-
<b>Purshia tridentata<sup>p</sup> -- (antelope bitterbrush)</b>									
2013	20	-	100	0	0	0	0	0	-/-
2016	20	-	0	100	0	0	100	0	31/26
2018	20	-	0	100	0	0	0	0	28/57

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

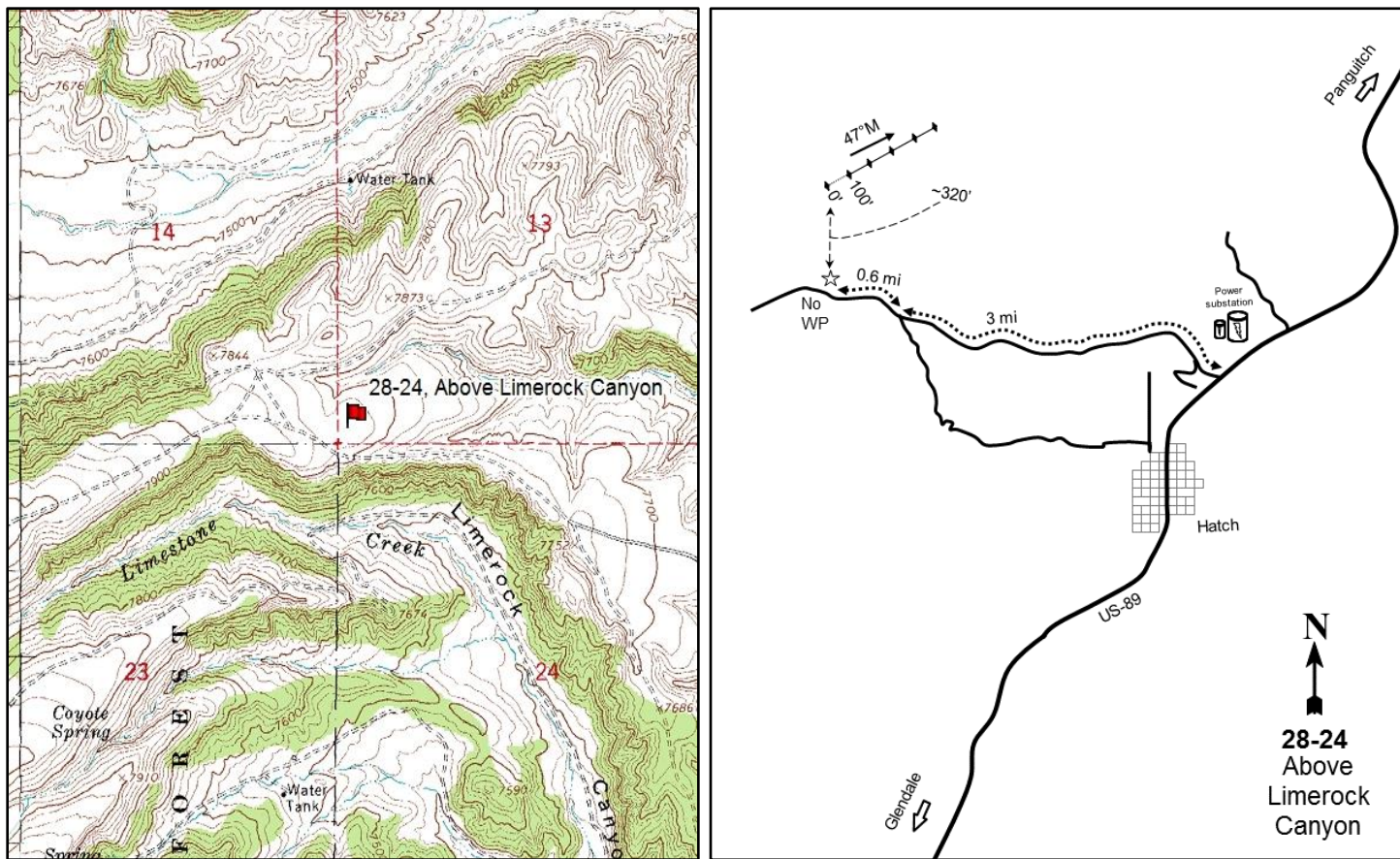
**Table 28-23.14 - Tree Characteristics.** Point-quarter tree density, size class distribution, and average diameter.

