



# UTAH WATERSHED RESTORATION INITIATIVE VEGETATION MONITORING 2019

PUBLICATION NUMBER 20-03  
REPORT FOR FEDERAL AID PROJECT W-82-R-64

STATE OF UTAH  
DEPARTMENT OF NATURAL RESOURCES  
DIVISION OF WILDLIFE RESOURCES



# Utah Watershed Restoration Initiative Vegetation Monitoring 2019

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Silvery Lupine (*Lupinus argenteus*) and Nevada Bumble Bee (*Bombus nevadensis*) by Jason Cox (2019)

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

## PROGRAM NARRATIVE

State: UTAH

Project Number: W-82-R-64

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 (UDWR) 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, however on certain management units, 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 are 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. Range trend data may also be gathered where habitat information is necessary for other wildlife species such as greater sage-grouse.

Objective: Monitor, evaluate, and report range trend within 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.

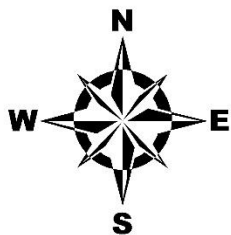
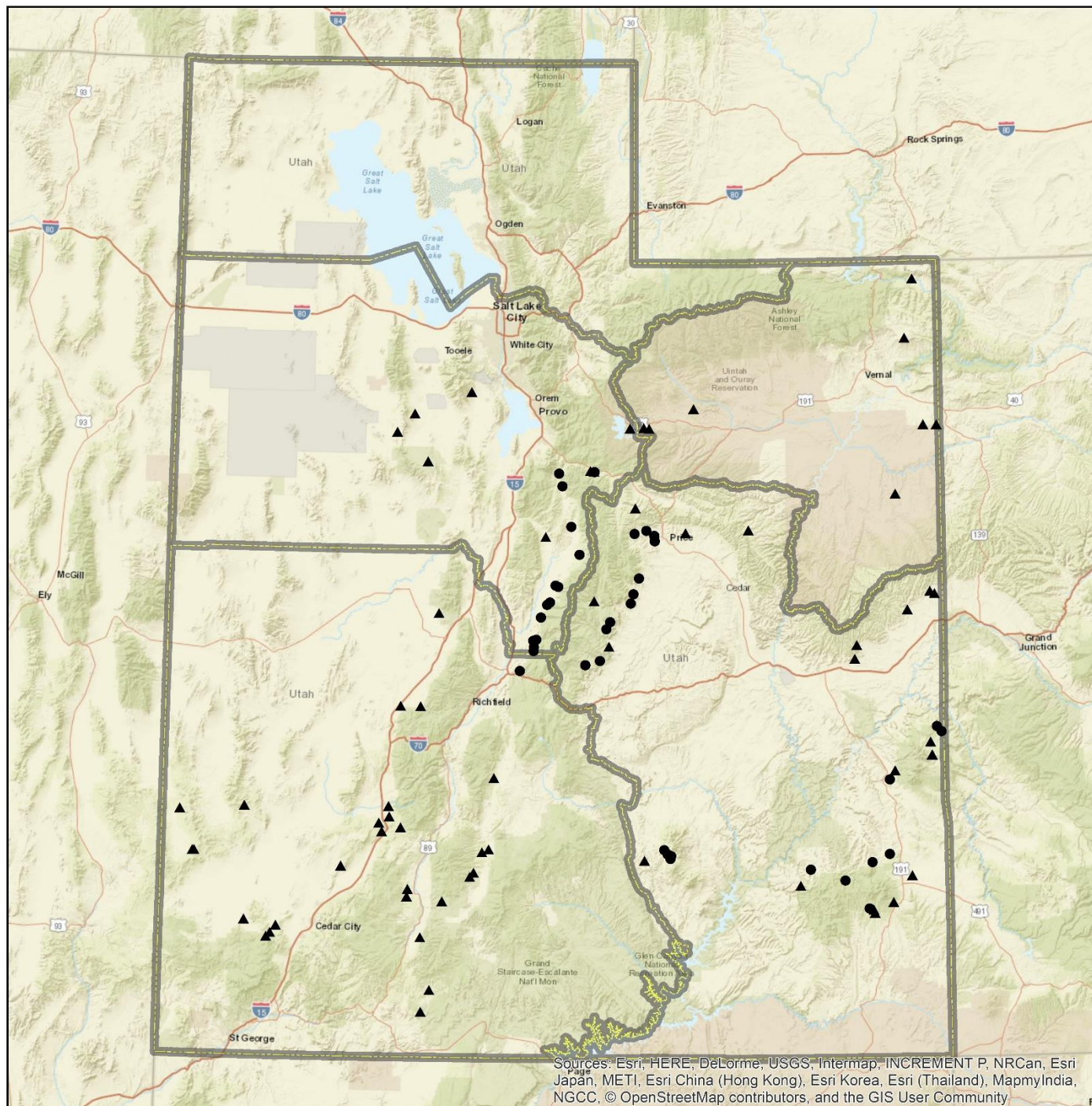
Expected Results or Benefits: Range trend studies in each region will be reread every five years, and vegetation condition and trend assessments will be made for key areas. UDWR biologists, land management personnel from the USFS and BLM, and private landowners will use the range trend database to evaluate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

## REMARKS

The work completed during the 2019 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.

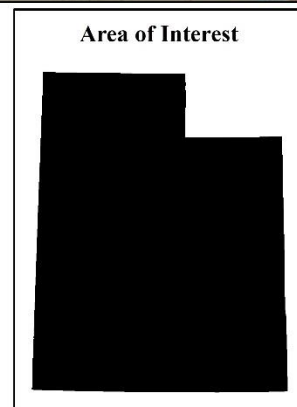
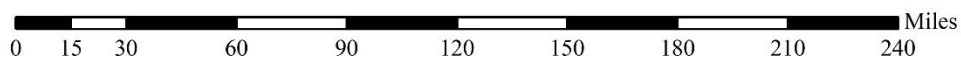
The BLM and USFS offices provided information and/or assistance in completion of the trend studies, which added to the value of this interagency report. Private landowners were cooperative in allowing access to study sites located on their land.

# RANGE TREND STUDY SITES SURVEYED IN 2019



**Study Location**

- RT
- ▲ WRI
- Region Boundary





## 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.

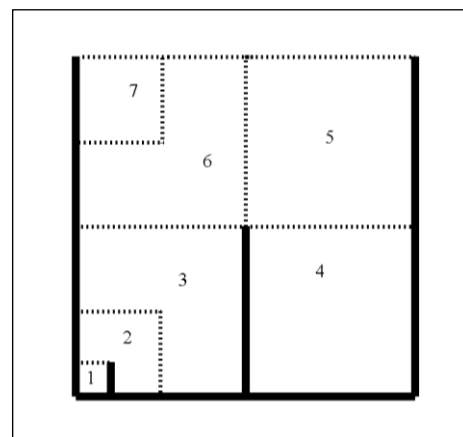
Study sites for the Watershed Restoration Initiative (WRI) are placed to monitor vegetation treatment projects. Studies are established to assess conditions prior to treatment. Each study is re-read approximately every 3-5 years following treatment.

### 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.

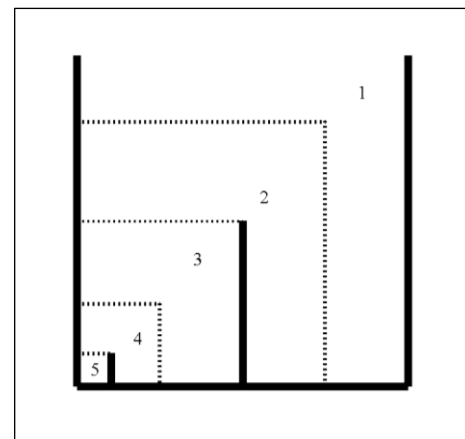
**Percent Cover:** Cover is determined using an ocular cover estimation procedure using seven cover classes (Bailey and Poulton 1968, Daubenmire 1959). The seven cover classes are: 1) .01-1%, 2) 1.1-5%, 3) 5.1-25%, 4) 25.1-50%, 5) 50.1-75%, 6) 75.1-95%, and 7) 95.1-100% (Figure 1). For example, to estimate 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.

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



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

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



**Figure 2** Nested frequency sub-quadrats of the 1/4 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 its corresponding species listed in the adjacent cell. Most vegetation types will have one dominant species listed: this is usually a shrub species (Appendix A - Vegetation Type). For example, some sites will have a shrub canopy that dominates the site with a perennial herbaceous understory that has similar average cover as the canopy, but occurs infrequently. In this case, precedence is given to the shrub layer. Vegetation type can also be shared in the case of co-dominance. Using the example above, if the herbaceous understory had a higher cover, then the shrub layer would likely share the vegetation type with the perennial understory. The history of pinyon-juniper encroachment is characterized within the table stating the phase(s) of succession and the corresponding years of persistence. Phases of woodland succession may also influence the vegetation type. For example, pinyon-juniper encroachments in phase I are not considered co-dominant and may not be listed within the vegetation type column as they are subordi vegetation type. Trees in phase II are considered co-dominant with the co-dominant understory counterpart, and under these circumstances tree species are then listed with the understory counterpart within the vegetation type column.

The following “Vegetation History” table indicates that Wyoming big sagebrush was the dominant vegetation type on the site from 1982 to 2010, but the site transitioned to an annual grass-forb community in 2015. The table also indicates that woodland succession has remained in Phase I over the sample years until 2015 when the Taylor Mountain Fire removed all of the trees on the site. The transition from Wyoming big sagebrush to an annual grass-forb community that occurred between the 2010 and 2015 sample years indicates that a trigger mechanism has occurred and a threshold has been crossed that lead to the change in community composition, and in this case is related to the Taylor Mountain fire that occurred in 2014.

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

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

#### Site Notes

This section contains miscellaneous information pertinent to the study site.

#### Soils

**Table 4:** Chemical and textural characteristics are listed here and were determined by laboratory analysis from a composite soil sample taken near each of the five baseline starting stakes (Allison and Moode 1965, Day 1965, Kenney and Nelson 1982, Normandin et. al. 1998, Olsen et. al. 1954, Rhodes 1982, Schoenau and Karamonos 1993, Sims and Jackson 1934, Walkley and Black 1971).

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

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

Percent organic matter (% OM) refers to the amount of organic matter in the top 12 inches of the soil profile. Parts per million (ppm) of phosphorus (P) and potassium (K) are also included. Values for phosphorus and potassium less than 6

ppm and 60 ppm, respectively, are considered to have low availability for plant growth and development (Tiedemann and Lopez 2004).

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

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

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

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

### *Site Potential*

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

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

### *Trend Summary Tables*

**Table 6:** The “Shrub/Tree Summary” table summarizes percent average quadrat cover and percent average line intercept cover for all shrub and tree species occurring on the site. Average quadrat cover is determined using cover classes in conjunction with the 1/4m<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

## 2019 BIG GAME RANGE TREND STUDIES - WRI PROJECTS

The following table is a list of big game range trend studies that were read in 2019 which had a Watershed Restoration Initiative (WRI) habitat treatment associated with it. The site report for each of these studies can be found in the "[Utah Big Game Range Trend Studies 2019 Wildlife Management Units 13A, 14, 15, 16B & 16C](https://wildlife.utah.gov/range-trends-archives.html)" which is available on the range trend website, <https://wildlife.utah.gov/range-trends-archives.html>.

Study #	Study Name	Type	Disturbance Name (If Available)	Date	Acres	WRI Project #
13A-8	Black Ridge	Lop and Scatter	Black Ridge Fuels Reduction and Vegetation Restoration - Phase II	2011	1359	1730
13A-12	Below Polar Rim	Lop and Scatter	Moab Mule Deer Winter Range Habitat Improvement-Phase 3	November 2018	1470	4514
13A-18	Dolores Point	Lop and Scatter	Moab Mule Deer Winter Range Habitat Improvement-Phase 3	November 2018	1470	4514
14-2	Brushy Basin	Bullhog	Brushy Basin Habitat Improvement Project Phase II	Fall 2012-Winter 2014	573	2275
14-9	Harts Draw	Single Drum/Seed	Hart Draw Sagebrush Restoration (year 1)	December 2005	629	246
14-11	Shay Mesa	Bullhog	Shay Mesa Phase II	May-June 2009	545	1091
14-23	South Plain	Transplant	Beef Basin Phase II	May 2016	10	3307
		Aerial After Plateau	Beef Basin Phase I	January 2015	272	2939
			Beef Basin Phase I	Late November 2014	272	2939
14-27	Mormon Pasture Point	Bullhog	Mormon Pasture Mountain Wildlife Habitat Improvement Phase I	November 2016	463	3774
15-4	South Creek Chaining	Lop and Scatter	Dugout Flat Lop and Scatter Phase II	Fall 2009	1396	1335
15-5	Bates Knob	Lop and Scatter	Airplane Springs Fuels Project	June-July 2008	1464	1123
15-6	Box Springs Chaining	Lop and Scatter	Bullfrog Creek Chaining Maint. Phase I	June-November 2008	164	339
15-7	Airplane Spring	Lop and Scatter	Airplane Springs Fuels Project	June-July 2008	1464	1123
16B-4	Dry Creek Chaining	Bullhog	Dry Canyon Wildlife Improvement and Fuels Reduction Project Phase I	Between July 2010 and June 2012	496	1701
16B-5	Jackson Unit	Bullhog	Birdseye WMA Bullhog Project	September 2016-December 2017	229	3605
16B-6	Mill Fork	Lop and Scatter	Mill Fork Wildlife Habitat Improvement Project (Phase 2)	August-November 2015	553	3019
		Aerial Before	Mill Fork Wildlife Habitat Improvement Project	October 2007	462	716
		Two-Way Ely/Smooth Dribbler	Mill Fork Wildlife Habitat Improvement Project	October-November 2007	350	716
			Mill Fork Wildlife Habitat Improvement Project	November 2007	350	716
16B-11	Hilltop	Bullhog	Hilltop Conservation Easement Bullhog Phase 2	July 2014-June 2015	269	3047
16B-18	Porphyry Bench	Double Drum/Seed	Price West Benches Year 1--Porphyry Bench	November 2004, April-May 2005	1104	229
		Aerial After One-Way Broadcast After	Price West Benches Year 1--Porphyry Bench Porphyry Bench Sagebrush Planting	December 2004	1104	229
			Porphyry Bench Sagebrush Planting	November 2016	20	3616
			November 2016	20	3616	
16B-20	Telephone Bench	Lop and Scatter	North Springs PJ Removal Phase II	March-October 2018	4484	3583
16B-22	Poison Spring Bench	Lop and Scatter	Burma Rd. Pinyon/Juniper Removal	October-December 2013	1312	2556
16B-23	Consumer Bench	Double Drum/Seed	Price West Benches Year 2	October-December 2005	2658	228
		Aerial After	Price West Benches Year 2	March 2006	2658	228
		Broadcast Before	Price West Benches Year 2	October-December 2005	2658	228
		Lop and Scatter	Miller Creek Watershed Restoration	November 2018	242	4207
16C-1	Manti Face Chaining	Lop and Scatter	Manti Face Lop and Scatter	September-December 2012	853	1707
16C-3	North Manti Face	Lop and Scatter	Manti Face Lop and Scatter	July 2010-June 2012	853	1707
16C-5	Cane Valley	Lop and Scatter	Black Hills WMA Lop and Scatter	October 2007	878	710
16C-6	Black Hill	Lop and Scatter	Black Hills WMA Lop and Scatter	October 2007	878	710
16C-7	Mayfield Mountain Face	Lop and Scatter	Twelve Mile WMA Habitat Improvement	July-October 2007	1294	273

Study #	Study Name	Type	Disturbance Name (If Available)	Date	Acres	WRI Project #
16C-9	Pole Canyon Oak	Two-Way Ely/Smooth Aerial Before	Twelve Mile WMA Habitat Improvement - Year 2	October-November 2008	540	1059
		Dribbler	Twelve Mile WMA Habitat Improvement - Year 2	October-November 2008	618	1059
			Twelve Mile WMA Habitat Improvement - Year 2	October-November 2008	540	1059
16C-11	Above South Hollow	Two-Way Ely/Smooth Aerial Before	Twelve Mile WMA Habitat Improvement - Year 2	October-November 2008	540	1059
		Dribbler	Twelve Mile WMA Habitat Improvement - Year 2	October-November 2008	618	1059
			Twelve Mile WMA Habitat Improvement - Year 2	October-November 2008	540	1059
16C-12	Manti Dump	Lop and Scatter Bullhog	6-Mile Habitat Improvement	June-August 2009	787	1051
		Dribbler Unknown	Six Mile WMA In-House Bullhog Project - Phase 1 (Proposed)	2019	1065	4809
			Six Mile WMA In-House Bullhog Project - Phase 1 (Proposed)	2019	1065	4809
16C-14	Red Point	Lop and Scatter	Burma Rd. Pinyon/Juniper Removal	October-December 2013	1312	2556
16C-22	North Horn- Rock Canyon	Bullhog	Swasey Wildlife Habitat Improvement and Hazardous Fuels Reduction Project Phase VII	August 2016-June 2017	620	3638
16C-24	South Horn Exclosure	Bullhog	South Horn Wildlife Habitat Improvement Project	June 2017-April 2018	608	4036
16C-32	Muddy Creek	Broadcast	Muddy Creek Seeding	February 2006	60	95
16C-36	Danish Bench	Lop and Scatter	Danish Bench Lop and Scatter	Spring 2009	586	1390
16C-38	Pleasant Creek	Two-Way Ely Aerial Before	Bear Mountain CWMU Habitat Enhancement	October-December 2013	232	2602
		Dribbler	Bear Mountain CWMU Habitat Enhancement	October-December 2013	232	2602
			Bear Mountain CWMU Habitat Enhancement	October-December 2013	232	2602
		Aerial After	Bear Mountain CWMU Habitat Enhancement	February 2014	232	2602
			CWMU Habitat			
16C-40	Cedar Mountain	One-Way Dixie	Fishlake NF PJ Maintenance-Sagebrush Enhancement - Year 1	June-December 2005	4445	216
16C-42	Box Canyon Sage-Grouse	One-Way Dixie	Wildcat Knolls Habitat Improvement	September-November 2008	435	1161
		Broadcast Before	Wildcat Knolls Habitat Improvement	September-November 2008	810	1161
		Rangeland Drill	Wildcat Sagebrush Restoration Project Phase II	August-September 2009	466	1392
16C-45	Olsen Canyon	Lop and Scatter	Twelve Mile Wma Habitat Improvement	July 2007-October 2008	1254	273
16R-6	North Slackpile	Roller Chopper	Gordon Creek Roller Chopper	October 2006	199	513

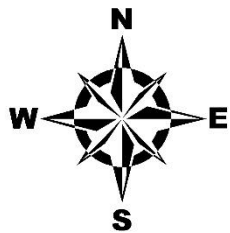
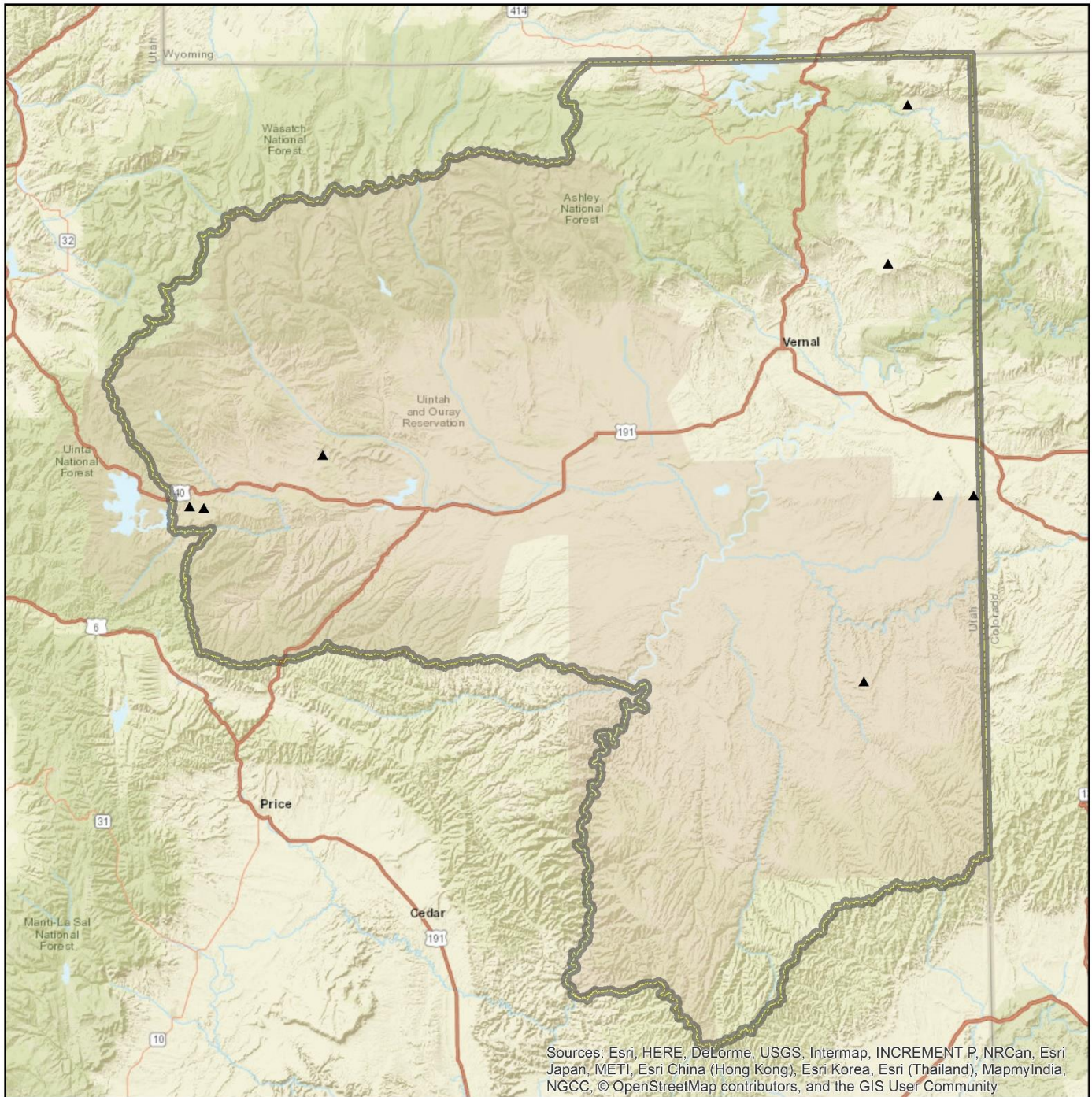


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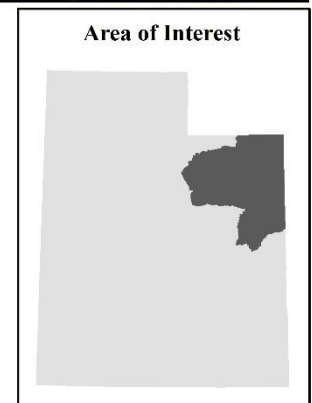
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# NORTHEASTERN REGION



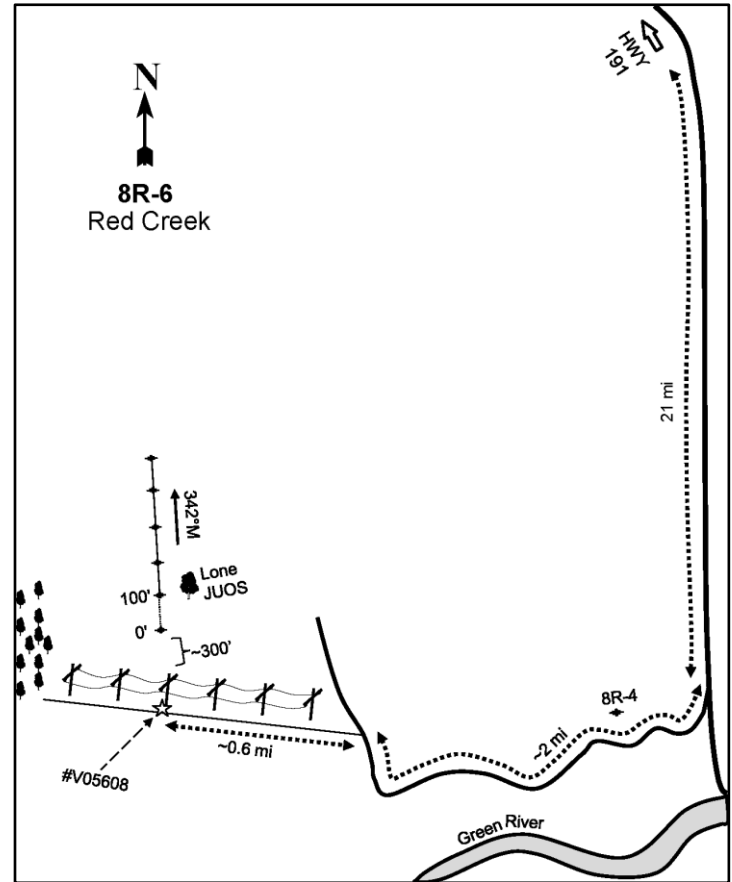
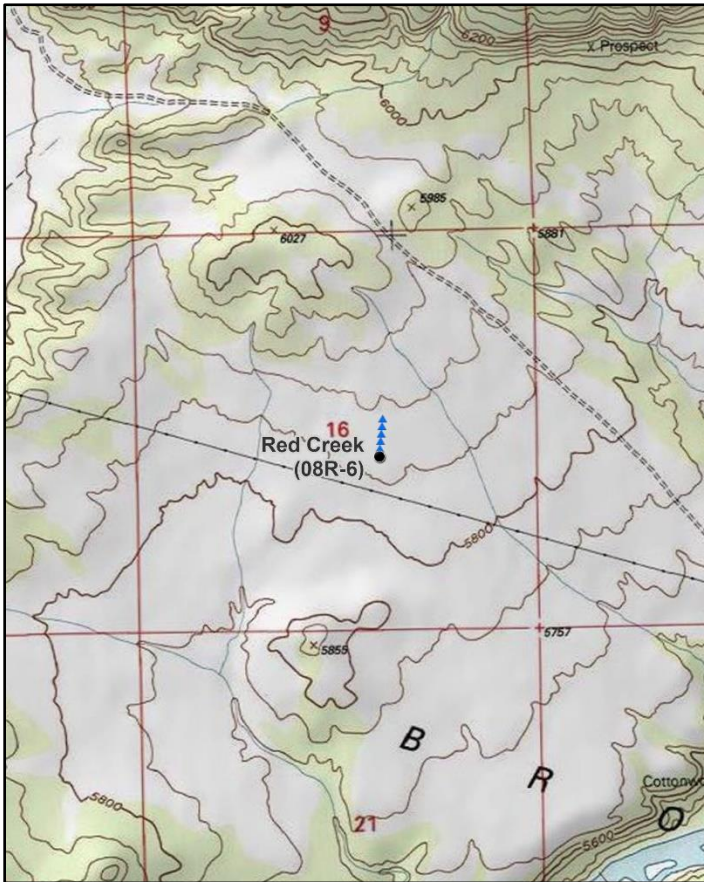
**Study Location**

- ▲ WRI
- ▭ Region Boundary





## RED CREEK - STUDY NO. 08R-6

**Location Information**

USGS 7.5 min Map Info  
GPS (0' Stake)

Clay Basin SW; Township 2N, Range 24E, Section 16  
NAD 83 UTM ZONE 12, 650769 East 4530138 North

**Transect Information**

Browse Tag # (0' Stake)	Not Available
Transect Bearing	350° magnetic
Length	500ft
Belt Placement	Line 1 (11ft), Line 2 (34ft), Line 3 (59ft), Line 4 (71ft), Line 5 (95ft)
Belt Marker Placement	No Rebar

**Directions to Site**

From Highway 191, drive 21 miles on Brown's Park Road to the junction of Highway 318. From the junction, turn right (west) onto Brown's Park Road. Continue for about 2 miles (you will pass study #08R-04) to a fork in the road. Stay left (west) at the fork onto a powerline road and travel for about 0.6 miles to power pole #V05608. From the power pole, the 0-foot baseline stake is about 300 feet away at 205 degrees magnetic. The baseline runs at 342 degrees magnetic and there is a lone Utah juniper to the left (east) of the transect.

**Site Information**

Land Ownership	State
Land Administrator	UDWR
Allotment	RED CREEK FLAT
Elevation	5,850ft (1,783m)
Aspect	Northwest
Slope	4%
Sample Dates	08/09/2016, 07/20/2019

**Table 08R-06.1 Disturbance History.** Recorded history of major disturbances.

Treatment/Disturbance	Name	WRI DB#	Date	Size (acres)
Hand Crew - Lop and Scatter	Red Creek Flat Phase 2 Lop and Scatter	359	May 2007	503

**Wildlife Habitat and Vegetation History****Table 08R-06.3 - Wildlife Seasonal Habitat.** UDWR wildlife habitat and seasonality.

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

**Table 08R-06.4 - Vegetation History.** The dominant vegetation type(s) and phase of woodland succession (Tausch, Miller, Roundy, & Chambers, 2009).

Year	Vegetation Type	Woodland Succession
2016	Mountain Big Sagebrush	Phase I
2019	Mountain Big Sagebrush	Phase I

**Site Notes**

No Notes

**Site Potential**

1981 - 2010 Average Annual Precipitation	9 inches
NRCS Ecological Site	Semidesert Loam (Wyoming Big Sagebrush)
NRCS Ecological Site #	R034XY212UT
States and Transitions	No state and transition model is available for this ecological site.

This study has been dominated by mountain big sagebrush (*Artemisia tridentata* ssp. *vaseyana*) since study establishment in 2016 (Table 08R-06.12, Table 08R-06.13). The herbaceous understory has not been particularly diverse, but the perennial grass needle and thread (*Hesperostipa comata*) has contributed over 10 percent cover in both sample years (Table 08R-06.7, Table 08R-06.10, Table 08R-06.11). Although density of Utah juniper (*Juniperus osteosperma*) has remained low in both study years (Table 08R-06.14), a lop and scatter treatment in the vicinity prior to study establishment (Table 08R-06.1) likely reduced the density of trees and it is possible that infill will occur in future sample years.



**Trend Summary Tables**

**Table 08R-06.6 - Shrub/Tree Summary.** Average modified Daubenmire quadrat and line intercept cover by year for shrubs/trees

Year	Quadrat Cover (%)			Line-intercept Cover (%)		
	Preferred Shrub	Other Shrub	Tree	Preferred Shrub	Other Shrub	Tree
2016	12.6	2.9	-	14.9	2.5	-
2019	15.1	4.2	-	15.9	4.3	-

**Table 08R-06.7 - Herbaceous Summary.** Nested frequency and average modified Daubenmire quadrat cover by year for herbaceous functional groups

Year	Nested Frequency				Quadrat Cover (%)			
	Annual Grass	Perennial Grass	Annual/Biennial Forb	Perennial Forb	Annual Grass	Perennial Grass	Annual/Biennial Forb	Perennial Forb
2016	342	302	8	5	6.3	11.2	0.0	0.0
2019	298	296	220	22	2.2	13.0	2.6	0.1

**Table 08R-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
2016	38.9	1.1	25.4	9.0	0.0	32.4
2019	39.3	3.0	38.4	8.4	0.7	34.7

**Table 08R-06.9 - Pellet Group Data.** Quadrat frequency and pellet group transect data for animal pellets. Rabbit pellet groups are not sampled in the pellet group transect.

Year	Cattle	Mule Deer	Rocky Mountain Elk	Rabbit
	Quadrat Frequency			
2016	4	27	-	63
2019	11	31	-	23
Year	Days Use Per Acre (ha)			
2016	24.0 (59.2)	16.1 (39.7)	32.2 (79.5)	-
2019	-	36.2 (89.4)	1.3 (3.3)	-

**Table 08R-06.10 - 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)	Hesperostipa comata (needle and thread)	Poa secunda (Sandberg bluegrass)	Vulpia octoflora <sup>a</sup> (six weeks fescue)
year	Nested Frequency					
2016	1	4	27	293	-	342
2019	15	44	29	282	0	291
year	Average Cover (%)					
2016	0.0	0.0	0.6	10.6	-	6.3
2019	0.4	0.2	0.6	12.1	0.0	2.0

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

**Table 08R-06.11 - Forb Species.** Nested frequency and modified Daubenmire average cover by year.

FORB SPECIES									
Alyssum desertorum <sup>ai</sup> (desert madwort)									
Descurainia pinnata <sup>a</sup> (western tansymustard)									
Ipomopsis congesta (ballhead ipomopsis)									
Lappula occidentalis <sup>a</sup> (flatspine stickseed)									
Phacelia ivesiana <sup>a</sup> (Ives' phacelia)									
Phlox hoodii (spiny phlox)									
Schoenocrambe linifolia (flaxleaf plainsmustard)									
Sphaeralcea grossularifolia (gooseberry/leaf globemallow)									
Townsendia incana (hoary Townsend daisy)									
year	Nested Frequency								
2016	-	5	-	1	2	1	-	2	2
2019	45	48	3	199	8	6	0	-	13
year	Average Cover (%)								
2016	-	0.0	-	0.0	0.0	0.0	-	0.0	0.0
2019	0.2	0.1	0.0	2.3	0.0	0.0	0.0	-	0.0

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

**Table 08R-06.12 - Shrub and Tree Species.** Average modified Daubenmire quadrat and line intercept cover by year.

SHRUB SPECIES				
Artemisia tridentata ssp. vaseyana <sup>p</sup> (mountain big sagebrush)				
Chrysothamnus viscidiflorus ssp. viscidiflorus var. stenophyllus (yellow rabbitbrush)				
Gutierrezia sarothrae (broom snakeweed)				
Opuntia polyacantha (plains pricklypear)				
year	Line Intercept Cover (%)			
2016	14.9	-	1.4	1.1
2019	15.9	-	3.3	1
year	Quadrat Cover (%)			
2016	12.6	0.1	1.4	1.3
2019	15.1	-	3.0	1.3

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

**Table 08R-06.13 - Shrub/Tree Characteristics.** Population characteristics of shrub/tree species populations including density reproduction (seedlings), age distribution, utilization, vigor and average size (height/crown) of plants.

Year	Density		Age Class Distribution			Utilization		Poor Vigor (%)	Average Height Crown (cm)
	Plants Per Acre		Excluding Seedlings			Moderate (%)	Heavy (%)		
	Excluding Seedlings	Seedling	Young (%)	Mature (%)	Decadent (%)				
<b>Artemisia tridentata ssp. vaseyana<sup>p</sup> -- (mountain big sagebrush)</b>									
2016	5060	20	9	52	39	38	55	42	34/69
2019	5620	20	14	37	49	31	25	57	39/67
<b>Chrysothamnus viscidiflorus ssp. viscidiflorus var. stenophyllus -- (yellow rabbitbrush)</b>									
2016	20	-	0	100	0	0	0	0	16/24
2019	20	-	0	100	0	0	0	0	18/10
<b>Gutierrezia sarothrae -- (broom snakeweed)</b>									
2016	4080	40	7	93	0	0	0	0	18/16
2019	5620	20	5	93	2	0	0	2	19/22
<b>Opuntia polyacantha -- (plains pricklypear)</b>									
2016	1660	-	0	100	0	0	0	0	9/33
2019	620	-	3	90	7	0	0	7	11/41

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

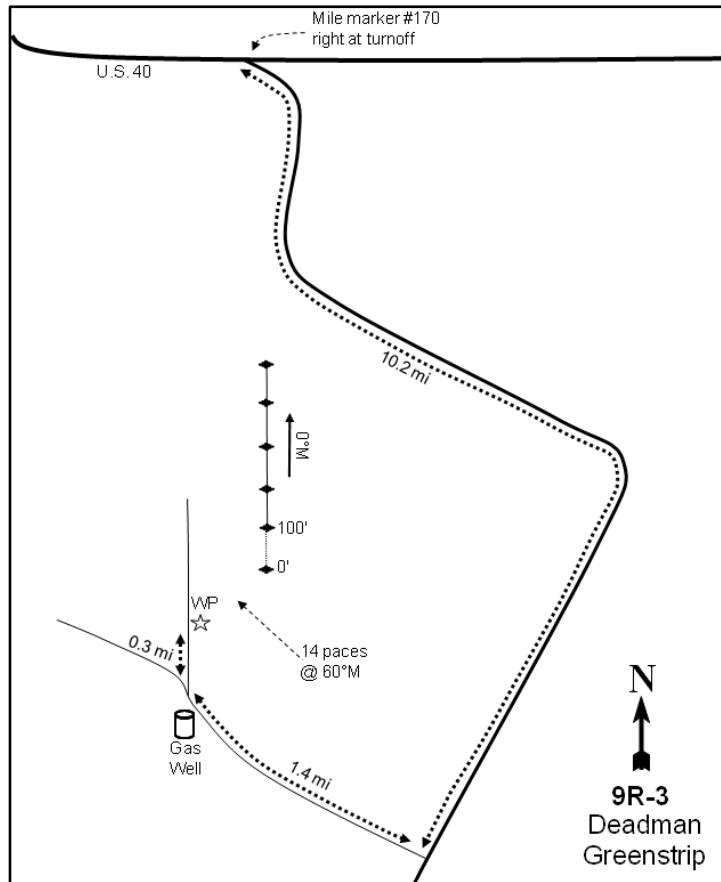
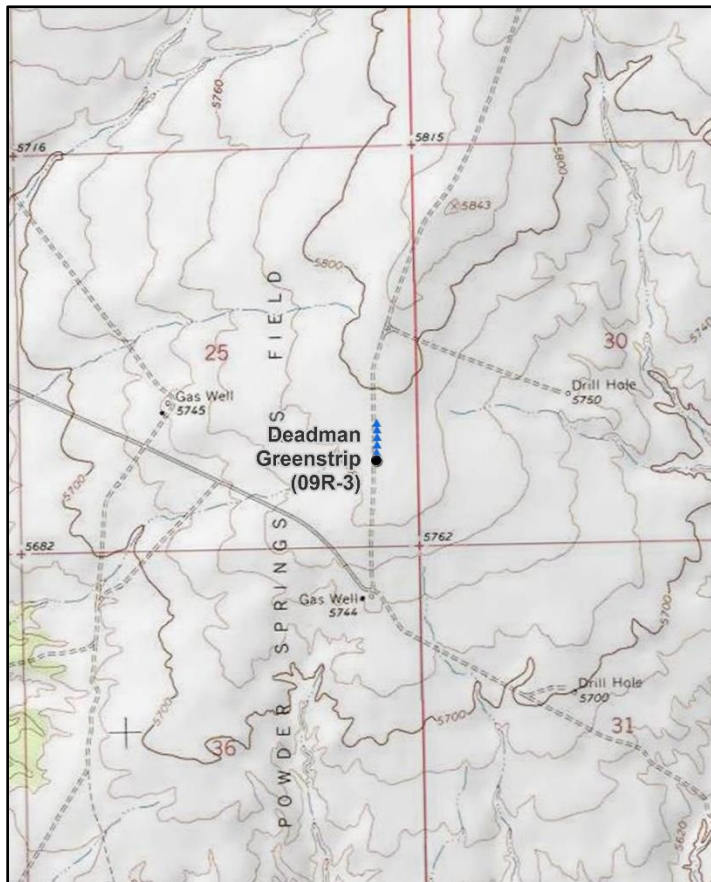
**Table 08R-06.14 - Tree Characteristics.** Point-quarter tree density, size class distribution, and average diameter.

Year	Density	Size Class Distribution					Average Diameter (cm)
	Trees per Acre	Seedling (%)	1-4' (%)	4-8' (%)	8-12' (%)	>12' (%)	
<b>Juniperus osteosperma (Utah juniper)</b>							
2016	1	-	100	-	-	-	24.0
2019	3	33	67	-	-	-	5.0

**Table 08R-06.15 - 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
2016	18.6	3.3	4.4	22.5	-4.8	0.0	0.0	44.0	Fair-Good
2019	19.9	0.4	7.0	26.1	-1.7	0.2	0.0	51.8	Good

## DEADMAN GREENSTRIP - STUDY NO. 09R-3



### Location Information

USGS 7.5 min Map Info  
GPS (0' Stake)

Dinosaur NW SE; Township 7S, Range 24E, Section 25  
NAD 83 UTM ZONE 12, 657087 East 4448956 North

### Transect Information

Browse Tag # (0' Stake)	135
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 US-40, turn right (south) at the turnoff after mile marker 168. Drive south for 10.2 miles and turn right (west). Travel 1.4 miles and turn right. Drive 0.3 miles to the witness post on the right (east) side of the road. The 0-foot stake is about 14 paces from the witness post at 60 degrees magnetic and is marked with browse tag #135.

**Site Information**

Land Ownership	Federal
Land Administrator	BLM
Allotment	COYOTE WASH
Elevation	5,800ft (1,768m)
Aspect	South
Slope	1%
Sample Dates	06/28/2004, 07/30/2007, 08/10/2011, 08/25/2015, 07/21/2019

**Table 09R-03.1 Disturbance History.** Recorded history of major disturbances.

Treatment/Disturbance	Name	WRI DB#	Date	Size (acres)
Herbicide - Plateau	Deadman Bench follow-up herbicide	2202	September 2012	1003
Aerator - Single Drum/Seed	Deadman Greenstrip	PDB	Fall 2004	680
Herbicide - Plateau	Deadman Bench Range Improvement	1081	September 2008	523
Seeding - Rangeland Drill	Deadman Bench Range Improvement	1081	November-December 2008	523
Herbicide - Plateau	Green River District Herbicide Treatments 2019 (Proposed)	5000	Fall 2019	7102

**Table 09R-03.2 Seed Mix.** List of known seeded plant species and rates (if available).

Mix Name			Application Type	Application Date	Acres
Deadman Bench			Broadcast	Nov 2004	500
Type	Species	Common Name	Cultivar/Source ID	Bulk lbs/acre	PLS
G	Agropyron cristatum	Crested Wheatgrass	Douglas	0.50	0.41
G	Agropyron cristatum	Crested Wheatgrass	Ephraim	1.00	0.92
G	Agropyron desertorum	Crested Wheatgrass	Hycrest	1.50	1.35
G	Agropyron fragile	Siberian Wheatgrass	Vavilov	0.50	0.46
G	Pascopyrum smithii	Western Wheatgrass	Arriba	1.00	0.83
F	Medicago sativa	Alfalfa	Nomad	1.00	0.94
F	Medicago sativa	Alfalfa	Ladak +	1.00	0.92
F	Medicago sativa	Alfalfa	Spredor 3	1.00	0.85
F	Onobrychis viciifolia	Sainfoin	Eski	1.00	0.91
F	Sanguisorba minor	Small Burnet	Delar	1.00	0.95
S	Atriplex canescens	Fourwing Saltbush	Emery UT	1.00	0.45
S	Bassia prostrata	Forage Kochia	Immigrant	2.00	1.54

Mix Name			Application Type	Application Date	Acres
Deadman Bench Mix 2			Drill	Dec 2008	200
Type	Species	Common Name	Cultivar/Source ID	Bulk lbs/acre	PLS
G	Agropyron cristatum	Crested Wheatgrass	Douglas	0.75	0.61
G	Agropyron cristatum	Crested Wheatgrass	Nordan	0.75	0.67
G	Agropyron fragile	Siberian Wheatgrass	Vavilov	1.00	0.84
G	Elymus elymoides	Bottlebrush Squirreltail	Toe Jam	0.50	0.43
G	Pascopyrum smithii	Western Wheatgrass	Arriba	1.00	0.87
G	Poa secunda	Canby Bluegrass	Canbar	0.25	0.21
G	Psathyrostachys juncea	Russian Wildrye	Bozoisky	1.00	0.94
G	Pseudoroegneria spicata	Bluebunch Wheatgrass	Anatone	1.00	0.82
F	Achillea millefolium	Western Yarrow		0.10	0.10
F	Linum perenne	Blue Flax	Appar	0.25	0.22
F	Medicago sativa	Alfalfa	Ladak	1.50	1.36
F	Medicago sativa	Alfalfa	Ranger	1.50	1.38
S	Atriplex canescens	Fourwing Saltbush	Central UT	1.00	0.38

Mix Name			Application Type	Application Date	Acres
Deadman Bench - Kochia 2			Drill	Dec 2008	200
Type	Species	Common Name	Cultivar/Source ID	Bulk lbs/acre	PLS
S	Bassia prostrata	Forage Kochia	Humbolt/Lander NV	3.00	2.02



**Wildlife Habitat and Vegetation History****Table 09R-03.3 - Wildlife Seasonal Habitat.** UDWR wildlife habitat and seasonality.

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

**Table 09R-03.4 - Vegetation History.** The dominant vegetation type(s) and phase of woodland succession (Tausch, Miller, Roundy, & Chambers, 2009).

Year	Vegetation Type	Woodland Succession
2004	Mountain Big Sagebrush	No Encroachment
2007	Annual Grass	No Encroachment
2011	Perennial Grass	No Encroachment
2015	Perennial Grass	No Encroachment
2019	Perennial Grass/Mountain Big Sagebrush	No Encroachment

**Site Notes**

No Notes

**Soils****Table 09R-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 Clay Loam	7.5	50.3	25.5	24.2	1.0	7.1	131.2	0.6	12/01/2004

**Site Potential**

1981 - 2010 Average Annual Precipitation	10 inches
NRCS Ecological Site	Semidesert Loam (Wyoming Big Sagebrush)
NRCS Ecological Site #	R034BY212UT
States and Transitions	A defined state and transition model is available.

When the study was established in 2004, the plant community on this site was dominated by mountain big sagebrush (*Artemisia tridentata* ssp. *vaseyana*) (Table 09R-03.12, Table 09R-03.13) with a poor herbaceous understory (Table 09R-03.7). Following the treatment in the fall of 2004 (Table 09R-03.1), the site transitioned to an introduced annual grass (cheatgrass) (*Bromus tectorum*) state. However, an additional seeding and herbicide treatment in the fall of 2008 caused the site to transition to one dominated by introduced perennial grasses, primarily crested wheatgrass (*Agropyron cristatum*) and Siberian wheatgrass (*A. fragile*) as of 2019 (Table 09R-03.10). Sagebrush has remained lower than pre-treatment levels, but was considered to be a co-dominant site component in 2019 (Table 09R-03.12). The current perennial grass-sagebrush plant community is similar to the Wyoming big sagebrush, introduced perennial grass phase within the Seeded State of the State and Transition model, though subspecies of sagebrush are different. Barring a major disturbance or significant changes in management, this site may have the potential to again transition to one dominated by sagebrush over time (Jornada, 2019).

**Trend Summary Tables****Table 09R-03.6 - Shrub/Tree Summary.** Average modified Daubenmire quadrat and line intercept cover by year for shrubs/trees

Year	Quadrat Cover (%)			Line-intercept Cover (%)		
	Preferred Shrub	Other Shrub	Tree	Preferred Shrub	Other Shrub	Tree
2004	15.1	0.4	-	16.1	0.2	-
2007	3.8	0.0	-	4.0	0.1	-
2011	6.8	0.1	-	8.3	0.1	-
2015	4.0	0.0	-	6.9	-	-
2019	9.2	-	-	10.5	-	-

**Table 09R-03.7 - Herbaceous Summary.** Nested frequency and average modified Daubenmire quadrat cover by year for herbaceous functional groups

Year	Nested Frequency				Quadrat Cover (%)			
	Annual Grass	Perennial Grass	Annual/Biennial Forb	Perennial Forb	Annual Grass	Perennial Grass	Annual/Biennial Forb	Perennial Forb
2004	276	242	43	35	3.1	5.3	0.1	0.2
2007	459	142	248	37	25.7	1.9	2.3	0.2
2011	253	340	139	23	4.1	19.5	0.7	0.4
2015	100	310	145	-	0.4	14.2	0.6	-
2019	277	276	464	7	7.2	15.1	19.8	0.0

**Table 09R-03.8 - Basic Ground Cover.** Average modified Daubenmire quadrat cover by year for basic ground cover types.

Year	Cover Type (%)					
	Bare Ground	Cryptogams	Litter	Pavement	Rock	Vegetation
2004	44.4	10.3	29.6	0.0	-	26.1
2007	38.5	1.1	38.2	0.0	-	32.9
2011	39.3	0.1	34.6	0.0	-	32.4
2015	40.8	0.1	48.8	0.0	0.0	21.8
2019	40.9	0.0	50.7	0.1	0.4	46.2

**Table 09R-03.9 - Pellet Group Data.** Quadrat frequency and pellet group transect data for animal pellets. Rabbit pellet groups are not sampled in the pellet group transect.

Year	Cattle	Coyote	Mule Deer/Pronghorn	Rocky Mountain Elk	Horse	Rabbit
	Quadrat Frequency					
2004	-	-	19	-	-	71
2007	2	-	34	2	-	84
2011	-	-	28	6	-	28
2015	-	-	43	11	4	96
2019	-	-	28	18	7	23
Year	Days Use Per Acre (ha)					
2004	-	-	18.7 (46.3)	-	2.3 (5.7)	-
2007	-	17.4 (43.0)*	36.2 (89.4)	-	-	-
2011	-	-	6.0 (14.9)	7.4 (18.2)	0.6 (1.4)	-
2015	-	-	50.9 (125.8)	-	4.7 (11.5)	-
2019	0.7 (1.8)	-	20.1 (49.7)	4.7 (11.6)	4.7 (11.5)	-

\*Pellets per acre (ha)

**Table 09R-03.10 - Grass Species.** Nested frequency and modified Daubenmire average cover by year.

GRASS SPECIES	Agropyron cristatum <sup>i</sup> (crested wheatgrass)	Agropyron fragile <sup>i</sup> (Siberian wheatgrass)	Bromus tectorum <sup>ai</sup> (cheatgrass)	Elymus elymoides (squirreltail)	Pascopyrum smithii (western wheatgrass)	Poa secunda (Sandberg bluegrass)	Psathyrostachys juncea <sup>i</sup> (Russian wildrye)	Pseudoroegneria spicata (bluebunch wheatgrass)	Vulpia octoflora <sup>a</sup> (sixweeks fescue)
year	Nested Frequency								
2004	-	-	276	92	163	3	-	-	1
2007	9	-	459	70	71	2	-	-	13
2011	156	8	253	74	206	2	5	9	-
2015	184	12	96	23	135	-	25	2	4
2019	164	93	277	3	75	4	12	3	7
year	Average Cover (%)								
2004	-	-	3.1	3.2	2.1	0.0	-	-	0.0
2007	0.0	-	25.6	1.0	0.9	0.0	-	-	0.1
2011	7.2	0.3	4.1	2.1	9.4	0.0	0.0	0.4	-
2015	8.6	0.5	0.4	0.5	3.3	-	1.2	0.1	0.0
2019	8.3	3.7	7.1	0.1	1.9	0.2	1.0	0.1	0.1

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

**Table 09R-03.11 - Forb Species.** Nested frequency and modified Daubenmire average cover by year.

FORB SPECIES	Agoseris glauca (pale agoseris)	Alyssum desertorum <sup>ai</sup> (desert madwort)	Astragalus (milkvetch)	Ceratocephala testiculata <sup>ai</sup> (curvseed butterwort)	Collinsia parviflora <sup>a</sup> (maiden blue eyed Mary)	Descurainia pinnata <sup>a</sup> (western tansymustard)	Eriastrum diffusum <sup>a</sup> (miniature woollystar)	Erigeron pumilus (shaggy fleabane)	Gilia inconspicua <sup>a</sup> (shy gilia)	Lappula occidentalis <sup>a</sup> (flatspine stickseed)	Lupinus brevicaulis <sup>a</sup> (shortstem lupine)	Medicago sativa <sup>a</sup> (alfalfa)	Phlox hoodii (spiny phlox)	Phlox longifolia (longleaf phlox)	Plantago patagonica <sup>a</sup> (woolly plantain)	Schoenocrambe limifolia (flaxleaf plainsmustard)	Sisymbrium altissimum <sup>ai</sup> (tall tumbledmustard)
year	Nested Frequency																
2004	-	3	-	-	-	-	-	-	-	36	10	-	-	-	-	-	-
2007	-	109	3	1	1	27	-	-	116	126	3	2	1	3	-	3	-
2011	2	122	-	-	-	13	-	-	-	4	-	3	-	1	-	2	3
2015	-	143	-	-	-	8	-	-	-	2	-	-	-	-	-	-	15
2019	-	462	-	-	2	44	7	0	2	90	79	-	-	4	7	-	2
year	Average Cover (%)																
2004	-	0.0	-	-	-	-	-	-	-	0.1	0.0	-	-	-	-	-	-
2007	-	0.7	0.0	0.0	0.0	0.1	-	-	0.5	0.9	0.0	0.0	0.0	0.0	-	0.1	-
2011	0.0	0.6	-	-	-	0.0	-	-	-	0.0	-	0.0	-	0.0	-	0.0	0.0
2015	-	0.5	-	-	-	0.0	-	-	-	0.0	-	-	-	-	-	-	0.1
2019	-	18.6	-	-	0.0	0.2	0.0	0.0	0.0	0.5	0.4	-	-	0.0	0.0	-	0.0

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

FORB SPECIES		
Sphaeralcea coccinea (scarlet globemallow)		
Trifolium (clover)		
year	Nested Frequency	
2004	32	3
2007	25	-
2011	15	-
2015	-	-
2019	3	-
year	Average Cover (%)	
2004	0.2	0.0
2007	0.1	-
2011	0.3	-
2015	-	-
2019	0.0	-

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

**Table 09R-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)					
Bassia prostrata <sup>pi</sup> (forage kochia)					
Chrysothamnus depressus <sup>p</sup> (longflower rabbitbrush)					
Grayia spinosa (spiny hopsage)					
Opuntia (pricklypear)					
year	Line Intercept Cover (%)				
2004	16.1	-	-	-	0.2
2007	4	-	-	-	0.1
2011	7.2	1.1	-	-	0.1
2015	6.8	0.1	-	-	-
2019	8.9	1.6	-	-	-
year	Quadrat Cover (%)				
2004	15.1	-	-	0.1	0.3
2007	3.8	0.0	0.0	-	0.0
2011	6.0	0.8	-	-	0.1
2015	3.8	0.3	-	-	0.0
2019	7.6	1.6	-	-	-

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

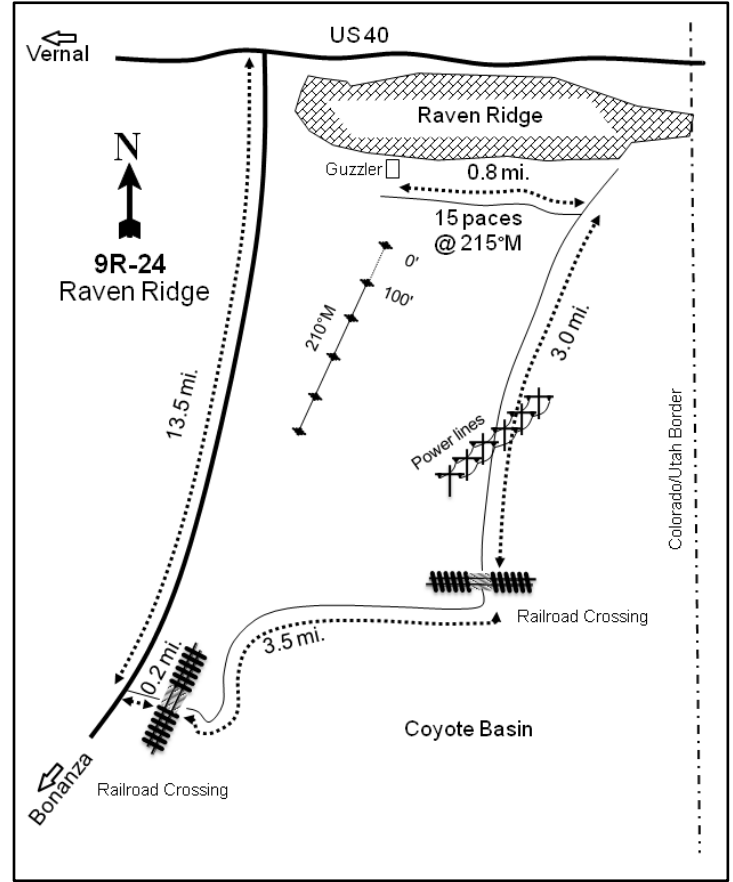
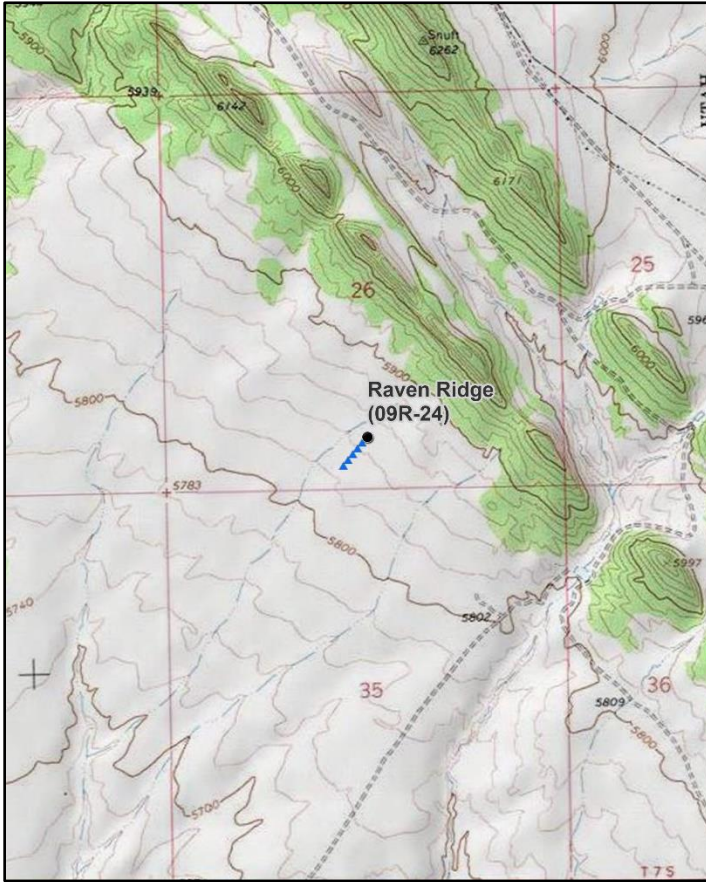
**Table 09R-03.13 - Shrub/Tree Characteristics.** Population characteristics of shrub/tree species populations including density reproduction (seedlings), age distribution, utilization, vigor and average size (height/crown) of plants.

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>Artemisia tridentata ssp. vaseyana<sup>p</sup> -- (mountain big sagebrush)</b>									
2004	5420	-	2	40	59	31	1	30	60/75
2007	2760	20	1	27	73	25	18	72	39/49
2011	2660	52920	26	65	9	31	5	12	32/46
2015	3860	120	28	62	11	59	9	38	33/52
2019	3500	-	6	79	14	29	5	31	44/64
<b>Bassia prostrata<sup>pi</sup> -- (forage kochia)</b>									
2004	-	-	-	-	-	-	-	-	-/-
2007	240	140	67	33	0	0	0	0	7/8
2011	960	1200	29	71	0	25	4	0	21/34
2015	480	-	0	88	13	38	63	21	12/29
2019	440	-	0	100	0	0	14	0	47/59
<b>Chrysothamnus depressus<sup>p</sup> -- (longflower rabbitbrush)</b>									
2004	-	-	-	-	-	-	-	-	-/-
2007	-	-	-	-	-	-	-	-	-/-
2011	20	-	0	100	0	100	0	0	5/15
2015	-	-	-	-	-	-	-	-	-/-
2019	-	-	-	-	-	-	-	-	-/-
<b>Chrysothamnus viscidiflorus -- (yellow rabbitbrush)</b>									
2004	20	-	0	0	100	0	100	100	-/-
2007	-	-	-	-	-	-	-	-	-/-
2011	-	-	-	-	-	-	-	-	-/-
2015	-	-	-	-	-	-	-	-	-/-
2019	-	-	-	-	-	-	-	-	19/31
<b>Grayia spinosa -- (spiny hopsage)</b>									
2004	20	-	0	100	0	100	0	0	40/54
2007	-	-	-	-	-	-	-	-	-/-
2011	-	-	-	-	-	-	-	-	-/-
2015	-	-	-	-	-	-	-	-	-/-
2019	-	-	-	-	-	-	-	-	-/-
<b>Opuntia -- (pricklypear)</b>									
2004	740	-	0	60	41	0	0	8	10/25
2007	320	-	19	44	38	0	0	25	7/14
2011	320	-	0	100	0	0	0	0	10/25
2015	280	-	36	57	7	21	0	21	9/24
2019	60	-	0	100	0	0	0	0	9/26

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



## RAVEN RIDGE - STUDY NO. 09R-24



### Location Information

USGS 7.5 min Map Info  
GPS (0' Stake)

Dinosaur SW; Township 7S, Range 25E, Section 26  
NAD 83 UTM ZONE 12, 664514 East 4448961 North

### Transect Information

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

### Directions to Site

At the intersection of State Road 45 (SR-45) and US-40, take SR-45 and drive south for 13.5 miles. Turn right (east) and drive for 0.2 miles to a railroad crossing. Cross the railroad, staying left, and follow the railroad tracks for 3.7 miles. Cross the railroad tracks, heading north, and travel for 3 miles to a road on the left. At this point, turn left (west) and drive 0.9 miles to a wildlife guzzler. The transect is 15 paces from the guzzler at 215 degrees magnetic. The 0-foot baseline stake is marked by browse tag #181.

**Site Information**

Land Ownership	Federal
Land Administrator	BLM
Allotment	RAVEN RIDGE
Elevation	5,790ft (1,765m)
Aspect	South
Slope	5%
Sample Dates	08/10/2011, 08/18/2014, 07/21/2019

**Table 09R-24.1 Disturbance History.** Recorded history of major disturbances.

Treatment/Disturbance	Name	WRI DB#	Date	Size (acres)
Harrow - One-Way Chain	Raven Ridge Harrow Project	1989	September-October 2011	500
Herbicide - Plateau	Raven Ridge Harrow Project	1989	September 2011	500
Herbicide - Plateau	Green River District Herbicide Treatments 2019 (Proposed)	5000	Fall 2019	7102
Seeding - Broadcast Before	Raven Ridge Harrow Project	1989	September-October 2011	500

**Table 09R-24.2 Seed Mix.** List of known seeded plant species and rates (if available).

Mix Name			Application Type	Application Date	Acres
Raven Ridge Harrow Project			Broadcast	Oct 2011	500
Type	Species	Common Name	Cultivar/Source ID	Bulk lbs/acre	PLS
G	Achnatherum hymenoides	Indian Ricegrass	Emery UT	0.77	0.64
G	Agropyron cristatum	Crested Wheatgrass	Ephraim	1.50	1.37
G	Agropyron fragile	Siberian Wheatgrass	Vavilov NC	1.00	0.77
G	Elymus elymoides	Bottlebrush Squirreltail	Millard UT	0.50	0.39
G	Elymus wawawaiensis	Snake River Wheatgrass	Secar	1.50	1.39
G	Pascopyrum smithii	Western Wheatgrass	Arriba	2.00	1.72
G	Poa secunda	Canby Bluegrass	Canbar	0.25	0.12
G	Psathyrostachys juncea	Russian Wildrye	Bozoisky	1.50	1.25
F	Achillea millefolium	Western Yarrow	Eagle Mountain	0.10	0.09
F	Cleome serrulata	Rocky Mountain Beeplant	Millard/Sevier/Sanpete UT	0.50	0.47
F	Linum perenne	Blue Flax	Appar	0.50	0.37
F	Sphaeralcea coccinea	Scarlet Globemallow		0.20	0.13
S	Atriplex canescens	Fourwing Saltbush	Carbon/Emery UT	1.00	0.38
S	Atriplex canescens	Fourwing Saltbush	Carbon UT	0.50	0.22

**Wildlife Habitat and Vegetation History**

**Table 09R-24.3 - 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 09R-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	Mountain Big Sagebrush	Phase I
2014	Mountain Big Sagebrush	No Encroachment
2019	Annual Grass/Mountain Big Sagebrush	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.

Mountain big sagebrush (*Artemisia tridentata* ssp. *vaseyana*) has been the dominant shrub on this site since study establishment in 2011, although density and cover have decreased following the harrow treatment (Table 09R-24.1). Other shrub species have remained limited in both diversity and abundance (Table 09R-24.12, Table 09R-24.13). The herbaceous understory has been mainly comprised of the introduced annual grass species cheatgrass (*Bromus tectorum*) and/or annual forbs such as tall tumbled mustard (*Sisymbrium altissimum*). Cheatgrass cover increased by 30 percent between 2014 and 2019, and it was a co-dominant vegetation component in 2019 (Table 09R-24.7, Table 09R-24.10, Table 09R-24.11). High amounts of annual grasses can increase fuel loads and may affect the ecological resilience of the plant community; additional treatments may be necessary in order to restore the herbaceous understory on this site.

**Trend Summary Tables****Table 09R-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	18.0	0.2	-	23.4	0.2	-
2014	9.7	0.5	-	14.6	0.2	-
2019	8.2	0.5	-	11.1	0.1	-

**Table 09R-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	375	57	51	29	8.9	0.7	1.8	0.4
2014	282	115	303	27	9.3	3.1	13.8	0.1
2019	471	106	231	17	39.4	2.0	4.4	0.9

**Table 09R-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	40.0	2.1	32.2	0.3	0.0	29.8
2014	39.5	0.1	45.8	0.8	0.1	36.1
2019	25.5	0.0	66.9	0.3	0.1	52.1

**Table 09R-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	Mule Deer/Pronghorn	Rocky Mountain Elk	Horse	Rabbit
	Quadrat Frequency			
2011	6	2	-	7
2014	3	-	-	20
2019	19	10	5	7
Year	Days Use Per Acre (ha)			
2011	10.7 (26.5)	-	-	-
2014	5.3 (13.2)	0.7 (1.7)	-	-
2019	16.1 (39.7)	6.7 (16.6)	8.7 (21.5)	-

**Table 09R-24.10 - 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)	Pascopyrum smithii (western wheatgrass)	Vulpia octoflora <sup>a</sup> (sixweeks fescue)
year	Nested Frequency				
2011	-	375	10	47	-
2014	3	267	5	107	58
2019	24	471	11	79	37
year	Average Cover (%)				
2011	-	8.9	0.1	0.6	-
2014	0.1	9.0	0.0	3.0	0.3
2019	0.9	39.3	0.1	0.9	0.1

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

**Table 09R-24.11 - Forb Species.** Nested frequency and modified Daubenmire average cover by year.

FORB SPECIES	Achillea millefolium (Common yarrow)	Alyssum desertorum <sup>ai</sup> (desert madwort)	Cryptantha <sup>a</sup> (annual cryptantha)	Descurainia pinnata <sup>a</sup> (western tansymustard)	Eriastrum diffusum <sup>a</sup> (miniature woollystar)	Erysimum (wallflower)	Gilia inconspicua <sup>a</sup> (shy gilia)	Lappula occidentalis <sup>ai</sup> (flatspine stickseed)	Machaeranthera canescens (hoary tansyaster)	Salsola tragus <sup>ai</sup> (prickly Russian thistle)	Sisymbrium altissimum <sup>ai</sup> (tall tumblemustard)	Sphaeralcea grossularifolia (gooseberry/leaf globemallow)
year	Nested Frequency											
2011	-	8	-	1	18	20	-	4	10	-	22	1
2014	2	-	2	208	29	-	-	126	4	62	94	21
2019	-	63	7	42	91	3	1	133	3	9	36	11
year	Average Cover (%)											
2011	-	0.0	-	0.0	0.3	0.3	-	0.0	0.1	-	1.4	0.0
2014	0.0	-	0.0	6.1	0.2	-	-	1.4	0.0	0.9	5.2	0.1
2019	-	0.3	0.0	0.4	0.6	0.0	0.0	1.3	0.0	0.1	1.8	0.9

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

**Table 09R-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)	Gutierrezia sarothrae (broom snakeweed)	Opuntia (pricklypear)
year	Line Intercept Cover (%)		
2011	23.4	-	0.2
2014	14.6	0.2	-
2019	11.1	-	0.1
year	Quadrat Cover (%)		
2011	18.0	0.1	0.0
2014	9.7	0.2	0.3
2019	8.2	0.0	0.5

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

**Table 09R-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.

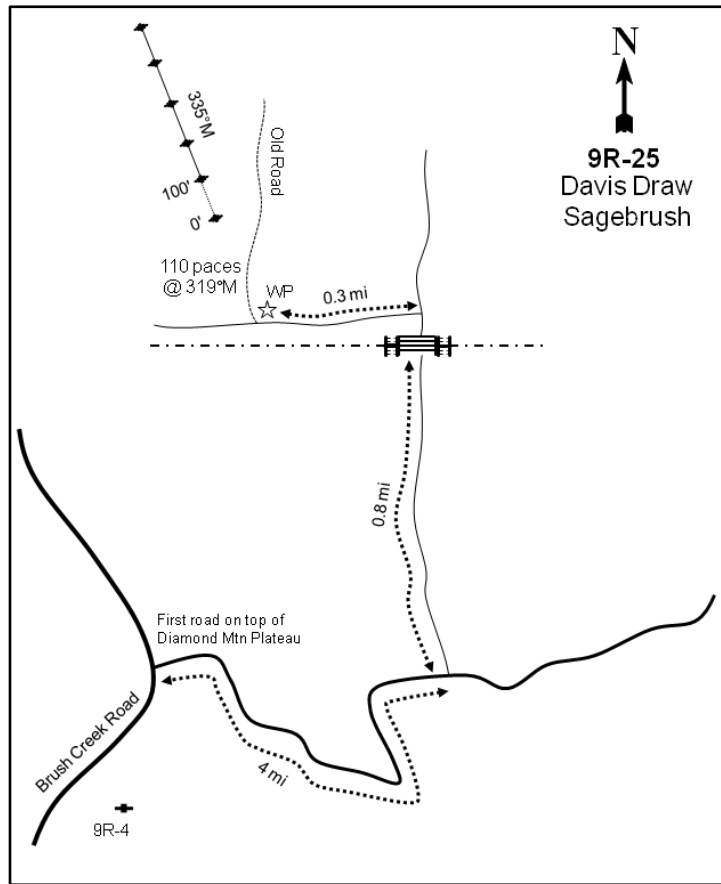
Year	Density		Age Class Distribution			Utilization		Poor Vigor (%)	Average Height Crown (cm)
	Plants Per Acre		Excluding Seedlings			Moderate (%)	Heavy (%)		
	Excluding Seedlings	Seedling	Young (%)	Mature (%)	Decadent (%)				
<b>Artemisia tridentata ssp. vaseyana<sup>p</sup> -- (mountain big sagebrush)</b>									
2011	4120	2060	2	67	32	62	13	29	53/78
2014	2180	-	1	67	32	27	17	19	43/77
2019	1920	-	0	52	48	35	14	48	54/82
<b>Gutierrezia sarothrae -- (broom snakeweed)</b>									
2011	120	-	0	100	0	0	0	0	29/53
2014	800	-	88	13	0	0	0	0	24/38
2019	120	580	17	83	0	0	0	0	22/26
<b>Opuntia -- (pricklypear)</b>									
2011	60	-	0	100	0	0	0	0	12/38
2014	80	-	0	100	0	0	0	0	11/39
2019	100	-	0	100	0	0	0	0	12/48

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

**Table 09R-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	2	-	100	-	-	-	7.0

## DAVIS DRAW SAGEBRUSH - STUDY NO. 09R-25



### Location Information

USGS 7.5 min Map Info	Jensen Ridge NE; Township 2S, Range 24E, Section 30
GPS (0' Stake)	NAD 83 UTM ZONE 12, 646683 East 4497123 North

### Transect Information

Browse Tag # (0' Stake)	Not Available
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

Driving from Vernal, take the Brush Creek Road to the top of Diamond Mountain Plateau. At the top of the plateau take the first road to the right (Rim Road). Travel 4 miles along Rim Road, then turn left (north) onto a two-track road. Travel 0.8 miles to a gate. Turn left (west) after going through the gate and travel 0.3 mile to the witness post on the right (north) side of the road. Walk 110 paces at 319 degrees magnetic to the 0-foot stake.



**Site Information**

Land Ownership	Federal
Land Administrator	BLM
Allotment	DAVIS DRAW
Elevation	7,610ft (2,320m)
Aspect	Northeast
Slope	5-6%
Sample Dates	06/12/2012, 08/25/2015, 07/22/2019

**Table 09R-25.1 Disturbance History.** Recorded history of major disturbances.

Treatment/Disturbance	Name	WRI DB#	Date	Size (acres)
Harrow - Two-Way Chain	Davis Draw Sagebrush	2266	September 2012	424

**Wildlife Habitat and Vegetation History****Table 09R-25.3 - Wildlife Seasonal Habitat.** UDWR wildlife habitat and seasonality.

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

**Table 09R-25.4 - Vegetation History.** The dominant vegetation type(s) and phase of woodland succession (Tausch, Miller, Roundy, & Chambers, 2009).

Year	Vegetation Type	Woodland Succession
2012	Mountain Big Sagebrush/Antelope Bitterbrush/Perennial Grass	No Encroachment
2015	Perennial Grass/Mountain Big Sagebrush/Antelope Bitterbrush	No Encroachment
2019	Mountain Big Sagebrush/Antelope Bitterbrush/Perennial Grass	No Encroachment

**Site Notes**

No Notes

**Site Potential**

1981 - 2010 Average Annual Precipitation	17 inches
NRCS Ecological Site	Mountain Loam (Mountain Big Sagebrush)
NRCS Ecological Site #	R047XC430UT
States and Transitions	A defined state and transition model is available.

Upon study establishment in 2012, this site was dominated by a mixed mountain big sagebrush (*Artemisia tridentata* ssp. *vaseyana*) and antelope bitterbrush (*Purshia tridentata*) plant community; sagebrush and bitterbrush cover was considerably reduced following the chain harrow treatment later that year (Table 09R-25.1, Table 09R-25.12, Table 09R-25.13). Perennial grasses, particularly muttongrass (*Poa fendleriana*), needle and thread (*Hesperostipa comata*), and thickspike wheatgrass (*Elymus lanceolatus*), increased and have been considered a co-dominant site component in all years. This specific perennial grass-sagebrush-bitterbrush community is not defined by the available model (Jornada, 2019). The introduced annual grass cheatgrass (*Bromus tectorum*) contributed moderate cover in 2019 (Table 09R-25.7, Table 09R-25.10); cheatgrass may have the potential to influence the ecological resilience of this site should it persist over time. Browse species have begun to increase as of 2019 (Table 09R-25.12), indicating that the site could transition to one solely dominated by bitterbrush and sagebrush in future sample years.

**Trend Summary Tables****Table 09R-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
2012	33.6	0.1	-	41.2	0.2	-
2015	8.9	0.2	-	11.6	0.7	-
2019	17.1	0.7	-	18.9	1.2	-

**Table 09R-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
2012	6	414	85	283	0.0	24.4	0.2	7.3
2015	132	400	7	55	2.4	32.3	0.0	1.1
2019	196	428	299	227	7.1	31.8	3.4	5.8

**Table 09R-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
2012	9.0	0.5	44.6	0.1	0.1	68.0
2015	15.2	-	67.0	0.1	1.6	43.3
2019	9.7	0.1	65.0	0.4	0.1	58.4

**Table 09R-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/Domestic Sheep	Rocky Mountain Elk	Greater Sage-Grouse	Rabbit
	Quadrat Frequency				
2012	2	24	-	-	2
2015	1	35	-	17	31
2019	2	23	7	2	11
Year	Days Use Per Acre (ha)				
2012	9.4 (23.3)	73.7 (182.1)	-	-	-
2015	-	31.5 (77.8)	-	122.0 (301.3)*	-
2019	17.4 (43.0)	18.7 (46.3)	59.6 (147.3)	122.0 (301.3)*	-

\*Pellets per acre (ha)

**Table 09R-25.10 - Grass Species.** Nested frequency and modified Daubenmire average cover by year.

GRASS SPECIES												
Achnatherum lettermanii (Letterman's needlegrass)												
Bromus tectorum <sup>ai</sup> (cheatgrass)												
Carex (sedge)												
Carex obtusata (obtuse sedge)												
Elymus elymoides (squirreltail)												
Elymus lanceolatus (thickspike wheatgrass)												
Hesperostipa comata (needle and thread)												
Koeleria macrantha (prairie Junegrass)												
Poa fendleriana (muttongrass)												
Poa pratensis <sup>i</sup> (Kentucky bluegrass)												
Poa secunda (Sandberg bluegrass)												
Pseudoroegneria spicata (bluebunch wheatgrass)												
year	Nested Frequency											
2012	52	6	-	13	39	184	175	47	174	11	98	-
2015	13	132	20	-	39	166	152	20	240	5	31	13
2019	63	196	3	24	121	287	177	40	45	-	175	3
year	Average Cover (%)											
2012	1.0	0.0	-	0.1	0.4	3.8	8.5	1.1	8.0	0.1	1.4	-
2015	0.9	2.4	0.3	-	0.9	5.1	7.3	0.7	15.3	0.0	0.9	0.9
2019	1.8	7.1	0.0	0.2	3.4	11.6	8.4	0.6	1.3	-	4.6	0.0

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

**Table 09R-25.11 - Forb Species.** Nested frequency and modified Daubenmire average cover by year.

FORB SPECIES																		
Agoseris glauca (pale agoseris)																		
Allium (onion)																		
Antennaria (pussytoes)																		
Antennaria microphylla (littleleaf pussytoes)																		
Arabis holboellii <sup>a</sup> (Holboell's rockcress)																		
Arenaria congesta (ballhead sandwort)																		
Astragalus convallarius (lesser rushy milkvetch)																		
Chenopodium leptophyllum <sup>a</sup> (narrowleaf goosefoot)																		
Collinsia parviflora <sup>a</sup> (maiden blue eyed Mary)																		
Collomia linearis <sup>a</sup> (tiny trumpet)																		
Cordylanthus <sup>a</sup> (bird's-beak)																		
Cymopterus (springparsley)																		
Delphinium nuttallianum (two-lobed larkspur)																		
Erigeron eatonii (Eaton's fleabane)																		
Erigeron pumilus (shaggy fleabane)																		
Eriogonum racemosum (redroot buckwheat)																		
Eriogonum umbellatum (sulphur-flower buckwheat)																		
year	Nested Frequency																	
2012	10	-	131	-	36	55	12	-	21	-	-	25	-	6	34	3	16	
2015	-	-	-	48	-	5	1	-	-	-	-	-	-	-	-	-	-	
2019	13	58	14	13	-	77	32	6	220	106	2	25	1	-	43	3	3	
year	Average Cover (%)																	
2012	0.1	-	4.9	-	0.1	0.4	0.1	-	0.0	-	-	0.1	-	0.0	0.1	0.0	0.6	
2015	-	-	-	1.0	-	0.0	0.0	-	-	-	-	-	-	-	-	-	-	
2019	0.3	0.5	0.3	0.2	-	2.0	1.0	0.0	1.5	0.4	0.0	0.1	0.0	-	0.6	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>a</sup> (flatspine stickseed)	Penstemon humilis (low beardtongue)	Phlox longifolia (longleaf phlox)	Polygonum douglasii <sup>a</sup> (Douglas' knotweed)	Silene drummondii (Drummond's campion)	Sphaeralcea coccinea (scarlet globemallow)	Taraxacum officinale (common dandelion)	Tragopogon dubius <sup>ai</sup> (yellow salsify)	Trifolium gymnocarpon (hollyleaf clover)	Zigadenus paniculatus (foothill deathcamas)
year	Nested Frequency											
2012	-	6	5	4	132	55	-	2	3	-	37	-
2015	-	-	7	-	-	-	4	1	-	-	-	-
2019	64	-	37	8	37	155	8	1	13	2	24	2
year	Average Cover (%)											
2012	-	0.0	0.0	0.0	0.8	0.1	-	0.0	0.0	-	0.1	-
2015	-	-	0.0	-	-	-	0.0	0.0	-	-	-	-
2019	0.3	-	0.4	0.2	0.1	0.8	0.2	0.0	0.2	0.0	0.0	0.0

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

**Table 09R-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 microthecum <sup>p</sup> (slender buckwheat)	Opuntia (pricklypear)	Purshia tridentata <sup>p</sup> (antelope bitterbrush)
year	Line Intercept Cover (%)				
2012	23.4	0.2	-	-	17.8
2015	5	0.7	0.3	-	6.3
2019	10.6	1.2	-	-	8.3
year	Quadrat Cover (%)				
2012	21.5	0.1	-	0.0	12.1
2015	4.7	0.2	0.1	0.0	4.1
2019	9.8	0.7	-	-	7.3

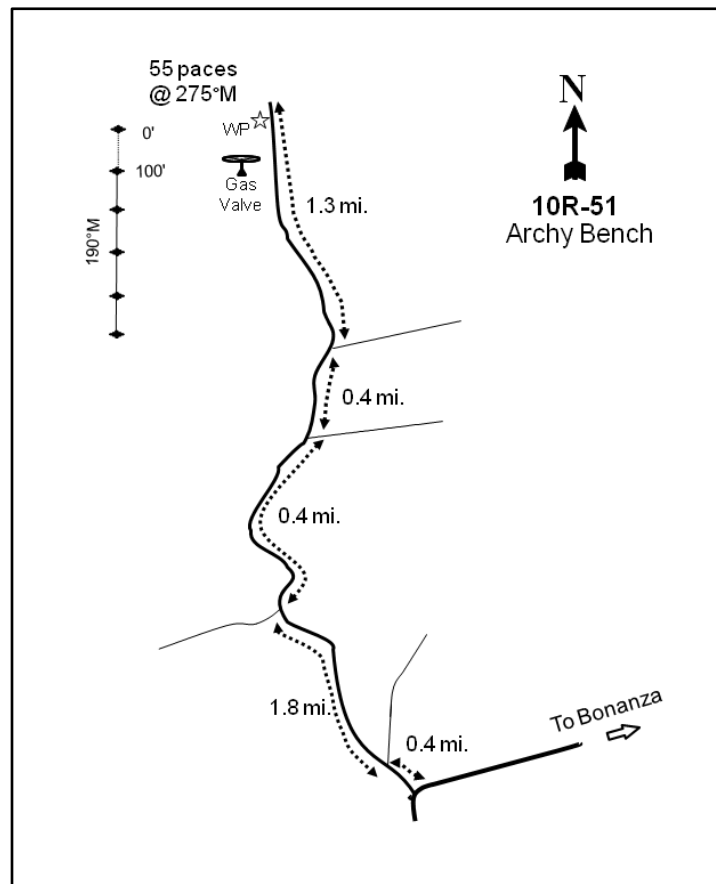
t - Tree Species; p - Preferred Browse; i - Introduced Species

**Table 09R-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>									
2012	5920	1820	42	46	12	28	22	9	68/92
2015	3160	160	53	45	2	26	8	10	35/52
2019	2740	1280	3	89	8	12	1	12	47/70
<b>Chrysothamnus viscidiflorus ssp. viscidiflorus var. viscidiflorus -- (yellow rabbitbrush)</b>									
2012	220	-	0	100	0	0	0	9	32/55
2015	240	-	0	83	17	0	100	17	28/37
2019	260	-	0	100	0	0	0	0	33/53
<b>Eriogonum microthecum<sup>P</sup> -- (slender buckwheat)</b>									
2012	-	-	-	-	-	-	-	-	-/-
2015	80	-	0	100	0	0	100	0	18/37
2019	-	-	-	-	-	-	-	-	-/-
<b>Linanthus pungens -- (granite prickly phlox)</b>									
2012	40	-	50	50	0	0	0	0	24/37
2015	-	-	-	-	-	-	-	-	-/-
2019	20	-	0	100	0	0	0	0	15/31
<b>Opuntia -- (pricklypear)</b>									
2012	40	-	50	50	0	0	0	0	7/28
2015	20	-	0	100	0	0	0	100	- / -
2019	-	-	-	-	-	-	-	-	-/-
<b>Purshia tridentata<sup>P</sup> -- (antelope bitterbrush)</b>									
2012	2500	60	8	90	2	38	47	2	51/101
2015	1320	20	14	86	0	36	33	2	40/86
2019	1260	-	5	94	2	51	8	2	38/84
<b>Symphoricarpos oreophilus<sup>P</sup> -- (mountain snowberry)</b>									
2012	-	-	-	-	-	-	-	-	-/-
2015	-	-	-	-	-	-	-	-	39/39
2019	-	-	-	-	-	-	-	-	42/72
<b>Tetradymia canescens -- (spineless horsebrush)</b>									
2012	-	-	-	-	-	-	-	-	-/-
2015	20	-	0	100	0	0	100	0	17/13

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

## ARCHY BENCH - STUDY NO. 10R-51



### Location Information

USGS 7.5 min Map Info  
GPS (0' Stake)

Archy Bench SE NW; Township 11S, Range 23E, Section 28  
NAD 83 UTM ZONE 12, 641689 East 4410270 North

### Transect Information

Browse Tag # (0' Stake)	674
Transect Bearing	190° magnetic
Length	500ft
Belt Placement	Line 1 (11ft), Line 2 (34ft), Line 3 (59ft), Line 4 (71ft), Line 5 (95ft)
Belt Marker Placement	Belts 1, 4, 5: No Rebar

### Directions to Site

From the main gravel road in Bonanza at the intersection in West Fork Asphalt Wash, take the road heading north towards Archy Bench. Drive 0.4 miles to an intersection, stay left, and continue for 1.8 miles. Proceed to the right and travel another 0.4 miles; stay left for an additional 0.4 miles until another intersection is reached. Proceed to the left and travel another 1.3 miles to the site. The 0-foot stake is located approximately 55 paces to the west at 275 degrees magnetic from the gas valve and is marked by browse tag #674.

**Site Information**

Land Ownership	Federal
Land Administrator	BLM
Allotment	OLSEN AMP
Elevation	6,107ft (1,861m)
Aspect	Southeast
Slope	4%
Sample Dates	08/01/2011, 08/18/2014, 07/21/2019

**Table 10R-51.1 Disturbance History.** Recorded history of major disturbances.

Treatment/Disturbance	Name	WRI DB#	Date	Size (acres)
Lop and Scatter - Hand Crew	Archy Bench Slashing	-	Summer 2010	1339
Seeding - Aerial Before	Archy Bench Sagebrush Restoration	2050	October 2011	607
Chaining - One-Way Ely	Archy Bench Sagebrush Restoration	2050	October 2011	607
Herbicide - Plateau	Archy Bench Sagebrush Restoration	2050	October 2011	607

**Table 10R-51.2 Seed Mix.** List of known seeded plant species and rates (if available).

Mix Name			Application Type	Application Date	Acres
Archy Bench Sagebrush Restoration			Aerial	Oct 2011	600
Type	Species	Common Name	Cultivar/Source ID	Bulk lbs/acre	PLS
	Achnatherum hymenoides	Indian Ricegrass	Emery UT	1.00	0.83
G	Agropyron cristatum	Crested Wheatgrass	Ephraim	1.50	1.45
G	Agropyron fragile	Siberian Wheatgrass	Vavilov	1.00	0.77
G	Elymus elymoides	Bottlebrush Squirreltail	Millard UT	1.00	0.78
G	Elymus wawawaiensis	Snake River Wheatgrass	Secar	1.50	1.19
G	Pascopyrum smithii	Western Wheatgrass	Arriba	2.00	1.72
G	Poa secunda	Canby Bluegrass	Canbar	0.25	0.12
G	Psathyrostachys juncea	Russian Wildrye	Bozoisky	1.50	1.25
F	Achillea millefolium	Western Yarrow	Eagle Mountain	0.13	0.11
F	Cleome serrulata	Rocky Mountain Beeplant	Sevier UT	0.50	0.48
F	Cleome serrulata	Rocky Mountain Beeplant	Millard/Sevier/Sanpete UT	0.50	0.47
F	Linum perenne	Blue Flax	Appar	1.00	0.73
S	Atriplex canescens	Fourwing Saltbush	Carbon UT	1.50	0.65
S	Bassia prostrata	Forage Kochia	Beaver UT	0.25	0.12
S	Krascheninnikovia lanata	Winterfat		0.47	0.08
S	Krascheninnikovia lanata	Winterfat	Millard/Sevier/Carbon UT	0.53	0.19

**Wildlife Habitat and Vegetation History****Table 10R-51.3 - Wildlife Seasonal Habitat.** UDWR wildlife habitat and seasonality.

Species	Habitat	Season
American Bison	potential	winter
Mule Deer	substantial	winter
Rocky Mountain Elk	substantial	winter

**Table 10R-51.4 - Vegetation History.** The dominant vegetation type(s) and phase of woodland succession (Tausch, Miller, Roundy, & Chambers, 2009).

Year	Vegetation Type	Woodland Succession
2011	Mountain Big Sagebrush/Annual Grass	Phase I
2014	Mountain Big Sagebrush/Annual Grass	No Encroachment
2019	Mountain Big Sagebrush/Annual Grass	Phase I

**Site Notes**

No Notes



**Site Potential**

1981 - 2010 Average Annual Precipitation	11 inches
NRCS Ecological Site	Semidesert Loam (Wyoming Big Sagebrush)
NRCS Ecological Site #	R034BY212UT
States and Transitions	A defined state and transition model is available.

Mountain big sagebrush (*Artemisia tridentata* ssp. *vaseyana*) has dominated this site since study establishment in 2011 with few other browse species present. However, cover and density of sagebrush decreased following treatment (Table 10R-51.12, Table 10R-51.13). The herbaceous understory has remained primarily comprised of the introduced annual grass species cheatgrass (*Bromus tectorum*) which increased in cover following treatment and has been a co-dominant vegetation component (Table 10R-51.7, Table 10R-51.10). High amounts of cheatgrass may increase fuel loads and threaten the ecological resilience of the plant community on this site. As such, further treatments may be necessary to control annual grasses.

**Trend Summary Tables**

**Table 10R-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
2011	18.5	4.6	-	22.2	6.0	-
2014	10.6	2.2	-	13.7	4.6	-
2019	13.2	2.9	-	14.6	4.1	-

**Table 10R-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
2011	317	75	75	62	16.8	2.9	4.6	0.7
2014	364	60	102	60	20.1	1.1	2.0	0.6
2019	373	59	92	12	20.5	1.6	2.3	0.2

**Table 10R-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
2011	7.8	2.0	27.2	35.1	1.4	44.8
2014	16.9	0.4	37.2	24.3	4.1	36.4
2019	22.1	0.0	44.9	24.9	1.2	39.0

**Table 10R-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	Rocky Mountain Elk	Rabbit
	Quadrat Frequency			
2011	-	6	8	2
2014	-	5	7	-
2019	1	10	20	3
Year	Days Use Per Acre (ha)			
2011	-	23.4 (57.9)	7.4 (18.2)	-
2014	-	8.7 (21.5)	24.1 (59.6)	-
2019	-	8.7 (21.5)	44.9 (110.9)	-

**Table 10R-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)	Bromus tectorum <sup>ai</sup> (cheatgrass)	Elymus elymoides (squirreltail)	Elymus lanceolatus (thickspike wheatgrass)	Hesperostipa comata (needle and thread)	Poa secunda (Sandberg bluegrass)
year	Nested Frequency						
2011	5	-	317	28	41	3	-
2014	4	12	364	11	31	-	3
2019	3	17	373	13	28	-	-
year	Average Cover (%)						
2011	0.2	-	16.8	1.1	1.6	0.0	-
2014	0.0	0.2	20.1	0.1	0.8	-	0.0
2019	0.1	0.4	20.5	0.2	0.8	-	-

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

**Table 10R-51.11 - 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)	Chamaesyce albomarginata (whitemargin 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)	Erigeron divergens <sup>a</sup> (spreading fleabane)	Eriogonum cernuum <sup>a</sup> (nodding buckwheat)	Halogeton glomeratus <sup>ai</sup> (saltlover)	Lappula occidentalis <sup>a</sup> (flatspine stickseed)	Machaeranthera canescens (hoary tansyaster)	Mentzelia albicaulis <sup>a</sup> (whitestem blazingstar)	Phacelia <sup>a</sup> (phacelia)	Phlox austromontana (mountain phlox)	Phlox longifolia (longleaf phlox)
year	Nested Frequency																
2011	-	8	5	24	8	-	6	6	-	7	2	1	8	-	-	5	12
2014	-	-	-	36	-	-	7	25	-	-	33	34	10	-	1	-	4
2019	10	3	-	2	3	25	-	19	5	8	1	23	3	1	7	-	4
year	Average Cover (%)																
2011	-	0.1	0.0	0.3	0.1	-	0.0	0.1	-	0.2	0.1	0.0	0.1	-	-	0.2	0.0
2014	-	-	-	0.1	-	-	0.0	0.5	-	-	0.1	0.4	0.4	-	0.0	-	0.0
2019	1.0	0.0	-	0.1	0.0	0.1	-	0.2	0.0	0.1	0.0	0.3	0.0	0.0	0.5	-	0.0

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

FORB SPECIES			
	Salsola tragus <sup>ai</sup> (prickly Russian thistle)		
	Sisymbrium altissimum <sup>ai</sup> (tall tumblemustard)		
	Townsendia (Townsend daisy)		
year	Nested Frequency		
2011	55	17	-
2014	27	18	3
2019	21	5	-
year	Average Cover (%)		
2011	3.5	0.6	-
2014	0.5	0.6	0.0
2019	0.2	0.0	-

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

**Table 10R-51.12 - 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)				
	Grayia spinosa (spiny hopsage)				
	Gutierrezia sarothrae (broom snakeweed)				
	Opuntia (pricklypear)				
	Sarcobatus vermiculatus (greasewood)				
year	Line Intercept Cover (%)				
2011	22.2	0.8	1.7	-	3.5
2014	13.7	-	1.6	-	3
2019	14.6	-	1.3	-	2.8
year	Quadrat Cover (%)				
2011	18.5	1.0	2.3	0.0	1.3
2014	10.6	-	1.2	0.1	0.9
2019	13.2	-	1.9	-	1.0

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

**Table 10R-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>									
2011	3460	40	4	71	25	60	19	18	64/90
2014	2920	-	9	66	25	51	7	17	55/79
2019	2840	-	0	56	44	27	1	62	55/79
<b>Chrysothamnus viscidiflorus -- (yellow rabbitbrush)</b>									
2011	20	-	0	100	0	0	0	0	46/78
2014	-	-	-	-	-	-	-	-	46/80
2019	-	-	-	-	-	-	-	-	52/98
<b>Ericameria nauseosa -- (rubber rabbitbrush)</b>									
2011	-	-	-	-	-	-	-	-	59/54
2014	-	-	-	-	-	-	-	-	81/104
2019	-	-	-	-	-	-	-	-	51/70
<b>Grayia spinosa -- (spiny hopsage)</b>									
2011	40	-	50	50	0	100	0	0	74/112
2014	-	-	-	-	-	-	-	-	-/-
2019	20	-	0	100	0	0	0	0	58/67
<b>Gutierrezia sarothrae -- (broom snakeweed)</b>									
2011	1140	240	35	65	0	0	0	0	33/55
2014	1900	3820	44	54	2	0	0	0	24/30
2019	2160	-	1	94	6	0	0	6	22/19
<b>Juniperus osteosperma<sup>i</sup> -- (Utah juniper)</b>									
2011	-	20	0	0	0	0	0	0	-/-
2014	-	-	-	-	-	-	-	-	-/-
2019	20	-	100	0	0	0	0	0	-/-
<b>Opuntia -- (pricklypear)</b>									
2011	20	-	0	100	0	0	0	0	11/33
2014	40	-	0	100	0	0	0	0	10/23
2019	40	-	0	100	0	0	0	0	9/30
<b>Sarcobatus vermiculatus -- (greasewood)</b>									
2011	180	20	11	89	0	22	44	0	112/169
2014	180	-	0	100	0	33	0	0	81/144
2019	180	-	0	100	0	0	0	0	94/154

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

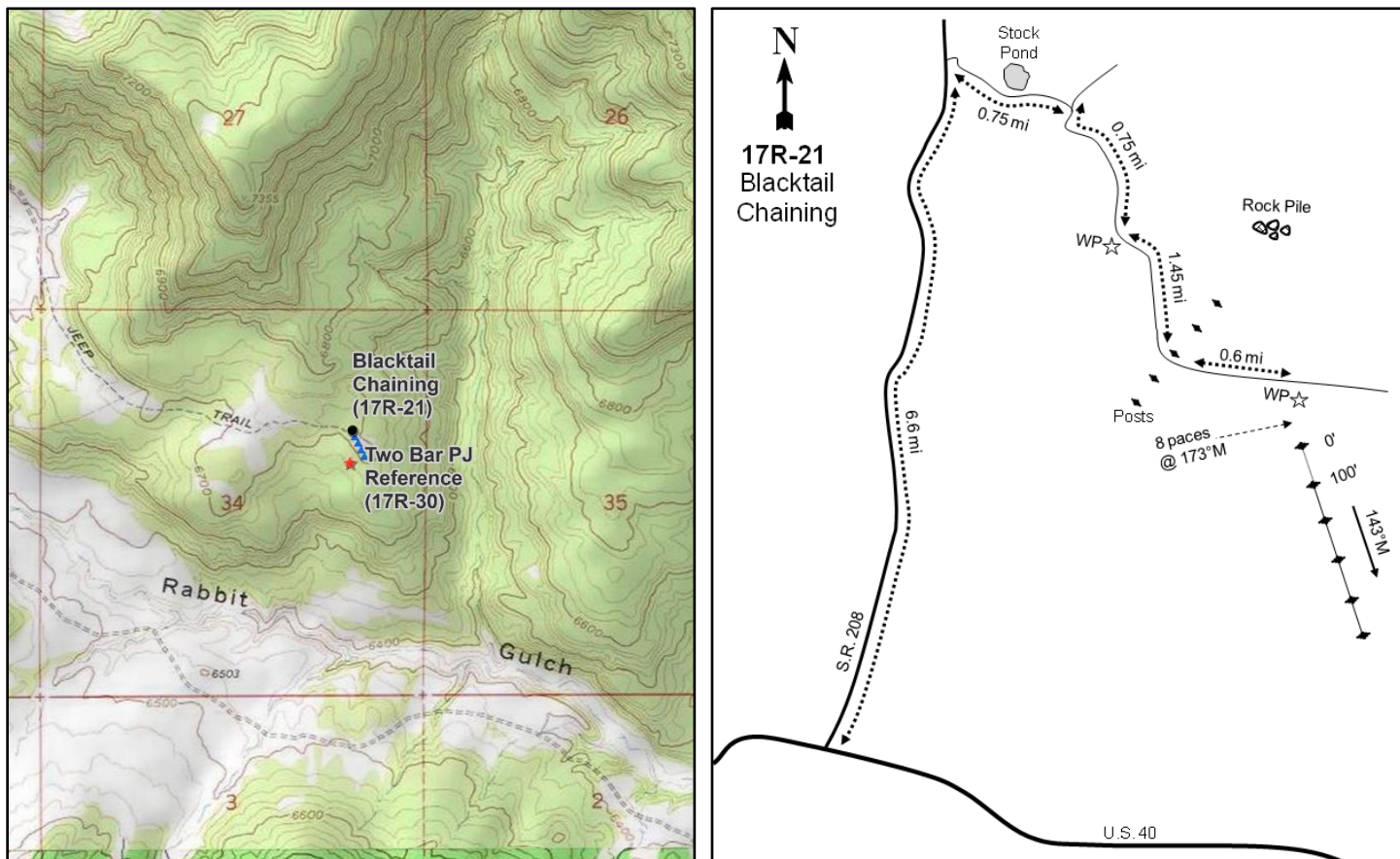
**Table 10R-51.14 - Tree Characteristics.** Point-quarter tree density, size class distribution, and average diameter.

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	6	-	67	33	-	-	7.3
2019	6	-	100	-	-	-	4.8
<b>Pinus edulis (twoneedle pinyon)</b>							
2011	1	100	-	-	-	-	2.0

**Table 10R-51.15 - Deer Desirable Components Index: Low Potential Scale.**

Year	Preferred Browse Cover	Preferred Browse Decadence	Preferred Browse Young	Perennial Grass Cover	Annual Grass Cover	Perennial Forb Cover	Noxious Weeds	Total Score	Ranking
2011	27.8	7.4	1.8	5.7	-12.6	1.5	0.0	31.5	Fair
2014	17.1	7.6	4.5	2.3	-15.1	1.2	0.0	17.5	Poor
2019	18.3	1.9	0.0	3.2	-15.4	0.4	0.0	8.4	Very Poor-Poor

## BLACKTAIL CHAINING - STUDY NO. 17R-21

**Location Information**

USGS 7.5 min Map Info  
GPS (0' Stake)

Tabiona SE; Township 2S, Range 7W, Section 34  
NAD 83 UTM ZONE 12, 529257 East 4457303 North

**Transect Information**

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

Not Available  
143° magnetic  
400ft  
Line 1 (11ft & 95ft), Line 2 (34ft), Line 3 (59ft), Line 4 (71ft)  
No Rebar

**Directions to Site**

From US-40, drive north on State Route 208 for 6.6 miles to a road on the right. Turn right and drive 0.75 miles to a junction. Stay straight on this road, following it around a bend for 0.75 miles, to a witness post on the right (south) side of the road. From there, drive 1.45 miles to an old fence (just posts remain), following the road as it curves back to the east. Proceed 0.6 miles to another witness post on the right (south) and a rock pile on the left (north) side of the road. From the witness post, walk 8 paces at 173 degrees magnetic to the 0-foot stake.

**Site Information**

Land Ownership	State
Land Administrator	UDWR
Allotment	No data
Elevation	6,700ft (2,042m)
Aspect	East
Slope	3-4%
Sample Dates	07/06/2006, 07/09/2009, 06/29/2010, 06/25/2013, 07/21/2019

**Table 17R-21.1 Disturbance History.** Recorded history of major disturbances.

Treatment/Disturbance	Name	WRI DB#	Date	Size (acres)
Chaining - Two-Way Ely	East Santaquin Draw P/J Chaining	367	September-October 2006	450
Seeding - Aerial Before	East Santaquin Draw P/J Chaining	367	September 2006	450
Seeding - Aerial After	East Santaquin Draw P/J Chaining	367	January 2007	450
Seeding - Dribbler	East Santaquin Draw P/J Chaining	367	September-October 2006	450

**Table 17R-21.2 Seed Mix.** List of known seeded plant species and rates (if available).

Mix Name			Application Type	Application Date	Acres
Santaquin East P-J Chaining			Aerial	Sep 2006	500
Type	Species	Common Name	Cultivar/Source ID	Bulk lbs/acre	PLS
G	Agropyron cristatum	Crested Wheatgrass	Ephraim	0.03	0.03
G	Agropyron cristatum	Crested Wheatgrass	Hycrest	1.00	0.90
G	Dactylis glomerata	Orchardgrass	Paiute	0.20	0.19
G	Elymus lanceolatus	Thickspike Wheatgrass	Bannock	1.00	0.92
G	Elymus wawawaiensis	Snake River Wheatgrass	Secar	0.50	0.46
G	Poa secunda	Canby Bluegrass	Canbar	0.25	0.23
G	Psathyrostachys juncea	Russian Wildrye		1.00	0.85
G	Psathyrostachys juncea	Russian Wildrye		0.03	0.02
F	Linum perenne	Blue Flax		0.25	0.22
F	Medicago sativa	Alfalfa	Ladak	0.30	0.28
F	Medicago sativa	Alfalfa	Nomad	0.30	0.27
F	Medicago sativa	Alfalfa	Ranger	0.40	0.35
F	Onobrychis viciifolia	Sainfoin	Eski	2.00	1.77
F	Sanguisorba minor	Small Burnet	Delar	2.00	1.86
S	Atriplex canescens	Fourwing Saltbush	Juab/Tooele UT	1.00	0.51

Mix Name			Application Type	Application Date	Acres
Santaquin East P-J Chaining - Dribble mix			Dribbler	Sep 2006	500
Type	Species	Common Name	Cultivar/Source ID	Bulk lbs/acre	PLS
F	Sanguisorba minor	Small Burnet	Delar	0.10	0.09
S	Cercocarpus montanus	True Mountain Mahogany		0.05	0.04
S	Ephedra viridis	Green Ephedra		0.10	0.09
S	Purshia tridentata	Bitterbrush	Millard UT	0.05	0.04

Mix Name			Application Type	Application Date	Acres
Santaquin East P-J Chaining Browse			Aerial	Jan 2007	500
Type	Species	Common Name	Cultivar/Source ID	Bulk lbs/acre	PLS
S	Artemisia tridentata ssp. wyomingensis	Wyoming Big Sagebrush	Sanpete UT	1.00	0.20
S	Bassia prostrata	Forage Kochia	Beaver UT	1.00	0.70

**Wildlife Habitat and Vegetation History****Table 17R-21.3 - Wildlife Seasonal Habitat.** UDWR wildlife habitat and seasonality.

Species	Habitat	Season
Mule Deer	crucial	winter
Rocky Mountain Elk	crucial	winter

**Table 17R-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-Juniper	Phase III
2009	Perennial Grass	Phase I
2010	Perennial Grass	Phase I
2013	Perennial Grass	Phase I

**Site Notes**

The study was established in 2006 in the Tabby Mountain Wildlife Management Area (WMA).

**Soils****Table 17R-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
	6.6	0.0	0.0	0.0	4.5	19.0	403.0	0.3	08/06/2015
Sandy Loam	6.9	71.3	14.4	14.3	4.5	20.7	131.2	0.9	07/05/2006

**Site Potential**

1981 - 2010 Average Annual Precipitation 12 inches  
 NRCS Ecological Site Upland Loam (Mountain Big Sagebrush)  
 NRCS Ecological Site # R047XC310UT  
 States and Transitions A defined state and transition model is available.

When the study was established in 2006, this site had a limited browse component and was severely encroached by twoneedle pinyon (*Pinus edulis*) and Utah juniper (*Juniperus osteosperma*). Following the chaining and seeding treatment in the fall-winter of 2006 (Table 17R-21.1), the site transitioned to a perennial grass-dominated plant community with an increasing browse component. The herbaceous understory has been moderately diverse with perennial grasses -- particularly thickspike wheatgrass (*Elymus lanceolatus*) and needle and thread (*Hesperostipa comata*) -- providing the most cover. The introduced annual grass species cheatgrass (*Bromus tectorum*) has been present in most sample years, but in low amounts (Table 17R-21.10). Forb cover has fluctuated, but has generally remained low (Table 17R-21.11). Forage kochia (*Bassia prostrata*) has been the dominant browse species present with an increasing trend observed following treatment. In addition, there has been a small amount of mountain big sagebrush (*Artemisia tridentata* ssp. *vaseyana*) present in all sample years, the cover and density of which have exhibited slight increases overall (Table 17R-21.12, Table 17R-21.13). Pinyon and juniper have persisted following treatment, albeit with low cover and density (Table 17R-21.12, Table 17R-21.14).

**Trend Summary Tables****Table 17R-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	1.7	2.9	1.2	1.8	21.2
2009	2.2	2.3	1.7	2.0	2.1	1.8
2010	1.8	2.6	1.2	2.4	1.4	1.1
2013	2.3	1.0	0.6	3.2	1.8	0.6
2019	8.6	2.2	1.0	9.0	1.1	1.6

**Table 17R-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	125	216	83	5	0.7	3.5	0.3	0.0
2009	98	249	93	66	2.2	18.9	2.4	4.0
2010	97	303	97	73	2.0	18.4	1.8	2.5
2013	151	344	49	60	0.6	13.4	0.2	0.5
2019	219	353	250	12	4.7	20.8	5.0	0.1



**Table 17R-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	40.0	5.6	50.5	-	1.1	10.1
2009	22.4	0.8	57.2	0.0	0.2	37.1
2010	20.7	0.4	51.3	-	0.2	33.4
2013	16.6	0.1	70.4	-	0.1	24.8
2019	21.3	0.9	59.3	0.0	0.2	35.8

**Table 17R-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	-	20	23	69
2009	-	31	22	63
2010	-	20	13	25
2013	-	9	24	28
2019	-	9	32	61
Year	Days Use Per Acre (ha)			
2006	-	52.3 (129.1)	42.9 (105.9)	-
2009	0.7 (1.8)	39.6 (97.7)	14.7 (36.4)	-
2010	-	24.8 (61.2)	32.8 (81.1)	-
2013	2.2 (5.4)	24.1 (59.6)	81.1 (200.3)	-
2019	-	10.0 (24.8)	36.8 (91.0)	-

**Table 17R-21.10 - 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)	Carex obtusata (obtusate sedge)	Dactylis glomerata <sup>i</sup> (orchardgrass)	Elymus elymoides (squirreltail)	Elymus lanceolatus (thickspike wheatgrass)	Elymus trachycaulis (slender wheatgrass)	Hesperostipa comata (needle and thread)	Pascopyrum smithii (western wheatgrass)	Poa secunda (Sandberg bluegrass)	Psathyrostachys juncea <sup>i</sup> (Russian wildrye)	Pseudoroegneria spicata (bluebunch wheatgrass)	Sporobolus cryptandrus (sand dropseed)
year	Nested Frequency																
2006	57	19	-	16	27	17	-	-	-	-	-	88	97	26	-	-	-
2009	16	2	33	7	69	-	-	21	12	62	-	101	70	15	3	7	-
2010	25	3	55	21	83	22	-	2	5	68	-	131	103	10	7	4	-
2013	32	-	79	16	128	35	-	1	14	168	16	146	10	7	10	1	3
2019	19	-	65	10	129	33	19	-	6	228	-	125	10	17	5	4	3
year	Average Cover (%)																
2006	0.8	0.2	-	0.1	0.1	0.0	-	-	-	-	-	1.5	0.7	0.1	-	-	-
2009	0.5	0.1	1.8	0.2	1.8	-	-	0.7	0.2	2.7	-	7.9	3.7	0.4	0.2	0.5	-
2010	0.5	0.0	1.8	0.9	1.9	0.5	-	0.0	0.2	2.9	-	7.5	2.9	0.3	0.3	0.8	-
2013	0.8	-	1.7	0.8	0.5	0.2	-	0.0	0.2	3.7	0.9	4.5	0.1	0.0	0.4	0.0	0.0
2019	0.8	-	3.0	0.1	3.1	0.9	0.4	-	0.2	7.3	-	7.0	0.4	0.2	0.3	0.1	0.0

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

GRASS SPECIES	Vulpia octoflora <sup>a</sup> (sixweeks fescue)
year	Nested Frequency
2006	121
2009	45
2010	20
2013	47
2019	162
year	Average Cover (%)
2006	0.6
2009	0.4
2010	0.1
2013	0.1
2019	1.6

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

**Table 17R-21.11 - 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)	Chaenactis douglasii (Douglas' dustymaiden)	Chenopodium fremontii <sup>a</sup> (Fremont's goosefoot)	Chenopodium leptophyllum <sup>a</sup> (narrowleaf goosefoot)	Collinsia parviflora <sup>a</sup> (maiden blue eyed Mary)	Cryptantha (cryptantha)	Cryptantha <sup>a</sup> (annual cryptantha)	Descurainia pinnata <sup>a</sup> (western tansymustard)	Draba <sup>a</sup> (draba)	Eriogonum cernuum <sup>a</sup> (nodding buckwheat)	Gayophytum ramosissimum <sup>a</sup> (pinyon groundsmoke)	Gilia inconspicua <sup>a</sup> (shy gilia)	Ipomopsis aggregata (scarlet gilia)	Lactuca serriola <sup>ai</sup> (prickly lettuce)	
year	Nested Frequency																
2006	-	-	-	-	-	-	-	2	-	3	3	-	-	-	2	-	
2009	-	-	3	6	-	44	3	-	9	-	-	-	14	-	-	0	
2010	-	-	-	9	-	28	7	1	10	-	-	17	-	8	-	7	
2013	-	8	-	5	10	-	4	-	2	-	12	-	8	13	-	-	
2019	3	-	-	-	-	85	35	21	-	4	30	1	-	93	24	3	
year	Average Cover (%)																
2006	-	-	-	-	-	-	-	-	0.0	-	0.0	0.0	-	-	-	0.0	-
2009	-	-	0.0	0.0	-	0.5	0.0	-	0.3	-	-	-	0.4	-	-	0.0	
2010	-	-	-	0.1	-	0.5	0.0	0.0	0.4	-	-	0.2	-	0.0	-	0.0	
2013	-	0.0	-	0.0	0.0	-	0.0	-	0.0	-	0.0	-	0.0	0.0	-	-	
2019	0.0	-	-	-	-	0.4	0.6	0.1	-	0.0	0.6	0.0	-	0.7	0.1	0.0	

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

FORB SPECIES															
<i>Lappula occidentalis</i> <sup>a</sup> (flatspine stickseed)															
<i>Linum perenne</i> <sup>i</sup> (blue flax)															
<i>Machaeranthera grindeltooides</i> (rayless tansyaster)															
<i>Medicago sativa</i> <sup>i</sup> (alfalfa)															
<i>Mentzelia albicaulis</i> <sup>a</sup> (whitestem blazingstar)															
<i>Microsteris gracilis</i> <sup>a</sup> (slender phlox)															
<i>Onobrychis vicifolia</i> <sup>i</sup> (sainfoin)															
<i>Packera multilobata</i> (lobeleaf groundsel)															
<i>Penstemon</i> (beardtongue)															
<i>Phlox austromontana</i> (mountain phlox)															
<i>Polygonum douglasii</i> <sup>a</sup> (Douglas' knotweed)															
<i>Salsola tragus</i> <sup>a</sup> (prickly Russian thistle)															
<i>Sanguisorba minor</i> <sup>i</sup> (small burnet)															
<i>Schoenocrambe linifolia</i> (flaxleaf plainsmustard)															
<i>Tragopogon dubius</i> <sup>a</sup> (yellow salsify)															
year	Nested Frequency														
2006	62	-	-	-	-	-	-	-	1	-	20	-	-	-	-
2009	24	0	-	5	13	-	-	6	-	-	9	1	0	38	0
2010	24	2	-	4	5	-	2	3	3	-	9	8	5	39	1
2013	9	3	-	6	-	-	2	6	-	1	-	8	-	24	4
2019	81	-	2	-	10	1	0	2	-	-	66	4	-	8	4
year	Average Cover (%)														
2006	0.2	-	-	-	-	-	-	-	0.0	-	0.0	-	-	-	-
2009	0.6	0.0	-	0.7	0.4	-	-	0.7	-	-	0.1	0.3	0.0	2.2	0.0
2010	0.1	0.0	-	0.2	0.1	-	0.0	0.0	0.0	-	0.0	0.8	0.1	1.6	0.0
2013	0.0	0.0	-	0.0	-	-	0.1	0.0	-	0.0	-	0.1	-	0.1	0.0
2019	1.0	-	0.0	-	1.1	0.0	0.0	0.0	-	-	0.3	0.0	-	0.1	0.1

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

**Table 17R-21.12 - 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>p</sup> (forage kochia)						
<i>Juniperus osteosperma</i> <sup>i</sup> (Utah juniper)						
<i>Linanthus pungens</i> (granite prickly phlox)						
<i>Opuntia</i> (pricklypear)						
<i>Pinus edulis</i> <sup>t</sup> (twoneedle pinyon)						
year	Line Intercept Cover (%)					
2006	1.2	-	7.5	-	1.8	13.7
2009	0.4	1.6	0.9	-	2.1	0.9
2010	1	1.4	0.3	-	1.4	0.8
2013	1	2.2	0.1	-	1.8	0.5
2019	1.9	7.1	0.4	-	1.1	1.2
year	Quadrat Cover (%)					
2006	1.1	-	0.6	0.0	1.7	2.4
2009	0.3	1.8	0.8	-	2.3	1.0
2010	0.3	1.4	0.2	-	2.6	1.0
2013	0.5	1.8	0.0	-	1.0	0.6
2019	1.4	7.2	0.0	-	2.2	1.0

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

**Table 17R-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>									
2006	-	-	-	-	-	-	-	-	29/76
2009	-	-	-	-	-	-	-	-	-/-
2010	-	-	-	-	-	-	-	-	-/-
2013	-	-	-	-	-	-	-	-	-/-
2019	-	-	-	-	-	-	-	-	-/-
<b>Artemisia tridentata ssp. vaseyana<sup>P</sup> -- (mountain big sagebrush)</b>									
2006	340	2140	6	18	77	29	0	65	36/68
2009	-	-	-	-	-	-	-	-	35/44
2010	1040	-	40	54	6	25	42	2	40/53
2013	900	20	40	51	9	7	58	20	38/48
2019	600	1880	23	70	7	17	3	7	47/69
<b>Atriplex canescens<sup>P</sup> -- (fourwing saltbush)</b>									
2006	-	-	-	-	-	-	-	-	-/-
2009	-	-	-	-	-	-	-	-	-/-
2010	-	-	-	-	-	-	-	-	-/-
2013	-	-	-	-	-	-	-	-	131/230
2019	-	-	-	-	-	-	-	-	100/104
<b>Bassia prostrata<sup>Pi</sup> -- (forage kochia)</b>									
2006	-	-	-	-	-	-	-	-	-/-
2009	-	-	-	-	-	-	-	-	31/35
2010	2100	200	29	71	0	9	2	0	29/41
2013	6140	100	52	49	0	26	4	0	31/42
2019	3580	-	10	90	0	0	0	0	40/58
<b>Cercocarpus montanus<sup>P</sup> -- (alderleaf mountain mahogany)</b>									
2006	-	-	-	-	-	-	-	-	162/140
2009	-	-	-	-	-	-	-	-	111/137
2010	-	-	-	-	-	-	-	-	70/125
2013	-	-	-	-	-	-	-	-	75/83
2019	-	-	-	-	-	-	-	-	84/98
<b>Eriogonum corymbosum -- (crispleaf buckwheat)</b>									
2006	-	-	-	-	-	-	-	-	-/-
2009	-	-	-	-	-	-	-	-	-/-
2010	-	-	-	-	-	-	-	-	-/-
2013	-	-	-	-	-	-	-	-	22/25
2019	-	-	-	-	-	-	-	-	-/-
<b>Ericameria nauseosa -- (rubber rabbitbrush)</b>									
2006	-	-	-	-	-	-	-	-	-/-
2009	-	-	-	-	-	-	-	-	71/78
2010	60	-	100	0	0	0	0	0	79/89
2013	-	-	-	-	-	-	-	-	-/-
2019	-	-	-	-	-	-	-	-	89/124
<b>Juniperus osteosperma<sup>1</sup> -- (Utah juniper)</b>									
2006	40	-	0	50	50	0	0	0	- / -
2009	-	-	-	-	-	-	-	-	-/-
2010	-	-	-	-	-	-	-	-	-/-
2013	80	-	75	25	0	0	0	0	- / -
2019	-	-	-	-	-	-	-	-	-/-

Year	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>Linanthus pungens -- (granite prickly phlox)</b>									
2006	-	-	-	-	-	-	-	-	5/14
2009	-	-	-	-	-	-	-	-	-/-
2010	-	-	-	-	-	-	-	-	-/-
2013	-	-	-	-	-	-	-	-	-/-
2019	-	-	-	-	-	-	-	-	15/17
<b>Opuntia -- (pricklypear)</b>									
2006	1800	-	0	83	17	0	0	9	14/50
2009	-	-	-	-	-	-	-	-	14/40
2010	1900	-	8	91	1	0	0	1	13/48
2013	2320	20	1	99	0	0	0	1	11/26
2019	2260	-	9	91	0	0	0	0	13/34
<b>Pinus edulis<sup>t</sup> -- (twoneedle pinyon)</b>									
2006	120	20	33	67	0	0	0	0	- / -
2009	-	-	-	-	-	-	-	-	-/-
2010	-	-	-	-	-	-	-	-	-/-
2013	20	-	0	100	0	0	0	100	- / -
2019	-	-	-	-	-	-	-	-	-/-
<b>Purshia tridentata<sup>p</sup> -- (antelope bitterbrush)</b>									
2006	-	-	-	-	-	-	-	-	30/136
2009	-	-	-	-	-	-	-	-	62/180
2010	-	-	-	-	-	-	-	-	50/137
2013	-	-	-	-	-	-	-	-	35/43
2019	-	-	-	-	-	-	-	-	77/174

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

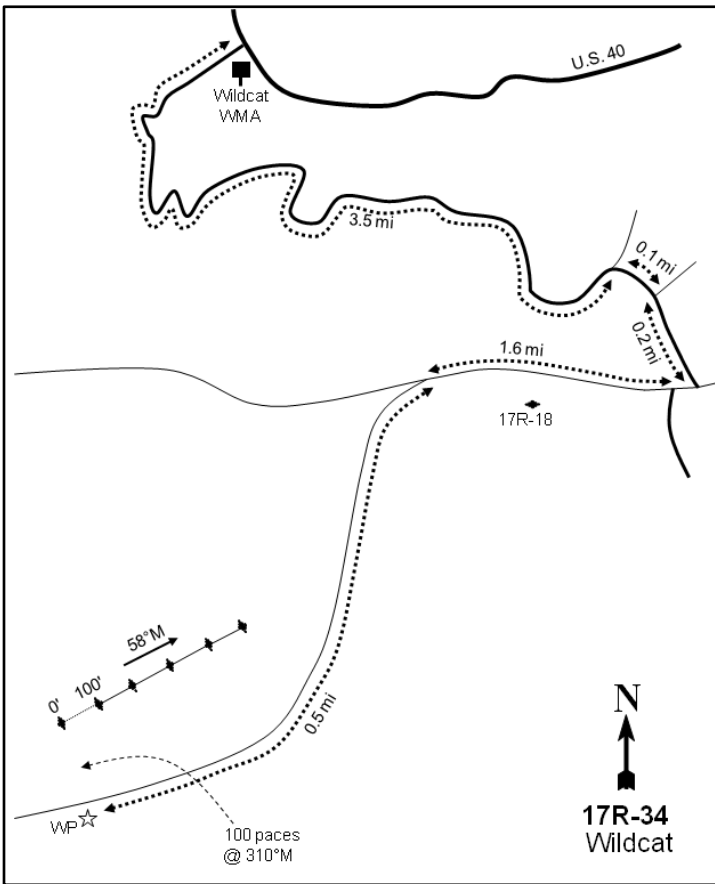
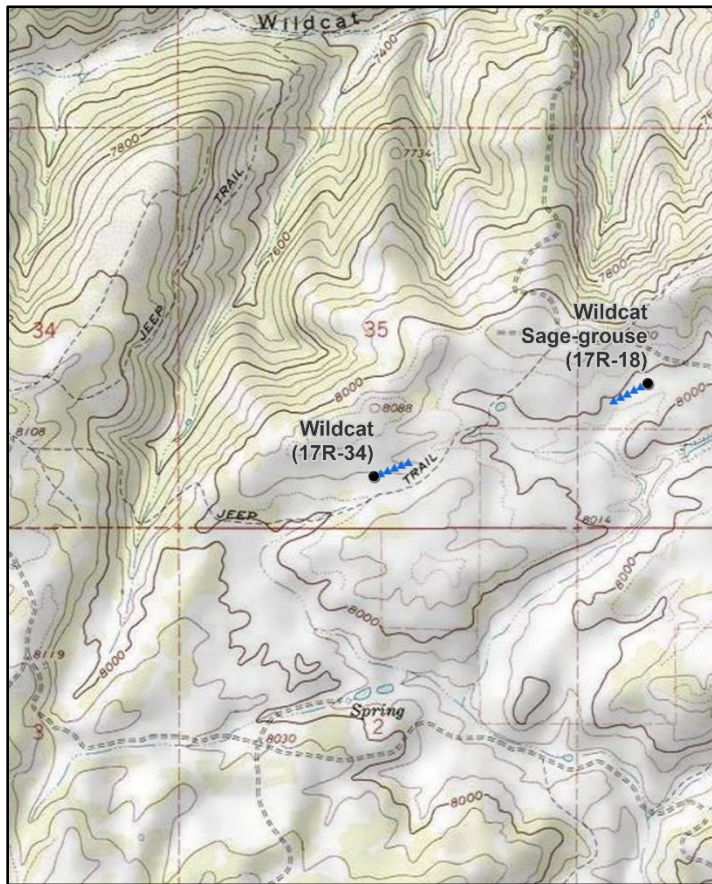
**Table 17R-21.14 - Tree Characteristics.** Point-quarter tree density, size class distribution, and average diameter.

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	30	-	-	13	50	38	47.6
2009	8	-	25	25	-	50	21.3
2010	20	-	91	9	-	-	14.7
2013	7	-	20	80	-	-	13.2
2019	10	14	57	29	-	-	21.1
<b>Pinus edulis (twoneedle pinyon)</b>							
2006	50	33	17	17	6	28	16.7
2009	27	-	89	11	-	-	4.3
2010	23	17	75	8	-	-	3.0
2013	20	-	80	20	-	-	4.9
2019	20	-	63	38	-	-	5.9

**Table 17R-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
2006	1.5	0.0	0.0	6.9	-0.5	0.0	0.0	7.9	Very Poor
2009	2.9	0.0	0.0	30.0	-1.6	7.9	0.0	39.2	Poor
2010	3.4	0.0	0.0	30.0	-1.5	5.0	0.0	36.9	Very Poor-Poor
2013	4.6	0.0	0.0	26.7	-0.5	0.9	0.0	31.7	Very Poor
2019	13.0	14.6	6.4	30.0	-3.6	0.2	0.0	60.7	Fair

## WILDCAT - STUDY NO. 17R-34



### Location Information

USGS 7.5 min Map Info  
GPS (0' Stake)

Deep Creek Canyon SW; Township 3S, Range 10W, Section 35  
NAD 83 UTM ZONE 12, 501550 East 4446688 North

### Transect Information

Browse Tag # (0' Stake)	9169
Transect Bearing	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

While driving east on US-40, go past Strawberry Reservoir to the road that goes to the Wildcat WMA. Turn right (south) and drive 3.5 miles to a fork. Proceed to the right, drive 0.1 miles to a fork, and stay right. Drive 0.2 miles to another fork and stay right again. Drive 1.6 miles to a road on the right (south). Turn right and travel for another 0.5 miles to a witness post on the left (south) side of the road. From the witness post, walk 33 paces at 310 degrees magnetic to the 0-foot stake. The 0-foot stake is marked with browse tag #9169.



**Site Information**

Land Ownership	State
Land Administrator	UDWR
Allotment	No data
Elevation	8,031ft (2,448m)
Aspect	Southeast
Slope	1-3%
Sample Dates	07/11/2012, 08/04/2015, 07/20/2019

**Table 17R-34.1 Disturbance History.** Recorded history of major disturbances.

Treatment/Disturbance	Name	WRI DB#	Date	Size (acres)
Harrow - Two-Way Chain	Wildcat Harrow	2309	October 2012	244

**Wildlife Habitat and Vegetation History****Table 17R-34.3 - Wildlife Seasonal Habitat.** UDWR wildlife habitat and seasonality.

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

**Table 17R-34.4 - Vegetation History.** The dominant vegetation type(s) and phase of woodland succession (Tausch, Miller, Roundy, & Chambers, 2009).

Year	Vegetation Type	Woodland Succession
2012	Mountain Big Sagebrush/Bitterbrush/Perennial Grass	No Encroachment
2015	Perennial Grass/Yellow Rabbitbrush/Bitterbrush	No Encroachment
2019	Perennial Grass/Yellow Rabbitbrush/Bitterbrush	No Encroachment

**Site Notes**

No Notes

**Site Potential**

1981 - 2010 Average Annual Precipitation	20 inches
NRCS Ecological Site	Mountain Loam (Mountain Big Sagebrush)
NRCS Ecological Site #	R047XA430UT
States and Transitions	A defined state and transition model is available.

When the site was established in 2012, the plant community was in a mountain big sagebrush (*Artemisia tridentata* ssp. *vaseyana*)-dominated state; the site was harrowed in the fall of 2012 (Table 17R-34.1). Perennial grass cover has increased following treatment, with much of that cover provided by needle and thread (*Hesperostipa comata*), squirreltail (*Elymus elymoides*), western wheatgrass (*Pascopyrum smithii*), and Letterman's needlegrass (*Achnatherum lettermanii*), among others (Table 17R-34.10). Post-treatment forb cover has also increased, with sandwort (*Arenaria* sp.) as the dominant species (Table 17R-34.11). The harrow treatment reduced the cover of bitterbrush (*Purshia tridentata*) and mountain big sagebrush. However, yellow rabbitbrush (*Chrysothamnus viscidiflorus* ssp. *viscidiflorus* var. *viscidiflorus*) has increased and is currently the dominant shrub as of 2019 (Table 17R-34.12, Table 17R-34.13). The state and transition model indicates that this site has moved to the yellow rabbitbrush/spineless horsebrush state and that this transition is possible following mechanical treatment. The succession path that this site takes will likely depend upon management decisions such as grazing management, habitat treatments, and wildlife usage (Jornada, 2019).

**Trend Summary Tables**

**Table 17R-34.6 - Shrub/Tree Summary.** Average modified Daubenmire quadrat and line intercept cover by year for shrubs/trees

Year	Quadrat Cover (%)			Line-intercept Cover (%)		
	Preferred Shrub	Other Shrub	Tree	Preferred Shrub	Other Shrub	Tree
2012	27.9	4.5	-	40.4	6.6	-
2015	11.2	10.1	-	14.4	12.7	-
2019	14.1	17.6	-	15.0	19.1	-

**Table 17R-34.7 - Herbaceous Summary.** Nested frequency and average modified Daubenmire quadrat cover by year for herbaceous functional groups

Year	Nested Frequency				Quadrat Cover (%)			
	Annual Grass	Perennial Grass	Annual/Biennial Forb	Perennial Forb	Annual Grass	Perennial Grass	Annual/Biennial Forb	Perennial Forb
2012	-	443	51	257	-	21.6	0.2	8.6
2015	-	453	92	246	-	29.4	0.5	8.4
2019	-	416	316	328	-	29.8	8.4	13.4

**Table 17R-34.8 - Basic Ground Cover.** Average modified Daubenmire quadrat cover by year for basic ground cover types.

Year	Cover Type (%)					
	Bare Ground	Cryptogams	Litter	Pavement	Rock	Vegetation
2012	11.3	1.9	62.6	-	0.0	63.8
2015	9.5	0.1	40.9	0.0	-	61.1
2019	8.9	0.3	59.9	0.1	0.0	59.6

**Table 17R-34.9 - Pellet Group Data.** Quadrat frequency and pellet group transect data for animal pellets. Rabbit pellet groups are not sampled in the pellet group transect.

Year	Coyote	Mule Deer	Rocky Mountain Elk	Greater Sage-Grouse	Shiras Moose	Rabbit
	Quadrat Frequency					
2012	-	8	-	-	3	-
2015	-	7	3	11	-	2
2019	-	3	10	12	-	3
Year	Days Use Per Acre (ha)					
2012	8.7 (21.5)*	35.5 (87.7)	2.7 (6.6)	156.8 (387.3)*	3.9 (9.6)	-
2015	-	13.4 (33.1)	10.7 (26.5)	322.3 (796.2)*	-	-
2019	-	18.1 (44.7)	12.1 (29.8)	139.4 (344.3)*	-	-

\*Pellets per acre (ha)

**Table 17R-34.10 - Grass Species.** Nested frequency and modified Daubenmire average cover by year.

GRASS SPECIES	Achnatherum lettermanii (Letterman's needlegrass)	Achnatherum nelsonii (Columbia needlegrass)	Bromus porteri (Porter brome)	Carex (sedge)	Carex obtusata (obtusate sedge)	Carex rossii (Ross' sedge)	Elymus elymoides (squirreltail)	Elymus lanceolatus (thickspike wheatgrass)	Festuca idahoensis (Idaho fescue)	Hesperostipa comata (needle and thread)	Koeleria macrantha (prairie Junegrass)	Pascopyrum smithii (western wheatgrass)	Poa fendleriana (muttongrass)	Poa pratensis <sup>1</sup> (Kentucky bluegrass)	Poa secunda (Sandberg bluegrass)	
year	Nested Frequency															
2012	69	4	53	120	-	-	52	117	158	8	96	-	68	17	76	
2015	41	10	43	106	-	-	211	141	149	31	85	-	78	50	54	
2019	78	33	12	-	65	26	136	-	70	86	62	159	83	75	56	
year	Average Cover (%)															
2012	1.3	0.0	1.2	1.4	-	-	0.9	1.0	7.4	0.2	3.5	-	2.3	0.9	1.5	
2015	0.7	0.2	1.2	3.3	-	-	7.5	1.0	5.0	1.3	1.6	-	1.4	3.9	2.3	
2019	3.1	1.7	0.3	-	1.2	0.7	3.9	-	2.5	4.4	1.4	3.8	2.7	2.7	1.4	

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

**Table 17R-34.11 - Forb Species.** Nested frequency and modified Daubenmire average cover by year.

FORB SPECIES	Nested Frequency																	
Agoseris glauca (pale agoseris)	-	19	64	-	2	184	-	11	-	-	3	-	-	-	-	17	12	
Androsace septentrionalis <sup>a</sup> (pygmyflower rockjasmine)	-	18	90	-	1	173	1	11	-	3	4	14	1	-	7	7	17	
Antennaria (pussytoes)	18	13	13	47	-	148	-	37	5	-	-	134	11	9	-	4	13	
Antennaria microphylla (littleleaf pussytoes)	Average Cover (%)																	
Arabis (rockcress)	-	0.1	2.3	-	0.0	5.1	-	0.0	-	-	0.0	-	-	-	-	0.0	0.2	
Arenaria (sandwort)	-	0.1	2.9	-	0.0	3.6	0.0	0.0	-	0.0	0.0	0.0	0.0	-	0.0	0.0	0.3	
Artemisia dracunculus (tarragon)	0.1	0.2	0.1	0.9	-	4.3	-	0.8	0.0	-	-	2.5	0.0	0.1	-	0.0	0.8	
Astragalus convallarius (lesser rushy milkvetch)																		
Calochortus nuttallii (sego lily)																		
Castilleja linariifolia (Wyoming Indian paintbrush)																		
Chaenactis douglasii (Douglas' dustymaiden)																		
Collinsia parviflora <sup>a</sup> (maiden blue eyed Mary)																		
Comandra umbellata (bastard toadflax)																		
Crepis acuminata (tapertip hawksbeard)																		
Descurainia pinnata <sup>a</sup> (western tansymustard)																		
Draba cuneifolia <sup>a</sup> (wedgeleaf draba)																		
Eriogonum umbellatum (sulphur-flower buckwheat)																		

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

FORB SPECIES	Nested Frequency																	
Gayophytum ramosissimum <sup>a</sup> (pinyon groundsmoke)	9	3	5	-	-	-	-	-	17	-	-	61	2	-	6	3	-	
Gentiana (gentian)	-	2	19	-	-	-	18	-	52	1	2	55	2	2	8	3	-	
Linum lewisii (Lewis flax)	40	-	7	6	18	2	1	19	206	-	-	61	123	147	4	-	26	
Lithophragma tenellum (slender woodland-star)	Average Cover (%)																	
Lomatium (desertparsley)	0.0	0.0	0.1	-	-	-	-	-	0.1	-	-	0.6	0.0	-	0.0	0.0	-	
Lupinus caespitosus var. utahensis (Utah lupine)	-	0.0	0.6	-	-	-	0.1	-	0.3	0.0	0.0	0.6	0.0	0.0	0.1	0.0	-	
Machaeranthera canescens (hoary tansyaster)	0.5	-	0.2	0.0	0.2	0.0	0.0	0.1	3.8	-	-	1.8	2.0	0.6	0.1	-	0.8	
Mertensia (bluebells)																		
Orthocarpus tolmiei <sup>a</sup> (Tolmie's owl's-clover)																		
Packera multilobata (lobeleaf groundsel)																		
Penstemon (beardtongue)																		
Penstemon watsonii (Watson's penstemon)																		
Phlox longifolia (longleaf phlox)																		
Polygonum douglasii <sup>a</sup> (Douglas' knotweed)																		
Potentilla gracilis (slender cinquefoil)																		
Potentilla hippiana (woolly cinquefoil)																		
Senecio integerrimus <sup>a</sup> (lambstongue ragwort)																		

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

FORB SPECIES						
<i>Silene drummondii</i> (Drummond's campion)						
<i>Symphotrichum</i> (aster)						
<i>Symphotrichum ascendens</i> (western aster)						
<i>Taraxacum officinale</i> (common dandelion)						
<i>Tragopogon dubius</i> <sup>ai</sup> (yellow salsify)						
<i>Trifolium</i> (clover)						
year	Nested Frequency					
2012	5	17	-	5	-	28
2015	1	-	-	25	6	16
2019	-	-	2	102	3	72
year	Average Cover (%)					
2012	0.0	0.1	-	0.0	-	0.1
2015	0.0	-	-	0.1	0.0	0.0
2019	-	-	0.0	1.2	0.0	0.5

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

**Table 17R-34.12 - 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> ssp. <i>viscidiflorus</i> var. <i>viscidiflorus</i> (yellow rabbitbrush)							
<i>Eriogonum microthecum</i> <sup>p</sup> (slender buckwheat)							
<i>Mahonia repens</i> (creeping barberry)							
<i>Purshia tridentata</i> <sup>p</sup> (antelope bitterbrush)							
<i>Symphoricarpos oreophilus</i> <sup>p</sup> (mountain snowberry)							
<i>Tetradymia canescens</i> (spineless horsebrush)							
year	Line Intercept Cover (%)						
2012	21	6.1	-	0.4	19.1	0.3	0.1
2015	5.3	12.1	-	0.4	9	0.1	0.2
2019	4.6	17.6	-	1.2	10.1	0.3	0.3
year	Quadrat Cover (%)						
2012	13.1	4.3	-	0.1	14.8	0.1	0.1
2015	4.1	9.8	0.4	0.2	6.6	0.1	0.1
2019	4.3	16.8	-	0.4	9.4	0.4	0.4

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

**Table 17R-34.13 - Shrub/Tree Characteristics.** Population characteristics of shrub/tree species populations including density reproduction (seedlings), age distribution, utilization, vigor and average size (height/crown) of plants.

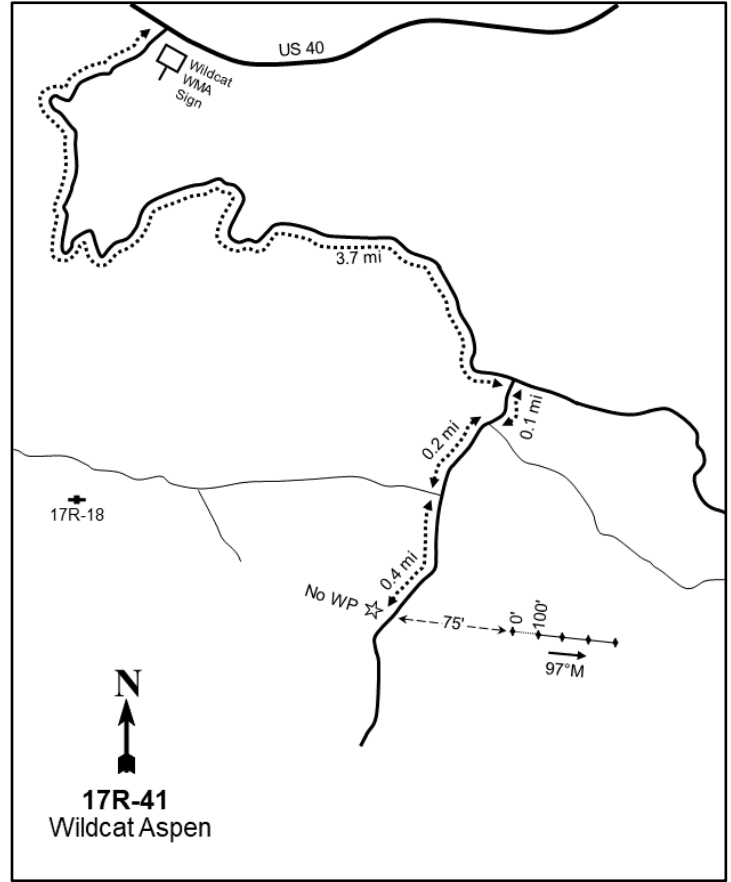
Year	Density		Age Class Distribution			Utilization		Poor Vigor (%)	Average Height Crown (cm)
	Plants Per Acre		Excluding Seedlings			Moderate (%)	Heavy (%)		
	Excluding Seedlings	Seedling	Young (%)	Mature (%)	Decadent (%)				
<b>Amelanchier utahensis<sup>p</sup> -- (Utah serviceberry)</b>									
2012	-	-	-	-	-	-	-	-	102/87
2015	-	-	-	-	-	-	-	-	59/54
2019	-	-	-	-	-	-	-	-	71/74
<b>Artemisia tridentata ssp. vaseyana<sup>p</sup> -- (mountain big sagebrush)</b>									
2012	5440	-	3	72	25	25	2	32	55/76
2015	2160	40	7	66	28	44	15	59	41/64
2019	1800	-	6	91	3	30	1	3	42/66
<b>Bassia prostrata<sup>pi</sup> -- (forage kochia)</b>									
2012	-	-	-	-	-	-	-	-	-/-
2015	-	-	-	-	-	-	-	-	47/38
2019	-	-	-	-	-	-	-	-	-/-
<b>Chrysothamnus viscidiflorus ssp. viscidiflorus var. viscidiflorus -- (yellow rabbitbrush)</b>									
2012	6960	60	1	96	3	0	0	8	21/26
2015	9000	-	5	95	0	0	0	1	22/36
2019	9740	-	5	95	0	0	0	0	22/36
<b>Gutierrezia sarothrae -- (broom snakeweed)</b>									
2012	-	-	-	-	-	-	-	-	-/-
2015	20	-	0	100	0	100	0	0	-/-
2019	-	-	-	-	-	-	-	-	-/-
<b>Mahonia repens -- (creeping barberry)</b>									
2012	3840	-	0	100	0	0	0	0	7/7
2015	2960	-	4	96	0	0	0	0	8/9
2019	2000	-	0	100	0	0	1	0	9/10
<b>Purshia tridentata<sup>p</sup> -- (antelope bitterbrush)</b>									
2012	2300	20	1	61	38	57	16	24	56/119
2015	1920	20	16	84	0	48	20	1	42/81
2019	1480	-	4	95	1	31	46	1	42/81
<b>Ribes cereum<sup>p</sup> -- (wax currant)</b>									
2012	20	-	0	100	0	0	0	0	57/83
2015	80	-	0	100	0	0	0	0	109/276
2019	-	-	-	-	-	-	-	-	92/148
<b>Symphoricarpos oreophilus<sup>p</sup> -- (mountain snowberry)</b>									
2012	60	-	0	100	0	0	0	0	48/53
2015	40	-	50	0	50	100	0	0	43/62
2019	60	-	33	67	0	0	0	0	53/81
<b>Tetradymia canescens -- (spineless horsebrush)</b>									
2012	240	-	0	92	8	0	0	0	21/18
2015	280	-	29	64	7	14	0	14	25/33
2019	300	-	0	93	7	0	0	7	23/31

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

**Table 17R-34.15 – 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
2012	30.0	5.7	1.1	30.0	0.0	10.0	0.0	76.7	Good
2015	20.2	11.8	6.2	30.0	0.0	10.0	0.0	78.3	Good
2019	21.2	14.4	2.6	30.0	0.0	10.0	0.0	78.2	Good

## WILDCAT ASPEN - STUDY NO. 17R-41



### Location Information

USGS 7.5 min Map Info  
GPS (0' Stake)

Deep Creek Canyon SW; Township 4S, Range 9W, Section 06  
NAD 83 UTM ZONE 12, 504550 East 4446370 North

### Transect Information

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

594  
132° magnetic  
400ft  
Line 1 (11ft & 95ft), Line 2 (34ft), Line 3 (59ft), Line 4 (71ft)  
Standard

### Directions to Site

From Fruitland, drive east on US-40 for 7 miles to Wildcat Canyon. Turn left and proceed for 0.5 miles to a "Y" junction. Proceed to the left again and continue for 2.9 miles to a "T" junction. At this point, turn right and stay on the primary road for 0.9 miles; there are a few side roads that go off to the left and right. After the 0.9 miles, there is an aspen stand. Park in the middle of this stand: the site is located on the left (east) side of the road.



**Site Information**

Land Ownership	State
Land Administrator	UDWR
Allotment	No data
Elevation	8,020ft (2,444m)
Aspect	Northwest
Slope	5-10%
Sample Dates	07/21/2019

**Wildlife Habitat and Vegetation History****Table 17R-41.3 - Wildlife Seasonal Habitat.** UDWR wildlife habitat and seasonality.

Species	Habitat	Season
Mule Deer	crucial	year-long
Rocky Mountain Elk	crucial	summer
Greater Sage-Grouse		undefined & undefined
Shiras Moose	crucial	winter

**Table 17R-41.4 - Vegetation History.** The dominant vegetation type(s) and phase of woodland succession (Tausch, Miller, Roundy, & Chambers, 2009).

Year	Vegetation Type	Woodland Succession
2019	Quaking Aspen/Perennial Grass	NA

**Site Notes**

No Notes

**Site Potential**

1981 - 2010 Average Annual Precipitation	20 inches
NRCS Ecological Site	High Mountain Loam (Aspen)
NRCS Ecological Site #	F047XA508UT
States and Transitions	A defined state and transition model is available.

As of study establishment in 2019, the plant community on this site is dominated by quaking aspen (*Populus tremuloides*) and a robust and diverse understory. Perennial grasses and forbs contribute a majority of the cover in the herbaceous understory. Kentucky bluegrass (*Poa pratensis*) is the dominant perennial grass species on this site (Table 17R-41.10). Forbs are mostly native, with maiden blue eyed Mary (*Collinsia parviflora*) and silvery lupine (*Lupinus argenteus*) as the most abundant species (Table 17R-41.11). Shrubs are comparatively rare with yellow rabbitbrush (*Chrysothamnus viscidiflorus* ssp. *viscidiflorus* var. *viscidiflorus*) as the dominant species (Table 17R-41.12, Table 17R-41.13). A mixture of individuals of different size classes comprises the significant aspen component that is present (Table 17R-41.13a, Table 17R-41.14).

**Trend Summary Tables****Table 17R-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
2019	0.9	4.2	7.5	1.4	4.8	31.5

**Table 17R-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
2019	-	371	285	269	-	25.2	9.5	15.7

**Table 17R-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
2019	24.3	0.0	52.4	0.1	0.5	46.2

**Table 17R-41.9 - Pellet Group Data.** Quadrat frequency and pellet group transect data for animal pellets. Rabbit pellet groups are not sampled in the pellet group transect.

Year	Cattle	Mule Deer	Rocky Mountain Elk
	Quadrat Frequency		
2019	-	4	3
Year	Days Use Per Acre (ha)		
2019	2.2 (5.4)	4.7 (11.6)	2.7 (6.6)

**Table 17R-41.10 - Grass Species.** Nested frequency and modified Daubenmire average cover by year.

GRASS SPECIES													
Achnatherum nelsonii (Columbia needlegrass)													
Bromus marginatus (mountain brome)													
Bromus porteri (Porter brome)													
Carex geyeri (Geyer's sedge)													
Elymus elymoides (squirreltail)													
Elymus trachycaulus (slender wheatgrass)													
Festuca idahoensis (Idaho fescue)													
Hesperostipa comata (needle and thread)													
Melica bulbosa (oniongrass)													
Pascopyrum smithii (western wheatgrass)													
Poa fendleriana (muttongrass)													
Poa pratensis <sup>i</sup> (Kentucky bluegrass)													
Poa secunda (Sandberg bluegrass)													
year	Nested Frequency												
2019	12	1	9	110	2	18	3	3	2	41	5	333	1
year	Average Cover (%)												
2019	0.1	0.1	0.1	3.7	0.1	0.7	0.0	0.4	0.0	0.5	0.1	19.3	0.1

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

**Table 17R-41.11 - Forb Species.** Nested frequency and modified Daubenmire average cover by year.

FORB SPECIES																	
Achillea millefolium (Common yarrow)																	
Androsace septentrionalis <sup>a</sup> (pygmyflower rockjasmine)																	
Capsella bursa-pastoris <sup>ai</sup> (shepherd's purse)																	
Carduus nutans <sup>ni</sup> (nodding plumeless thistle)																	
Chenopodium fremontii <sup>a</sup> (Fremont's goosefoot)																	
Collinsia parviflora <sup>a</sup> (maiden blue eyed Mary)																	
Collomia linearis <sup>ai</sup> (tiny trumpet)																	
Corydalis aurea <sup>a</sup> (scrambled eggs)																	
Delphinium nuttallianum (two-lobed larkspur)																	
Descurainia californica <sup>a</sup> (Sierra tansymustard)																	
Draba <sup>a</sup> (draba)																	
Epilobium brachycarpum <sup>a</sup> (tall annual willowherb)																	
Eriogonum heracleoides (parsnipflower buckwheat)																	
Galium <sup>a</sup> (bedstraw)																	
Gayophytum ramosissimum <sup>a</sup> (pinyon groundsmoke)																	
Geranium richardsonii (Richardson's geranium)																	
Hydrophyllum capitatum (ballhead waterleaf)																	
year	Nested Frequency																
2019	27	4	5	21	24	163	67	3	10	6	2	13	4	61	8	1	5
year	Average Cover (%)																
2019	0.7	0.0	0.7	0.8	0.3	3.2	0.8	0.0	0.1	0.1	0.0	0.1	0.2	1.6	0.2	0.1	0.1

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

FORB SPECIES	Nested Frequency																
<i>Lactuca serriola</i> <sup>ai</sup> (prickly lettuce)	8	1	1	53	34	1	27	20	64	5	126	4	95	59	11	19	
<i>Lepidium montanum</i> <sup>a</sup> (mountain pepperweed)	Average Cover (%)																
<i>Lithophragma tenellum</i> (slender woodland-star)	0.1	0.0	0.0	4.6	0.7	0.0	0.4	0.2	0.6	0.1	3.4	0.5	2.9	2.0	0.4	0.5	
<i>Lupinus argenteus</i> (silvery lupine)																	
<i>Nemophila breviflora</i> <sup>a</sup> (basin nemophila)																	
<i>Penstemon watsonii</i> (Watson's penstemon)																	
<i>Perideridia gairdneri</i> ssp. <i>borealis</i> (common yampah)																	
<i>Phlox longifolia</i> (longleaf phlox)																	
<i>Polygonum douglasii</i> <sup>a</sup> (Douglas' knotweed)																	
<i>Potentilla gracilis</i> (slender cinquefoil)																	
<i>Pseudostellaria jamesiana</i> (tuber starwort)																	
<i>Symphytotrichum</i> (aster)																	
<i>Symphytotrichum ascendens</i> (western aster)																	
<i>Taraxacum officinale</i> (common dandelion)																	
<i>Tragopogon dubius</i> <sup>ai</sup> (yellow salsify)																	
<i>Trifolium douglasii</i> (Douglas' clover)																	

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

**Table 17R-41.12 - 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)	0.7	3.9	0.9	31.5	-	-	0.7
<i>Chrysothamnus viscidiflorus</i> ssp. <i>viscidiflorus</i> var. <i>viscidiflorus</i> (yellow rabbitbrush)	0.6	3.1	1.1	7.5	0.0	0.0	0.2
<i>Mahonia repens</i> (creeping barberry)							
<i>Populus tremuloides</i> <sup>i</sup> (quaking aspen)							
<i>Ribes hudsonianum</i> <sup>p</sup> (northern black currant)							
<i>Rosa woodsii</i> <sup>p</sup> (Woods' rose)							
<i>Symphoricarpos oreophilus</i> <sup>p</sup> (mountain snowberry)							
year	Quadrat Cover (%)						
2019	0.6	3.1	1.1	7.5	0.0	0.0	0.2

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

**Table 17R-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 (%)				
<i>Artemisia cana</i> <sup>p</sup> -- (silver sagebrush)									
2019	-	-	-	-	-	-	-	-	44/56
<i>Artemisia tridentata</i> ssp. <i>vaseyana</i> <sup>p</sup> -- (mountain big sagebrush)									
2019	20	-	0	100	0	0	0	0	79/159
<i>Chrysothamnus viscidiflorus</i> ssp. <i>viscidiflorus</i> var. <i>viscidiflorus</i> -- (yellow rabbitbrush)									
2019	1880	-	9	92	0	0	0	0	35/46
<i>Mahonia repens</i> -- (creeping barberry)									
2019	5240	-	0	100	0	0	0	0	11/12
<i>Rosa woodsii</i> <sup>p</sup> -- (Woods' rose)									
2019	40	-	100	0	0	0	0	0	25/53
<i>Symphoricarpos oreophilus</i> <sup>p</sup> -- (mountain snowberry)									
2019	200	-	20	80	0	0	0	0	45/67

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

**Table 17R-41.13a - Aspen Characteristics.** Characteristics of aspen populations including density, size class distribution, and vigor of plants.

Year	Density	Size Class Distribution				Utilization		Poor Vigor (%)
	Plants per Acre	Class I (%)	Class II (%)	Class III (%)	Class IV (%)	Moderate (%)	Heavy (%)	
Populus tremuloides (quaking aspen)								
2019	6480	31	66	-	2	0	1	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)

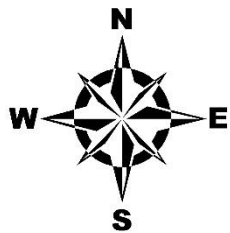
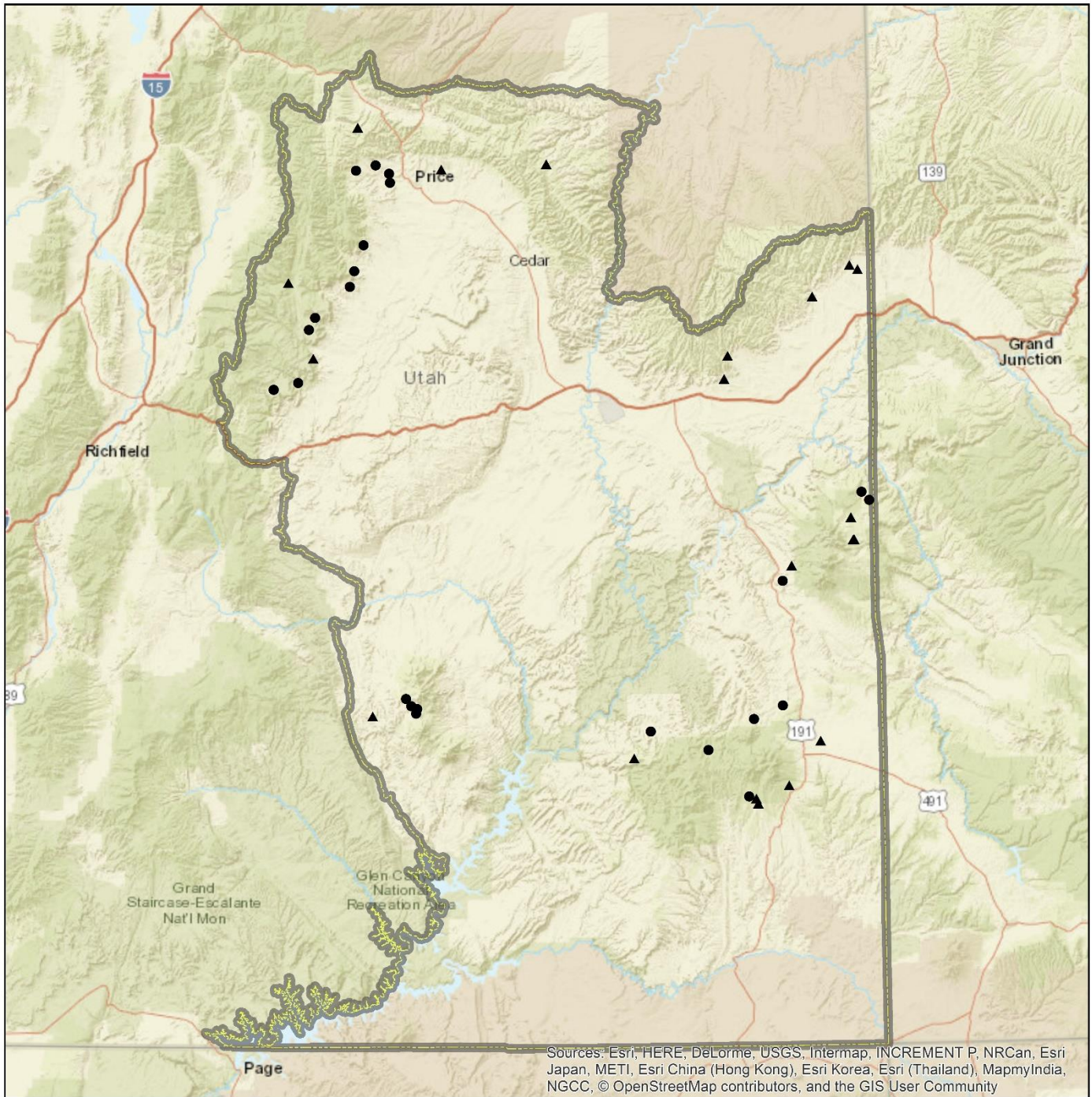
**Table 17R-41.14 - Tree Characteristics.** Point-quarter tree density, size class distribution, and average diameter.

Year	Density	Size Class Distribution					Average Diameter (cm)
	Trees per Acre	Seedling (%)	1-4' (%)	4-8' (%)	8-12' (%)	>12' (%)	
Populus tremuloides (quaking aspen)							
2019	4007	25	70	-	-	5	2.4

**Table 17R-41.15 – Deer Desirable Components Index: High Potential Scale.**

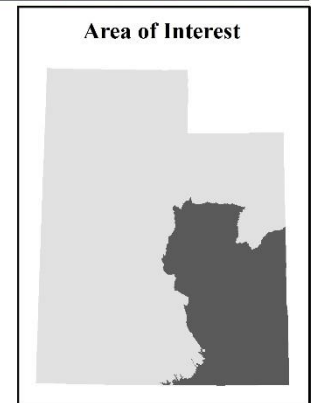
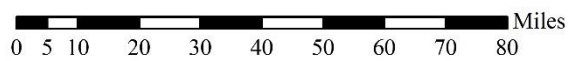
Year	Preferred Browse Cover	Preferred Browse Decadence	Preferred Browse Young	Perennial Grass Cover	Annual Grass Cover	Perennial Forb Cover	Noxious Weeds	Total Score	Ranking
2019	1.6	0.0	0.0	30.0	0.0	10.0	-2.0	39.6	Very Poor-Poor

# SOUTHEASTERN REGION



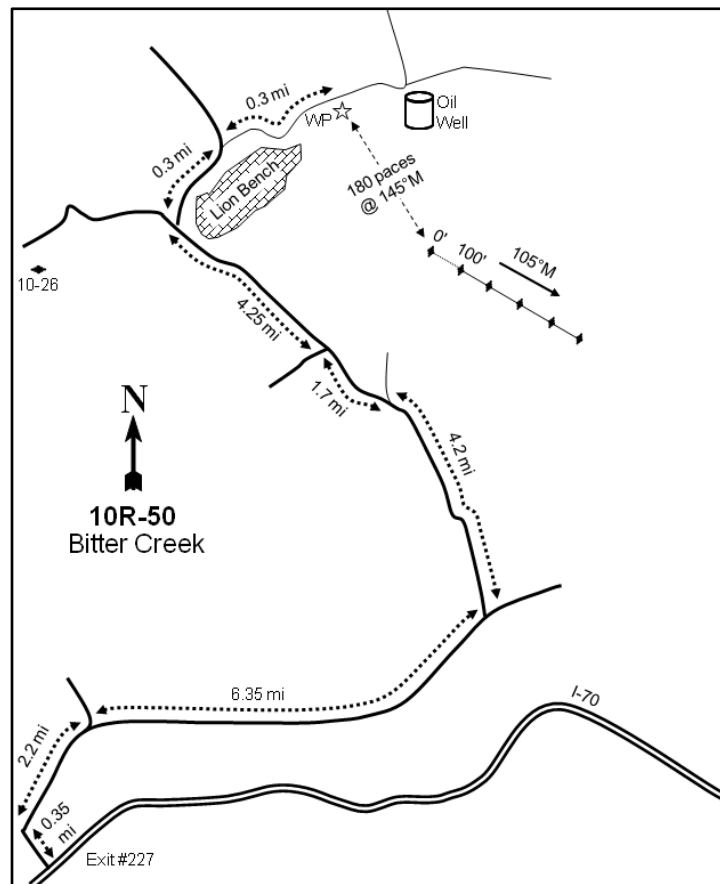
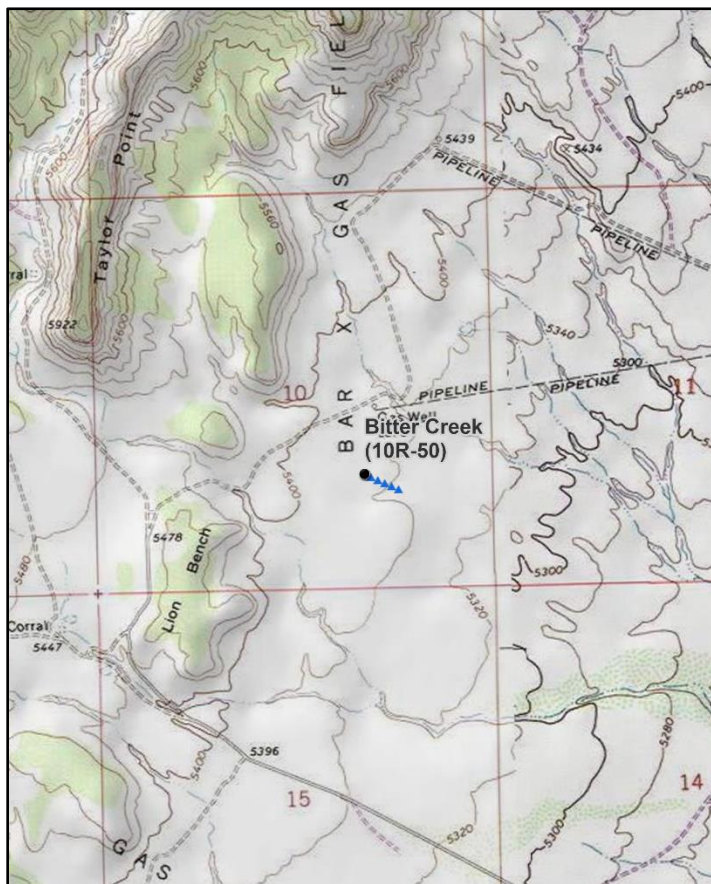
**Study Location**

- RT
- ▲ WRI
- ▭ Region Boundary





## BITTER CREEK - STUDY NO. 10R-50

**Location Information**

USGS 7.5 min Map Info  
GPS (0' Stake)

Bryson Canyon NE; Township 17S, Range 25E, Section 10  
NAD 83 UTM ZONE 12, 660944 East 4356145 North

**Transect Information**

Browse Tag # (0' Stake)	187
Transect Bearing	105° 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: No Rebar

**Directions to Site**

Take exit #227 (Westwater exit) from I-70 and turn left to the Book Cliff area. Travel 0.35 miles to a "T" intersection and turn right (northeast). Proceed 2.2 miles to a fork and keep right. Stay on the main road for 6.35 miles to a dirt road on the left. Turn left, traveling north-northwest. Proceed 4.2 miles and stay left on the main road. Continue and turn right. Travel another 4.25 miles to a fork. Proceed to the right, continue for 0.3 miles to another fork, and turn right. Travel an additional 0.3 miles to the witness post on the right (south) side of the road. The 0-foot baseline stake is 80 paces away at 145 degrees magnetic and is marked with browse tag #187.



**Site Information**

Land Ownership	Federal
Land Administrator	BLM
Allotment	SAN ARROYO
Elevation	5,380ft (1,640m)
Aspect	East
Slope	3%
Sample Dates	07/21/2011, 05/27/2015, 07/31/2019

**Table 10R-50.1 Disturbance History.** Recorded history of major disturbances.

Treatment/Disturbance	Name	WRI DB#	Date	Size (acres)
Seeding - Rangeland Drill	Bitter Creek Restoration Phase 2	2161	October 2012	1580
Seeding - Rangeland Drill	Bitter Creek Phase 3 Seeding (Proposed)	4673	Fall 2019	1626
Herbicide - Plateau	Bitter Creek Phase 3 Seeding (Proposed)	4673	October 2018	4739
Herbicide - Plateau	Bitter Creek Restoration Phase 2	2161	September 2012	2250

**Table 10R-50.2 Seed Mix.** List of known seeded plant species and rates (if available).

Mix Name			Application Type	Application Date	Acres
Bitter Creek 2			Drill	Oct 2012	950
Type	Species	Common Name	Cultivar/Source ID	Bulk lbs/acre	PLS
G	<i>Achnatherum hymenoides</i>	Indian Ricegrass	Emery UT	1.53	1.16
G	<i>Agropyron cristatum</i>	Crested Wheatgrass	Douglas	1.13	1.08
G	<i>Agropyron cristatum</i>	Crested Wheatgrass	Ephraim	0.30	0.28
G	<i>Agropyron cristatum</i>	Crested Wheatgrass	Nordan	0.14	0.12
G	<i>Agropyron desertorum</i>	Crested Wheatgrass	Hycrest II	0.95	0.86
G	<i>Bouteloua gracilis</i>	Blue Grama	Alma	0.32	0.22
G	<i>Pascopyrum smithii</i>	Western Wheatgrass	Arriba	0.60	0.44
G	<i>Pascopyrum smithii</i>	Western Wheatgrass	Arriba	0.89	0.75
G	<i>Pleuraphis jamesii</i>	Galleta		0.76	0.45
G	<i>Psathyrostachys juncea</i>	Russian Wildrye		1.00	0.75
G	<i>Pseudoroegneria spicata</i>	Bluebunch Wheatgrass	P-7	0.14	0.11
G	<i>Pseudoroegneria spicata</i>	Bluebunch Wheatgrass	P-7	1.37	1.22
G	<i>Sporobolus cryptandrus</i>	Sand Dropseed		0.10	0.09
G	<i>Thinopyrum intermedium</i>	Pubescent Wheatgrass	Luna	2.00	1.63
F	<i>Linum perenne</i>	Blue Flax	Appar	0.50	0.44
F	<i>Penstemon palmeri</i>	Palmer Penstemon	Carbon/Emery UT	0.24	0.19
F	<i>Sanguisorba minor</i>	Small Burnet	Delar	1.84	1.65
S	<i>Atriplex canescens</i>	Fourwing Saltbush	Kane UT	0.66	0.25
S	<i>Atriplex canescens</i>	Fourwing Saltbush	Emery/Grand UT	0.84	0.33
S	<i>Krascheninnikovia lanata</i>	Winterfat	Millard/Sevier/Carbon UT	0.06	0.02

Mix Name			Application Type	Application Date	Acres
Bitter Creek 2 Sage/Kochia			Drill	Oct 2012	950
Type	Species	Common Name	Cultivar/Source ID	Bulk lbs/acre	PLS
S	<i>Artemisia tridentata</i> ssp. <i>wyomingensis</i>	Wyoming Big Sagebrush	Sevier UT	0.60	0.10
S	<i>Bassia prostrata</i>	Forage Kochia	Beaver UT	0.50	0.31

**Wildlife Habitat and Vegetation History****Table 10R-50.3 - Wildlife Seasonal Habitat.** UDWR wildlife habitat and seasonality.

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

**Table 10R-50.4 - 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
2015	Annual-Perennial Grass	No Encroachment
2019	Annual Grass	No Encroachment

**Site Notes**

The 2011 WRI report states that the Bitter Creek Restoration Project occurred in two phases. However, it appears that the site was not captured in the phase I polygon, but within the phase II treatment (WRI #2161) that occurred in 2012 instead. Both phases were comprised of similar treatments that included the application of the herbicide Plateau and a drill seeding (WRI Database, 2019).

**Site Potential**

1981 - 2010 Average Annual Precipitation	12 inches
NRCS Ecological Site	Semidesert Loam (Wyoming Big Sagebrush)
NRCS Ecological Site #	R034XY212UT
States and Transitions	No state and transition model is available for this ecological site.

The introduced annual grass species cheatgrass (*Bromus tectorum*) contributed the most vegetation cover on this site upon study establishment in 2011. Perennial grasses were less abundant, but were still considered to be a co-dominant site component. Perennial grasses provided more cover than annual species in 2015 following treatment (Table 10R-50.1), but both were still co-dominant in the plant community. However, perennial grass cover decreased in 2019, and cheatgrass and the native annual grass species sixweeks fescue (*Vulpia octoflora*) were the sole vegetation components. Forbs remained relatively sparse until the 2019 sample year, when annual forbs contributed a moderate amount of cover (Table 10R-50.7, Table 10R-50.10, Table 10R-50.11). The shrub component has been very limited, with Wyoming big sagebrush (*Artemisia tridentata* ssp. *vaseyana*) contributing modest amounts of cover in all sample years (Table 10R-50.12, Table 10R-50.13). The persistently high amounts of annual grasses on this site indicates that further treatments may be necessary; increased amounts of annual grasses have the potential to affect the ecological resilience of a plant community.

**Trend Summary Tables****Table 10R-50.6 - Shrub/Tree Summary.** Average modified Daubenmire quadrat and line intercept cover by year for shrubs/trees

Year	Quadrat Cover (%)			Line-intercept Cover (%)		
	Preferred Shrub	Other Shrub	Tree	Preferred Shrub	Other Shrub	Tree
2011	2.2	-	-	4.1	-	-
2015	3.2	-	-	4.3	-	-
2019	3.3	-	-	4.2	-	-

**Table 10R-50.7 - Herbaceous Summary.** Nested frequency and average modified Daubenmire quadrat cover by year for herbaceous functional groups

Year	Nested Frequency				Quadrat Cover (%)			
	Annual Grass	Perennial Grass	Annual/Biennial Forb	Perennial Forb	Annual Grass	Perennial Grass	Annual/Biennial Forb	Perennial Forb
2011	413	184	36	56	26.8	12.7	0.4	0.8
2015	415	309	155	26	15.9	22.3	1.0	0.2
2019	455	228	298	9	28.3	7.5	6.0	0.1

**Table 10R-50.8 - Basic Ground Cover.** Average modified Daubenmire quadrat cover by year for basic ground cover types.

Year	Cover Type (%)					
	Bare Ground	Cryptogams	Litter	Pavement	Rock	Vegetation
2011	34.9	0.2	22.4	0.3	0.1	44.2
2015	36.2	16.3	30.1	0.7	0.2	38.3
2019	42.0	4.9	34.8	0.5	0.6	33.8

**Table 10R-50.9 - Pellet Group Data.** Quadrat frequency and pellet group transect data for animal pellets. Rabbit pellet groups are not sampled in the pellet group transect.

Year	Cattle	Coyote	Mule Deer/Pronghorn	Rocky Mountain Elk	Rabbit
	Quadrat Frequency				
2011	4	-	15	4	24
2015	2	-	4	1	22
2019	9	-	11	-	62
Year	Days Use Per Acre (ha)				
2011	19.6 (48.4)	-	8.7 (21.5)	2.7 (6.6)	-
2015	-	-	3.4 (8.3)	-	-
2019	16.0 (39.5)	8.7 (21.5)*	6.7 (16.6)	0.7 (1.7)	-

Pellets per acre (ha)

**Table 10R-50.10 - 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)						
Pleuraphis jamesii (James' galleta)						
Sporobolus cryptandrus (sand dropseed)						
Vulpia octoflora <sup>a</sup> (sixweeks fescue)						
year	Nested Frequency					
2011	112	62	413	10	33	12
2015	261	-	353	45	54	285
2019	177	12	379	39	20	425
year	Average Cover (%)					
2011	6.7	3.8	26.7	0.4	1.9	0.1
2015	18.2	-	11.3	1.6	2.6	4.6
2019	6.5	0.0	14.9	0.5	0.4	13.4

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

**Table 10R-50.11 - Forb Species.** Nested frequency and modified Daubenmire average cover by year.

FORB SPECIES																		
Ceratocephala testiculata <sup>ai</sup> (curseweed butterwort)																		
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)																		
Draba <sup>a</sup> (draba)																		
Erodium cicutarium <sup>ai</sup> (redstem stork's bill)																		
Helianthus annuus <sup>a</sup> (common sunflower)																		
Lappula occidentalis <sup>a</sup> (flatspine stickseed)																		
Lepidium <sup>a</sup> (pepperweed)																		
Machaeranthera canescens (hoary tansyaster)																		
Plantago patagonica <sup>a</sup> (woolly plantain)																		
Salsola tragus <sup>ai</sup> (prickly Russian thistle)																		
Schoenocrambe limifolia (flaxleaf plainsmustard)																		
Sisymbrium altissimum <sup>ai</sup> (tall tumblemustard)																		
Sphaeralcea coccinea (scarlet globemallow)																		
Streptanthus cordatus (heartleaf twistflower)																		
year	Nested Frequency																	
2011	9	-	1	-	1	-	2	-	17	-	-	-	-	-	11	56	-	
2015	-	-	-	49	2	1	97	-	14	15	1	10	1	2	-	23	2	
2019	16	6	-	142	34	16	91	3	104	31	-	18	11	-	12	9	-	
year	Average Cover (%)																	
2011	0.0	-	0.0	-	0.0	-	0.0	-	0.1	-	-	-	-	-	0.2	0.8	-	
2015	-	-	-	0.2	0.0	0.0	0.7	-	0.1	0.0	0.0	0.0	0.0	0.0	-	0.1	0.0	
2019	0.1	0.0	-	1.9	0.3	0.1	1.6	0.0	1.1	0.5	-	0.1	0.0	-	0.3	0.1	-	

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

**Table 10R-50.12 - Shrub and Tree Species.** Average modified Daubenmire quadrat and line intercept cover by year.

SHRUB SPECIES	Artemisia tridentata ssp. wyomingensis <sup>p</sup> (Wyoming big sagebrush)
year	Line Intercept Cover (%)
2011	4.1
2015	4.3
2019	4.2
year	Quadrat Cover (%)
2011	2.2
2015	3.2
2019	3.3

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

**Table 10R-50.13 - Shrub/Tree Characteristics.** Population characteristics of shrub/tree species populations including density reproduction (seedlings), age distribution, utilization, vigor and average size (height/crown) of plants.