Year	Density	Size Class Distribution					Average Diameter (cm)
	Trees per Acre	Seedling (%)	1-4' (%)	4-8' (%)	8-12' (%)	>12' (%)	
<b>Juniperus osteosperma (Utah juniper)</b>							
2013	76	11	50	17	22	-	8.2
2016	51	13	56	31	-	-	6.4
2018	69	6	82	12	-	-	10.4
<b>Pinus edulis (twoneedle pinyon)</b>							
2013	89	10	55	20	15	-	5.5
2016	71	15	45	40	-	-	4.3
2018	79	26	53	21	-	-	4.2

**Table -28-23.15 - Deer Desirable Components Index: Mid Potential Scale.**

Year	Preferred Browse Cover	Preferred Browse Decadence	Preferred Browse Young	Perennial Grass Cover	Annual Grass Cover	Perennial Forb Cover	Noxious Weeds	Total Score	Ranking
2013	0.3	0	0	3.1	0	0.4	0	<b>3.8</b>	Very Poor
2016	0.4	0	0	25.9	-0.2	0.3	0	<b>26.4</b>	Very Poor
2018	1	0	0	23.9	0	0.1	0	<b>25</b>	Very Poor

## ABOVE LIMEROCK CANYON - STUDY NO. 28-24



### Location Information

USGS 7.5 min Map Info  
GPS (0' Stake)

Hatch SW; Township 36S, Range 6W, Section 13  
NAD 83 UTM ZONE 12, 368953 East 4170701 North

### Transect Information

Browse Tag # (0' Stake)	571
Transect Bearing	47° 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: 1ft

### Directions to Site

Driving north from the town of Hatch, turn left onto Pass Creek Road (in between two power substations). Continue east on this road for about 3 miles to a fork with the To Hatch road. Proceed straight for 0.6 miles and park; there is no witness post. The 0-foot stake is approximately 320 feet north of the road and is marked by browse tag #571.

**Site Information**

Land Ownership	Federal
Land Administrator	BLM
Allotment	ROCK CANYON
Elevation	No data
Aspect	Northeast
Slope	2%
Sample Dates	06/20/2018

**Table 28-24.1 Disturbance History.** Recorded history of major disturbances.

Treatment/Disturbance	Name	WRI DB#	Date	Size (acres)
Seeding - Aerial Before	South Canyon (Limestone)	3264	November 2015	1694
Mechanical - Bullhog	South Canyon (Limestone)	3264	October 2015-January 2016	1694

**Wildlife Habitat and Vegetation History**

**Table 28-24.3 - Wildlife Seasonal Habitat.** UDWR wildlife habitat and seasonality.

Species	Habitat	Season
Deer	crucial	winter
Greater Sage Grouse		

**Table 28-24.4 - Vegetation History.** The dominant vegetation type(s) and phase of woodland succession (Tausch, Miller, Roundy, & Chambers, 2009).

Year	Vegetation Type	Woodland Succession
2018	Bitterbrush/Mountain Big Sagebrush	Phase I

**Site Notes**

No Notes

**Soils**

**Table 28-24.5 - 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
Loam	6.4	50.2	29.4	20.4	3.1	43.0	300.0	0.3	06/20/2018

**Site Potential**

1981 - 2010 Average Annual Precipitation	17 inches
NRCS Ecological Site	Mountain Stony Loam (Antelope Bitterbrush)
NRCS Ecological Site #	R047XB456UT
States and Transitions	No state and transition model is available for this ecological site.

Upon establishment in 2018, this study site existed as a stand of mountain big sagebrush (*Artemisia tridentata* ssp. *vaseyana*) and antelope bitterbrush (*Purshia tridentata*) with a minor component of black sagebrush (*A. nova*) (Photos, Table 28-24.12, Table 28-24.13). The herbaceous understory was abundant and mainly composed of perennial grasses, primarily the introduced species crested wheatgrass (*Agropyron cristatum*) and the native species squirreltail (*Elymus elymoides*); forbs were lacking in diversity and abundance (Table 28-24.7, Table 28-24.10, Table 28-24.11). Although the area underwent a bullhog and seeding treatment in the winter of 2015, small twoneedle pinyon (*Pinus edulis*) were observed in both cover and density measurements (Table 28-24.12, Table 28-24.13, Table 28-24.14), indicating that there may be potential for further encroachment in future sample years.