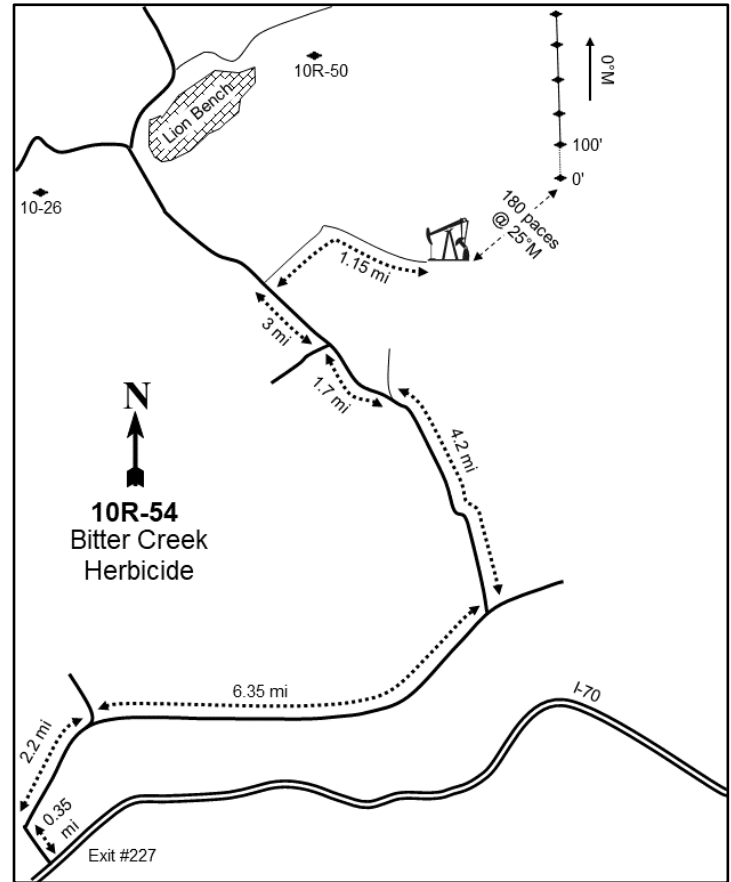
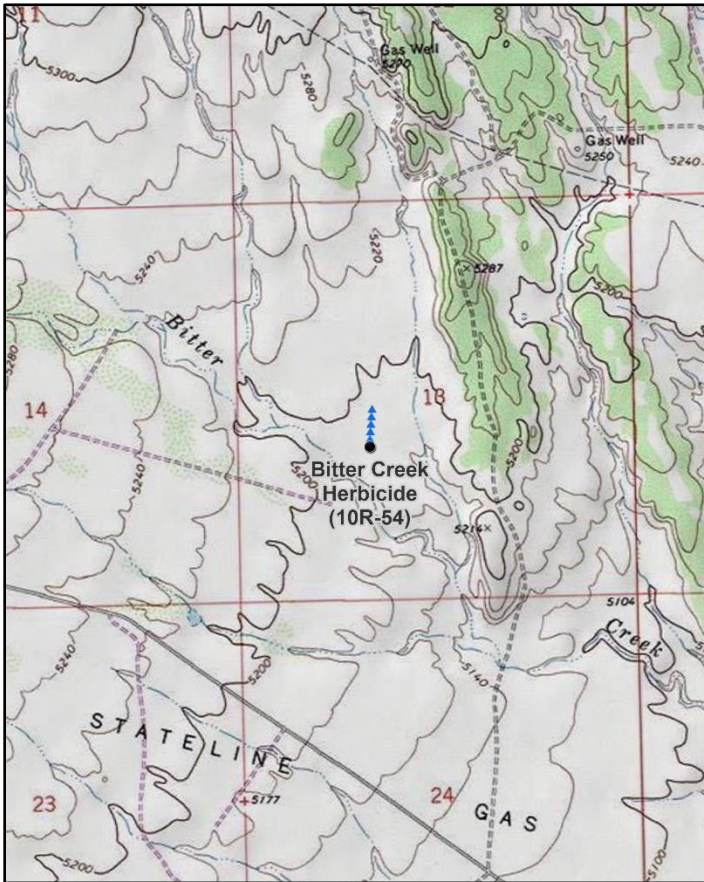
Year	Density		Age Class Distribution			Utilization		Poor Vigor (%)	Average Height Crown (cm)
	Plants Per Acre		Excluding Seedlings			Moderate (%)	Heavy (%)		
	Excluding Seedlings	Seedling	Young (%)	Mature (%)	Decadent (%)				
<b>Artemisia tridentata ssp. wyomingensis<sup>p</sup> -- (Wyoming big sagebrush)</b>									
2011	260	-	0	100	0	39	0	8	53/82
2015	300	3420	0	100	0	7	27	0	54/99
2019	340	-	0	71	29	12	6	41	66/120
<b>Gutierrezia sarothrae -- (broom snakeweed)</b>									
2011	-	-	-	-	-	-	-	-	-/-
2015	-	-	-	-	-	-	-	-	26/27
2019	-	-	-	-	-	-	-	-	-/-
<b>Opuntia polyacantha -- (plains pricklypear)</b>									
2011	-	-	-	-	-	-	-	-	-/-
2015	-	-	-	-	-	-	-	-	-/-
2019	-	-	-	-	-	-	-	-	10/12

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

**Table 10R-50.15 - Deer Desirable Components Index: Low Potential Scale.**

Year	Preferred Browse Cover	Preferred Browse Decadence	Preferred Browse Young	Perennial Grass Cover	Annual Grass Cover	Perennial Forb Cover	Noxious Weeds	Total Score	Ranking
2011	5.1	0.0	0.0	25.5	-20.0	1.5	0.0	12.1	Poor
2015	5.4	0.0	0.0	30.0	-11.9	0.4	0.0	23.8	Poor-Fair
2019	5.3	0.0	0.0	14.9	-20.0	0.1	0.0	0.3	Very Poor

## BITTER CREEK HERBICIDE - STUDY NO. 10R-54

**Location Information**

USGS 7.5 min Map Info  
GPS (0' Stake)

Bar X Wash NW; Township 17S, Range 25E, Section 13  
NAD 83 UTM ZONE 12, 663623 East 4354747 North

**Transect Information**

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

Not Available  
0° magnetic  
500ft  
Line 1 (11ft), Line 2 (34ft), Line 3 (59ft), Line 4 (71ft), Line 5 (95ft)  
Standard

**Directions to Site**

From I-70 take exit #227. Travel west for 0.35 miles to US-6/Old Highway Harley Dome. Turn right and travel 8.55 miles crossing the Utah/Colorado border to 1 8/10 Road/Book Cliff Ridge Road, then turn left. Travel along Book Cliff Ridge Road for 8.9 miles and turn right. Travel 1.15 miles to an oil/gas pad and park. The 0-foot stake is 180 paces away from the oil/gas pad at 25 degrees magnetic.

**Site Information**

Land Ownership	Federal
Land Administrator	BLM
Allotment	SAN ARROYO
Elevation	5,197ft (1,584m)
Aspect	Northeast
Slope	0-5%
Sample Dates	08/20/2012, 05/27/2015, 08/01/2019

**Table 10R-54.1 Disturbance History.** Recorded history of major disturbances.

Treatment/Disturbance	Name	WRI DB#	Date	Size (acres)
Herbicide - Plateau	Bitter Creek Restoration Phase 2	2161	September 2012	2250
Herbicide - Plateau	Bitter Creek Phase 3 Seeding (Proposed)	4673	October 2018	4739
Seeding - Rangeland Drill	Bitter Creek Phase 3 Seeding (Proposed)	4673	Fall 2019	1626
Seeding - Rangeland Drill	Bitter Creek Restoration Phase 2	2161	October 2012	1580

**Table 10R-54.2 Seed Mix.** List of known seeded plant species and rates (if available).

Mix Name		Application Type	Application Date	Acres	
Bitter Creek 2		Drill	Oct 2012	950	
Type	Species	Common Name	Cultivar/Source ID	Bulk lbs/acre	PLS
G	Achnatherum hymenoides	Indian Ricegrass	Emery UT	1.53	1.16
G	Agropyron cristatum	Crested Wheatgrass	Douglas	1.13	1.08
G	Agropyron cristatum	Crested Wheatgrass	Ephraim	0.30	0.28
G	Agropyron cristatum	Crested Wheatgrass	Hycrest II	0.95	0.86
G	Agropyron cristatum	Crested Wheatgrass	Nordan	0.14	0.12
G	Bouteloua gracilis	Blue Grama	Alma	0.32	0.22
G	Pascopyrum smithii	Western Wheatgrass	Arriba	0.60	0.44
G	Pascopyrum smithii	Western Wheatgrass	Arriba	0.89	0.75
G	Pleuraphis jamesii	Galleta		0.76	0.45
G	Psathyrostachys juncea	Russian Wildrye		1.00	0.75
G	Pseudoroegneria spicata	Bluebunch Wheatgrass	P-7	0.14	0.11
G	Pseudoroegneria spicata	Bluebunch Wheatgrass	P-7	1.37	1.22
G	Sporobolus cryptandrus	Sand Dropseed		0.10	0.09
G	Thinopyrum intermedium	Pubescent Wheatgrass	Luna	2.00	1.63
F	Linum perenne	Blue Flax	Appar	0.50	0.44
F	Penstemon palmeri	Palmer Penstemon	Carbon/Emery UT	0.24	0.19
F	Sanguisorba minor	Small Burnet	Delar	1.84	1.65
S	Atriplex canescens	Fourwing Saltbush	Emery/Grand UT	0.84	0.33
S	Atriplex canescens	Fourwing Saltbush	Kane UT	0.66	0.25
S	Krascheninnikovia lanata	Winterfat	Millard/Sevier/Carbon UT	0.06	0.02

**Wildlife Habitat and Vegetation History****Table 10R-54.3 - Wildlife Seasonal Habitat.** UDWR wildlife habitat and seasonality.

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

**Table 10R-54.4 - Vegetation History.** The dominant vegetation type(s) and phase of woodland succession (Tausch, Miller, Roundy, & Chambers, 2009).

Year	Vegetation Type	Woodland Succession
2012	Annual Grass	No Encroachment
2015	Annual Grass	No Encroachment
2019	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 #	R034BY212UT
States and Transitions	A defined state and transition model is available.

Annual grasses have dominated this site since study establishment in 2012, with the introduced species cheatgrass (*Bromus tectorum*) and native species sixweeks fescue (*Vulpia octoflora*) varying in cover from year to year. Diversity within the community improved slightly after treatment with perennial grasses providing moderate amounts of cover in 2015 and 2019. Forb cover also increased in these sample years, but mainly due to the weedy annual species prickly Russian thistle (*Salsola tragus*) and tall tumbled mustard (*Sisymbrium altissimum*) (Table 10R-54.7, Table 10R-54.10, Table 10R-54.11). The shrub component has remained limited throughout the study period, with Wyoming big sagebrush (*Artemisia tridentata* ssp. *wyomingensis*) and fourwing saltbush (*Atriplex canescens*) as the only preferred browse species present (Table 10R-54.12, Table 10R-54.13). The vegetation composition places the site in the Invasive annuals Community that is found within the Invasive Annual State as described by the available model (Jornada, 2019). This site will likely continue to remain dominated by annual grasses without further treatment; high amounts of annual grasses can increase fuel loads and may threaten the ecological resilience of the plant community on this site.

**Trend Summary Tables****Table 10R-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
2012	-	-	-	-	-	-
2015	0.0	1.2	-	-	0.4	-
2019	0.4	0.2	-	0.5	-	-

**Table 10R-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
2012	426	6	246	107	23.4	0.3	6.0	1.0
2015	449	166	373	45	41.0	8.6	15.2	1.2
2019	473	166	239	121	32.6	5.1	17.3	1.1

**Table 10R-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
2012	32.4	0.0	52.7	-	0.4	31.3
2015	22.1	0.2	50.5	0.1	-	56.1
2019	29.5	0.0	40.5	0.1	0.0	52.8

**Table 10R-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/Pronghorn	Rocky Mountain Elk	Horse	Rabbit
	Quadrat Frequency				
2012	2	5	25	-	5
2015	-	-	-	-	-
2019	6	11	16	-	20
Year	Days Use Per Acre (ha)				
2012	0.7 (1.8)	3.4 (8.3)	31.5 (77.8)	-	-
2015	0.7 (1.8)	2.7 (6.6)	-	-	-
2019	13.1 (32.3)	-	5.3 (13.2)	0.6 (1.4)	-

**Table 10R-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)	Bromus tectorum <sup>ai</sup> (cheatgrass)	Elymus elymoides (squirreltail)	Erenopyrum trifiticeum <sup>ai</sup> (annual wheatgrass)	Pascopyrum smithii (western wheatgrass)	Psathyrostachys juncea <sup>i</sup> (Russian wildrye)	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										
2012	-	6	426	-	-	-	-	-	-	-	-
2015	-	74	394	3	-	63	28	6	-	23	386
2019	0	50	432	1	2	68	48	-	15	8	422
year	Average Cover (%)										
2012	-	0.3	23.4	-	-	-	-	-	-	-	-
2015	-	4.7	16.2	0.2	-	1.8	1.3	0.2	-	0.5	24.8
2019	0.0	1.6	21.2	0.0	0.0	1.5	1.3	-	0.4	0.2	11.4

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

**Table 10R-54.11 - Forb Species.** Nested frequency and modified Daubenmire average cover by year.

FORB SPECIES	Chaetopappa ericoides (rose heath)	Cryptantha (cryptantha)	Cryptantha <sup>a</sup> (annual cryptantha)	Descurainia pinnata <sup>a</sup> (western tansymustard)	Draba <sup>a</sup> (draba)	Erodium cicutarium <sup>ai</sup> (redstem stork's bill)	Lappula occidentalis <sup>a</sup> (flat-spine stickseed)	Lepidium <sup>a</sup> (pepperweed)	Lupinus brevicaulis <sup>a</sup> (shortstem lupine)	Machaeranthera canescens (hoary tansyaster)	Oenothera pallida ssp. pallida (pale evening primrose)	Plantago patagonica <sup>a</sup> (woolly plantain)	Salsola tragus <sup>ai</sup> (prickly Russian thistle)	Sanguisorba minor <sup>i</sup> (small burnet)	Sisymbrium altissimum <sup>ai</sup> (tall tumbledustard)	Sphaeralcea (globemallow)	Sphaeralcea coccinea (scarlet globemallow)
year	Nested Frequency																
2012	-	5	-	-	3	60	-	-	-	-	-	-	-	-	213	77	29
2015	-	-	-	2	2	19	14	6	-	2	5	4	360	3	75	-	-
2019	3	2	2	7	-	26	42	18	4	-	4	-	69	-	175	-	-
year	Average Cover (%)																
2012	-	0.0	-	-	0.0	0.6	-	-	-	-	-	-	-	-	5.4	0.3	0.3
2015	-	-	-	0.0	0.0	0.1	0.0	0.1	-	0.0	0.1	0.0	12.4	0.4	2.6	-	-
2019	0.1	0.0	0.0	0.2	-	0.8	0.3	0.1	0.0	-	0.0	-	0.6	-	15.2	-	-

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

FORB SPECIES			
	Sphaeralcea grossulariifolia (gooseberry/leaf globemallow)		
	Sphaeralcea parvifolia (smallflower globemallow)		
	Townsendia (Townsend daisy)		
year	Nested Frequency		
2012	-	-	5
2015	9	26	-
2019	16	108	-
year	Average Cover (%)		
2012	-	-	0.4
2015	0.2	0.5	-
2019	0.1	0.8	-

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

**Table 10R-54.12 - Shrub and Tree Species.** Average modified Daubenmire quadrat and line intercept cover by year.

SHRUB SPECIES			
	Artemisia tridentata ssp. wyomingensis <sup>p</sup> (Wyoming big sagebrush)		
	Atriplex canescens <sup>p</sup> (fourwing saltbush)		
	Gutierrezia sarothrae (broom snakeweed)		
year	Line Intercept Cover (%)		
2012	-	-	-
2015	-	-	0.4
2019	0.1	0.4	0
year	Quadrat Cover (%)		
2012	-	-	-
2015	0.0	-	1.2
2019	0.0	0.4	0.2

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

**Table 10R-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.

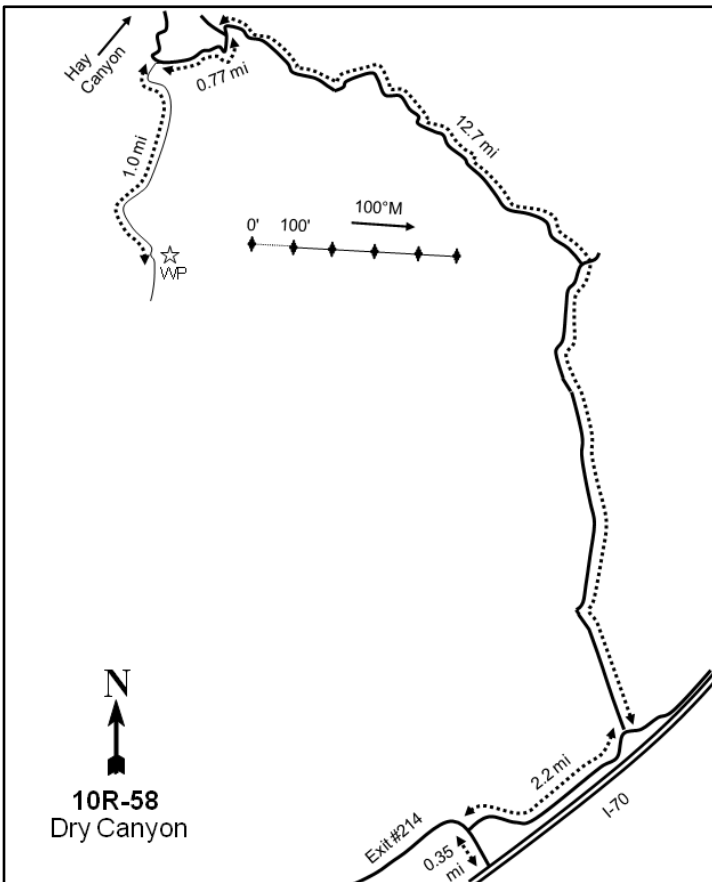
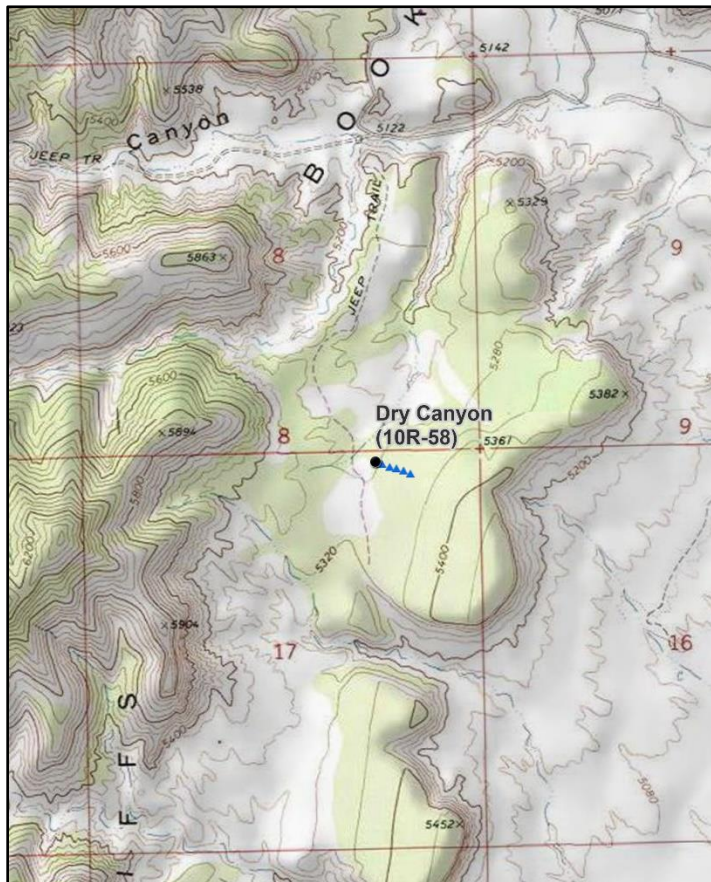
Year	Density		Age Class Distribution			Utilization		Poor Vigor (%)	Average Height Crown (cm)
	Plants Per Acre		Excluding Seedlings			Moderate (%)	Heavy (%)		
	Excluding Seedlings	Seedling	Young (%)	Mature (%)	Decadent (%)				
<b>Artemisia tridentata ssp. wyomingensis<sup>p</sup> -- (Wyoming big sagebrush)</b>									
2012	60	-	0	100	0	0	100	0	36/60
2015	40	-	100	0	0	0	0	0	46/75
2019	20	-	0	100	0	100	0	0	45/83
<b>Atriplex canescens<sup>p</sup> -- (fourwing saltbush)</b>									
2012	-	-	-	-	-	-	-	-	-/-
2015	20	-	100	0	0	0	0	0	44/43
2019	40	-	0	100	0	0	0	0	85/89
<b>Gutierrezia sarothrae -- (broom snakeweed)</b>									
2012	-	-	-	-	-	-	-	-	-/-
2015	1140	-	0	100	0	0	0	0	31/37
2019	1760	2180	98	0	2	0	0	2	37/47

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

**Table 10R-54.15 - 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
2012	0.0	0.0	0.0	0.7	-17.6	1.9	0.0	-15.0	Very Poor
2015	0.0	0.0	0.0	17.3	-20.0	2.3	0.0	-0.4	Very Poor
2019	0.6	0.0	0.0	10.1	-20.0	2.2	0.0	-7.1	Very Poor

## DRY CANYON - STUDY NO. 10R-58



### Location Information

USGS 7.5 min Map Info  
GPS (0' Stake)

Antone Canyon NE; Township 18S, Range 24E, Section 17  
NAD 83 UTM ZONE 12, 648488 East 4345710 North

### Transect Information

Browse Tag # (0' Stake)	101
Transect Bearing	100° magnetic
Length	500ft
Belt Placement	Line 1 (11ft), Line 2 (34ft), Line 3 (59ft), Line 4 (71ft), Line 5 (95ft)
Belt Marker Placement	Belt 4: 3ft

### Directions to Site

From I-70, take the US-6/Old Highway Harley Dome exit and travel for 2.2 miles to Book Cliff Ridge Road (Hay Canyon) and turn left (north). Travel for 11.2 miles to a jeep trail that crosses the wash, then turn left again. Follow the jeep trail for 1.0 mile to the top of a flat and park: there is no witness post. Use a GPS unit to navigate to the 0-foot baseline stake which is marked by browse tag #101.

**Site Information**

Land Ownership	Federal
Land Administrator	BLM
Allotment	CORRAL WASH CANYON
Elevation	5,300ft (1,615m)
Aspect	West
Slope	5%
Sample Dates	09/02/2015, 07/29/2019

**Table 10R-58.1 Disturbance History.** Recorded history of major disturbances.

Treatment/Disturbance	Name	WRI DB#	Date	Size (acres)
Seeding - Aerial Before	South Bookcliffs Vegetation Improvement (Hay) Phase III	3330	March 2016	322
Bullhog - Mechanical	South Bookcliffs Vegetation Improvement (Hay) Phase III	3330	March-May 2016	322

**Table 10R-58.2 Seed Mix.** List of known seeded plant species and rates (if available).

Mix Name		Application Type	Application Date	Acres	
Hay Canyon		Aerial	Dec 2015	322	
Type	Species	Common Name	Cultivar/Source ID	Bulk lbs/acre	PLS
G	Achnatherum hymenoides	Indian Ricegrass	White River	1.00	0.94
G	Elymus lanceolatus	Thickspike Wheatgrass	Bannock	0.50	0.47
G	Poa secunda	Sandberg Bluegrass	UP/Colorado Plateau	0.50	0.38
F	Achillea millefolium	Western Yarrow	Lincoln WA	0.10	0.09
F	Cleome serrulata	Rocky Mountain Beeplant		0.54	0.35
F	Cleome serrulata	Rocky Mountain Beeplant	Sanpete UT	0.47	0.40
F	Helianthus annuus	Annual Sunflower	Box Elder UT	0.50	0.40
F	Linum perenne	Blue Flax	Appar	0.86	0.68
F	Linum perenne	Blue Flax	Appar	0.14	0.12
F	Medicago sativa	Alfalfa	Ladak +	1.00	0.93
F	Onobrychis viciifolia	Sainfoin	Eski	1.00	0.97
F	Penstemon palmeri	Palmer Penstemon	Carbon/Emery UT	0.20	0.18
F	Sanguisorba minor	Small Burnet		1.00	0.83
S	Atriplex canescens	Fourwing Saltbush	Emery UT	1.00	0.43
S	Krascheninnikovia lanata	Winterfat	Millard UT	0.50	0.36

Mix Name		Application Type	Application Date	Acres	
Hay Canyon Sagebrush		Aerial	Mar 2016	322	
Type	Species	Common Name	Cultivar/Source ID	Bulk lbs/acre	PLS
		Rice Hulls		0.62	0.00
S	Artemisia tridentata ssp. wyomingensis	Wyoming Big Sagebrush	Paiute/Wayne/Sevier UT	0.62	0.12

**Wildlife Habitat and Vegetation History**

**Table 10R-58.3 - Wildlife Seasonal Habitat.** UDWR wildlife habitat and seasonality.

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

**Table 10R-58.4 - 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 III
2019	Broom Snakeweed	Phase I

**Site Notes**

No Notes



**Site Potential**

1981 - 2010 Average Annual Precipitation	11 inches
NRCS Ecological Site	Semidesert Shallow Loam (Wyoming Big Sagebrush)
NRCS Ecological Site #	R034BY225UT
States and Transitions	A defined state and transition model is available.

Upon study establishment in 2015, this site was dominated by Utah Juniper (*Juniperus osteosperma*) with a lesser component of twoneedle pinyon (*Pinus edulis*) and was considered to be in Phase III of woodland succession (Table 10R-58.4). The shrub component was fairly limited, but broom snakeweed (*Gutierrezia sarothrae*) provided moderate amounts of cover. The herbaceous understory was depauperate in both diversity and abundance. A bullhog and seeding treatment in the winter of 2015-2016 (Table 10R-58.1) removed most of the trees, causing the site to transition to one dominated by broom snakeweed in 2019 (Table 10R-58.12, Table 10R-58.13, Table 10R-58.14). The herbaceous component diversified and increased, with the introduced annual grass cheatgrass (*Bromus tectorum*) and a variety of annual forbs contributing a majority of the cover (Table 10R-58.7, Table 10R-58.10, Table 10R-58.11). Although the site is considered to be within Phase I of woodland succession as of 2019 (Table 10R-58.4), continued tree presence indicates that there may be potential for infilling in future sample years.

**Trend Summary Tables**

**Table 10R-58.6 - Shrub/Tree Summary.** Average modified Daubenmire quadrat and 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	1.9	6.6	6.4	3.9	11.8	26.4
2019	2.3	14.9	0.0	2.3	27.5	-

**Table 10R-58.7 - Herbaceous Summary.** Nested frequency and average modified Daubenmire quadrat cover by year for herbaceous functional 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	69	2	23	27	0.2	0.0	0.1	0.1
2019	141	28	198	98	5.6	0.8	5.0	2.9

**Table 10R-58.8 - 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	42.2	3.1	34.8	7.7	11.0	14.8
2019	17.4	0.5	64.3	3.0	5.0	27.1

**Table 10R-58.9 - Pellet Group 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	-	12	1	23
2019	-	23	-	13
Year	Days Use Per Acre (ha)			
2015	-	9.4 (23.2)	0.7 (1.7)	-
2019	0.7 (1.8)	51.6 (127.5)	-	-

**Table 10R-58.10 - 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)	Vulpia octoflora <sup>a</sup> (sixweeks fescue)
year	Nested Frequency				
2015	-	69	2	-	3
2019	1	141	27	0	-
year	Average Cover (%)				
2015	-	0.2	0.0	-	0.0
2019	0.0	5.6	0.8	0.0	-

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

**Table 10R-58.11 - Forb Species.** Nested frequency and modified Daubenmire average cover by year.

FORB SPECIES	Achillea millefolium (Common yarrow)	Alyssum desertorum <sup>ai</sup> (desert madwort)	Astragalus chamaeleuce (citada milkvetch)	Chenopodium fremontii <sup>a</sup> (Fremont's goosefoot)	Cryptantha (cryptantha)	Descurainia pinnata <sup>a</sup> (western tansymustard)	Draba <sup>a</sup> (draba)	Eriogonum cernuum <sup>a</sup> (nodding buckwheat)	Gilia inconspicua <sup>a</sup> (shy gilia)	Lappula occidentalis <sup>a</sup> (flatspine stickseed)	Lepidium montanum <sup>a</sup> (mountain pepperweed)	Linum perenne <sup>i</sup> (blue flax)	Lithospermum incisum (narrowleaf stoneseed)	Mentzelia albicaulis <sup>a</sup> (whitestem blazingstar)	Microsteris gracilis <sup>a</sup> (slender phlox)	Mirabilis (four o'clock)	Orobanche fasciculata (clustered broomrape)
year	Nested Frequency																
2015	-	5	-	-	3	17	-	3	-	9	-	-	-	-	-	-	-
2019	1	8	2	21	12	52	74	16	103	22	3	3	4	14	3	0	45
year	Average Cover (%)																
2015	-	0.0	-	-	0.0	0.1	-	0.0	-	0.0	-	-	-	-	-	-	-
2019	0.0	0.3	0.0	0.1	0.1	1.4	0.5	0.0	2.3	0.1	0.1	0.0	0.1	0.1	0.1	0.2	1.5

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

FORB SPECIES	Phlox longifolia (longleaf phlox)	Sanguisorba minor <sup>i</sup> (small burnet)	Schoenocrambe limifolia (flaxleaf plainsmustard)	Sphaeralcea grossulariifolia (gooseberry/leaf globemallow)	Townsendia (Townsend daisy)
year	Nested Frequency				
2015	2	-	-	5	17
2019	-	0	19	-	24
year	Average Cover (%)				
2015	0.0	-	-	0.0	0.1
2019	-	0.0	0.7	-	0.4

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

**Table 10R-58.12 - 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)	Ephedra viridis <sup>p</sup> (mormon tea)	Gutierrezia sarothrae (broom snakeweed)	Juniperus osteosperma <sup>t</sup> (Utah juniper)	Opuntia (pricklypear)	Pinus edulis <sup>t</sup> (twoneedle pinyon)	Yucca (yucca)
year	Line Intercept Cover (%)							
2015	3.7	-	0.2	10.1	21.1	1	5.3	0.7
2019	2	-	0.3	26.1	-	1.4	-	-
year	Quadrat Cover (%)							
2015	1.7	0.0	0.1	5.6	5.0	0.8	1.4	0.2
2019	1.9	-	0.4	13.9	0.0	1.0	0.0	-

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

**Table 10R-58.13 - Shrub/Tree Characteristics.** Population characteristics of shrub/tree species populations including density reproduction (seedlings), age distribution, utilization, vigor and average size (height/crown) of plants.

Year	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	620	-	13	32	55	42	13	58	51/92
2019	560	560	11	71	18	32	29	43	51/71
<b>Echinocereus -- (hedgehog cactus)</b>									
2015	-	-	-	-	-	-	-	-	6/14
2019	-	-	-	-	-	-	-	-	-/-
<b>Ephedra viridis<sup>p</sup> -- (mormon tea)</b>									
2015	40	-	0	50	50	0	50	50	43/45
2019	100	-	0	100	0	0	0	0	44/38

Year	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>									
2015	-	-	-	-	-	-	-	-	-/-
2019	-	-	-	-	-	-	-	-	12/7
<b>Gutierrezia sarothrae -- (broom snakeweed)</b>									
2015	15120	40	31	68	1	0	0	1	24/29
2019	9400	2640	12	82	6	0	0	7	35/53
<b>Juniperus osteosperma<sup>i</sup> -- (Utah juniper)</b>									
2015	120	-	33	50	17	0	0	17	-/-
2019	-	60	0	0	0	0	0	0	-/-
<b>Opuntia -- (pricklypear)</b>									
2015	600	20	3	80	17	3	0	17	11/43
2019	680	-	0	100	0	0	0	3	11/27
<b>Pinus edulis<sup>i</sup> -- (twoneedle pinyon)</b>									
2015	20	40	0	100	0	0	0	0	-/-
2019	-	340	0	0	0	0	0	0	-/-
<b>Yucca -- (yucca)</b>									
2015	280	-	7	71	21	0	0	14	27/52
2019	40	-	0	100	0	0	0	0	29/33

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

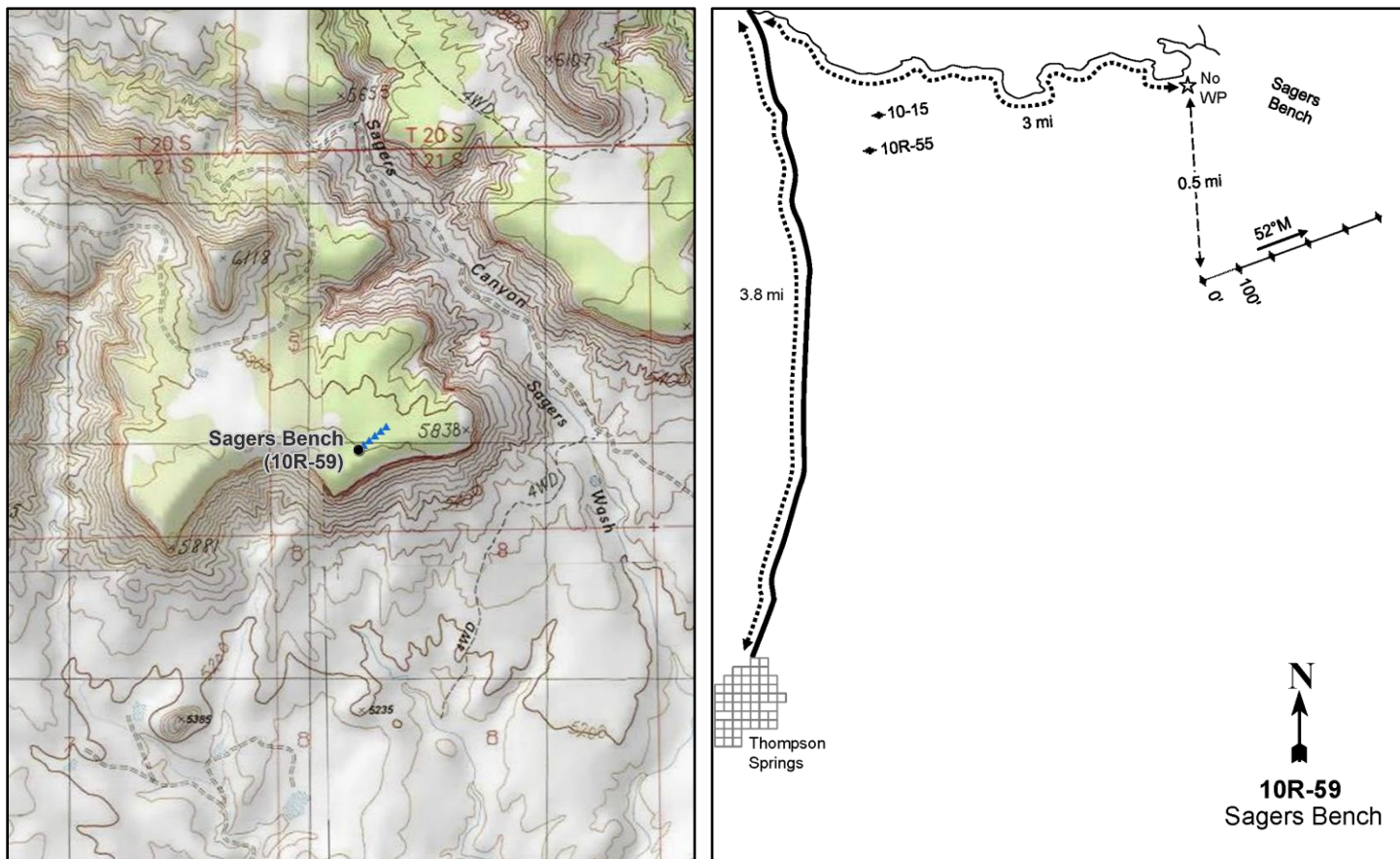
**Table 10R-58.14 - Tree Characteristics.** Point-quarter tree density, size class distribution, and average diameter.

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	186	-	10	-	50	40	23.4
2019	14	-	100	-	-	-	4.0
<b>Pinus edulis (twoneedle pinyon)</b>							
2015	32	-	17	17	8	58	15.4
2019	4	25	75	-	-	-	2.3

**Table 10R-58.15 - 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
2015	4.9	0.0	0.0	0.0	-0.2	0.2	0.0	5.0	Very Poor
2019	2.9	0.0	0.0	1.6	-4.2	5.9	0.0	6.2	Very Poor

## SAGERS BENCH - STUDY NO. 10R-59

**Location Information**

USGS 7.5 min Map Info  
GPS (0' Stake)

Calf Canyon SW; Township 21S, Range 21E, Section 05  
NAD 83 UTM ZONE 12, 619151 East 4318167 North

**Transect Information**

Browse Tag # (0' Stake)	Not Available
Transect Bearing	40° 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: 9ft, Belt 2: 17ft, Belt 4: 8ft

**Directions to Site**

From Thompson, travel north on Thompson Canyon Road for 3.8 miles to a road on the right (east). Turn here, continue for 3 miles (past studies #10-15 and #10R-55), and stop. The transect is about 1/2 mile south of the road.

**Site Information**

Land Ownership	Federal
Land Administrator	BLM
Allotment	CISCO
Elevation	5,827ft (1,776m)
Aspect	North
Slope	2-4%
Sample Dates	08/04/2016, 07/29/2019

**Table 10R-59.1 Disturbance History.** Recorded history of major disturbances.

Treatment/Disturbance	Name	WRI DB#	Date	Size (acres)
Seeding - Aerial After	South Bookcliffs Phase 4 (Sagers)	3673	December 2016	360
Mechanical - Bullhog	South Bookcliffs Phase 4 (Sagers)	3673	October-November 2016	360
Seeding - Aerial Before	South Bookcliffs Phase 4 (Sagers)	3673	October 2016	360

**Table 10R-59.2 Seed Mix.** List of known seeded plant species and rates (if available).

Mix Name			Application Type	Application Date	Acres
South Bookcliffs Sagers			Aerial	Oct 2016	471
Type	Species	Common Name	Cultivar/Source ID	Bulk lbs/acre	PLS
G	<i>Achnatherum hymenoides</i>	Indian Ricegrass	White River	0.79	0.73
G	<i>Achnatherum hymenoides</i>	Indian Ricegrass	Emery UT	0.21	0.20
G	<i>Elymus lanceolatus</i>	Thickspike Wheatgrass	Critana	0.42	0.36
G	<i>Elymus lanceolatus</i>	Thickspike Wheatgrass	Critana	0.11	0.09
G	<i>Poa secunda</i>	Sandberg Bluegrass	UP/Colorado Plateau	0.96	0.72
F	<i>Achillea millefolium</i>	Western Yarrow	Lincoln WA	0.11	0.10
F	<i>Cleome serrulata</i>	Rocky Mountain Beeplant	Davis UT	0.34	0.28
F	<i>Cleome serrulata</i>	Rocky Mountain Beeplant	Piute UT	0.47	0.43
F	<i>Cleome serrulata</i>	Rocky Mountain Beeplant	Sanpete UT	0.11	0.10
F	<i>Dalea purpurea</i>	Purple Prairie Clover		0.31	0.25
F	<i>Dalea purpurea</i>	Purple Prairie Clover	Bismark	0.64	0.63
F	<i>Helianthus annuus</i>	Annual Sunflower	Montezuma CO	0.53	0.47
F	<i>Linum perenne</i>	Blue Flax	Appar	0.96	0.85
F	<i>Medicago sativa</i>	Alfalfa	Ladak+	0.64	0.61
F	<i>Onobrychis viciifolia</i>	Sainfoin	Eski	0.96	0.73
F	<i>Penstemon palmeri</i>	Palmer Penstemon	Carbon UT	0.21	0.17
F	<i>Ratibida columnifera</i>	Prairie Coneflower	Stillwater	0.32	0.29
F	<i>Sanguisorba minor</i>	Small Burnet		0.96	0.89
F	<i>Sphaeralcea grossularifolia</i>	Gooseberryleaf Globemallow	Beaver UT	0.21	0.08
S	<i>Atriplex canescens</i>	Fourwing Saltbush	Wayne/Carbon/Emery UT	0.96	0.40

Mix Name			Application Type	Application Date	Acres
South Bookcliffs Sagers Sagebrush			Aerial	Dec 2016	471
Type	Species	Common Name	Cultivar/Source ID	Bulk lbs/acre	PLS
F	<i>Medicago sativa</i>	Alfalfa	Ladak	0.32	0.30
S	<i>Artemisia tridentata</i> ssp. <i>wyomingensis</i>	Wyoming Big Sagebrush	Sanpete UT	0.53	0.10

**Wildlife Habitat and Vegetation History****Table 10R-59.3 - Wildlife Seasonal Habitat.** UDWR wildlife habitat and seasonality.

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

**Table 10R-59.4 - Vegetation History.** The dominant vegetation type(s) and phase of woodland succession (Tausch, Miller, Roundy, & Chambers, 2009).

Year	Vegetation Type	Woodland Succession
2016	Pinyon-Juniper	Phase III
2019	Broom Snakeweed	Phase I

**Site Notes**

No Notes



**Site Potential**

1981 - 2010 Average Annual Precipitation	11 inches
NRCS Ecological Site	Upland Shallow Loam (Cliffrose)
NRCS Ecological Site #	R035XY313UT
States and Transitions	A defined state and transition model is available.

Upon study establishment in 2016, this site existed as a degraded Stansbury cliffrose (*Purshia stansburiana*) community dominated by older Utah juniper (*Juniperus osteosperma*) and twoneedle pinyon (*Pinus edulis*) trees in Phase III of woodland succession (Table 10R-59.4, Photos). A number of other browse species were present, but they provided limited cover. However, a bullhog and seeding treatment in 2016 (Table 10R-59.1) removed most of the trees, and the site transitioned to one dominated by broom snakeweed (*Gutierrezia sarothrae*) in 2019 (Table 10R-59.12, Table 10R-59.13, Table 10R-59.14). Cover and diversity for the herbaceous community were both low prior to treatment. The understory had diversified as of 2019, however, with perennial and annual forbs providing most of the herbaceous cover present. The introduced annual grass species cheatgrass has been observed in all years. Although cheatgrass exhibited a slight increase following treatment, cover has remained low (Table 10R-59.7, Table 10R-59.10, Table 10R-59.11). The current plant community on this site is not described, but it may behave similarly to the Fire recovery Community that is defined by the state and transition model which shows potential to transition to a shrub dominated state (Jornada, 2019). Although the site is classified of being within Phase I of encroachment as of 2019 (Table 10R-59.4), the persistent tree component indicates that there is potential for future infilling over time.

**Trend Summary Tables****Table 10R-59.6 - Shrub/Tree Summary.** Average modified Daubenmire quadrat and line intercept cover by year for shrubs/trees

Year	Quadrat Cover (%)			Line-intercept Cover (%)		
	Preferred Shrub	Other Shrub	Tree	Preferred Shrub	Other Shrub	Tree
2016	1.1	3.0	5.7	4.3	5.0	18.5
2019	0.7	8.9	0.0	1.1	10.7	-

**Table 10R-59.7 - Herbaceous Summary.** Nested frequency and average modified Daubenmire quadrat cover by year for herbaceous functional groups

Year	Nested Frequency				Quadrat Cover (%)			
	Annual Grass	Perennial Grass	Annual/Biennial Forb	Perennial Forb	Annual Grass	Perennial Grass	Annual/Biennial Forb	Perennial Forb
2016	18	0	119	76	0.0	0.0	0.3	1.8
2019	156	87	208	216	1.4	1.7	3.5	4.0

**Table 10R-59.8 - 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
2016	47.8	1.0	34.7	9.6	11.6	10.6
2019	15.9	0.1	55.7	12.1	14.6	20.4

**Table 10R-59.9 - Pellet Group Data.** Quadrat frequency and pellet group transect data for animal pellets. Rabbit pellet groups are not sampled in the pellet group transect.

Year	Mule Deer	Rabbit
	Quadrat Frequency	
2016	11	32
2019	11	6
Year	Days Use Per Acre (ha)	
2016	7.4 (18.2)	-
2019	12.8 (31.5)	-

**Table 10R-59.10 - 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)								
Elymus trachycaulus (slender wheatgrass)								
Poa secunda (Sandberg bluegrass)								
Vulpia octoflora <sup>a</sup> (sixweeks fescue)								
year	Nested Frequency							
2016	0	-	18	-	-	-	-	-
2019	23	1	154	21	34	0	17	3
year	Average Cover (%)							
2016	0.0	-	0.0	-	-	-	-	-
2019	0.4	0.0	1.4	0.8	0.4	0.0	0.2	0.0

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

**Table 10R-59.11 - Forb Species.** Nested frequency and modified Daubenmire average cover by year.

FORB SPECIES																	
Aliciella hutchinsifolia <sup>a</sup> (desert pale gilia)																	
Androsace septentrionalis <sup>a</sup> (pygmyflower rockjasmine)																	
Antennaria dimorpha (low pussytoes)																	
Arenaria fendleri (Fendler's sandwort)																	
Calochortus nuttallii (sego lily)																	
Chamaesyce (sandmat)																	
Chenopodium fremontii <sup>a</sup> (Fremont's goosefoot)																	
Cleome serrulata <sup>a</sup> (Rocky Mountain beplant)																	
Collinsia parviflora <sup>a</sup> (maiden blue eyed Mary)																	
Cryptantha (cryptantha)																	
Cryptantha <sup>a</sup> (annual cryptantha)																	
Cymopterus (springparsley)																	
Dalea purpurea (purple prairie clover)																	
Draba <sup>a</sup> (draba)																	
Gilia inconspicua <sup>a</sup> (shy gilia)																	
Helianthus annuus <sup>a</sup> (common sunflower)																	
Lactuca scariola <sup>ai</sup> (prickly lettuce)																	
year	Nested Frequency																
2016	-	2	1	-	-	18	-	-	-	19	2	1	-	114	10	-	-
2019	4	27	-	1	7	9	10	1	4	24	5	-	1	152	67	2	1
year	Average Cover (%)																
2016	-	0.0	0.0	-	-	0.2	-	-	-	0.3	0.0	0.0	-	0.3	0.0	-	-
2019	0.0	0.6	-	0.0	0.0	0.2	0.2	0.0	0.0	0.2	0.0	-	0.0	1.1	0.9	0.0	0.0

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

FORB SPECIES	Lappula occidentalis <sup>a</sup> (flatspine stickseed)	Lepidium <sup>a</sup> (pepperweed)	Linum perenne <sup>i</sup> (blue flax)	Machaeranthera grindeloides (rayless tansyaster)	Malcolmia africana <sup>ai</sup> (African mustard)	Medicago sativa <sup>i</sup> (alfalfa)	Penstemon (beardtongue)	Penstemon palmeri (Palmer's penstemon)	Petroradia pumila (rock goldenrod)	Salsola tragus <sup>ai</sup> (prickly Russian thistle)	Sanguisorba minor <sup>i</sup> (small burnet)	Stenotus acaulis (stemless mock goldenweed)	Streptanthus cordatus (heartleaf twistflower)	Tetraneuris acaulis (stemless four-nerve daisy)	Townsendia (Townsend daisy)
year	Nested Frequency														
2016	6	-	-	12	-	-	8	-	21	-	-	4	-	-	2
2019	19	4	166	6	2	7	13	13	11	6	10	23	2	2	-
year	Average Cover (%)														
2016	0.0	-	-	0.1	-	-	0.0	-	1.2	-	-	0.0	-	-	0.0
2019	0.1	0.2	1.2	0.4	0.1	0.1	0.1	0.5	0.6	0.2	0.3	0.3	0.0	0.1	-

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

**Table 10R-59.12 - Shrub and Tree Species.** Average modified Daubenmire quadrat and line intercept cover by year.

SHRUB SPECIES	Atriplex canescens <sup>p</sup> (fourwing saltbush)	Ephedra viridis <sup>p</sup> (mormon tea)	Eriogonum microthecum <sup>p</sup> (slender buckwheat)	Gutierrezia sarothrae (broom snakeweed)	Juniperus osteosperma <sup>i</sup> (Utah juniper)	Linanthus pungens (granite prickly phlox)	Pinus edulis <sup>i</sup> (twoneedle pinyon)	Purshia stansburiana <sup>p</sup> (Stansbury cliffrose)	Symphoricarpos oreophilus <sup>p</sup> (mountain snowberry)	Yucca (yucca)
year	Line Intercept Cover (%)									
2016	-	0.2	0.1	4.9	16.3	0.1	2.2	3.2	0.8	-
2019	0.3	-	0.1	9.9	-	0.6	-	0.4	0.3	0.2
year	Quadrat Cover (%)									
2016	-	0.1	0.1	3.0	4.3	0.1	1.5	0.8	0.1	-
2019	0.0	-	0.0	8.3	0.0	0.2	-	0.3	0.4	0.4

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

**Table 10R-59.13 - Shrub/Tree Characteristics.** Population characteristics of shrub/tree species populations including density reproduction (seedlings), age distribution, utilization, vigor and average size (height/crown) of plants.

Year	Density		Age Class Distribution			Utilization		Poor Vigor (%)	Average Height Crown (cm)
	Plants Per Acre		Excluding Seedlings			Moderate (%)	Heavy (%)		
	Excluding Seedlings	Seedling	Young (%)	Mature (%)	Decadent (%)				
Artemisia tridentata ssp. wyomingensis <sup>p</sup> -- (Wyoming big sagebrush)									
2016	-	-	-	-	-	-	-	-	-/-
2019	100	-	100	0	0	0	0	0	26/26
Atriplex canescens <sup>p</sup> -- (fourwing saltbush)									
2016	-	-	-	-	-	-	-	-	-/-
2019	40	-	0	100	0	0	0	0	68/75
Ephedra viridis <sup>p</sup> -- (mormon tea)									
2016	100	-	20	80	0	20	0	0	74/79
2019	60	-	0	100	0	33	0	0	36/48
Eriogonum microthecum <sup>p</sup> -- (slender buckwheat)									
2016	920	80	20	80	0	28	30	0	11/17
2019	400	-	15	85	0	25	0	0	14/21

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>Gutierrezia sarothrae -- (broom snakeweed)</b>									
2016	17460	80	31	68	1	0	0	1	18/21
2019	11300	3280	37	60	3	0	0	3	24/38
<b>Juniperus osteosperma<sup>i</sup> -- (Utah juniper)</b>									
2016	160	-	13	63	25	0	0	38	- / -
2019	20	40	100	0	0	0	0	0	- / -
<b>Linanthus pungens -- (granite prickly phlox)</b>									
2016	480	-	29	71	0	25	33	13	8/12
2019	580	40	3	97	0	0	0	0	13/23
<b>Opuntia -- (pricklypear)</b>									
2016	60	-	33	67	0	0	0	0	12/30
2019	20	-	0	100	0	0	0	0	7/12
<b>Pinus edulis<sup>t</sup> -- (twoneedle pinyon)</b>									
2016	80	60	75	25	0	0	0	0	- / -
2019	-	-	-	-	-	-	-	-	- / -
<b>Purshia stansburiana<sup>p</sup> -- (Stansbury cliffrose)</b>									
2016	340	20	47	41	12	29	24	12	67/87
2019	220	-	55	36	9	9	0	9	69/90
<b>Symphoricarpos oreophilus<sup>p</sup> -- (mountain snowberry)</b>									
2016	280	-	7	93	0	43	43	0	39/58
2019	260	-	15	85	0	69	0	0	41/64
<b>Yucca -- (yucca)</b>									
2016	-	-	-	-	-	-	-	-	32/42
2019	60	-	0	100	0	0	0	0	27/39

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

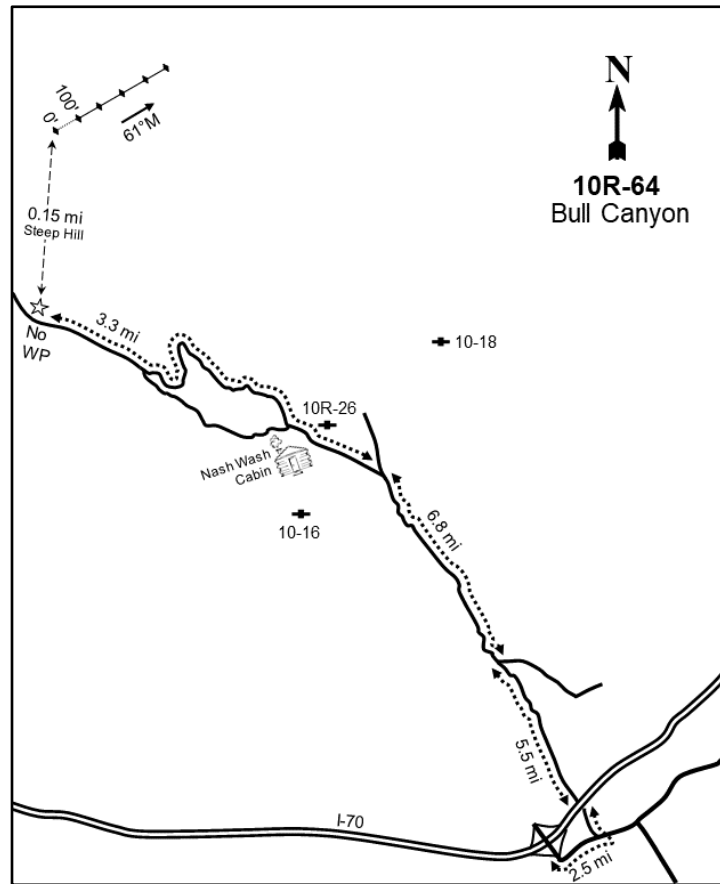
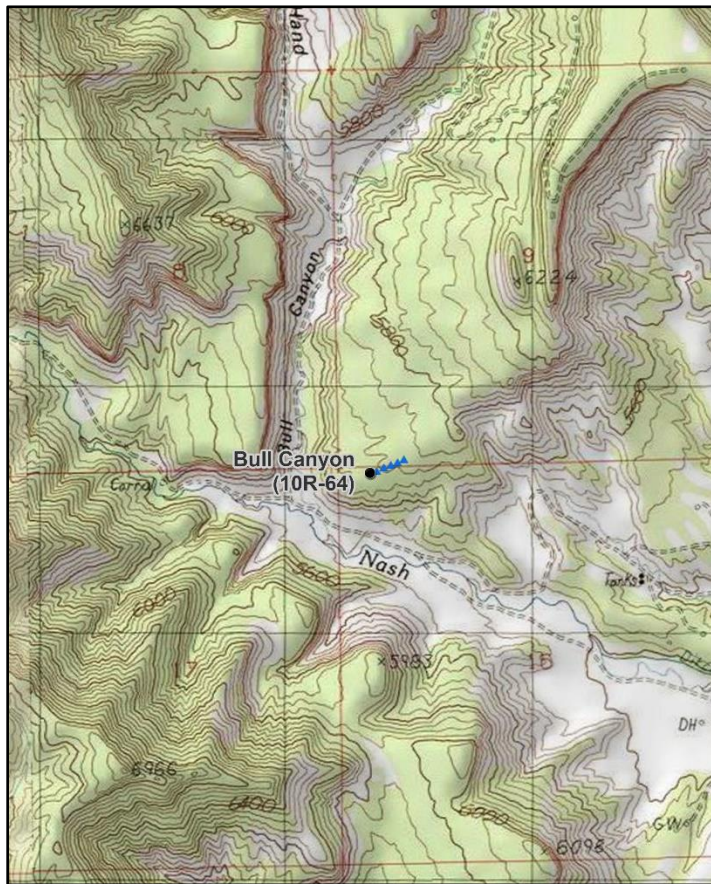
**Table 10R-59.14 - Tree Characteristics.** Point-quarter tree density, size class distribution, and average diameter.

Year	Density	Size Class Distribution					Average Diameter (cm)
	Trees per Acre	Seedling (%)	1-4' (%)	4-8' (%)	8-12' (%)	>12' (%)	
<b>Juniperus osteosperma (Utah juniper)</b>							
2016	255	-	15	35	35	15	27.5
2019	15	13	88	-	-	-	11.4
<b>Pinus edulis (twoneedle pinyon)</b>							
2016	54	-	67	7	7	20	11.9
2019	5	-	100	-	-	-	2.5

**Table 10R-59.15 - 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
2016	6.0	0.0	0.0	0.0	0.0	3.6	0.0	9.6	Very Poor
2019	1.4	0.0	0.0	3.5	-1.1	8.0	0.0	11.8	Very Poor

## BULL CANYON - STUDY NO. 10R-64



### Location Information

USGS 7.5 min Map Info  
GPS (0' Stake)

Calf Canyon NW; Township 20S, Range 21E, Section 16  
NAD 83 UTM ZONE 12, 620279 East 4325851 North

### Transect Information

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

Not Available  
61° magnetic  
500ft  
Line 1 (11ft), Line 2 (34ft), Line 3 (59ft), Line 4 (71ft), Line 5 (95ft)  
No Stakes or Rebar

### Directions to Site

Traveling east on I-70, take exit 204 for State Route 128 toward Cisco. Proceed on SR-128 for a short while, turn left onto the Nash Wash road (BLM #170), and continue under I-70 -- approximately 2.5 miles in total. Continue on the Nash Wash road for 5.5 miles to a road coming in from the right (east) and continue straight. From here, drive for 6.8 miles to a fork, then proceed to the left. Continue driving for 3.3 miles, passing the Nash Wash cabin, then park: there is no witness post. The study site is approximately 0.15 miles up a steep hill northeast of the road.

**Site Information**

Land Ownership	State
Land Administrator	UDWR
Allotment	CISCO
Elevation	5,600ft (1,707m)
Aspect	West
Slope	8%
Sample Dates	08/20/2019

**Table 10R-64.1 Disturbance History.** Recorded history of major disturbances.

Treatment/Disturbance	Name	WRI DB#	Date	Size (acres)
Seeding - Aerial Before	South Bookcliffs Phase 7 (Nash) (Proposed)	4836	Fall 2019	437
Mechanical - Bullhog	South Bookcliffs Phase 7 (Nash) (Proposed)	4836	Fall 2019	437
Seeding - Aerial After	South Bookcliffs Phase 7 (Nash) (Proposed)	4836	Fall 2019	437

**Wildlife Habitat and Vegetation History****Table 10R-64.3 - Wildlife Seasonal Habitat.** UDWR wildlife habitat and seasonality.

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

**Table 10R-64.4 - Vegetation History.** The dominant vegetation type(s) and phase of woodland succession (Tausch, Miller, Roundy, & Chambers, 2009).

Year	Vegetation Type	Woodland Succession
2019	Pinyon-Juniper	Phase III

**Site Notes**

No Notes

**Site Potential**

1981 - 2010 Average Annual Precipitation	12 inches
NRCS Ecological Site	Semidesert Stony Loam (Utah Juniper-Pinyon)
NRCS Ecological Site #	R034BY247UT
States and Transitions	A defined state and transition model is available.

Upon study establishment in 2019, this site was dominated by Utah juniper (*Juniperus osteosperma*) with lesser amounts of twoneedle pinyon (*Pinus edulis*) and was considered to be within Phase III of woodland succession. Shrub species were moderately diverse, but sparse (Table 10R-64.4, Table 10R-64.12, Table 10R-64.13, Table 10R-64.14). The herbaceous understory provided modest cover with annual and perennial forbs contributing most of the cover (Table 10R-64.7). The plant community that characterizes this site may be comparable to the Open Canopy-Utah Juniper, Two-Needle Pinyon, Invasive Species Community Phase within the Current Potential State as defined by the available state and transition model (Jornada, 2019). Tree encroachment would likely continue on this site without a major disturbance. However, a bullhog and seeding project scheduled for the fall of 2019 (Table 10R-64.1) will likely remove much of the tree component and rejuvenate the understory, allowing for the establishment of browse and herbaceous species that are beneficial to wildlife.

**Trend Summary Tables**

**Table 10R-64.6 - Shrub/Tree Summary.** Average modified Daubenmire quadrat and line intercept cover by year for shrubs/trees

Year	Quadrat Cover (%)			Line-intercept Cover (%)		
	Preferred Shrub	Other Shrub	Tree	Preferred Shrub	Other Shrub	Tree
2019	-	0.7	13.9	-	0.3	40.0

**Table 10R-64.7 - Herbaceous Summary.** Nested frequency and average modified Daubenmire quadrat cover by year for herbaceous functional groups

Year	Nested Frequency				Quadrat Cover (%)			
	Annual Grass	Perennial Grass	Annual/Biennial Forb	Perennial Forb	Annual Grass	Perennial Grass	Annual/Biennial Forb	Perennial Forb
2019	5	13	309	102	0.0	0.1	6.4	4.0

**Table 10R-64.8 - 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
2019	22.0	7.6	49.2	11.8	19.9	23.3

**Table 10R-64.9 - Pellet 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	
2019	1	15
Year	Days Use Per Acre (ha)	
2019	2.0 (5.0)	

**Table 10R-64.10 - Grass Species.** Nested frequency and modified Daubenmire average cover by year.

GRASS SPECIES	Nested Frequency		
	year	Nested Frequency	
Achnatherum hymenoides (Indian ricegrass)	2019	4	5
Bromus tectorum <sup>ai</sup> (cheatgrass)	2019	5	9
Elymus elymoides (squirreltail)	2019	0.0	0.1
year	Average Cover (%)		
2019	0.0	0.0	0.1

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



**Table 10R-64.11 - Forb Species.** Nested frequency and modified Daubenmire average cover by year.

FORB SPECIES	Nested Frequency																
year	Average Cover (%)																
Aliciella hutchinsifolia <sup>a</sup> (desert pale gilia)	1	21	20	3	4	47	8	3	2	113	176	0	171	27	11	1	15
Arabis (rockress)	0.0	0.2	0.2	0.0	0.2	1.1	0.2	0.0	0.1	2.4	1.0	0.0	2.8	2.0	0.0	0.0	0.1
Astragalus convallarius (lesser russy milkvetch)																	
Ceratocephala testiculata <sup>ai</sup> (curvseed butterwort)																	
Chaetopappa ericoides (rose heath)																	
Chamaesyce (sandmat)																	
Chenopodium album <sup>a</sup> (lambquarters)																	
Chenopodium fremontii <sup>a</sup> (Fremont's goosefoot)																	
Cryptantha (cryptantha)																	
Descurainia pinnata <sup>a</sup> (western tansymustard)																	
Draba <sup>a</sup> (draba)																	
Eriogonum ovalifolium (cushion buckwheat)																	
Gilia inconspicua <sup>a</sup> (shy gilia)																	
Hedysarum boreale (Utah sweetvetch)																	
Lappula occidentalis <sup>a</sup> (flatspine stickseed)																	
Penstemon (beardtongue)																	
Townsendia incana (hoary Townsend daisy)																	

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

**Table 10R-64.12 - Shrub and Tree Species.** Average modified Daubenmire quadrat and line intercept cover by year.

SHRUB SPECIES	Line Intercept Cover (%)				
year	Quadrat Cover (%)				
Gutierrezia sarothrae (broom snakeweed)	-	36.9	0.3	-	3.1
Juniperus osteosperma <sup>t</sup> (Utah juniper)	0.0	11.9	0.6	0.0	2.0
Opuntia polyacantha (plains pricklypear)					
Pediocactus simpsonii (mountain ball cactus)					
Pinus edulis <sup>t</sup> (twoneedle pinyon)					

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

**Table 10R-64.13 - Shrub/Tree Characteristics.** Population characteristics of shrub/tree species populations including density reproduction (seedlings), age distribution, utilization, vigor and average size (height/crown) of plants.

Year	Density		Age Class Distribution			Utilization		Poor Vigor (%)	Average Height Crown (cm)
	Plants Per Acre		Excluding Seedlings			Moderate (%)	Heavy (%)		
	Excluding Seedlings	Seedling	Young (%)	Mature (%)	Decadent (%)				
Echinocereus -- (hedgehog cactus)									
2019	-	-	-	-	-	-	-	-	7/12
Ephedra viridis <sup>p</sup> -- (mormon tea)									
2019	-	-	-	-	-	-	-	-	118/132
Gutierrezia sarothrae -- (broom snakeweed)									
2019	20	20	0	100	0	0	0	0	24/24
Juniperus osteosperma <sup>t</sup> -- (Utah juniper)									
2019	420	40	14	62	24	0	0	29	- / -
Opuntia polyacantha -- (plains pricklypear)									
2019	60	-	0	67	33	0	0	33	12/40
Pediocactus simpsonii -- (mountain ball cactus)									
2019	-	-	-	-	-	-	-	-	5/8
Pinus edulis <sup>t</sup> -- (twoneedle pinyon)									
2019	40	-	0	50	50	0	0	50	- / -
Symphoricarpos oreophilus <sup>p</sup> -- (mountain snowberry)									
2019	-	-	-	-	-	-	-	-	44/15

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

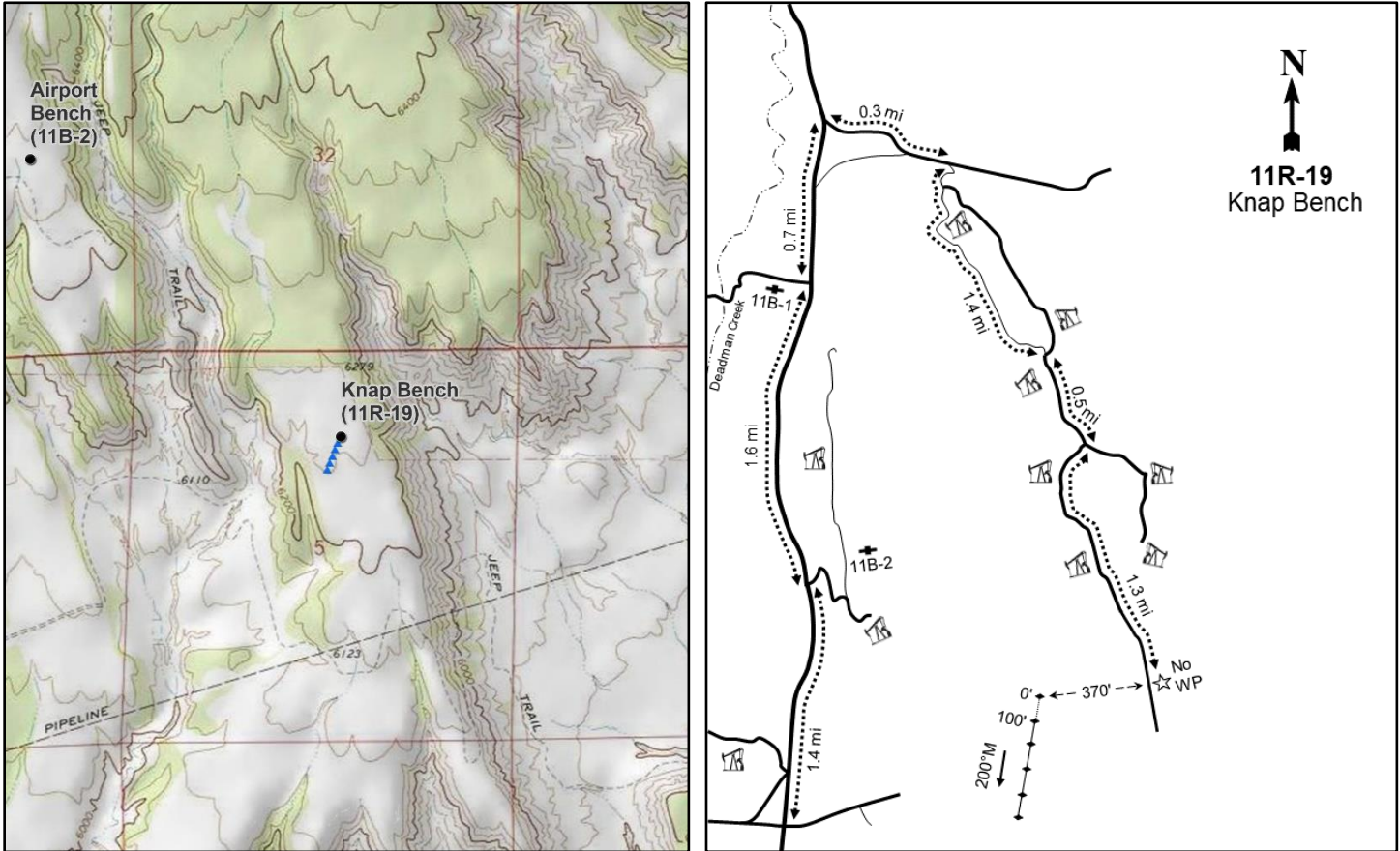
**Table 10R-64.14 - Tree Characteristics.** Point-quarter tree density, size class distribution, and average diameter.

Year	Density	Size Class Distribution					Average Diameter (cm)
	Trees per Acre	Seedling (%)	1-4' (%)	4-8' (%)	8-12' (%)	>12' (%)	
Juniperus osteosperma (Utah juniper)							
2019	324	15	5	-	20	60	39.0
Pinus edulis (twoneedle pinyon)							
2019	13	13	13	13	38	25	8.3

**Table 10R-64.15 – 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
2019	0.0	0.0	0.0	0.2	0.0	8.0	0.0	8.2	Very Poor-Poor

## KNAP BENCH - STUDY NO. 11R-19



### Location Information

USGS 7.5 min Map Info  
GPS (0' Stake)

Deadman Canyon SW; Township 14S, Range 11E, Section 05  
NAD 83 UTM ZONE 12, 524828 East 4388068 North

### Transect Information

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

Not Available  
200° 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 intersection of Airport Road and Airport Cutoff Road in Price, travel north for 1.4 miles to a road on the right that leads to study #11B-02. Continue straight for 1.6 miles to a road on the left and study #11B-01. Proceed straight again for 0.7 miles, then turn right onto Straight Canyon Road. After 0.3 miles on this road, turn right onto a dirt road and drive for 1.4 miles, staying right at the first fork, to another fork. Proceed to the right and continue for 0.5 miles to another fork, then stay right again. Drive for approximately 1.3 miles and park: there is no witness post. The study is approximately 370 feet west of the road. There are no stakes, so use a GPS to find the exact location of the transect.

**Site Information**

Land Ownership	Federal
Land Administrator	BLM
Allotment	HAYES WASH
Elevation	6,300ft (1,920m)
Aspect	South
Slope	1-6%
Sample Dates	08/19/2019

**Table 11R-19.1 Disturbance History.** Recorded history of major disturbances.

Treatment/Disturbance	Name	WRI DB#	Date	Size (acres)
Hand Crew - Lop and Scatter	Miller Creek Watershed Restoration 2.0 (Proposed)	4734	Fall 2019	1638
Seeding - Hand Planter	Miller Creek Watershed Restoration 2.0 (Proposed)	4734	Fall 2019	58

**Wildlife Habitat and Vegetation History****Table 11R-19.3 - Wildlife Seasonal Habitat.** UDWR wildlife habitat and seasonality.

Species	Habitat	Season
Mule Deer	crucial	winter
Pronghorn	crucial	year-long

**Table 11R-19.4 - Vegetation History.** The dominant vegetation type(s) and phase of woodland succession (Tausch, Miller, Roundy, & Chambers, 2009).

Year	Vegetation Type	Woodland Succession
2019	Mixed Shrub	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 #	R034BY321UT
States and Transitions	No state and transition model is available for this ecological site.

This site was dominated by mixed shrubs, including broom snakeweed (*Gutierrezia sarothrae*), mormon tea (*Ephedra viridis*), and alderleaf mountain mahogany (*Cercocarpus montanus*) upon study establishment in 2019. Other shrub species were present, but provided less cover (Table 11R-19.12, Table 11R-19.13). The herbaceous understory was abundant, with annual forbs such as western tansymustard (*Descurainia pinnata*) and the introduced species prickly Russian thistle (*Salsola tragus*) contributing most of the cover. However, moderate amounts of cover were also provided by the introduced perennial grass species crested wheatgrass (*Agropyron cristatum*) and perennial forbs; annual grasses were rare (Table 11R-19.7, Table 11R-19.10, Table 11R-19.11). In addition, Utah juniper (*Juniperus osteosperma*), Rocky Mountain juniper (*J. scopulorum*), and twoneedle pinyon (*Pinus edulis*) were observed, placing the site in Phase I of woodland succession (Table 11R-19.4, Table 11R-19.13, Table 11R-19.14). However, it is likely that these trees will be removed by a lop and scatter project planned for the area in the fall of 2019. In addition, it is probable that a seeding that is part of the same project will diversify and increase the forb component of the understory (Table 11R-19.1).

**Trend Summary Tables****Table 11R-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
2019	7.6	10.5	1.1	11.3	9.2	0.6

**Table 11R-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
2019	25	192	317	133	0.5	8.4	14.0	4.9

**Table 11R-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
2019	32.3	0.0	29.3	17.0	6.5	36.6

**Table 11R-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	Coyote	Mule Deer	Rabbit
	Quadrat Frequency			
2019	4	1	23	54
Year	Days Use Per Acre (ha)			
2019	4.4 (10.8)	-	4.0 (9.9)	-

**Table 11R-19.10 - Grass Species.** Nested frequency and modified Daubenmire average cover by year.

GRASS SPECIES	Nested Frequency		
	year	Nested Frequency	
Achnatherum hymenoides (Indian ricegrass)	2019	10	191
Agropyron cristatum <sup>i</sup> (crested wheatgrass)	2019	191	25
Bromus tectorum <sup>ai</sup> (cheatgrass)	2019	25	0.5
GRASS SPECIES	Average Cover (%)		
Achnatherum hymenoides (Indian ricegrass)	2019	0.6	7.8
Agropyron cristatum <sup>i</sup> (crested wheatgrass)	2019	7.8	0.5
Bromus tectorum <sup>ai</sup> (cheatgrass)	2019	0.5	0.5

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

**Table 11R-19.11 - Forb Species.** Nested frequency and modified Daubenmire average cover by year.

FORB SPECIES	Nested Frequency																
year	Average Cover (%)																
Camelina microcarpa <sup>ai</sup> (littlepod false flax)	41	26	2	12	262	55	53	32	3	5	5	62	6	6	22	88	3
Chamaesyce (sandmat)	0.5	0.3	0.0	0.5	9.9	2.6	0.5	1.3	0.0	0.0	0.1	0.8	0.1	0.0	0.1	2.0	0.1
Chenopodium album <sup>a</sup> (lambsquarters)																	
Cryptantha (cryptantha)																	
Descurainia pinnata <sup>a</sup> (western tansymustard)																	
Eriogonum (buckwheat)																	
Eriogonum cernuum <sup>a</sup> (nodding buckwheat)																	
Eriogonum racemosum (redroot buckwheat)																	
Erodium cicutarium <sup>ai</sup> (redstem stork's bill)																	
Gilia inconspicua <sup>a</sup> (shy gilia)																	
Lactuca serriola <sup>ai</sup> (prickly lettuce)																	
Lappula occidentalis <sup>a</sup> (flatspine stickseed)																	
Lesquerella (bladderpod)																	
Penstemon (beardtongue)																	
Physaria (twinpod)																	
Salsola tragus <sup>ai</sup> (prickly Russian thistle)																	
Sisymbrium altissimum <sup>ai</sup> (tall tumblemustard)																	

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

FORB SPECIES	Nested Frequency	
year	Average Cover (%)	
Townsendia incana (hoary Townsend daisy)	7	1
Tragopogon dubius <sup>ai</sup> (yellow salsify)	0.1	0.0

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

**Table 11R-19.12 - Shrub and Tree Species.** Average modified Daubenmire quadrat and line intercept cover by year.

SHRUB SPECIES	Line Intercept Cover (%)						
year	Quadrat Cover (%)						
Cercocarpus montanus <sup>p</sup> (aldерleaf mountain mahogany)	4.6	4.9	-	1.8	9.2	-	0.6
Ephedra viridis <sup>p</sup> (mormon tea)	2.9	3.8	0.0	1.0	10.5	0.1	1.0
Ericameria nauseosa (rubber rabbitbrush)							
Ericameria nauseosa ssp. nauseosa var. hololeuca <sup>p</sup>							
Gutierrezia sarothrae (broom snakeweed)							
Juniperus osteosperma <sup>t</sup> (Utah juniper)							
Juniperus scopulorum <sup>t</sup> (Rocky Mountain juniper)							

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



**Table 11R-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>Atriplex canescens<sup>p</sup> -- (fourwing saltbush)</b>									
2019	-	-	-	-	-	-	-	-	82/162
<b>Cercocarpus montanus<sup>p</sup> -- (alderleaf mountain mahogany)</b>									
2019	120	-	17	50	33	67	17	33	139/162
<b>Echinocereus coccineus -- (scarlet hedgehog cactus)</b>									
2019	-	-	-	-	-	-	-	-	22/41
<b>Ephedra viridis<sup>p</sup> -- (mormon tea)</b>									
2019	540	20	22	74	4	11	26	0	91/146
<b>Ericameria nauseosa -- (rubber rabbitbrush)</b>									
2019	20	-	0	100	0	100	0	0	89/148
<b>Ericameria nauseosa ssp. nauseosa var. hololeuca<sup>p</sup> -- (rubber rabbitbrush)</b>									
2019	180	280	11	78	11	11	0	0	73/114
<b>Gutierrezia sarothrae -- (broom snakeweed)</b>									
2019	28680	5280	71	29	0	0	0	0	24/37
<b>Juniperus osteosperma<sup>t</sup> -- (Utah juniper)</b>									
2019	20	-	100	0	0	0	0	0	- / -
<b>Juniperus scopulorum<sup>t</sup> -- (Rocky Mountain juniper)</b>									
2019	20	-	0	100	0	0	0	0	- / -
<b>Opuntia polyacantha -- (plains pricklypear)</b>									
2019	20	-	100	0	0	0	0	0	9/37
<b>Quercus gambelii<sup>p</sup> -- (Gambel oak)</b>									
2019	-	-	-	-	-	-	-	-	98/54
<b>Yucca -- (yucca)</b>									
2019	-	-	-	-	-	-	-	-	30/31

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

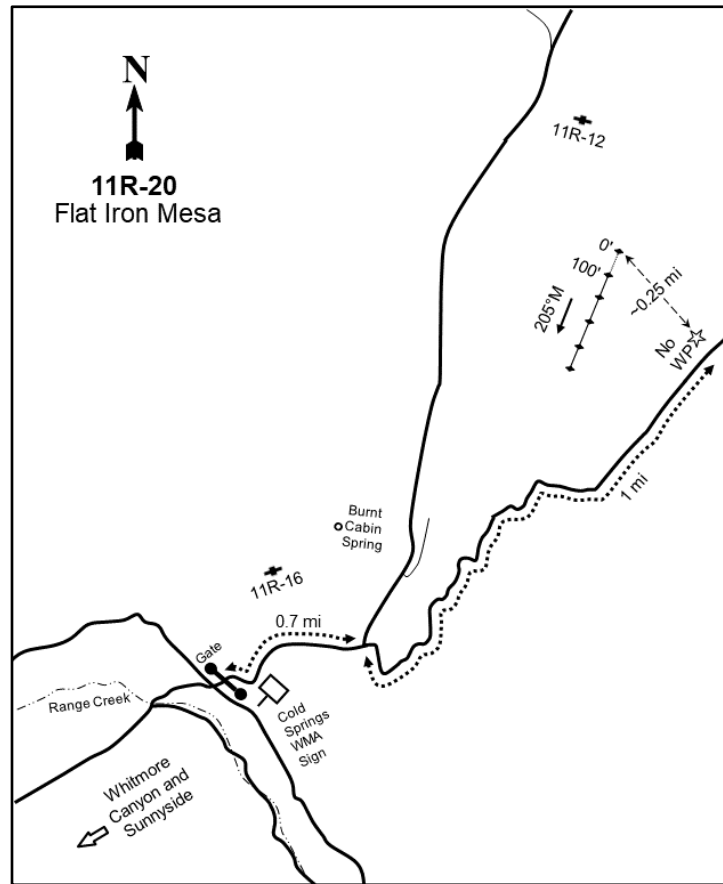
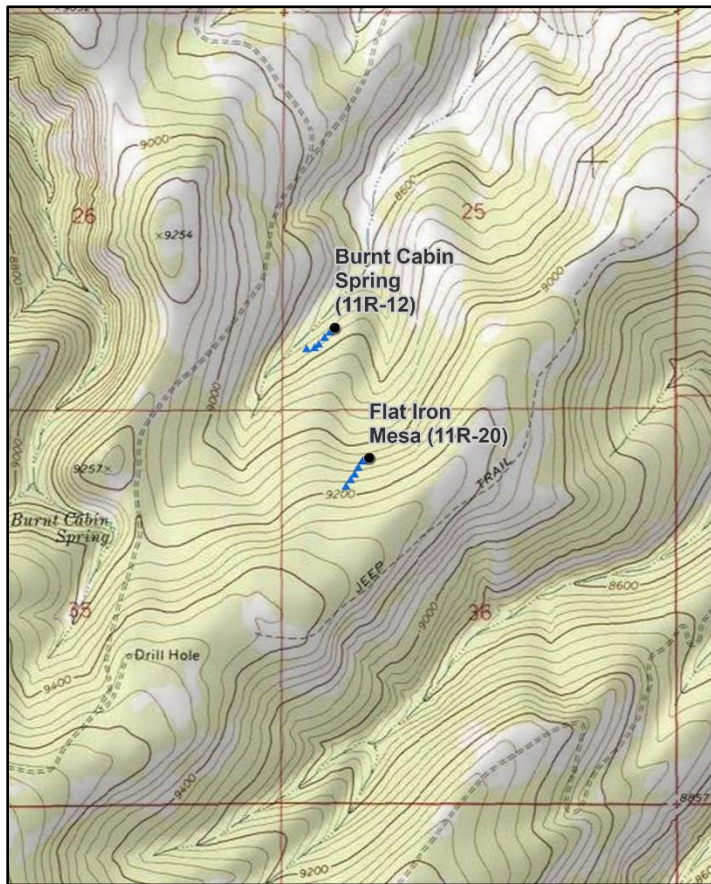
**Table 11R-19.14 - Tree Characteristics.** Point-quarter tree density, size class distribution, and average diameter.

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>							
2019	18	-	30	70	-	-	11.3
<b>Pinus edulis (twoneedle pinyon)</b>							
2019	14	-	50	50	-	-	5.5

**Table 11R-19.15 – 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
2019	15.3	9.9	9.1	16.8	-0.4	9.8	0.0	60.5	Fair

## FLAT IRON MESA - STUDY NO. 11R-20



### Location Information

USGS 7.5 min Map Info  
GPS (0' Stake)

Bruin Point SE; Township 13S, Range 14E, Section 36  
NAD 83 UTM ZONE 12, 559798 East 4389786 North

### Transect Information

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

Not Available  
205° magnetic  
500ft  
Line 1 (11ft), Line 2 (34ft), Line 3 (59ft), Line 4 (71ft), Line 5 (95ft)  
No Stakes or Rebar

### Directions to Site

From the fence and the Cold Springs WMA sign, travel east for 0.7 miles to a fork. Proceed left at the fork, continue for 1.0 miles, and park: there is no witness post. The study site is located approximately 0.25 miles downhill and northwest of the road. There are no stakes, so use a GPS unit to navigate to the transect.

**Site Information**

Land Ownership	State
Land Administrator	UDWR
Allotment	GREEN RIVER
Elevation	9,150ft (2,789m)
Aspect	Northwest
Slope	20%
Sample Dates	08/20/2019

**Table 11R-20.1 Disturbance History.** Recorded history of major disturbances.

Treatment/Disturbance	Name	WRI DB#	Date	Size (acres)
Mechanical - Push	Cold Springs WMA Conifer Removal Aspen Regeneration Phase VI (Proposed)	4840	Fall 2019	339

**Wildlife Habitat and Vegetation History**

**Table 11R-20.3 - Wildlife Seasonal Habitat.** UDWR wildlife habitat and seasonality.

Species	Habitat	Season
Mule Deer	crucial	summer
Rocky Mountain Elk	crucial	summer
Greater Sage-Grouse		undefined & undefined
Shiras Moose	substantial	year-long

**Table 11R-20.4 - Vegetation History.** The dominant vegetation type(s) and phase of woodland succession (Tausch, Miller, Roundy, & Chambers, 2009).

Year	Vegetation Type	Woodland Succession
2019	Quaking Aspen-Conifer Encroached	NA

**Site Notes**

No Notes

**Site Potential**

1981 - 2010 Average Annual Precipitation	22 inches
NRCS Ecological Site	High Mountain Loam (Aspen)
NRCS Ecological Site #	R048AY506UT
States and Transitions	No state and transition model is available for this ecological site.

This study was established in 2019 and was dominated by mixed conifers, mainly subalpine fir (*Abies lasiocarpa*), and quaking aspen (*Populus tremuloides*). The browse component was diverse and abundant, with Woods' rose (*Rosa woodsii*) and mountain snowberry (*Symphoricarpos oreophilus*) contributing most of the cover (Table 11R-20.12, Table 11R-20.13, Table 11R-20.14, Photos). Perennial forbs provided a majority of the cover in the herbaceous understory, while annual forbs and perennial grasses were rare (Table 11R-20.7, Table 11R-20.10, Table 11R-20.11). It is probable that conifer encroachment would continue in this area without a major disturbance. However, a bulldozer treatment planned for the fall of 2019 (Table 11R-20.1) will likely remove many of these trees, allowing for aspen regeneration and diversification/amplification of shrub and herbaceous species that are valuable for wildlife (WRI Database, 2019).

**Trend Summary Tables**

**Table 11R-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
2019	14.5	2.6	21.8	17.9	3.1	69.2

**Table 11R-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
2019	-	87	17	299	-	1.7	0.5	25.0

**Table 11R-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
2019	3.9	4.8	74.1	1.2	0.6	49.6

**Table 11R-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		
2019	2	1	1
Year	Days Use Per Acre (ha)		
2019	5.3 (13.2)	2.7 (6.6)	-

**Table 11R-20.10 - Grass Species.** Nested frequency and modified Daubenmire average cover by year.

year	Nested Frequency	
	2019	60
year	Average Cover (%)	
2019	0.9	0.8

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

**Table 11R-20.11 - Forb Species.** Nested frequency and modified Daubenmire average cover by year.

FORB SPECIES	Nested Frequency																
year	Average Cover (%)																
Achillea millefolium (Common yarrow)	40	3	7	199	96	1	116	2	28	5	1	21	43	16	27	12	4
Aquilegia coerulea (Colorado blue columbine)	1.1	0.2	0.0	6.7	6.0	0.0	5.7	0.2	1.9	0.2	0.0	0.3	1.3	0.5	0.1	0.2	0.2
Arabis hirsuta (hairy rockress)																	
Arnica cordifolia (heartleaf arnica)																	
Astragalus miser (timber milkvetch)																	
Epilobium brachycarpum <sup>a</sup> (tall annual willowherb)																	
Erigeron (fleabane)																	
Fragaria virginiana (Virginia strawberry)																	
Lupinus argenteus (silvery lupine)																	
Lupinus aridus (desert lupine)																	
Maianthemum racemosum (feathery false lily of the valley)																	
Osmorhiza berteroi (sweetcicely)																	
Saxifraga (saxifrage)																	
Senecio integerrimus <sup>a</sup> (lambstongue ragwort)																	
Silene menziesii (Menzies' campion)																	
Taraxacum officinale (common dandelion)																	
Thalictrum fendleri (Fendler's meadow-rue)																	

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

FORB SPECIES	Nested Frequency
year	Average Cover (%)
Viola (violet)	61
2019	1.1

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

**Table 11R-20.12 - Shrub and Tree Species.** Average modified Daubenmire quadrat and line intercept cover by year.

SHRUB SPECIES	Line Intercept Cover (%)									
year	Quadrat Cover (%)									
Abies lasiocarpa <sup>t</sup> (subalpine fir)	43.1	0.2	-	0.4	22.7	3.4	0.5	11.1	2.5	6.3
Mahonia repens (creeping barberry)	20.9	0.3	0.0	1.2	0.9	0.0	1.2	9.1	1.0	4.2
Orthilia secunda (sidebells wintergreen)										
Paxistima myrsinites (Oregon boxleaf)										
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)										
Shepherdia canadensis (russet buffaloberry)										
Symphoricarpos oreophilus <sup>p</sup> (mountain snowberry)										

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

**Table 11R-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 lasiocarpa<sup>t</sup> -- (subalpine fir)</b>									
2019	1260	660	67	32	2	0	0	2	- / -
<b>Acer glabrum -- (Rocky Mountain maple)</b>									
2019	-	-	-	-	-	-	-	-	78/55
<b>Acer negundo<sup>t</sup> -- (boxelder)</b>									
2019	20	-	100	0	0	100	0	0	- / -
<b>Mahonia repens -- (creeping barberry)</b>									
2019	900	-	0	100	0	0	0	0	18/14
<b>Paxistima myrsinites -- (Oregon boxleaf)</b>									
2019	2580	20	6	94	0	0	0	0	11/16
<b>Pseudotsuga menziesii<sup>t</sup> -- (Douglas-fir)</b>									
2019	240	20	8	92	0	0	0	0	- / -
<b>Ribes<sup>p</sup> -- (currant)</b>									
2019	240	-	0	100	0	0	0	0	48/36
<b>Rosa woodsii<sup>p</sup> -- (Woods' rose)</b>									
2019	13280	120	9	91	0	1	0	1	23/25
<b>Shepherdia canadensis -- (russet buffaloberry)</b>									
2019	420	-	19	76	5	0	0	5	45/48
<b>Symphoricarpos oreophilus<sup>p</sup> -- (mountain snowberry)</b>									
2019	3280	60	4	95	1	1	0	1	44/45

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

**Table 11R-20.13a - 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>								
2019	520	27	42	4	27	5	0	5

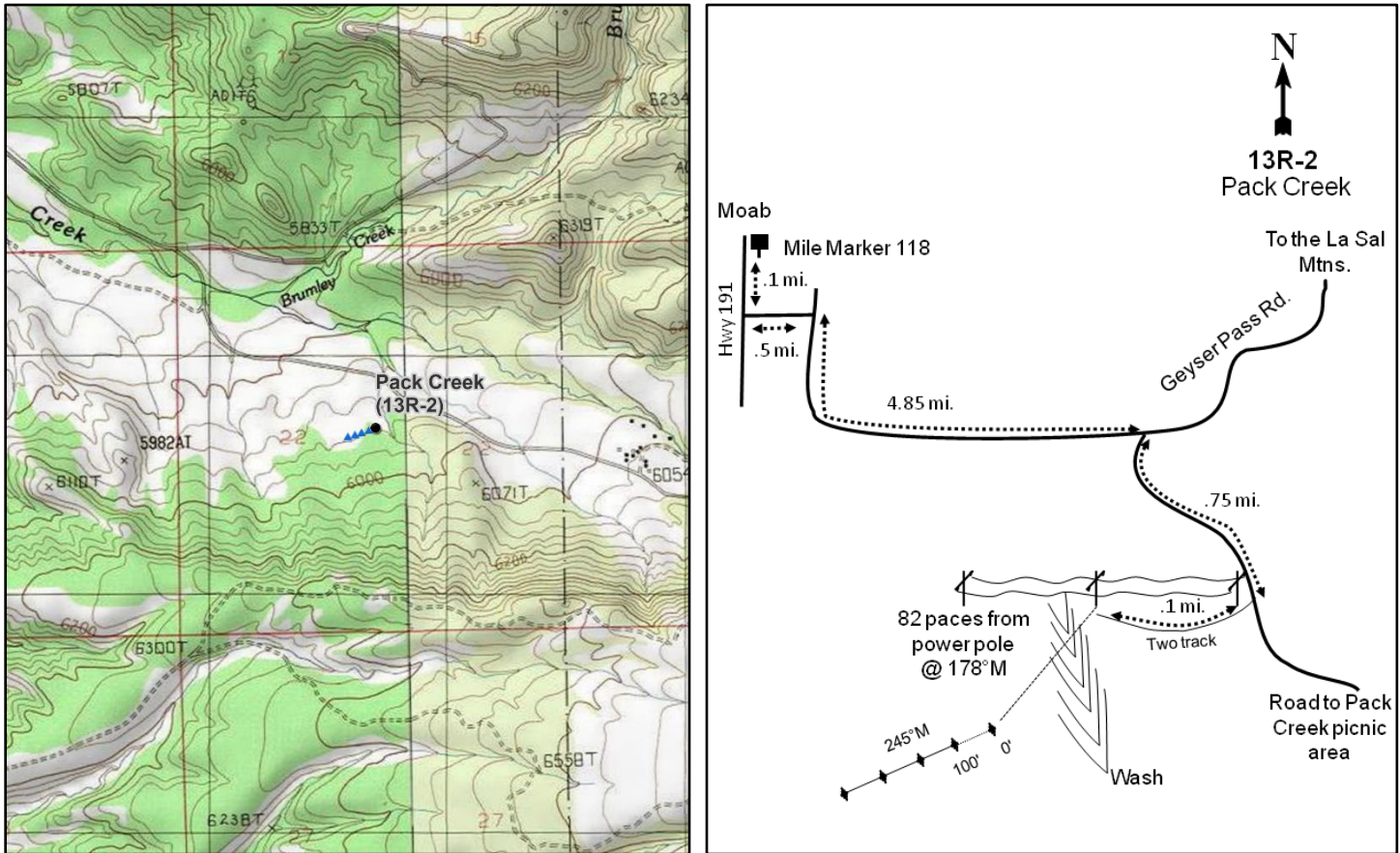
Class I - <= 1.5 feet; Class II - > 1.5 feet to 5 feet; Class III - > 5 feet and up to 1 inch diameter at breast height (dbh); Class IV - > 1 in diameter at breast height (dbh)

**Table 11R-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>Populus tremuloides (quaking aspen)</b>							
2019	196	-	13	-	-	88	16.4



## PACK CREEK - STUDY NO. 13R-2

**Location Information**

USGS 7.5 min Map Info  
GPS (0' Stake)

Kane Springs NE; Township 27S, Range 23E, Section 22  
NAD 83 UTM ZONE 12, 641639 East 4255899 North

**Transect Information**

Browse Tag # (0' Stake)	185
Transect Bearing	245° magnetic
Length	400ft
Belt Placement	Line 1 (11ft & 95ft), Line 2 (34ft), Line 3 (59ft), Line 4 (71ft)
Belt Marker Placement	No Rebar

**Directions to Site**

Travel south from Moab on Highway 191 to mile marker 118. From there, continue 0.1 miles, turn left (east), and travel 0.5 miles to a "T" in the road. Turn right at the "T" junction and travel 4.85 miles to a fork, then proceed to the right toward the Pack Creek picnic area. Drive 0.75 miles to a faint two-track road on the right, turn onto the two-track, and go 0.1 miles to where the road ends; there is a power pole at the end of the two-track. From the power pole, the 0-foot stake is 82 paces away at 178 degrees magnetic and is marked with browse tag #185.

**Site Information**

Land Ownership	Federal
Land Administrator	BLM
Allotment	BLACK RIDGE
Elevation	5,900ft (1,798m)
Aspect	North
Slope	7%
Sample Dates	06/14/2007, 06/16/2010, 08/04/2014, 06/20/2019

**Table 13R-02.1 Disturbance History.** Recorded history of major disturbances.

Treatment/Disturbance	Name	WRI DB#	Date	Size (acres)
Hand Crew - Lop and Scatter	Pack Creek	-	2003	-
Mechanical - Bullhog	Pack Creek	907	April 2007	127
Fire - Slash Pile	Pack Creek	907	October 2007	127
Seeding - Broadcast/Harrow	Pack Creek	907	October 2007	127

**Table 13R-02.2 Seed Mix.** List of known seeded plant species and rates (if available).

Mix Name		Application Type	Application Date	Acres	
Pack Creek		Broadcast	Oct 2007	171	
Type	Species	Common Name	Cultivar/Source ID	Bulk lbs/acre	PLS
G	<i>Achnatherum hymenoides</i>	Indian Ricegrass	Rimrock	1.17	1.02
G	<i>Agropyron fragile</i>	Siberian Wheatgrass	Vavilov	2.63	2.27
G	<i>Elymus lanceolatus</i>	Thickspike Wheatgrass	Bannock	2.34	2.18
G	<i>Pascopyrum smithii</i>	Western Wheatgrass	Arriba	1.75	1.43
G	<i>Poa secunda</i>	Sandberg Bluegrass	Mountain Home ID	0.58	0.54
G	<i>Poa secunda</i>	Canby Bluegrass	Canbar	0.88	0.78
G	<i>Sporobolus cryptandrus</i>	Sand Dropseed		0.29	0.28
F	<i>Penstemon palmeri</i>	Palmer Penstemon	Carbon/Washington/Iron UT	0.05	0.04
S	<i>Atriplex canescens</i>	Fourwing Saltbush	Kane UT	0.58	0.20

**Wildlife Habitat and Vegetation History****Table 13R-02.3 - Wildlife Seasonal Habitat.** UDWR wildlife habitat and seasonality.

Species	Habitat	Season
Mule Deer	crucial	winter

**Table 13R-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	Annual Grass	Phase I
2010	Blackbrush	Phase I
2014	Blackbrush	Phase I
2019	Blackbrush	Phase I

**Site Notes**

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

**Soils****Table 13R-02.5 - Soil Analysis Data.** List of chemical and textural soil characteristics determined by laboratory analysis.

Texture	pH	%sand	%silt	%clay	%OM	PPM P	PPM K	ds/m	Sample Date
Loam	7.2	48.2	32.0	19.8	2.6	10.4	108.8	0.6	06/14/2007

**Site Potential**

1981 - 2010 Average Annual Precipitation	13 inches
NRCS Ecological Site	Semidesert Stony Loam (Blackbrush)
NRCS Ecological Site #	R035XY243UT
States and Transitions	A defined state and transition model is available.

Upon study establishment in 2007, this site was dominated by the introduced annual grass species cheatgrass (*Bromus tectorum*) with limited cover from other grasses and forbs (Table 13R-02.7). However, perennial grass cover has shown steady increases with Indian ricegrass (*Achnatherum hymenoides*) being the dominant grass species. Cheatgrass has decreased in general, although a flush was observed in the 2019 sample year (Table 13R-02.10). Forb cover has displayed slight increases over time with gooseberryleaf globemallow (*Sphaeralcea grossularifolia*) and Zion milkvetch (*Astragalus zionis*) as the dominant species (Table 13R-02.11). The browse component of this site is dominated by blackbrush (*Coleogyne ramosissima*) with Wyoming big sagebrush (*Artemisia tridentata* ssp. *wyomingensis*) as a subordinate species: cover of both of these species has slightly increased (Table 13R-02.12, Table 13R-02.13). The study was established following the 2007 bullhog treatment (Table 13R-02.1) which only removed a small number of trees (Photos); twoneedle pinyon (*Pinus edulis*) and Utah juniper (*Juniperus osteosperma*) have been observed throughout the study period with density and cover remaining fairly stable (Table 13R-02.12, Table 13R-02.14). This blackbrush-dominated plant community may be comparable to the phases within the Current Potential State as is defined by the available state and transition model (Jornada, 2019).

**Trend Summary Tables**

**Table 13R-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	6.7	5.3	1.0	6.2	4.5	3.2
2010	7.3	3.7	0.0	9.0	2.4	3.1
2014	7.7	1.8	0.0	8.0	3.4	2.0
2019	8.2	2.9	0.6	10.2	2.3	1.9

**Table 13R-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	457	96	230	170	26.1	3.5	1.7	3.8
2010	268	109	182	158	3.4	5.3	3.7	4.7
2014	164	149	271	178	1.9	5.4	3.4	3.4
2019	317	142	297	268	15.6	6.1	6.6	6.6

**Table 13R-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	13.8	1.7	22.4	13.0	13.7	48.7
2010	18.7	0.3	38.6	13.5	13.3	28.7
2014	26.0	1.5	25.5	14.9	14.4	23.7
2019	22.5	1.0	30.9	22.5	18.5	36.9

**Table 13R-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			
2007	-	36	3	16
2010	-	30	1	9
2014	-	33	2	12
2019	1	26	2	15
Year	Days Use Per Acre (ha)			
2007	-	32.2 (79.5)	84.5 (208.6)	-
2010	1.5 (3.6)	59.6 (147.3)	1.3 (3.3)	-
2014	-	22.1 (54.6)	-	-
2019	2.9 (7.2)	42.9 (105.9)	1.3 (3.3)	-

**Table 13R-02.10 - Grass Species.** Nested frequency and modified Daubenmire average cover by year.

GRASS SPECIES	Achnatherum hymenoides (Indian ricegrass)	Agropyron fragile <sup>i</sup> (Siberian wheatgrass)	Aristida purpurea (purple threeawn)	Bouteloua gracilis (blue grama)	Bromus tectorum <sup>ai</sup> (cheatgrass)	Elymus elymoides (squirreltail)	Elymus lanceolatus (thickspike wheatgrass)	Hesperostipa comata (needle and thread)	Pleuraphis jamesii (James' galleta)	Poa secunda (Sandberg bluegrass)	Sporobolus cryptandrus (sand dropseed)	Vulpia octoflora <sup>a</sup> (sixweeks fescue)
year	Nested Frequency											
2007	3	-	-	-	457	68	-	-	5	23	-	35
2010	1	5	1	3	262	83	-	-	4	16	-	10
2014	11	13	17	7	163	85	3	2	4	28	19	3
2019	15	17	12	6	314	27	12	25	33	13	12	14
year	Average Cover (%)											
2007	0.2	-	-	-	26.1	2.6	-	-	0.0	0.7	-	0.1
2010	0.8	0.0	0.2	0.2	3.2	2.8	-	-	0.7	0.7	-	0.2
2014	1.0	0.8	0.4	0.3	1.9	1.3	0.2	0.1	0.1	0.3	1.0	0.0
2019	2.2	1.0	0.6	0.1	15.5	0.1	0.0	0.5	1.0	0.4	0.1	0.0

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

**Table 13R-02.11 - Forb Species.** Nested frequency and modified Daubenmire average cover by year.

FORB SPECIES	Astragalus (milkvetch)	Astragalus convallarius (lesser rushy milkvetch)	Astragalus flexuosus (flexile milkvetch)	Astragalus miser (timber milkvetch)	Astragalus zionis (Zion milkvetch)	Calochortus nuttallii (sego lily)	Ceratocephala testiculata <sup>ai</sup> (curveseed butterwort)	Chaetopappa ericoides (rose heath)	Chenopodium leptophyllum <sup>a</sup> (narrowleaf goosefoot)	Collinsia parviflora <sup>a</sup> (maiden blue eyed Mary)	Cryptantha (cryptantha)	Cymopterus (springparsley)	Delphinium nuttallianum (twolobe larkspur)	Descurainia pinnata <sup>a</sup> (western tansymustard)	Draba <sup>a</sup> (draba)	Eriogonum cernuum <sup>a</sup> (nodding buckwheat)	Eriogonum ovalifolium (cushion buckwheat)
year	Nested Frequency																
2007	4	-	3	-	52	2	66	-	-	-	42	3	1	-	58	4	3
2010	17	-	-	-	21	6	10	-	1	11	22	1	-	-	3	40	14
2014	-	-	20	-	21	-	1	-	10	-	48	-	-	5	16	4	4
2019	-	0	3	27	75	16	61	4	6	-	9	14	3	16	106	94	-
year	Average Cover (%)																
2007	0.0	-	0.2	-	0.2	0.0	0.3	-	-	-	0.6	0.0	0.0	-	0.1	0.0	0.0
2010	0.9	-	-	-	0.1	0.0	0.1	-	0.0	0.1	0.7	0.0	-	-	0.0	0.1	0.0
2014	-	-	0.1	-	0.3	-	0.0	-	0.0	-	0.4	-	-	0.0	0.1	0.0	0.0
2019	-	0.4	0.0	0.3	1.2	0.0	0.3	0.1	0.0	-	0.1	0.1	0.0	0.3	0.4	1.3	-

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

FORB SPECIES																		
<i>Gilia inconspicua</i> <sup>a</sup> (shy gilia)																		
<i>Helianthus annuus</i> <sup>a</sup> (common sunflower)																		
<i>Lactuca scariola</i> <sup>ai</sup> (prickly lettuce)																		
<i>Lesquerella</i> (bladderpod)																		
<i>Linum lewisii</i> (Lewis flax)																		
<i>Machaeranthera canescens</i> (hoary tansyaster)																		
<i>Machaeranthera grindelioides</i> (rayless tansyaster)																		
<i>Microsteris gracilis</i> <sup>a</sup> (slender phlox)																		
<i>Packera multilobata</i> (lobeleaf groundsel)																		
<i>Penstemon</i> (beardtongue)																		
<i>Penstemon cyanocaulis</i> (bluestem beardtongue)																		
<i>Petroradia pumila</i> (rock goldenrod)																		
<i>Phlox longifolia</i> (longleaf phlox)																		
<i>Pleiocanthus spinosus</i> (thorn skeletonweed)																		
<i>Salsola tragus</i> <sup>ai</sup> (prickly Russian thistle)																		
<i>Silene antirrhina</i> <sup>a</sup> (sleepy silene)																		
<i>Sisymbrium altissimum</i> <sup>ai</sup> (tall tumbled mustard)																		
year	Nested Frequency																	
2007	106	1	6	4	1	3	-	-	-	-	27	4	51	5	100	1	-	
2010	32	14	7	17	-	1	-	1	-	22	17	4	20	-	154	-	-	
2014	11	3	-	46	-	11	-	-	-	-	17	17	-	-	250	12	3	
2019	143	21	-	150	-	3	1	4	1	16	3	9	60	-	12	-	-	
year	Average Cover (%)																	
2007	0.7	0.0	0.0	0.0	0.0	0.0	-	-	-	-	1.3	0.7	0.2	0.0	0.4	0.0	-	
2010	0.1	0.1	0.0	0.2	-	0.0	-	0.0	-	0.8	0.0	0.6	0.1	-	3.0	-	-	
2014	0.0	0.0	-	0.1	-	0.1	-	-	-	-	0.4	0.5	-	-	3.2	0.0	0.0	
2019	4.0	0.1	-	1.8	-	0.0	0.0	0.0	0.0	0.1	0.0	0.4	0.7	-	0.1	-	-	

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

FORB SPECIES					
<i>Sphaeralcea grossularifolia</i> (gooseberry/leaf globemallow)					
<i>Tetranneuris acaulis</i> (stemless four-nerve daisy)					
<i>Townsendia</i> (Townsend daisy)					
<i>Tragopogon dubius</i> <sup>ai</sup> (yellow salsify)					
<i>Zigadenus paniculatus</i> (foothill deathcamas)					
year	Nested Frequency				
2007	12	1	31	-	-
2010	25	4	19	1	1
2014	24	4	25	4	1
2019	30	28	-	32	-
year	Average Cover (%)				
2007	0.3	0.0	0.1	-	-
2010	0.9	0.2	0.2	0.1	0.0
2014	0.3	0.4	0.6	0.0	0.0
2019	0.8	0.6	-	0.1	-

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

**Table 13R-02.12 - Shrub and Tree Species.** Average modified Daubenmire quadrat and line intercept cover by year.

SHRUB SPECIES	Artemisia tridentata ssp. wyomingensis <sup>p</sup> (Wyoming big sagebrush)	Atriplex canescens <sup>p</sup> (fourwing saltbush)	Coleogyne ramosissima <sup>p</sup> (blackbrush)	Echinocereus coccineus var. coccineus (scarlet hedgehog cactus)	Ephedra torreyana (Torrey's jointfir)	Ericameria nauseosa (rubber rabbitbrush)	Eriogonum corymbosum (crisp-leaf buckwheat)	Gutierrezia sarothrae (broom snakeweed)	Juniperus osteosperma <sup>i</sup> (Utah juniper)	Opuntia (pricklypear)	Pinus edulis <sup>i</sup> (two-needle pinyon)	Sclerocactus (fishhook cactus)
year	Line Intercept Cover (%)											
2007	1.7	-	4.5	-	-	-	0	4.5	3.2	-	-	-
2010	2	-	7	-	0.4	-	0.1	1.9	3	-	0.1	-
2014	1.6	-	6.4	-	0.3	0.8	0.1	2.2	2	-	-	-
2019	3.2	-	7	-	0.1	1.4	0.5	0.3	1.9	-	-	-
year	Quadrat Cover (%)											
2007	1.9	-	4.8	0.0	-	0.6	0.3	4.4	0.8	-	0.1	-
2010	2.4	0.0	4.8	0.0	0.0	-	0.3	3.2	0.0	0.0	0.0	0.0
2014	2.0	-	5.7	-	0.0	0.1	0.3	1.4	0.0	0.0	0.0	0.0
2019	2.7	-	5.5	-	0.2	0.6	0.5	1.3	0.6	0.2	-	0.0

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

**Table 13R-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 tridentata ssp. wyomingensis<sup>p</sup> -- (Wyoming big sagebrush)</b>									
2007	1100	40	6	38	56	29	2	44	38/65
2010	960	-	0	81	19	17	4	13	41/69
2014	1300	-	3	74	23	32	62	17	37/67
2019	980	-	0	82	18	41	53	18	40/65
<b>Atriplex canescens<sup>p</sup> -- (fourwing saltbush)</b>									
2007	-	-	-	-	-	-	-	-	91/137
2010	-	-	-	-	-	-	-	-	-/-
2014	-	-	-	-	-	-	-	-	-/-
2019	-	-	-	-	-	-	-	-	-/-
<b>Coleogyne ramosissima<sup>p</sup> -- (blackbrush)</b>									
2007	1680	-	6	71	23	39	0	4	27/59
2010	1880	-	3	96	1	13	3	2	24/54
2014	2120	-	0	99	1	22	69	5	27/54
2019	2240	-	4	94	3	40	52	9	29/63
<b>Echinocereus coccineus var. coccineus -- (scarlet hedgehog cactus)</b>									
2007	80	-	0	100	0	0	0	0	13/10
2010	40	-	0	100	0	0	0	0	14/12
2014	-	-	-	-	-	-	-	-	-/-
2019	200	-	0	100	0	30	0	0	17/24
<b>Ephedra torreyana -- (Torrey's jointfir)</b>									
2007	40	-	0	100	0	0	0	0	45/57
2010	60	-	0	100	0	0	33	0	53/78
2014	80	-	0	100	0	25	50	50	49/83
2019	140	-	0	86	14	43	0	14	61/94



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>Eriogonum corymbosum -- (crisp leaf buckwheat)</b>									
2007	160	20	50	50	0	0	0	0	29/33
2010	80	-	0	100	0	0	0	0	19/31
2014	420	40	14	86	0	24	43	0	17/21
2019	180	200	0	100	0	0	0	0	17/24
<b>Ericameria nauseosa -- (rubber rabbitbrush)</b>									
2007	740	-	0	97	3	3	0	8	45/62
2010	180	-	89	11	0	0	0	0	92/119
2014	140	-	14	86	0	0	0	0	75/101
2019	180	1040	0	100	0	0	0	0	63/73
<b>Gutierrezia sarothrae -- (broom snakeweed)</b>									
2007	4340	3180	12	84	3	0	0	3	25/39
2010	3140	20	14	86	0	0	0	0	21/30
2014	2260	1280	10	89	2	0	0	2	24/29
2019	4160	24040	71	27	1	0	0	1	15/16
<b>Juniperus osteosperma<sup>t</sup> -- (Utah juniper)</b>									
2007	20	-	0	100	0	0	0	0	- / -
2010	40	-	50	50	0	0	0	0	- / -
2014	60	-	67	33	0	0	0	0	- / -
2019	40	40	50	50	0	0	0	0	- / -
<b>Opuntia -- (pricklypear)</b>									
2007	-	-	-	-	-	-	-	-	13/22
2010	60	-	100	0	0	0	0	0	13/41
2014	60	-	33	67	0	0	0	0	13/41
2019	60	160	0	100	0	0	0	0	14/52
<b>Pinus edulis<sup>t</sup> -- (two needle pinyon)</b>									
2007	20	-	100	0	0	0	0	0	- / -
2010	-	20	0	0	0	0	0	0	- / -
2014	-	40	0	0	0	0	0	0	- / -
2019	20	-	100	0	0	0	0	0	- / -
<b>Rhus -- (sumac)</b>									
2007	-	-	-	-	-	-	-	-	- / -
2010	-	-	-	-	-	-	-	-	68/131
2014	-	-	-	-	-	-	-	-	- / -
2019	-	-	-	-	-	-	-	-	56/137
<b>Sclerocactus -- (fishhook cactus)</b>									
2007	-	-	-	-	-	-	-	-	- / -
2010	20	-	0	100	0	0	0	0	10/10
2014	80	-	0	100	0	0	0	0	9/10
2019	20	-	0	100	0	0	0	0	11/12
<b>Symphoricarpos oreophilus<sup>p</sup> -- (mountain snowberry)</b>									
2007	-	-	-	-	-	-	-	-	- / -
2010	-	-	-	-	-	-	-	-	- / -
2014	-	-	-	-	-	-	-	-	- / -
2019	-	-	-	-	-	-	-	-	- / -
<b>Yucca -- (yucca)</b>									
2007	-	-	-	-	-	-	-	-	69/134
2010	-	-	-	-	-	-	-	-	9/33
2014	-	-	-	-	-	-	-	-	19/46
2019	-	-	-	-	-	-	-	-	22/44

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

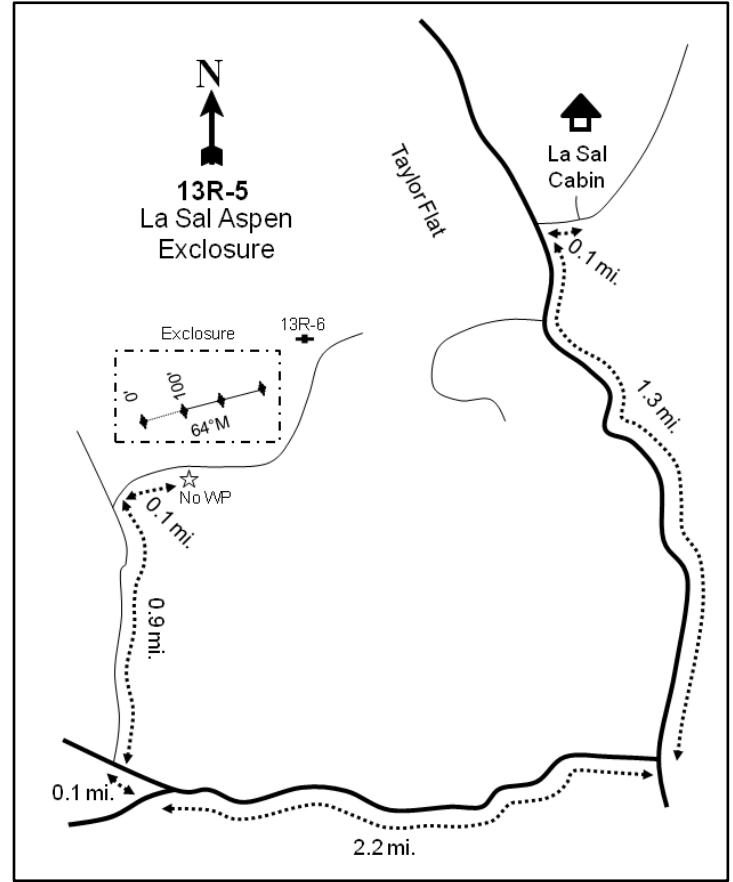
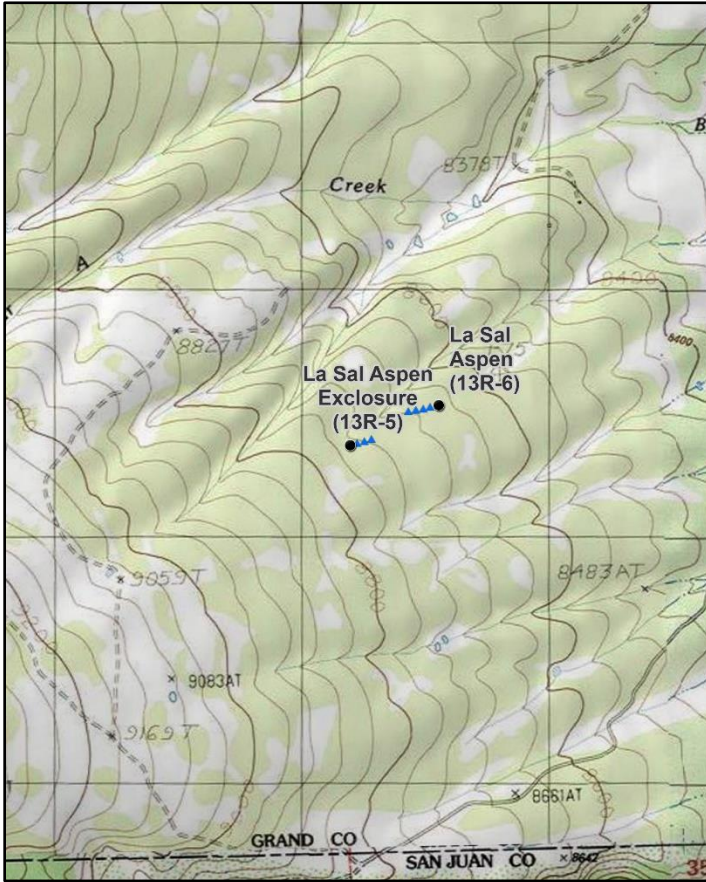
**Table 13R-02.14 - Tree Characteristics.** Point-quarter tree density, size class distribution, and average diameter.

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>							
2007	22	17	17	-	50	17	34.9
2010	16	10	60	-	10	20	15.5
2014	59	12	65	-	12	12	10.1
2019	61	11	78	-	6	6	7.9
<b>Pinus edulis (twoneedle pinyon)</b>							
2007	4	75	25	-	-	-	1.8
2010	4	33	33	-	-	33	9.7
2014	7	-	100	-	-	-	4.7
2019	8	20	80	-	-	-	2.6

**Table 13R-02.15 - Deer Desirable Components Index: Low Potential Scale.**

Year	Preferred Browse Cover	Preferred Browse Decadence	Preferred Browse Young	Perennial Grass Cover	Annual Grass Cover	Perennial Forb Cover	Noxious Weeds	Total Score	Ranking
2007	6.6	5.4	2.9	6.9	-19.6	7.6	0.0	9.9	Very Poor-Poor
2010	9.5	13.5	1.2	10.7	-2.6	9.5	0.0	41.8	Fair
2014	8.4	13.4	0.3	10.8	-1.4	6.7	0.0	38.2	Fair
2019	11.0	12.7	1.2	12.2	-11.7	10.0	0.0	35.5	Fair

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

**Location Information**

USGS 7.5 min Map Info  
GPS (0' Stake)

Mount Waas SE; Township 26S, Range 25E, Section 26  
NAD 83 UTM ZONE 12, 662148 East 4264560 North

**Transect Information**

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

189  
64° magnetic  
300ft  
Line 1 (11ft & 95ft), Line 2 (34ft & 71ft), Line 3 (59ft)  
Standard

**Directions to Site**

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

**Site Information**

Land Ownership	State
Land Administrator	SITLA
Allotment	No data
Elevation	8,682ft (2,646m)
Aspect	Northeast
Slope	9%
Sample Dates	07/18/2011, 08/06/2014, 06/24/2019

**Table 13R-05.1 Disturbance History.** Recorded history of major disturbances.

Treatment/Disturbance	Name	WRI DB#	Date	Size (acres)
Logging - Logging/Clear-Cut	La Sal Mountain Aspen Enhancement	1990	September-November 2011	124

**Wildlife Habitat and Vegetation History****Table 13R-05.3 - Wildlife Seasonal Habitat.** UDWR wildlife habitat and seasonality.

Species	Habitat	Season
Mule Deer	crucial	summer
Rocky Mountain Elk	crucial	summer

**Table 13R-05.4 - Vegetation History.** The dominant vegetation type(s) and phase of woodland succession (Tausch, Miller, Roundy, & Chambers, 2009).

Year	Vegetation Type	Woodland Succession
2011	Aspen/Snowberry	NA
2014	Aspen/Snowberry	NA
2019	Aspen/Snowberry	NA

**Site Notes**

The study was established in 2011 to monitor an aspen regeneration project. Livestock grazing occurs from June 15 to Oct 20. Density of snowberry was not taken in 2011 due to high density and difficulty distinguishing individual plants. It was noted that pellet groups were hard to see due to thick vegetation on the site. Cattle were on the site at the time of sampling, but no cattle pellet groups were sampled on the study site in 2011. For point-quarter density measurements, measure from the tall lone oak tree for the fifth stake.

**Site Potential**

1981 - 2010 Average Annual Precipitation	26 inches
NRCS Ecological Site	High Mountain Loam (Aspen)
NRCS Ecological Site #	048AY506UT
States and Transitions	No state and transition model is available for this ecological site.

This site has existed as a stable aspen/mountain snowberry plant community since study establishment in 2011. Although browse cover has remained similar, the age structure of the aspen (*Populus tremuloides*) community has changed following the clear-cut logging treatment (Table 13R-05.1, Table 13R-05.12, Table 13R-05.13a). The mature quaking aspen trees were removed from the site, which has stimulated suckering of a dense stand of young aspen (WRI Database 2019). Perennial grass and forb cover have displayed a generally decreasing trend after treatment (Table 13R-05.7). Kentucky bluegrass (*Poa pratensis*) is the dominant grass species on the site with sedge (*Carex* sp.) providing significant but lesser cover (Table 13R-05.10). Perennial forbs contribute significant cover with Nevada pea (*Lathyrus lanszwertii*) and Fendler's meadow-rue (*Thalictrum fendleri*) as the dominant species (Table 13R-05.11). Mountain snowberry (*Symphoricarpos oreophilus*) has consistently provided a high amount of browse cover (Table 13R-05.12., Table 13R-05.13). Aspen has shown an increase in intercept cover and a slight decrease in density following an initial post-treatment increase (Table 13R-05.12, Table 13R-05.13a, Table 13R-05.14). It is probable that this trend of increasing cover and decreasing density of quaking aspen will continue as the stand continues to mature.

**Trend Summary Tables**

**Table 13R-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
2011	25.3	-	3.3	39.1	-	29.2
2014	22.5	-	16.0	28.3	-	35.2
2019	33.5	0.0	8.4	56.8	-	68.7

**Table 13R-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
2011	-	421	61	391	-	34.0	1.5	48.1
2014	-	358	0	397	-	27.7	0.0	46.0
2019	-	291	12	353	-	15.8	0.1	38.9

**Table 13R-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
2011	0.0	0.1	55.9	-	-	86.6
2014	-	0.1	62.1	-	-	85.9
2019	-	-	84.5	-	-	78.4

**Table 13R-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	Black Bear	Cattle	Mule Deer	Rocky Mountain Elk	Rabbit
	Quadrat Frequency				
2011	-	1	-	-	-
2019	-	-	-	1	1
Year	Days Use Per Acre (ha)				
2011	-	-	0.7 (1.7)	1.3 (3.3)	-
2019	26.2 (64.6)*	0.7 (1.8)	-	0.7 (1.7)	-

\*Pellets per acre (ha)

**Table 13R-05.10 - Grass Species.** Nested frequency and modified Daubenmire average cover by year.

GRASS SPECIES	Achnatherum nelsonii (Columbia needlegrass)	Bromus inermis <sup>i</sup> (smooth brome)	Bromus marginatus (mountain brome)	Bromus porteri (Porter brome)	Carex (sedge)	Elymus trachycaulus (slender wheatgrass)	Festuca thurberi (Thurber's fescue)	Poa pratensis <sup>i</sup> (Kentucky bluegrass)
year	Nested Frequency							
2011	45	-	18	23	84	126	8	391
2014	15	8	58	37	68	88	6	278
2019	7	9	42	48	121	12	9	194
year	Average Cover (%)							
2011	1.4	-	0.7	0.2	4.3	3.7	0.4	23.5
2014	0.3	0.6	1.8	0.8	4.0	4.8	0.4	15.1
2019	0.3	0.4	1.2	1.6	3.3	0.3	0.9	7.8

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

**Table 13R-05.11 - Forb Species.** Nested frequency and modified Daubenmire average cover by year.

FORB SPECIES	Achillea millefolium (Common yarrow)	Artemisia ludoviciana (white sagebrush)	Calochortus gunnisonii (Gunnison's mariposa lily)	Chenopodium fremontii <sup>a</sup> (Fremont's goosefoot)	Crepis acuminata (tapertip hawkbeard)	Galium <sup>a</sup> (bedstraw)	Gilia inconspicua <sup>a</sup> (shy gilia)	Grindelia squarrosa (curlycup gumweed)	Heracleum maximum (common cowparsnip)	Hymenoxys hoopesii (owl's-claws)	Lathyrus lanszwertii (Nevada pea)	Lupinus sericeus (silky lupine)	Phacelia heterophylla <sup>a</sup> (varileaf phacelia)	Potentilla gracilis (slender cinquefoil)	Pseudocymopterus montanus (alpine false springparsley)	Pseudostellaria jamesiana (tuber starwort)	Symphotrichum (aster)
year	Nested Frequency																
2011	71	3	2	-	-	58	3	-	24	-	206	6	-	1	14	10	17
2014	48	3	1	-	2	-	-	4	20	0	256	2	0	-	1	16	1
2019	14	-	10	1	2	7	-	-	22	-	166	3	4	1	18	3	-
year	Average Cover (%)																
2011	2.0	0.0	0.0	-	-	1.5	0.0	-	1.7	-	6.9	0.2	-	0.0	0.3	0.1	0.3
2014	1.0	0.0	0.0	-	0.0	-	-	0.0	0.8	0.0	11.1	0.1	0.0	-	0.0	0.4	0.1
2019	0.3	-	0.1	0.0	0.0	0.1	-	-	1.4	-	8.8	0.2	0.0	0.0	0.5	0.0	-

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

FORB SPECIES	Taraxacum officinale (common dandelion)	Thalictrum fendleri (Fendler's meadow-rue)	Vicia americana (American vetch)
year	Nested Frequency		
2011	33	301	204
2014	2	307	55
2019	11	272	92
year	Average Cover (%)		
2011	0.5	26.4	9.5
2014	0.0	31.4	1.0
2019	0.3	24.5	3.0

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



**Table 13R-05.12 - 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)	Quercus gambelii <sup>p</sup> (Gambel oak)	Rosa woodsii <sup>p</sup> (Woods' rose)	Symphoricarpos oreophilus <sup>p</sup> (mountain snowberry)
year	Line Intercept Cover (%)				
2011	-	29.2	-	0.4	38.7
2014	-	35.2	-	0.5	27.8
2019	-	68.7	1	0.2	55.6
year	Quadrat Cover (%)				
2011	-	3.3	-	0.2	25.1
2014	-	16.0	-	0.4	22.1
2019	0.0	8.4	0.0	0.9	32.5

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

**Table 13R-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>									
2011	-	60	0	0	0	0	0	0	- / -
2014	-	-	-	-	-	-	-	-	- / -
2019	-	-	-	-	-	-	-	-	- / -
<b>Mahonia repens -- (creeping barberry)</b>									
2011	-	-	-	-	-	-	-	-	- / -
2014	-	-	-	-	-	-	-	-	- / -
2019	20	-	0	100	0	0	0	0	94/64
<b>Quercus gambelii<sup>p</sup> -- (Gambel oak)</b>									
2011	40	-	0	100	0	0	0	0	- / -
2014	40	-	0	100	0	0	0	0	- / -
2019	60	-	33	67	0	0	0	0	530/286
<b>Rosa woodsii<sup>p</sup> -- (Woods' rose)</b>									
2011	180	-	33	67	0	0	0	0	54/37
2014	260	-	0	100	0	0	0	0	52/28
2019	460	-	9	91	0	0	0	0	69/43
<b>Symphoricarpos oreophilus<sup>p</sup> -- (mountain snowberry)</b>									
2011	-	-	-	-	-	-	-	-	- / -
2014	8580	-	0	100	0	0	0	0	82/65
2019	9080	20	8	92	0	11	0	0	91/85

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

**Table 13R-05.13a - Aspen Characteristics.** Characteristics of aspen populations including density, size class distribution, and vigor of plants.

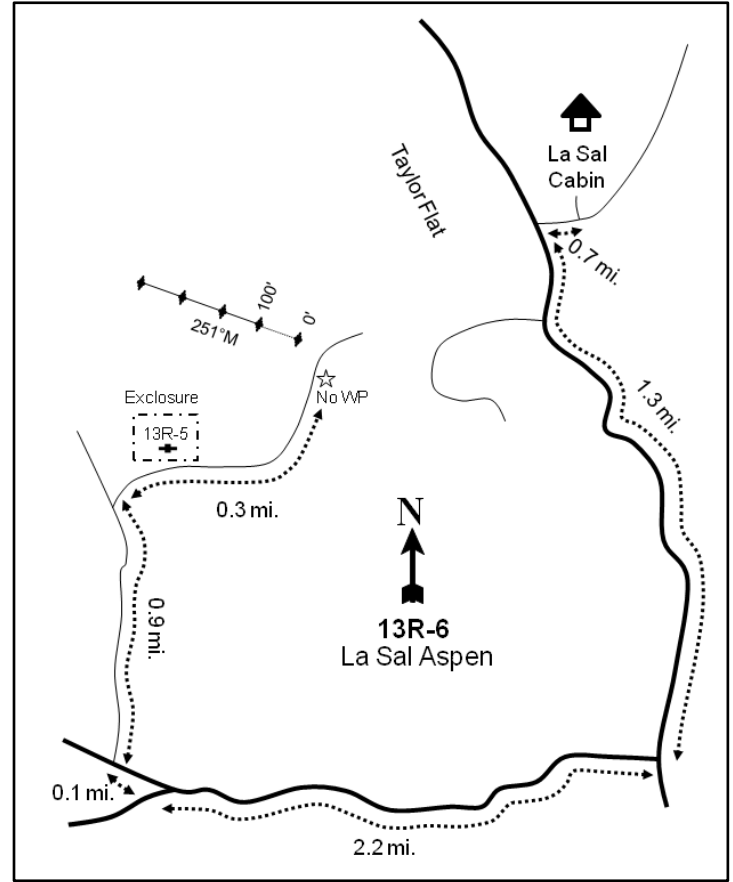
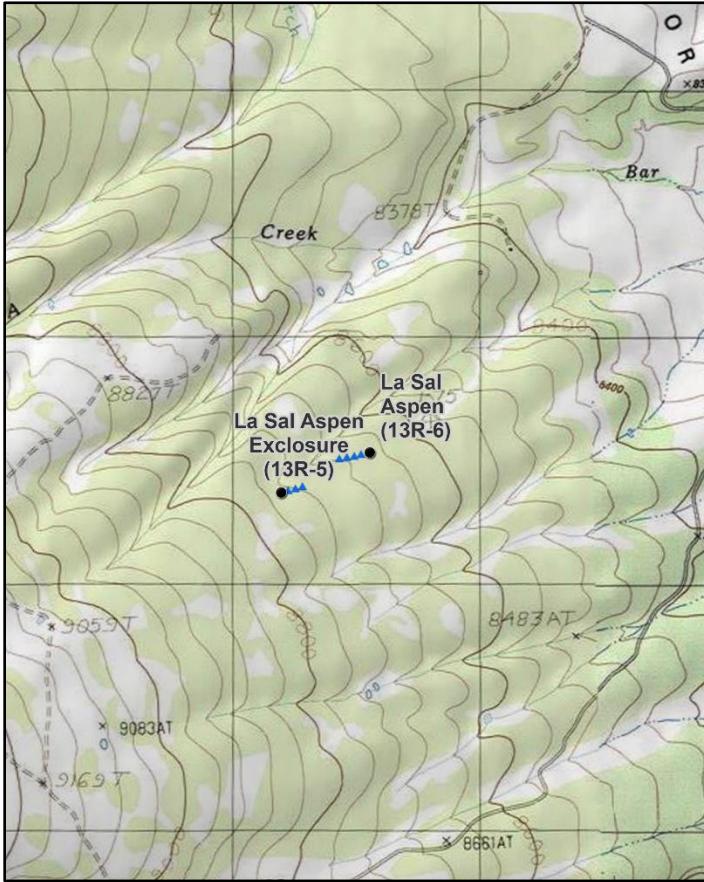
Year	Density	Size Class Distribution				Utilization		Poor Vigor (%)
	Plants per Acre	Class I (%)	Class II (%)	Class III (%)	Class IV (%)	Moderate (%)	Heavy (%)	
Populus tremuloides (quaking aspen)								
2011	4740	21	77	-	2	24	11	1
2014	10080	0	35	64	-	0	0	0
2019	8080	1	3	67	30	14	1	0

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 13R-05.14 - Tree Characteristics.** Point-quarter tree density, size class distribution, and average diameter.

Year	Density	Size Class Distribution					Average Diameter (cm)
	Trees per Acre	Seedling (%)	1-4' (%)	4-8' (%)	8-12' (%)	>12' (%)	
Populus tremuloides (quaking aspen)							
2011	44	-	-	-	-	100	39.1
2014	2156	-	40	55	5	-	2.0
2019	1231	-	5	21	53	21	3.5

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

**Location Information**

USGS 7.5 min Map Info  
GPS (0' Stake)

Mount Waas SE; Township 26S, Range 25E, Section 26  
NAD 83 UTM ZONE 12, 662507 East 4264723 North

**Transect Information**

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

**Directions to Site**

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

**Site Information**

Land Ownership	State
Land Administrator	SITLA
Allotment	No data
Elevation	8,593ft (2,619m)
Aspect	North
Slope	10%
Sample Dates	07/19/2011, 08/06/2014, 06/25/2019

**Table 13R-06.1 Disturbance History.** Recorded history of major disturbances.

Treatment/Disturbance	Name	WRI DB#	Date	Size (acres)
Logging - Logging/Clear-Cut	La Sal Mountain Aspen Enhancement	1990	September-November 2011	124

**Wildlife Habitat and Vegetation History****Table 13R-06.3 - Wildlife Seasonal Habitat.** UDWR wildlife habitat and seasonality.

Species	Habitat	Season
Mule Deer	crucial	summer
Rocky Mountain Elk	crucial	summer

**Table 13R-06.4 - Vegetation History.** The dominant vegetation type(s) and phase of woodland succession (Tausch, Miller, Roundy, & Chambers, 2009).

Year	Vegetation Type	Woodland Succession
2011	Aspen/Snowberry	NA
2014	Aspen/Snowberry	NA
2019	Aspen/Snowberry	NA

**Site Notes**

The study was established in 2011 to monitor an aspen regeneration project. Following the logging treatment, mountain snowberry (*Symphoricarpos oreophilus*) was planned to be thinned by a dozer or a skidsteer equipped with a brush rake. However, due to timing and limited access from winter storms, the snowberry was not thinned (WRI Database 2019). Three temporary fences were constructed in areas known to experience heavy browsing within the project. Exclosure size ranged from three to eight acres. The study is located outside of the exclosure portion of the project. Livestock grazing occurs from June 15 to Oct 20. Cattle, deer, and elk pellet groups were sampled in low abundance in 2011 and 2014. Cattle were present on the site at the time of sampling in 2011. It was noted that pellet groups were hard to see due to thick vegetation on the site. Density was not taken on snowberry in 2011 due to the large number of plants and the difficulty in distinguishing individual plants.

**Site Potential**

1981 - 2010 Average Annual Precipitation	25 inches
NRCS Ecological Site	High Mountain Loam (Aspen)
NRCS Ecological Site #	048AY506UT
States and Transitions	No state and transition model is available for this ecological site.

Upon study establishment in 2011, the plant community on this site existed as a mixed stand of quaking aspen (*Populus tremuloides*) and snowberry (*Symphoricarpos oreophilus*) with some Gambel oak (*Quercus gambelii*) present; there was also a small amount of Wood's rose (*Rosa woodsii*) observed (Table 13R-06.12). The herbaceous understory was abundant with the dominant grass being Kentucky bluegrass (*Poa pratensis*) (Table 13R-06.10). Forbs were abundant and diverse with Fendler's meadow-rue (*Thalictrum fendleri*), Nevada pea (*Lathyrus lanszwertii*), and Common yarrow (*Achillea millefolium*) as the dominant species (Table 13R-06.11). After the treatment, aspen cover initially decreased with a slight increase occurring in the 2019 sample year (Table 13R-06.12). In addition, the age class of the quaking aspen population has shifted, with the majority of the age class moving from Class I following treatment to most of the aspen trees being considered as Class III in the most recent sample year (Table 13R-06.13a).

**Trend Summary Tables**

**Table 13R-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
2011	24.8	0.0	2.4	38.4	-	17.5
2014	20.1	-	2.2	33.4	-	3.0
2019	28.8	-	4.6	39.5	-	9.9

**Table 13R-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
2011	-	409	21	383	-	35.5	0.3	46.9
2014	-	416	11	358	-	38.8	0.1	30.6
2019	-	382	51	342	-	23.6	0.8	29.6

**Table 13R-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
2011	0.8	0.1	49.8	-	-	82.4
2014	0.1	0.0	63.6	0.0	-	79.2
2019	2.3	-	70.3	0.1	0.1	72.4

**Table 13R-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
	Quadrat Frequency		
2011	1	-	-
2014	2	-	4
2019	5	2	16
Days Use Per Acre (ha)			
2011	8.7 (21.5)	0.7 (1.7)	2.0 (5.0)
2014	0.7 (1.8)	1.3 (3.3)	13.4 (33.1)
2019	13.8 (34.1)	4.7 (11.6)	27.5 (67.9)

**Table 13R-06.10 - Grass Species.** Nested frequency and modified Daubenmire average cover by year.

GRASS SPECIES	Nested Frequency								
	Achnatherum nelsonii (Columbia needlegrass)	Bromus inermis <sup>i</sup> (smooth brome)	Bromus marginatus (mountain brome)	Bromus porteri (Porter brome)	Carex (sedge)	Elymus trachycaulus (slender wheatgrass)	Festuca idahoensis (Idaho fescue)	Festuca thurberi (Thurber's fescue)	Poa pratensis <sup>i</sup> (Kentucky bluegrass)
year	Nested Frequency								
2011	82	6	24	35	11	91	7	28	374
2014	35	17	95	4	-	55	10	64	368
2019	17	20	48	22	39	44	1	20	347
year	Average Cover (%)								
2011	3.0	0.1	1.2	0.5	0.2	3.5	0.2	1.9	24.9
2014	1.3	0.3	3.6	0.1	-	2.0	0.1	5.0	26.3
2019	1.2	0.5	1.2	0.8	0.5	0.7	0.0	3.3	15.5

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

**Table 13R-06.11 - Forb Species.** Nested frequency and modified Daubenmire average cover by year.

FORB SPECIES	Achillea millefolium (Common yarrow)	Androsace septentrionalis <sup>ai</sup> (pygmyflower rockjasmine)	Artemisia ludoviciana (white sagebrush)	Calochortus gunnisonii (Gunnison's mariposa lily)	Chenopodium fremontii <sup>ai</sup> (Fremont's goosefoot)	Cirsium (thistle)	Dracocephalum parviflorum (American dragonhead)	Erigeron flagellaris (trailing fleabane)	Erigeron speciosus (aspen fleabane)	Galium <sup>a</sup> (bedstraw)	Grindelia squarrosa (curlycup gumweed)	Heracleum maximum (common cowparsnip)	Hymenoxys hoopesii (owl's-claws)	Lactuca serriola <sup>ai</sup> (prickly lettuce)	Lappula occidentalis <sup>a</sup> (flatspine stickseed)	Lathyrus lanszwertii (Nevada pea)	Lupinus sericeus (silky lupine)
year	Nested Frequency																
2011	204	3	-	-	8	1	-	2	-	12	-	10	-	-	-	232	14
2014	205	-	3	-	6	-	2	-	7	6	1	6	0	-	-	207	12
2019	131	-	-	2	44	5	3	-	-	4	-	15	21	1	2	190	13
year	Average Cover (%)																
2011	9.6	0.0	-	-	0.1	0.0	-	0.0	-	0.2	-	0.3	-	-	-	9.8	0.9
2014	11.1	-	0.0	-	0.0	-	0.0	-	0.3	0.1	0.0	0.1	0.0	-	-	6.5	0.9
2019	6.0	-	-	0.0	0.7	0.1	0.0	-	-	0.0	-	0.5	0.4	0.0	0.0	6.6	0.9

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

FORB SPECIES	Machaeranthera canescens (hoary tansyaster)	Potentilla gracilis (slender cinquefoil)	Pseudocymopterus montanus (alpine false springparsley)	Symphotrichum (aster)	Taraxacum officinale (common dandelion)	Thalictrum fendleri (Fendler's meadow-rue)	Tragopogon dubius <sup>ai</sup> (yellow salsify)	Vicia americana (American vetch)
year	Nested Frequency							
2011	-	-	3	12	34	257	-	138
2014	4	2	-	14	24	191	1	86
2019	-	2	21	59	89	120	2	63
year	Average Cover (%)							
2011	-	-	0.0	0.1	0.7	20.7	-	4.8
2014	0.0	0.0	-	0.4	0.2	9.6	0.0	1.5
2019	-	0.0	0.7	2.9	3.8	6.0	0.0	1.5

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

**Table 13R-06.12 - Shrub and Tree Species.** Average modified Daubenmire quadrat and line intercept cover by year.

SHRUB SPECIES	Line Intercept Cover (%)				
	Mahonia repens (creeping barberry)	Populus tremuloides <sup>i</sup> (quaking aspen)	Quercus gambelii <sup>p</sup> (Gambel oak)	Rosa woodsii <sup>p</sup> (Woods' rose)	Symphoricarpos oreophilus <sup>p</sup> (mountain snowberry)
year	Line Intercept Cover (%)				
2011	-	17.5	7.6	0.1	30.7
2014	-	3	3.1	-	30.3
2019	-	9.9	3.1	0.1	36.3
year	Quadrat Cover (%)				
2011	0.0	2.4	0.3	0.0	24.5
2014	-	2.2	0.9	0.1	19.1
2019	-	4.6	0.1	0.2	28.4

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

**Table 13R-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>Quercus gambelii<sup>p</sup> -- (Gambel oak)</b>									
2011	620	-	90	10	0	52	0	0	- / -
2014	760	-	100	0	0	0	92	0	- / -
2019	180	-	0	100	0	0	0	0	45/29
<b>Rosa woodsii<sup>p</sup> -- (Woods' rose)</b>									
2011	60	-	0	100	0	0	0	0	56/47
2014	120	-	0	100	0	33	0	0	72/42
2019	120	-	0	100	0	0	0	0	67/42
<b>Symphoricarpos oreophilus<sup>p</sup> -- (mountain snowberry)</b>									
2011	-	-	-	-	-	-	-	-	- / -
2014	6680	-	0	100	0	65	0	0	74/82
2019	4840	-	8	92	0	17	0	0	82/101

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

**Table 13R-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 (%)	
<b>Populus tremuloides (quaking aspen)</b>								
2011	1920	33	64	2	1	31	38	0
2014	2400	4	95	1	-	37	0	0
2019	1020	-	16	63	22	26	0	0

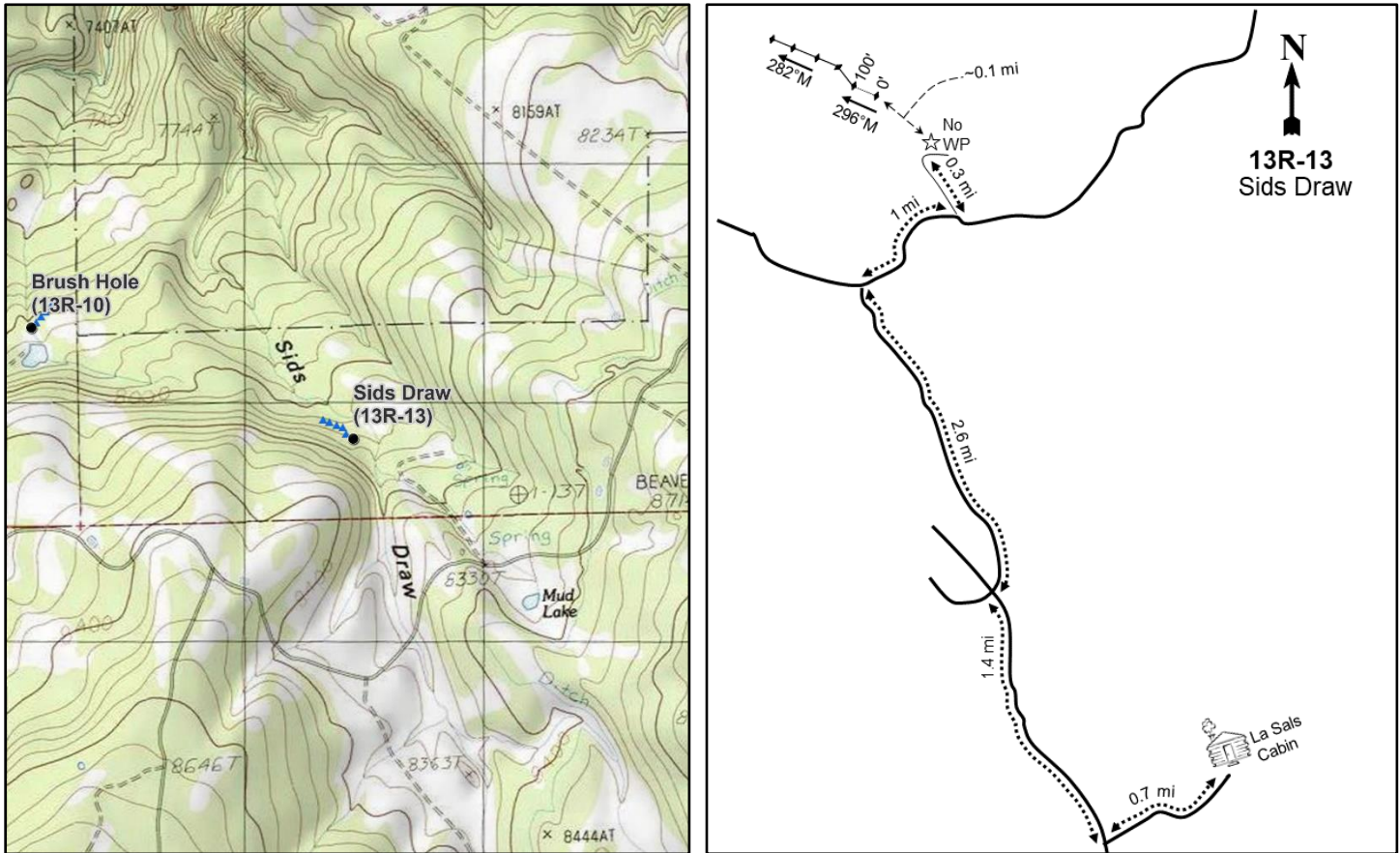
Class I - &lt;= 1.5 feet; Class II - &gt; 1.5 feet to 5 feet; Class III - &gt; 5 feet and up to 1 inch diameter at breast height (dbh); Class IV - &gt; 1 in diameter at breast height (dbh)



**Table 13R-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' (%)	
Populus tremuloides (quaking aspen)							
2011	33	-	-	-	-	100	39.2
2014	277	6	72	22	-	-	2.2
2019	175	-	17	72	11	-	4.3

## SIDS DRAW - STUDY NO. 13R-13



### Location Information

USGS 7.5 min Map Info  
GPS (0' Stake)

Mount Waas NE; Township 25S, Range 25E, Section 34  
NAD 83 UTM ZONE 12, 661405 East 4272048 North

### Transect Information

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

Not Available  
296° magnetic (Line 2: 331° magnetic, Lines 3-5: 282° 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 Moab, follow UT-128 along the Colorado River for 16 miles to the La Sal Loop Road and Castle Valley. Travel on the La Sal Loop Road for 10.7 miles to the junction of La Sal Loop Road and Mountain Loop Road, then continue left onto this main road. Proceed for approximately 7.6 miles to a "T" junction, and at this "T" turn right onto the Paradox Trail/Gateway Road. From this turn, follow the road through a winding section and pass by the Taylor Flat Road for 5.4 miles. There are two faint roads to the left (north): take the second of these roads and pass under the powerlines. Follow this road to an opening where you can park. The site is located roughly 1200 feet to the northwest in a dense oak stand. You will need to cross the draw, following game trails through the dense brush.

**Site Information**

Land Ownership	State
Land Administrator	SITLA
Allotment	No data
Elevation	8,120ft (2,475m)
Aspect	North
Slope	10-20%
Sample Dates	08/22/2019

**Table 13R-13.1 Disturbance History.** Recorded history of major disturbances.

Treatment/Disturbance	Name	WRI DB#	Date	Size (acres)
Mechanical - Bullhog	North End La Sal (Brush Hole Phase 4)	4837	Fall 2019	1247

**Wildlife Habitat and Vegetation History****Table 13R-13.3 - Wildlife Seasonal Habitat.** UDWR wildlife habitat and seasonality.

Species	Habitat	Season
Mule Deer	crucial	summer
Rocky Mountain Elk	crucial	summer

**Table 13R-13.4 - Vegetation History.** The dominant vegetation type(s) and phase of woodland succession (Tausch, Miller, Roundy, & Chambers, 2009).

Year	Vegetation Type	Woodland Succession
2019	Gambel Oak/Perennial Grass	Phase I

**Site Notes**

No Notes

**Site Potential**

1981 - 2010 Average Annual Precipitation	25 inches
NRCS Ecological Site	Mountain Loam (Oak)
NRCS Ecological Site #	R048AY415UT
States and Transitions	No state and transition model is available for this ecological site.

As of study establishment in 2019, this study is a Gambel oak (*Quercus gambelii*) ecological site with an abundant understory composed of perennial grasses and forbs. Perennial grass species are primarily native species with the exception of Kentucky bluegrass (*Poa pratensis*), which is the dominant species; sub-dominant in the understory are sedges (*Carex sp.*) (Table 13R-13.10). Perennial forbs are diverse and abundant with western sweetroot (*Osmorhiza occidentalis*) and tuber starwort (*Pseudostellaria jamesiana*) contributing the most forb cover (Table 13R-13.11). Browse species are abundant and contribute large amounts of cover: total preferred shrub cover is over one hundred percent due to the layering effect in the canopy. Gambel oak (*Quercus gambelii*) and mountain snowberry (*Symphoricarpos oreophilus*) are the dominant browse species and provide significant cover, although small amounts of chokecherry (*Prunus virginiana*), Utah serviceberry (*Amelanchier utahensis*), and Wood's rose (*Rosa woodsii*) are also present (Table 13R-13.6, Table 13R-13.12, Table 13R-13.13 ). In addition, a small number of quaking aspen (*Populus tremuloides*) and Rocky Mountain juniper (*Juniperus scopulorum*) were observed on the site as well (Table 13R-13.13a, Table 13R-13.14).

**Trend Summary Tables**

**Table 13R-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
2019	45.9	0.0	2.4	120.7	0.5	5.9

**Table 13R-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
2019	-	431	133	282	-	29.7	2.9	25.1

**Table 13R-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
2019	3.4	0.0	67.1	0.8	0.3	70.0

**Table 13R-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	Black Bear	Cattle	Mule Deer	Rocky Mountain Elk
	Quadrat Frequency			
2019	-	3	-	-
Year	Days Use Per Acre (ha)			
2019	8.7 (21.5)*	3.6 (9.0)	2.7 (6.6)	2.7 (6.6)

\*Pellets per acre (ha)

**Table 13R-13.10 - Grass Species.** Nested frequency and modified Daubenmire average cover by year.

GRASS SPECIES	Achmatherum nelsonii (Columbia needlegrass)	Bromus porteri (Porter brome)	Carex (sedge)	Carex obtusata (obtusate sedge)	Elymus elymoides (squirreltail)	Elymus trachycaulus (slender wheatgrass)	Festuca thurberi (Thurber's fescue)	Muhlenbergia richardsonis (mat muhly)	Poa pratensis <sup>a</sup> (Kentucky bluegrass)
year	Nested Frequency								
2019	17	50	198	4	4	5	0	5	345
year	Average Cover (%)								
2019	0.8	1.1	7.0	0.0	0.2	0.0	0.0	0.2	20.3

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

**Table 13R-13.11 - Forb Species.** Nested frequency and modified Daubenmire average cover by year.

FORB SPECIES	Nested Frequency																
Achillea millefolium (Common yarrow)	23	9	0	10	7	3	4	25	1	5	116	1	26	45	3	9	10
Arenaria (sandwort)																	
Calochortus nuttallii (sego lily)																	
Cerastium (mouse-ear chickweed)																	
Chenopodium fremontii <sup>a</sup> (Fremont's goosefoot)																	
Clematis hirsutissima (hairy clematis)																	
Collinsia parviflora <sup>a</sup> (maiden blue eyed Mary)																	
Erigeron (fleabane)																	
Eriogonum racemosum (redroot buckwheat)																	
Frasera speciosa (elkweed)																	
Galium <sup>b</sup> (bedstraw)																	
Hymenoxys hoopesii (owl's-claws)																	
Iris missouriensis (Rocky Mountain iris)																	
Lathyrus lanszwertii (Nevada pea)																	
Ligusticum (licorice-root)																	
Ligusticum porteri (Porter's licorice-root)																	
Lupinus argenteus (silvery lupine)																	
year	Average Cover (%)																
2019	0.9	0.7	0.0	0.2	0.2	0.1	0.0	1.1	0.1	0.4	2.7	0.3	1.5	2.1	0.0	1.4	2.0

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

FORB SPECIES	Nested Frequency									
Osmorhiza occidentalis (western sweetroot)	54	3	11	147	3	18	29	3	67	51
Phlox longifolia (longleaf phlox)										
Polygonum douglasii <sup>a</sup> (Douglas' knotweed)										
Pseudostellaria jamesiana (tuber starwort)										
Silene drummondii (Drummond's campion)										
Symphotrichum ascendens (western aster)										
Taraxacum officinale (common dandelion)										
Thalictrum fendleri (Fendler's meadow-rue)										
Vicia americana (American vetch)										
Viola (violet)										
year	Average Cover (%)									
2019	5.0	0.0	0.1	4.6	0.0	0.6	0.7	0.0	2.5	0.9

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

**Table 13R-13.12 - 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)	0.8	5.6	0.5	0.3	9.9	75.9	2.9	31.2
Juniperus scopulorum <sup>i</sup> (Rocky Mountain juniper)								
Mahonia repens (creeping barberry)								
Populus tremuloides <sup>i</sup> (quaking aspen)								
Prunus virginiana <sup>p</sup> (chokecherry)								
Quercus gambelii <sup>p</sup> (Gambel oak)								
Rosa woodsii <sup>p</sup> (Woods' rose)								
Symphoricarpos oreophilus <sup>p</sup> (mountain snowberry)								
year	Quadrat Cover (%)							
2019	0.5	2.3	0.0	0.1	3.1	13.1	1.9	27.4

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

**Table 13R-13.13 - Shrub/Tree Characteristics.** Population characteristics of shrub/tree species populations including density reproduction (seedlings), age distribution, utilization, vigor and average size (height/crown) of plants.

Year	Density		Age Class Distribution			Utilization		Poor Vigor (%)	Average Height Crown (cm)
	Plants Per Acre		Excluding Seedlings			Moderate (%)	Heavy (%)		
	Excluding Seedlings	Seedling	Young (%)	Mature (%)	Decadent (%)				
Amelanchier utahensis <sup>p</sup> -- (Utah serviceberry)									
2019	240	-	42	58	0	0	0	0	135/92
Chrysothamnus viscidiflorus ssp. viscidiflorus -- (yellow rabbitbrush)									
2019	-	-	-	-	-	-	-	-	75/93
Juniperus scopulorum <sup>t</sup> -- (Rocky Mountain juniper)									
2019	40	-	0	100	0	0	0	0	- / -
Mahonia repens -- (creeping barberry)									
2019	340	-	0	100	0	0	0	0	15/16
Prunus virginiana <sup>p</sup> -- (chokecherry)									
2019	2020	-	26	74	0	0	0	0	157/98
Quercus gambelii <sup>p</sup> -- (Gambel oak)									
2019	9040	-	59	39	2	9	0	1	157/92
Rosa woodsii <sup>p</sup> -- (Woods' rose)									
2019	1500	-	19	77	4	1	0	4	78/52
Symphoricarpos oreophilus <sup>p</sup> -- (mountain snowberry)									
2019	8520	-	12	86	1	1	0	1	59/67

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

**Table 13R-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)								
2019	100	-	100	-	-	100	0	0

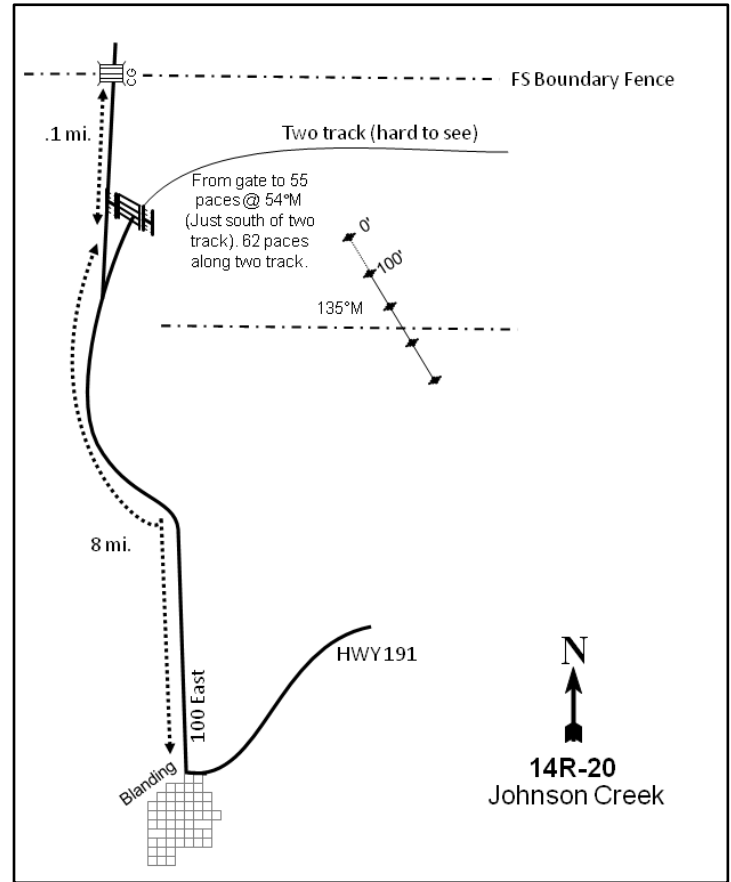
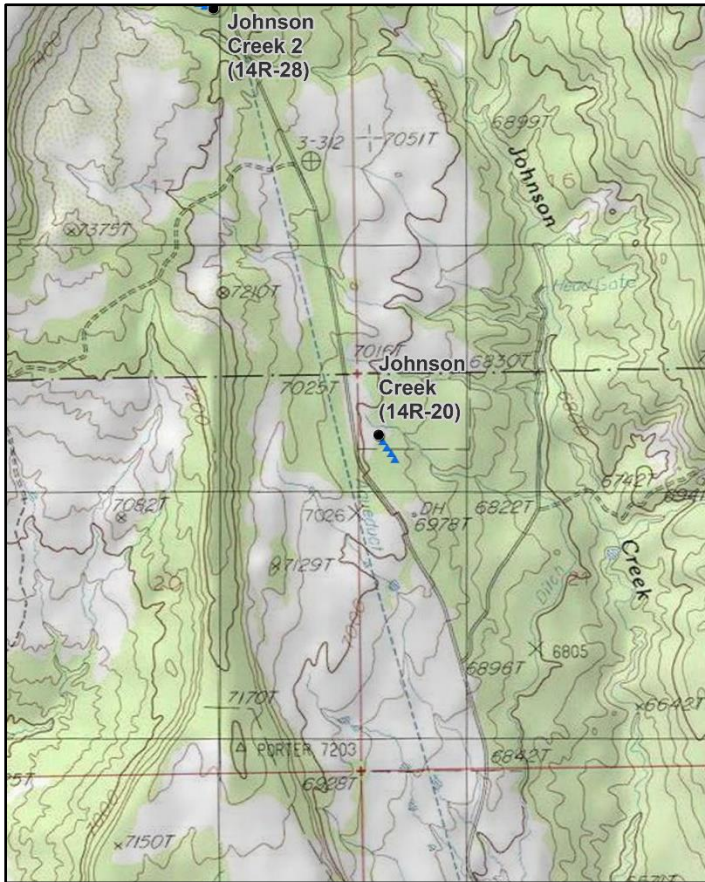
Class I - &lt;= 1.5 feet; Class II - &gt; 1.5 feet to 5 feet; Class III - &gt; 5 feet and up to 1 inch diameter at breast height (dbh); Class IV - &gt; 1 in diameter at breast height (dbh)

**Table 13R-13.14 - Tree Characteristics.** Point-quarter tree density, size class distribution, and average diameter.

Year	Density	Size Class Distribution					Average Diameter (cm)
	Trees per Acre	Seedling (%)	1-4' (%)	4-8' (%)	8-12' (%)	>12' (%)	
Juniperus scopulorum (Rocky Mountain juniper)							
2019	13	-	-	20	20	60	23.0



## JOHNSON CREEK - STUDY NO. 14R-20

**Location Information**

USGS 7.5 min Map Info  
GPS (0' Stake)

Mancos Jim Butte NE; Township 35S, Range 22E, Section 21  
NAD 83 UTM ZONE 12, 630588 East 4176434 North

**Transect Information**

Browse Tag # (0' Stake)	181
Transect Bearing	135° magnetic
Length	400ft
Belt Placement	Line 1 (11ft & 95ft), Line 2 (34ft), Line 3 (59ft), Line 4 (71ft)
Belt Marker Placement	No Rebar

**Directions to Site**

Travel south on Highway 191 to 100 East in Blanding. Turn right and travel north for about 8 miles to a cattle guard; there is a turnoff to the right 0.1 miles before reaching the cattle guard. Turn right, coming to a gate and a two-track after the gate. From the gate, walk 320 feet (55 paces) at 46 degrees magnetic to the 0-foot stake. The 0-foot stake is just south of the two-track and is marked with browse tag #181.



**Site Information**

Land Ownership	Federal
Land Administrator	BLM
Allotment	TANK BENCH BRUSHY BASIN
Elevation	7,000ft (2,134m)
Aspect	SE
Slope	7%
Sample Dates	06/12/2007, 06/15/2010, 06/25/2014, 06/17/2019

**Table 14R-20.1 Disturbance History.** Recorded history of major disturbances.

Treatment/Disturbance	Name	WRI DB#	Date	Size (acres)
Fire - Slash Pile	Johnson Creek	905	October 2007-May 2008	261
Hand Crew - Lop and Scatter	Johnson Creek	905	October 2007-May 2008	300
Seeding - Broadcast/Harrow	Johnson Creek	905	October 2007-May 2008	300

**Table 14R-20.2 Seed Mix.** List of known seeded plant species and rates (if available).

Mix Name		Application Type	Application Date	Acres	
Johnson Creek		Broadcast	Oct 2007	326	
Type	Species	Common Name	Cultivar/Source ID	Bulk lbs/acre	PLS
G	<i>Achnatherum hymenoides</i>	Indian Ricegrass	Rimrock	1.07	0.93
G	<i>Agropyron fragile</i>	Siberian Wheatgrass	Vavilov	2.45	2.12
G	<i>Elymus lanceolatus</i>	Thickspike Wheatgrass	Bannock	1.69	1.57
G	<i>Pascopyrum smithii</i>	Western Wheatgrass	Arriba	1.23	1.00
G	<i>Poa secunda</i>	Sandberg Bluegrass	Mountain Home ID	1.07	0.99
G	<i>Poa secunda</i>	Canby Bluegrass	Canbar	1.23	1.09
G	<i>Sporobolus cryptandrus</i>	Sand Dropseed		0.46	0.41
F	<i>Penstemon palmeri</i>	Palmer Penstemon	Carbon/Washington/Iron UT	0.15	0.12

**Wildlife Habitat and Vegetation History****Table 14R-20.3 - Wildlife Seasonal Habitat.** UDWR wildlife habitat and seasonality.

Species	Habitat	Season
Mule Deer	crucial	summer
Rocky Mountain Elk	crucial	winter

**Table 14R-20.4 - 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 Grass/Perennial Forb	Phase I
2014	Wyoming Big Sagebrush	Phase I
2019	Wyoming Big Sagebrush/Annual Grass/Perennial Forb	Phase I

**Site Notes**

The study was established to monitor a fuels reduction project. Following years of grazing management and fire suppression, twoneedle pinyon (*Pinus edulis*) and Utah juniper (*Juniperus osteosperma*) encroachment and growth created a closed canopy system that reduced the herbaceous understory. Following an extended drought, an infestation of bark beetles (*Ips sp.*) killed 40% of the twoneedle pinyon in the area.

**Soils****Table 14R-20.5 - Soil Analysis Data.** List of chemical and textural soil characteristics determined by laboratory analysis.

Texture	pH	%sand	%silt	%clay	%OM	PPM P	PPM K	ds/m	Sample Date
Loam	6.2	42.2	40.0	17.8	2.2	9.9	115.2	0.5	06/12/2007

**Site Potential**

1981 - 2010 Average Annual Precipitation	17 inches
NRCS Ecological Site	Upland Loam (Mountain Big Sagebrush)
NRCS Ecological Site #	R035XY308UT
States and Transitions	A defined state and transition model is available.

When this study was established in 2007, it was being encroached by twoneedle pinyon (*Pinus edulis*) and Utah juniper (*Juniperus osteosperma*) and was classified as being within Phase III of woodland succession. Other browse species were also present, but they

contributed little cover. Tree cover decreased following the lop and scatter treatment (Table 14R-20.1), but the site has remained in Phase I since 2010 (Table 14R-20.4, Table 14R-20.12, Table 14R-20.14). Wyoming big sagebrush (*Artemisia tridentata* ssp. *wyomingensis*) cover has increased since treatment and it became the dominant vegetation component in 2014 (Table 14R-20.12, Table 14R-20.13). Prior to treatment, the herbaceous understory was diverse and moderately abundant. The introduced annual grass species cheatgrass (*Bromus tectorum*) has fluctuated following treatment, but contributed the most herbaceous cover of any species in 2019: this increased amount may pose a threat to the resilience of the plant community. Other herbaceous components have exhibited overall increases in cover following treatment (Table 14R-20.7, Table 14R-20.10, Table 14R-20.11). According to the state and transition model, infilling by remaining pinyon and juniper could cause the site to again transition to a tree-dominated state in future sample years (Jornada, 2019).

### Trend Summary Tables

**Table 14R-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
2007	4.3	0.0	8.9	6.5	-	41.9
2010	5.1	-	0.7	5.4	0.1	9.1
2014	7.9	0.1	0.7	8.1	0.4	4.3
2019	14.4	0.0	0.8	23.7	-	2.8

**Table 14R-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
2007	310	82	329	118	4.0	1.2	3.8	4.5
2010	378	109	129	122	18.1	3.5	1.8	14.1
2014	298	161	176	248	7.0	4.0	4.6	6.2
2019	347	112	310	286	18.3	3.3	12.6	18.6

**Table 14R-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
2007	28.6	3.8	55.7	0.1	0.0	24.2
2010	15.4	-	60.6	-	-	41.2
2014	27.2	0.0	52.6	0.0	-	32.8
2019	27.9	-	36.5	0.1	0.0	55.8

**Table 14R-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			
2007	9	1	1	82
2010	5	5	1	2
2014	6	6	6	46
2019	10	1	-	5
Year	Days Use Per Acre (ha)			
2007	27.6 (68.1)	11.4 (28.1)	0.7 (1.7)	-
2010	10.9 (26.9)	8.7 (21.5)	2.0 (5.0)	-
2014	1.5 (3.6)	0.7 (1.7)	-	-
2019	25.4 (62.8)	4.7 (11.6)	2.7 (6.6)	-

**Table 14R-20.10 - 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)	Pascopyrum smithii (western wheatgrass)	Poa bulbosa <sup>i</sup> (bulbous bluegrass)	Poa fendleriana (muttongrass)	Poa pratensis <sup>i</sup> (Kentucky bluegrass)	Poa secunda (Sandberg bluegrass)	Sporobolus cryptandrus (sand dropseed)	Vulpia octoflora <sup>a</sup> (sixweeks fescue)
year	Nested Frequency														
2007	9	-	10	257	0	23	-	-	-	-	-	3	44	-	154
2010	4	21	6	378	-	48	19	-	5	-	-	3	21	-	-
2014	1	11	25	294	-	42	53	7	26	-	-	14	22	3	44
2019	3	7	11	329	-	24	26	4	27	0	7	2	0	12	59
year	Average Cover (%)														
2007	0.2	-	0.0	3.1	0.0	0.1	-	-	-	-	-	0.0	0.8	-	0.9
2010	0.2	0.6	0.2	18.1	-	1.0	0.5	-	0.0	-	-	0.1	1.0	-	-
2014	0.0	0.0	0.7	6.9	-	0.8	1.6	0.1	0.1	-	-	0.3	0.3	0.0	0.1
2019	0.0	0.4	0.4	17.9	-	0.6	0.6	0.2	0.7	0.0	0.1	0.0	0.0	0.3	0.4

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

**Table 14R-20.11 - Forb Species.** Nested frequency and modified Daubenmire average cover by year.

FORB SPECIES	Allium (onion)	Alyssum desertorum <sup>ai</sup> (desert madwort)	Arabis (rockcress)	Astragalus (milkvetch)	Astragalus calycosus (Torrey's milkvetch)	Astragalus convallarius (lesser rushy milkvetch)	Calochortus nuttallii (sego lily)	Ceratocephala testiculata <sup>ai</sup> (curvedseed butterwort)	Chenopodium fremontii <sup>a</sup> (Fremont's goosefoot)	Chenopodium leptophyllum <sup>a</sup> (narrowleaf goosefoot)	Cirsium (thistle)	Collinsia parviflora <sup>a</sup> (maiden blue eyed Mary)	Comandra umbellata (bastard toadflax)	Cryptantha (cryptantha)	Cryptantha bakeri <sup>a</sup> (Baker's cryptantha)	Descurainia pinnata <sup>a</sup> (western tansymustard)	Draba <sup>a</sup> (draba)
year	Nested Frequency																
2007	-	-	16	3	-	20	2	240	-	-	-	131	-	14	-	14	151
2010	3	-	-	13	-	9	-	43	6	-	3	5	2	7	-	6	-
2014	-	5	-	3	12	6	-	9	3	-	-	1	-	20	1	14	13
2019	5	0	12	-	10	17	-	66	44	11	3	43	4	-	2	48	88
year	Average Cover (%)																
2007	-	-	0.0	0.0	-	0.2	0.0	2.6	-	-	-	0.6	-	0.0	-	0.1	0.4
2010	0.0	-	-	0.3	-	0.4	-	0.4	0.0	-	0.1	0.1	0.0	0.3	-	0.0	-
2014	-	0.0	-	0.0	0.0	0.0	-	0.0	0.0	-	-	0.0	-	0.1	0.1	0.2	0.1
2019	0.0	0.0	0.1	-	0.0	0.1	-	0.2	0.3	0.0	0.0	0.7	0.0	-	0.0	0.7	0.6

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

FORB SPECIES	Erigeron (fleabane)	Eriogonum (buckwheat)	Eriogonum racemosum (redroot buckwheat)	Erodium cicutarium <sup>ai</sup> (redstem stork's bill)	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)	Lepidium <sup>a</sup> (pepperweed)	Lupinus argenteus (silvery lupine)	Machaeranthera grindelioides (rayless tansyaster)	Medicago sativa <sup>i</sup> (alfalfa)	Mentzelia albicaulis <sup>a</sup> (whitestem blazingstar)	Microsteris gracilis <sup>a</sup> (slender phlox)	Oenothera (evening primrose)	Packera multilobata (lobeleaf groundsel)	Pedicularis centranthera (dwarf lousewort)
year	Nested Frequency																
2007	-	-	1	3	-	2	-	14	-	68	-	-	-	-	-	-	14
2010	3	4	6	3	7	13	9	29	-	81	5	-	-	13	-	-	-
2014	150	10	-	33	-	3	1	104	-	94	17	-	4	24	4	1	7
2019	221	7	-	76	21	59	6	147	8	79	47	1	-	111	5	14	2
year	Average Cover (%)																
2007	-	-	0.0	0.0	-	0.0	-	0.0	-	3.6	-	-	-	-	-	-	0.5
2010	0.0	0.0	0.0	0.0	0.0	0.1	0.0	0.3	-	12.6	0.0	-	-	0.0	-	-	-
2014	0.8	0.0	-	0.4	-	0.0	0.0	0.6	-	5.0	0.0	-	0.0	0.1	0.1	0.0	0.1
2019	2.6	0.1	-	1.7	0.2	0.8	0.1	4.9	0.0	15.2	0.3	0.0	-	1.8	0.0	0.1	0.0

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

FORB SPECIES	Penstemon palmeri (Palmer's penstemon)	Phlox longifolia (longleaf phlox)	Plantago patagonica <sup>a</sup> (woolly plantain)	Polygonum douglasii <sup>a</sup> (Douglas' knotweed)	Salsola tragus <sup>ai</sup> (prickly Russian thistle)	Schoenocrambe limifolia (flaxleaf plainsmustard)	Silene antirrhina <sup>a</sup> (sleepy silene)	Sphaeralcea coccinea (scarlet globemallow)	Tragopogon dubius <sup>ai</sup> (yellow salsify)	Verbascum thapsus <sup>ai</sup> (common mullein)
year	Nested Frequency									
2007	5	10	-	9	2	-	1	-	1	-
2010	3	5	-	28	-	0	7	-	-	22
2014	10	9	-	5	-	-	2	-	-	38
2019	4	6	5	44	-	-	2	2	-	15
year	Average Cover (%)									
2007	0.0	0.0	-	0.0	0.0	-	0.0	-	0.0	-
2010	0.0	0.0	-	0.1	-	0.0	0.1	-	-	0.5
2014	0.0	0.0	-	0.0	-	-	0.0	-	-	3.1
2019	0.1	0.0	0.0	0.4	-	-	0.0	0.0	-	0.0

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

**Table 14R-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 tridentata ssp. vaseyana <sup>p</sup> (mountain big sagebrush)	Gutierrezia sarothrae (broom snakeweed)	Juniperus osteosperma <sup>i</sup> (Utah juniper)	Opuntia fragilis (brittle pricklypear)	Pinus edulis <sup>i</sup> (twoneedle pinyon)	Quercus gambelii <sup>p</sup> (Gambel oak)
year	Line Intercept Cover (%)						
2007	3.9	0.6	-	15.9	0	26	2
2010	1.8	1.8	-	3	0.1	6.1	1.8
2014	1.1	6.7	-	0.9	0.4	3.4	0.3
2019	5.2	11	-	0.7	-	2.1	7.5
year	Quadrat Cover (%)						
2007	2.6	1.1	-	3.9	0.0	5.0	0.6
2010	1.0	3.2	-	0.0	0.0	0.7	0.9
2014	0.3	7.6	-	0.2	0.1	0.5	0.0
2019	3.1	10.4	0.0	0.4	0.0	0.4	0.8

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

**Table 14R-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>									
2007	320	60	25	69	6	0	38	13	160/158
2010	280	-	36	64	0	29	36	0	113/125
2014	200	-	20	80	0	30	30	0	71/81
2019	160	-	13	88	0	50	13	0	106/123
<b>Artemisia tridentata ssp. vaseyana<sup>p</sup> -- (mountain big sagebrush)</b>									
2007	700	200	6	17	77	54	23	69	49/65
2010	700	3020	20	80	0	29	11	0	48/66
2014	4160	80	33	67	0	47	0	1	42/57
2019	3120	-	39	58	4	5	0	4	58/80
<b>Gutierrezia sarothrae -- (broom snakeweed)</b>									
2007	-	-	-	-	-	-	-	-	-/-
2010	-	-	-	-	-	-	-	-	-/-
2014	-	-	-	-	-	-	-	-	-/-
2019	20	100	0	100	0	0	0	0	28/25
<b>Juniperus osteosperma<sup>i</sup> -- (Utah juniper)</b>									
2007	320	-	25	75	0	0	0	6	-/-
2010	120	-	83	17	0	0	0	0	-/-
2014	100	-	80	20	0	0	0	0	-/-
2019	40	-	50	50	0	0	0	0	-/-
<b>Opuntia fragilis -- (brittle pricklypear)</b>									
2007	160	-	50	25	25	0	0	38	7/27
2010	60	-	0	100	0	0	0	33	6/17
2014	240	-	17	83	0	0	0	0	8/17
2019	40	-	50	50	0	0	0	0	8/16

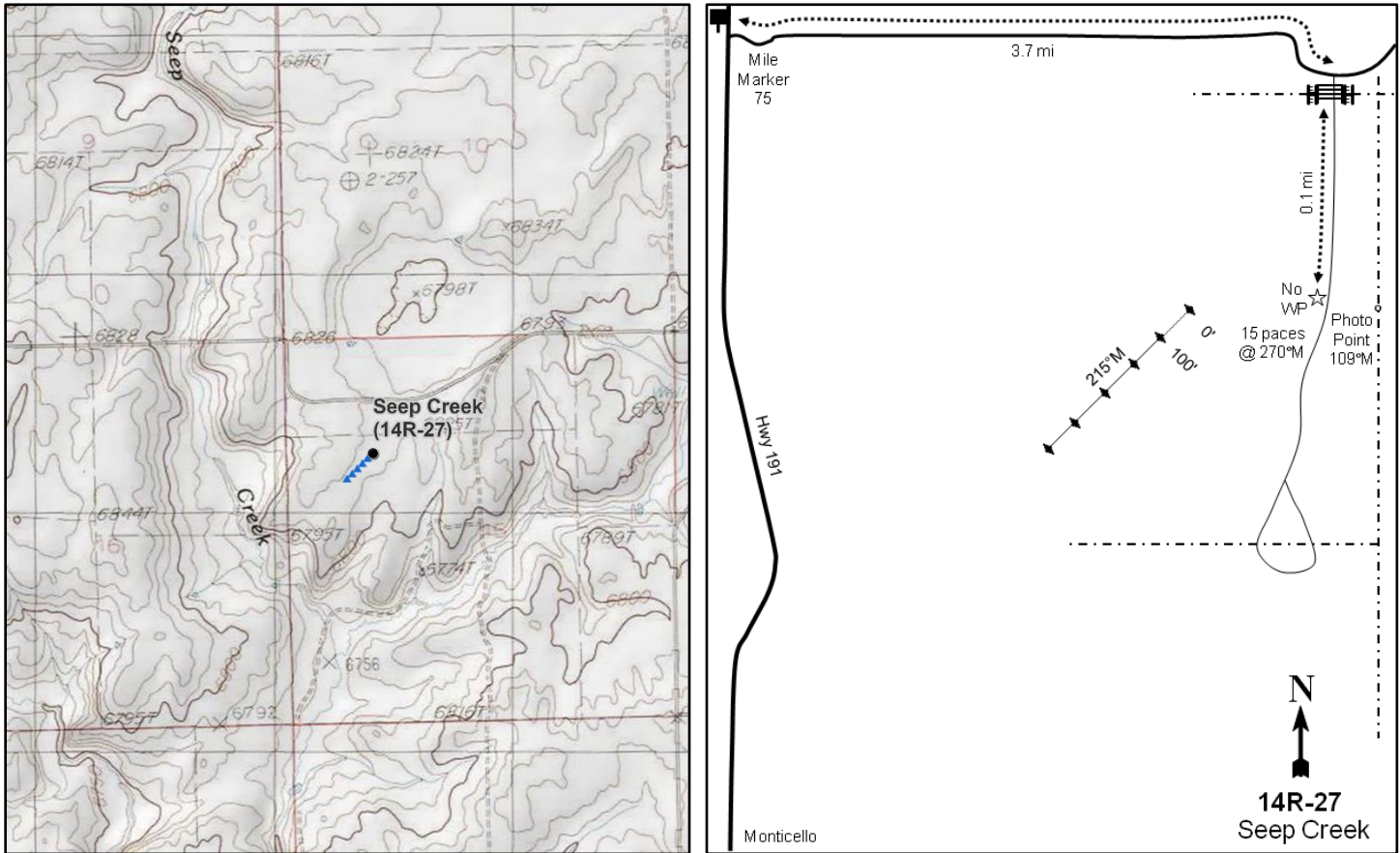
Year	Density		Age Class Distribution			Utilization		Poor Vigor (%)	Average Height Crown (cm)
	Plants Per Acre		Excluding Seedlings			Moderate (%)	Heavy (%)		
	Excluding Seedlings	Seedling	Young (%)	Mature (%)	Decadent (%)				
<b>Peraphyllum ramosissimum<sup>p</sup> -- (wild crab apple)</b>									
2007	-	-	-	-	-	-	-	-	-/-
2010	-	-	-	-	-	-	-	-	-/-
2014	-	-	-	-	-	-	-	-	52/138
2019	-	-	-	-	-	-	-	-	112/155
<b>Pediocactus simpsonii -- (mountain ball cactus)</b>									
2007	-	-	-	-	-	-	-	-	6/11
2010	40	-	100	0	0	0	0	0	4/9
2014	-	-	-	-	-	-	-	-	-/-
2019	-	-	-	-	-	-	-	-	-/-
<b>Pinus edulis<sup>t</sup> -- (twoneedle pinyon)</b>									
2007	460	180	56	39	4	0	0	4	- / -
2010	60	40	67	33	0	0	0	0	- / -
2014	140	20	86	14	0	0	0	0	- / -
2019	120	-	100	0	0	0	0	0	- / -
<b>Quercus gambelii<sup>p</sup> -- (Gambel oak)</b>									
2007	660	20	39	55	6	0	0	6	294/201
2010	340	-	53	47	0	0	0	0	51/120
2014	60	-	100	0	0	0	0	0	205/235
2019	1300	20	92	8	0	6	0	0	157/90
<b>Tetradymia canescens -- (spineless horsebrush)</b>									
2007	-	-	-	-	-	-	-	-	29/48
2010	-	-	-	-	-	-	-	-	-/-
2014	-	-	-	-	-	-	-	-	34/39
2019	-	-	-	-	-	-	-	-	65/118

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

**Table 14R-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>							
2007	112	-	11	6	44	39	17.6
2010	25	27	64	-	-	9	6.5
2014	57	20	80	-	-	-	3.2
2019	51	13	44	31	6	6	6.6
<b>Pinus edulis (twoneedle pinyon)</b>							
2007	431	35	20	15	20	10	5.5
2010	57	27	40	7	7	20	8.0
2014	53	19	63	6	-	13	6.4
2019	57	5	70	10	-	15	8.0

## SEEP CREEK - STUDY NO. 14R-27

**Location Information**

USGS 7.5 min Map Info  
GPS (0' Stake)

Monticello North SE; Township 33S, Range 24E, Section 15  
NAD 83 UTM ZONE 12, 651361 East 4197447 North

**Transect Information**

Browse Tag # (0' Stake)	573
Transect Bearing	215° magnetic
Length	500ft
Belt Placement	Line 1 (11ft), Line 2 (34ft), Line 3 (59ft), Line 4 (71ft), Line 5 (95ft)
Belt Marker Placement	Standard

**Directions to Site**

Drive from mile marker 75 on Highway 191 and proceed east on a gravel road for 3.7 miles. Turn right (south), pass through a gate, and continue for 0.1 miles; there is no witness post. The transect is on the right approximately 100 feet to the west in an old agricultural field. The 0-foot stake is marked with browse tag #573.