**Trend Summary Tables**

**Table 28-24.6 - 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
2018	31.7	0.1	0.0	41.3	0.2	0.1

**Table 28-24.7 - Herbaceous Summary.** Nested frequency and average modified Daubenmire quadrat cover by year for herbaceous functional group

Year	Nested Frequency				Quadrat Cover (%)			
	Annual Gras	Perennial Gras	Annual/Biennial For	Perennial For	Annual Gras	Perennial Gras	Annual/Biennial For	Perennial For
2018	-	280	1	16	-	18.4	0.0	0.2

**Table 28-24.8 - 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
2018	12.9	0.2	61.9	6.9	11.5	42.4

**Table 28-24.9 - 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			
2018	1	7	2	30
Year	Days Use Per Acre (ha)			
2018	2.2 (5.4)	20.1 (49.7)	2.7 (6.6)	-

**Table 28-24.10 - Grass Species.** Nested frequency and modified Daubenmire average cover by year.

GRASS SPECIES								
Achnatherum hymenoides (Indian ricegrass)								
Achnatherum lettermanii (Letterman's needlegrass)								
Agropyron cristatum <sup>i</sup> (crested wheatgrass)								
Bouteloua gracilis (blue grama)								
Elymus elymoides (squirreltail)								
Hesperostipa comata (needle and thread)								
Poa fendleriana (muttongrass)								
Poa pratensis <sup>i</sup> (Kentucky bluegrass)								
year	Nested Frequency							
2018	3	16	147	41	121	7	2	2
year	Average Cover (%)							
2018	0.4	0.7	8.9	2.6	5.2	0.5	0.1	0.0

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

**Table 28-24.11 - Forb Species.** Nested frequency and modified Daubenmire average cover by year.

FORB SPECIES				
Descurainia pinnata <sup>a</sup> (western tansymustard)				
Plectranthus spinosus (thorn skeletonweed)				
Sanguisorba minor <sup>i</sup> (small burnet)				
Trifolium (clover)				
year	Nested Frequency			
2018	1	8	3	5
year	Average Cover (%)			
2018	0.0	0.1	0.1	0.0

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

**Table 28-24.12 - Shrub and Tree Species.** Average modified Daubenmire quadrat and line intercept cover by year.

SHRUB SPECIES					
Artemisia nova <sup>p</sup> (black sagebrush)					
Artemisia tridentata ssp. vaseyana <sup>p</sup> (mountain big sagebrush)					
Opuntia polyacantha (plains pricklypear)					
Pinus edulis <sup>i</sup> (twoneedle pinyon)					
Purshia tridentata <sup>p</sup> (antelope bitterbrush)					
year	Line Intercept Cover (%)				
2018	5.6	15.9	0.2	0.1	19.8
year	Quadrat Cover (%)				
2018	3.4	12.6	0.1	0.0	15.8

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



**Table 28-24.13 - Shrub/Tree Characteristics.** Population characteristics of shrub/tree species populations including density reproduction (seedlings), age distribution, utilization, vigor and average size (height/crown) of plants.

Year	Density		Age Class Distribution			Utilization		Poor Vigor (%)	Average Height Crown (cm)
	Plants Per Acre		Excluding Seedlings			Moderate (%)	Heavy (%)		
	Excluding Seedlings	Seedling	Young (%)	Mature (%)	Decadent (%)				
Artemisia nova <sup>p</sup> -- (black sagebrush)									
2018	1200	-	0	92	8	15	0	5	43/74
Artemisia tridentata ssp. vaseyana <sup>p</sup> -- (mountain big sagebrush)									
2018	3740	220	10	80	11	2	0	5	55/68
Chrysothamnus viscidiflorus ssp. viscidiflorus var. viscidiflorus -- (yellow rabbitbrush)									
2018	140	-	71	29	0	57	0	0	12/18
Opuntia polyacantha -- (plains pricklypear)									
2018	40	-	0	100	0	0	0	50	14/27
Pinus edulis <sup>t</sup> -- (twoneedle pinyon)									
2018	80	80	75	25	0	0	0	0	- / -
Purshia tridentata <sup>p</sup> -- (antelope bitterbrush)									
2018	2060	-	15	85	0	39	21	0	71/122