**Site Information**

Land Ownership	Private
Land Administrator	Private
Allotment	No data
Elevation	6,824ft (2,080m)
Aspect	South
Slope	3%
Sample Dates	06/21/2012, 08/31/2015, 06/18/2019

**Table 14R-27.1 Disturbance History.** Recorded history of major disturbances.

Treatment/Disturbance	Name	WRI DB#	Date	Size (acres)
Herbicide - Plateau	Seep Creek Sagebrush and Wet Meadow Enhancement	2325	November 2012	130
Mechanical - Disk	Seep Creek Sagebrush and Wet Meadow Enhancement	2325	November 2012	130
Seeding - Rangeland Drill	Seep Creek Sagebrush and Wet Meadow Enhancement	2325	November 2012	130
Seeding - Transplant	Seep Creek Sagebrush and Wet Meadow Enhancement	2325	March 2013	130
Seeding - Transplant	Seep Creek Sagebrush and Wet Meadow Enhancement	2325	April 2014	130
Seeding - Rangeland Drill	Seep Creek Sagebrush and Wet Meadow Enhancement	2325	September 2013	130

**Table 14R-27.2 Seed Mix.** List of known seeded plant species and rates (if available).

Mix Name			Application Type	Application Date	Acres
Seep Creek Sagebrush and Wet Meadow Enhancement			Drill	Nov 2012	130
Type	Species	Common Name	Cultivar/Source ID	Bulk lbs/acre	PLS
G	<i>Achnatherum hymenoides</i>	Indian Ricegrass	Emery UT	1.35	1.03
G	<i>Elymus elymoides</i>	Bottlebrush Squirreltail	Fish Creek	0.69	0.53
G	<i>Hesperostipa comata</i>	Needle and Threadgrass	Duchesne UT	0.19	0.14
G	<i>Leymus cinereus</i>	Great Basin Wildrye	Trailhead	0.77	0.71
G	<i>Pascopyrum smithii</i>	Western Wheatgrass	Arriba	1.15	0.97
G	<i>Pleuraphis jamesii</i>	Galleta		0.38	0.23
G	<i>Pseudoroegneria spicata</i>	Bluebunch Wheatgrass	P-7	0.38	0.34
G	<i>Pseudoroegneria spicata</i>	Bluebunch Wheatgrass	Anatone	0.38	0.38
F	<i>Achillea millefolium</i>	Western Yarrow	Eagle Mountain	0.01	0.01
F	<i>Achillea millefolium</i>	Western Yarrow	Eagle	0.08	0.07
F	<i>Linum perenne</i>	Blue Flax	Appar	0.38	0.34
F	<i>Onobrychis viciifolia</i>	Sainfoin	Eski	0.50	0.39
F	<i>Sanguisorba minor</i>	Small Burnet	Delar	1.15	1.03
F	<i>Sphaeralcea coccinea</i>	Scarlet Globemallow		0.19	0.12
F	<i>Trifolium fragiferum</i>	Strawberry Clover		0.50	0.40

Mix Name			Application Type	Application Date	Acres
Seep Creek Sagebrush and Wet Meadow Enhancement - Fluffy Mix			Drill	Nov 2012	130
Type	Species	Common Name	Cultivar/Source ID	Bulk lbs/acre	PLS
F	<i>Medicago sativa</i>	Alfalfa	Nomad	0.50	0.45
S	<i>Artemisia tridentata</i> ssp. <i>wyomingensis</i>	Wyoming Big Sagebrush	Sevier UT	0.92	0.19

Mix Name			Application Type	Application Date	Acres
The Nature Conservancy Mix			Drill	Oct 2013	130
Type	Species	Common Name	Cultivar/Source ID	Bulk lbs/acre	PLS
G	<i>Achnatherum hymenoides</i>	Indian Ricegrass		1.25	0.00
G	<i>Elymus elymoides</i>	Bottlebrush Squirreltail		0.70	0.00
G	<i>Hesperostipa comata</i>	Needle and Threadgrass		0.20	0.00
G	<i>Leymus cinereus</i>	Great Basin Wildrye		0.75	0.00
G	<i>Pascopyrum smithii</i>	Western Wheatgrass		1.00	0.00
G	<i>Pleuraphis jamesii</i>	Galleta		0.40	0.00
G	<i>Pseudoroegneria spicata</i>	Bluebunch Wheatgrass		0.75	0.00
F	<i>Achillea millefolium</i>	Western Yarrow		0.10	0.00
F	<i>Linum perenne</i>	Blue Flax		0.50	0.00
F	<i>Onobrychis viciifolia</i>	Sainfoin		0.50	0.00
F	<i>Sanguisorba minor</i>	Small Burnet		1.00	0.00
F	<i>Sphaeralcea coccinea</i>	Scarlet Globemallow		0.25	0.00
F	<i>Trifolium fragiferum</i>	Strawberry Clover		0.50	0.00
S	<i>Artemisia tridentata</i> ssp. <i>wyomingensis</i>	Wyoming Big Sagebrush		1.00	0.00
S	<i>Krascheninnikovia lanata</i>	Winterfat		1.00	0.00

Mix Name			Application Type	Application Date	Acres
DWR, TNC and USFWS staff and volunteers Bareroot Planting			Seedling Transplant	Mar 2013	
Type	Species	Common Name	Cultivar/Source ID	Bulk lbs/acre	PLS
	<i>Artemisia tridentata</i>	Big Sagebrush		NaN	NaN

Mix Name			Application Type	Application Date	Acres
DWR, TNC and volunteers Bareroot Planting			Seedling Transplant	Apr 2014	
Type	Species	Common Name	Cultivar/Source ID	Bulk lbs/acre	PLS
	<i>Artemisia tridentata</i>	Big Sagebrush		NaN	NaN

### Wildlife Habitat and Vegetation History

**Table 14R-27.3 - Wildlife Seasonal Habitat.** UDWR wildlife habitat and seasonality.

Species	Habitat	Season
Mule Deer	crucial	spring/fall

**Table 14R-27.4 - Vegetation History.** The dominant vegetation type(s) and phase of woodland succession (Tausch, Miller, Roundy, & Chambers, 2009).

Year	Vegetation Type	Woodland Succession
2012	Annual Grass-Forb	No Encroachment
2015	Annual Grass-Forb	No Encroachment
2019	Annual Grass-Forb	No Encroachment

### Site Notes

In the fall of 2012, approximately 130 acres were sprayed with Plateau (Imazapic) herbicide, disked, and drill seeded with grass and forb species and Wyoming big sagebrush (*Artemisia tridentata* ssp. *wyomingensis*) (Table 14R-27.2). In the spring of 2013, approximately 5,240 bareroot plugs of sagebrush stock were planted on 40 acres. In the fall of 2013, the site was reseeded with a seed mix recommended by the NRCS because the first seeding appeared to not have been successful: this seed mix is not available, but is said to be similar to the first. In addition, in April of 2014, approximately 10,000 bareroot sagebrush plugs were planted to improve the bareroot plantings from 2013.

### Site Potential

1981 - 2010 Average Annual Precipitation	15 inches
NRCS Ecological Site	Upland Loam (Mountain Big Sagebrush)
NRCS Ecological Site #	R035XY308UT
States and Transitions	A defined state and transition model is available.

Since study establishment in 2012, this site has remained in an annual grass-forb community type. The annual grass species cheatgrass (*Bromus tectorum*) and cereal rye (*Secale cereale*) and the annual forb redstem stork's bill (*Erodium cicutarium*) are the dominant species as of 2019 (Table 14R-27.10, Table 14R-27.11), although restoration seedings have tried to increase desired rangeland species (Table 14R-27.1). Shrubs have remained rare following treatment, but mountain big sagebrush (*Artemisia tridentata* ssp. *vaseyana*) has been sampled in low abundance following the seeding and plantings. Although the state and transition

model does not define a transition pathway (Jornada, 2019), slight increases in sagebrush cover and density (Table 14R-27.12, Table 14R-27.13) indicate that this site may have the potential to transition to a sagebrush-dominated state in the future.

### Trend Summary Tables

**Table 14R-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
2012	-	-	-	-	-	-
2015	0.4	0.0	-	0.2	-	-
2019	3.0	-	-	1.7	-	-

**Table 14R-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
2012	389	2	266	88	23.5	0.0	15.3	2.0
2015	434	14	389	121	31.3	1.0	27.7	2.9
2019	412	64	445	194	17.9	1.6	35.9	10.1

**Table 14R-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
2012	47.7	-	14.0	-	2.7	45.8
2015	26.0	0.0	36.9	0.0	0.4	58.1
2019	29.0	0.2	36.4	0.3	0.7	56.2

**Table 14R-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	Coyote	Mule Deer/Domestic Sheep	Rabbit
	Quadrat Frequency			
2012	-	-	-	2
2015	2	-	2	24
2019	7	-	25	74
Days Use Per Acre (ha)				
2012	-	8.7 (21.5)*	0.7 (1.7)	-
2015	2.2 (5.4)	-	10.0 (24.8)	-
2019	13.8 (34.1)	-	12.1 (29.8)	-

\*Pellets per acre (ha)

**Table 14R-27.10 - 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)	Hesperostipa comata (needle and thread)	Muhlenbergia richardsonis (mat muhly)	Pascopyrum smithii (western wheatgrass)	Psathyrostachys juncea <sup>i</sup> (Russian wildrye)	Secale cereale <sup>ai</sup> (cereal rye)	Sporobolus cryptandrus (sand dropseed)	Triticum aestivum <sup>ai</sup> (common wheat)
year	Nested Frequency									
2012	2	344	-	-	-	-	-	111	-	65
2015	7	417	1	1	-	5	-	190	4	-
2019	6	410	7	3	9	29	9	174	7	1
year	Average Cover (%)									
2012	0.0	15.0	-	-	-	-	-	7.9	-	0.6
2015	0.3	25.1	0.1	0.1	-	0.2	-	6.2	0.2	-
2019	0.3	14.0	0.0	0.0	0.5	0.6	0.2	3.9	0.0	0.0

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

**Table 14R-27.11 - Forb Species.** Nested frequency and modified Daubenmire average cover by year.

FORB SPECIES	Achillea millefolium (Common yarrow)	Androsace septentrionalis <sup>a</sup> (pygmyflower rockjasmine)	Camelina microcarpa <sup>ai</sup> (littledod false flax)	Ceratocephala testiculata <sup>ai</sup> (curvseed butterwort)	Chenopodium fremontii <sup>a</sup> (Fremont's goosefoot)	Cirsium (thistle)	Cirsium undulatum <sup>a</sup> (wavyleaf thistle)	Convolvulus arvensis <sup>ai</sup> (field bindweed)	Descurainia pinnata <sup>a</sup> (western tansymustard)	Descurainia sophia <sup>ai</sup> (herb sophia)	Erodium cicutarium <sup>ai</sup> (redstem stork's bill)	Helianthus annuus <sup>a</sup> (common sunflower)	Heterotheca villosa (hairy false goldenaster)	Lactuca serriola <sup>ai</sup> (prickly lettuce)	Lappula occidentalis <sup>a</sup> (flatspine stickseed)	Machaeranthera canescens (hoary tansyaster)	Medicago sativa <sup>i</sup> (alfalfa)
year	Nested Frequency																
2012	-	-	24	26	2	-	-	87	33	31	36	1	-	26	-	-	-
2015	2	-	-	-	28	-	-	103	3	-	37	4	-	1	-	5	0
2019	6	1	-	30	4	3	2	147	60	-	417	-	2	35	45	8	3
year	Average Cover (%)																
2012	-	-	0.6	0.2	0.0	-	-	2.0	0.8	1.1	2.0	0.0	-	0.2	-	-	-
2015	0.3	-	-	-	0.3	-	-	2.3	0.0	-	0.1	0.0	-	0.0	-	0.1	0.0
2019	0.5	0.0	-	0.1	0.0	0.0	0.0	8.8	0.7	-	27.5	-	0.1	0.1	0.6	0.0	0.0

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

FORB SPECIES	Nested Frequency														
year	Average Cover (%)														
Microsteris gracilis <sup>a</sup> (slender phlox)	2	29	-	-	6	-	-	61	-	167	4	-	-	-	
Oenothera pallida <sup>a</sup> (pale evening primrose)	-	20	4	-	7	-	4	378	5	22	5	-	4	20	
Onobrychis vicifolia <sup>i</sup> (sainfoin)	4	49	-	1	35	8	-	71	3	266	22	2	2	-	
Orobanche fasciculata (clustered broomrape)	0.1	0.2	-	-	0.0	-	-	0.9	-	9.3	0.0	-	-	-	
Polygonum aviculare <sup>i</sup> (prostrate knotweed)	-	0.3	0.1	-	0.0	-	0.0	25.8	0.1	0.8	0.0	-	0.0	0.4	
Polygonum douglasii <sup>a</sup> (Douglas' knotweed)	0.0	0.8	-	0.0	0.1	0.0	-	0.2	0.0	5.9	0.3	0.1	0.0	-	
Portulaca oleracea <sup>ai</sup> (little hogweed)															
Salsola tragus <sup>ai</sup> (prickly Russian thistle)															
Sanguisorba minor <sup>i</sup> (small burnet)															
Sisymbrium altissimum <sup>ai</sup> (tall tumblemustard)															
Sphaeralcea coccinea (scarlet globemallow)															
Taraxacum officinale (common dandelion)															
Trifolium (clover)															
Verbesina encelioides <sup>ai</sup> (golden crownbeard)															

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

**Table 14R-27.12 - 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)	0.2	-
	1.7	-
year	Quadrat Cover (%)	
2012	-	-
2015	0.4	0.0
2019	3.0	-

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

**Table 14R-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 tridentata ssp. vaseyana<sup>p</sup> -- (mountain big sagebrush)</b>									
2012	-	-	-	-	-	-	-	-	90/172
2015	320	-	56	44	0	0	0	0	36/34
2019	380	13820	21	79	0	11	0	0	51/62
<b>Chrysothamnus viscidiflorus ssp. viscidiflorus var. viscidiflorus -- (yellow rabbitbrush)</b>									
2012	-	-	-	-	-	-	-	-	32/60
2015	-	-	-	-	-	-	-	-	-/-
2019	-	-	-	-	-	-	-	-	27/24
<b>Gutierrezia sarothrae -- (broom snakeweed)</b>									
2012	-	-	-	-	-	-	-	-	-/-
2015	20	-	100	0	0	0	0	0	21/19

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





**Site Information**

Land Ownership	Federal
Land Administrator	USFS
Allotment	CAMP JACKSON
Elevation	7,243ft (2,208m)
Aspect	South
Slope	10%
Sample Dates	06/19/2012, 09/01/2015, 07/31/2019

**Table 14R-28.1 Disturbance History.** Recorded history of major disturbances.

Treatment/Disturbance	Name	WRI DB#	Date	Size (acres)
Fire - Prescribed Fire	La Sal/Abajo Prescribed Fire FY20 (Proposed)	4882	Fall 2019?	1000
Mechanical - Bullhog	Johnson Creek Hazard Fuel Project	2265	October 2013-June 2014	266

**Wildlife Habitat and Vegetation History****Table 14R-28.3 - Wildlife Seasonal Habitat.** UDWR wildlife habitat and seasonality.

Species	Habitat	Season
Mule Deer	crucial	summer
Rocky Mountain Elk	crucial	winter

**Table 14R-28.4 - 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	Gambel Oak	Phase I
2019	Gambel Oak	Phase I

**Site Notes**

No Notes

**Site Potential**

1981 - 2010 Average Annual Precipitation	19 inches
NRCS Ecological Site	Mountain Loam (Oak)
NRCS Ecological Site #	R048AY415UT
States and Transitions	No state and transition model is available for this ecological site.

When the study was established in 2012, this site existed in a conifer-encroached state with twoneedle pinyon (*Pinus edulis*) and Utah juniper (*Juniperus osteosperma*) as the dominant conifer species; the shrub understory was dominated by Gambel oak (*Quercus gambelii*) (Table 14R-28.12). Tree cover decreased following the bullhog treatment (Table 14R-28.1), and Gambel oak became the dominant vegetation component in 2015 (Table 14R-28.12, Table 14R-28.13, Table 14R-28.14). The herbaceous understory was sparse with low diversity and cover prior to treatment, but has since increased: the introduced annual grass cheatgrass (*Bromus tectorum*) and a mixture of mainly native perennial grasses contributed the most herbaceous cover in 2019 (Table 14R-28.7, Table 14R-28.10, Table 14R-28.11). Although cover and density have been low (Table 14R-28.12, Table 14R-28.14), the post-treatment presence of pinyon and juniper indicates that this site may have the potential to be infilled in future sample years.

**Trend Summary Tables**

**Table 14R-28.6 - Shrub/Tree Summary.** Average modified Daubenmire quadrat and line intercept cover by year for shrubs/trees

Year	Quadrat Cover (%)			Line-intercept Cover (%)		
	Preferred Shrub	Other Shrub	Tree	Preferred Shrub	Other Shrub	Tree
2012	23.8	0.4	11.8	32.7	0.4	43.8
2015	12.8	0.5	0.0	16.4	-	4.3
2019	20.6	0.6	0.0	26.8	1.0	3.9

**Table 14R-28.7 - Herbaceous Summary.** Nested frequency and average modified Daubenmire quadrat cover by year for herbaceous functional groups

Year	Nested Frequency				Quadrat Cover (%)			
	Annual Grass	Perennial Grass	Annual/Biennial Forb	Perennial Forb	Annual Grass	Perennial Grass	Annual/Biennial Forb	Perennial Forb
2012	-	41	22	72	-	0.6	0.0	1.3
2015	-	60	58	48	-	1.9	0.9	1.9
2019	130	83	183	105	4.7	5.0	3.5	3.0

**Table 14R-28.8 - Basic Ground Cover.** Average modified Daubenmire quadrat cover by year for basic ground cover types.

Year	Cover Type (%)					
	Bare Ground	Cryptogams	Litter	Pavement	Rock	Vegetation
2012	12.3	1.4	73.5	1.9	6.2	36.2
2015	16.1	0.0	71.8	1.6	4.7	15.6
2019	17.0	-	65.5	2.1	7.2	32.0

**Table 14R-28.9 - Pellet Group Data.** Quadrat frequency and pellet group transect data for animal pellets. Rabbit pellet groups are not sampled in the pellet group transect.

Year	Cattle	Mule Deer	Rocky Mountain Elk	Rabbit
	Quadrat Frequency			
2012	-	-	1	3
2015	-	9	2	1
2019	4	19	4	4
Year	Days Use Per Acre (ha)			
2012	-	1.3 (3.3)	2.7 (6.6)	-
2015	-	8.7 (21.5)	-	-
2019	0.7 (1.8)	18.7 (46.3)	3.4 (8.3)	-

**Table 14R-28.10 - Grass Species.** Nested frequency and modified Daubenmire average cover by year.

GRASS SPECIES	Achnatherum hymenoides (Indian ricegrass)	Bromus tectorum <sup>ai</sup> (cheatgrass)	Carex rossii (Ross' sedge)	Elymus elymoides (squirreltail)	Pascopyrum smithii (western wheatgrass)	Poa fendleriana (muttongrass)	Poa pratensis <sup>i</sup> (Kentucky bluegrass)
year	Nested Frequency						
2012	-	-	40	-	-	3	-
2015	-	-	30	1	5	25	6
2019	2	130	30	12	13	16	11
year	Average Cover (%)						
2012	-	-	0.5	-	-	0.0	-
2015	-	-	0.8	0.0	0.0	0.6	0.5
2019	0.2	4.7	1.7	0.9	1.1	0.4	0.7

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

**Table 14R-28.11 - Forb Species.** Nested frequency and modified Daubenmire average cover by year.

FORB SPECIES	Arabis holboellii <sup>a</sup> (Holboell's rockcress)	Arabis pulchra (beautiful rockcress)	Astragalus (milkvetch)	Cirsium (thistle)	Cirsium vulgare <sup>ai</sup> (bull thistle)	Collinsia parviflora <sup>a</sup> (maiden blue eyed Mary)	Conyza canadensis <sup>a</sup> (Canadian horseweed)	Crepis acuminata (tapertip hawksbeard)	Cryptantha (cryptantha)	Cymopterus (springparsley)	Descurainia pinnata <sup>a</sup> (western tansymustard)	Draba <sup>a</sup> (draba)	Erigeron flagellaris (trailing fleabane)	Eriogonum alatum (winged buckwheat)	Erodium cicutarium <sup>ai</sup> (redstem stork's bill)	Gayophytum ramosissimum <sup>a</sup> (pinyon groundsmoke)	Gilia inconspicua <sup>a</sup> (shy gilia)
year	Nested Frequency																
2012	22	-	2	-	-	-	-	-	9	-	0	-	-	5	-	-	-
2015	25	12	-	0	-	-	-	1	4	-	20	4	0	-	0	1	8
2019	8	-	-	12	9	50	26	4	-	1	52	2	16	-	-	19	17
year	Average Cover (%)																
2012	0.0	-	0.0	-	-	-	-	-	0.0	-	0.0	-	-	0.1	-	-	-
2015	0.4	0.3	-	0.3	-	-	-	0.0	0.0	-	0.2	0.0	0.0	-	0.0	0.0	0.0
2019	0.1	-	-	0.0	0.3	0.4	0.2	0.0	-	0.0	0.7	0.0	0.2	-	-	0.1	0.4

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

FORB SPECIES	Helianthella microcephala (purpledisk helianthella)	Heterotheca villosa (hairy false goldenaster)	Ipomopsis aggregata (scarlet gilia)	Lactuca serriola <sup>ai</sup> (prickly lettuce)	Lesquerella (bladderpod)	Machaeranthera grindelioides (rayless tansyaster)	Microsteris gracilis <sup>a</sup> (slender phlox)	Packera streptanthifolia (Rocky Mountain groundsel)	Pedicularis centranthera (dwarf lousewort)	Phlox hoodii (spiny phlox)	Polygonum douglasii <sup>a</sup> (Douglas' knotweed)	Tetranneuris acaulis (stemless four-nerve daisy)	Trifolium (clover)	Verbascum thapsus <sup>ai</sup> (common mullein)
year	Nested Frequency													
2012	21	-	4	-	1	-	-	-	27	7	-	-	-	-
2015	22	3	-	7	3	-	-	2	-	3	6	-	5	-
2019	45	5	-	75	15	2	25	34	-	4	39	0	-	4
year	Average Cover (%)													
2012	0.5	-	0.0	-	0.0	-	-	-	0.6	0.1	-	-	-	-
2015	1.2	0.0	-	0.1	0.0	-	-	0.0	-	0.0	0.2	-	0.0	-
2019	1.7	0.6	-	0.5	0.0	0.2	0.1	0.1	-	0.0	0.4	0.0	-	0.2

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

**Table 14R-28.12 - 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)	Gutierrezia sarothrae (broom snakeweed)	Juniperus osteosperma <sup>i</sup> (Utah juniper)	Opuntia fragilis (brittle pricklypear)	Pinus edulis <sup>i</sup> (twoneedle pinyon)	Quercus gambelii <sup>p</sup> (Gambel oak)
year	Line Intercept Cover (%)								
2012	5.6	0.5	0.2	-	0.3	13.8	0.1	30	26.4
2015	0.5	-	-	-	-	-	-	4.3	15.9
2019	0.2	0.7	-	-	1	-	0	3.9	25.9
year	Quadrat Cover (%)								
2012	3.8	1.5	0.4	-	0.2	3.2	0.2	8.6	18.1
2015	0.4	-	-	-	0.2	-	0.3	0.0	12.4
2019	0.6	0.0	-	0.0	0.5	-	0.2	0.0	20.1

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

**Table 14R-28.13 - Shrub/Tree Characteristics.** Population characteristics of shrub/tree species populations including density reproduction (seedlings), age distribution, utilization, vigor and average size (height/crown) of plants.

Year	Density		Age Class Distribution			Utilization		Poor Vigor (%)	Average Height Crown (cm)
	Plants Per Acre		Excluding Seedlings			Moderate (%)	Heavy (%)		
	Excluding Seedlings	Seedling	Young (%)	Mature (%)	Decadent (%)				
<b>Amelanchier utahensis<sup>p</sup> -- (Utah serviceberry)</b>									
2012	440	60	32	68	0	0	0	0	238/272
2015	540	-	70	30	0	37	56	33	36/73
2019	400	-	35	65	0	5	75	0	43/60
<b>Artemisia tridentata ssp. vaseyana<sup>p</sup> -- (mountain big sagebrush)</b>									
2012	120	-	33	67	0	33	0	17	39/54
2015	20	20	0	100	0	0	0	0	36/72
2019	300	40	33	67	0	13	7	0	39/60
<b>Cercocarpus montanus<sup>p</sup> -- (alderleaf mountain mahogany)</b>									
2012	20	-	0	100	0	0	0	0	142/132
2015	-	-	-	-	-	-	-	-	58/122
2019	-	-	-	-	-	-	-	-	64/65
<b>Chrysothamnus depressus<sup>p</sup> -- (longflower rabbitbrush)</b>									
2012	-	-	-	-	-	-	-	-	-/-
2015	-	-	-	-	-	-	-	-	-/-
2019	60	-	0	100	0	0	0	0	4/12
<b>Ericameria nauseosa -- (rubber rabbitbrush)</b>									
2012	-	-	-	-	-	-	-	-	-/-
2015	-	-	-	-	-	-	-	-	-/-
2019	-	-	-	-	-	-	-	-	109/108
<b>Gutierrezia sarothrae -- (broom snakeweed)</b>									
2012	660	400	6	94	0	0	0	0	17/17
2015	140	-	0	100	0	0	0	0	20/31
2019	480	60	0	96	4	0	0	4	22/33
<b>Juniperus osteosperma<sup>i</sup> -- (Utah juniper)</b>									
2012	200	-	10	50	40	0	0	40	-/-
2015	-	20	0	0	0	0	0	0	-/-
2019	20	-	0	0	100	0	0	100	-/-

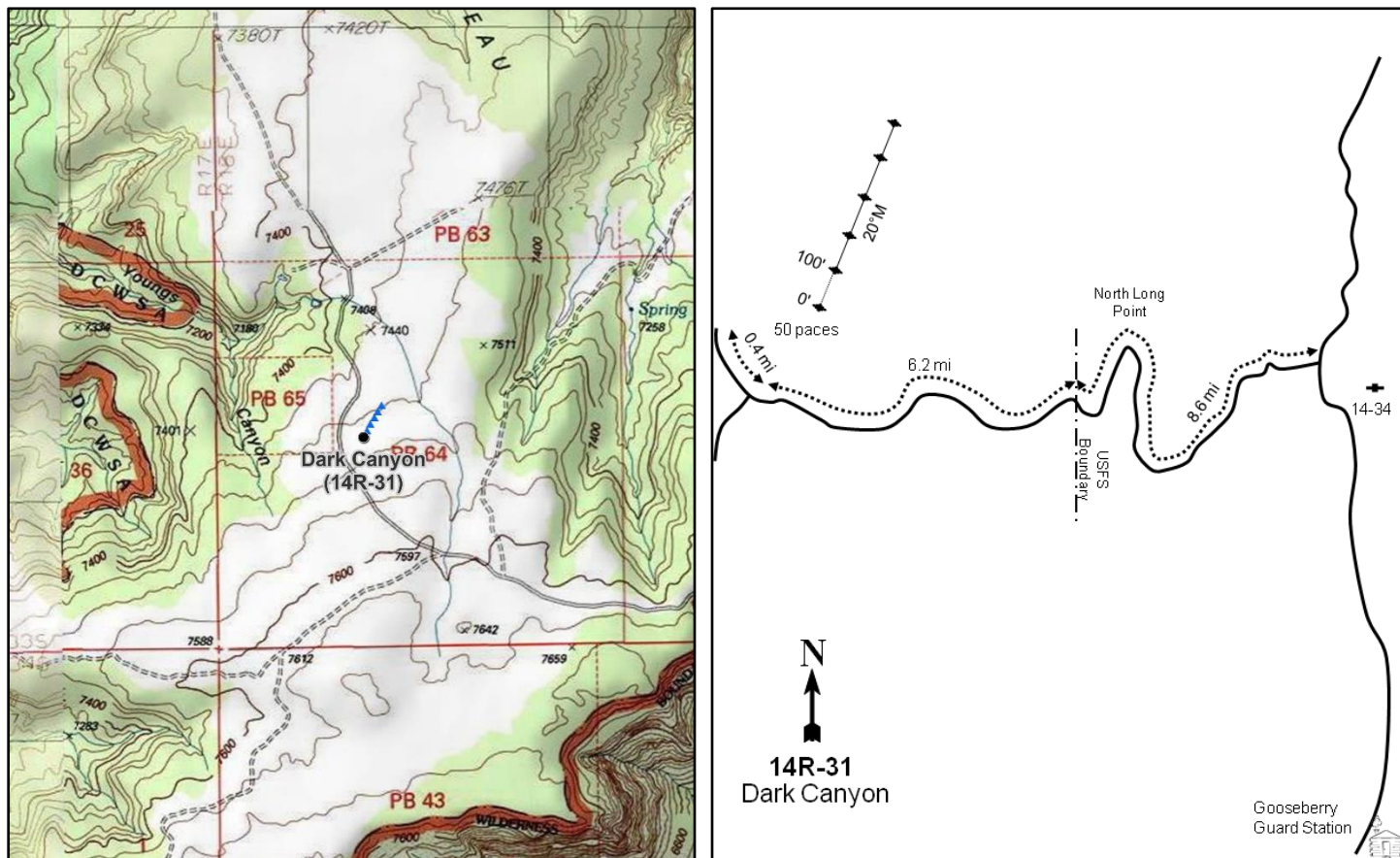
Year	Density		Age Class Distribution			Utilization		Poor Vigor (%)	Average Height Crown (cm)
	Plants Per Acre		Excluding Seedlings			Moderate (%)	Heavy (%)		
	Excluding Seedlings	Seedling	Young (%)	Mature (%)	Decadent (%)				
<b>Opuntia fragilis -- (brittle pricklypear)</b>									
2012	240	-	17	83	0	0	0	17	6/30
2015	200	-	10	80	10	0	0	0	9/17
2019	180	-	0	100	0	0	0	0	4/14
<b>Pediocactus simpsonii -- (mountain ball cactus)</b>									
2012	20	-	0	100	0	0	0	0	5/9
2015	-	-	-	-	-	-	-	-	-/-
2019	-	-	-	-	-	-	-	-	-/-
<b>Pinus edulis<sup>t</sup> -- (twoneedle pinyon)</b>									
2012	360	40	28	72	0	0	0	0	-/-
2015	60	-	67	33	0	0	0	0	-/-
2019	60	-	33	33	33	0	0	33	-/-
<b>Pinus ponderosa<sup>t</sup> -- (ponderosa pine)</b>									
2012	-	-	-	-	-	-	-	-	-/-
2015	-	-	-	-	-	-	-	-	-/-
2019	40	-	100	0	0	0	0	50	-/-
<b>Purshia tridentata<sup>p</sup> -- (antelope bitterbrush)</b>									
2012	-	-	-	-	-	-	-	-	18/61
2015	-	-	-	-	-	-	-	-	30/89
2019	-	-	-	-	-	-	-	-	-/-
<b>Quercus gambelii<sup>p</sup> -- (Gambel oak)</b>									
2012	7460	-	60	41	0	3	0	0	102/120
2015	9800	200	54	46	0	71	19	38	50/51
2019	6940	40	6	80	14	43	47	14	52/57
<b>Yucca -- (yucca)</b>									
2012	-	-	-	-	-	-	-	-	37/73
2015	-	-	-	-	-	-	-	-	29/64
2019	-	-	-	-	-	-	-	-	71/114

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

**Table 14R-28.14 - 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	173	-	10	-	10	80	40.5
2015	21	20	70	10	-	-	5.6
2019	25	29	57	14	-	-	5.6
<b>Pinus edulis (twoneedle pinyon)</b>							
2012	152	-	11	26	5	58	19.0
2015	11	-	50	13	-	38	18.8
2019	11	17	-	17	17	50	19.2
<b>Pinus ponderosa (ponderosa pine)</b>							
2015	4	33	-	33	33	-	5.5

## DARK CANYON - STUDY NO. 14R-31

**Location Information**

USGS 7.5 min Map Info  
GPS (0' Stake)

Warren Canyon NW; Township 33S, Range 18E, Section 64  
NAD 83 UTM ZONE 12, 589169 East 4191477 North

**Transect Information**

Browse Tag # (0' Stake)	Not Available
Transect Bearing	20° magnetic
Length	500ft
Belt Placement	Line 1 (11ft), Line 2 (34ft), Line 3 (59ft), Line 4 (71ft), Line 5 (95ft)
Belt Marker Placement	Standard

**Directions to Site**

Driving from the junction of Sweet Alice Road and Beef Basin Road, travel west on Sweet Alice Road for 8.6 miles to the USFS boundary. Continue for another 6.2 miles to a fork, go right, and continue for 0.4 miles. The site is on the right side of the road; there is no witness post.

**Site Information**

Land Ownership	Federal
Land Administrator	BLM
Allotment	INDIAN CREEK
Elevation	7,506ft (2,288m)
Aspect	Northwest
Slope	5%
Sample Dates	08/29/2012, 09/01/2015, 07/29/2019

**Table 14R-31.1 Disturbance History.** Recorded history of major disturbances.

Treatment/Disturbance	Name	WRI DB#	Date	Size (acres)
Mechanical - Bullhog	Dark Canyon Phase I (formerly Beef Basin Phase 1)	2177	June-October 2013	285

**Wildlife Habitat and Vegetation History****Table 14R-31.3 - Wildlife Seasonal Habitat.** UDWR wildlife habitat and seasonality.

Species	Habitat	Season
Mule Deer	crucial	winter
Rocky Mountain Elk	crucial	winter

**Table 14R-31.4 - Vegetation History.** The dominant vegetation type(s) and phase of woodland succession (Tausch, Miller, Roundy, & Chambers, 2009).

Year	Vegetation Type	Woodland Succession
2012	Pinyon	Phase II transitioning to Phase III
2015	Perennial Grass/Mountain Big Sagebrush	Phase I
2019	Perennial Grass/Mountain Big Sagebrush	Phase I

**Site Notes**

No Notes

**Site Potential**

1981 - 2010 Average Annual Precipitation	15 inches
NRCS Ecological Site	Upland Loam (Mountain Big Sagebrush)
NRCS Ecological Site #	R048AY306UT
States and Transitions	No state and transition model is available for this ecological site.

When the study was established in 2012, the site was in a conifer-encroached state with twoneedle pinyon (*Pinus edulis*) as the dominant species (Table 14R-31.12); the site was considered to be within Phase II to Phase III of woodland succession (Table 14R-31.4). Mountain big sagebrush (*Artemisia tridentata* ssp. *vaseyana*) was sampled on the site, but the majority of the sagebrush plants were considered decadent (Table 14R-31.13). The herbaceous understory was not overly diverse with the introduced grass species crested wheatgrass (*Agropyron cristatum*) being the dominant species; other species were rare (Table 14R-31.10, Table 14R-31.11). Following the treatment, the site transitioned to an introduced seeded grass and sagebrush community type with crested wheatgrass as the dominant species (Table 14R-31.10). Most of the pinyon and Utah juniper (*Juniperus osteosperma*) trees were removed (Table 14R-31.14). Although the study has been within Phase I of succession following treatment (Table 14R-31.4), continued tree presence in the area indicates that there may be potential for future infilling. Although sagebrush exhibited an initial decrease in the first post-treatment sample year, density and cover have increased to levels roughly equal to pre-treatment (Table 14R-31.12, Table 14R-31.13). Sagebrush will likely continue to increase and may become a dominant vegetation component in future sample years.



## Trend Summary Tables

**Table 14R-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
2012	8.8	0.7	20.3	11.3	0.4	27.5
2015	5.7	0.4	0.0	8.2	1.2	-
2019	9.0	0.2	-	13.5	0.1	-

**Table 14R-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
2012	22	212	-	61	0.1	9.4	-	0.8
2015	214	250	10	116	2.4	14.4	0.4	1.5
2019	253	281	143	140	4.4	19.6	0.9	2.2

**Table 14R-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
2012	27.2	3.5	59.0	0.0	0.6	36.1
2015	15.1	0.3	69.9	0.0	1.1	23.8
2019	22.7	0.1	66.3	0.0	1.4	32.7

**Table 14R-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	Horse	Rabbit
	Quadrat Frequency				
2012	2	8	1	1	14
2015	-	2	4	-	4
2019	4	6	3	-	4
Year	Days Use Per Acre (ha)				
2012	-	13.4 (33.1)	0.7 (1.7)	-	-
2015	3.6 (9.0)	9.4 (23.2)	0.7 (1.7)	-	-
2019	14.5 (35.9)	6.0 (14.9)	6.0 (14.9)	-	-

**Table 14R-31.10 - 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)												
Dactylis glomerata <sup>i</sup> (orchardgrass)												
Elymus elymoides (squirreltail)												
Elymus lanceolatus (thickspike wheatgrass)												
Hesperostipa comata (needle and thread)												
Pleuraphis jamesii (James' galleta)												
Poa fendleriana (muttongrass)												
Poa pratensis <sup>i</sup> (Kentucky bluegrass)												
Sporobolus cryptandrus (sand dropseed)												
Vulpia octoflora <sup>a</sup> (sixweeks fescue)												
year	Nested Frequency											
2012	151	7	22	11	1	-	17	-	35	5	11	-
2015	181	-	191	-	45	1	12	2	42	-	7	53
2019	214	3	237	-	44	7	8	-	45	-	2	77
year	Average Cover (%)											
2012	7.0	0.2	0.1	0.4	0.0	-	0.3	-	1.1	0.0	0.3	-
2015	10.4	-	2.1	-	1.5	0.1	0.6	0.0	1.7	-	0.1	0.3
2019	17.1	0.0	4.0	-	1.3	0.0	0.4	-	0.7	-	0.0	0.5

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

**Table 14R-31.11 - Forb Species.** Nested frequency and modified Daubenmire average cover by year.

FORB SPECIES																	
Agoseris glauca (pale agoseris)																	
Allium (onion)																	
Arabis (rockcress)																	
Astragalus (milkvetch)																	
Astragalus calycosus (Torrey's milkvetch)																	
Astragalus convallarius (lesser rushy milkvetch)																	
Calochortus nuttallii (sego lily)																	
Castilleja linariifolia (Wyoming Indian paintbrush)																	
Chenopodium fremontii <sup>a</sup> (Fremont's goosefoot)																	
Collinsia parviflora <sup>a</sup> (maiden blue eyed Mary)																	
Cordylanthus kingii <sup>a</sup> (King's bird's-beak)																	
Cryptantha (cryptantha)																	
Descurainia pinnata <sup>a</sup> (western tansymustard)																	
Draba <sup>a</sup> (draba)																	
Erigeron (fleabane)																	
Eriogonum racemosum (redroot buckwheat)																	
Gayophytum ramosissimum <sup>a</sup> (pinyon groundsmoke)																	
year	Nested Frequency																
2012	-	-	10	1	-	-	3	1	-	-	-	1	-	-	-	4	-
2015	-	-	24	21	4	7	-	4	2	-	6	-	2	-	2	10	-
2019	8	21	1	-	-	22	2	0	4	2	22	-	10	8	3	5	8
year	Average Cover (%)																
2012	-	-	0.0	0.0	-	-	0.0	0.0	-	-	-	0.0	-	-	-	0.2	-
2015	-	-	0.1	0.1	0.0	0.1	-	0.0	0.0	-	0.3	-	0.0	-	0.0	0.1	-
2019	0.2	0.2	0.0	-	-	0.1	0.0	0.2	0.0	0.0	0.3	-	0.0	0.0	0.0	0.6	0.1

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

FORB SPECIES											
Heterotheca villosa (hairy false goldenaster)											
Lappula occidentalis <sup>a</sup> (flatspine stickseed)											
Lomatium (desertparsley)											
Machaeranthera canescens (hoary tansyaster)											
Machaeranthera grindeloides (rayless tansyaster)											
Microsteris gracilis <sup>a</sup> (slender phlox)											
Packera multilobata (lobeleaf groundsel)											
Penstemon (beardtongue)											
Phlox hoodii (spiny phlox)											
Phlox longifolia (longleaf phlox)											
Polygonum douglasii <sup>a</sup> (Douglas' knotweed)											
year	Nested Frequency										
2012	-	-	-	-	-	-	11	-	-	34	-
2015	0	-	-	-	11	-	14	1	15	29	-
2019	4	4	1	5	8	105	27	3	9	76	20
year	Average Cover (%)										
2012	-	-	-	-	-	-	0.3	-	-	0.2	-
2015	0.1	-	-	-	0.1	-	0.4	0.0	0.3	0.2	-
2019	0.0	0.0	0.0	0.0	0.0	0.5	0.1	0.1	0.1	0.5	0.1

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

**Table 14R-31.12 - 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)											
Chrysothamnus depressus <sup>p</sup> (longflower rabbitbrush)											
Chrysothamnus viscidiflorus ssp. viscidiflorus var. viscidiflorus (yellow rabbitbrush)											
Gutierrezia sarothrae (broom snakeweed)											
Linanthus pungens (granite prickly phlox)											
Opuntia (pricklypear)											
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 (%)										
2012	0.3	8.1	1.6	-	0	-	0.4	27.5	0.5	0.8	
2015	-	5.5	2.7	-	1.1	0.1	-	-	-	-	
2019	0.3	9.6	3.6	-	-	0.1	-	-	-	-	
year	Quadrat Cover (%)										
2012	0.0	5.4	2.6	-	0.2	-	0.5	20.3	0.7	0.0	
2015	-	3.4	2.3	0.1	0.2	0.0	0.0	0.0	-	-	
2019	0.0	6.1	2.8	0.1	-	0.0	0.0	-	0.0	-	

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

**Table 14R-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>									
2012	20	-	0	100	0	100	0	0	169/170
2015	20	-	0	0	100	100	0	100	88/90
2019	20	-	0	100	0	100	0	0	138/174
<b>Artemisia tridentata ssp. vaseyana<sup>P</sup> -- (mountain big sagebrush)</b>									
2012	1520	-	3	43	54	41	16	38	54/85
2015	860	-	5	63	33	28	7	28	57/89
2019	1080	-	6	78	17	44	2	17	65/104
<b>Chrysothamnus depressus<sup>P</sup> -- (longflower rabbitbrush)</b>									
2012	3440	-	5	89	6	80	6	8	12/27
2015	1800	-	1	98	1	33	12	1	19/37
2019	1720	-	0	98	2	27	0	2	17/40
<b>Chrysothamnus viscidiflorus ssp. viscidiflorus var. viscidiflorus -- (yellow rabbitbrush)</b>									
2012	-	-	-	-	-	-	-	-	-/-
2015	-	-	-	-	-	-	-	-	44/61
2019	-	-	-	-	-	-	-	-	49/68
<b>Gutierrezia sarothrae -- (broom snakeweed)</b>									
2012	100	20	20	80	0	0	0	0	16/25
2015	500	-	0	100	0	0	0	0	21/29
2019	100	-	0	100	0	0	0	0	23/32
<b>Linanthus pungens -- (granite prickly phlox)</b>									
2012	-	-	-	-	-	-	-	-	-/-
2015	20	-	0	100	0	0	0	0	-/-
2019	80	-	0	50	50	0	0	50	7/21
<b>Opuntia fragilis -- (brittle pricklypear)</b>									
2012	-	-	-	-	-	-	-	-	-/-
2015	-	-	-	-	-	-	-	-	-/-
2019	60	-	0	100	0	0	0	0	8/11
<b>Opuntia polyacantha -- (plains pricklypear)</b>									
2012	-	-	-	-	-	-	-	-	-/-
2015	-	-	-	-	-	-	-	-	-/-
2019	-	-	-	-	-	-	-	-	8/14
<b>Opuntia -- (pricklypear)</b>									
2012	80	-	0	100	0	0	0	0	9/31
2015	80	-	0	75	25	0	0	25	7/16
2019	20	-	100	0	0	0	0	0	8/11
<b>Pinus edulis<sup>t</sup> -- (twoneedle pinyon)</b>									
2012	500	160	8	92	0	0	0	0	-/-
2015	-	-	-	-	-	-	-	-	-/-
2019	-	-	-	-	-	-	-	-	-/-
<b>Purshia tridentata<sup>P</sup> -- (antelope bitterbrush)</b>									
2012	140	-	0	57	43	43	57	29	53/96
2015	-	-	-	-	-	-	-	-	49/97
2019	-	20	0	0	0	0	0	0	60/138
<b>Quercus gambelii<sup>P</sup> -- (Gambel oak)</b>									
2012	120	-	100	0	0	0	0	0	56/51
2015	-	-	-	-	-	-	-	-	71/77
2019	-	-	-	-	-	-	-	-	102/53
<b>Yucca -- (yucca)</b>									
2012	-	-	-	-	-	-	-	-	-/-
2015	-	-	-	-	-	-	-	-	-/-
2019	-	-	-	-	-	-	-	-	48/60

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

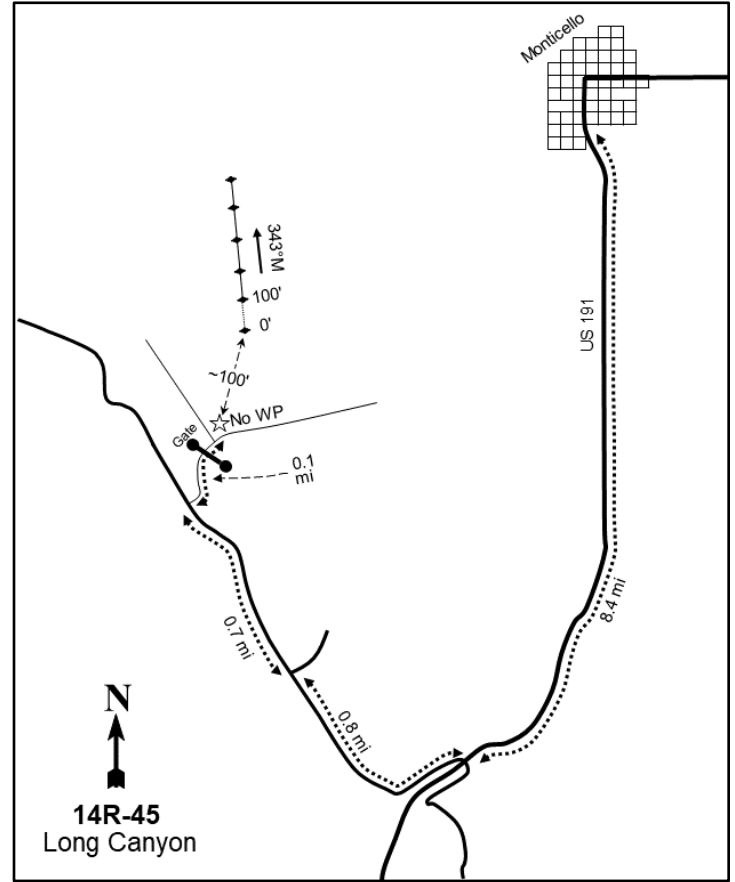
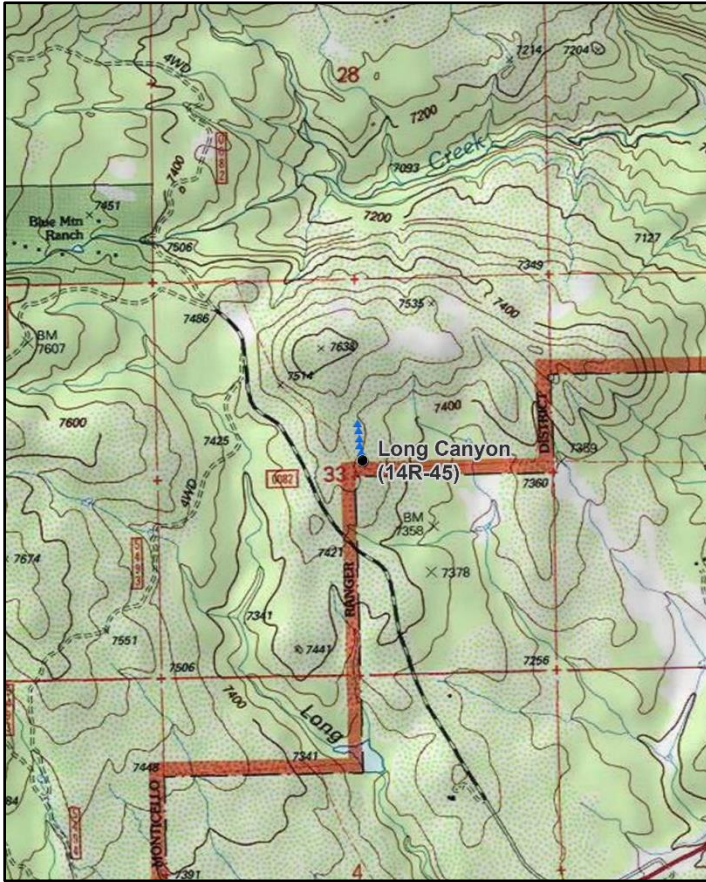
**Table 14R-31.14 - Tree Characteristics.** Point-quarter tree density, size class distribution, and average diameter.

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>							
2015	2	-	100	-	-	-	4.0
2019	2	-	100	-	-	-	8.0
<b>Pinus edulis (twoneedle pinyon)</b>							
2012	543	-	5	5	30	60	16.9
2015	18	14	86	-	-	-	3.9
2019	20	-	100	-	-	-	5.6

**Table 14R-31.15 - 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
2012	14.1	2.6	4.8	18.8	-0.1	1.6	0.0	41.9	Poor
2015	10.3	8.3	1.8	28.8	-1.8	3.0	0.0	50.4	Poor-Fair
2019	17.0	11.3	2.0	30.0	-3.3	4.3	0.0	61.2	Fair

## LONG CANYON - STUDY NO. 14R-45

**Location Information**

USGS 7.5 min Map Info  
GPS (0' Stake)

Abajo Peak SE; Township 34S, Range 23E, Section 33  
NAD 83 UTM ZONE 12, 640875 East 4182516 North

**Transect Information**

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

Not Available  
343° magnetic  
500ft  
Line 1 (11ft), Line 2 (34ft), Line 3 (59ft), Line 4 (71ft), Line 5 (95ft)  
No Rebar or Stakes

**Directions to Site**

Drive south on US-191 from Monticello for 8.4 miles. Turn right onto Dude Ranch Road, then travel for 1.5 miles and turn right onto a two-track road. Proceed for 0.1 miles on this two-track, passing through a gate, to a three-way intersection. Park at this intersection: there is no witness post. The 0-foot baseline stake is roughly 100 feet northeast of the road.

**Site Information**

Land Ownership	Federal
Land Administrator	USFS
Allotment	VERDURE
Elevation	7,420ft (2,262m)
Aspect	Southeast
Slope	4%
Sample Dates	08/21/2019

**Table 14R-45.1 Disturbance History.** Recorded history of major disturbances.

Treatment/Disturbance	Name	WRI DB#	Date	Size (acres)
Mechanical - Bullhog	Shingle Mill Phase 1 (Proposed)	4860	August-December 2019	312

**Wildlife Habitat and Vegetation History****Table 14R-45.3 - Wildlife Seasonal Habitat.** UDWR wildlife habitat and seasonality.

Species	Habitat	Season
Mule Deer	crucial	summer
Rocky Mountain Elk	crucial	winter

**Table 14R-45.4 - Vegetation History.** The dominant vegetation type(s) and phase of woodland succession (Tausch, Miller, Roundy, & Chambers, 2009).

Year	Vegetation Type	Woodland Succession
2019	Mixed Shrub/Juniper	Phase II

**Site Notes**

No Notes

**Site Potential**

1981 - 2010 Average Annual Precipitation	19 inches
NRCS Ecological Site	Mountain Loam (Oak)
NRCS Ecological Site #	R048AY415UT
States and Transitions	No state and transition model is available for this ecological site.

As of study establishment in 2019, this site is dominated by a mixture of browse species including mountain snowberry (*Symphoricarpos oreophilus*) and Gambel oak (*Quercus gambelii*); species such as wild crabapple (*Peraphyllum ramosissimum*) and mountain big sagebrush (*Artemisia tridentata* ssp. *vaseyana*) are also present, but contribute less cover (Table 14R-45.12, Table 14R-45.13). The understory is moderately diverse and somewhat abundant, with perennial forbs -- namely lupine (*Lupinus sp.*) -- providing most of the cover. The introduced annual grass species cheatgrass (*Bromus tectorum*) is also present, but in low amounts (Table 14R-45.7, Table 14R-45.10, Table 14R-45.11). Utah juniper (*Juniperus osteosperma*) was observed in high amounts and is a co-dominant site component; this site is classified as being within Phase II of woodland succession (Table 14R-45.4, Table 14R-45.12, Table 14R-45.14). Further tree encroachment and associated loss of understory shrub and herbaceous species would likely occur over time without a tree-removing disturbance. However, a bullhog treatment in late 2019 (Table 14R-45.1) will likely remove much of the tree component and may lead to increased shrub and herbaceous productivity as time since treatment increases.



**Trend Summary Tables**

**Table 14R-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
2019	32.1	0.7	14.4	39.6	0.4	33.6

**Table 14R-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
2019	38	142	201	158	0.7	4.1	2.3	7.2

**Table 14R-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
2019	28.1	0.2	54.9	1.7	3.0	46.4

**Table 14R-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	Rabbit
	Quadrat Frequency			
2019	-	14	1	5
Year	Days Use Per Acre (ha)			
2019	5.1 (12.6)	15.4 (38.1)	2.7 (6.6)	-

**Table 14R-45.10 - 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)	Koeleria macrantha (prairie Junegrass)	Pascopyrum smithii (western wheatgrass)	Poa fendleriana (muttongrass)
year	Nested Frequency					
2019	4	38	54	31	36	51
year	Average Cover (%)					
2019	0.2	0.7	1.3	0.6	0.5	1.6

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

**Table 14R-45.11 - Forb Species.** Nested frequency and modified Daubenmire average cover by year.

FORB SPECIES	Nested Frequency																
year	Average Cover (%)																
Allium (onion)	45	36	43	22	73	9	4	77	2	14	3	3	1	47	6	30	42
Astragalus lentiginosus (freckled milkvetch)	0.2	1.0	0.2	0.1	0.8	0.1	0.0	0.7	0.0	0.8	0.0	0.0	0.0	4.4	0.0	0.5	0.3
Chenopodium fremontii <sup>a</sup> (Fremont's goosefoot)																	
Chenopodium leptophyllum <sup>a</sup> (narrowleaf goosefoot)																	
Collinsia parviflora <sup>a</sup> (maiden blue eyed Mary)																	
Descurainia pinnata <sup>a</sup> (western tansymustard)																	
Dracocephalum (dragonhead)																	
Eriastrum <sup>a</sup> (woollystar)																	
Erigeron divergens <sup>a</sup> (spreading fleabane)																	
Eriogonum racemosum (redroot buckwheat)																	
Lactuca serriola <sup>ii</sup> (prickly lettuce)																	
Lappula occidentalis <sup>a</sup> (flatspine stickseed)																	
Lomatium (desertparsley)																	
Lupinus (lupine)																	
Packera multilobata (lobeleaf groundsel)																	
Penstemon caespitosus (mat penstemon)																	
Phlox longifolia (longleaf phlox)																	

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

FORB SPECIES	Nested Frequency	
year	Average Cover (%)	
Polygonum douglasii <sup>a</sup> (Douglas' knotweed)	76	3
Tetranneuris acaulis (stemless four-nerve daisy)	0.4	0.0

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

**Table 14R-45.12 - 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. vaseyana <sup>p</sup> (mountain big sagebrush)	4.6	-	33.6	0.4	-	-	6.4	-	13.5	15.1	
Gutierrezia sarothrae (broom snakeweed)	4.5	0.1	12.5	0.5	0.0	0.0	5.0	1.9	10.7	12.0	
Juniperus osteosperma <sup>i</sup> (Utah juniper)											
Mahonia repens (creeping barberry)											
Opuntia (pricklypear)											
Opuntia fragilis (brittle 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)											

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

**Table 14R-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.

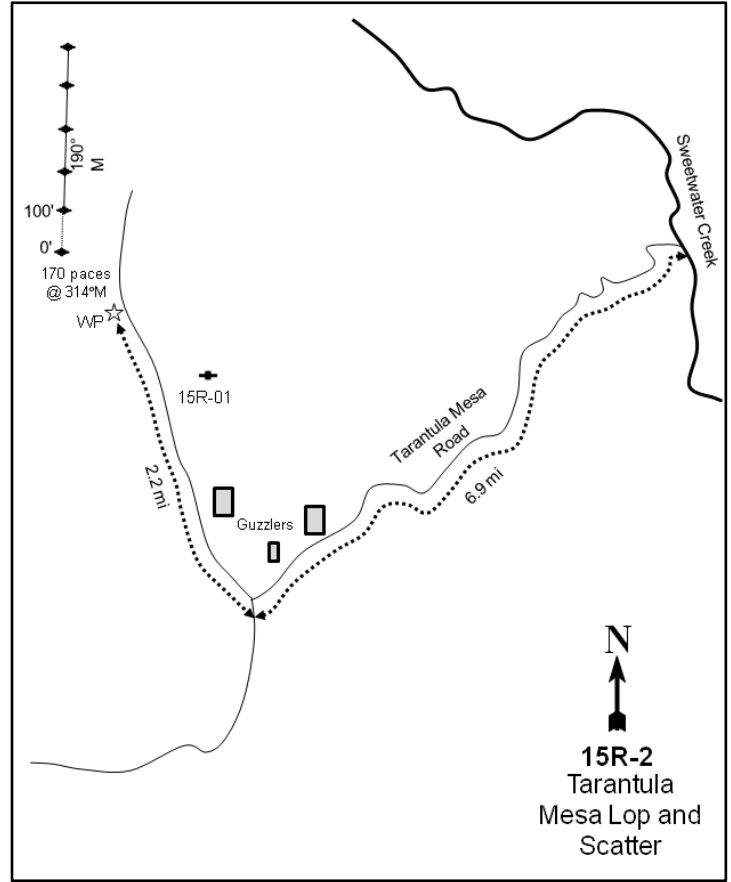
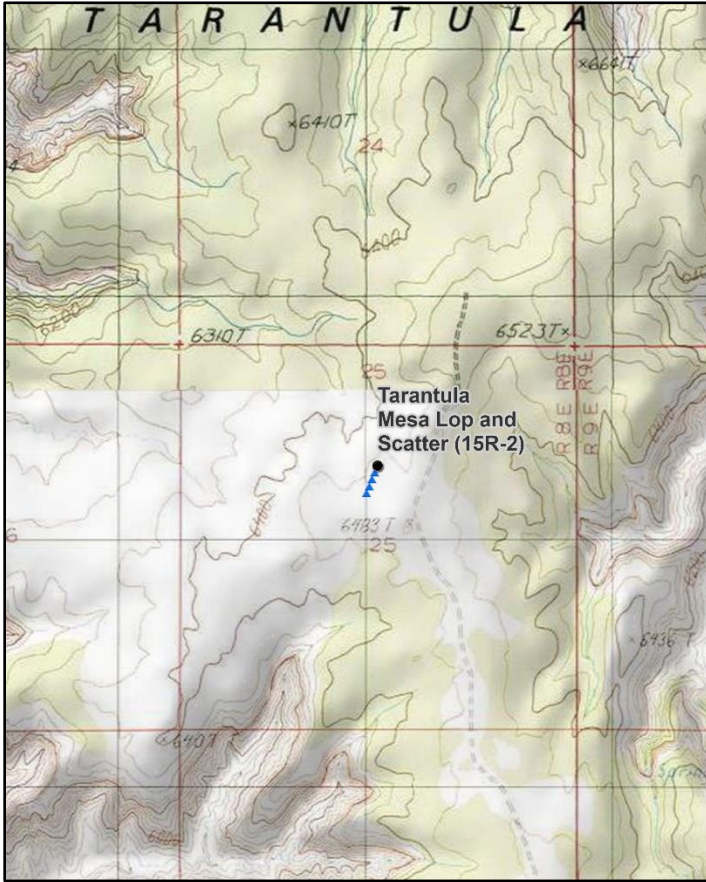
Year	Density		Age Class Distribution			Utilization		Poor Vigor (%)	Average Height Crown (cm)
	Plants Per Acre		Excluding Seedlings			Moderate (%)	Heavy (%)		
	Excluding Seedlings	Seedling	Young (%)	Mature (%)	Decadent (%)				
<b>Artemisia tridentata ssp. vaseyana<sup>p</sup> -- (mountain big sagebrush)</b>									
2019	1660	-	8	82	10	12	4	68	44/63
<b>Gutierrezia sarothrae -- (broom snakeweed)</b>									
2019	60	-	0	100	0	0	0	0	26/23
<b>Juniperus osteosperma<sup>i</sup> -- (Utah juniper)</b>									
2019	240	-	17	83	0	0	0	0	- / -
<b>Mahonia repens -- (creeping barberry)</b>									
2019	1500	-	7	93	0	0	0	0	10/14
<b>Opuntia fragilis -- (brittle pricklypear)</b>									
2019	20	20	0	100	0	0	0	0	6/9
<b>Opuntia -- (pricklypear)</b>									
2019	20	-	0	100	0	0	0	0	13/23
<b>Peraphyllum ramosissimum<sup>p</sup> -- (wild crab apple)</b>									
2019	780	-	28	64	8	33	23	10	100/135
<b>Pinus edulis<sup>t</sup> -- (twoneedle pinyon)</b>									
2019	20	-	100	0	0	0	0	0	- / -
<b>Quercus gambelii<sup>p</sup> -- (Gambel oak)</b>									
2019	3780	-	53	40	7	26	34	7	70/79
<b>Symphoricarpos oreophilus<sup>p</sup> -- (mountain snowberry)</b>									
2019	5680	-	12	88	0	6	5	0	44/54
<b>Tetradymia canescens -- (spineless horsebrush)</b>									
2019	-	-	-	-	-	-	-	-	46/51

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

**Table 14R-45.14 - 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>							
2019	108	5	10	5	20	60	37.0
<b>Pinus monophylla (singleleaf pinyon)</b>							
2019	2	-	50	-	-	50	16.5

## TARANTULA MESA LOP AND SCATTER - STUDY NO. 15R-2



### Location Information

USGS 7.5 min Map Info  
GPS (0' Stake)

Cave Flat NW; Township 32S, Range 8E, Section 25  
NAD 83 UTM ZONE 12, 501993 East 4205505 North

### Transect Information

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

226  
190° magnetic  
400ft  
Line 1 (11ft & 95ft), Line 2 (34ft), Line 3 (59ft), Line 4 (71ft)  
Standard

### Directions to Site

From the turn at the top of Pennellen Pass near Box Spring, turn onto right onto the Horn Road and proceed 0.4 miles to a "Y" junction. Turn right and go down the King Ranch Road for 3.3 miles, crossing Bullfrog Creek. There will be a turn to the Cave Flat Road, but continue straight on the King Ranch Road for 0.9 more miles. At this point there is another "Y" junction: turn left onto the Tarantula Mesa Road and proceed for 4.3 miles to a guzzler with a catch basin. Continue 2.7 miles to a turn, then proceed to the right (north) for 2.2 miles (total of 9.35 miles). The witness post is on the left (west) side of the road; proceed 450 yards from the witness post at 314 degrees magnetic. The 0-foot stake is marked by browse tag #226.

**Site Information**

Land Ownership	Federal
Land Administrator	BLM
Allotment	STEELE BUTTE
Elevation	6,400ft (1,951m)
Aspect	West
Slope	3%
Sample Dates	06/03/2009, 06/28/2012, 06/04/2019

**Table 15R-02.1 Disturbance History.** Recorded history of major disturbances.

Treatment/Disturbance	Name	WRI DB#	Date	Size (acres)
Seeding - Aerial Before	Tarantula Seeding #2	-	April 1966	1500
Chaining - Two-Way Unknown	Tarantula Seeding #2	-	October 1965-March 1966	1500
Hand Crew - Lop and Scatter	Tarantula Mesa Lop and Scatter Phase II	1336	August-September 2009	1784

**Table 15R-02.2 Seed Mix.** List of known seeded plant species and rates (if available).

Mix Name			Application Type	Application Date	Acres
Tarantula Seeding #2			Aerial	Apr 1965	1500
Type	Species	Common Name	Cultivar/Source ID	Bulk lbs/acre	PLS
G	Agropyron cristatum	Crested Wheatgrass		6.67	0.00
S	Atriplex canescens	Four-wing Saltbush		0.07	0.00
S	Purshia tridentata	Antelope Bitterbrush		1.00	0.00

**Wildlife Habitat and Vegetation History****Table 15R-02.3 - Wildlife Seasonal Habitat.** UDWR wildlife habitat and seasonality.

Species	Habitat	Season
American Bison	crucial	year-long

**Table 15R-02.4 - Vegetation History.** The dominant vegetation type(s) and phase of woodland succession (Tausch, Miller, Roundy, & Chambers, 2009).

Year	Vegetation Type	Woodland Succession
2009	Mountain Big Sagebrush	Phase I
2012	Mountain Big Sagebrush	Phase I
2019	Mountain Big Sagebrush	Phase I

**Site Notes**

No Notes

**Site Potential**

1981 - 2010 Average Annual Precipitation	10 inches
NRCS Ecological Site	Semidesert Sandy Loam (Wyoming Big Sagebrush)
NRCS Ecological Site #	R035XY216UT
States and Transitions	A defined state and transition model is available.

When the study was established in 2009, it was a twoneedle pinyon (*Pinus edulis*) and Utah juniper (*Juniperus osteosperma*)-encroached mountain big sagebrush (*Artemisia tridentata* ssp. *vaseyana*) site. However, a lop and scatter treatment occurred in the fall of that year (Table 15R-02.1) and removed a majority of the trees (Table 15R-02.14). The herbaceous understory has been dominated by perennial grasses with a depleted forb layer (Table 15R-02.7). Crested wheatgrass (*Agropyron cristatum*) and blue grama (*Bouteloua gracilis*) have been the dominant grass species; blue grama has maintained cover while crested wheatgrass has moderately increased over time (Table 15R-02.10). No forbs were sampled in 2009 and only one plant was sampled in 2012. The 2019 sample year showed a significant increase in the number of forbs, however, likely due to significant winter precipitation: shy gilia (*Gilia inconspicua*) was the dominant forb in that sample year (Table 15R-02.11). Mountain big sagebrush is the predominant browse species, and cover has increased steadily through time (Table 15R-02.12, Table 15R-02.13). Although pinyon and juniper decreased in cover and density following treatment, they are still present on this site. This persistent tree component suggests that there may be potential for future infilling (Table 15R-02.14). The state and transition model places this site in the Wyoming Big Sagebrush/Perennial Grass Community Phase within the Current Potential State. The site is likely to stay in this community phase unless there is significant disturbance or trees infilling to the point that it affects shrub growth and understory (Jornada, 2019).

**Trend Summary Tables**

**Table 15R-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
2009	13.2	1.9	2.5	18.1	1.8	3.5
2012	13.7	1.2	0.8	20.0	0.7	1.5
2019	14.6	1.0	0.8	20.4	0.7	0.3

**Table 15R-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
2009	-	210	-	-	-	8.1	-	-
2012	-	240	-	3	-	7.1	-	0.0
2019	173	241	264	35	0.7	13.7	2.7	0.2

**Table 15R-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
2009	55.3	2.6	26.4	0.2	0.6	25.3
2012	65.5	1.8	22.2	0.1	0.3	23.1
2019	55.7	2.5	32.4	0.4	0.3	32.0

**Table 15R-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			
2009	2	11	-	50
2012	1	1	-	2
2019	-	15	-	17
Days Use Per Acre (ha)				
2009	2.9 (7.2)	32.2 (79.5)	-	-
2012	3.6 (9.0)	11.4 (28.1)	-	-
2019	2.2 (5.4)	6.7 (16.6)	0.7 (1.7)	-

**Table 15R-02.10 - Grass Species.** Nested frequency and modified Daubenmire average cover by year.

GRASS SPECIES	<i>Agropyron cristatum</i> <sup>i</sup> (crested wheatgrass)	<i>Bouteloua gracilis</i> (blue grama)	<i>Elymus elymoides</i> (squirreltail)	<i>Hesperostipa comata</i> (needle and thread)	<i>Pleuraphis jamesii</i> (James' galleta)	<i>Vulpia octoflora</i> <sup>a</sup> (sixweeks fescue)
year	Nested Frequency					
2009	100	84	-	5	62	-
2012	152	125	7	-	1	-
2019	169	108	5	4	12	173
year	Average Cover (%)					
2009	3.2	2.4	-	0.2	2.4	-
2012	4.1	3.0	0.0	-	0.0	-
2019	9.3	4.1	0.0	0.1	0.3	0.7

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

**Table 15R-02.11 - Forb Species.** Nested frequency and modified Daubenmire average cover by year.

FORB SPECIES	Astragalus (milkvetch)	Calochortus nuttallii (sego lily)	Cryptantha (cryptantha)	Cryptantha <sup>a</sup> (annual cryptantha)	Cymopterus (springparsley)	Descurainia pinnata <sup>a</sup> (western tansymustard)	Gilia inconspicua <sup>a</sup> (shy gilia)	Oenothera pallida <sup>a</sup> (pale evening primrose)	Phlox longifolia (longleaf phlox)	Plantago patagonica <sup>a</sup> (woolly plantain)
year	Nested Frequency									
2009	-	-	-	-	-	-	-	-	-	-
2012	3	-	-	-	-	-	-	-	-	-
2019	4	20	5	5	4	3	244	12	2	65
year	Average Cover (%)									
2009	-	-	-	-	-	-	-	-	-	-
2012	0.0	-	-	-	-	-	-	-	-	-
2019	0.0	0.1	0.0	0.0	0.0	0.1	2.3	0.0	0.0	0.2

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

**Table 15R-02.12 - 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)	Ephedra viridis <sup>p</sup> (mormon tea)	Gutierrezia sarothrae (broom snakeweed)	Juniperus osteosperma <sup>t</sup> (Utah juniper)	Opuntia (pricklypear)
year	Line Intercept Cover (%)				
2009	15.7	2.4	1.3	3.5	0.5
2012	17.1	2.9	0.2	1.5	0.5
2019	18	2.4	0.3	0.3	0.4
year	Quadrat Cover (%)				
2009	11.9	1.3	1.6	2.5	0.3
2012	12.7	1.0	0.6	0.8	0.6
2019	13.9	0.8	0.8	0.8	0.2

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



**Table 15R-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.

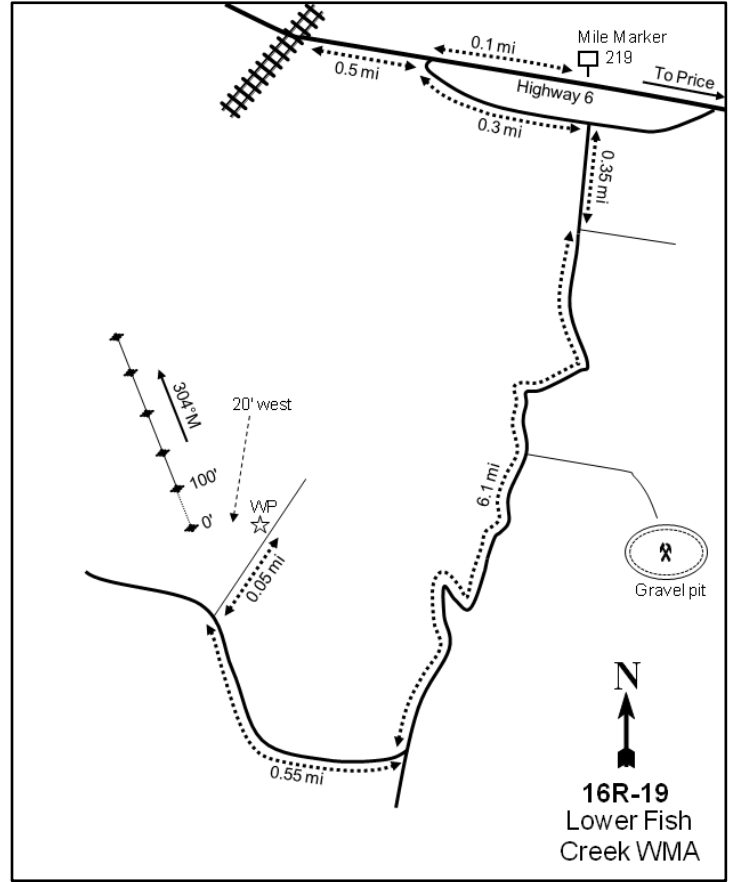
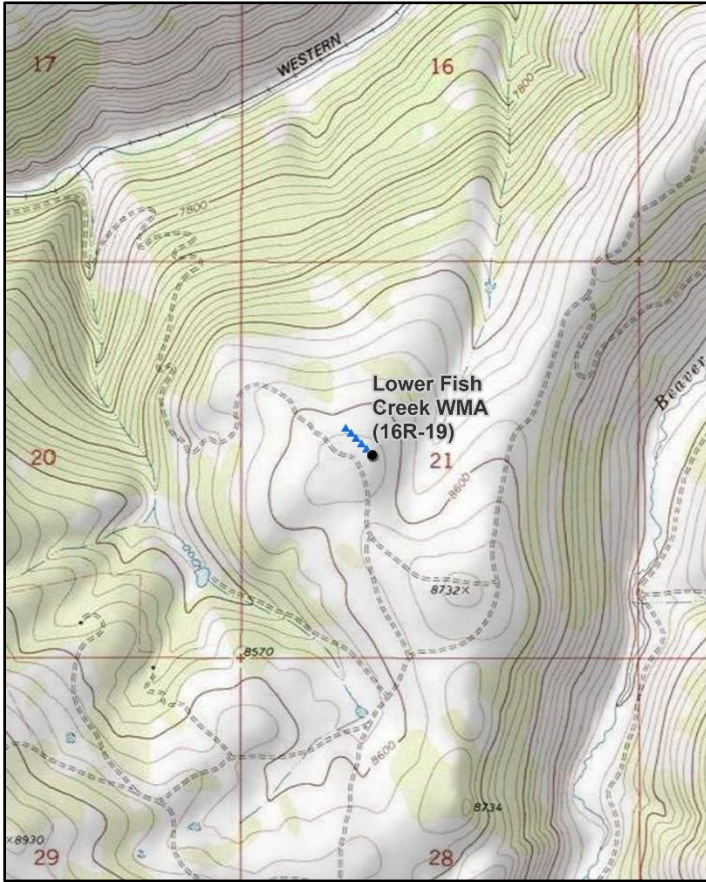
Year	Density		Age Class Distribution			Utilization		Poor Vigor (%)	Average Height Crown (cm)
	Plants Per Acre		Excluding Seedlings			Moderate (%)	Heavy (%)		
	Excluding Seedlings	Seedling	Young (%)	Mature (%)	Decadent (%)				
<b>Artemisia tridentata ssp. vaseyana<sup>p</sup> -- (mountain big sagebrush)</b>									
2009	-	-	-	-	-	-	-	-	53/90
2012	2580	20	21	68	11	33	33	51	53/88
2019	1900	-	5	75	20	33	44	19	51/77
<b>Atriplex canescens<sup>p</sup> -- (fourwing saltbush)</b>									
2009	-	-	-	-	-	-	-	-	106/118
2012	-	-	-	-	-	-	-	-	99/107
2019	-	-	-	-	-	-	-	-	24/48
<b>Ephedra viridis<sup>p</sup> -- (mormon tea)</b>									
2009	-	-	-	-	-	-	-	-	50/65
2012	1080	-	11	80	9	37	0	56	52/65
2019	1220	-	23	72	5	0	3	5	41/45
<b>Gutierrezia sarothrae -- (broom snakeweed)</b>									
2009	-	-	-	-	-	-	-	-	12/15
2012	2060	500	36	60	4	3	0	7	12/14
2019	2780	3160	15	84	1	0	0	1	12/13
<b>Juniperus osteosperma<sup>i</sup> -- (Utah juniper)</b>									
2009	-	-	-	-	-	-	-	-	-/-
2012	60	-	67	33	0	0	0	0	-/-
2019	40	-	50	50	0	0	0	0	-/-
<b>Linanthus pungens -- (granite prickly phlox)</b>									
2009	-	-	-	-	-	-	-	-	5/12
2012	-	-	-	-	-	-	-	-	-/-
2019	-	-	-	-	-	-	-	-	-/-
<b>Opuntia -- (pricklypear)</b>									
2009	-	-	-	-	-	-	-	-	10/31
2012	620	-	36	65	0	0	0	7	8/30
2019	300	-	13	80	7	0	0	0	9/34
<b>Sclerocactus -- (fishhook cactus)</b>									
2009	-	-	-	-	-	-	-	-	7/9
2012	20	-	0	100	0	0	0	0	13/13
2019	20	-	0	100	0	0	0	0	12/13

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

**Table 15R-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>							
2009	41	7	21	71	-	-	10.7
2012	25	-	77	23	-	-	9.8
2019	26	-	92	8	-	-	10.5
<b>Pinus edulis (twoneedle pinyon)</b>							
2009	4	-	50	50	-	-	7.3
2012	1	-	100	-	-	-	4.0
2019	1	-	100	-	-	-	8.0

## LOWER FISH CREEK WMA - STUDY NO. 16R-19



### Location Information

USGS 7.5 min Map Info  
GPS (0' Stake)

Colton SE; Township 12S, Range 8E, Section 21  
NAD 83 UTM ZONE 12, 496950 East 4401981 North

### Transect Information

Browse Tag # (0' Stake)	92
Transect Bearing	304° magnetic
Length	500ft
Belt Placement	Line 1 (11ft), Line 2 (34ft), Line 3 (59ft), Line 4 (71ft), Line 5 (95ft)
Belt Marker Placement	Standard

### Directions to Site

Traveling north on US-6 from Price, drive to mile marker 219 and continue 0.1 miles to a road on the left (southwest) side of the road. Turn left and drive 0.3 miles to a road on the right (south). Turn right and drive 6.1 miles to a fork. Take the right fork and drive 0.5 miles to a two-track on the right (east) side of the road. Turn right on the two-track and drive 0.05 miles to the witness post. From the witness post, walk 20 feet in a westward direction to the 0-foot stake. The 0-foot stake is marked with browse tag #92.

**Site Information**

Land Ownership	State
Land Administrator	UDWR
Allotment	BEAVER CREEK
Elevation	8,640ft (2,633m)
Aspect	North
Slope	5%
Sample Dates	08/10/2005, 06/24/2010, 08/19/2015, 07/16/2019

**Wildlife Habitat and Vegetation History**

**Table 16R-19.3 - Wildlife Seasonal Habitat.** UDWR wildlife habitat and seasonality.

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

**Table 16R-19.4 - Vegetation History.** The dominant vegetation type(s) and phase of woodland succession (Tausch, Miller, Roundy, & Chambers, 2009).

Year	Vegetation Type	Woodland Succession
2005	Mountain Big Sagebrush/Yellow Rabbitbrush/Mountain Snowberry	NA
2010	Mountain Big Sagebrush/Yellow Rabbitbrush/Mountain Snowberry	NA
2015	Mountain Big Sagebrush/Yellow Rabbitbrush/Mountain Snowberry	NA
2019	Mountain Big Sagebrush/Yellow Rabbitbrush/Mountain Snowberry	NA

**Site Notes**

No Notes

**Soils**

**Table 16R-19.5 - Soil Analysis Data.** List of chemical and textural soil characteristics determined by laboratory analysis.

Texture	pH	% sand	% silt	% clay	%OM	PPM P	PPM K	ds/m	Sample Date
Silt Loam	6.8	16.0	41.4	42.6	5.9	18.5	268.8	0.8	08/10/2005

**Site Potential**

1981 - 2010 Average Annual Precipitation	19 inches
NRCS Ecological Site	Mountain Loam (Mountain Big Sagebrush)
NRCS Ecological Site #	R047XA430UT
States and Transitions	A defined state and transition model is available.

This site has remained dominated by mountain big sagebrush (*Artemisia tridentata* ssp. *vaseyana*), yellow rabbitbrush (*Chrysothamnus viscidiflorus* ssp. *viscidiflorus* var. *viscidiflorus*), and mountain snowberry (*Symphoricarpos oreophilus*) since study establishment in 2005 (Table 16R-19.12, Table 16R-19.13). The herbaceous understory has remained abundant and diverse, with perennial forbs and grasses -- particularly Kentucky bluegrass (*Poa pratensis*) -- providing a majority of the cover (Table 16R-19.7, Table 16R-19.10, Table 16R-19.11). The plant community on this site could be comparable to the Mountain Big Sagebrush/Snowberry State as is described by the available state and transition model (Jornada, 2019). Without a major shrub-removing disturbance or changes in management and/or grazing, this site will likely continue to remain in this state in future sample years.

**Trend Summary Tables**

**Table 16R-19.6 - Shrub/Tree Summary.** Average modified Daubenmire quadrat and line intercept cover by year for shrubs/trees

Year	Quadrat Cover (%)			Line-intercept Cover (%)		
	Preferred Shrub	Other Shrub	Tree	Preferred Shrub	Other Shrub	Tree
2005	18.8	17.1	-	28.7	24.8	-
2010	23.8	18.6	-	33.2	25.7	-
2015	28.4	15.1	-	38.1	23.2	-
2019	26.8	20.5	-	44.6	22.8	-

**Table 16R-19.7 - Herbaceous Summary.** Nested frequency and average modified Daubenmire quadrat cover by year for herbaceous functional groups

Year	Nested Frequency				Quadrat Cover (%)			
	Annual Grass	Perennial Grass	Annual/Biennial Forb	Perennial Forb	Annual Grass	Perennial Grass	Annual/Biennial Forb	Perennial Forb
2005	-	391	96	290	-	15.1	1.6	22.4
2010	-	392	69	292	-	20.9	2.7	19.3
2015	-	459	47	238	-	34.8	0.7	16.8
2019	-	425	93	337	-	21.9	3.5	19.1

**Table 16R-19.8 - Basic Ground Cover.** Average modified Daubenmire quadrat cover by year for basic ground cover types.

Year	Cover Type (%)					
	Bare Ground	Cryptogams	Litter	Pavement	Rock	Vegetation
2005	3.9	0.0	58.5	0.0	0.2	65.5
2010	3.8	0.0	59.0	-	-	68.8
2015	0.7	0.0	38.8	0.0	0.1	83.2
2019	3.5	-	63.4	0.0	0.2	70.8

**Table 16R-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	Greater Sage-Grouse	Rabbit
	Quadrat Frequency				
2005	4	9	9	-	1
2010	7	15	1	-	2
2015	2	6	2	-	-
2019	5	11	5	-	1
Year	Days Use Per Acre (ha)				
2005	21.1 (52.0)	22.8 (56.3)	30.8 (76.1)	8.7 (21.5)*	-
2010	11.6 (28.7)	14.7 (36.4)	2.0 (5.0)	-	-
2015	14.5 (35.9)	13.4 (33.1)	-	-	-
2019	5.8 (14.3)	32.2 (79.5)	-	-	-

\*Pellets per acre (ha)

**Table 16R-19.10 - Grass Species.** Nested frequency and modified Daubenmire average cover by year.

GRASS SPECIES	Achnatherum lettermanii (Letterman's needlegrass)	Achnatherum nelsonii (Columbia needlegrass)	Bromus porteri (Porter brome)	Carex (sedge)	Carex geyeri (Geyer's sedge)	Elymus elymoides (squirreltail)	Elymus lanceolatus (thick-spike wheatgrass)	Elymus trachycaulus (slender wheatgrass)	Festuca idahoensis (Idaho fescue)	Koeleria macrantha (prairie Junegrass)	Poa fendleriana (muttongrass)	Poa pratensis <sup>1</sup> (Kentucky bluegrass)	Poa secunda (Sandberg bluegrass)	Pseudoroegneria spicata (bluebunch wheatgrass)
year	Nested Frequency													
2005	-	96	40	8	-	2	178	32	4	8	-	233	18	-
2010	-	15	13	-	-	-	92	19	12	1	1	325	19	-
2015	26	7	62	3	-	-	26	15	9	3	3	434	19	0
2019	33	10	65	-	1	10	85	4	9	10	15	360	-	-
year	Average Cover (%)													
2005	-	2.3	0.6	0.2	-	0.1	2.8	0.7	0.0	0.1	-	7.9	0.5	-
2010	-	0.4	0.2	-	-	-	2.6	0.4	0.2	0.0	0.0	16.8	0.2	-
2015	0.8	0.1	1.7	0.4	-	-	0.3	0.2	0.3	0.0	0.1	30.5	0.4	0.0
2019	1.2	0.7	0.7	-	0.0	0.2	1.8	0.0	0.1	0.1	0.4	16.6	-	-

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

**Table 16R-19.11 - 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 (pussytoes)	Aquilegia (columbine)	Arabis (rockcress)	Astragalus convallarius (lesser rushy milkvetch)	Astragalus miser (timber milkvetch)	Astragalus purshii (woollypod milkvetch)	Astragalus tenellus (looseflower milkvetch)	Calochortus nuttallii (sego lily)	Castilleja flava (yellow Indian paintbrush)	Chaenactis douglasii (Douglas' dustymaiden)	Erigeron (fleabane)	Erigeron eatonii (Eaton's fleabane)	Eriogonum umbellatum (sulphur-flower buckwheat)	Frasera speciosa (elkweed)	Geranium <sup>a</sup> (geranium)
year	Nested Frequency																
2005	2	5	1	0	3	41	-	11	88	-	13	6	-	11	30	89	54
2010	4	1	2	-	-	12	-	6	85	-	-	-	1	4	63	89	40
2015	16	18	1	-	7	2	-	8	-	-	3	-	-	14	18	92	28
2019	8	-	4	-	16	10	40	9	58	5	7	-	3	4	45	97	45
year	Average Cover (%)																
2005	0.0	0.0	0.0	0.0	0.0	0.2	-	0.1	3.7	-	0.4	0.1	-	0.1	1.1	3.8	0.5
2010	0.2	0.0	0.0	-	-	0.1	-	0.2	2.8	-	-	-	0.0	0.0	2.0	5.5	1.7
2015	0.6	0.1	0.0	-	0.1	0.0	-	0.1	-	-	0.0	-	-	0.1	0.7	7.1	0.6
2019	0.6	-	0.0	-	0.1	0.1	0.7	0.1	1.0	0.0	0.2	-	0.0	0.0	1.8	4.9	2.7

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

FORB SPECIES	Gilia inconspicua <sup>a</sup> (shy gilia)	Hymenoxys hoopesii (owl's-claws)	Ipomopsis aggregata (scarlet gilia)	Lupinus argenteus (silvery lupine)	Machaeranthera grindelioides (rayless tansyaster)	Mertensia (bluebells)	Orthocarpus <sup>a</sup> (owl's-clover)	Packera multilobata (lobeleaf groundsel)	Penstemon (beardtongue)	Penstemon watsonii (Watson's penstemon)	Phacelia <sup>a</sup> (phacelia)	Phlox longifolia (longleaf phlox)	Polygonum douglasii <sup>a</sup> (Douglas' knotweed)	Potentilla gracilis (slender cinquefoil)	Senecio integerrimus <sup>a</sup> (lambstongue ragwort)	Silene drummondii (Drummond's campion)	Symphyotrichum ascendens (western aster)
year	Nested Frequency																
2005	3	14	3	118	-	-	32	3	1	122	-	60	7	3	-	-	5
2010	-	-	2	65	0	49	-	5	-	114	1	26	-	4	5	-	66
2015	-	2	3	39	-	9	5	-	-	86	-	2	-	5	-	-	6
2019	-	3	-	45	1	73	42	3	-	150	-	42	7	8	-	3	7
year	Average Cover (%)																
2005	0.0	0.2	0.0	7.9	-	-	1.0	0.1	0.0	2.9	-	0.2	0.0	0.1	-	-	0.1
2010	-	-	0.0	1.5	0.0	0.9	-	0.2	-	3.5	0.1	0.3	-	0.1	0.1	-	1.4
2015	-	0.0	0.0	2.8	-	0.6	0.0	-	-	1.5	-	0.0	-	0.2	-	-	0.1
2019	-	0.0	-	2.6	0.0	0.8	0.7	0.0	-	3.6	-	0.2	0.0	0.4	-	0.0	0.2

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

FORB SPECIES					
	Taraxacum officinale (common dandelion)	Tragopogon dubius <sup>ai</sup> (yellow salsify)	Trifolium (clover)	Veronica biloba <sup>ai</sup> (two-lobed speedwell)	Vicia americana (American vetch)
year	Nested Frequency				
2005	31	3	1	1	48
2010	23	-	-	23	25
2015	16	-	-	-	102
2019	69	-	-	3	35
year	Average Cover (%)				
2005	0.7	0.0	0.0	0.0	0.6
2010	0.2	-	-	0.8	0.2
2015	0.1	-	-	-	2.9
2019	0.8	-	-	0.0	1.0

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

**Table 16R-19.12 - 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)	Chrysothamnus viscidiflorus ssp. viscidiflorus var. viscidiflorus (yellow rabbitbrush)	Ribes <sup>p</sup> (currant)	Rosa woodsii <sup>p</sup> (Woods' rose)	Symphoricarpos oreophilus <sup>p</sup> (mountain snowberry)
year	Line Intercept Cover (%)					
2005	-	18.6	24.8	0.2	0.1	9.8
2010	-	22.8	25.7	0.1	0.4	9.9
2015	-	25.8	23.2	0.2	0.1	12
2019	-	30	22.8	0.1	-	14.5
year	Quadrat Cover (%)					
2005	-	13.7	17.1	0.2	0.2	4.8
2010	-	18.4	18.6	0.1	0.1	5.2
2015	0.0	19.4	15.1	0.7	0.2	8.0
2019	-	16.6	20.5	0.1	0.2	9.8

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

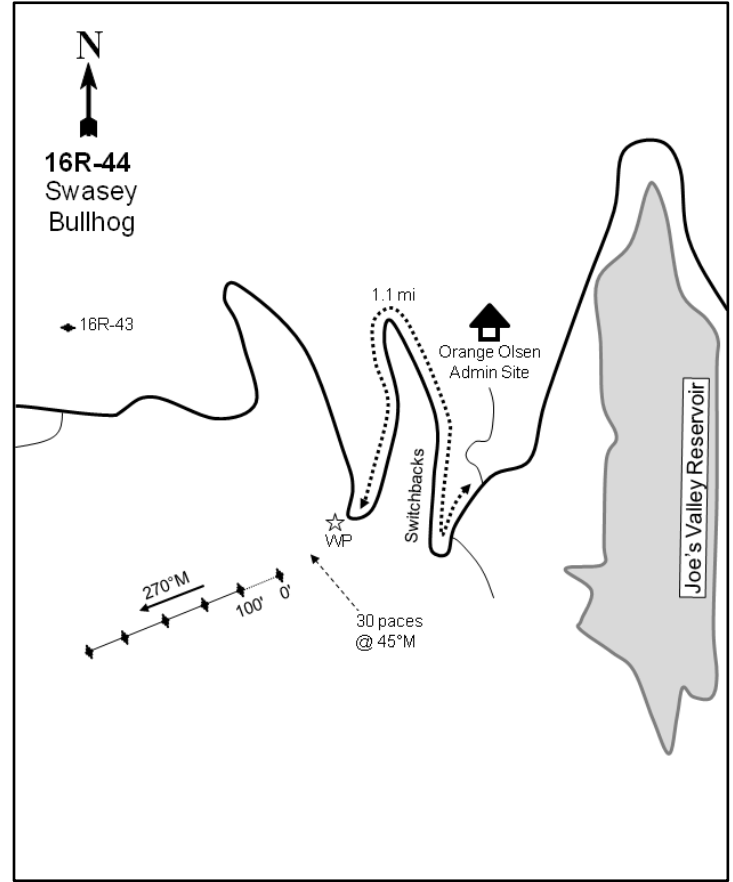
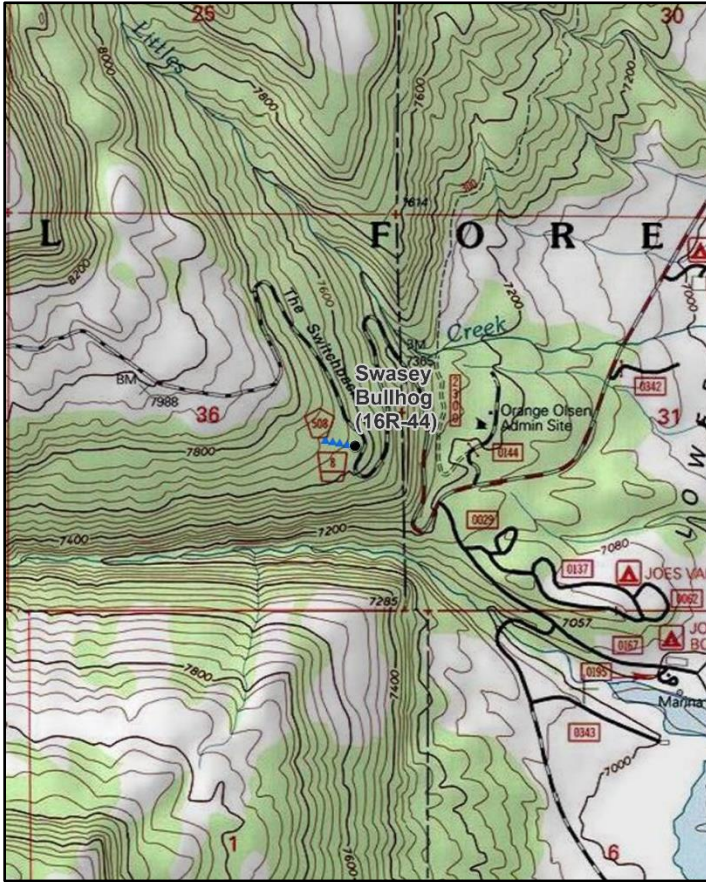
**Table 16R-19.13 - Shrub/Tree Characteristics.** Population characteristics of shrub/tree species populations including density reproduction (seedlings), age distribution, utilization, vigor and average size (height/crown) of plants.

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>Amelanchier utahensis<sup>p</sup> -- (Utah serviceberry)</b>									
2005	40	20	0	100	0	50	50	0	60/51
2010	40	-	50	50	0	0	0	0	70/62
2015	40	-	50	0	50	0	50	50	55/41
2019	40	-	50	50	0	0	50	50	49/37
<b>Artemisia tridentata ssp. vaseyana<sup>p</sup> -- (mountain big sagebrush)</b>									
2005	4400	220	4	30	66	20	4	41	71/73
2010	3600	100	11	78	11	28	5	11	74/91
2015	4240	20	8	70	22	25	1	25	70/84
2019	3700	-	6	57	37	20	16	36	77/83
<b>Chrysothamnus viscidiflorus ssp. viscidiflorus var. viscidiflorus -- (yellow rabbitbrush)</b>									
2005	11540	60	1	99	0	0	0	0	34/46
2010	11380	460	16	84	0	0	0	0	32/46
2015	11240	-	8	92	0	2	0	4	38/50
2019	11280	-	2	98	1	0	1	1	34/43
<b>Juniperus communis -- (common juniper)</b>									
2005	-	-	-	-	-	-	-	-	-/-
2010	-	-	-	-	-	-	-	-	-/-
2015	-	-	-	-	-	-	-	-	-/-
2019	-	-	-	-	-	-	-	-	27/45
<b>Ribes<sup>p</sup> -- (currant)</b>									
2005	40	-	0	100	0	0	0	0	55/50
2010	60	-	33	67	0	0	0	0	45/47
2015	140	-	57	43	0	14	0	14	57/66
2019	40	-	0	100	0	0	0	0	65/62
<b>Ribes cereum<sup>p</sup> -- (wax currant)</b>									
2005	-	-	-	-	-	-	-	-	-/-
2010	-	-	-	-	-	-	-	-	-/-
2015	-	-	-	-	-	-	-	-	-/-
2019	20	-	0	100	0	0	0	0	82/87
<b>Rosa woodsii<sup>p</sup> -- (Woods' rose)</b>									
2005	480	-	25	75	0	0	0	0	23/17
2010	360	20	22	78	0	0	0	0	36/23
2015	260	-	54	46	0	0	0	23	47/31
2019	160	-	0	100	0	0	0	0	-/-
<b>Symphoricarpos oreophilus<sup>p</sup> -- (mountain snowberry)</b>									
2005	1480	-	7	92	1	0	0	0	60/84
2010	1080	-	2	98	0	2	0	0	73/107
2015	2620	-	8	92	0	9	0	0	69/82
2019	2060	20	2	89	9	14	8	9	68/89
<b>Tetradymia canescens -- (spineless horsebrush)</b>									
2005	-	-	-	-	-	-	-	-	26/32
2010	20	-	100	0	0	0	0	0	27/29
2015	-	-	-	-	-	-	-	-	-/-
2019	20	-	0	0	100	0	0	100	48/11

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



## SWASEY BULLHOG - STUDY NO. 16R-44



### Location Information

USGS 7.5 min Map Info  
GPS (0' Stake)

Joes Valley Reservoir; Township 17S, Range 5E, Section 36  
NAD 83 UTM ZONE 12, 473854 East 4350159 North

### Transect Information

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

9161  
270° magnetic  
400ft  
Line 1 (11ft & 95ft), Line 2 (34ft), Line 3 (59ft), Line 4 (71ft)  
No rebar

### Directions to Site

From the turnoff to the Orange Olsen Administration Site near Joes Valley Reservoir, drive west for 1.1 miles up the switchbacks. The witness post is on the east side of the road. The 0-foot stake is approximately 30 paces from the witness post at 45 degrees magnetic and is marked with browse tag #9161.

**Site Information**

Land Ownership	Federal
Land Administrator	USFS
Allotment	OLSEN BENCH
Elevation	7,565ft (2,306m)
Aspect	Southeast
Slope	5-10%
Sample Dates	08/31/2011, 08/17/2015, 08/08/2019

**Table 16R-44.1 Disturbance History.** Recorded history of major disturbances.

Treatment/Disturbance	Name	WRI DB#	Date	Size (acres)
Mechanical - Bullhog	Swasey Wildlife Improvement and Hazardous Fuels Phase IV	2627	August 2013-June 2015	519

**Wildlife Habitat and Vegetation History****Table 16R-44.3 - Wildlife Seasonal Habitat.** UDWR wildlife habitat and seasonality.

Species	Habitat	Season
Mule Deer	crucial	winter
Rocky Mountain Elk	substantial	winter
Shiras Moose	crucial	winter

**Table 16R-44.4 - 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
2015	Perennial Grass	Phase I
2019	Perennial Grass	Phase I

**Site Notes**

No Notes

**Site Potential**

1981 - 2010 Average Annual Precipitation	16 inches
NRCS Ecological Site	Mountain Shallow Loam (Mountain Big Sagebrush)
NRCS Ecological Site #	R047XA446UT
States and Transitions	A defined state and transition model is available.

When the study was established in 2011, this site was dominated by twoneedle pinyon (*Pinus edulis*) and Utah juniper (*Juniperus osteosperma*), placing it in Phase III of woodland succession. The 2013-2015 bullhog treatment (Table 16R-44.1) removed many of these trees, and the site has been in Phase I since 2015 (Table 16R-44.4, Table 16R-44.12, Table 16R-44.14). However, the continued presence of trees suggests that this site may have the potential for infilling in future sample years. Although degraded prior to treatment, the browse component on this site has increased over time with antelope bitterbrush (*Purshia tridentata*) providing the most cover (Table 16R-44.12, Table 16R-44.13). The herbaceous understory was in fair condition before the bullhog treatment and consisted of primarily perennial grass and forb species. Perennial grasses, namely bluebunch wheatgrass (*Pseudoroegneria spicata*) and slender wheatgrass (*Elymus trachycaulus*), increased in cover following treatment and have been the dominant site component since 2015 (Table 16R-44.7, Table 16R-44.10, Table 16R-44.11, Photos). Although the presence of pinyon and juniper is not mentioned by the state and transition model, this perennial grass community type may be comparable to the increased perennial grasses/mountain big sagebrush reduced phase in the Perennial Grass State (Jornada, 2019).

**Trend Summary Tables**

**Table 16R-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
2011	2.3	0.7	14.0	3.6	0.8	41.2
2015	3.2	0.5	1.8	5.5	0.3	10.3
2019	7.3	0.5	4.1	11.4	0.3	10.1

**Table 16R-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
2011	-	174	-	185	-	4.5	-	5.4
2015	-	180	13	131	-	9.8	0.3	3.4
2019	-	271	69	176	-	23.1	0.7	5.5

**Table 16R-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
2011	39.4	0.6	34.8	2.7	9.3	25.2
2015	23.2	0.3	61.4	1.8	7.7	19.1
2019	24.0	0.1	51.9	1.9	7.8	36.9

**Table 16R-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/Domestic Sheep	Rocky Mountain Elk	Rabbit
	Quadrat Frequency		
2011	10	5	21
2015	6	4	11
2019	23	28	12
Year	Days Use Per Acre (ha)		
2011	17.4 (43.0)	14.7 (36.4)	-
2015	10.0 (24.8)	6.0 (14.9)	-
2019	14.7 (36.4)	30.8 (76.1)	-

**Table 16R-44.10 - Grass Species.** Nested frequency and modified Daubenmire average cover by year.

GRASS SPECIES	Achnatherum hymenoides (Indian ricegrass)	Achnatherum lettermanii (Letterman's needlegrass)	Carex rossii (Ross' sedge)	Elymus lanceolatus (thickspike wheatgrass)	Elymus trachycaulus (slender wheatgrass)	Festuca idahoensis (Idaho fescue)	Juncus (rush)	Koeleria macrantha (prairie Junegrass)	Pascopyrum smithii (western wheatgrass)	Poa fendleriana (muttongrass)	Poa secunda (Sandberg bluegrass)	Pseudoroegneria spicata (bluebunch wheatgrass)
year	Nested Frequency											
2011	9	4	6	80	-	-	3	1	5	38	1	53
2015	15	17	5	12	57	3	-	4	41	16	7	38
2019	30	14	5	9	105	5	-	3	49	2	4	118
year	Average Cover (%)											
2011	0.4	0.0	0.1	1.6	-	-	0.0	0.0	0.0	0.5	0.0	1.7
2015	1.9	0.3	0.2	0.6	2.9	0.1	-	0.0	1.1	0.1	0.1	2.4
2019	3.4	0.1	0.3	0.2	6.0	0.0	-	0.1	3.0	0.1	0.0	9.9

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

**Table 16R-44.11 - Forb Species.** Nested frequency and modified Daubenmire average cover by year.

FORB SPECIES	Achillea millefolium (Common yarrow)	Arabis (rockcress)	Astragalus (milkvetch)	Astragalus convallarius (lesser rushy milkvetch)	Astragalus tenellus (looseflower milkvetch)	Calochortus nuttallii (sego lily)	Chaenactis douglasii (Douglas' dustymaiden)	Chenopodium leptophyllum <sup>a</sup> (narrowleaf goosefoot)	Cirsium (thistle)	Cymopterus (springparsley)	Erigeron eatonii (Eaton's fleabane)	Eriogonum umbellatum (sulphur-flower buckwheat)	Hymenoxys richardsonii (pingue rubberweed)	Lactuca serriola <sup>ai</sup> (prickly lettuce)	Lithospermum incisum (narrowleaf stoneseed)	Machaeranthera canescens (hoary tansyaster)	Packera multilobata (lobeleaf groundsel)
year	Nested Frequency																
2011	3	4	9	6	3	2	8	-	-	-	18	3	0	-	-	5	-
2015	-	2	-	1	3	5	2	4	-	-	2	1	1	10	0	9	8
2019	-	1	5	4	-	5	43	12	4	8	4	1	-	59	1	1	2
year	Average Cover (%)																
2011	0.0	0.0	0.0	0.1	0.0	0.0	0.0	-	-	-	0.0	0.1	0.0	-	-	0.0	-
2015	-	0.0	-	0.0	0.2	0.0	0.0	0.1	-	-	0.0	0.1	0.1	0.3	0.0	0.2	0.1
2019	-	0.0	0.0	0.0	-	0.0	0.2	0.0	0.2	0.0	0.1	0.0	-	0.4	0.0	0.0	0.0

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

FORB SPECIES	Penstemon caespitosus (mat penstemon)	Phlox austromontana (mountain phlox)	Polygonum douglasii <sup>a</sup> (Douglas' knotweed)	Symphytotrichum (aster)	Taraxacum officinale (common dandelion)	Tragopogon dubius <sup>ai</sup> (yellow salsify)
year	Nested Frequency					
2011	119	85	-	15	-	-
2015	81	50	-	7	8	-
2019	96	61	4	24	9	2
year	Average Cover (%)					
2011	2.6	2.2	-	0.0	-	-
2015	1.7	0.6	-	0.1	0.2	-
2019	2.7	1.6	0.0	0.6	0.0	0.2

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

**Table 16R-44.12 - Shrub and Tree Species.** Average modified Daubenmire quadrat and line intercept cover by year.

SHRUB SPECIES	Abies concolor <sup>t</sup> (white fir)	Amelanchier utahensis <sup>p</sup> (Utah serviceberry)	Artemisia nova <sup>p</sup> (black sagebrush)	Artemisia tridentata ssp. vaseyana <sup>p</sup> (mountain big sagebrush)	Chrysothamnus depressus <sup>p</sup> (longflower rabbitbrush)	Ericameria parryi var. parryi (Parry's rabbitbrush)	Gutierrezia sarothrae (broom snakeweed)	Juniperus osteosperma <sup>t</sup> (Utah juniper)	Juniperus scopulorum <sup>t</sup> (Rocky Mountain juniper)	Opuntia (pricklypear)	Pinus edulis <sup>t</sup> (twoneedle pinyon)	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 (%)													
2011	0.2	-	-	0.4	0.1	-	-	18.2	-	0.8	22.8	-	3	0.1
2015	-	-	-	1	-	-	-	0.8	-	0.3	8.5	1	4.1	0.4
2019	-	-	0.5	2.6	0.1	-	-	1.2	-	0.3	8.9	-	7.8	0.4
year	Quadrat Cover (%)													
2011	0.0	0.4	-	0.1	0.1	-	-	4.7	-	0.7	9.3	-	1.6	0.1
2015	-	-	-	0.6	0.0	0.0	-	0.2	-	0.5	1.6	0.0	2.6	0.0
2019	-	0.0	0.1	1.8	0.2	-	0.1	0.2	0.1	0.5	3.8	-	4.8	0.3

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

**Table 16R-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>									
2011	-	-	-	-	-	-	-	-	21/24
2015	40	-	50	0	50	50	50	50	137/45
2019	100	-	60	40	0	20	60	0	16/15
<b>Artemisia nova<sup>p</sup> -- (black sagebrush)</b>									
2011	-	-	-	-	-	-	-	-	17/54
2015	-	-	-	-	-	-	-	-	15/46
2019	40	-	0	100	0	100	0	0	33/50
<b>Artemisia tridentata ssp. vaseyana<sup>p</sup> -- (mountain big sagebrush)</b>									
2011	1020	300	63	29	8	18	12	6	43/62
2015	400	-	20	80	0	10	20	0	38/53
2019	840	480	48	52	0	19	7	0	38/55
<b>Cercocarpus montanus<sup>p</sup> -- (alderleaf mountain mahogany)</b>									
2011	20	-	0	100	0	0	100	0	31/41
2015	20	-	0	100	0	0	100	0	30/45
2019	-	-	-	-	-	-	-	-	34/51
<b>Chrysothamnus depressus<sup>p</sup> -- (longflower rabbitbrush)</b>									
2011	420	-	0	100	0	38	0	0	11/24
2015	60	-	33	67	0	33	0	0	11/20
2019	140	-	0	100	0	14	57	0	11/26
<b>Chrysothamnus viscidiflorus ssp. viscidiflorus var. viscidiflorus -- (yellow rabbitbrush)</b>									
2011	20	-	0	100	0	0	0	0	10/18
2015	20	-	0	100	0	0	0	0	47/39
2019	20	-	0	100	0	0	100	0	17/29
<b>Ericameria nauseosa -- (rubber rabbitbrush)</b>									
2011	-	-	-	-	-	-	-	-	59/34
2015	-	-	-	-	-	-	-	-	-/-
2019	60	-	0	100	0	0	33	0	48/49

Year	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 var. parryi -- (Parry's rabbitbrush)</b>									
2011	-	-	-	-	-	-	-	-	-/-
2015	60	-	0	100	0	0	33	0	14/28
2019	-	-	-	-	-	-	-	-	-/-
<b>Gutierrezia sarothrae -- (broom snakeweed)</b>									
2011	-	-	-	-	-	-	-	-	-/-
2015	60	-	0	100	0	0	0	0	24/32
2019	420	-	0	95	5	0	0	5	21/30
<b>Juniperus osteosperma<sup>1</sup> -- (Utah juniper)</b>									
2011	240	-	42	42	17	0	0	17	-/-
2015	20	-	0	100	0	0	0	0	-/-
2019	20	20	100	0	0	0	0	0	-/-
<b>Juniperus scopulorum<sup>1</sup> -- (Rocky Mountain juniper)</b>									
2011	-	-	-	-	-	-	-	-	-/-
2015	-	-	-	-	-	-	-	-	-/-
2019	20	-	0	100	0	0	0	0	-/-
<b>Opuntia -- (pricklypear)</b>									
2011	440	-	18	82	0	0	0	0	12/39
2015	480	-	0	92	8	0	0	4	8/36
2019	380	-	5	95	0	0	0	0	8/16
<b>Pinus edulis<sup>1</sup> -- (twoneedle pinyon)</b>									
2011	80	220	75	25	0	0	0	25	-/-
2015	60	20	33	67	0	0	0	0	-/-
2019	80	20	50	50	0	0	0	0	-/-
<b>Purshia tridentata<sup>p</sup> -- (antelope bitterbrush)</b>									
2011	620	20	3	90	7	23	10	7	34/117
2015	640	-	3	97	0	84	0	0	27/65
2019	980	220	2	98	0	25	51	0	39/121
<b>Quercus gambelii<sup>p</sup> -- (Gambel oak)</b>									
2011	-	-	-	-	-	-	-	-	53/48
2015	-	-	-	-	-	-	-	-	-/-
2019	-	-	-	-	-	-	-	-	40/51
<b>Symphoricarpos oreophilus<sup>p</sup> -- (mountain snowberry)</b>									
2011	260	-	46	46	8	15	15	8	14/23
2015	160	-	25	75	0	13	0	0	20/35
2019	220	-	18	82	0	46	0	0	25/50

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

**Table 16R-44.14 - Tree Characteristics.** Point-quarter tree density, size class distribution, and average diameter.

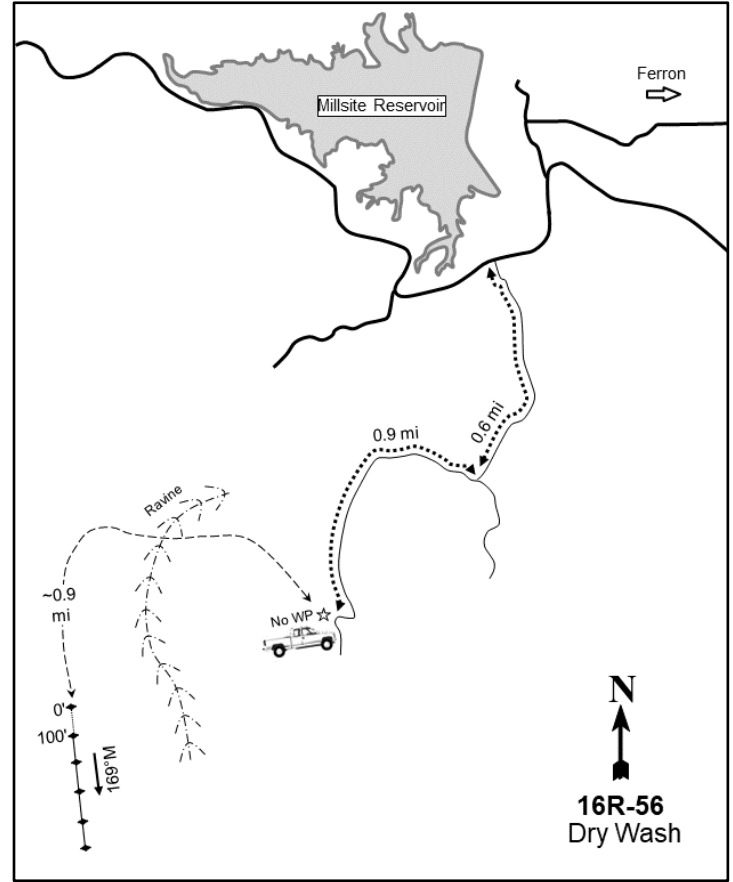
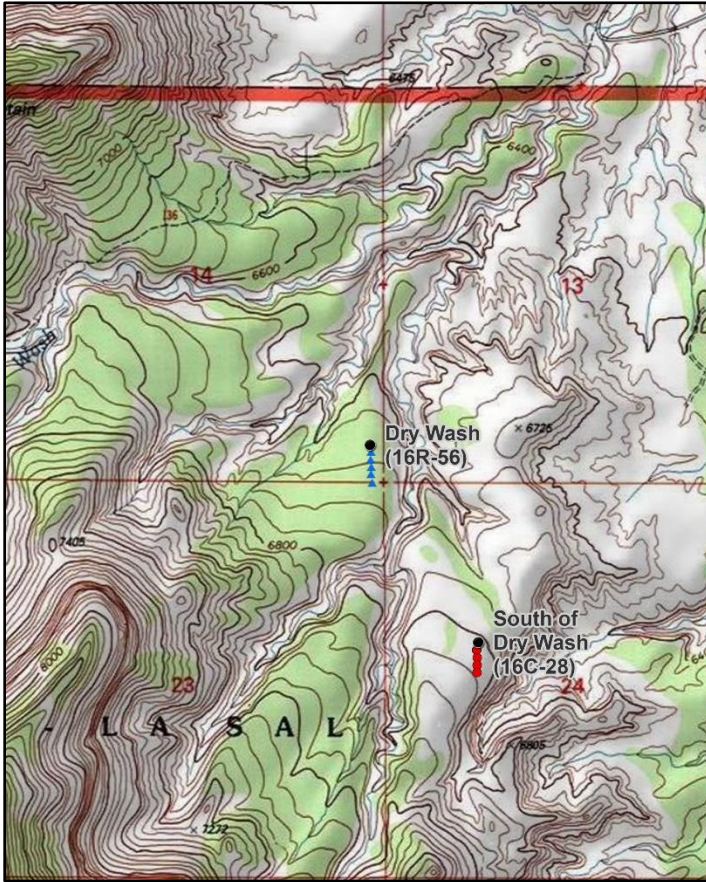
Year	Density	Size Class Distribution					Average Diameter (cm)
	Trees per Acre	Seedling (%)	1-4' (%)	4-8' (%)	8-12' (%)	>12' (%)	
<b>Juniperus osteosperma (Utah juniper)</b>							
2011	127	10	15	20	25	30	22.9
2015	20	25	42	33	-	-	6.2
2019	21	30	50	10	10	-	6.9
<b>Juniperus scopulorum (Rocky Mountain juniper)</b>							
2019	2	-	-	100	-	-	7.5
<b>Pinus edulis (twoneedle pinyon)</b>							
2011	98	20	15	20	25	20	10.8
2015	20	-	45	27	-	27	18.1
2019	22	-	40	20	-	40	17.4
<b>Pinus flexilis (limber pine)</b>							
2019	1	-	-	-	-	100	42.0
<b>Pseudotsuga menziesii (Douglas-fir)</b>							
2019	1	-	-	-	100	-	19.0

**Table 16R-44.15 – 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
2011	5.2	0.0	0.0	9.0	0.0	10.0	0.0	24.2	Very Poor
2015	7.8	15.0	3.9	19.6	0.0	6.9	0.0	53.1	Poor-Fair
2019	16.1	15.0	6.4	30.0	0.0	10.0	0.0	77.5	Good



## DRY WASH - STUDY NO. 16R-56



### Location Information

USGS 7.5 min Map Info  
GPS (0' Stake)

Ferron NW; Township 20S, Range 6E, Section 14  
NAD 83 UTM ZONE 12, 482171 East 4324874 North

### Transect Information

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

Not Available  
169° magnetic  
500ft  
Line 1 (11ft), Line 2 (34ft), Line 3 (59ft), Line 4 (71ft), Line 5 (95 ft)  
No Rebar or Stakes

### Directions to Site

From the intersection of State Street and Ferron Canyon Road in the town of Ferron, proceed west on Ferron Canyon Road for 3.4 miles to a dirt road on the left (south) side of the road. Turn left onto this road and drive for 0.6 miles to a fork. Proceed to the right and continue for 0.9 miles to a flat area right before the road inclines sharply towards the top of a bench, then park. Hike down the slopes just north of the flat area, west across the ravine and up onto the next bench, and then south to the study site. This hike is approximately 0.9 miles in length and there are no stakes or rebar: use a GPS to navigate to the transect.

**Site Information**

Land Ownership	Federal
Land Administrator	USFS
Allotment	FERRON
Elevation	No data
Aspect	north
Slope	6%
Sample Dates	08/27/2019

**Table 16R-56.1 Disturbance History.** Recorded history of major disturbances.

Treatment/Disturbance	Name	WRI DB#	Date	Size (acres)
Hand Crew - Lop and Scatter	Dry Wash Units 4, 5, 9 (Proposed)	4907	Fall 2019	264
Seeding - Aerial Before	Dry Wash Units 4, 5, 9 (Proposed)	4907	Fall 2019	264

**Wildlife Habitat and Vegetation History**

**Table 16R-56.3 - Wildlife Seasonal Habitat.** UDWR wildlife habitat and seasonality.

Species	Habitat	Season
Mule Deer	crucial	winter
Rocky Mountain Elk	substantial	winter

**Table 16R-56.4 - Vegetation History.** The dominant vegetation type(s) and phase of woodland succession (Tausch, Miller, Roundy, & Chambers, 2009).

Year	Vegetation Type	Woodland Succession
2019	Pinyon-Juniper	Phase III

**Site Notes**

No Notes

**Site Potential**

1981 - 2010 Average Annual Precipitation	11 inches
NRCS Ecological Site	Upland Stony Loam (Pinyon-Utah Juniper)
NRCS Ecological Site #	R047XB333UT
States and Transitions	A defined state and transition model is available.

Upon establishment in 2019, this study site was dominated by Utah juniper (*Juniperus osteosperma*) and twoneedle pinyon (*Pinus edulis*) and was classified as being within Phase III of woodland succession (Table 16R-56.4, Table 16R-56.12, Table 16R-56.14). Shrubs, particularly alderleaf mountain mahogany (*Cercocarpus montanus*), provided moderate amounts of cover and were somewhat diverse (Table 16R-56.12, Table 16R-56.13). The herbaceous understory was depauperate in both composition and biodiversity, with annual forbs providing most of the very limited herbaceous cover (Table 16R-56.7, Table 16R-56.10, Table 16R-56.11). This plant community may be comparable to the Invasive Annuals phase within the Pinyon-Juniper Invasive State that is illustrated by the available state and transition model (Jornada, 2019). This site could continue to remain in this state and might exhibit further degradation of the understory without a major disturbance. However, a seeding and lop and scatter treatment that is scheduled for the fall of 2019 (Table 16R-56.1) will likely reduce tree cover and augment the shrub and herbaceous understories.

**Trend Summary Tables**

**Table 16R-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
2019	5.3	-	19.5	7.8	-	36.4

**Table 16R-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
2019	2	-	98	79	0.0	-	1.0	0.7

**Table 16R-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
2019	27.1	2.6	43.9	22.3	11.9	24.9

**Table 16R-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	Mule Deer	Rocky Mountain Elk	Rabbit
	Quadrat Frequency		
2019	14	9	17
Year	Days Use Per Acre (ha)		
2019	67.7 (167.2)	22.1 (54.6)	-

**Table 16R-56.10 - Grass Species.** Nested frequency and modified Daubenmire average cover by year.

GRASS SPECIES	
<i>Bromus tectorum</i> <sup>ai</sup> (cheatgrass)	
year	Nested Frequency
2019	2
year	Average Cover (%)
2019	0.0

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

**Table 16R-56.11 - Forb Species.** Nested frequency and modified Daubenmire average cover by year.

FORB SPECIES										
<i>Arabis</i> (rockress)										
<i>Chenopodium fremontii</i> <sup>a</sup> (Fremont's goosefoot)										
<i>Cryptantha</i> (cryptantha)										
<i>Descurainia pinnata</i> <sup>a</sup> (western tansymustard)										
<i>Eriogonum</i> (buckwheat)										
<i>Hymenopappus filifolius</i> (fineleaf hymenopappus)										
<i>Penstemon</i> (beardtongue)										
<i>Schoenocrambe linifolia</i> (flaxleaf plainsmustard)										
<i>Stanleya viridiflora</i> (green princesplume)										
<i>Townsendia incana</i> (hoary Townsend daisy)										
year	Nested Frequency									
2019	34	58	15	49	16	4	18	3	1	2
year	Average Cover (%)									
2019	0.2	0.5	0.1	0.5	0.0	0.0	0.2	0.0	0.2	0.0

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

**Table 16R-56.12 - 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)	2019	1.2	6.4	0.1	0.1	16.7	19.7
Cercocarpus montanus <sup>p</sup> (alderleaf mountain mahogany)	2019	1.6	2.8	0.8	0.1	11.7	7.8
Ephedra viridis <sup>p</sup> (mormon tea)							
Eriogonum microthecum <sup>p</sup> (slender buckwheat)							
Juniperus osteosperma <sup>i</sup> (Utah juniper)							
Pinus edulis <sup>t</sup> (twoneedle pinyon)							

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

**Table 16R-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 (%)				
Artemisia nova <sup>p</sup> -- (black sagebrush)									
2019	1360	-	21	49	31	22	2	38	23/35
Cercocarpus montanus <sup>p</sup> -- (alderleaf mountain mahogany)									
2019	360	40	28	72	0	28	22	0	123/168
Ephedra viridis <sup>p</sup> -- (mormon tea)									
2019	280	-	43	50	7	7	0	7	77/91
Eriogonum microthecum <sup>p</sup> -- (slender buckwheat)									
2019	1960	-	11	89	0	7	0	0	12/14
Juniperus osteosperma <sup>i</sup> -- (Utah juniper)									
2019	160	-	0	100	0	0	0	0	- / -
Opuntia polyacantha -- (plains pricklypear)									
2019	40	-	0	100	0	0	0	0	10/31
Pinus edulis <sup>t</sup> -- (twoneedle pinyon)									
2019	280	40	57	43	0	0	0	0	- / -
Sclerocactus -- (fishhook cactus)									
2019	20	-	0	100	0	0	0	0	20/31

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

**Table 16R-56.14 - Tree Characteristics.** Point-quarter tree density, size class distribution, and average diameter.

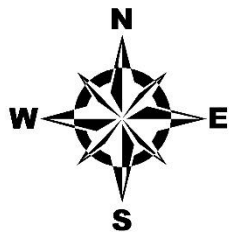
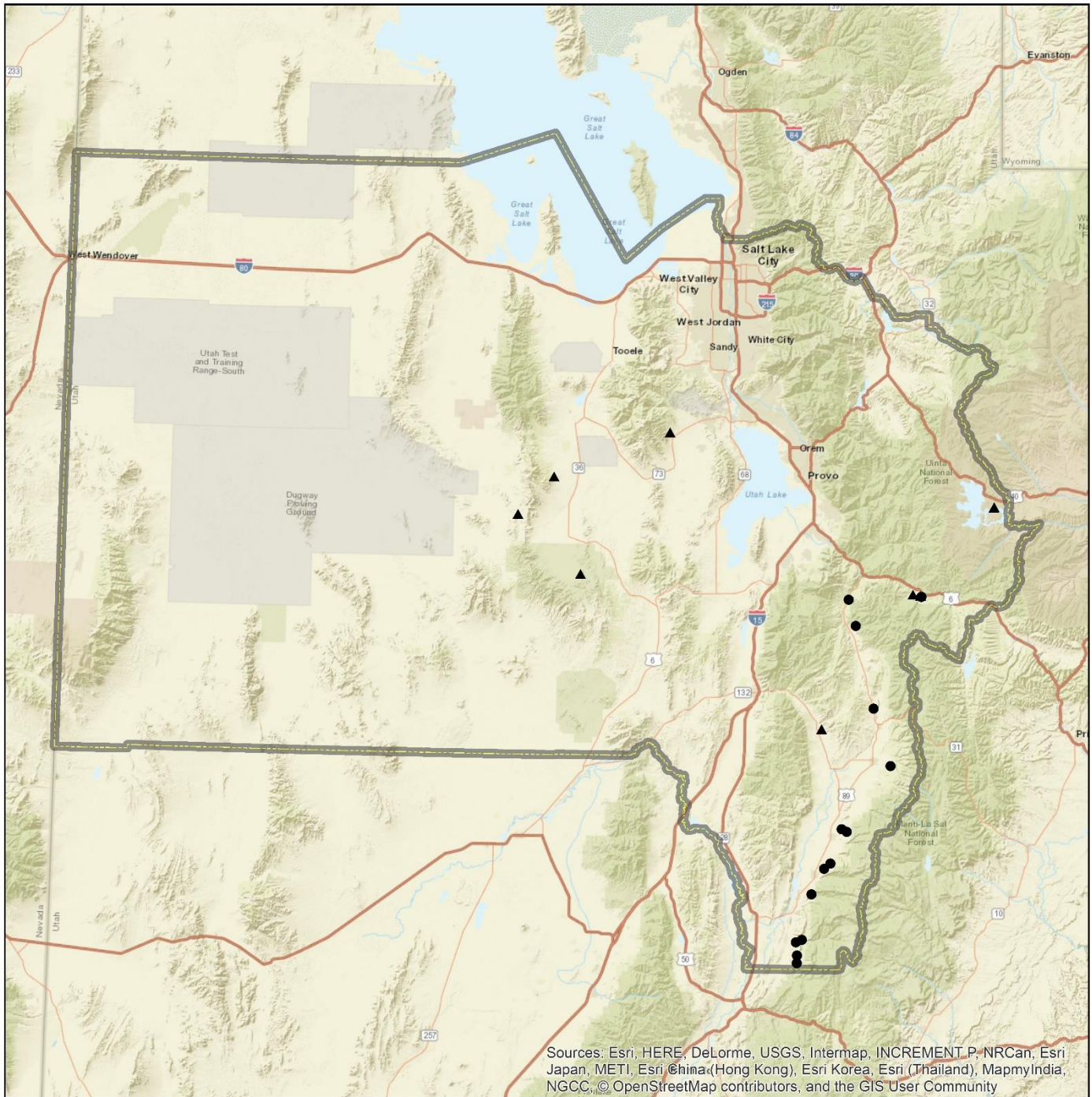
Year	Density	Size Class Distribution					Average Diameter (cm)
	Trees per Acre	Seedling (%)	1-4' (%)	4-8' (%)	8-12' (%)	>12' (%)	
Juniperus osteosperma (Utah juniper)							
2019	139	-	-	50	45	5	34.0
Pinus edulis (twoneedle pinyon)							
2019	386	5	20	55	10	10	13.7

**Table 16R-56.15 – 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
2019	11.4	13.5	13.3	0.0	0.0	1.5	0.0	39.7	Poor

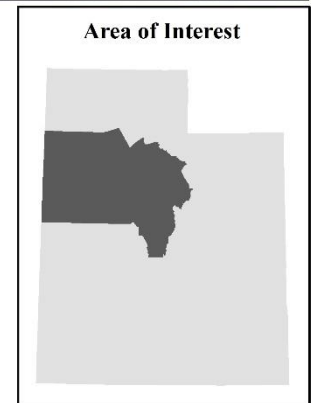
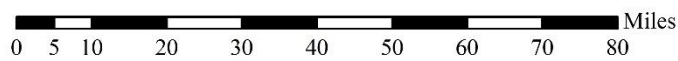


# CENTRAL REGION

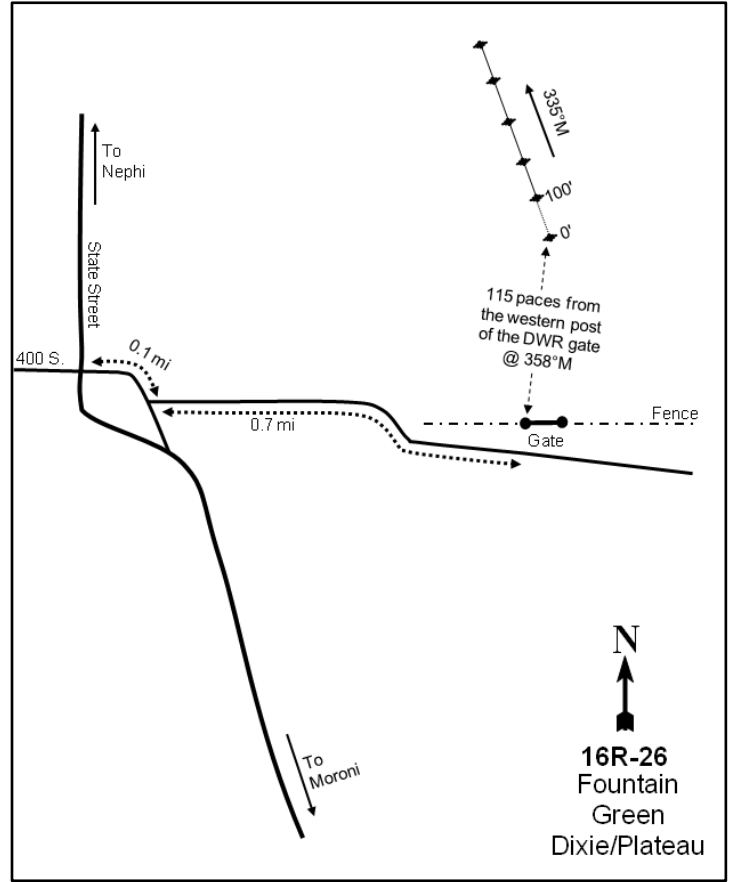


**Study Location**

- RT
- ▲ WRI
- ▭ Region Boundary



## FOUNTAIN GREEN DIXIE AND PLATEAU - STUDY NO. 16R-26



### Location Information

USGS 7.5 min Map Info  
GPS (0' Stake)

Moroni NW; Township 14S, Range 3E, Section 08  
NAD 83 UTM ZONE 12, 446953 East 4386036 North

### Transect Information

Browse Tag # (0' Stake)	192
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

Traveling south through Fountain Green on State Route 132, drive to 400 South. Turn left here and travel 0.1 miles to another left turn. Turn left (east) here and continue to drive for 0.7 miles to a UDWR gate on the left (north) side of the road. The 0-foot stake is about 115 paces from the western post of the gate at 358 degrees magnetic and is marked with browse tag #192.



**Site Information**

Land Ownership	State
Land Administrator	UDWR
Allotment	No data
Elevation	5,850ft (1,783m)
Aspect	Southwest
Slope	3%
Sample Dates	07/03/2007, 07/21/2010, 08/18/2015, 07/15/2019

**Table 16R-26.1 Disturbance History.** Recorded history of major disturbances.

Treatment/Disturbance	Name	WRI DB#	Date	Size (acres)
Herbicide - Plateau	Fountain Green WMA Habitat Improvement	288	September 2007	240
Harrow - Two-Way Dixie	Fountain Green WMA Habitat Improvement	288	September 2007-April 2008	20
Seeding - Broadcast Before	Fountain Green WMA Habitat Improvement	288	April 2008	35

**Table 16R-26.2 Seed Mix.** List of known seeded plant species and rates (if available).

Mix Name			Application Type	Application Date	Acres
Fountain Green Harrow			Broadcast	Apr 2008	30
Type	Species	Common Name	Cultivar/Source ID	Bulk lbs/acre	PLS
G	Achnatherum hymenoides	Indian Ricegrass	Rimrock	1.00	0.98
G	Agropyron cristatum	Crested Wheatgrass	Douglas	1.00	0.84
G	Agropyron desertorum	Crested Wheatgrass	Hycrest	1.00	0.93
G	Agropyron fragile	Siberian Wheatgrass	Vavilov	1.00	0.87
G	Dactylis glomerata	Orchardgrass	Paiute	0.50	0.39
G	Leymus cinereus	Great Basin Wildrye	Trailhead	1.00	0.91
G	Poa secunda	Sandberg Bluegrass	Mountain Home ID	0.50	0.46
G	Pseudoroegneria spicata	Bluebunch Wheatgrass	Anatone	1.00	0.85
G	Thinopyrum intermedium	Intermediate Wheatgrass		2.00	1.92
F	Achillea millefolium	Western Yarrow		0.17	0.16
F	Medicago sativa	Alfalfa	Ladak	1.00	0.92
F	Medicago sativa	Alfalfa	Ranger	1.00	0.89
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 16R-26.3 - Wildlife Seasonal Habitat.** UDWR wildlife habitat and seasonality.

Species	Habitat	Season
Mule Deer	crucial	winter
Rocky Mountain Elk	crucial	winter

**Table 16R-26.4 - Vegetation History.** The dominant vegetation type(s) and phase of woodland succession (Tausch, Miller, Roundy, & Chambers, 2009).

Year	Vegetation Type	Woodland Succession
2007	Annual Grass-Forb/Basin Big Sagebrush	No Encroachment
2010	Annual Grass-Forb	No Encroachment
2015	Annual Grass	No Encroachment
2019	Annual Grass-Forb	No Encroachment

**Site Notes**

No Notes

**Soils**

**Table 16R-26.5 - Soil Analysis Data.** List of chemical and textural soil characteristics determined by laboratory analysis.

Texture	pH	%sand	%silt	%clay	%OM	PPM P	PPM K	ds/m	Sample Date
Clay Loam	7.2	34.2	38.0	27.8	1.4	11.4	304.0	0.7	07/03/2007



**Site Potential**

1981 - 2010 Average Annual Precipitation	13 inches
NRCS Ecological Site	Upland Loam (Basin Big Sagebrush)
NRCS Ecological Site #	R047XA308UT
States and Transitions	A defined state and transition model is available.

When the study was established in 2007, the plant community on this site was dominated by basin big sagebrush (*Artemisia tridentata* ssp. *tridentata*) and annual grasses and forbs. Following the harrow and herbicide treatment in 2007-2008, sagebrush decreased and became a minor component (Table 16R-26.12, Table 16R-26.13). Annual grasses -- mainly the introduced annual grass cheatgrass (*Bromus tectorum*) -- and/or forbs have remained dominant or co-dominant vegetation types following treatment; high amounts of cheatgrass can increase fuel loads and threaten the ecological resilience of the plant community. Perennial grass and forb species have remained rare, providing comparatively little cover despite reseeding efforts in 2008 (Table 16R-26.10, Table 16R-26.11). The annual grass/forb community type on this site is not illustrated by the available state and transition model, but may have similarities with the phases described within the Seeded State (Jornada, 2019). Without further treatments to reduce annual grasses and forbs, this site will likely remain in this or a similar state in future sample years.

**Trend Summary Tables**

**Table 16R-26.6 - Shrub/Tree Summary.** Average modified Daubenmire quadrat and line intercept cover by year for shrubs/trees

Year	Quadrat Cover (%)			Line-intercept Cover (%)		
	Preferred Shrub	Other Shrub	Tree	Preferred Shrub	Other Shrub	Tree
2007	2.8	0.4	-	2.0	-	-
2010	0.6	-	-	0.8	-	-
2015	0.8	0.1	-	0.9	-	-
2019	0.7	0.0	-	0.5	0.3	-

**Table 16R-26.7 - Herbaceous Summary.** Nested frequency and average modified Daubenmire quadrat cover by year for herbaceous functional groups

Year	Nested Frequency				Quadrat Cover (%)			
	Annual Grass	Perennial Grass	Annual/Biennial Forb	Perennial Forb	Annual Grass	Perennial Grass	Annual/Biennial Forb	Perennial Forb
2007	475	79	414	100	22.3	0.6	15.1	1.7
2010	335	113	303	88	19.6	6.4	23.4	6.0
2015	444	93	209	35	21.0	2.2	1.7	0.2
2019	421	118	417	34	43.7	5.6	39.6	0.6

**Table 16R-26.8 - Basic Ground Cover.** Average modified Daubenmire quadrat cover by year for basic ground cover types.

Year	Cover Type (%)					
	Bare Ground	Cryptogams	Litter	Pavement	Rock	Vegetation
2007	14.9	1.9	42.8	1.5	5.6	42.9
2010	25.1	-	44.5	2.0	5.0	51.5
2015	15.2	0.0	60.8	2.2	5.1	26.7
2019	8.9	0.0	57.6	0.8	4.4	66.5

**Table 16R-26.9 - Pellet Group Data.** Quadrat frequency and pellet group transect data for animal pellets. Rabbit pellet groups are not sampled in the pellet group transect.

Year	Cattle	Mule Deer/Domestic Sheep	Rocky Mountain Elk	Rabbit
	Quadrat Frequency			
2007	4	90	2	25
2010	-	27	3	7
2015	-	46	1	50
2019	-	31	9	13
Year	Days Use Per Acre (ha)			
2007	-	149.4 (369.1)	4.7 (11.6)	-
2010	-	15.4 (38.1)	6.7 (16.6)	-
2015	-	61.7 (152.3)	17.4 (43.0)	-
2019	-	29.5 (72.8)	5.3 (13.2)	-

**Table 16R-26.10 - Grass Species.** Nested frequency and modified Daubenmire average cover by year.

GRASS SPECIES	Nested Frequency											
Achnatherum hymenoides (Indian ricegrass)	4	-	475	16	-	-	64	-	-	-	5	
Agropyron cristatum <sup>i</sup> (crested wheatgrass)	2	13	335	7	-	-	76	7	11	9	-	
Bromus tectorum <sup>ai</sup> (cheatgrass)	-	5	444	13	5	-	69	5	-	-	-	
Elymus elymoides (squirreltail)	4	8	420	19	8	0	77	-	-	20	18	
Hesperostipa comata (needle and thread)	Average Cover (%)											
Leymus cinereus (basin wildrye)	2007	0.0	-	22.3	0.1	-	-	0.4	-	-	-	0.0
Pascopyrum smithii (western wheatgrass)	2010	0.0	0.0	19.6	0.5	-	-	5.0	0.0	0.2	0.6	-
Poa secunda (Sandberg bluegrass)	2015	-	0.0	21.0	0.1	0.2	-	1.9	0.1	-	-	-
Pseudoroegneria spicata (bluebunch wheatgrass)	2019	0.4	0.8	43.4	0.3	0.1	0.1	3.2	-	-	0.6	0.4
Thinopyrum intermedium <sup>i</sup> (intermediate wheatgrass)	Nested Frequency											
Vulpia octoflora <sup>a</sup> (sixweeks fescue)	2007	4	-	475	16	-	-	64	-	-	-	5
	2010	2	13	335	7	-	-	76	7	11	9	-
	2015	-	5	444	13	5	-	69	5	-	-	-
	2019	4	8	420	19	8	0	77	-	-	20	18

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

**Table 16R-26.11 - Forb Species.** Nested frequency and modified Daubenmire average cover by year.

FORB SPECIES	Nested Frequency																	
Alyssum desertorum <sup>ai</sup> (desert madwort)	292	-	9	36	165	3	2	-	382	8	4	-	-	-	83	71	6	
Bassia scoparia <sup>ai</sup> (burningbush)	109	189	-	11	66	-	12	-	4	12	2	52	-	136	32	30	-	
Camelina microcarpa <sup>ai</sup> (littlepod false flax)	5	1	-	-	1	-	-	-	167	-	-	-	1	13	42	34	-	
Cardaria draba <sup>ai</sup> (whitetop)	210	-	0	7	181	17	15	3	283	7	-	-	-	-	105	24	9	
Ceratocephala testiculata <sup>ai</sup> (curvseed butterwort)	Average Cover (%)																	
Chorispora tenella <sup>ai</sup> (crossflower)	2007	0.6	-	0.0	0.4	0.5	0.1	0.0	-	12.7	0.0	0.0	-	-	-	1.1	1.4	0.0
Descurainia pinnata <sup>a</sup> (western tansymustard)	2010	1.5	14.5	-	0.3	1.1	-	0.0	-	0.1	0.2	0.0	5.1	-	4.2	1.7	0.6	-
Erigeron pumilus (shaggy fleabane)	2015	0.0	0.0	-	-	0.0	-	-	-	1.1	-	-	-	0.0	0.1	0.5	0.2	-
Erodium cicutarium <sup>ai</sup> (redstem stork's bill)	2019	6.4	-	0.0	0.0	3.5	0.5	0.5	0.1	17.9	0.1	-	-	-	-	10.6	0.4	0.1
Lactuca serriola <sup>ai</sup> (prickly lettuce)	Nested Frequency																	
Lappula occidentalis <sup>ai</sup> (flatspine stickseed)	2007	292	-	9	36	165	3	2	-	382	8	4	-	-	-	83	71	6
Medicago sativa <sup>i</sup> (alfalfa)	2010	109	189	-	11	66	-	12	-	4	12	2	52	-	136	32	30	-
Onobrychis viciifolia <sup>i</sup> (sainfoin)	2015	5	1	-	-	1	-	-	-	167	-	-	-	1	13	42	34	-
Salsola tragus <sup>ai</sup> (prickly Russian thistle)	2019	210	-	0	7	181	17	15	3	283	7	-	-	-	-	105	24	9
Sisymbrium altissimum <sup>ai</sup> (tall tumbledustard)	Average Cover (%)																	
Sphaeralcea coccinea (scarlet globemallow)	2007	0.6	-	0.0	0.4	0.5	0.1	0.0	-	12.7	0.0	0.0	-	-	-	1.1	1.4	0.0
Tragopogon dubius <sup>ai</sup> (yellow salsify)	2010	1.5	14.5	-	0.3	1.1	-	0.0	-	0.1	0.2	0.0	5.1	-	4.2	1.7	0.6	-
	2015	0.0	0.0	-	-	0.0	-	-	-	1.1	-	-	-	0.0	0.1	0.5	0.2	-
	2019	6.4	-	0.0	0.0	3.5	0.5	0.5	0.1	17.9	0.1	-	-	-	-	10.6	0.4	0.1

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

**Table 16R-26.12 - 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)	Artemisia tridentata ssp. wyomingensis <sup>p</sup> (Wyoming big sagebrush)	Chrysothamnus viscidiflorus ssp. viscidiflorus var. stenophyllus (yellow rabbitbrush)	Ericameria nauseosa ssp. nauseosa var. speciosa <sup>p</sup> (rubber rabbitbrush)	Opuntia (pricklypear)
year	Line Intercept Cover (%)				
2007	2	-	-	-	-
2010	0.8	-	-	-	-
2015	0.1	0.8	-	-	-
2019	-	0.5	0.1	-	0.2
year	Quadrat Cover (%)				
2007	2.8	-	-	-	0.4
2010	0.6	-	-	-	-
2015	0.0	0.8	0.1	-	-
2019	-	0.7	0.0	0.1	0.0

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

**Table 16R-26.13 - Shrub/Tree Characteristics.** Population characteristics of shrub/tree species populations including density reproduction (seedlings), age distribution, utilization, vigor and average size (height/crown) of plants.

Year	Density		Age Class Distribution			Utilization		Poor Vigor (%)	Average Height Crown (cm)
	Plants Per Acre		Excluding Seedlings			Moderate (%)	Heavy (%)		
	Excluding Seedlings	Seedling	Young (%)	Mature (%)	Decadent (%)				
<b>Artemisia tridentata ssp. tridentata<sup>p</sup> -- (basin big sagebrush)</b>									
2007	1020	-	2	16	82	0	100	51	77/96
2010	220	400	27	73	0	46	9	0	46/65
2015	60	-	0	100	0	0	33	0	41/52
2019	-	-	-	-	-	-	-	-	-/-
<b>Artemisia tridentata ssp. wyomingensis<sup>p</sup> -- (Wyoming big sagebrush)</b>									
2007	-	-	-	-	-	-	-	-	-/-
2010	-	-	-	-	-	-	-	-	-/-
2015	360	-	11	44	44	39	39	28	37/51
2019	540	-	0	89	11	15	0	7	63/56
<b>Chrysothamnus viscidiflorus ssp. viscidiflorus var. stenophyllus -- (yellow rabbitbrush)</b>									
2007	-	-	-	-	-	-	-	-	21/24
2010	-	-	-	-	-	-	-	-	44/69
2015	60	-	67	33	0	0	0	0	36/48
2019	80	-	0	100	0	0	0	0	45/47
<b>Ericameria nauseosa -- (rubber rabbitbrush)</b>									
2007	-	-	-	-	-	-	-	-	-/-
2010	-	-	-	-	-	-	-	-	-/-
2015	20	-	0	100	0	0	0	0	60/60
2019	-	-	-	-	-	-	-	-	-/-
<b>Ericameria nauseosa ssp. nauseosa var. speciosa<sup>p</sup> -- (rubber rabbitbrush)</b>									
2007	-	-	-	-	-	-	-	-	47/34
2010	-	-	-	-	-	-	-	-	54/80
2015	20	-	0	100	0	0	0	0	58/85
2019	180	-	0	100	0	0	0	0	54/55

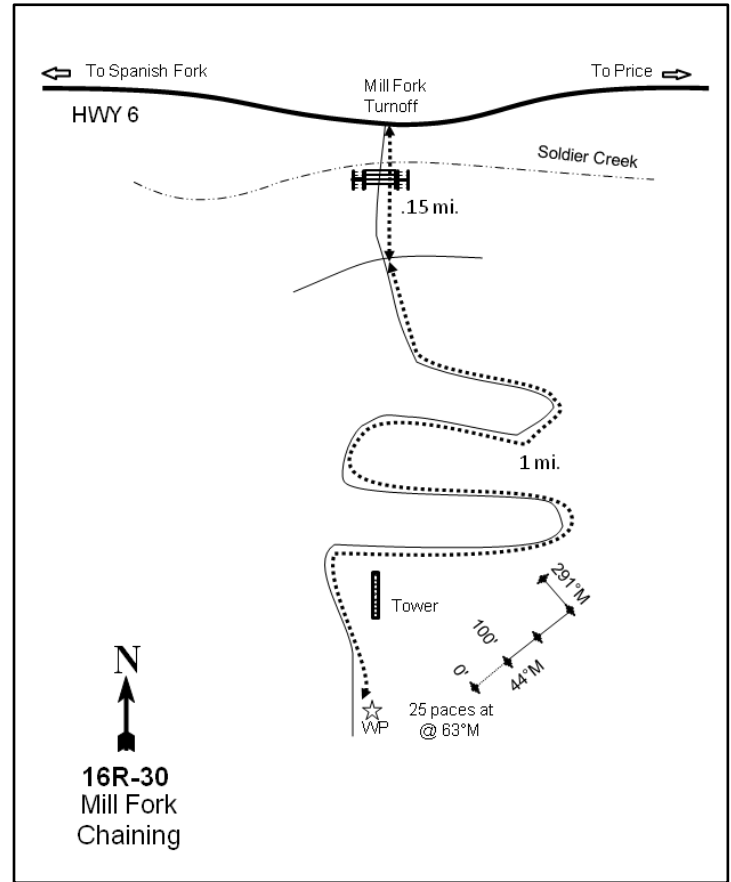
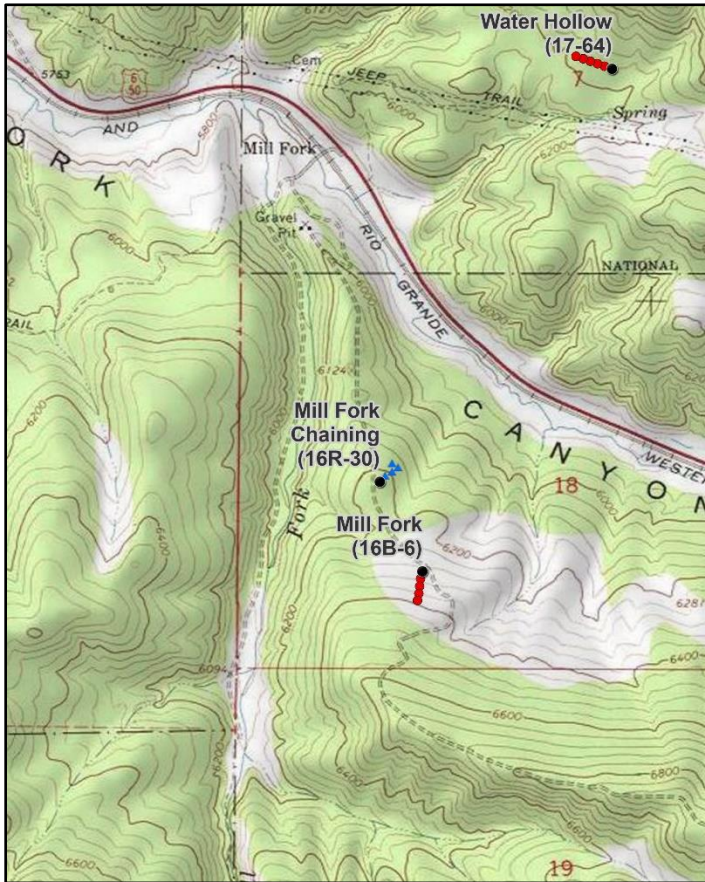
Year	Density		Age Class Distribution			Utilization		Poor Vigor (%)	Average Height Crown (cm)
	Plants Per Acre		Excluding Seedlings			Moderate (%)	Heavy (%)		
	Excluding Seedlings	Seedling	Young (%)	Mature (%)	Decadent (%)				
<b>Gutierrezia sarothrae -- (broom snakeweed)</b>									
2007	-	-	-	-	-	-	-	-	16/14
2010	-	-	-	-	-	-	-	-	-/-
2015	-	-	-	-	-	-	-	-	-/-
2019	-	-	-	-	-	-	-	-	-/-
<b>Opuntia -- (pricklypear)</b>									
2007	20	-	0	100	0	0	0	100	19/40
2010	40	-	0	100	0	0	0	0	20/24
2015	40	-	0	100	0	0	0	0	16/48
2019	40	-	0	100	0	0	0	0	19/53
<b>Purshia stansburiana<sup>p</sup> -- (Stansbury cliffrose)</b>									
2007	-	-	-	-	-	-	-	-	57/41
2010	-	-	-	-	-	-	-	-	-/-
2015	-	-	-	-	-	-	-	-	-/-
2019	-	-	-	-	-	-	-	-	-/-
<b>Tetradymia canescens -- (spineless horsebrush)</b>									
2007	-	-	-	-	-	-	-	-	52/61
2010	20	-	0	100	0	0	0	0	67/67

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

**Table 16R-26.15 – 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
2007	2.5	0.0	0.0	1.2	-16.8	2.7	-2.0	-12.3	Very Poor
2010	1.0	0.0	0.0	12.9	-14.7	10.0	-2.0	7.2	Very Poor
2015	1.1	0.0	0.0	4.4	-15.7	0.5	0.0	-9.8	Very Poor
2019	0.6	0.0	0.0	11.2	-20.0	1.1	-2.0	-9.2	Very Poor

## MILL FORK CHAINING - STUDY NO. 16R-30



16R-30  
Mill Fork  
Chaining

**Location Information**

USGS 7.5 min Map Info  
GPS (0' Stake)

Mill Fork NE; Township 10S, Range 6E, Section 18  
NAD 83 UTM ZONE 12, 473936 East 4422429 North

**Transect Information**

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

111  
44° magnetic  
400ft  
Line 1 (11ft & 95ft), Line 2 (34ft), Line 3 (59ft), Line 4 (71ft)  
Standard

**Directions to Site**

Travel east on Highway 6 (toward Price) for 1.9 miles to the Mill Fork turnoff on the south side of the highway from the Sheep Creek Café and the Sheep Creek Turnoff. Take this road 0.15 miles, pass through a gate, cross the river, and arrive at a fork. Stay to the left (east) and go up the hill 1 mile to a witness post on the east side of the road. From the witness post the 0-foot baseline stake is located 25 paces away at 63 degrees magnetic. The 0-foot baseline stake is marked by browse tag #111.

**Site Information**

Land Ownership	Private
Land Administrator	Private
Allotment	No data
Elevation	6,200ft (1,890m)
Aspect	North
Slope	3%
Sample Dates	10/09/2007, 06/21/2010, 05/29/2014, 05/30/2019

**Table 16R-30.1 Disturbance History.** Recorded history of major disturbances.

Treatment/Disturbance	Name	WRI DB#	Date	Size (acres)
Chaining - Two-Way Ely	Mill Fork Wildlife Habitat Improvement	716	October-November 2007	350
Seeding - Aerial Before	Mill Fork Wildlife Habitat Improvement	716	October 2007	462
Seeding - Dribbler	Mill Fork Wildlife Habitat Improvement	716	November 2007	350
Hand Crew - Lop and Scatter	Mill Fork Wildlife Habitat Improvement Project (Phase 2)	3019	August-November 2015	553

**Table 16R-30.2 Seed Mix.** List of known seeded plant species and rates (if available).

Mix Name			Application Type	Application Date	Acres
Mill Fork Chaining			Aerial	Oct 2007	472
Type	Species	Common Name	Cultivar/Source ID	Bulk lbs/acre	PLS
G	<i>Achnatherum hymenoides</i>	Indian Ricegrass	Rimrock	0.95	0.83
G	<i>Agropyron cristatum</i>	Crested Wheatgrass	Douglas	0.53	0.44
G	<i>Agropyron cristatum</i>	Crested Wheatgrass	Ephraim	0.53	0.47
G	<i>Agropyron cristatum</i>	Crested Wheatgrass	Hycrest	0.42	0.39
G	<i>Agropyron fragile</i>	Siberian Wheatgrass	Vavilov	0.85	0.73
G	<i>Bromus marginatus</i>	Mountain Brome		0.85	0.79
G	<i>Dactylis glomerata</i>	Orchardgrass	Paiute	0.42	0.33
G	<i>Leymus cinereus</i>	Great Basin Wildrye	Trailhead	0.53	0.51
G	<i>Poa secunda</i>	Canby Bluegrass	Canbar	0.42	0.38
G	<i>Pseudoroegneria spicata</i>	Bluebunch Wheatgrass	Anatone	0.95	0.81
G	<i>Thinopyrum intermedium</i>	Intermediate Wheatgrass		0.95	0.91
F	<i>Achillea millefolium</i>	Western Yarrow		0.10	0.10
F	<i>Astragalus cicer</i>	Cicer Milkvetch	Lutana	0.53	0.49
F	<i>Medicago sativa</i>	Alfalfa	Ladak	0.64	0.59
F	<i>Medicago sativa</i>	Alfalfa	Ranger	0.64	0.57
F	<i>Medicago sativa</i>	Alfalfa	Spreador 4	0.64	0.61
F	<i>Onobrychis viciifolia</i>	Sainfoin	Eski	1.91	1.75
F	<i>Sanguisorba minor</i>	Small Burnet	Delar	1.87	1.74

Mix Name			Application Type	Application Date	Acres
Mill Fork Chaining Dribbler			Dribbler	Nov 2007	370
Type	Species	Common Name	Cultivar/Source ID	Bulk lbs/acre	PLS
S	<i>Atriplex canescens</i>	Fourwing Saltbush	Juab/Millard UT	0.27	0.10
S	<i>Purshia tridentata</i>	Bitterbrush	Elko NV	0.12	0.11
S	<i>Purshia tridentata</i>	Bitterbrush	Millard UT	0.15	0.13

**Wildlife Habitat and Vegetation History****Table 16R-30.3 - Wildlife Seasonal Habitat.** UDWR wildlife habitat and seasonality.

Species	Habitat	Season
Mule Deer	crucial	winter/spring
Rocky Mountain Elk	crucial	winter
Shiras Moose	substantial	year-long

**Table 16R-30.4 - Vegetation History.** The dominant vegetation type(s) and phase of woodland succession (Tausch, Miller, Roundy, & Chambers, 2009).

Year	Vegetation Type	Woodland Succession
2007	Juniper	Phase III
2010	Annual Grass	Phase I
2014	Perennial Grass	Phase I
2019	Perennial Grass	Phase I

**Site Notes**

The study was established in 2007 to monitor a big game winter range improvement project in Spanish Fork Canyon. A large portion of the sagebrush habitats in the canyon have become decadent or have been invaded by twoneedle pinyon pine (*Pinus edulis*) and Utah juniper (*Juniperus osteosperma*). These rangelands had been heavily grazed by sheep and cattle for decades, leaving little herbaceous understory (WRI Database, 2019).

**Soils****Table 16R-30.5 - Soil Analysis Data.** List of chemical and textural soil characteristics determined by laboratory analysis.

Texture	pH	%sand	%silt	%clay	%OM	PPM P	PPM K	ds/m	Sample Date
Clay Loam	6.9	34.4	37.0	28.6	3.7	8.9	179.2	0.7	10/09/2007

**Site Potential**

1981 - 2010 Average Annual Precipitation	21 inches
NRCS Ecological Site	Mountain Loam (Mountain Big Sagebrush)
NRCS Ecological Site #	R047XA430UT
States and Transitions	A defined state and transition model is available.

Upon study establishment in 2007, this site was dominated by Utah juniper (*Juniperus osteosperma*) and considered to be within Phase III of woodland succession. A chaining treatment in 2007 and lop and scatter in 2015 (Table 16R-30.1) removed many of these trees, and the study has been in Phase I since 2010. However, point-quarter data shows that juniper has increased in the years after treatment: this indicates that this site may have the potential to be infilled over time without further treatments. Browse species have remained rare both prior to and after treatment (Table 16R-30.4, Table 16R-30.12, Table 16R-30.13, Table 16R-30.14). Although sparse before the chaining, the herbaceous understory has been abundant in the post-treatment sample years. The introduced annual grass species cheatgrass (*Bromus tectorum*) initially increased in cover and was the dominant vegetation component in 2010. However, annual grasses decreased and perennial grasses -- particularly bluebunch wheatgrass (*Pseudoroegneria spicata*), squirreltail (*Elymus elymoides*), and crested wheatgrass (*Agropyron cristatum*) -- increased significantly following this initial post-treatment sampling. As such, perennial grasses have been the dominant vegetation component on this site since 2014 (Table 16R-30.7, Table 16R-30.10, Table 16R-30.11). None of these states are illustrated by the available state and transition model, but the current perennial grass community may share functional similarities with the described Introduced Grassland State (Jornada, 2019).

**Trend Summary Tables****Table 16R-30.6 - Shrub/Tree Summary.** Average modified Daubenmire quadrat and line intercept cover by year for shrubs/trees

Year	Quadrat Cover (%)			Line-intercept Cover (%)		
	Preferred Shrub	Other Shrub	Tree	Preferred Shrub	Other Shrub	Tree
2007	-	1.2	7.0	-	1.0	39.2
2010	0.1	0.8	1.6	0.6	0.2	1.1
2014	0.0	0.8	2.0	-	0.6	3.1
2019	0.0	1.5	0.5	-	1.0	0.2

**Table 16R-30.7 - Herbaceous Summary.** Nested frequency and average modified Daubenmire quadrat cover by year for herbaceous functional groups

Year	Nested Frequency				Quadrat Cover (%)			
	Annual Grass	Perennial Grass	Annual/Biennial Forb	Perennial Forb	Annual Grass	Perennial Grass	Annual/Biennial Forb	Perennial Forb
2007	226	216	201	77	2.5	4.2	0.9	0.5
2010	313	130	230	85	13.5	5.8	4.3	2.0
2014	102	362	167	91	0.9	27.7	3.2	2.9
2019	50	340	336	97	1.4	33.5	5.6	2.0



**Table 16R-30.8 - 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	15.9	11.7	49.9	17.8	5.5	15.5
2010	18.1	0.4	60.5	4.6	3.6	29.7
2014	12.8	0.8	59.2	2.3	3.9	37.5
2019	18.7	0.6	55.3	4.9	6.8	45.0

**Table 16R-30.9 - Pellet Group Data.** Quadrat frequency and pellet group transect data for animal pellets. Rabbit pellet groups are not sampled in the pellet group transect.

Year	Mule Deer	Rocky Mountain Elk	Horse	Rabbit
	Quadrat Frequency			
2007	6	2	-	23
2010	4	1	-	8
2014	3	10	-	15
2019	7	3	2	15
Year	Days Use Per Acre (ha)			
2007	4.7 (11.6)	2.7 (6.6)	-	-
2010	7.4 (18.2)	10.7 (26.5)	-	-
2014	11.4 (28.1)	18.1 (44.7)	-	-
2019	16.8 (41.4)	2.7 (6.6)	-	-

**Table 16R-30.10 - 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 marginatus (mountain brome)	Bromus tectorum <sup>ai</sup> (cheatgrass)	Dactylis glomerata <sup>i</sup> (orchardgrass)	Elymus elymoides (squirreltail)	Leymus cinereus (basin wildrye)	Leymus salinus (saline wildrye)	Poa fendleriana (muttongrass)	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	5	-	-	226	-	117	-	-	-	5	130	-	-
2010	6	15	11	313	7	65	-	-	-	18	14	-	19
2014	20	67	-	102	6	240	2	5	13	21	35	29	55
2019	34	109	-	50	-	70	17	-	7	1	35	127	95
year	Average Cover (%)												
2007	0.1	-	-	2.5	-	1.4	-	-	-	0.0	2.7	-	-
2010	0.0	0.9	0.5	13.5	0.3	2.5	-	-	-	0.3	0.3	-	0.8
2014	0.4	3.8	-	0.9	0.2	15.3	0.4	0.7	0.3	0.6	0.8	2.6	2.6
2019	1.1	7.8	-	1.4	-	4.2	1.8	-	0.2	0.0	1.2	12.7	4.5

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

**Table 16R-30.11 - Forb Species.** Nested frequency and modified Daubenmire average cover by year.

FORB SPECIES	Achillea millefolium (Common yarrow)	Agoseris glauca (pale agoseris)	Alyssum desertorum <sup>ni</sup> (desert madwort)	Antennaria (pussytoes)	Astragalus calycosus (Torrey's milkvetch)	Astragalus cibirius (browse milkvetch)	Astragalus convallarius (lesser rushy milkvetch)	Astragalus utahensis (Utah milkvetch)	Calochortus nuttallii (sego lily)	Camelina microcarpa <sup>ai</sup> (littledod false flax)	Carduus nutans <sup>ni</sup> (nodding plumeless thistle)	Ceratocephala testiculata <sup>ai</sup> (curvseed butterwort)	Chaenactis douglasii (Douglas' dustymaiden)	Cirsium (thistle)	Collinsia parviflora <sup>a</sup> (maiden blue eyed Mary)	Cryptantha (cryptantha)	Cymopterus (springparsley)
year	Nested Frequency																
2007	-	-	25	12	-	-	1	4	-	-	-	148	2	-	13	-	-
2010	-	2	38	2	-	-	-	1	1	-	-	12	8	3	-	-	4
2014	1	9	45	-	12	0	-	1	2	2	87	25	19	-	-	-	18
2019	-	-	205	-	2	-	7	3	15	4	58	161	8	-	7	1	20
year	Average Cover (%)																
2007	-	-	0.1	0.0	-	-	0.0	0.0	-	-	-	0.5	0.0	-	0.0	-	-
2010	-	0.1	0.3	0.0	-	-	-	0.0	0.0	-	-	0.1	0.0	0.2	-	-	0.0
2014	0.0	0.2	0.2	-	0.3	0.0	-	0.0	0.0	0.0	1.8	0.1	0.1	-	-	-	0.2
2019	-	-	2.3	-	0.0	-	0.2	0.0	0.7	0.1	0.5	1.5	0.0	-	0.0	0.0	0.4

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

FORB SPECIES	Cynoglossum officinale <sup>ni</sup> (gypsyflower)	Descurainia pinnata <sup>a</sup> (western tansymustard)	Eriogonum (buckwheat)	Gilia inconspicua <sup>a</sup> (shy gilia)	Lactuca serriola <sup>ai</sup> (prickly lettuce)	Lappula occidentalis <sup>a</sup> (flatspine stickseed)	Machaeranthera canescens (hoary tansyaster)	Machaeranthera grindeliooides (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 caespitosus (mat penstemon)	Phlox hoodii (spiny phlox)	Phlox longifolia (longleaf phlox)	Sanguisorba minor <sup>i</sup> (small burnet)	Streptanthus cordatus (heartleaf twistflower)
year	Nested Frequency																
2007	-	86	-	-	-	-	-	-	-	28	-	6	25	-	28	-	1
2010	-	30	36	-	199	-	-	3	7	-	4	7	6	-	2	6	-
2014	2	51	-	-	13	-	13	-	2	-	9	-	14	5	8	15	-
2019	0	98	2	4	-	3	-	-	-	-	1	-	8	5	3	-	-
year	Average Cover (%)																
2007	-	0.2	-	-	-	-	-	-	-	0.1	-	0.0	0.2	-	0.1	-	0.0
2010	-	0.4	0.4	-	3.5	-	-	0.0	0.1	-	0.3	0.0	0.5	-	0.0	0.2	-
2014	0.0	0.4	-	-	0.0	-	0.2	-	0.1	-	0.3	-	0.5	0.1	0.2	0.4	-
2019	0.0	1.2	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			
	Taraxacum officinale (common dandelion)	Tragopogon dubius <sup>ai</sup> (yellow salsify)	Verbascum thapsus <sup>ai</sup> (common mullein)
year	Nested Frequency		
2007	-	-	-
2010	4	-	-
2014	22	11	12
2019	49	4	-
year	Average Cover (%)		
2007	-	-	-
2010	0.0	-	-
2014	0.2	0.1	0.5
2019	0.4	0.0	-

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

**Table 16R-30.12 - 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)	Juniperus osteosperma <sup>t</sup> (Utah juniper)	Linanthus pungens (granite prickly phlox)	Opuntia fragilis (brittle pricklypear)	Symphoricarpos oreophilus <sup>p</sup> (mountain snowberry)
year	Line Intercept Cover (%)					
2007	-	0.1	39.2	-	0.9	-
2010	0.6	0.1	1.1	-	0.1	-
2014	-	0	3.1	-	0.6	-
2019	-	0.8	0.2	-	0.2	-
year	Quadrat Cover (%)					
2007	-	0.0	7.0	-	1.1	-
2010	0.1	0.1	1.6	0.1	0.6	-
2014	-	0.1	2.0	-	0.8	0.0
2019	-	1.1	0.5	-	0.4	0.0

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

**Table 16R-30.13 - Shrub/Tree Characteristics.** Population characteristics of shrub/tree species populations including density reproduction (seedlings), age distribution, utilization, vigor and average size (height/crown) of plants.

Year	Density		Age Class Distribution			Utilization		Poor Vigor (%)	Average Height Crown (cm)
	Plants Per Acre		Excluding Seedlings			Moderate (%)	Heavy (%)		
	Excluding Seedlings	Seedling	Young (%)	Mature (%)	Decadent (%)				
<b>Artemisia tridentata ssp. vaseyana<sup>P</sup> -- (mountain big sagebrush)</b>									
2007	-	-	-	-	-	-	-	-	25/25
2010	20	-	0	100	0	0	0	0	32/39
2014	-	-	-	-	-	-	-	-	61/67
2019	-	-	-	-	-	-	-	-	78/104
<b>Atriplex canescens<sup>P</sup> -- (fourwing saltbush)</b>									
2007	-	-	-	-	-	-	-	-	-/-
2010	40	-	100	0	0	0	0	0	46/59
2014	-	-	-	-	-	-	-	-	45/89
2019	-	-	-	-	-	-	-	-	79/80
<b>Chrysothamnus viscidiflorus ssp. viscidiflorus var. viscidiflorus -- (yellow rabbitbrush)</b>									
2007	-	-	-	-	-	-	-	-	-/-
2010	-	-	-	-	-	-	-	-	-/-
2014	-	-	-	-	-	-	-	-	-/-
2019	-	-	-	-	-	-	-	-	14/28
<b>Ericameria nauseosa -- (rubber rabbitbrush)</b>									
2007	-	-	-	-	-	-	-	-	-/-
2010	-	-	-	-	-	-	-	-	-/-
2014	-	-	-	-	-	-	-	-	-/-
2019	-	-	-	-	-	-	-	-	41/57
<b>Ericameria nauseosa ssp. nauseosa var. hololeuca<sup>P</sup> -- (rubber rabbitbrush)</b>									
2007	-	-	-	-	-	-	-	-	-/-
2010	-	-	-	-	-	-	-	-	-/-
2014	-	-	-	-	-	-	-	-	-/-
2019	-	-	-	-	-	-	-	-	32/62
<b>Gutierrezia sarothrae -- (broom snakeweed)</b>									
2007	40	-	0	100	0	0	0	0	22/29
2010	220	20	55	36	9	0	0	9	31/40
2014	280	20	14	86	0	0	0	0	17/22
2019	1180	20	20	76	3	0	0	3	17/23
<b>Juniperus osteosperma<sup>1</sup> -- (Utah juniper)</b>									
2007	340	40	6	77	18	0	0	0	-/-
2010	100	20	40	40	20	0	0	20	-/-
2014	180	200	67	33	0	0	0	0	-/-
2019	200	60	70	30	0	0	0	0	-/-
<b>Krascheninnikovia lanata<sup>P</sup> -- (winterfat)</b>									
2007	-	-	-	-	-	-	-	-	-/-
2010	-	-	-	-	-	-	-	-	43/64
2014	-	-	-	-	-	-	-	-	-/-
2019	-	-	-	-	-	-	-	-	38/57
<b>Linanthus pungens -- (granite prickly phlox)</b>									
2007	20	-	100	0	0	0	0	0	-/-
2010	60	-	0	100	0	0	0	0	3/10
2014	-	-	-	-	-	-	-	-	-/-
2019	-	-	-	-	-	-	-	-	-/-
<b>Opuntia fragilis -- (brittle pricklypear)</b>									
2007	1060	-	15	79	6	0	0	2	8/34
2010	440	-	9	91	0	0	0	0	9/23
2014	560	20	11	82	7	0	0	14	9/25
2019	200	-	10	90	0	0	0	0	7/13

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>Purshia tridentata<sup>p</sup> -- (antelope bitterbrush)</b>									
2007	-	-	-	-	-	-	-	-	-/-
2010	20	-	100	0	0	0	0	0	24/33
2014	60	-	67	33	0	67	33	0	16/29
2019	20	-	0	100	0	0	100	0	22/45
<b>Symphoricarpos oreophilus<sup>p</sup> -- (mountain snowberry)</b>									
2007	-	-	-	-	-	-	-	-	-/-
2010	-	-	-	-	-	-	-	-	-/-
2014	40	-	50	50	0	0	100	0	56/61
2019	40	-	0	100	0	50	0	0	38/41
<b>Tetradymia canescens -- (spineless horsebrush)</b>									
2007	-	-	-	-	-	-	-	-	-/-
2010	-	-	-	-	-	-	-	-	30/41
2014	-	-	-	-	-	-	-	-	40/62
2019	-	-	-	-	-	-	-	-	28/47

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

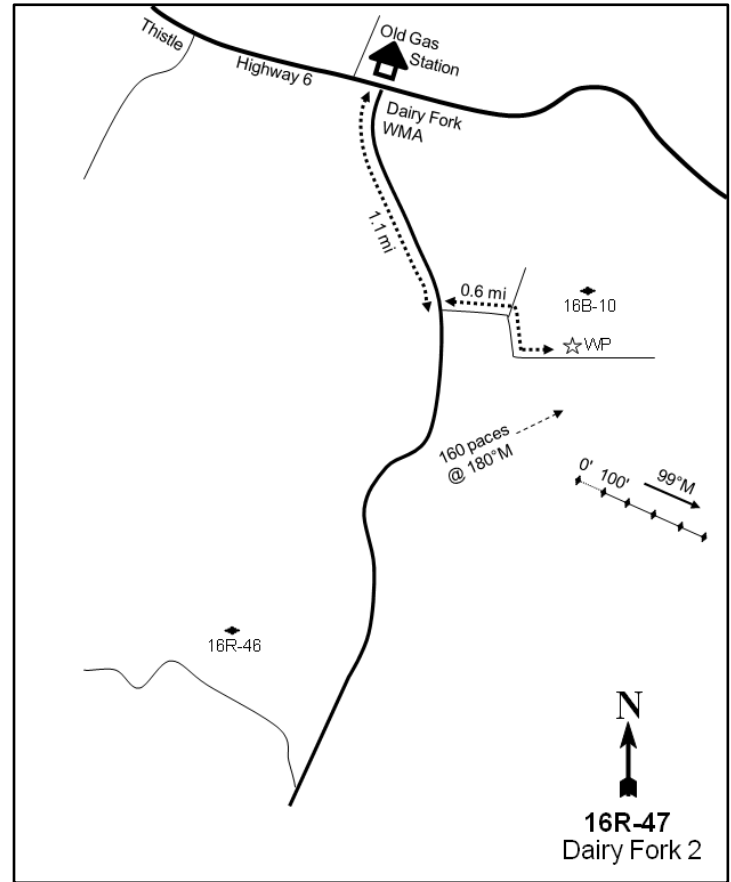
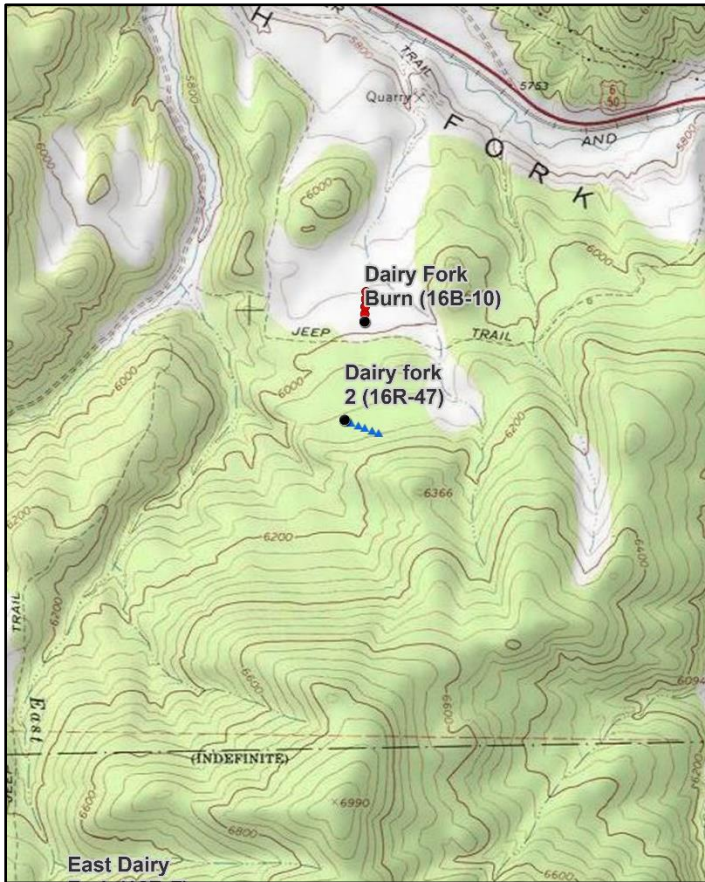
**Table 16R-30.14 - Tree Characteristics.** Point-quarter tree density, size class distribution, and average diameter.