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

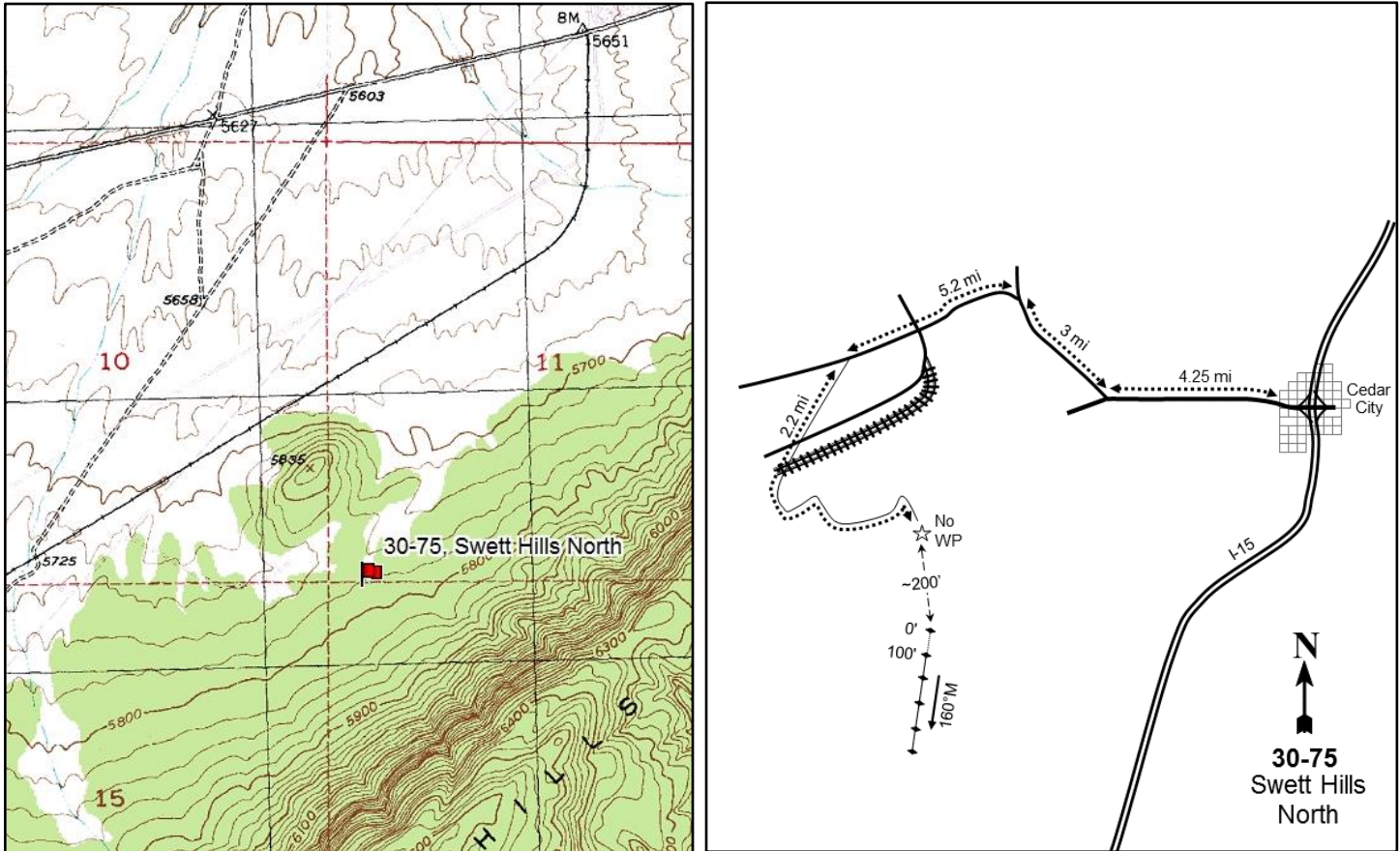
**Table 28-24.14 - Tree Characteristics.** Point-quarter tree density, size class distribution, and average diameter.

Year	Density	Size Class Distribution					Average Diameter (cm)
	Trees per Acre	Seedling (%)	1-4' (%)	4-8' (%)	8-12' (%)	>12' (%)	
Pinus edulis (twoneedle pinyon)							
2018	78	80	20	-	-	-	1.1

**Table -28-24.15 - Deer Desirable Components Index: High Potential Scale.**

Year	Preferred Browse Cover	Preferred Browse Decadence	Preferred Browse Young	Perennial Grass Cover	Annual Grass Cover	Perennial Forb Cover	Noxious Weeds	Total Score	Ranking
2018	30	13.4	5.3	30	0	0.3	0	<b>79.1</b>	Good

## SWETT HILLS NORTH - STUDY NO. 30-75

**Location Information**

USGS 7.5 min Map Info  
GPS (0' Stake)

Desert Mound SE; Township 36S, Range 13W, Section 14  
NAD 83 UTM ZONE 12, 298294 East 4172441 North

**Transect Information**

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

Not Available  
160° magnetic  
500ft  
Line 1 (11ft), Line 2 (34ft), Line 3 (59ft), Line 4 (71ft), Line 5 (95ft)  
Standard

**Directions to Site**

From I-15 in Cedar City, travel west on Highway 56 for 4.25 miles to West 4800 North (West Iron Springs Road). Bear right and continue for 3 miles. At a "Y" intersection, turn left onto Desert Mount Road and proceed for 5.2 miles to a railroad track. Turn left onto a dirt road 0.25 miles after the track. Follow this road, crossing a gravel road and the railroad tracks. At a "T"-junction, turn left and follow this road through the trees. The site will be 800 feet past a treated clearing.

**Site Information**

Land Ownership	Federal
Land Administrator	BLM
Allotment	EIGHT MILE HILLS
Elevation	No data
Aspect	northwest
Slope	5-10%
Sample Dates	05/23/2018

**Table 30-75.1 Disturbance History.** Recorded history of major disturbances.

Treatment/Disturbance	Name	WRI DB#	Date	Size (acres)
Seeding - Aerial Before	Duncan Creek - Final Phase	3563	Fall 2016	998
Mechanical - Bullhog	Duncan Creek - Final Phase	3563	October 2016-May 2017	998

**Wildlife Habitat and Vegetation History****Table 30-75.3 - Wildlife Seasonal Habitat.** UDWR wildlife habitat and seasonality.

Species	Habitat	Season
Deer	substantial	winter

**Table 30-75.4 - Vegetation History.** The dominant vegetation type(s) and phase of woodland succession (Tausch, Miller, Roundy, & Chambers, 2009).

Year	Vegetation Type	Woodland Succession
2018	Perennial Grass/Stansbury Cliffrose	Phase I

**Site Notes**

No Notes

**Soils****Table 30-75.5 - 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	7.8	64.2	19.4	16.4	2.2	10.0	167.0	0.4	05/23/2018

**Site Potential**

1981 - 2010 Average Annual Precipitation	13 inches
NRCS Ecological Site	Upland Gravelly Loam (Wyoming Big Sagebrush)
NRCS Ecological Site #	R028AY307UT
States and Transitions	No state and transition model is available for this ecological site.

The site was established in 2018 to monitor deer habitat west of Cedar City in areas recently treated to remove pinyon (*Pinus sp.*) and Utah juniper trees (*Juniperus osteosperma*). The site lacked in significant amounts of browse cover, but Stansbury cliffrose (*Purshia stansburiana*) was the primary species sampled with almost two percent cover (Table 30-75.12). The understory was dominated by a mix of both introduced and native grasses. Crested wheatgrass (*Agropyron cristatum*) contributed the most perennial grass cover, while the introduced annual species cheatgrass (*Bromus tectorum*) was sampled with approximately five percent cover. Annual grass cover may decrease over time as other perennial species grow and compete for resources (Table 30-75.7, Table 30-75.10). Cover of perennial and annual forbs was low to moderate, but composition was moderately diverse. The introduced annual species tall tumbled mustard (*Sisymbrium altissimum*) was the dominant forb species sampled in 2018 (Table 30-75.7, Table 30-75.11). Utah juniper (*Juniperus osteosperma*) was also observed, with all trees sampled being seedlings. Although density and age of trees are low as of 2018, maintenance projects such as lop and scatter may be advisable in the future to prevent further infilling (Table 30-75.14).