Year	Density	Size Class Distribution					Average Diameter (cm)
	Trees per Acre	Seedling (%)	1-4' (%)	4-8' (%)	8-12' (%)	>12' (%)	
<b>Juniperus osteosperma (Utah juniper)</b>							
2007	272	30	5	10	10	45	13.8
2010	82	25	25	6	19	25	12.4
2014	112	22	72	6	-	-	6.5
2019	128	58	37	-	-	5	4.1
<b>Juniperus scopulorum (Rocky Mountain juniper)</b>							
2014	4	-	-	100	-	-	5.0
<b>Pinus edulis (twoneedle pinyon)</b>							
2010	29	-	100	-	-	-	2.0
2014	32	-	100	-	-	-	3.0
2019	7	-	67	33	-	-	5.7

**Table 16R-30.15 – 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
2007	2.5	0.0	0.0	1.2	-16.8	2.7	-2.0	-12.3	Very Poor
2010	1.0	0.0	0.0	12.9	-14.7	10.0	-2.0	7.2	Very Poor
2015	1.1	0.0	0.0	4.4	-15.7	0.5	0.0	-9.8	Very Poor
2019	0.6	0.0	0.0	11.2	-20.0	1.1	-2.0	-9.2	Very Poor

## DAIRY FORK 2 - STUDY NO. 16R-47

**Location Information**

USGS 7.5 min Map Info  
GPS (0' Stake)

Mill Fork NW; Township 10S, Range 5E, Section 13  
NAD 83 UTM ZONE 12, 471854 East 4422727 North

**Transect Information**

Browse Tag # (0' Stake)	9167
Transect Bearing	99° 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**

Near the Sheep Creek Café on Highway 6, travel on the Dairy Fork Road on the south side of the highway 0.9 miles to a left-hand fork. Take this fork, cross the creek, and go 0.35 miles staying east (left) to a sagebrush flat/burn and a three-way intersection. Turn right (south) and follow the road around the upper edge of the flat for 0.3 miles to a junction on the right and a witness post on the left. The study is approximately 160 paces away from the south side of the road at 180 degrees magnetic.

**Site Information**

Land Ownership	State
Land Administrator	UDWR
Allotment	No data
Elevation	6,088ft (1,856m)
Aspect	North
Slope	7%
Sample Dates	07/03/2012, 08/20/2015, 07/16/2019

**Table 16R-47.1 Disturbance History.** Recorded history of major disturbances.

Treatment/Disturbance	Name	WRI DB#	Date	Size (acres)
Transplant - Bitterbrush	Bitterbrush Hand Planting	-	July 2015	-
Seeding - Aerial After	Dairy Fork Habitat Improvement Phase 2	2214	February 2014	460
Chaining - Two-Way Ely	Dairy Fork Habitat Improvement Phase 2	2214	November 2013	460
Seeding - Aerial Before	Dairy Fork Habitat Improvement Phase 2	2214	November 2013	460
Seeding - Dribbler	Dairy Fork Habitat Improvement Phase 2	2214	November 2013	460

**Table 16R-47.2 Seed Mix.** List of known seeded plant species and rates (if available).

Mix Name			Application Type	Application Date	Acres
Dairy Fork Chaining			Aerial	Nov 2013	525
Type	Species	Common Name	Cultivar/Source ID	Bulk lbs/acre	PLS
G	<i>Achnatherum hymenoides</i>	Indian Ricegrass	Nezpar	0.95	0.92
G	<i>Agropyron cristatum</i>	Crested Wheatgrass	CDII	1.24	1.13
G	<i>Bromus marginatus</i>	Mountain Brome	Bromar	1.05	1.01
G	<i>Dactylis glomerata</i>	Orchardgrass	Paiute	0.48	0.41
G	<i>Elymus wawawaiensis</i>	Snake River Wheatgrass	Secar	1.05	0.93
G	<i>Festuca ovina</i>	Sheep Fescue	Covar	0.24	0.23
G	<i>Leymus cinereus</i>	Great Basin Wildrye	UDWR IntMtn Tetra	0.48	0.41
G	<i>Poa secunda</i>	Sandberg Bluegrass	Mountain Home	0.33	0.27
F	<i>Achillea millefolium</i>	Western Yarrow	Hanford WA	0.10	0.09
F	<i>Astragalus cicer</i>	Cicer Milkvetch	Lutana	1.05	0.99
F	<i>Medicago sativa</i>	Alfalfa	Big Sky Ladak	0.95	0.89
F	<i>Medicago sativa</i>	Alfalfa	Ladak	0.07	0.07
F	<i>Onobrychis viciifolia</i>	Sainfoin	Delaney	3.05	2.99
F	<i>Penstemon palmeri</i>	Palmer Penstemon	Emery UT	0.05	0.04
F	<i>Penstemon palmeri</i>	Palmer Penstemon	Carbon UT	0.10	0.07
F	<i>Sanguisorba minor</i>	Small Burnet		2.00	1.84

Mix Name			Application Type	Application Date	Acres
Dairy Fork Dribbler 1			Dribbler	Nov 2013	525
Type	Species	Common Name	Cultivar/Source ID	Bulk lbs/acre	PLS
F	<i>Sanguisorba minor</i>	Small Burnet		0.10	0.09
S	<i>Cercocarpus ledifolius</i>	Curleaf Mountain Mahogany	Sevier UT	0.10	0.08
S	<i>Purshia tridentata</i>	Bitterbrush	Oneida ID	0.10	0.08

Mix Name			Application Type	Application Date	Acres
Dairy Fork Dribbler 2			Dribbler	Nov 2013	525
Type	Species	Common Name	Cultivar/Source ID	Bulk lbs/acre	PLS
F	<i>Sanguisorba minor</i>	Small Burnet		0.10	0.09
S	<i>Atriplex canescens</i>	Fourwing Saltbush	Juab/Utah/Carbon UT	0.10	0.05
S	<i>Purshia tridentata</i>	Bitterbrush	Oneida ID	0.10	0.08

Mix Name			Application Type	Application Date	Acres
Dairy Fork Sage-Kochia			Aerial	Feb 2014	461
Type	Species	Common Name	Cultivar/Source ID	Bulk lbs/acre	PLS
F	<i>Medicago sativa</i>	Alfalfa	Big Sky Ladak	0.98	0.91
S	<i>Artemisia tridentata</i> ssp. <i>vaseyana</i>	Mountain Big Sagebrush	Beaver UT	0.49	0.21
S	<i>Bassia prostrata</i>	Forage Kochia	Beaver UT	1.08	0.72



**Wildlife Habitat and Vegetation History****Table 16R-47.3 - Wildlife Seasonal Habitat.** UDWR wildlife habitat and seasonality.

Species	Habitat	Season
Mule Deer	crucial	winter/spring
Rocky Mountain Elk	crucial	winter
Shiras Moose	substantial	year-long

**Table 16R-47.4 - 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	Perennial Grass	Phase I
2019	Perennial Grass	Phase I

**Site Notes**

No Notes

**Site Potential**

1981 - 2010 Average Annual Precipitation 21 inches  
 NRCS Ecological Site Mountain Stony Loam (Mountain big sagebrush)  
 NRCS Ecological Site # R047XC462UT  
 States and Transitions No state and transition model is available for this ecological site.

Utah juniper (*Juniperus osteosperma*) and lesser amounts of twoneedle pinyon (*Pinus edulis*) dominated this site upon study establishment in 2012, placing it in Phase III of woodland succession. Many of the trees were removed by a 2013 chaining and seeding treatment (Table 16R-47.1), and the study has been considered to be within Phase I of encroachment since the 2015 sample year. Although density is low to moderate as of 2019, the continued tree presence suggests that this site may be at risk for infilling in future sample years (Table 16R-47.4, Table 16R-47.12, Table 16R-47.14). Shrubs have remained rare, but moderately diverse throughout the study period (Table 16R-47.12, Table 16R-47.13). The herbaceous understory was moderately abundant prior to the chaining. A mixture of native and introduced perennial grasses have provided the most herbaceous cover in all sample years, and perennial grasses became the dominant vegetation component on the site in 2015. The introduced annual grass species cheatgrass (*Bromus tectorum*) has been observed each year, but with low abundance (Table 16R-47.7, Table 16R-47.10).

**Trend Summary Tables****Table 16R-47.6 - Shrub/Tree Summary.** Average modified Daubenmire quadrat and 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	1.8	-	19.9	1.1	-	46.7
2015	0.5	-	0.9	0.7	-	3.9
2019	1.5	-	0.5	1.7	-	1.2

**Table 16R-47.7 - Herbaceous Summary.** Nested frequency and average modified Daubenmire quadrat cover by year for herbaceous functional 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	282	136	68	2.0	17.0	0.4	1.3
2015	75	225	84	58	1.8	11.0	2.6	1.3
2019	114	327	204	107	2.0	29.8	6.1	5.7

**Table 16R-47.8 - 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	18.3	10.6	53.4	3.3	3.2	39.8
2015	20.4	1.1	61.8	4.4	2.0	22.2
2019	16.2	0.2	60.7	3.3	1.7	44.1

**Table 16R-47.9 - Pellet Group 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	-	1	9	4
2015	-	-	3	9
2019	4	11	13	11
Year	Days Use Per Acre (ha)			
	2012	-	0.7 (1.7)	9.4 (23.2)
2015	-	11.4 (28.1)	12.1 (29.8)	-
2019	-	9.4 (23.2)	6.7 (16.6)	-

**Table 16R-47.10 - 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)	Agropyron cristatum <sup>i</sup> (crested wheatgrass)	Bromus inermis <sup>i</sup> (smooth brome)	Bromus tectorum <sup>ai</sup> (cheatgrass)	Dactylis glomerata <sup>i</sup> (orchardgrass)	Elymus elymoides (squirreltail)	Elymus lanceolatus (thickspike wheatgrass)	Festuca idahoensis (Idaho fescue)	Hesperostipa comata (needle and thread)	Leymus cinereus (basin wildrye)	Pascopyrum smithii (western wheatgrass)	Poa fendleriana (nuttongrass)	Poa pratensis <sup>i</sup> (Kentucky bluegrass)	Poa secunda (Sandberg bluegrass)	Pseudoroegneria spicata (bluebunch wheatgrass)
year	Nested Frequency																
2012	25	-	-	-	-	109	-	65	-	-	8	-	-	119	17	39	67
2015	18	8	6	43	1	75	25	35	3	-	7	-	-	30	20	20	101
2019	19	10	5	72	-	114	0	67	14	3	17	14	4	6	11	23	181
year	Average Cover (%)																
2012	1.0	-	-	-	-	2.0	-	1.9	-	-	0.4	-	-	7.5	1.7	0.5	4.0
2015	0.5	0.1	0.7	1.5	0.1	1.8	0.8	0.7	0.0	-	0.6	-	-	0.6	0.9	0.2	4.4
2019	1.1	0.9	0.5	3.4	-	2.0	0.0	2.2	0.0	0.2	1.4	0.6	0.2	0.3	0.3	1.3	17.4

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

**Table 16R-47.11 - Forb Species.** Nested frequency and modified Daubenmire average cover by year.

FORB SPECIES	Achillea millefolium (Common yarrow)	Alyssum desertorum <sup>ai</sup> (desert madwort)	Antennaria (pussytoes)	Antennaria dimorpha (low pussytoes)	Antennaria microphylla (littleleaf pussytoes)	Arabis holboellii <sup>a</sup> (Holboell's rockcress)	Astragalus cibirius (browse milkvetch)	Astragalus eicer <sup>i</sup> (chickpea milkvetch)	Astragalus convallarius (lesser rushy milkvetch)	Astragalus utahensis (Utah milkvetch)	Camelina microcarpa <sup>ai</sup> (littlepod false flax)	Cardaria draba <sup>ai</sup> (whitetop)	Carduus nutans <sup>ami</sup> (nodding plumeless thistle)	Ceratocephala testiculata <sup>ai</sup> (curveseed butterwort)	Chaenactis douglasii (Douglas' dustymaiden)	Chenopodium album <sup>a</sup> (lambsquarters)	Chenopodium fremontii <sup>a</sup> (Fremont's goosefoot)
year	Nested Frequency																
2012	-	111	6	-	-	3	-	-	20	3	-	-	-	14	7	-	-
2015	3	28	5	-	-	-	7	-	9	-	-	4	-	-	-	-	29
2019	12	73	-	6	5	-	10	8	5	-	1	31	62	22	2	1	10
year	Average Cover (%)																
2012	-	0.3	0.2	-	-	0.0	-	-	0.1	0.0	-	-	-	0.0	0.0	-	-
2015	0.0	0.5	0.1	-	-	-	0.1	-	0.1	-	-	0.1	-	-	-	-	0.3
2019	0.5	1.1	-	0.2	0.1	-	0.2	0.5	0.4	-	0.0	2.2	2.4	0.1	0.0	0.0	0.2

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

FORB SPECIES																		
Cirsium (thistle)																		
Collinsia parviflora <sup>a</sup> (maiden blue eyed Mary)																		
Cymopterus (springparsley)																		
Descurainia pinnata <sup>a</sup> (western tansymustard)																		
Draba <sup>a</sup> (draba)																		
Epilobium brachycarpum <sup>a</sup> (tall annual willowherb)																		
Eriogon pumilus (shaggy fleabane)																		
Eriogonum umbellatum (sulphur-flower buckwheat)																		
Lactuca serriola <sup>ai</sup> (prickly lettuce)																		
Lappula occidentalis <sup>a</sup> (flatspine stickseed)																		
Medicago sativa <sup>i</sup> (alfalfa)																		
Microsteris gracilis <sup>a</sup> (slender phlox)																		
Packera multilobata (lobeleaf groundsel)																		
Penstemon caespitosus (mat penstemon)																		
Penstemon palmeri (Palmer's penstemon)																		
Phlox hoodii (spiny phlox)																		
Phlox longifolia (longleaf phlox)																		
year	Nested Frequency																	
2012	3	17	-	-	1	2	-	6	-	-	-	5	-	-	-	24	6	
2015	1	-	-	37	-	-	0	-	4	8	14	4	2	4	1	5	-	
2019	0	3	6	34	-	-	-	-	56	23	5	16	1	1	2	13	6	
year	Average Cover (%)																	
2012	0.0	0.0	-	-	0.0	0.0	-	0.2	-	-	-	0.0	-	-	-	0.8	0.0	
2015	0.2	-	-	1.5	-	-	0.0	-	0.0	0.1	0.1	0.0	0.0	0.0	0.0	0.1	-	
2019	0.0	0.0	0.0	0.6	-	-	-	-	0.6	0.2	0.4	0.1	0.0	0.0	0.0	0.5	0.0	

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

FORB SPECIES						
Sanguisorba minor <sup>i</sup> (small burnet)						
Sisymbrium altissimum <sup>ai</sup> (tall tumblemustard)						
Streptanthus cordatus (heartleaf twistflower)						
Tragopogon dubius <sup>ai</sup> (yellow salsify)						
Trifolium (clover)						
Verbascum thapsus <sup>ai</sup> (common mullein)						
year	Nested Frequency					
2012	-	-	3	3	-	-
2015	17	0	3	2	-	0
2019	7	0	-	17	3	4
year	Average Cover (%)					
2012	-	-	0.0	0.0	-	-
2015	0.4	0.0	0.0	0.2	-	0.0
2019	0.5	0.1	-	0.5	0.0	0.1

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

**Table 16R-47.12 - 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)	Juniperus osteosperma <sup>i</sup> (Utah juniper)	Pinus edulis <sup>i</sup> (twoneedle pinyon)	Symphoricarpos oreophilus <sup>p</sup> (mountain snowberry)
year	Line Intercept Cover (%)				
2012	1.1	-	42.1	4.6	-
2015	0.3	0.4	3.9	-	-
2019	1.2	0.5	1.2	-	-
year	Quadrat Cover (%)				
2012	1.8	-	18.1	1.9	0.1
2015	0.1	0.3	0.9	-	-
2019	0.9	0.5	0.5	-	0.0

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

**Table 16R-47.13 - Shrub/Tree Characteristics.** Population characteristics of shrub/tree species populations including density reproduction (seedlings), age distribution, utilization, vigor and average size (height/crown) of plants.

Year	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	100	-	20	80	0	0	0	0	55/70
2015	80	-	0	100	0	0	0	0	63/79
2019	80	-	0	100	0	25	0	0	79/89
<b>Bassia prostrata<sup>pi</sup> -- (forage kochia)</b>									
2012	-	-	-	-	-	-	-	-	-/-
2015	460	-	39	61	0	0	0	0	33/44
2019	260	-	0	100	0	0	15	0	32/44
<b>Cercocarpus montanus<sup>p</sup> -- (alderleaf mountain mahogany)</b>									
2012	-	-	-	-	-	-	-	-	67/85
2015	-	-	-	-	-	-	-	-	-/-
2019	-	-	-	-	-	-	-	-	75/87
<b>Chrysothamnus viscidiflorus ssp. viscidiflorus var. viscidiflorus -- (yellow rabbitbrush)</b>									
2012	-	-	-	-	-	-	-	-	33/44
2015	20	-	0	100	0	0	0	0	36/49
2019	-	-	-	-	-	-	-	-	41/70
<b>Ericameria nauseosa -- (rubber rabbitbrush)</b>									
2012	-	-	-	-	-	-	-	-	74/64
2015	-	-	-	-	-	-	-	-	-/-
2019	-	-	-	-	-	-	-	-	102/153
<b>Gutierrezia sarothrae -- (broom snakeweed)</b>									
2012	-	-	-	-	-	-	-	-	20/17
2015	-	-	-	-	-	-	-	-	-/-
2019	-	-	-	-	-	-	-	-	-/-
<b>Juniperus osteosperma<sup>i</sup> -- (Utah juniper)</b>									
2012	520	20	19	81	0	0	0	4	- / -
2015	300	-	73	20	7	0	0	27	- / -
2019	120	40	83	17	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 polyacantha -- (plains pricklypear)</b>									
2012	-	-	-	-	-	-	-	-	-/-
2015	-	-	-	-	-	-	-	-	-/-
2019	-	-	-	-	-	-	-	-	10/17
<b>Opuntia -- (pricklypear)</b>									
2012	-	-	-	-	-	-	-	-	13/47
2015	-	-	-	-	-	-	-	-	-/-
2019	-	-	-	-	-	-	-	-	13/30
<b>Pinus edulis<sup>t</sup> -- (twoneedle pinyon)</b>									
2012	40	40	100	0	0	0	0	0	- / -
2015	-	-	-	-	-	-	-	-	-/-
2019	20	-	100	0	0	0	0	0	- / -
<b>Purshia tridentata<sup>p</sup> -- (antelope bitterbrush)</b>									
2012	-	-	-	-	-	-	-	-	19/98
2015	-	-	-	-	-	-	-	-	-/-
2019	-	-	-	-	-	-	-	-	25/76
<b>Quercus gambelii<sup>p</sup> -- (Gambel oak)</b>									
2012	-	-	-	-	-	-	-	-	72/75
2015	-	-	-	-	-	-	-	-	-/-
2019	-	-	-	-	-	-	-	-	67/76
<b>Sambucus nigra ssp. cerulea<sup>p</sup> -- (blue elderberry)</b>									
2012	-	-	-	-	-	-	-	-	166/150
2015	-	-	-	-	-	-	-	-	135/112
2019	-	-	-	-	-	-	-	-	149/171
<b>Symphoricarpos oreophilus<sup>p</sup> -- (mountain snowberry)</b>									
2012	60	-	0	33	67	0	0	0	29/45
2015	60	-	0	100	0	0	0	0	35/42
2019	80	-	0	100	0	0	25	0	31/52

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

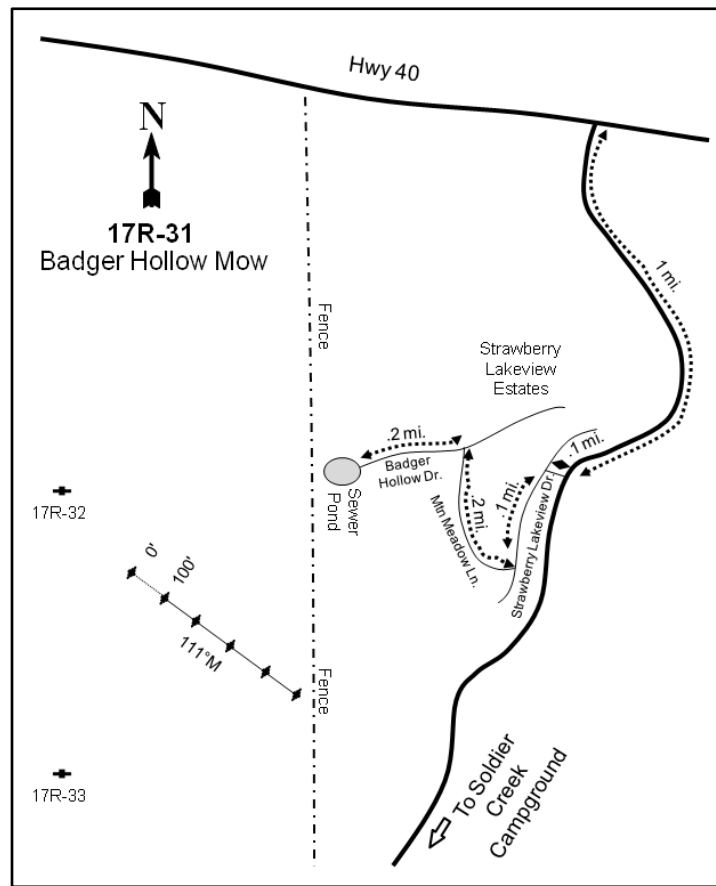
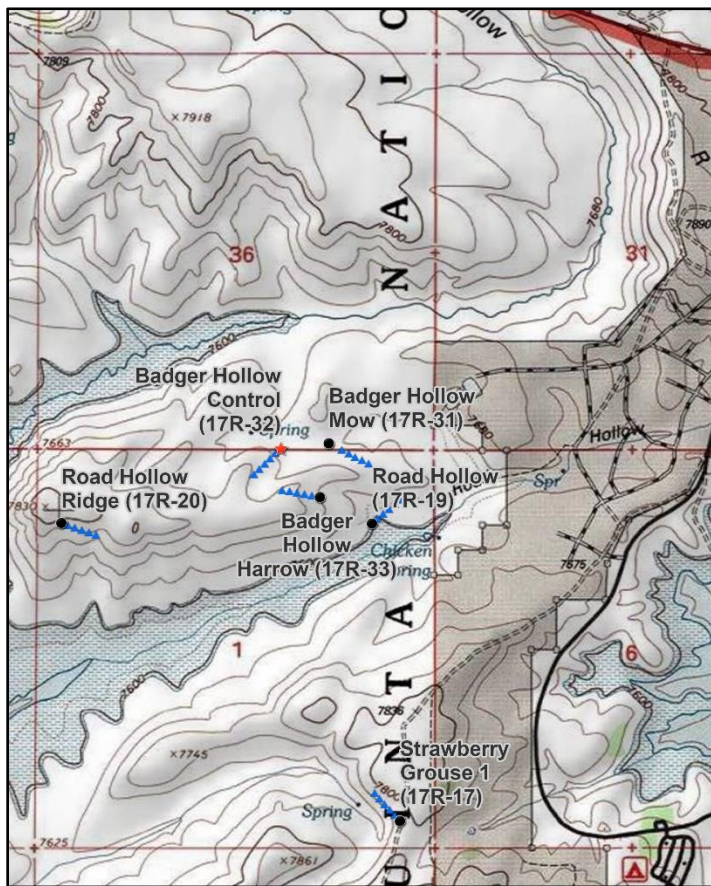
**Table 16R-47.14 - Tree Characteristics.** Point-quarter tree density, size class distribution, and average diameter.

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	244	-	-	20	30	50	28.9
2015	25	-	73	27	-	-	4.7
2019	36	13	50	31	6	-	4.6
<b>Pinus edulis (twoneedle pinyon)</b>							
2012	18	40	20	-	-	40	25.4
2019	4	67	33	-	-	-	2.0

**Table 16R-47.15 – 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
2012	1.4	0.0	0.0	30.0	-1.5	2.7	0.0	32.6	Very Poor
2015	1.0	0.0	0.0	22.0	-1.4	2.2	-2.0	21.8	Very Poor
2019	2.3	0.0	0.0	30.0	-1.5	7.1	-4.0	33.8	Very Poor

## BADGER HOLLOW MOW - STUDY NO. 17R-31



### Location Information

USGS 7.5 min Map Info  
GPS (0' Stake)

Strawberry Reservoir; Township 3S, Range 11W, Section 36  
NAD 83 UTM ZONE 12, 493930 East 4446518 North

### Transect Information

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

Not Available  
111° magnetic  
500ft  
Line 1 (11ft), Line 2 (34ft), Line 3 (59ft), Line 4 (71ft), Line 5 (95ft)  
Standard

### Directions to Site

Drive south towards the Soldier Creek campground from the US-40 and Soldier Creek campground intersection. Travel 1 mile to the Strawberry Lakeview Estates and turn right, traveling west. Drive 0.1 miles to Strawberry Lakeview Drive and turn left (south). Travel 0.1 miles to Mountain Meadow Lane on the right (west) side of the road. Continue on Mountain Meadow Lane for 0.2 miles to Badger Hollow Drive, then turn left (west). Drive 0.2 miles to the sewer ponds. To get to the study, park at the sewer ponds and walk about one-half mile southwest.

**Site Information**

Land Ownership	Federal
Land Administrator	USFS
Allotment	No data
Elevation	7,680ft (2,341m)
Aspect	North-Northwest
Slope	5-10%
Sample Dates	07/26/2011, 08/05/2014, 07/20/2019

**Table 17R-31.1 Disturbance History.** Recorded history of major disturbances.

Treatment/Disturbance	Name	WRI DB#	Date	Size (acres)
Mechanical - Mower	Badger Hollow/Chicken Spring Ridge Habitat Improvement	1816	August-September 2011	60

**Wildlife Habitat and Vegetation History****Table 17R-31.3 - Wildlife Seasonal Habitat.** UDWR wildlife habitat and seasonality.

Species	Habitat	Season	Brood/Young Rearing
Mule Deer	substantial	summer/fall	
Rocky Mountain Elk	crucial	summer	
Greater Sage-Grouse	occupied	year-long & Winter	brood-rearing
Shiras Moose	crucial	spring/fall	

**Table 17R-31.4 - Vegetation History.** The dominant vegetation type(s) and phase of woodland succession (Tausch, Miller, Roundy, & Chambers, 2009).

Year	Vegetation Type	Woodland Succession
2011	Mountain Big Sagebrush/Perennial Grass-Forb	No Encroachment
2014	Perennial Grass-Forb	No Encroachment
2019	Perennial Grass-Forb	No Encroachment

**Site Notes**

No Notes

**Site Potential**

1981 - 2010 Average Annual Precipitation	21 inches
NRCS Ecological Site	Mountain Loam (Mountain Big Sagebrush)
NRCS Ecological Site #	R047XA430UT
States and Transitions	A defined state and transition model is available.

Upon study establishment in 2011, this site was in a mountain big sagebrush (*Artemisia tridentata* ssp. *vaseyana*) state with a robust, co-dominant understory of mostly native grasses and forbs. The site was treated with a mower in 2011 (Table 17R-31.1) to reduce sagebrush cover. Following treatment, perennial grasses and forbs became the dominant vegetation components. Perennial grasses have been dominated by needle and thread (*Hesperostipa comata*) and cover has generally increased (Table 17R-31.10). Perennial forb cover has decreased slightly following the treatment; silvery lupine (*Lupinus argenteus*), Fendler's sandwort (*Arenaria fendleri*), and parsnipflower buckwheat (*Eriogonum heracleoides*) have been the dominant forb species (Table 17R-31.11). The shrub component has been dominated by mountain big sagebrush in all sample years. Sagebrush cover significantly decreased in the initial sampling following treatment, but an increase was observed between 2014 and 2019 (Table 17R-31.12, Table 17R-31.13). The state and transition model indicates that there is potential for the site to cycle from a sagebrush-dominated state to a sagebrush and perennial grass/forb-dominated state (Jornada, 2019).



**Trend Summary Tables**

**Table 17R-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
2011	33.7	1.2	-	40.9	1.3	-
2014	2.4	0.2	-	4.1	0.6	-
2019	6.1	1.1	-	8.5	1.2	-

**Table 17R-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
2011	-	433	149	397	-	39.4	4.7	45.6
2014	-	451	83	357	-	47.8	0.5	23.5
2019	-	448	120	361	-	42.0	1.5	28.0

**Table 17R-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
2011	5.0	0.1	44.7	0.2	0.0	81.4
2014	4.1	0.1	85.2	0.1	1.0	75.0
2019	6.9	0.3	64.3	0.8	1.2	59.3

**Table 17R-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	Mule Deer	Rocky Mountain Elk	Greater Sage-Grouse	Rabbit
	Quadrat Frequency			
2011	1	1	-	8
2014	1	-	2	4
2019	-	1	13	21
Year	Days Use Per Acre (ha)			
2011	10.7 (26.5)	6.7 (16.6)	17.4 (43.0)*	-
2014	2.0 (5.0)	-	-	-
2019	2.7 (6.6)	-	104.5 (258.2)*	-

\*Pellets per acre (ha)

**Table 17R-31.10 - Grass Species.** Nested frequency and modified Daubenmire average cover by year.

GRASS SPECIES	Nested Frequency																	
	year	Nested Frequency																
Achnatherum lettermanii (Letterman's needlegrass)	58	42	58	-	-	1	1	81	10	-	9	248	4	198	-	20	118	
Bromus porteri (Porter brome)	5	67	67	-	-	1	-	133	-	10	9	314	9	47	-	17	134	
Carex (sedge)	7	26	5	176	1	3	-	130	-	9	8	366	22	83	40	47	116	
Carex geyeri (Geyer's sedge)	Average Cover (%)																	
Carex phaecephala (dunhead sedge)	2011	4.9	0.9	0.9	-	-	0.0	0.0	1.8	0.1	-	0.1	13.8	0.0	8.9	-	0.7	5.4
Dactylis glomerata <sup>1</sup> (orchardgrass)	2014	0.1	0.8	1.9	-	-	0.0	-	4.1	-	0.7	0.2	25.1	0.2	0.8	-	1.2	6.7
Deschampsia cespitosa (tufted hairgrass)	2019	0.2	0.3	0.1	4.4	0.1	0.0	-	3.1	-	0.0	0.3	26.7	0.3	1.4	0.7	1.4	2.7
Elymus elymoides (squirreltail)																		
Elymus lanceolatus (thick-spike wheatgrass)																		
Elymus trachycaulus (slender wheatgrass)																		
Festuca idahoensis (Idaho fescue)																		
Hesperostipa comata (needle and thread)																		
Juncus arcticus (arctic rush)																		
Koeleria macrantha (prairie Junegrass)																		
Pascopyrum smithii (western wheatgrass)																		
Poa fendleriana (muttongrass)																		
Poa pratensis <sup>1</sup> (Kentucky bluegrass)																		

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

GRASS SPECIES	
	Poa secunda (Sandberg bluegrass)
year	Nested Frequency
2011	39
2014	112
2019	7
year	Average Cover (%)
2011	1.9
2014	6.0
2019	0.1

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

**Table 17R-31.11 - 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 (pussytoes)																		
Antennaria microphylla (littleleaf pussytoes)																		
Arabis drummondii (Drummond's rockcress)																		
Arenaria fendleri (Fendler's sandwort)																		
Draba rectiflora <sup>a</sup> (mountain draba)																		
Eriogonum heracleoides (parsnipflower buckwheat)																		
Gayophytum ramosissimum <sup>a</sup> (pinyon groundsmoke)																		
Ipomopsis aggregata (scarlet gilia)																		
Lupinus argenteus (silvery lupine)																		
Machaeranthera canescens (hoary tansyaster)																		
Mertensia (bluebells)																		
Orthocarpus luteus <sup>a</sup> (yellow owl's-clover)																		
Packera multilobata (lobeleaf groundsel)																		
Penstemon procerus (littleflower penstemon)																		
Polygonum douglasii <sup>a</sup> (Douglas' knotweed)																		
year	Nested Frequency																	
2011	3	8	1	-	1	251	14	144	-	-	295	3	25	138	12	3	4	
2014	4	18	29	-	9	219	36	111	-	2	219	7	-	41	8	2	-	
2019	4	35	3	6	-	234	9	141	7	-	218	-	19	94	15	-	14	
year	Average Cover (%)																	
2011	0.0	0.1	0.0	-	0.0	10.9	0.0	9.0	-	-	25.3	0.0	0.2	4.6	0.3	0.0	0.0	
2014	0.0	0.1	0.9	-	0.0	6.4	0.1	4.9	-	0.0	11.2	0.0	-	0.4	0.0	0.0	-	
2019	0.0	0.3	0.0	0.0	-	6.8	0.0	10.0	0.0	-	10.3	-	0.1	1.2	0.7	-	0.0	

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

**Table 17R-31.12 - Shrub and Tree Species.** Average modified Daubenmire quadrat and line intercept cover by year.

SHRUB SPECIES	Line Intercept Cover (%)	
	2011	2014
<i>Artemisia tridentata</i> ssp. <i>vaseyana</i> <sup>p</sup> (mountain big sagebrush)	40.9	1.3
<i>Chrysothamnus viscidiflorus</i> ssp. <i>viscidiflorus</i> var. <i>viscidiflorus</i> (yellow rabbitbrush)	4.1	0.6
	8.5	1.2
SHRUB SPECIES	Quadrat Cover (%)	
	2011	2014
<i>Artemisia tridentata</i> ssp. <i>vaseyana</i> <sup>p</sup> (mountain big sagebrush)	33.7	1.2
<i>Chrysothamnus viscidiflorus</i> ssp. <i>viscidiflorus</i> var. <i>viscidiflorus</i> (yellow rabbitbrush)	2.4	0.2
	6.1	1.1

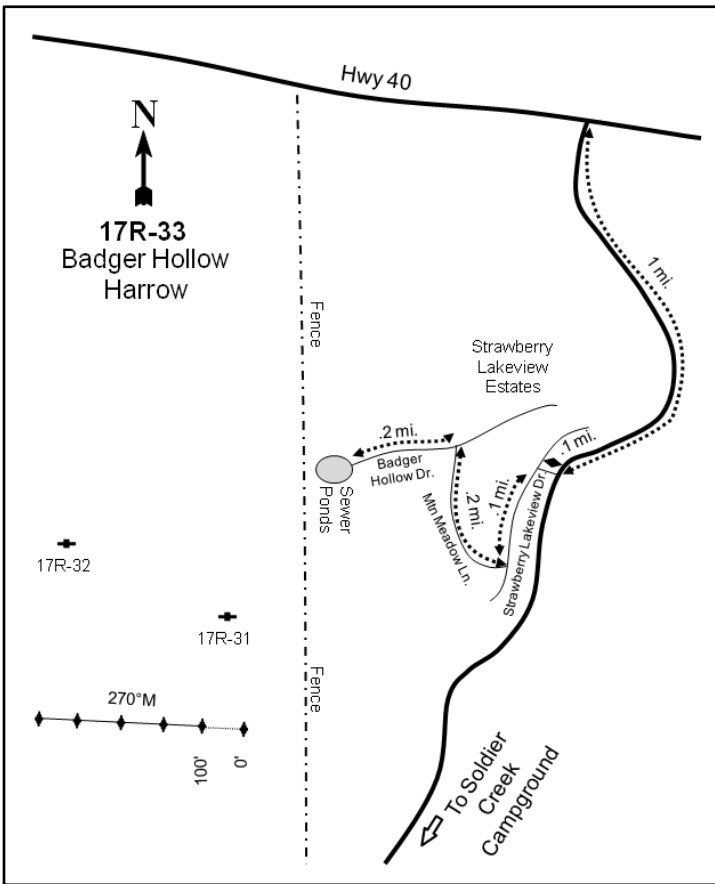
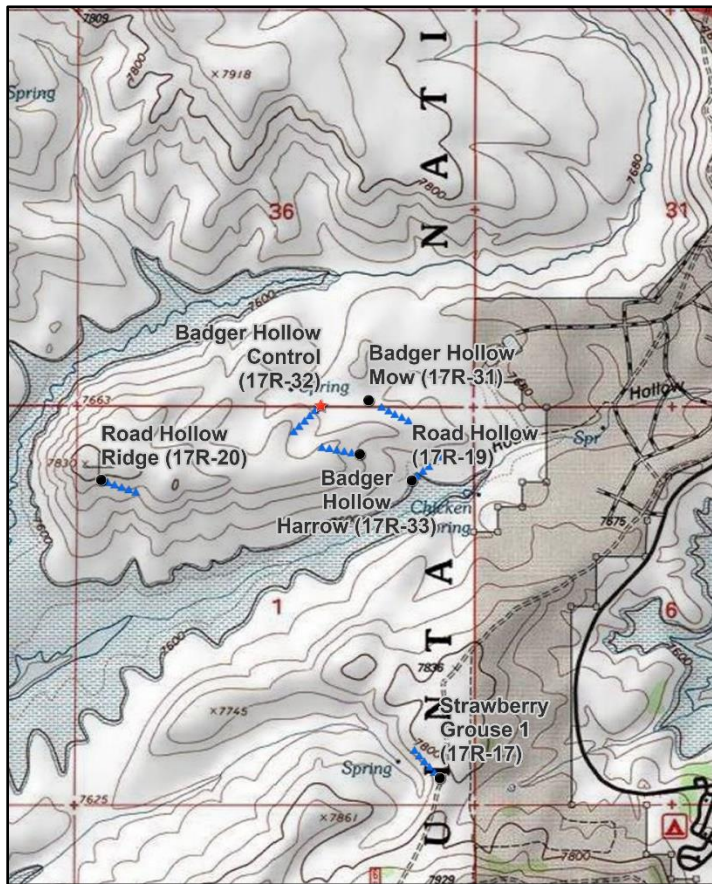
t - Tree Species; p - Preferred Browse; i - Introduced Species

**Table 17R-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 (%)				
<i>Artemisia tridentata</i> ssp. <i>vaseyana</i> <sup>p</sup> -- (mountain big sagebrush)									
2011	4820	40	2	89	10	42	1	12	61/96
2014	1820	80	14	80	6	39	10	3	30/48
2019	2400	-	9	88	3	3	0	5	37/63
<i>Chrysothamnus viscidiflorus</i> ssp. <i>viscidiflorus</i> var. <i>viscidiflorus</i> -- (yellow rabbitbrush)									
2011	780	340	100	0	0	0	0	0	22/23
2014	260	20	0	100	0	0	0	0	25/40
2019	360	-	6	94	0	0	0	0	32/45

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

## BADGER HOLLOW HARROW - STUDY NO. 17R-33



### Location Information

USGS 7.5 min Map Info  
GPS (0' Stake)

Strawberry Reservoir; Township 4S, Range 11W, Section 01  
NAD 83 UTM ZONE 12, 493894 East 4446300 North

### Transect Information

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

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

### Directions to Site

Drive south towards the Soldier Creek campground from the US-40 and Soldier Creek campground intersection. Travel 1 mile to the Strawberry Lakeview Estates and turn right, traveling west. Drive 0.1 miles to Strawberry Lakeview Drive and turn left (south). Travel 0.1 miles to Mountain Meadow Lane on the right (west) side of the road. Continue on Mountain Meadow Lane for 0.2 miles to Badger Hollow Drive, then turn left (west). Drive 0.2 miles to the sewer ponds. To get to the study, park at the sewer ponds and walk about one-half mile southwest.

**Site Information**

Land Ownership	Federal
Land Administrator	USFS
Allotment	No data
Elevation	7,641ft (2,329m)
Aspect	East
Slope	4%
Sample Dates	07/27/2011, 08/05/2014, 07/21/2019

**Table 17R-33.1 Disturbance History.** Recorded history of major disturbances.

Treatment/Disturbance	Name	WRI DB#	Date	Size (acres)
Harrow - Two-Way Chain	Badger Hollow /Chicken Spring Ridge Habitat Improvement	1816	August-September 2011	253

**Wildlife Habitat and Vegetation History****Table 17R-33.3 - Wildlife Seasonal Habitat.** UDWR wildlife habitat and seasonality.

Species	Habitat	Season	Brood/Young Rearing
Mule Deer	substantial	summer/fall	
Rocky Mountain Elk	crucial	summer	
Greater Sage-Grouse	occupied	year-long & Winter	brood-rearing
Shiras Moose	crucial	spring/fall	

**Table 17R-33.4 - Vegetation History.** The dominant vegetation type(s) and phase of woodland succession (Tausch, Miller, Roundy, & Chambers, 2009).

Year	Vegetation Type	Woodland Succession
2011	Mountain Big Sagebrush	No Encroachment
2014	Perennial Grass	No Encroachment
2019	Perennial Grass/Mountain Big Sagebrush	No Encroachment

**Site Notes**

No Notes

**Site Potential**

1981 - 2010 Average Annual Precipitation	21 inches
NRCS Ecological Site	Mountain Loam (Mountain Big Sagebrush)
NRCS Ecological Site #	R047XA430UT
States and Transitions	A defined state and transition model is available.

Upon study establishment in 2011, this site was in a mountain big sagebrush (*Artemisia tridentata* ssp. *vaseyana*)-dominated state with a robust understory of mostly native grasses and forbs. The site was treated with a harrow in the fall of 2011 to reduce sagebrush cover and increase understory vigor (Table 17R-33.1). Perennial grasses became the dominant vegetation component following treatment. Needle and thread (*Hesperostipa comata*) and Kentucky bluegrass (*Poa pratensis*) have provided most of the perennial grass cover in all sample years. Cover of needle and thread has increased over time while that of Kentucky bluegrass has exhibited a slight decrease (Table 17R-33.7, Table 17R-33.10). Perennial forbs have decreased slightly following treatment, although they still contribute significant cover; silvery lupine (*Lupinus argenteus*) and sulphur-flower buckwheat (*Eriogonum umbellatum*) have been the dominant forb species (Table 17R-33.7, Table 17R-33.11). The shrub component has been dominated by mountain big sagebrush throughout the study period. Sagebrush cover exhibited a significant decrease in the initial post-treatment sample year, but an increase was observed between 2014 and 2019 (Table 17R-33.12, Table 17R-33.13). The state and transition model indicates that there is potential for the site to cycle from a sagebrush-dominated state to a sagebrush and perennial grass/forb-dominated state (Jornada, 2019).

**Trend Summary Tables**

**Table 17R-33.6 - Shrub/Tree Summary.** Average modified Daubenmire quadrat and 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	41.7	0.5	-	56.3	0.4	-
2014	3.1	1.4	-	4.1	1.5	-
2019	8.8	3.4	-	8.3	3.3	-

**Table 17R-33.7 - Herbaceous Summary.** Nested frequency and average modified Daubenmire quadrat cover by year for herbaceous functional 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	-	435	120	317	-	41.9	2.7	29.8
2014	-	455	86	292	-	47.6	0.7	18.7
2019	-	465	116	260	-	45.6	2.3	19.5

**Table 17R-33.8 - 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	4.1	0.1	49.5	-	0.0	83.5
2014	1.7	0.0	79.0	-	-	72.2
2019	4.1	0.2	64.8	0.4	0.0	60.4

**Table 17R-33.9 - Pellet 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			
2011	3	1	-	5
2014	4	-	16	11
2019	4	-	20	30
Days Use Per Acre (ha)				
2011	4.0 (9.9)	2.0 (5.0)	148.1 (365.8)*	-
2014	4.7 (11.6)	-	496.6 (1226.6)*	-
2019	-	-	400.8 (989.9)*	-

\*Pellets per acre (ha)

**Table 17R-33.10 - Grass Species.** Nested frequency and modified Daubenmire average cover by year.

GRASS SPECIES	Achnatherum lettermanii (Letterman's needlegrass)	Agrostis exarata (spike bentgrass)	Bromus porteri (Porter brome)	Carex (sedge)	Carex geeyeri (Geeyer's sedge)	Carex phaeocephala (dunhead sedge)	Deschampsia cespitosa (tufted hairgrass)	Elymus elymoides (squirreltail)	Elymus lanceolatus (thick-spike wheatgrass)	Elymus trachycaulus (slender wheatgrass)	Festuca idahoensis (Idaho fescue)	Hesperostipa comata (needle and thread)	Koeleria macrantha (prairie Junegrass)	Pascopyrum smithii (western wheatgrass)	Poa fendleriana (nuttongrass)	Poa pratensis <sup>i</sup> (Kentucky bluegrass)	Poa secunda (Sandberg bluegrass)
year	Nested Frequency																
2011	84	-	48	50	-	-	1	45	1	-	15	151	124	-	5	234	13
2014	69	14	57	13	-	-	-	139	5	1	-	217	48	-	17	175	44
2019	37	-	54	-	46	52	-	116	-	4	-	252	35	66	17	220	13
year	Average Cover (%)																
2011	6.3	-	2.4	0.7	-	-	0.0	0.9	0.0	-	0.1	7.6	8.9	-	0.4	13.6	0.8
2014	3.0	0.9	1.7	0.6	-	-	-	8.3	0.0	0.1	-	17.5	1.2	-	0.4	12.1	1.6
2019	1.9	-	2.2	-	1.1	4.9	-	2.8	-	0.0	-	16.4	1.0	2.8	0.6	11.1	0.6

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

**Table 17R-33.11 - 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 (pussytoes)	Antennaria parvifolia (small-leaf pussytoes)	Arabis drummondii (Drummond's rockress)	Arenaria fendleri (Fendler's sandwort)	Calochortus nuttallii (sego lily)	Cerastium (mouse-ear chickweed)	Collinsia parviflora <sup>a</sup> (maiden blue eyed Mary)	Draba rectiflora <sup>a</sup> (mountain draba)	Erigeron (fleabane)	Eriogonum umbellatum (sulphur-flower buckwheat)	Gayophytum ramosissimum <sup>a</sup> (pinyon groundsmoke)	Hackelia patens (spotted stickseed)	Hydrophyllum capitatum (ballhead waterleaf)	Lappula occidentalis <sup>a</sup> (flatspine stickseed)	Linum lewisii (Lewis flax)
year	Nested Frequency																
2011	10	12	10	-	1	15	-	-	3	19	-	48	5	1	10	5	-
2014	19	36	3	-	4	29	-	-	-	51	8	70	-	-	2	-	5
2019	18	13	-	4	7	26	1	8	56	13	-	77	32	2	2	1	0
year	Average Cover (%)																
2011	0.6	0.1	1.6	-	0.0	0.6	-	-	0.0	0.3	-	3.8	0.0	0.0	0.2	0.0	-
2014	0.4	0.1	0.1	-	0.0	1.1	-	-	-	0.2	0.7	3.6	-	-	0.0	-	0.2
2019	0.5	0.1	-	0.0	0.0	1.5	0.0	0.8	0.5	0.1	-	5.2	1.0	0.0	0.0	0.0	0.0

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

FORB SPECIES	Lupinus argenteus (silvery lupine)	Melilotus officinalis <sup>i</sup> (sweetclover)	Mertensia (bluebells)	Orthocarpus luteus <sup>a</sup> (yellow owl's-clover)	Phacelia hastata (silvertleaf phacelia)	Phacelia sericea <sup>a</sup> (silky phacelia)	Polygonum douglasii <sup>a</sup> (Douglas' knotweed)	Potentilla gracilis (slender cinquefoil)	Symphytotrichum ascendens (western aster)	Taraxacum officinale (common dandelion)
year	Nested Frequency									
2011	276	1	1	77	6	-	26	-	6	2
2014	216	-	-	10	9	3	12	2	5	2
2019	163	-	6	31	3	2	23	-	10	20
year	Average Cover (%)									
2011	22.6	0.1	0.0	2.1	0.2	-	0.1	-	0.0	0.0
2014	12.3	-	-	0.3	0.2	0.0	0.1	0.0	0.0	0.1
2019	9.7	-	0.1	0.2	0.4	0.1	0.2	-	1.0	0.1

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



**Table 17R-33.12 - 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)	Mahonia repens (creeping barberry)
year	Line Intercept Cover (%)		
2011	56.3	0.4	-
2014	4.1	1.5	0
2019	8.3	3.2	0.1
year	Quadrat Cover (%)		
2011	41.7	0.5	-
2014	3.1	1.3	0.0
2019	8.8	3.3	0.1

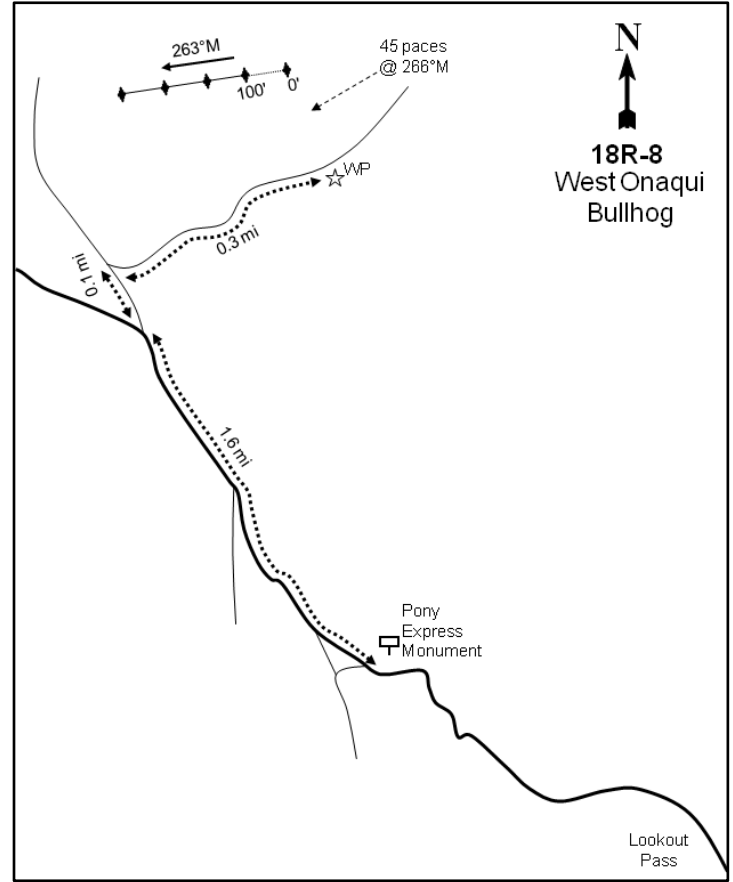
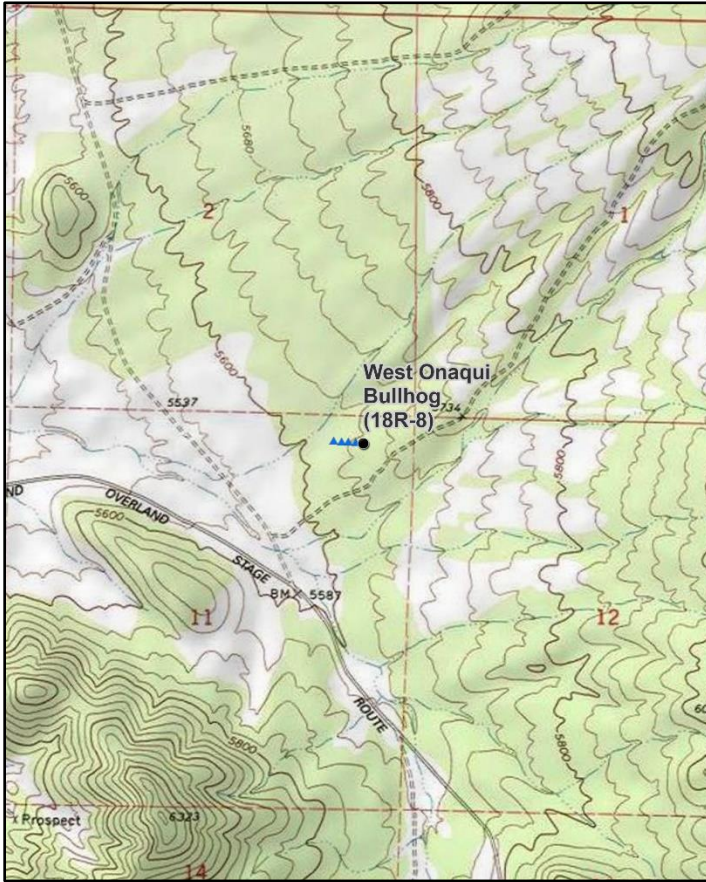
t - Tree Species; p - Preferred Browse; i - Introduced Species

**Table 17R-33.13 - Shrub/Tree Characteristics.** Population characteristics of shrub/tree species populations including density reproduction (seedlings), age distribution, utilization, vigor and average size (height/crown) of plants.

Year	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. vaseyanap -- (mountain big sagebrush)</b>									
2011	6160	100	0	91	9	1	0	11	64/101
2014	1700	20	4	79	18	28	6	14	39/60
2019	1500	20	9	81	9	0	1	16	49/84
<b>Chrysothamnus viscidiflorus ssp. viscidiflorus var. viscidiflorus -- (yellow rabbitbrush)</b>									
2011	160	-	63	38	0	0	0	0	30/47
2014	820	-	2	98	0	0	0	0	26/36
2019	1000	-	0	100	0	0	0	2	33/52
<b>Eriogonum microthecum<sup>p</sup> -- (slender buckwheat)</b>									
2011	-	-	-	-	-	-	-	-	-/-
2014	20	-	0	100	0	0	0	0	-/-
2019	-	-	-	-	-	-	-	-	39/79
<b>Ericameria nauseosa -- (rubber rabbitbrush)</b>									
2011	-	-	-	-	-	-	-	-	51/63
2014	-	-	-	-	-	-	-	-	-/-
2019	-	-	-	-	-	-	-	-	31/86
<b>Mahonia repens -- (creeping barberry)</b>									
2011	-	-	-	-	-	-	-	-	-/-
2014	100	-	40	60	0	0	0	0	4/4
2019	240	-	0	100	0	0	0	0	6/7

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

## WEST ONAQUI BULLHOG - STUDY NO. 18R-8



### Location Information

USGS 7.5 min Map Info  
GPS (0' Stake)

Onaqui Mountains Sou; Township 8S, Range 7W, Section 11  
NAD 83 UTM ZONE 12, 364354 East 4444695 North

### Transect Information

Browse Tag # (0' Stake)	258
Transect Bearing	263° 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 Pony Express Monument on Lookout Pass, drive 1.6 miles west. Turn right (north) and travel 0.1 miles, then turn right again (east) and drive 0.3 miles to a witness post on the left (south) side of the road. From the witness post, walk 45 paces at 266 degrees magnetic to the 0-foot stake which is marked with browse tag #258.

**Site Information**

Land Ownership	Federal
Land Administrator	BLM
Allotment	PONY EXPRESS TRAIL
Elevation	5,660ft (1,725m)
Aspect	Northwest
Slope	7-10%
Sample Dates	08/05/2008, 06/09/2011, 07/29/2015, 07/15/2019

**Table 18R-08.1 Disturbance History.** Recorded history of major disturbances.

Treatment/Disturbance	Name	WRI DB#	Date	Size (acres)
Seeding - Aerial Before	Faust Fire ESR	2484	December 2012	4532
Herbicide - Plateau	Faust Fire ESR	2484	September 2012	779
Chaining - One-Way Ely	Faust Fire ESR	2484	March-April 2013	4068
Fire - Wildfire	Faust Fire	-	August 2012	22045
Mechanical - Bullhog	West Onaqui Bullhog Phase III	1133	March-April 2009	512

**Table 18R-08.2 Seed Mix.** List of known seeded plant species and rates (if available).

Mix Name			Application Type	Application Date	Acres
Faust Fire - BLM			Aerial	Dec 2012	4518
Type	Species	Common Name	Cultivar/Source ID	Bulk lbs/acre	PLS
		Goosenest Mix		1.46	0.00
G	<i>Achnatherum hymenoides</i>	Indian Ricegrass	Nezpar	0.44	0.42
G	<i>Achnatherum hymenoides</i>	Indian Ricegrass	Nezpar	0.15	0.14
G	<i>Achnatherum hymenoides</i>	Indian Ricegrass	Rimrock	0.33	0.32
G	<i>Achnatherum hymenoides</i>	Indian Ricegrass	Rimrock	0.07	0.06
G	<i>Agropyron desertorum</i>	Crested Wheatgrass	Hycrest	1.03	0.87
G	<i>Agropyron desertorum</i>	Crested Wheatgrass	Hycrest II	0.44	0.40
G	<i>Agropyron fragile</i>	Siberian Wheatgrass	Vavilov	0.59	0.55
G	<i>Elymus elymoides</i>	Bottlebrush Squirreltail	Juab UT	0.24	0.22
G	<i>Elymus wawawaiensis</i>	Snake River Wheatgrass		0.34	0.28
G	<i>Elymus wawawaiensis</i>	Snake River Wheatgrass	Secar	0.08	0.06
G	<i>Elymus wawawaiensis</i>	Snake River Wheatgrass	Secar	0.58	0.52
G	<i>Elymus wawawaiensis</i>	Snake River Wheatgrass	Secar	0.23	0.21
G	<i>Elymus wawawaiensis</i>	Snake River Wheatgrass	Secar	0.02	0.02
G	<i>Hesperostipa comata</i>	Needle and Threadgrass	Duchesne UT	0.07	0.05
G	<i>Hesperostipa comata</i>	Needle and Threadgrass	Beaver UT	0.04	0.03
G	<i>Leymus cinereus</i>	Great Basin Wildrye	Magnar	0.24	0.23
G	<i>Pascopyrum smithii</i>	Western Wheatgrass	Arriba	1.33	1.08
G	<i>Poa secunda</i>	Sandberg Bluegrass	Mountain Home	0.15	0.13
G	<i>Psathyrostachys juncea</i>	Russian Wildrye	Bozoisky	0.53	0.44
G	<i>Psathyrostachys juncea</i>	Russian Wildrye	Bozoisky	0.66	0.54
G	<i>Pseudoroegneria spicata</i>	Bluebunch Wheatgrass	Anatone	0.66	0.59
G	<i>Pseudoroegneria spicata</i>	Bluebunch Wheatgrass	Anatone	0.33	0.29
G	<i>Sporobolus cryptandrus</i>	Sand Dropseed		0.08	0.08
G	<i>Sporobolus cryptandrus</i>	Sand Dropseed		0.03	0.03
G	<i>Thinopyrum intermedium</i>	Pubescent Wheatgrass	Luna	0.85	0.70
F	<i>Achillea millefolium</i>	Western Yarrow		0.02	0.02
F	<i>Linum perenne</i>	Blue Flax	Appar	0.33	0.32
F	<i>Medicago sativa</i>	Alfalfa	Ladak	0.89	0.75
F	<i>Medicago sativa</i>	Alfalfa	Ladak DL	0.24	0.21
F	<i>Penstemon palmeri</i>	Palmer Penstemon	Lincoln NV	0.04	0.02
F	<i>Penstemon palmeri</i>	Palmer Penstemon	Lincoln NV	0.12	0.05
F	<i>Penstemon palmeri</i>	Palmer Penstemon	Lincoln NV	0.01	0.00
F	<i>Sanguisorba minor</i>	Small Burnet		1.00	0.92
F	<i>Sanguisorba minor</i>	Small Burnet	Delar	0.09	0.08
F	<i>Sphaeralcea coccinea</i>	Scarlet Globemallow		0.07	0.04
S	<i>Purshia tridentata</i>	Bitterbrush		0.07	0.06

Mix Name			Application Type	Application Date	Acres
Faust Fire - BLM - Dribbler Mix			Dribbler	Mar 2013	4064
Type	Species	Common Name	Cultivar/Source ID	Bulk lbs/acre	PLS
F	<i>Sanguisorba minor</i>	Small Burnet		0.27	0.25
S	<i>Purshia stansburiana</i>	Stansbury Cliffrose	Millard UT	0.04	0.03
S	<i>Purshia stansburiana</i>	Stansbury Cliffrose	Millard/Juab UT	0.04	0.02
S	<i>Purshia tridentata</i>	Bitterbrush		0.27	0.24
S	<i>Purshia tridentata</i>	Bitterbrush		0.02	0.02

### Wildlife Habitat and Vegetation History

**Table 18R-08.3 - Wildlife Seasonal Habitat.** UDWR wildlife habitat and seasonality.

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

**Table 18R-08.4 - Vegetation History.** The dominant vegetation type(s) and phase of woodland succession (Tausch, Miller, Roundy, & Chambers, 2009).

Year	Vegetation Type	Woodland Succession
2008	Juniper	Phase III
2011	Perennial Grass	Phase I
2015	Perennial Grass	No Encroachment
2019	Perennial Grass	No Encroachment

### Site Notes

No Notes

### Site Potential

1981 - 2010 Average Annual Precipitation	14 inches
NRCS Ecological Site	Upland Shallow Loam (Black Sagebrush)
NRCS Ecological Site #	R028AY325UT
States and Transitions	A defined state and transition model is available.

Upon study establishment in 2008, this site was dominated by Utah juniper (*Juniperus osteosperma*) with a sparse understory. However, juniper cover was greatly reduced and perennial grasses became the dominant community component in the years following the 2009 bullhog treatment (Table 18R-08.1, Table 18R-08.7, Table 18R-08.10, Table 18R-08.12). Sandberg bluegrass (*Poa secunda*) was the dominant grass species in the 2011 sample year. After the fire and subsequent seeding in 2011, however, the dominant perennial grass species were bluebunch wheatgrass (*Pseudoroegneria spicata*), squirreltail (*Elymus elymoides*) and crested wheatgrass (*Agropyron cristatum*). Cheatgrass (*Bromus tectorum*) has been sampled in varying amounts, and an increasing trend has been observed (Table 18R-08.10). Weedy annual forbs including curvseeded butterwort (*Ceratocephala testiculata*) and prickly Russian thistle (*Salsola tragus*) have been present with generally significant cover that has varied by year (Table 18R-08.7, Table 18R-08.11). Black sagebrush (*Artemisia nova*) was sampled in low amounts before the fire, but has only been sampled in height/crown measurements following the burn (Table 18R-08.13). Utah juniper was sampled in small amounts following the bullhog treatment, but has not been sampled since the fire; remnant populations near the site indicate a potential for future infilling (Photos, Table 18R-08.12, Table 18R-08.14). The state and transition model places the site into the Burned/Chained Community Phase within the Juniper Invasion/Non-native Weed State. The model also states that in time there is potential for the site to move into a state dominated by Utah juniper with reduced understory production depending on factors such as drought and management decisions (Jornada, 2019).

## Trend Summary Tables

**Table 18R-08.6 - Shrub/Tree Summary.** Average modified Daubenmire quadrat and line intercept cover by year for shrubs/trees

Year	Quadrat Cover (%)			Line-intercept Cover (%)		
	Preferred Shrub	Other Shrub	Tree	Preferred Shrub	Other Shrub	Tree
2008	0.3	-	11.3	-	-	31.0
2011	0.2	-	1.4	-	-	1.1
2015	-	0.0	-	-	-	-
2019	-	0.7	-	-	-	-

**Table 18R-08.7 - Herbaceous Summary.** Nested frequency and average modified Daubenmire quadrat cover by year for herbaceous functional groups

Year	Nested Frequency				Quadrat Cover (%)			
	Annual Grass	Perennial Grass	Annual/Biennial Forb	Perennial Forb	Annual Grass	Perennial Grass	Annual/Biennial Forb	Perennial Forb
2008	6	248	285	53	0.0	3.2	0.7	0.4
2011	109	255	322	135	0.5	14.1	9.4	5.7
2015	369	273	313	60	9.7	19.1	8.3	1.0
2019	359	335	408	110	15.3	24.4	5.6	3.7

**Table 18R-08.8 - Basic Ground Cover.** Average modified Daubenmire quadrat cover by year for basic ground cover types.

Year	Cover Type (%)					
	Bare Ground	Cryptogams	Litter	Pavement	Rock	Vegetation
2008	14.3	20.6	41.3	22.3	1.9	17.5
2011	10.2	1.8	52.4	3.6	0.8	29.1
2015	39.9	-	30.5	13.0	2.7	37.3
2019	22.5	0.1	39.6	7.2	4.0	48.5

**Table 18R-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	Rabbit	Domestic Sheep
	Quadrat Frequency			
2008	-	4	84	-
2011	-	4	6	-
2015	-	10	13	-
2019	-	7	17	-
Year	Days Use Per Acre (ha)			
2008	-	-	-	-
2011	-	5.3 (13.2)	-	1.3 (3.3)
2015	-	12.1 (29.8)	-	-
2019	1.5 (3.6)	16.8 (41.4)	-	-

**Table 18R-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 arvensis <sup>ai</sup> (field brome)	Bromus tectorum <sup>ai</sup> (cheatgrass)	Elymus elymoides (squirreltail)	Elymus trachycaulus (slender wheatgrass)	Elymus wawawaiensis (Snake River wheatgrass)	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)
year	Nested Frequency												
2008	-	-	-	6	36	-	-	-	5	-	229	-	14
2011	3	-	-	109	40	-	-	-	26	6	219	-	32
2015	34	92	-	369	115	36	29	-	14	-	29	7	67
2019	8	95	2	359	83	48	14	5	68	42	158	10	74
year	Average Cover (%)												
2008	-	-	-	0.0	0.5	-	-	-	0.0	-	2.4	-	0.2
2011	0.0	-	-	0.5	2.0	-	-	-	0.0	0.2	10.7	-	1.2
2015	1.6	4.6	-	9.7	4.9	2.3	1.4	-	0.1	-	0.5	0.1	3.8
2019	0.2	5.1	0.0	15.3	3.6	1.8	0.6	0.4	1.8	1.2	4.6	0.3	4.9

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

**Table 18R-08.11 - Forb Species.** Nested frequency and modified Daubenmire average cover by year.

FORB SPECIES	Alyssum desertorum <sup>ai</sup> (desert madwort)	Antennaria (pussytoes)	Calochortus nuttallii (sego lily)	Camelina microcarpa <sup>ai</sup> (littlupod false flax)	Ceratocephala testiculata <sup>ai</sup> (curvseed butterwort)	Chaenactis douglasii (Douglas' dustymaiden)	Collinsia parviflora <sup>a</sup> (maiden blue eyed Mary)	Cryptantha (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)	Linum perenne <sup>i</sup> (blue flax)	Medicago sativa <sup>i</sup> (alfalfa)	Penstemon palmeri (Palmer's penstemon)	Phlox hoodii (spiny phlox)	Phlox longifolia (longleaf phlox)
year	Nested Frequency																
2008	89	4	-	-	272	1	4	-	-	-	-	-	-	-	-	5	-
2011	189	22	8	-	210	-	-	2	24	3	10	179	-	-	-	7	6
2015	195	3	-	-	-	1	-	-	-	-	-	7	9	1	2	13	3
2019	376	-	4	3	240	-	-	-	-	-	4	15	-	-	-	5	-
year	Average Cover (%)																
2008	0.2	0.1	-	-	0.5	0.0	0.0	-	-	-	-	-	-	-	-	0.1	-
2011	2.8	0.3	0.0	-	4.4	-	-	0.0	0.1	0.0	0.0	1.4	-	-	-	0.2	0.1
2015	0.9	0.0	-	-	-	0.0	-	-	-	-	-	0.0	0.0	0.0	0.1	0.1	0.0
2019	3.0	-	0.0	0.0	1.9	-	-	-	-	-	0.0	0.0	-	-	-	0.1	-

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

FORB SPECIES	Salsola tragus <sup>ai</sup> (prickly Russian thistle)	Sanguisorba minor <sup>i</sup> (small burnet)	Sisymbrium altissimum <sup>ai</sup> (tall tumblemustard)	Taraxacum officinale (common dandelion)	Tragopogon dubius <sup>ai</sup> (yellow salsify)	Vicia americana (American vetch)	Zizadenus paniculatus (foothill deathcamas)
year	Nested Frequency						
2008	-	-	-	-	-	42	1
2011	-	-	27	3	-	98	6
2015	191	9	31	-	16	26	-
2019	7	-	-	-	10	105	1
year	Average Cover (%)						
2008	-	-	-	-	-	0.3	0.0
2011	-	-	0.6	0.0	-	5.1	0.0
2015	6.3	0.4	0.8	-	0.3	0.3	-
2019	0.2	-	-	-	0.3	3.5	0.0

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

**Table 18R-08.12 - Shrub and Tree Species.** Average modified Daubenmire quadrat and line intercept cover by year.

SHRUB SPECIES	Artemisia nova <sup>p</sup> (black sagebrush)	Ericameria nauseosa (rubber rabbitbrush)	Juniperus osteosperma <sup>i</sup> (Utah juniper)
year	Line Intercept Cover (%)		
2008	-	-	31
2011	-	-	1.1
2015	-	-	-
2019	-	-	-
year	Quadrat Cover (%)		
2008	0.3	-	11.3
2011	0.2	-	1.4
2015	-	0.0	-
2019	-	0.7	-

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



**Table 18R-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 nova<sup>P</sup> -- (black sagebrush)</b>									
2008	340	-	6	12	82	0	53	82	24/43
2011	100	40	20	60	20	0	0	20	25/40
2015	-	-	-	-	-	-	-	-	19/40
2019	-	-	-	-	-	-	-	-	31/50
<b>Bassia prostrata<sup>PI</sup> -- (forage kochia)</b>									
2008	-	-	-	-	-	-	-	-	-/-
2011	-	-	-	-	-	-	-	-	-/-
2015	-	-	-	-	-	-	-	-	-/-
2019	-	-	-	-	-	-	-	-	33/29
<b>Chrysothamnus viscidiflorus -- (yellow rabbitbrush)</b>									
2008	-	-	-	-	-	-	-	-	-/-
2011	-	-	-	-	-	-	-	-	-/-
2015	-	-	-	-	-	-	-	-	-/-
2019	-	-	-	-	-	-	-	-	46/67
<b>Ericameria nauseosa -- (rubber rabbitbrush)</b>									
2008	-	-	-	-	-	-	-	-	-/-
2011	-	-	-	-	-	-	-	-	10/25
2015	20	-	0	100	0	0	0	0	58/76
2019	40	-	50	50	0	0	0	0	46/65
<b>Gutierrezia sarothrae -- (broom snakeweed)</b>									
2008	-	-	-	-	-	-	-	-	-/-
2011	-	-	-	-	-	-	-	-	20/22
2015	-	-	-	-	-	-	-	-	34/93
2019	-	-	-	-	-	-	-	-	29/43
<b>Juniperus osteosperma<sup>I</sup> -- (Utah juniper)</b>									
2008	1000	100	42	48	10	2	2	4	- / -
2011	320	60	81	13	6	0	0	6	- / -
2015	-	-	-	-	-	-	-	-	-/-
2019	-	-	-	-	-	-	-	-	-/-
<b>Purshia tridentata<sup>P</sup> -- (antelope bitterbrush)</b>									
2008	-	-	-	-	-	-	-	-	-/-
2011	-	-	-	-	-	-	-	-	-/-
2015	-	-	-	-	-	-	-	-	9/19
2019	-	-	-	-	-	-	-	-	13/25

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

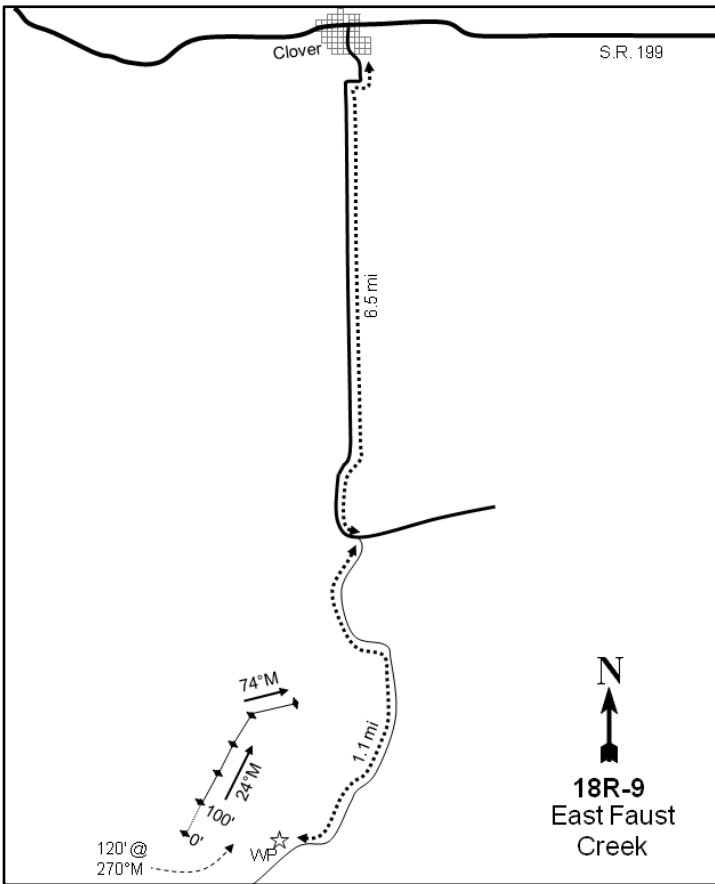
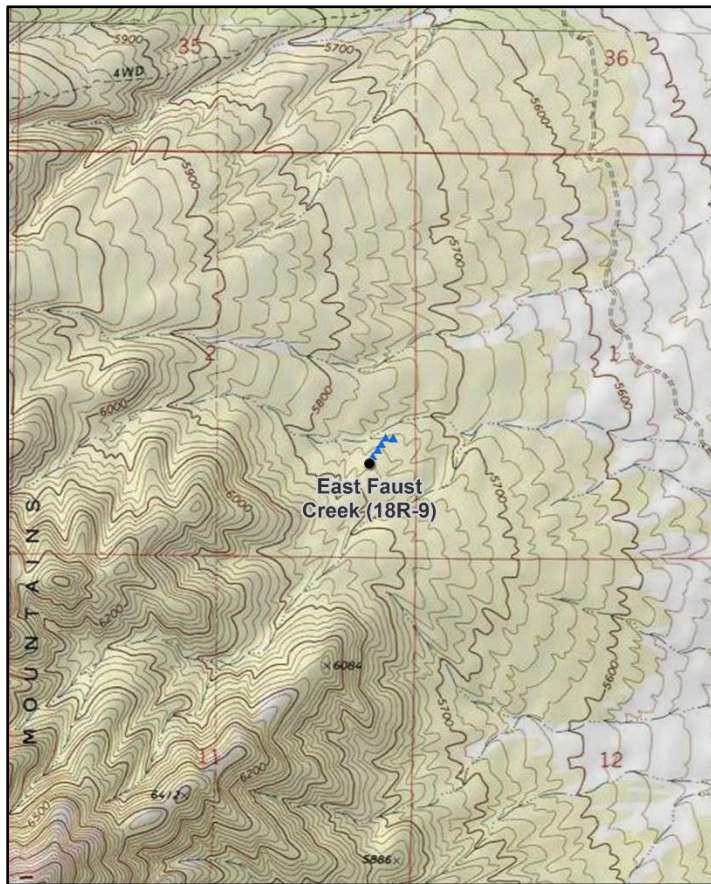
**Table 18R-08.14 - Tree Characteristics.** Point-quarter tree density, size class distribution, and average diameter.

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>							
2008	1425	20	40	25	15	-	10.3
2011	388	40	50	10	-	-	6.0

**Table 18R-08.15 – 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	0.0	0.0	0.0	6.4	0.0	0.9	0.0	7.3	Very Poor
2011	0.0	0.0	0.0	27.8	-0.4	10.0	0.0	37.4	Poor
2015	0.0	0.0	0.0	30.0	-7.3	2.1	0.0	24.8	Very Poor
2019	0.0	0.0	0.0	30.0	-11.5	7.4	0.0	25.9	Very Poor

## EAST FAUST CREEK - STUDY NO. 18R-9



### Location Information

USGS 7.5 min Map Info  
GPS (0' Stake)

Faust NW; Township 7S, Range 6W, Section 02  
NAD 83 UTM ZONE 12, 374160 East 4454884 North

### Transect Information

Browse Tag # (0' Stake)	522
Transect Bearing	Lines 1-4: 18° magnetic (Line 5: 53° magnetic)
Length	500ft
Belt Placement	Line 1 (11ft), Line 2 (34ft), Line 3 (59ft), Line 4 (71ft), Line 5 (95ft)
Belt Marker Placement	Standard

### Directions to Site

From the intersection of State Route 36 and the Pony Express and Overland Stage Route that leads to Faust, travel north on SR-36 for 2.7 miles. Turn left (west) onto a two-track road with a green gate and continue to travel for another 1.8 miles to an intersection. Turn right (north) and drive for another 1.8 miles to a left turn (west). Proceed toward the benches for 1.2 miles to an intersection. Continue up the drainage for another 0.9 miles to a small ridgeline where the transect is located on the right (north) side of the road.

**Site Information**

Land Ownership	State
Land Administrator	SITLA
Allotment	ONAQUI MOUNTAIN EAST
Elevation	5,750ft (1,753m)
Aspect	southeast
Slope	2-10%
Sample Dates	07/28/2015, 07/15/2019

**Table 18R-09.1 Disturbance History.** Recorded history of major disturbances.

Treatment/Disturbance	Name	WRI DB#	Date	Size (acres)
Seeding - Aerial Before	Onaqui East Bench Bullhog Phase III	3249	October 2015	191
Fire - Wildfire	Two Springs	-	September 2017	84
Mechanical - Bullhog	Onaqui East Bench Bullhog Phase III	3249	September 2015-March 2016	191

**Table 18R-09.2 Seed Mix.** List of known seeded plant species and rates (if available).

Mix Name			Application Type	Application Date	Acres
Onaqui East Bench 3			Aerial	Oct 2015	191
Type	Species	Common Name	Cultivar/Source ID	Bulk lbs/acre	PLS
G	Achnatherum hymenoides	Indian Ricegrass	Nezpar	1.05	0.97
G	Dactylis glomerata	Orchardgrass	Paiute	0.52	0.48
G	Elymus lanceolatus	Thickspike Wheatgrass	Bannock	1.57	1.48
G	Poa secunda	Canby Bluegrass	Canbar	0.52	0.28
G	Pseudoroegneria spicata	Bluebunch Wheatgrass	Anatone	3.01	2.60
F	Linum perenne	Blue Flax	Appar	0.16	0.13
F	Onobrychis viciifolia	Sainfoin	Eski	2.09	2.03
F	Penstemon palmeri	Palmer Penstemon	Carbon/Emery UT	0.15	0.13
F	Sanguisorba minor	Small Burnet		2.09	1.73

**Wildlife Habitat and Vegetation History****Table 18R-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

**Table 18R-09.4 - 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
2019	Perennial Grass/Annual-Perennial Fob	Phase I

**Site Notes**

Very little use occurs on the site.

**Site Potential**

1981 - 2010 Average Annual Precipitation	12 inches
NRCS Ecological Site	Upland Shallow Hardpan (Mountain Big Sagebrush)
NRCS Ecological Site #	R028AY322UT
States and Transitions	No state and transition model is available for this ecological site.

This site was established in 2015 and was dominated by Utah juniper (*Juniperus osteosperma*) with a moderate understory mainly comprised of perennial grasses. The herbaceous understory increased in both cover and diversity following the bullhog and seeding treatment (Table 18R-09.1, Table 18R-09.7). Bluebunch wheatgrass (*Pseudoroegneria spicata*) has been the dominant perennial grass species following treatment. Cheatgrass (*Bromus tectorum*) has been present throughout the study period and has exhibited an increase in cover between sample years (Table 18R-09.10). Forbs have increased significantly with the weedy annual species desert madwort (*Alyssum desertorum*) and tall tumbled mustard (*Sisymbrium altissimum*) contributing the most cover; American vetch (*Vicia americana*) was the dominant perennial species (Table 18R-09.11). Browse species are rare on this site. The fire in 2017 removed much of the browse that was remaining following treatment and mountain big sagebrush (*Artemisia tridentata* ssp. *vaseyana*) was sampled only in height/crown measurements in the most recent sample year (Table 18R-09.12, Table 18R-09.13). Utah juniper has decreased significantly following the bullhog and subsequent fire. Only a small number of trees were sampled in density measurements in 2019 and the site has transitioned from being in Phase III of woodland succession to Phase I (Table 18R-09.4, Table 18R-09.14). Without further disturbance, this site will likely remain in the present ecological state in future years.