**Trend Summary Tables**

**Table 30-75.6 - 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
2018	0.9	0.2	0.0	2.5	0.3	-

**Table 30-75.7 - 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
2018	169	115	51	48	5.4	8.4	3.2	1.2

**Table 30-75.8 - 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
2018	18.8	0.1	69.8	3.5	6.0	20.6

**Table 30-75.9 - 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		
2018	22	1	40
Year	Days Use Per Acre (ha)		
2018	23.4 (57.9)	-	-

**Table 30-75.10 - Grass Species.** Nested frequency and modified Daubenmire average cover by year.

GRASS SPECIES	Achnatherum hymenoides (Indian ricegrass)	Agropyron cristatum <sup>i</sup> (crested wheatgrass)	Aristida purpurea (purple threeawn)	Bromus tectorum <sup>ai</sup> (cheatgrass)	Elymus elymoides (squirreltail)	Elymus trachycaulus (slender wheatgrass)	Pascopyrum smithii (western wheatgrass)	Psathyrostachys juncea <sup>i</sup> (Russian wildrye)	Pseudoroegneria spicata (bluebunch wheatgrass)	Thinopyrum intermedium <sup>i</sup> (intermediate wheatgrass)	Vulpia octoflora <sup>a</sup> (sixweeks fescue)
year	Nested Frequency										
2018	2	61	3	169	30	13	4	4	15	12	5
year	Average Cover (%)										
2018	0.2	4.8	0.0	5.4	0.8	0.4	0.2	0.3	1.3	0.4	0.0

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

**Table 30-75.11 - Forb Species.** Nested frequency and modified Daubenmire average cover by year.

FORB SPECIES	Nested Frequency																
year	Average Cover (%)																
Astragalus lentiginosus (freckled milkvetch)	2	2	8	4	0	15	9	6	11	2	1	10	1	4	5	3	7
Cryptantha <sup>a</sup> (annual cryptantha)	0.1	0.0	0.1	0.0	0.0	0.2	0.1	0.0	0.1	0.1	0.0	0.2	0.0	0.0	0.1	0.1	0.2
Cryptantha gracilis <sup>a</sup> (narrowstem cryptantha)																	
Descurainia incana <sup>a</sup> (mountain tansymustard)																	
Draba <sup>a</sup> (draba)																	
Eriogonum caespitosum (matted buckwheat)																	
Eriogonum cernuum <sup>a</sup> (nodding buckwheat)																	
Gilia inconspicua <sup>a</sup> (shy gilia)																	
Lactuca serriola <sup>ai</sup> (prickly lettuce)																	
Lappula occidentalis <sup>a</sup> (flatspine stickseed)																	
Lomatium (desertparsley)																	
Nicotiana attenuata <sup>a</sup> (coyote tobacco)																	
Onobrychis vicifolia <sup>i</sup> (sainfoin)																	
Packera multilobata (lobeleaf groundsel)																	
Penstemon confusus (Owens Valley beardtongue)																	
Penstemon palmeri (Palmer's penstemon)																	
Sanguisorba minor <sup>i</sup> (small burnet)																	

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

FORB SPECIES	Nested Frequency		
year	Average Cover (%)		
Sisymbrium altissimum <sup>ai</sup> (tall tumblemustard)	9	6	7
Sphaeralcea grossulariifolia (gooseberry/leaf globemallow)	2.6	0.3	0.1
Streptanthus cordatus (heartleaf twistflower)			

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

**Table 30-75.12 - Shrub and Tree Species.** Average modified Daubenmire quadrat and line intercept cover by year.

SHRUB SPECIES	Line Intercept Cover (%)				
year	Quadrat Cover (%)				
Artemisia tridentata ssp. wyomingensis <sup>p</sup> (Wyoming big sagebrush)	0.6	0.2	-	0.1	1.9
Gutierrezia sarothrae (broom snakeweed)	0.4	0.0	0.0	0.2	0.5
Juniperus osteosperma <sup>i</sup> (Utah juniper)					
Opuntia polyacantha (plains pricklypear)					
Purshia stansburiana <sup>p</sup> (Stansbury cliffrose)					

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

**Table 30-75.13 - 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 (%)				
<b>Artemisia tridentata ssp. wyomingensis<sup>p</sup> -- (Wyoming big sagebrush)</b>									
2018	120	-	33	67	0	17	0	0	32/40
<b>Atriplex canescens<sup>p</sup> -- (fourwing saltbush)</b>									
2018	20	-	100	0	0	0	0	0	33/30
<b>Bassia prostrata<sup>pi</sup> -- (forage kochia)</b>									
2018	-	-	-	-	-	-	-	-	13/21
<b>Echinocereus coccineus -- (scarlet hedgehog cactus)</b>									
2018	-	-	-	-	-	-	-	-	11/23
<b>Ericameria nauseosa ssp. nauseosa var. hololeuca<sup>p</sup> -- (rubber rabbitbrush)</b>									
2018	-	-	-	-	-	-	-	-	20/37
<b>Gutierrezia sarothrae -- (broom snakeweed)</b>									
2018	440	-	18	82	0	0	0	5	22/37
<b>Juniperus osteosperma<sup>t</sup> -- (Utah juniper)</b>									
2018	20	40	100	0	0	0	0	0	- / -
<b>Opuntia polyacantha -- (plains pricklypear)</b>									
2018	340	-	0	100	0	0	0	6	11/27
<b>Pinus edulis<sup>t</sup> -- (twoneedle pinyon)</b>									
2018	40	20	100	0	0	0	0	50	- / -
<b>Purshia stansburiana<sup>p</sup> -- (Stansbury cliffrose)</b>									
2018	360	20	61	39	0	17	33	11	129/129

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

**Table 30-75.14 - 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' (%)	
<b>Juniperus osteosperma (Utah juniper)</b>							
2018	30	100	-	-	-	-	3.0

**Table -30-75.15 - Deer Desirable Components Index: Mid Potential Scale.**

Year	Preferred Browse Cover	Preferred Browse Decadence	Preferred Browse Young	Perennial Grass Cover	Annual Grass Cover	Perennial Forb Cover	Noxious Weeds	Total Score	Ranking
2018	3.6	0	0	16.7	-4.1	2.4	0	<b>18.7</b>	Very Poor

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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).

Vegetation Type Code	Vegetation Community Type Name*	Description
QUGA	Gambel Oak	Major component of the site (typically >5% cover).
QUTU	Live Oak	Major component of the site (typically >5% cover).
SYOR	Snowberry	Major component of the site (typically >5% cover).
AMAL	Serviceberry	Major component of the site (typically >5% cover).
PUTR	Bitterbrush	Major component of the site (typically >5% cover).
PUGL	Desert Bitterbrush	Major component of the site (typically >5% cover).
ARCT2	Manzanita	Major component of the site (typically >5% cover).
CEMOM	True Mountain Mahogany	Major component of the site (typically >5% cover).
CELEL	Curleaf Mountain Mahogany	Major component of the site (typically >5% cover).
COMES	Stansbury Cliffrose	Major component of the site (typically >5% cover).
KOPR	Forage Kochia	Major component of the site (typically >5% cover).
TAMARIX	Tamarix	Major component of the site (typically >5% cover).
MMB	Mixed Mountain Brush	Mixture of one or more Mountain brush species (ARTRV, AMAL, CEMOM, etc.) with no one species expressing dominance.
MB	Mixed Shrub	Mixture of various shrub species with none expressing dominance.
CHAPARRAL	Chaparral	Mixture of fire tolerant shrub species.
JUNIPER	Juniper	Major component of the site (Phase III <sup>1</sup> ). No pinyon present.
PINYON	Pinyon	Major component of the site (Phase III <sup>1</sup> ). No juniper present.
PJ	Pinyon-Juniper	Major components of the site (Phase III <sup>1</sup> ). 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.

<sup>1</sup>Phase of woodland succession