**Trend Summary Tables****Table 18R-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
2015	0.0	0.0	13.6	-	0.1	30.7
2019	0.1	0.0	-	-	0.1	-

**Table 18R-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
2015	33	251	296	137	1.9	9.4	1.2	1.4
2019	198	171	382	196	7.4	12.7	16.8	8.5

**Table 18R-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
2015	23.7	4.9	34.1	30.8	5.5	25.6
2019	21.8	0.0	39.0	19.3	5.4	40.9

**Table 18R-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	Rabbit
	Quadrat Frequency
2015	15
2019	25
Year	Days Use Per Acre (ha)
2015	-
2019	-

**Table 18R-09.10 - 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)							
Elymus lanceolatus (thickspike wheatgrass)							
Leymus cinereus (basin wildrye)							
Poa secunda (Sandberg bluegrass)							
Pseudoroegneria spicata (bluebunch wheatgrass)							
year	Nested Frequency						
2015	-	33	20	-	-	154	150
2019	3	198	44	1	2	63	116
year	Average Cover (%)						
2015	-	1.9	1.2	-	-	3.7	4.5
2019	0.2	7.4	0.9	0.1	0.8	1.2	9.5

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

**Table 18R-09.11 - 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 tenellus (looseflower milkvetch)																	
Calochortus nuttallii (sego lily)																	
Ceratocephala testiculata <sup>ai</sup> (curveseed butterwort)																	
Crepis acuminata (tapertip hawkbeard)																	
Cryptantha (cryptantha)																	
Descurainia pinnata <sup>a</sup> (western tansymustard)																	
Eriogonum umbellatum (sulphur-flower buckwheat)																	
Erodium cicutarium <sup>ai</sup> (redstem stork's bill)																	
Ipomopsis congesta (ballhead ipomopsis)																	
Lactuca serriola <sup>ai</sup> (prickly lettuce)																	
Lappula occidentalis <sup>a</sup> (flatspine stickseed)																	
Lesquerella (bladderpod)																	
Linum perenne <sup>i</sup> (blue flax)																	
Onobrychis vicifolia <sup>i</sup> (sainfoin)																	
year	Nested Frequency																
2015	296	13	8	-	-	-	-	-	-	1	-	13	-	-	-	-	-
2019	354	4	12	2	3	86	1	13	2	1	2	-	112	11	5	40	4
year	Average Cover (%)																
2015	1.2	0.1	0.0	-	-	-	-	-	-	0.0	-	0.0	-	-	-	-	-
2019	8.1	0.0	0.1	0.1	0.0	0.6	0.0	0.4	0.0	0.0	0.0	-	1.7	0.1	0.2	1.0	0.3

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

FORB SPECIES									
Penstemon palmeri (Palmer's penstemon)									
Phlox hoodii (spiny phlox)									
Phlox longifolia (longleaf phlox)									
Physaria (twinpod)									
Salsola tragus <sup>ai</sup> (prickly Russian thistle)									
Sanguisorba minor <sup>i</sup> (small burnet)									
Sisymbrium altissimum <sup>ai</sup> (tall tumblemustard)									
Tragopogon dubius <sup>ai</sup> (yellow salsify)									
Vicia americana (American vetch)									
year	Nested Frequency								
2015	-	44	21	10	-	-	-	-	59
2019	0	26	26	-	10	28	72	3	92
year	Average Cover (%)								
2015	-	0.6	0.2	0.0	-	-	-	-	0.4
2019	0.1	0.6	0.2	-	0.4	1.2	6.0	0.0	4.4

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

**Table 18R-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)					
Eriogonum microthecum <sup>p</sup> (slender buckwheat)					
Gutierrezia sarothrae (broom snakeweed)					
Juniperus osteosperma <sup>i</sup> (Utah juniper)					
Opuntia (pricklypear)					
year	Line Intercept Cover (%)				
2015	-	-	-	30.7	0.1
2019	-	-	0.1	-	-
year	Quadrat Cover (%)				
2015	0.0	-	0.0	13.6	0.0
2019	-	0.1	0.0	-	-

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

**Table 18R-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>									
2015	140	-	29	29	43	14	29	57	47/66
2019	-	-	-	-	-	-	-	-	51/61
<b>Eriogonum microthecum<sup>p</sup> -- (slender buckwheat)</b>									
2015	-	-	-	-	-	-	-	-	-/-
2019	200	-	10	90	0	0	0	0	10/13
<b>Ericameria nauseosa -- (rubber rabbitbrush)</b>									
2015	-	-	-	-	-	-	-	-	-/-
2019	20	-	0	100	0	0	0	0	26/20
<b>Gutierrezia sarothrae -- (broom snakeweed)</b>									
2015	140	-	29	71	0	0	0	0	15/22
2019	140	-	14	86	0	0	0	0	23/30
<b>Juniperus osteosperma<sup>i</sup> -- (Utah juniper)</b>									
2015	240	40	8	92	0	0	0	0	- / -
2019	20	-	100	0	0	0	0	0	- / -
<b>Opuntia -- (pricklypear)</b>									
2015	40	-	0	100	0	0	0	0	16/42
2019	-	-	-	-	-	-	-	-	13/19
<b>Purshia stansburiana<sup>p</sup> -- (Stansbury cliffrose)</b>									
2015	-	-	-	-	-	-	-	-	97/244
2019	-	-	-	-	-	-	-	-	366/374
<b>Purshia tridentata<sup>p</sup> -- (antelope bitterbrush)</b>									
2015	-	-	-	-	-	-	-	-	68/111
2019	-	-	-	-	-	-	-	-	51/83

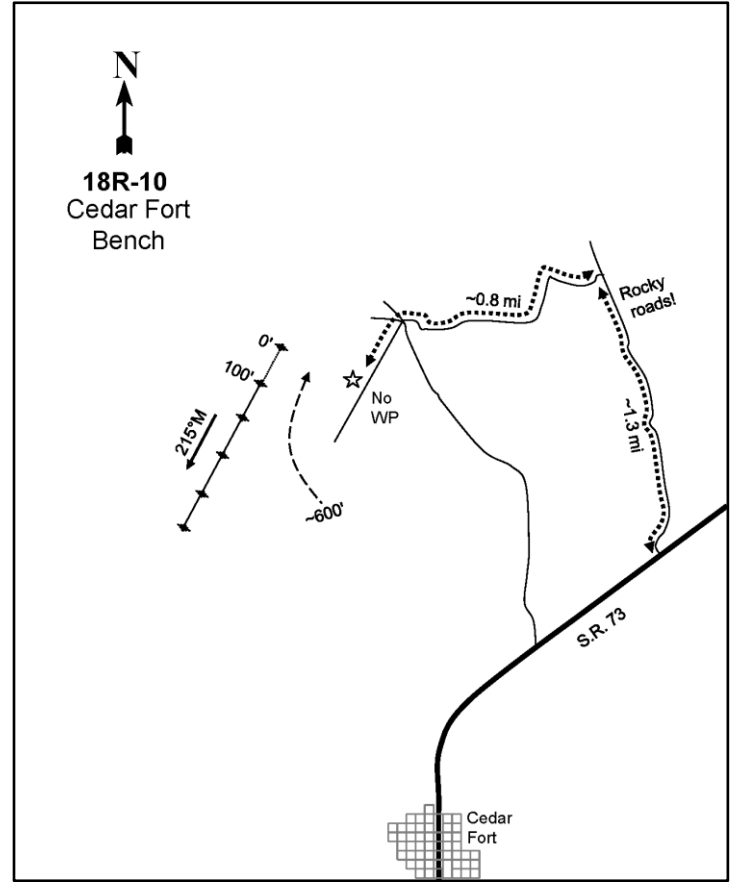
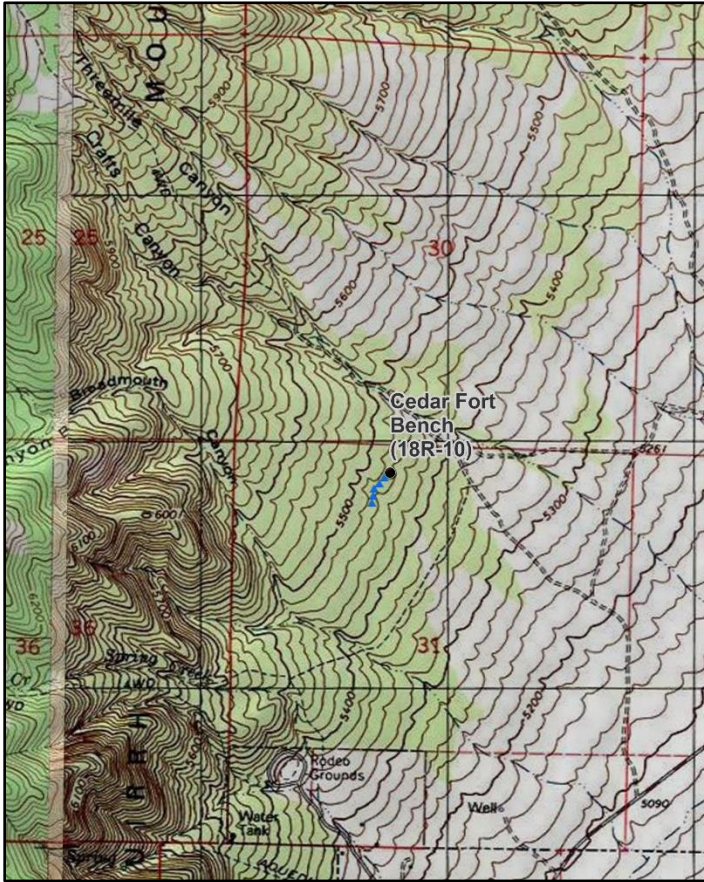
t - Tree Species; p - Preferred Browse; i - Introduced Species

**Table 18R-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>							
2015	486	-	40	30	30	-	13.7
2019	20	50	50	-	-	-	4.2



## CEDAR FORT BENCH - STUDY NO. 18R-10

**Location Information**

USGS 7.5 min Map Info  
GPS (0' Stake)

Cedar Fort NW; Township 5S, Range 2W, Section 31  
NAD 83 UTM ZONE 12, 405766 East 4466879 North

**Transect Information**

Browse Tag # (0' Stake)	769
Transect Bearing	Lines 1-3: 209° magnetic (Lines 4-5: 180)
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 southwest on State Route 73, turn right (north) onto a dirt road and continue for about 1.3 miles (this road gets very rocky). There is a road that comes in from the left (west): turn onto this road and continue for about 0.8 miles, passing an intersection. There is no witness post, but the study is about 600 feet away on the right-hand (northwest) side of the road.

**Site Information**

Land Ownership	Private
Land Administrator	Private
Allotment	DIAMOND VALLEY
Elevation	5,470ft (1,667m)
Aspect	Southeast
Slope	5-10%
Sample Dates	08/18/2016, 07/16/2019

**Table 18R-10.1 Disturbance History.** Recorded history of major disturbances.

Treatment/Disturbance	Name	WRI DB#	Date	Size (acres)
Seeding - Aerial After	Cedar Fort Chaining	3662	December 2016	1028
Seeding - Aerial Before	Cedar Fort Chaining	3662	October 2016	1028
Chaining - Two-Way Ely	Cedar Fort Chaining	3662	October-December 2016	1028
Seeding - Dribbler After	Cedar Fort Chaining	3662	October-December 2016	1028
Herbicide - Plateau	Cedar Fort Chaining	3662	September 2017	527

**Table 18R-10.2 Seed Mix.** List of known seeded plant species and rates (if available).

Mix Name			Application Type	Application Date	Acres
Cedar Fort Chaining			Aerial	Oct 2016	1028
Type	Species	Common Name	Cultivar/Source ID	Bulk lbs/acre	PLS
G	<i>Achnatherum hymenoides</i>	Indian Ricegrass	Nezpar	0.97	0.85
G	<i>Agropyron cristatum</i>	Crested Wheatgrass	Hycrest II	1.02	0.93
G	<i>Dactylis glomerata</i>	Orchardgrass	Paiute	0.31	0.28
G	<i>Dactylis glomerata</i>	Orchardgrass	Paiute	0.18	0.15
G	<i>Pascopyrum smithii</i>	Western Wheatgrass	Arriba	1.02	0.95
G	<i>Poa secunda</i>	Canby Bluegrass	Canbar	0.33	0.24
G	<i>Pseudoroegneria spicata</i>	Bluebunch Wheatgrass	Anatone	1.51	1.35
F	<i>Achillea millefolium</i>	Western Yarrow	Lincoln WA	0.10	0.09
F	<i>Helianthus annuus</i>	Annual Sunflower	Box Elder UT	0.41	0.32
F	<i>Helianthus annuus</i>	Annual Sunflower	Montezuma CO	0.08	0.07
F	<i>Linum perenne</i>	Blue Flax	Appar	0.49	0.43
F	<i>Medicago sativa</i>	Alfalfa	Ladak	0.72	0.67
F	<i>Medicago sativa</i>	Alfalfa	Ladak+	0.78	0.75
F	<i>Onobrychis viciifolia</i>	Sainfoin	Eski	1.99	1.53
F	<i>Sanguisorba minor</i>	Small Burnet		1.99	1.86

Mix Name			Application Type	Application Date	Acres
Cedar Fort Chaining Dribbler			Dribbler	Oct 2016	1028
Type	Species	Common Name	Cultivar/Source ID	Bulk lbs/acre	PLS
F	<i>Sanguisorba minor</i>	Small Burnet		0.39	0.36
S	<i>Atriplex canescens</i>	Fourwing Saltbush	Juab/Carbon UT	0.29	0.11
S	<i>Purshia tridentata</i>	Bitterbrush	Oneida ID	0.29	0.18

Mix Name			Application Type	Application Date	Acres
Cedar Fort Chaining Shrub			Aerial	Dec 2016	1028
Type	Species	Common Name	Cultivar/Source ID	Bulk lbs/acre	PLS
S	<i>Artemisia tridentata</i> ssp. <i>wyomingensis</i>	Wyoming Big Sagebrush	Sevier UT	0.49	0.09
S	<i>Bassia prostrata</i>	Forage Kochia	Box Elder UT	0.97	0.73

**Wildlife Habitat and Vegetation History****Table 18R-10.3 - Wildlife Seasonal Habitat.** UDWR wildlife habitat and seasonality.

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

**Table 18R-10.4 - Vegetation History.** The dominant vegetation type(s) and phase of woodland succession (Tausch, Miller, Roundy, & Chambers, 2009).

Year	Vegetation Type	Woodland Succession
2016	Juniper	Phase III
2019	Perennial Grass-Forb	Phase I

**Site Notes**

No Notes

**Site Potential**

1981 - 2010 Average Annual Precipitation	15 inches
NRCS Ecological Site	Upland Stony Loam (Wyoming Big Sagebrush)
NRCS Ecological Site #	R028AY334UT
States and Transitions	No state and transition model is available for this ecological site.

When the study was established in 2016, it was dominated by Utah juniper (*Juniperus osteosperma*) and was considered to be in Phase III of woodland succession (Table 18R-10.4, Table 18R-10.14). The herbaceous understory was depleted in both cover and diversity (Table 18R-10.7). However, the site was seeded with a variety of species and chained to removed trees in the fall and winter of 2016 (Table 18R-10.1, Table 18R-10.2). As of 2019, perennial grasses provide moderate cover with crested wheatgrass (*Agropyron cristatum*) as the dominant species (Table 18R-10.10). Perennial forbs are the primary component of the understory and contribute significant cover with the introduced species small burnet (*Sanguisorba minor*) and sainfoin (*Onobrychis viciifolia*) being the dominant species (Table 18R-10.11). Shrubs were initially sparse, but mountain big sagebrush (*Artemisia tridentata* ssp. *vaseyana*) and antelope bitterbrush (*Purshia tridentata*) were sampled in low amounts after treatment (Table 18R-10.12, Table 18R-10.13). Tree cover and density decreased significantly after treatment, and the site is within Phase I of woodland succession as of 2019 (Table 18R-10.12, Table 18R-10.14).

**Trend Summary Tables****Table 18R-10.6 - Shrub/Tree Summary.** Average modified Daubenmire quadrat and line intercept cover by year for shrubs/trees

Year	Quadrat Cover (%)			Line-intercept Cover (%)		
	Preferred Shrub	Other Shrub	Tree	Preferred Shrub	Other Shrub	Tree
2016	0.0	-	15.3	0.2	-	31.6
2019	0.4	0.1	1.3	0.2	0.2	0.6

**Table 18R-10.7 - Herbaceous Summary.** Nested frequency and average modified Daubenmire quadrat cover by year for herbaceous functional groups

Year	Nested Frequency				Quadrat Cover (%)			
	Annual Grass	Perennial Grass	Annual/Biennial Forb	Perennial Forb	Annual Grass	Perennial Grass	Annual/Biennial Forb	Perennial Forb
2016	44	105	383	50	0.1	0.4	1.3	0.3
2019	81	160	259	242	1.3	4.7	6.7	20.6

**Table 18R-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
2016	14.0	7.5	38.9	26.3	14.8	18.4
2019	15.4	0.0	47.5	7.9	21.1	32.7

**Table 18R-10.9 - Pellet Group Data.** Quadrat frequency and pellet group transect data for animal pellets. Rabbit pellet groups are not sampled in the pellet group transect.

Year	Cattle	Mule Deer	Rabbit
	Quadrat Frequency		
2016	-	-	10
2019	2	4	15
Year	Days Use Per Acre (ha)		
2016	-	1.3 (3.3)	-
2019	2.9 (7.2)	4.0 (9.9)	-

**Table 18R-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)										
Bromus tectorum <sup>ai</sup> (cheatgrass)										
Dactylis glomerata <sup>i</sup> (orchardgrass)										
Elymus elymoides (squirreltail)										
Elymus trachycaulus (slender wheatgrass)										
Pascopyrum smithii (western wheatgrass)										
Poa secunda (Sandberg bluegrass)										
Psathyrostachys juncea <sup>i</sup> (Russian wildrye)										
Pseudoroegneria spicata (bluebunch wheatgrass)										
year	Nested Frequency									
2016	1	-	44	-	63	-	-	50	-	-
2019	14	81	81	11	29	9	5	20	0	32
year	Average Cover (%)									
2016	0.0	-	0.1	-	0.2	-	-	0.2	-	-
2019	0.2	2.3	1.3	0.2	0.7	0.2	0.0	0.2	0.0	0.8

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

**Table 18R-10.11 - Forb Species.** Nested frequency and modified Daubenmire average cover by year.

FORB SPECIES																	
Achillea millefolium (Common yarrow)																	
Alyssum alyssoides <sup>ai</sup> (pale madwort)																	
Alyssum desertorum <sup>ai</sup> (desert madwort)																	
Arabis (rockcress)																	
Astragalus eurekaensis (Eureka 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)																	
Cryptantha (cryptantha)																	
Dracocephalum (dragonhead)																	
Eriogonum (buckwheat)																	
Eriogonum racemosum (redroot buckwheat)																	
Eriogonum umbellatum (sulphur-flower buckwheat)																	
Helianthus annuus <sup>a</sup> (common sunflower)																	
Lactuca scariola <sup>ai</sup> (prickly lettuce)																	
Lappula occidentalis <sup>a</sup> (flatspine stickseed)																	
year	Nested Frequency																
2016	-	-	381	4	-	-	40	-	3	14	-	17	1	2	-	-	-
2019	32	156	52	-	7	1	18	38	-	26	2	-	-	11	12	136	1
year	Average Cover (%)																
2016	-	-	1.2	0.0	-	-	0.1	-	0.0	0.0	-	0.1	0.0	0.0	-	-	-
2019	1.3	3.5	0.5	-	0.1	0.0	0.1	0.1	-	0.6	0.0	-	-	0.3	0.0	2.4	0.0

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

FORB SPECIES								
<i>Lathyrus brachycalyx</i> (Bonneville pea)								
<i>Linum perenne</i> <sup>i</sup> (blue flax)								
<i>Medicago sativa</i> <sup>i</sup> (alfalfa)								
<i>Onobrychis vicifolia</i> <sup>i</sup> (sainfoin)								
<i>Onopordum acanthium</i> <sup>mi</sup> (Scotch cottonthistle)								
<i>Polygonum douglasii</i> <sup>a</sup> (Douglas' knotweed)								
<i>Sanguisorba minor</i> <sup>i</sup> (small burnet)								
<i>Tragopogon dubius</i> <sup>ai</sup> (yellow salsify)								
year	Nested Frequency							
2016	15	-	-	-	-	-	-	1
2019	5	54	67	80	3	2	104	3
year	Average Cover (%)							
2016	0.1	-	-	-	-	-	-	0.0
2019	0.1	2.8	3.3	4.1	0.1	0.0	7.9	0.0

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

**Table 18R-10.12 - Shrub and Tree Species.** Average modified Daubenmire quadrat and line intercept cover by year.

SHRUB SPECIES								
<i>Artemisia tridentata</i> ssp. <i>vaseyana</i> <sup>p</sup> (mountain big sagebrush)								
<i>Ericameria nauseosa</i> (rubber rabbitbrush)								
<i>Ericameria nauseosa</i> ssp. <i>nauseosa</i> var. <i>hololeuca</i> <sup>p</sup> (rubber rabbitbrush)								
<i>Juniperus osteosperma</i> <sup>t</sup> (Utah juniper)								
<i>Pinus monophylla</i> <sup>t</sup> (singleleaf pinyon)								
<i>Purshia stansburiana</i> <sup>p</sup> (Stansbury cliffrose)								
<i>Purshia tridentata</i> <sup>p</sup> (antelope bitterbrush)								
year	Line Intercept Cover (%)							
2016	-	-	-	31.1	0.5	0.2	-	-
2019	0	0.2	0.2	0.6	-	-	-	-
year	Quadrat Cover (%)							
2016	-	-	-	15.0	0.4	0.0	-	-
2019	0.1	0.1	0.1	1.3	-	-	-	0.1

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

**Table 18R-10.13 - Shrub/Tree Characteristics.** Population characteristics of shrub/tree species populations including density reproduction (seedlings), age distribution, utilization, vigor and average size (height/crown) of plants.

Year	Density		Age Class Distribution			Utilization		Poor Vigor (%)	Average Height Crown (cm)
	Plants Per Acre		Excluding Seedlings			Moderate (%)	Heavy (%)		
	Excluding Seedlings	Seedling	Young (%)	Mature (%)	Decadent (%)				
<b>Artemisia tridentata ssp. vaseyana<sup>p</sup> -- (mountain big sagebrush)</b>									
2016	-	-	-	-	-	-	-	-	-/-
2019	40	-	50	50	0	0	0	0	38/34
<b>Chrysothamnus viscidiflorus -- (yellow rabbitbrush)</b>									
2016	-	-	-	-	-	-	-	-	-/-
2019	-	-	-	-	-	-	-	-	27/41
<b>Ericameria nauseosa -- (rubber rabbitbrush)</b>									
2016	-	-	-	-	-	-	-	-	-/-
2019	60	-	0	100	0	0	0	0	38/48
<b>Ericameria nauseosa ssp. nauseosa var. hololeuca<sup>p</sup> -- (rubber rabbitbrush)</b>									
2016	-	-	-	-	-	-	-	-	-/-
2019	20	-	0	100	0	0	0	0	44/47
<b>Gutierrezia sarothrae -- (broom snakeweed)</b>									
2016	20	-	100	0	0	0	0	100	14/4
2019	-	-	-	-	-	-	-	-	-/-
<b>Juniperus osteosperma<sup>i</sup> -- (Utah juniper)</b>									
2016	480	160	13	75	13	0	0	21	- / -
2019	100	-	0	100	0	0	0	20	- / -
<b>Opuntia -- (pricklypear)</b>									
2016	20	-	0	100	0	0	0	0	11/33
2019	-	-	-	-	-	-	-	-	8/15
<b>Pinus monophylla<sup>i</sup> -- (singleleaf pinyon)</b>									
2016	20	60	0	100	0	0	0	0	- / -
2019	-	20	0	0	0	0	0	0	- / -
<b>Purshia stansburiana<sup>p</sup> -- (Stansbury cliffrose)</b>									
2016	20	-	0	100	0	100	0	0	82/94
2019	-	-	-	-	-	-	-	-	78/92
<b>Purshia tridentata<sup>p</sup> -- (antelope bitterbrush)</b>									
2016	-	-	-	-	-	-	-	-	16/39
2019	180	-	100	0	0	0	0	0	6/12

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

**Table 18R-10.14 - Tree Characteristics.** Point-quarter tree density, size class distribution, and average diameter.

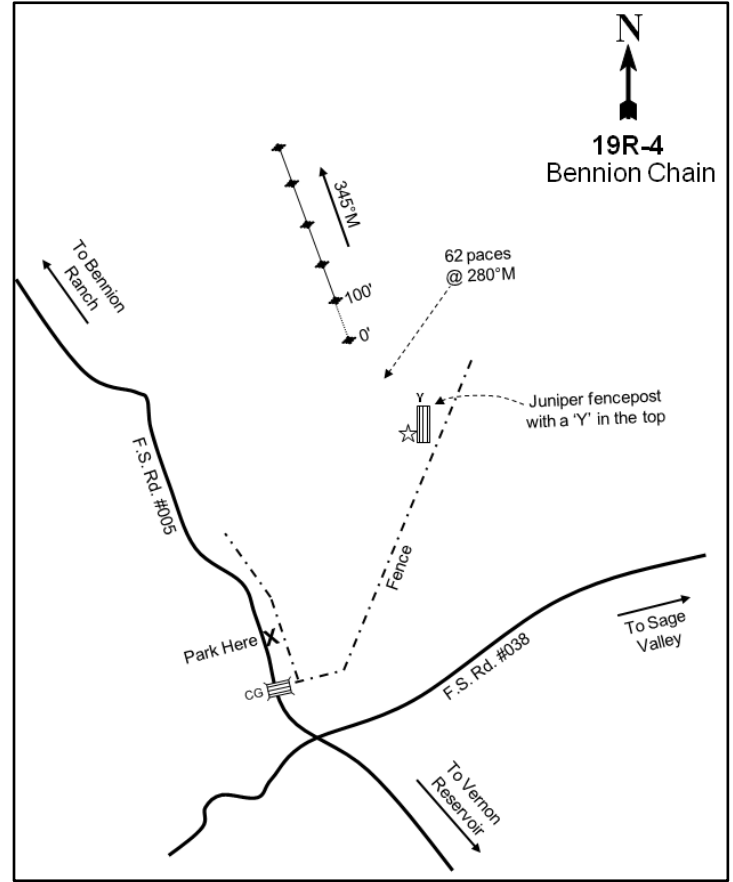
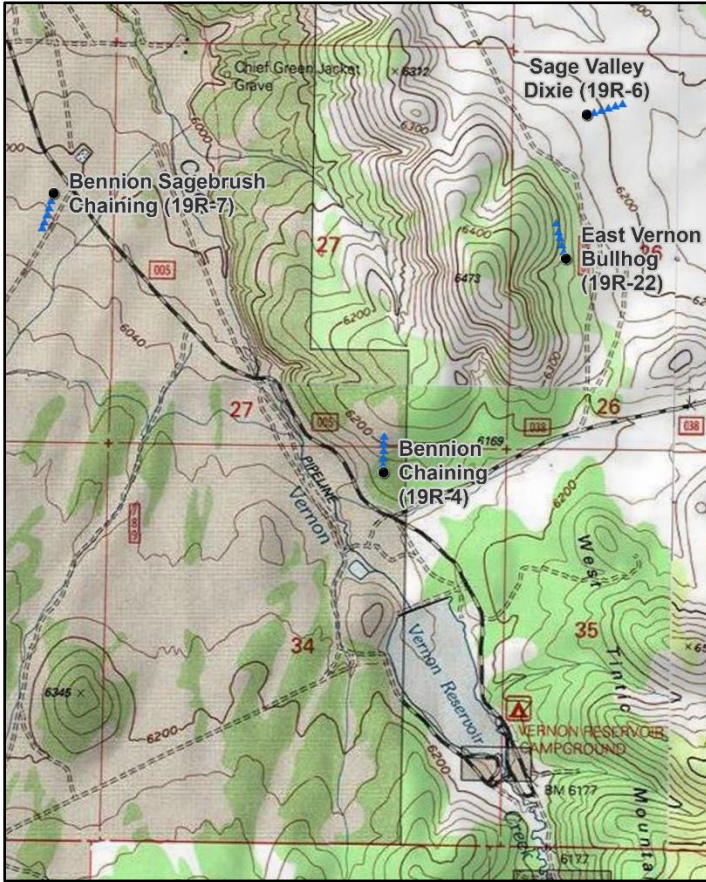
Year	Density	Size Class Distribution					Average Diameter (cm)
	Trees per Acre	Seedling (%)	1-4' (%)	4-8' (%)	8-12' (%)	>12' (%)	
<b>Juniperus osteosperma (Utah juniper)</b>							
2016	317	-	10	5	15	70	17.1
2019	106	-	100	-	-	-	15.4
<b>Pinus edulis (twoneedle pinyon)</b>							
2019	1	100	-	-	-	-	2.0
<b>Pinus monophylla (singleleaf pinyon)</b>							
2019	5	-	100	-	-	-	2.8

**Table 18R-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
2016	0.3	0.0	0.0	0.8	-0.1	0.5	0.0	1.5	Very Poor
2019	0.3	0.0	0.0	9.3	-0.9	10.0	-2.0	16.6	Very Poor



## BENNION CHAINING - STUDY NO. 19R-4



### Location Information

USGS 7.5 min Map Info  
GPS (0' Stake)

Dutch Peak NE; Township 9S, Range 5W, Section 34  
NAD 83 UTM ZONE 12, 381391 East 4428323 North

### Transect Information

Browse Tag # (0' Stake)	99
Transect Bearing	345° magnetic
Length	500ft
Belt Placement	Line 1 (11ft), Line 2 (34ft), Line 3 (59ft), Line 4 (71ft), Line 5 (95ft)
Belt Marker Placement	Standard

### Directions to Site

Drive southwest from Eureka on US-6 to Tintic Junction (State Routes 36 and 67). Turn right (northwest) on State Route 36 and drive 19.5 miles to two roads that go west: take the first road that goes south towards Vernon Reservoir. Drive south for 7.3 miles to a cattle guard just before the junction with Forest Service road #038. Park here and walk along the fence line for approximately 800 feet to a juniper fence post. From the fence post, walk 62 paces at 280 degrees magnetic to the 0-foot stake, which is marked with browse tag #99.



**Site Information**

Land Ownership	Private
Land Administrator	Private
Allotment	BENNION RANCH
Elevation	6,150ft (1,875m)
Aspect	South
Slope	20%
Sample Dates	10/12/2005, 08/10/2010, 07/30/2015, 07/16/2019

**Table 19R-04.1 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 Smooth	Bennion Ranch Sage-Grouse Demonstration Year 1	55	September-December 2006	450
Seeding - Aerial Before	Bennion Ranch Sage-Grouse Demonstration Year 1	55	December 2006	450
Seeding - Dribbler	Bennion Ranch Sage-Grouse Demonstration Year 1	55	September-December 2006	450
Seeding - Aerial After	Bennion Ranch Sage-Grouse Demonstration Year 1	55	January 2007	450

**Table 19R-04.2 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	150
Type	Species	Common Name	Cultivar/Source ID	Bulk lbs/acre	PLS
G	<i>Achnatherum hymenoides</i>	Indian Ricegrass	Rimrock	0.50	0.43
G	<i>Agropyron cristatum</i>	Crested Wheatgrass	Douglas	0.50	0.43
G	<i>Agropyron cristatum</i>	Crested Wheatgrass	CDII	0.50	0.44
G	<i>Agropyron fragile</i>	Siberian Wheatgrass	Vavilov	0.50	0.44
G	<i>Psathyrostachys juncea</i>	Russian Wildrye	Bozoisky	1.00	0.94
G	<i>Pseudoroegneria spicata</i>	Bluebunch Wheatgrass	Anatone	0.50	0.43
G	<i>Thinopyrum intermedium</i>	Pubescent Wheatgrass		0.50	0.42
G	<i>Thinopyrum intermedium</i>	Intermediate Wheatgrass		0.50	0.44
F	<i>Medicago sativa</i>	Alfalfa	Ladak	0.50	0.46
F	<i>Medicago sativa</i>	Alfalfa	Ranger	0.50	0.44
F	<i>Medicago sativa</i>	Alfalfa	Spredor 4	0.50	0.48
F	<i>Onobrychis viciifolia</i>	Sainfoin	Eski	2.00	1.84
F	<i>Sanguisorba minor</i>	Small Burnet	Delar	2.00	1.86

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	<i>Atriplex canescens</i>	Fourwing Saltbush	Juab/Millard UT	0.31	0.12
S	<i>Purshia tridentata</i>	Bitterbrush	Millard UT	0.16	0.12

Mix Name			Application Type	Application Date	Acres
Bennion Ranch			Aerial	Jan 2007	320
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	0.56	0.13
S	<i>Artemisia tridentata</i> ssp. <i>wyomingensis</i>	Wyoming Big Sagebrush	Beaver UT	0.44	0.10
S	<i>Bassia prostrata</i>	Forage Kochia	Rocky Mountain	1.00	0.57

**Wildlife Habitat and Vegetation History****Table 19R-04.3 - Wildlife Seasonal Habitat.** UDWR wildlife habitat and seasonality.

Species	Habitat	Season	Brood/Young Rearing
Mule Deer	crucial	spring/fall	
Greater Sage-Grouse	occupied	year-long & Winter	brood-rearing

**Table 19R-04.4 - Vegetation History.** The dominant vegetation type(s) and phase of woodland succession (Tausch, Miller, Roundy, & Chambers, 2009).

Year	Vegetation Type	Woodland Succession
2005	Pinyon-Juniper	Phase III
2010	Annual-Perennial Grass-Forb	Phase I
2015	Perennial Grass/Mixed Shrub	Phase I
2019	Annual-Perennial Grass/Mixed Shrub	Phase I

**Site Notes**

No Notes

**Soils****Table 19R-04.5 - Soil Analysis Data.** List of chemical and textural soil characteristics determined by laboratory analysis.

Texture	pH	% sand	% silt	% clay	% OM	PPM P	PPM K	ds/m	Sample Date
Loam	7.5	37.4	36.0	26.6	2.4	9.7	169.6	0.6	10/12/2005

**Site Potential**

1981 - 2010 Average Annual Precipitation 16 inches  
 NRCS Ecological Site Upland Gravelly Loam (Wyoming Big Sagebrush)  
 NRCS Ecological Site # R028AY307UT  
 States and Transitions A defined state and transition model is available.

Upon study establishment in 2005, this was a Utah juniper (*Juniperus osteosperma*)-dominated site considered to be in Phase III of woodland succession (Table 19R-04.4). The herbaceous understory was mostly depleted prior to the 2006 chaining and seeding treatment (Table 19R-04.1). The herbaceous understory increased following treatment, however, and annual and perennial grasses were co-dominant components along with perennial forbs (Table 19R-04.7). Perennial grasses have generally increased with bluebunch wheatgrass (*Pseudoroegneria spicata*) as the dominant species. Annual grasses have shown fluctuations with cheatgrass (*Bromus tectorum*) being the primary annual grass species sampled (Table 19R-04.10). Cover of both perennial and annual forbs has fluctuated, but desert madwort (*Alyssum desertorum*) has been the most abundant annual species (Table 19R-04.11). Shrub species were initially rare, but have increased in the years since treatment. Forage kochia (*Bassia prostrata*) and Wyoming big sagebrush (*Artemisia tridentata* ssp. *wyomingensis*) are the dominant shrub species present (Table 19R-04.12, Table 19R-04.13). Juniper and twoneedle pinyon (*Pinus edulis*) were present prior to treatment and juniper has been sampled in low abundance in the years since then (Table 19R-04.14).

**Trend Summary Tables****Table 19R-04.6 - Shrub/Tree Summary.** Average modified Daubenmire quadrat and line intercept cover by year for shrubs/trees

Year	Quadrat Cover (%)			Line-intercept Cover (%)		
	Preferred Shrub	Other Shrub	Tree	Preferred Shrub	Other Shrub	Tree
2005	-	0.1	17.8	0.1	-	44.8
2010	2.0	0.7	0.3	4.7	0.3	0.6
2015	9.1	1.6	0.8	11.5	1.8	0.6
2019	10.0	1.3	0.3	11.0	2.0	0.6

**Table 19R-04.7 - Herbaceous Summary.** Nested frequency and average modified Daubenmire quadrat cover by year for herbaceous functional groups

Year	Nested Frequency				Quadrat Cover (%)			
	Annual Grass	Perennial Grass	Annual/Biennial Forb	Perennial Forb	Annual Grass	Perennial Grass	Annual/Biennial Forb	Perennial Forb
2005	19	141	178	21	0.1	2.0	0.7	0.1
2010	341	146	306	146	9.9	7.6	6.3	11.2
2015	300	228	330	100	4.5	11.1	3.6	2.9
2019	342	238	419	126	13.1	16.6	5.6	5.2

**Table 19R-04.8 - Basic Ground Cover.** Average modified Daubenmire quadrat cover by year for basic ground cover types.

Year	Cover Type (%)					
	Bare Ground	Cryptogams	Litter	Pavement	Rock	Vegetation
2005	16.5	0.6	39.2	31.5	8.9	19.9
2010	12.5	0.5	49.1	9.2	8.9	36.6
2015	19.4	0.0	40.3	17.7	8.1	30.8
2019	11.7	-	46.6	14.1	11.1	49.0

**Table 19R-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			
2005	-	1	-	62
2010	2	7	1	2
2015	-	6	-	20
2019	8	5	2	22
Year	Days Use Per Acre (ha)			
2005	-	0.7 (1.7)	-	-
2010	2.2 (5.4)	7.4 (18.2)	-	-
2015	8.7 (21.5)	9.4 (23.2)	-	-
2019	7.2 (17.9)	4.7 (11.6)	2.0 (5.0)	-

**Table 19R-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 arvensis <sup>ai</sup> (field 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										
2005	0	-	-	19	4	-	-	125	-	15	-
2010	11	20	-	341	19	1	3	26	4	64	30
2015	-	21	-	300	75	15	-	60	25	111	10
2019	-	28	4	342	59	37	3	64	27	110	34
year	Average Cover (%)										
2005	0.0	-	-	0.1	0.0	-	-	1.8	-	0.2	-
2010	0.1	0.5	-	9.9	0.8	0.0	0.0	0.3	0.2	4.2	1.4
2015	-	1.0	-	4.5	1.4	0.7	-	0.8	1.2	5.3	0.8
2019	-	1.1	0.4	12.7	2.5	1.4	0.0	0.9	1.6	7.7	1.4

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

**Table 19R-04.11 - 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)	Argemone corymbosa <sup>a</sup> (Mojave pricklypoppy)	Astragalus (milkvetch)	Astragalus cibirius (browse milkvetch)	Astragalus convallarius (lesser rushy milkvetch)	Astragalus eurekaensis (Eureka milkvetch)	Astragalus utahensis (Utah milkvetch)	Ceratocephala testiculata <sup>ai</sup> (curvseed butterwort)	Chaenactis douglasii (Douglas' dusty maiden)	Chaetopappa ericoides (rose heath)	Chenopodium leptophyllum <sup>a</sup> (narrowleaf goosefoot)	Cirsium (thistle)	Crepis acuminata (tapertip hawkbeard)	Cryptantha (cryptantha)	Cymopterus (springparsley)
year	Nested Frequency																
2005	2	126	1	-	-	-	3	-	4	16	-	-	-	-	-	4	-
2010	-	291	-	0	100	-	-	-	18	-	9	-	-	-	3	1	2
2015	-	326	2	-	2	56	-	-	5	-	2	9	-	-	3	20	1
2019	-	417	-	-	-	78	3	1	8	11	8	18	1	2	-	16	-
year	Average Cover (%)																
2005	0.0	0.3	0.0	-	-	-	0.0	-	0.0	0.0	-	-	-	-	-	0.0	-
2010	-	4.6	-	0.6	8.5	-	-	-	0.4	-	0.1	-	-	-	0.0	0.0	0.0
2015	-	3.3	0.1	-	0.0	1.1	-	-	0.0	-	0.0	0.6	-	-	0.0	0.3	0.0
2019	-	5.2	-	-	-	1.5	0.0	0.0	0.0	0.0	0.0	1.7	0.0	0.0	-	0.6	-

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

FORB SPECIES	Descurainia pinnata <sup>a</sup> (western tansymustard)	Erodium cicutarium <sup>ai</sup> (redstem stork's bill)	Gilia inconspicua <sup>a</sup> (shy gilia)	Lactuca serriola <sup>ai</sup> (prickly lettuce)	Medicago sativa <sup>i</sup> (alfalfa)	Microsteris gracilis <sup>a</sup> (slender phlox)	Onobrychis vicifolia <sup>i</sup> (sainfoin)	Packera multilobata (lobeleaf groundsel)	Phlox longifolia (longleaf phlox)	Pleiocanthus spinosus (thorn skeletonweed)	Sanguisorba minor <sup>i</sup> (small burnet)	Sisymbrium altissimum <sup>ai</sup> (tall tumbleweed)	Tragopogon dubius <sup>ai</sup> (yellow salsify)	Trifolium (clover)
year	Nested Frequency													
2005	16	-	58	0	-	-	-	-	-	4	-	-	-	3
2010	19	-	-	45	24	2	1	10	-	1	19	-	1	-
2015	-	6	-	7	5	-	10	9	1	-	2	3	7	1
2019	4	15	13	7	7	1	-	-	3	0	1	-	7	-
year	Average Cover (%)													
2005	0.1	-	0.3	0.0	-	-	-	-	-	0.0	-	-	-	0.0
2010	0.3	-	-	0.8	1.3	0.0	0.0	0.1	-	0.0	0.8	-	0.0	-
2015	-	0.0	-	0.1	0.1	-	0.3	0.3	0.0	-	0.0	0.1	0.1	0.0
2019	0.0	0.1	0.1	0.0	1.1	0.0	-	-	0.0	0.0	0.2	-	0.1	-

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

**Table 19R-04.12 - Shrub and Tree Species.** Average modified Daubenmire quadrat and line intercept cover by year.

SHRUB SPECIES	Artemisia tridentata ssp. wyomingensis <sup>p</sup> (Wyoming big sagebrush)	Atriplex canescens <sup>p</sup> (fourwing saltbush)	Bassia prostrata <sup>pi</sup> (forage kochia)	Chrysothamnus viscidiflorus ssp. viscidiflorus var. stenophyllus (yellow rabbitbrush)	Ericameria nauseosa (rubber rabbitbrush)	Ericameria nauseosa ssp. nauseosa var. hololeuca <sup>p</sup> (rubber rabbitbrush)	Gutierrezia sarothrae (broom snakeweed)	Juniperus osteosperma <sup>i</sup> (Utah juniper)	Opuntia (pricklypear)	Pinus edulis <sup>i</sup> (twoneedle pinyon)	Pinus monophylla <sup>i</sup> (singleleaf pinyon)
year	Line Intercept Cover (%)										
2005	0.1	-	-	-	-	-	-	33.9	-	1.7	9.2
2010	0.1	0.1	4.5	-	0.3	-	-	0.6	0	-	-
2015	1.8	0.1	9.6	-	1.7	-	-	0.6	0.1	-	-
2019	2.8	0.8	7.4	0.5	1.5	-	-	0.6	-	-	-
year	Quadrat Cover (%)										
2005	0.0	-	-	-	-	-	-	12.2	0.1	1.0	4.6
2010	0.0	0.0	2.0	0.1	0.4	-	-	0.3	0.2	-	-
2015	2.9	0.4	5.8	0.0	1.5	-	0.0	0.8	0.1	-	-
2019	2.8	0.8	6.3	0.0	1.0	0.0	0.0	0.3	0.3	-	-

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

**Table 19R-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. wyomingensis<sup>p</sup> -- (Wyoming big sagebrush)</b>									
2005	60	-	0	33	67	0	0	33	30/44
2010	100	-	60	40	0	0	0	0	42/48
2015	120	-	17	83	0	50	0	0	59/86
2019	220	700	18	82	0	0	0	0	74/108
<b>Atriplex canescens<sup>p</sup> -- (fourwing saltbush)</b>									
2005	-	-	-	-	-	-	-	-	-/-
2010	60	-	67	33	0	0	0	0	53/42
2015	40	-	0	100	0	0	0	50	91/98
2019	60	-	0	100	0	0	0	0	111/152
<b>Bassia prostrata<sup>pi</sup> -- (forage kochia)</b>									
2005	-	-	-	-	-	-	-	-	-/-
2010	2860	-	12	88	0	39	0	0	43/55
2015	6440	520	34	67	0	39	0	3	32/64
2019	7020	960	12	88	0	15	0	0	33/47
<b>Chrysothamnus viscidiflorus ssp. viscidiflorus var. stenophyllus -- (yellow rabbitbrush)</b>									
2005	-	-	-	-	-	-	-	-	-/-
2010	20	-	0	100	0	0	0	0	35/51
2015	20	-	0	100	0	0	0	0	42/65
2019	40	-	0	100	0	0	0	0	52/83
<b>Ericameria nauseosa -- (rubber rabbitbrush)</b>									
2005	-	-	-	-	-	-	-	-	-/-
2010	40	-	0	100	0	0	0	0	50/55
2015	160	40	38	63	0	25	0	0	59/87
2019	180	-	11	89	0	0	0	0	68/87

Year	Density		Age Class Distribution			Utilization		Poor Vigor (%)	Average Height Crown (cm)
	Plants Per Acre		Excluding Seedlings			Moderate (%)	Heavy (%)		
	Excluding Seedlings	Seedling	Young (%)	Mature (%)	Decadent (%)				
<b>Ericameria nauseosa ssp. nauseosa var. hololeuca<sup>P</sup> -- (rubber rabbitbrush)</b>									
2005	-	-	-	-	-	-	-	-	-/-
2010	-	-	-	-	-	-	-	-	-/-
2015	-	-	-	-	-	-	-	-	-/-
2019	20	-	0	100	0	0	0	0	69/116
<b>Gutierrezia sarothrae -- (broom snakeweed)</b>									
2005	-	-	-	-	-	-	-	-	-/-
2010	20	-	0	100	0	0	0	0	- / -
2015	20	-	0	100	0	0	0	0	8/29
2019	20	-	0	100	0	0	0	0	32/47
<b>Juniperus osteosperma<sup>1</sup> -- (Utah juniper)</b>									
2005	560	-	18	82	0	0	0	0	- / -
2010	-	-	-	-	-	-	-	-	-/-
2015	100	20	40	60	0	0	0	0	- / -
2019	80	-	100	0	0	0	0	0	- / -
<b>Opuntia -- (pricklypear)</b>									
2005	180	-	33	67	0	0	0	0	10/30
2010	100	-	0	80	20	20	0	20	11/24
2015	160	-	13	88	0	0	0	0	12/36
2019	100	-	0	100	0	0	0	0	13/33
<b>Pinus monophylla<sup>1</sup> -- (singleleaf pinyon)</b>									
2005	20	-	0	100	0	0	0	0	- / -
2010	-	-	-	-	-	-	-	-	-/-
2015	-	-	-	-	-	-	-	-	-/-
2019	-	-	-	-	-	-	-	-	-/-
<b>Purshia tridentata<sup>P</sup> -- (antelope bitterbrush)</b>									
2005	-	-	-	-	-	-	-	-	-/-
2010	-	-	-	-	-	-	-	-	-/-
2015	20	-	100	0	0	0	0	0	12/22
2019	20	-	0	100	0	0	100	0	10/19
<b>Sambucus nigra ssp. cerulea<sup>P</sup> -- (blue elderberry)</b>									
2005	-	-	-	-	-	-	-	-	-/-
2010	-	-	-	-	-	-	-	-	-/-
2015	-	-	-	-	-	-	-	-	202/206
2019	-	-	-	-	-	-	-	-	-/-
<b>Tetradymia canescens -- (spineless horsebrush)</b>									
2005	-	-	-	-	-	-	-	-	-/-
2010	-	-	-	-	-	-	-	-	26/34
2015	-	-	-	-	-	-	-	-	33/50
2019	-	-	-	-	-	-	-	-	34/52

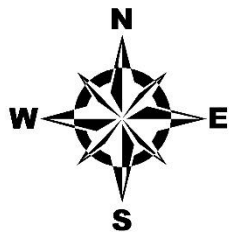
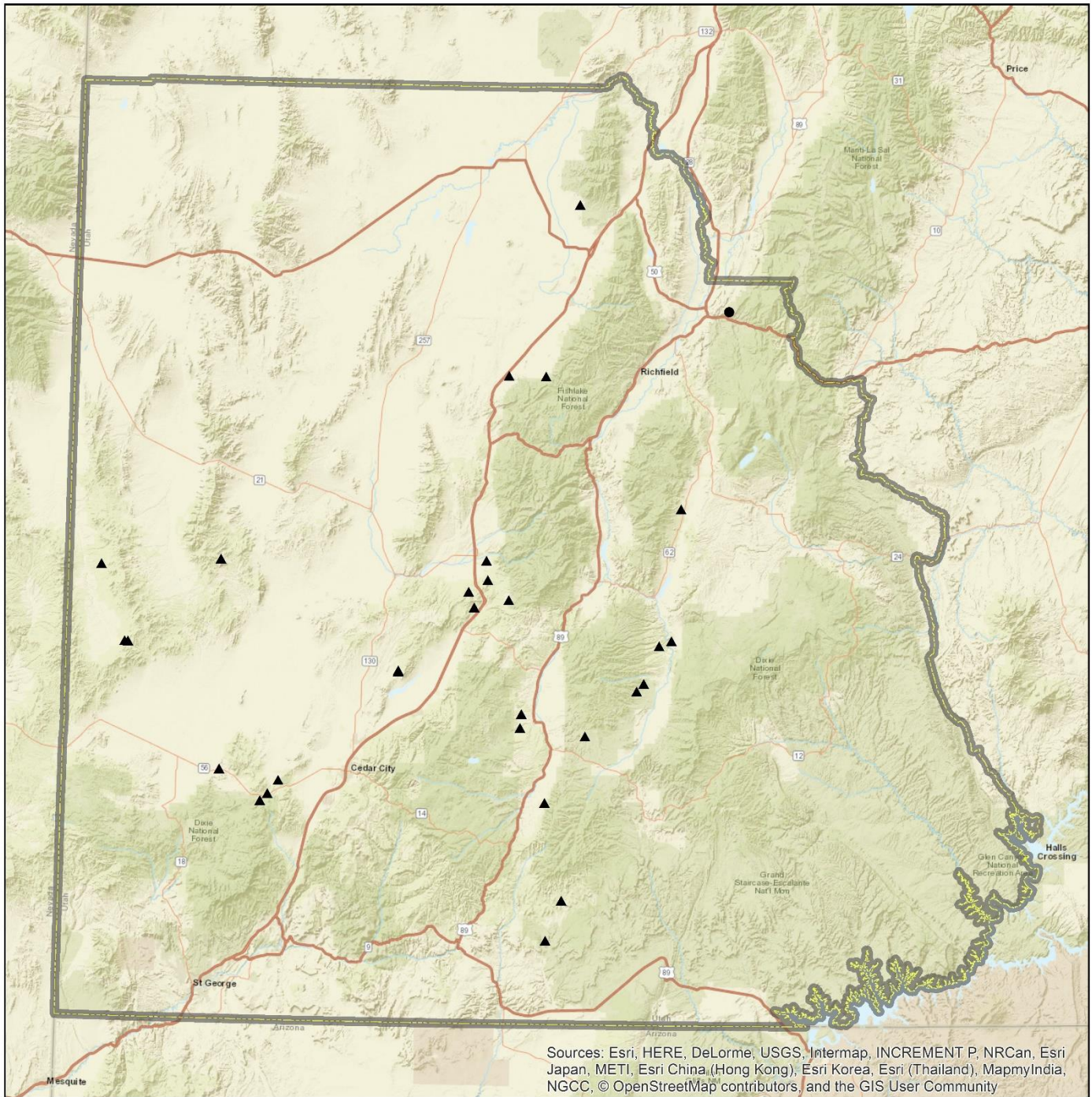
t - Tree Species; p - Preferred Browse; i - Introduced Species

**Table 19R-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>							
2005	392	5	5	40	40	10	13.0
2010	43	12	53	35	-	-	5.3
2015	64	-	76	24	-	-	5.4
2019	17	-	91	9	-	-	11.1
<b>Pinus edulis (twoneedle pinyon)</b>							
2005	22	-	-	17	8	75	21.8

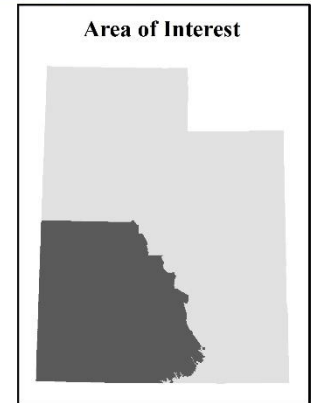
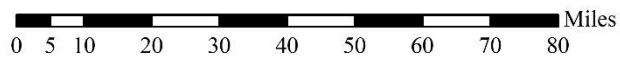


# SOUTHERN REGION



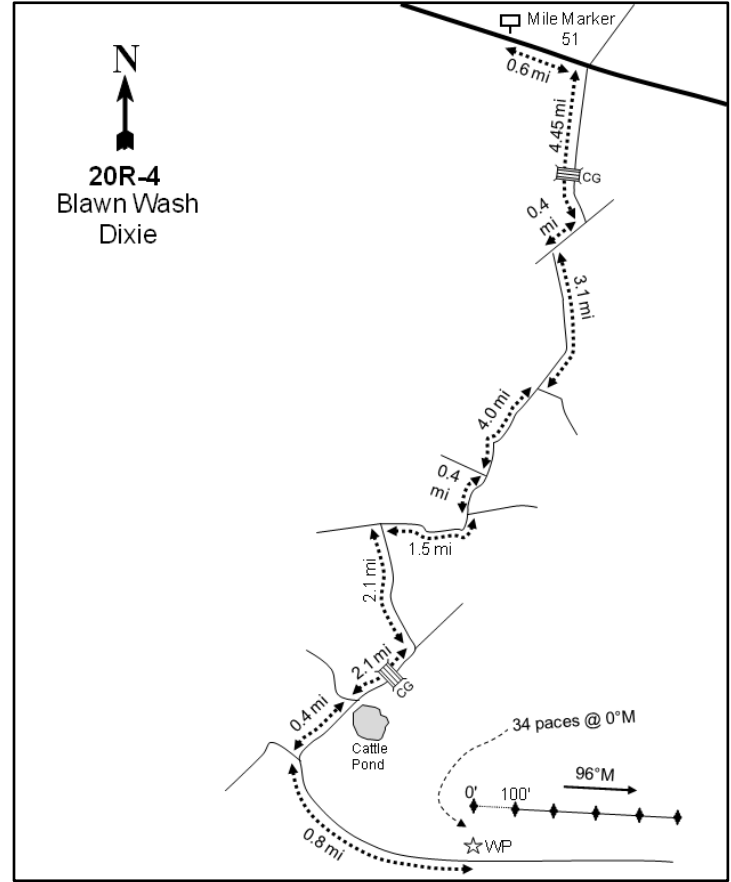
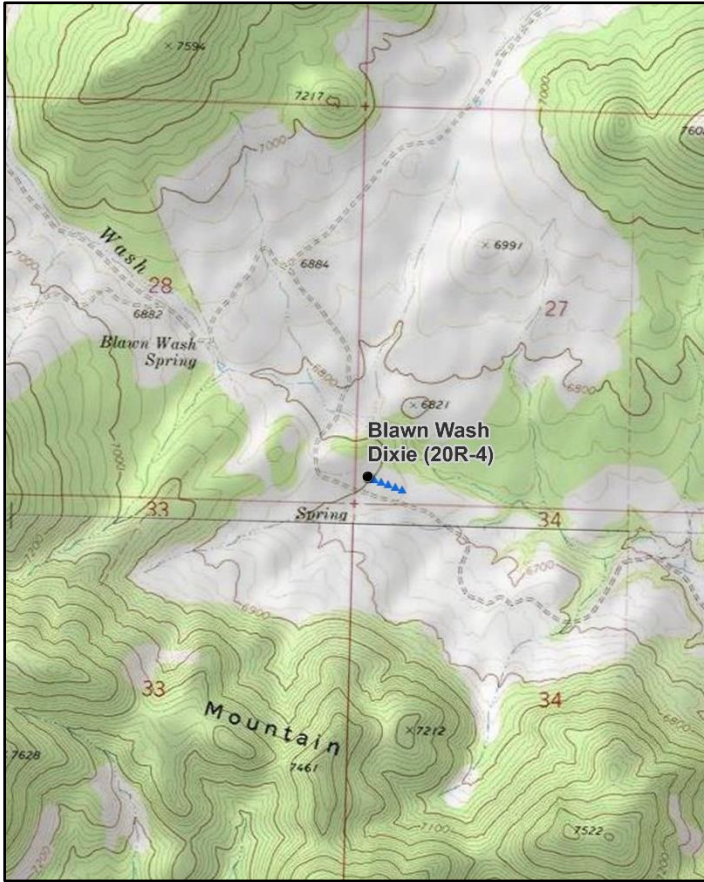
**Study Location**

- RT
- ▲ WRI
- ▭ Region Boundary





## BLAWN WASH DIXIE - STUDY NO. 20R-4



### Location Information

USGS 7.5 min Map Info  
GPS (0' Stake)

Lamerdorf Peak SE; Township 29S, Range 15W, Section 27  
NAD 83 UTM ZONE 12, 278974 East 4236756 North

### Transect Information

Browse Tag # (0' Stake)	173
Transect Bearing	96° magnetic
Length	500ft
Belt Placement	Line 1 (11ft), Line 2 (34ft), Line 3 (59ft), Line 4 (71ft), Line 5 (95ft)
Belt Marker Placement	Belt 3: 2ft

### Directions to Site

From mile marker 51 on Highway 21, drive 0.6 miles east to an intersection. Turn right and drive 4.45 miles, crossing a cattle guard, to a junction. Proceed to the right, drive 0.4 miles to another junction, and then turn left. Drive 3.1 miles to a fork, stay right, and continue for 4.0 miles (passing a fence and corral) to another fork. At the fork, turn left and travel for 0.4 miles to another fork. Proceed to the right at this fork and continue for 1.5 miles to a junction. From there, turn and drive 2.1 miles to a fork, then go right. Drive 2.1 miles, crossing one cattle guard, to another fork. Stay left and proceed for 0.4 miles to a fork. Stay to the right for 0.8 miles to a witness post on the left-hand (north) side of the road. Walk 34 paces at 0 degrees magnetic to the 0-foot stake which is marked with browse tag #173.

**Site Information**

Land Ownership	State
Land Administrator	SITLA
Allotment	BUCKET RANCH
Elevation	6,676ft (2,035m)
Aspect	Southeast
Slope	8-9%
Sample Dates	07/18/2006, 06/28/2011, 08/05/2015, 08/08/2019

**Table 20R-04.1 Disturbance History.** Recorded history of major disturbances.

Treatment/Disturbance	Name	WRI DB#	Date	Size (acres)
Chaining - Chain Unknown	Blawn Wash Seeding 1964	-	1964-1965	-
Seeding - Seed Unknown	Blawn Wash Seeding 1964	-	1964-1965	-
Harrow - One-Way Dixie	Blawn Wash Seeding Restoration	391	October 2006-January 2007	1067
Seeding - Broadcast Before	Blawn Wash Seeding Restoration	391	October 2006-January 2007	1067

**Table 20R-04.2 Seed Mix.** List of known seeded plant species and rates (if available).

Mix Name			Application Type	Application Date	Acres
Blawn Wash			Broadcast	Nov 2006	1800
Type	Species	Common Name	Cultivar/Source ID	Bulk lbs/acre	PLS
G	Achnatherum hymenoides	Indian Ricegrass	Rimrock	0.46	0.45
G	Agropyron desertorum	Crested Wheatgrass	Hycrest	2.00	1.79
G	Festuca ovina	Sheep Fescue		0.12	0.09
G	Leymus cinereus	Great Basin Wildrye	Trailhead	0.33	0.27
G	Poa secunda	Canby Bluegrass	Canbar	0.19	0.18
G	Psathyrostachys juncea	Russian Wildrye		0.50	0.44
G	Thinopyrum intermedium	Pubescent Wheatgrass		1.00	0.84
G	Thinopyrum intermedium	Intermediate Wheatgrass		1.00	0.83
F	Achillea millefolium	Western Yarrow	SID Columbia	0.05	0.04
F	Medicago sativa	Alfalfa	Nomad	0.33	0.30
F	Medicago sativa	Alfalfa	Ranger	0.33	0.29
F	Medicago sativa	Alfalfa	Spredor 4	0.33	0.32
F	Onobrychis viciifolia	Sainfoin	Eski	0.50	0.45
F	Sanguisorba minor	Small Burnet	Delar	1.00	0.93
S	Bassia prostrata	Forage Kochia	Beaver UT	0.50	0.39

**Wildlife Habitat and Vegetation History****Table 20R-04.3 - Wildlife Seasonal Habitat.** UDWR wildlife habitat and seasonality.

Species	Habitat	Season
Mule Deer	substantial	year-long
Rocky Mountain Elk	substantial	year-long

**Table 20R-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	Phase I transitioning to Phase II
2011	Mountain Big Sagebrush	Phase I
2015	Mountain Big Sagebrush	Phase I
2019	Mountain Big Sagebrush	Phase I

**Site Notes**

No Notes

**Soils****Table 20R-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
Silt Loam	6.8	56.0	18.1	25.9	2.1	12.6	240.0	0.7	07/18/2006

**Site Potential**

1981 - 2010 Average Annual Precipitation	18 inches
NRCS Ecological Site	Upland Gravelly Loam (Bonneville Big Sagebrush)
NRCS Ecological Site #	R028AY306UT
States and Transitions	A defined state and transition model is available.

This study has been a mountain big sagebrush (*Artemisia tridentata* ssp. *vaseyana*)-dominated ecological site since study establishment in 2006. At the beginning of the study, mature Utah juniper (*Juniperus osteosperma*) and singleleaf pinyon (*Pinus monophylla*) were present and the site was beginning to transition into Phase II of woodland succession (Table 20R-04.4). However, many of these trees were removed following a harrow and seeding treatment in the winter of 2006 (Table 20R-04.1). Perennial grasses have been moderately abundant on the site: there was a decrease in cover immediately following treatment, but cover has increased in every subsequent study year (Table 20R-04.7). The dominant perennial grass species is crested wheatgrass (*Agropyron cristatum*). Annual grasses -- mainly cheatgrass (*Bromus tectorum*) -- have been present throughout the study period, although cover has fluctuated (Table 20R-04.10). Both perennial and annual forbs have remained moderately diverse, but sparse (Table 20R-04.11). The shrub layer is robust with a stable to increasing cover trend, and decadence decreased following the treatment. The primary browse species are antelope bitterbrush (*Purshia tridentata*) and mountain big sagebrush (Table 20R-04.12). The size class of both pinyon and juniper decreased following the treatment, although cover has not changed significantly (Table 20R-04.12, Table 20R-04.14). Density of these species has shown increases in the years following treatment with small trees comprising a majority of the population (Table 20R-04.14). This site will likely remain in the current ecological condition in future years with infill of trees occurring over time.

**Trend Summary Tables****Table 20R-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	22.7	1.6	0.0	29.3	1.0	0.7
2011	18.4	0.2	0.4	23.1	0.2	0.8
2015	21.1	0.6	0.8	27.4	1.6	1.1
2019	25.5	0.2	0.7	35.4	0.7	1.3

**Table 20R-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	198	157	8	26	3.6	9.7	0.1	0.1
2011	305	153	82	120	9.9	4.5	0.9	1.3
2015	104	171	3	27	0.6	5.5	0.0	0.6
2019	261	177	80	76	5.5	9.3	0.6	1.0

**Table 20R-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	13.1	0.3	23.9	28.6	15.7	32.0
2011	26.5	0.0	18.5	12.4	12.8	33.9
2015	15.6	0.0	32.1	33.8	14.6	27.8
2019	18.3	0.1	37.3	27.9	13.5	34.7

**Table 20R-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	Horse	Rabbit
	Quadrat Frequency				
2006	-	8	1	5	55
2011	-	3	-	-	1
2015	1	1	4	-	19
2019	-	8	4	4	14
Year	Days Use Per Acre (ha)				
2006	3.6 (9.0)	5.3 (13.2)	4.7 (11.6)	7.0 (17.2)	-
2011	2.9 (7.2)	2.0 (5.0)	-	2.9 (7.2)	-
2015	-	3.4 (8.3)	2.0 (5.0)	2.3 (5.7)	-
2019	-	2.7 (6.6)	5.3 (13.2)	1.7 (4.3)	-

**Table 20R-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 arvensis <sup>ai</sup> (field brome)	Bromus tectorum <sup>ai</sup> (cheatgrass)	Elymus elymoides (squirreltail)	Festuca idahoensis (Idaho fescue)	Pascopyrum smithii (western wheatgrass)	Poa fendleriana (muttongrass)	Poa pratensis <sup>i</sup> (Kentucky bluegrass)	Thinopyrum intermedium <sup>i</sup> (intermediate wheatgrass)
year	Nested Frequency									
2006	1	131	-	198	14	-	-	3	-	23
2011	5	100	2	305	28	-	19	4	-	29
2015	2	118	4	100	44	-	4	7	2	27
2019	1	139	2	259	29	4	1	5	-	32
year	Average Cover (%)									
2006	0.2	8.7	-	3.6	0.3	-	-	0.0	-	0.6
2011	0.0	3.1	0.0	9.9	0.3	-	0.5	0.1	-	0.3
2015	0.0	3.7	0.0	0.6	0.9	-	0.1	0.2	0.0	0.5
2019	0.1	6.2	0.0	5.5	0.8	0.1	0.0	0.3	-	1.7

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

**Table 20R-04.11 - Forb Species.** Nested frequency and modified Daubenmire average cover by year.

FORB SPECIES	Allium (onion)	Alyssum desertorum <sup>ai</sup> (desert madwort)	Arabis (rockcress)	Astragalus lentiginosus (freckled milkvetch)	Calochortus nuttallii (sego lily)	Castilleja angustifolia (northwestern Indian paintbrush)	Ceratocephala testiculata <sup>ai</sup> (curvedseed butterwort)	Chaenactis douglasii (Douglas' dustymaiden)	Chaetopappa ericoides (rose heath)	Collinsia parviflora <sup>a</sup> (maiden blue eyed Mary)	Comandra umbellata (bastard toadflax)	Crepis acuminata (tapertip hawkbeard)	Cryptantha (cryptantha)	Cymopterus (springparsley)	Descurainia pinnata <sup>a</sup> (western tansymustard)	Gilia inconspicua <sup>a</sup> (shy gilia)	Heterotheca villosa (hairy false goldenaster)
year	Nested Frequency																
2006	-	-	-	0	-	-	-	10	8	6	-	-	-	-	-	-	-
2011	1	-	-	7	5	14	-	60	2	7	3	3	4	10	-	25	3
2015	-	-	-	2	-	-	-	1	4	3	-	-	3	-	-	-	-
2019	2	26	3	3	2	3	1	19	14	3	-	-	4	18	3	33	-
year	Average Cover (%)																
2006	-	-	-	0.0	-	-	-	0.0	0.0	0.0	-	-	-	-	-	-	-
2011	0.0	-	-	0.1	0.0	0.1	-	0.3	0.0	0.0	0.0	0.0	0.0	0.0	-	0.2	0.0
2015	-	-	-	0.0	-	-	-	0.0	0.0	0.0	-	-	0.1	-	-	-	-
2019	0.0	0.3	0.0	0.3	0.0	0.0	0.0	0.1	0.1	0.0	-	-	0.0	0.1	0.1	0.1	-

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

FORB SPECIES	Lesquerella (bladderpod)	Lomatium (desertparsley)	Lupinus argenteus (silvery lupine)	Machaeranthera canescens (hoary tansyaster)	Medicago sativa <sup>1</sup> (alfalfa)	Microsteris gracilis <sup>a</sup> (slender phlox)	Onobrychis vicifolia <sup>1</sup> (sainfoin)	Orobanche fasciculata (clustered broomrape)	Packera multilobata (lobeleaf groundsel)	Penstemon (beardtongue)	Penstemon pachyphyllus (thickleaf beardtongue)	Penstemon palmeri (Palmer's penstemon)	Phlox longifolia (longleaf phlox)	Sanguisorba minor <sup>1</sup> (small burnet)	Sphaeralcea coccinea (scarlet globemallow)	Tragopogon dubius <sup>ai</sup> (yellow salsify)
year	Nested Frequency															
2006	1	-	0	-	-	2	-	-	6	1	-	-	-	-	-	1
2011	-	-	9	4	6	62	5	-	4	-	-	3	4	3	1	-
2015	-	-	-	4	-	-	5	3	-	0	5	-	-	2	1	-
2019	-	1	-	3	3	29	-	11	-	-	2	-	-	-	-	-
year	Average Cover (%)															
2006	0.0	-	0.0	-	-	0.0	-	-	0.0	0.0	-	-	-	-	-	0.0
2011	-	-	0.2	0.0	0.2	0.7	0.1	-	0.0	-	-	0.1	0.0	0.0	0.0	-
2015	-	-	-	0.0	-	-	0.0	0.0	-	0.0	0.1	-	-	0.1	0.0	-
2019	-	0.0	-	0.0	0.1	0.1	-	0.1	-	-	0.1	-	-	-	-	-

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

**Table 20R-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 (yellow rabbitbrush)	Ericameria nauseosa ssp. nauseosa var. hololeuca <sup>p</sup> (rubber rabbitbrush)	Ericameria nauseosa ssp. nauseosa var. speciosa <sup>p</sup> (rubber rabbitbrush)	Gutierrezia sarothrae (broom snakeweed)	Juniperus osteosperma <sup>1</sup> (Utah juniper)	Opuntia (pricklypear)	Pinus monophylla <sup>1</sup> (singleleaf pinyon)	Purshia tridentata <sup>p</sup> (antelope bitterbrush)
year	Line Intercept Cover (%)								
2006	24.3	-	0.8	-	1	-	-	0.7	4.2
2011	20.6	0.1	0.5	-	0.1	-	-	0.8	2
2015	23.7	0.1	0.9	-	1.4	-	0.1	1.1	2.8
2019	28.9	-	0.8	-	0.5	-	0.2	1.3	5.7
year	Quadrat Cover (%)								
2006	20.6	-	0.0	-	1.6	-	-	0.0	2.1
2011	17.5	0.1	0.0	-	0.1	-	0.0	0.4	1.0
2015	19.2	0.2	0.2	0.0	0.4	0.0	0.0	0.8	1.7
2019	21.4	-	0.5	-	0.1	0.0	0.0	0.7	3.5

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

**Table 20R-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	-	-	-	-	-	-	-	-	-/-
2011	-	-	-	-	-	-	-	-	49/68
2015	-	-	-	-	-	-	-	-	-/-
2019	-	-	-	-	-	-	-	-	55/72
<b>Artemisia tridentata ssp. vaseyana<sup>P</sup> -- (mountain big sagebrush)</b>									
2006	8920	-	1	64	35	34	3	18	37/69
2011	4860	-	11	86	3	1	0	10	34/58
2015	5700	-	1	96	3	16	79	3	45/73
2019	5420	-	2	92	7	50	2	8	50/76
<b>Bassia prostrata<sup>PI</sup> -- (forage kochia)</b>									
2006	-	-	-	-	-	-	-	-	-/-
2011	-	-	-	-	-	-	-	-	7/15
2015	-	-	-	-	-	-	-	-	7/11
2019	-	-	-	-	-	-	-	-	6/7
<b>Chrysothamnus depressus<sup>P</sup> -- (longflower rabbitbrush)</b>									
2006	-	-	-	-	-	-	-	-	10/17
2011	-	-	-	-	-	-	-	-	-/-
2015	-	-	-	-	-	-	-	-	-/-
2019	-	-	-	-	-	-	-	-	-/-
<b>Chrysothamnus viscidiflorus -- (yellow rabbitbrush)</b>									
2006	20	-	0	100	0	0	0	0	13/18
2011	20	-	100	0	0	0	0	0	9/13
2015	80	-	0	100	0	0	0	0	29/34
2019	-	-	-	-	-	-	-	-	14/22
<b>Ephedra nevadensis<sup>P</sup> -- (Nevada jointfir)</b>									
2006	-	-	-	-	-	-	-	-	25/30
2011	-	-	-	-	-	-	-	-	-/-
2015	-	-	-	-	-	-	-	-	-/-
2019	-	-	-	-	-	-	-	-	-/-
<b>Ericameria nauseosa ssp. nauseosa var. hololeuca<sup>P</sup> -- (rubber rabbitbrush)</b>									
2006	120	-	0	50	50	0	50	33	58/60
2011	60	-	0	100	0	0	0	0	55/70
2015	280	-	0	21	79	7	7	86	57/65
2019	60	-	0	100	0	0	0	0	76/93
<b>Gutierrezia sarothrae -- (broom snakeweed)</b>									
2006	1560	320	9	80	12	0	0	9	19/24
2011	420	-	43	57	0	0	0	0	16/18
2015	960	180	17	81	2	0	0	2	24/26
2019	620	80	16	84	0	0	0	0	22/23
<b>Juniperus osteosperma<sup>I</sup> -- (Utah juniper)</b>									
2006	-	20	0	0	0	0	0	0	-/-
2011	-	-	-	-	-	-	-	-	-/-
2015	-	20	0	0	0	0	0	0	-/-
2019	20	-	100	0	0	0	0	0	-/-
<b>Opuntia -- (pricklypear)</b>									
2006	-	-	-	-	-	-	-	-	8/12
2011	-	-	-	-	-	-	-	-	8/15
2015	40	-	0	100	0	0	0	0	13/24
2019	60	-	0	100	0	0	0	0	11/38

Year	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 monophylla<sup>t</sup> -- (singleleaf pinyon)</b>									
2006	40	100	100	0	0	0	0	0	- / -
2011	40	20	50	50	0	0	0	0	29/28
2015	80	20	75	25	0	0	0	0	- / -
2019	80	-	75	25	0	0	0	0	- / -
<b>Purshia stansburiana<sup>p</sup> -- (Stansbury cliffrose)</b>									
2006	-	-	-	-	-	-	-	-	-/-
2011	-	-	-	-	-	-	-	-	56/68
2015	-	-	-	-	-	-	-	-	-/-
2019	-	-	-	-	-	-	-	-	102/166
<b>Purshia tridentata<sup>p</sup> -- (antelope bitterbrush)</b>									
2006	260	-	8	85	8	62	0	8	48/105
2011	240	-	8	92	0	42	0	0	37/84
2015	340	-	18	82	0	6	82	0	36/98
2019	440	-	5	96	0	41	27	0	44/112

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

**Table 20R-04.14 - Tree Characteristics.** Point-quarter tree density, size class distribution, and average diameter.

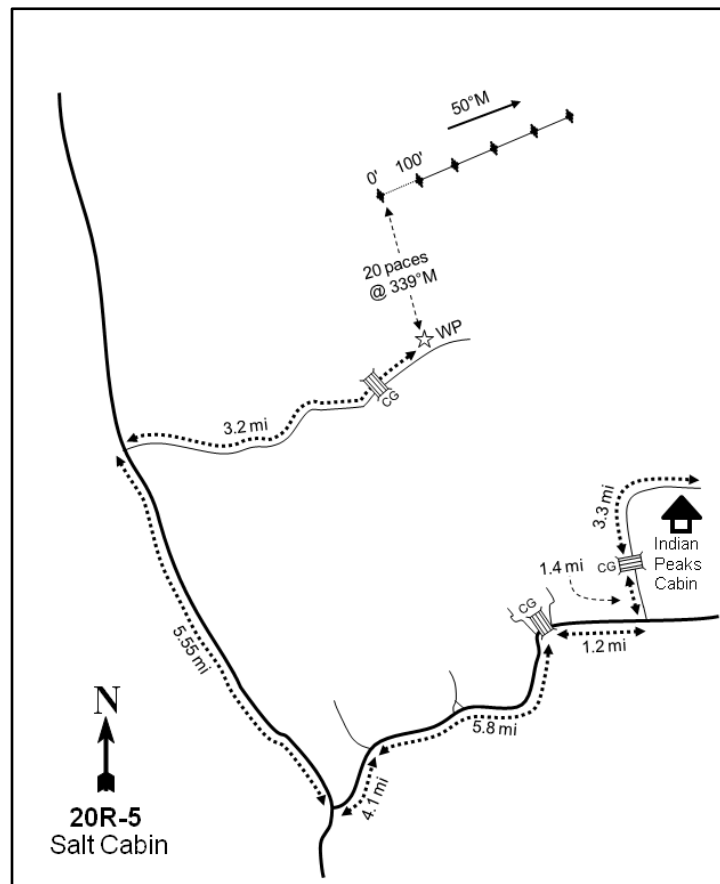
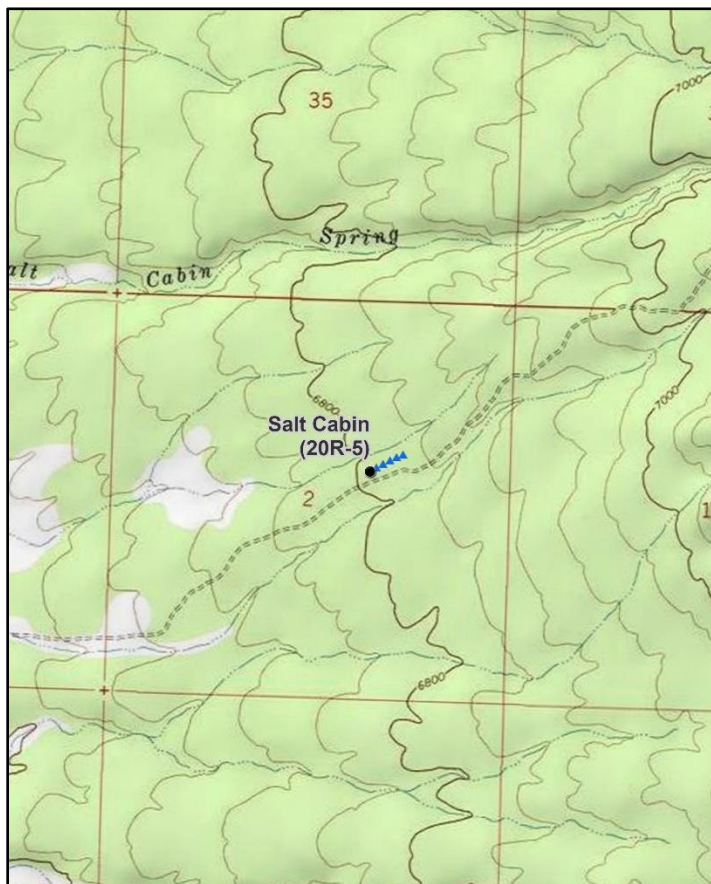
Year	Density	Size Class Distribution					Average Diameter (cm)
	Trees per Acre	Seedling (%)	1-4' (%)	4-8' (%)	8-12' (%)	>12' (%)	
<b>Juniperus osteosperma (Utah juniper)</b>							
2006	18	-	14	29	43	14	18.9
2011	5	-	25	-	75	-	15.3
2015	11	20	60	20	-	-	8.6
2019	20	78	-	22	-	-	3.1
<b>Pinus monophylla (singleleaf pinyon)</b>							
2006	77	82	18	-	-	-	1.2
2011	35	20	80	-	-	-	1.9
2015	104	5	95	-	-	-	2.6
2019	117	10	90	-	-	-	3.3

**Table 20R-04.15 – Deer Desirable Components Index: Mid Potential Scale.**

Year	Preferred Browse Cover	Preferred Browse Decadence	Preferred Browse Young	Perennial Grass Cover	Annual Grass Cover	Perennial Forb Cover	Noxious Weeds	Total Score	Ranking
2006	30.0	5.5	0.9	19.5	-2.7	0.3	0.0	53.5	Fair
2011	29.4	14.1	5.3	8.9	-7.4	2.6	0.0	52.8	Fair
2015	30.0	13.5	1.5	11.1	-0.5	1.1	0.0	56.7	Fair
2019	30.0	13.4	1.0	18.6	-4.1	2.1	0.0	60.9	Fair



## SALT CABIN - STUDY NO. 20R-5

**Location Information**

USGS 7.5 min Map Info  
GPS (0' Stake)

Atchison Creek NE; Township 30S, Range 19W, Section 02  
NAD 83 UTM ZONE 12, 242924 East 4235346 North

**Transect Information**

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

172  
50° magnetic  
500ft  
Line 1 (11ft), Line 2 (34ft), Line 3 (59ft), Line 4 (71ft), Line 5 (95ft)  
Standard

**Directions to Site**

Drive west from the Indian Peaks cabin for 0.3 miles to a fork and proceed to the left. Drive 0.1 miles to another fork and again stay left. From there, drive 2.9 miles to a cattle guard. From the cattle guard, drive 1.4 miles to a junction. Turn right and continue for 1.2 miles to an intersection. Go straight, crossing another cattle guard. From the cattle guard, drive 5.8 miles, staying on the main road, to a fork. Proceed to the left and drive 4.1 miles to another fork. Stay right (north) and drive 5.55 miles to a junction. Turn right and proceed 3.2 miles to a witness post on the left (north) side of the road. Walk 20 paces at 339 degrees magnetic to the 0-foot stake that is marked with browse tag #172.

**Site Information**

Land Ownership	State
Land Administrator	SITLA
Allotment	INDIAN PEAK
Elevation	6,800ft (2,073m)
Aspect	West
Slope	4%
Sample Dates	07/18/2006, 06/16/2011, 08/05/2015, 08/14/2019

**Table 20R-05.1 Disturbance History.** Recorded history of major disturbances.

Treatment/Disturbance	Name	WRI DB#	Date	Size (acres)
Chaining - Two-Way Ely	Salt Cabin Reseed	479	October-November 2006	733
Seeding - Aerial Before	Salt Cabin Reseed	479	November 2006	733

**Table 20R-05.2 Seed Mix.** List of known seeded plant species and rates (if available).

Mix Name			Application Type	Application Date	Acres
Salt Cabin Re-seed			Aerial	Nov 2006	800
Type	Species	Common Name	Cultivar/Source ID	Bulk lbs/acre	PLS
G	Agropyron cristatum	Crested Wheatgrass	Douglas	0.80	0.74
G	Agropyron cristatum	Crested Wheatgrass	Douglas	0.20	0.17
G	Dactylis glomerata	Orchardgrass	Paiute	0.25	0.23
G	Elymus wawawaiensis	Snake River Wheatgrass	Secar	1.00	0.88
G	Pascopyrum smithii	Western Wheatgrass	Arriba	1.00	0.76
G	Poa secunda	Canby Bluegrass	Canbar	0.10	0.09
G	Poa secunda	Canby Bluegrass	Canbar	0.10	0.09
G	Psathyrostachys juncea	Russian Wildrye		0.97	0.92
G	Psathyrostachys juncea	Russian Wildrye		0.03	0.02
G	Pseudoroegneria spicata	Bluebunch Wheatgrass	Goldar	1.00	0.94
G	Thinopyrum intermedium	Intermediate Wheatgrass		0.82	0.68
G	Thinopyrum intermedium	Intermediate Wheatgrass		0.17	0.15
F	Linum perenne	Blue Flax		0.20	0.17
F	Medicago sativa	Alfalfa	Ladak	0.50	0.47
F	Medicago sativa	Alfalfa	Nomad	0.50	0.45
F	Medicago sativa	Alfalfa	Ranger	0.50	0.44
F	Onobrychis viciifolia	Sainfoin	Eski	3.00	2.76
F	Sanguisorba minor	Small Burnet	Delar	2.00	1.86
S	Bassia prostrata	Forage Kochia	Beaver UT	1.00	0.70

**Wildlife Habitat and Vegetation History****Table 20R-05.3 - Wildlife Seasonal Habitat.** UDWR wildlife habitat and seasonality.

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

**Table 20R-05.4 - Vegetation History.** The dominant vegetation type(s) and phase of woodland succession (Tausch, Miller, Roundy, & Chambers, 2009).

Year	Vegetation Type	Woodland Succession
2006	Perennial Grass/Pinyon-Juniper	Phase II
2011	Perennial Grass/Rubber Rabbitbrush	Phase I
2015	Perennial Grass/Rubber Rabbitbrush	Phase I
2019	Rubber Rabbitbrush/Black Sagebrush/Perennial Grass	Phase I

**Site Notes**

No Notes

**Soils****Table 20R-05.5 - Soil Analysis Data.** List of chemical and textural soil characteristics determined by laboratory analysis.

Texture	pH	%sand	%silt	%clay	%OM	PPM P	PPM K	ds/m	Sample Date
Sandy Loam	7.1	61.0	19.1	19.9	2.8	19.6	188.8	0.7	07/18/2006

**Site Potential**

1981 - 2010 Average Annual Precipitation	17 inches
NRCS Ecological Site	Upland Loam (Wyoming Big Sagebrush)
NRCS Ecological Site #	R028AY309UT
States and Transitions	No state and transition model is available for this ecological site.

Upon study establishment in 2006, this site was dominated by Utah juniper (*Juniperus osteosperma*) and singleleaf pinyon (*Pinus monophylla*) with a robust understory composed of introduced perennial grasses. The site was chained and seeded in the fall of that year, removing much of the tree cover (Table 20R-05.1, Table 20R-05.6). Perennial grasses, particularly the introduced species smooth brome (*Bromus inermis*) and crested wheatgrass (*Agropyron cristatum*), have been a significant understory component with the exception of the 2019 sample year. Data for 2015 shows high frequency and cover of perennial grasses, but photos reveal that many of the grasses were eaten to the base (Table 20R-05.10, Photos). Both perennial and annual forbs have been observed in low abundance, but with moderate diversity (Table 20R-05.7, Table 20R-05.11). Rubber rabbitbrush (*Ericameria nauseosa* ssp. *nauseosa* var. *hololeuca*) is the dominant browse species as of 2019 with black sagebrush (*Artemisia nova*) and antelope bitterbrush (*Purshia tridentata*) also present. Preferred browse cover has increased in the post-treatment sample years: much of this can be attributed to rubber rabbitbrush (Table 20R-05.6, Table 20R-05.12). Although cover and density of pinyon and juniper decreased immediately following treatment, density has increased in subsequent years (Table 20R-05.14). Considering the presence of feral horses (Table 20R-05.9), reduced understory vigor is likely to continue in future years.

**Trend Summary Tables****Table 20R-05.6 - Shrub/Tree Summary.** Average modified Daubenmire quadrat and line intercept cover by year for shrubs/trees

Year	Quadrat Cover (%)			Line-intercept Cover (%)		
	Preferred Shrub	Other Shrub	Tree	Preferred Shrub	Other Shrub	Tree
2006	5.5	0.7	5.1	5.4	0.5	7.6
2011	5.0	0.9	0.1	4.0	0.5	1.4
2015	9.2	2.1	1.1	6.7	0.9	1.8
2019	15.0	2.7	1.8	14.1	2.3	2.1

**Table 20R-05.7 - Herbaceous Summary.** Nested frequency and average modified Daubenmire quadrat cover by year for herbaceous functional groups

Year	Nested Frequency				Quadrat Cover (%)			
	Annual Grass	Perennial Grass	Annual/Biennial Forb	Perennial Forb	Annual Grass	Perennial Grass	Annual/Biennial Forb	Perennial Forb
2006	18	319	13	87	0.1	16.6	0.1	1.5
2011	45	356	115	71	0.7	17.9	0.4	2.1
2015	16	354	-	61	0.1	14.7	-	1.0
2019	27	253	130	116	0.1	6.1	2.9	2.9

**Table 20R-05.8 - Basic Ground Cover.** Average modified Daubenmire quadrat cover by year for basic ground cover types.

Year	Cover Type (%)					
	Bare Ground	Cryptogams	Litter	Pavement	Rock	Vegetation
2006	23.7	0.2	33.6	28.1	1.8	27.4
2011	31.8	0.8	29.9	1.3	1.7	32.0
2015	45.9	0.0	39.5	7.6	1.1	26.8
2019	31.6	0.1	35.9	24.4	2.1	27.6

**Table 20R-05.9 - Pellet Group Data.** Quadrat frequency and pellet group transect data for animal pellets. Rabbit pellet groups are not sampled in the pellet group transect.

Year	Cattle	Mule Deer	Rocky Mountain Elk	Horse	Rabbit
	Quadrat Frequency				
2006	4	10	11	17	55
2011	-	5	11	11	-
2015	1	-	2	14	27
2019	-	3	2	9	27
Year	Days Use Per Acre (ha)				
2006	8.0 (19.7)	6.7 (16.6)	23.4 (57.9)	27.9 (68.9)	-
2011	2.2 (5.4)	2.7 (6.6)	26.8 (66.2)	18.6 (45.9)	-
2015	-	1.3 (3.3)	4.0 (9.9)	15.1 (37.3)	-
2019	2.9 (7.2)	3.4 (8.3)	0.7 (1.7)	11.6 (28.7)	-

**Table 20R-05.10 - 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)	Bromus inermis <sup>i</sup> (smooth brome)	Bromus tectorum <sup>ai</sup> (cheatgrass)	Elymus elymoides (squirreltail)	Hesperostipa comata (needle and thread)	Pascopyrum smithii (western wheatgrass)	Psathyrostachys juncea <sup>i</sup> (Russian wildrye)	Thinopyrum intermedium <sup>i</sup> (intermediate wheatgrass)
year	Nested Frequency										
2006	18	-	159	0	212	18	3	15	-	-	48
2011	13	2	145	-	271	45	17	21	28	10	4
2015	6	10	123	-	282	16	15	14	6	1	16
2019	3	-	107	-	146	27	10	29	4	2	-
year	Average Cover (%)										
2006	0.5	-	5.3	0.0	9.6	0.1	0.1	0.4	-	-	0.6
2011	0.2	0.0	4.6	-	10.8	0.7	0.3	0.3	1.0	0.3	0.4
2015	0.1	0.1	3.3	-	10.5	0.1	0.3	0.1	0.0	0.0	0.4
2019	0.1	-	1.6	-	3.3	0.1	0.1	0.8	0.0	0.1	-

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

**Table 20R-05.11 - Forb Species.** Nested frequency and modified Daubenmire average cover by year.

FORB SPECIES	Astragalus (milkvetch)	Astragalus beckwithii (Beckwith's milkvetch)	Astragalus calycosus (Torrey's milkvetch)	Astragalus utahensis (Utah milkvetch)	Caulanthus crassicaulis <sup>a</sup> (thickstem wild cabbage)	Chaenactis douglasii (Douglas' dustymaiden)	Chaetopappa ericoides (rose heath)	Collinsia parviflora <sup>a</sup> (maiden blue eyed Mary)	Cryptantha (cryptantha)	Cymopterus (springparsley)	Dalea searlsiae (Searl's prairie clover)	Descurainia pinnata <sup>a</sup> (western tansymustard)	Eriogonum cernuum <sup>a</sup> (nodding buckwheat)	Eriogonum umbellatum (sulphur-flower buckwheat)	Gayophytum ramosissimum <sup>a</sup> (pinyon groundsmoke)	Gilia inconspicua <sup>a</sup> (shy gilia)	Ipomopsis congesta (ballhead ipomopsis)
year	Nested Frequency																
2006	11	-	-	3	-	-	-	-	8	-	-	-	2	-	-	6	8
2011	8	-	-	-	2	0	-	11	11	3	11	24	3	-	-	59	11
2015	-	-	2	-	-	-	-	-	13	-	21	-	-	1	-	-	-
2019	3	1	4	3	-	0	3	9	12	4	30	19	5	-	13	97	3
year	Average Cover (%)																
2006	0.2	-	-	0.0	-	-	-	-	0.1	-	-	-	0.0	-	-	0.0	0.1
2011	0.2	-	-	-	0.0	0.0	-	0.0	0.3	0.0	0.1	0.1	0.0	-	-	0.2	0.3
2015	-	-	0.0	-	-	-	-	-	0.1	-	0.3	-	-	0.1	-	-	-
2019	0.1	0.0	0.0	0.0	-	0.0	0.0	0.3	0.3	0.0	1.1	0.2	0.1	-	0.1	1.7	0.0

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

FORB SPECIES																	
<i>Lappula occidentalis</i> <sup>a</sup> (flatspine stickseed)																	
<i>Linum perenne</i> <sup>i</sup> (blue flax)																	
<i>Lupinus</i> (lupine)																	
<i>Lupinus argenteus</i> (silvery lupine)																	
<i>Machaeranthera canescens</i> (hoary tansyaster)																	
<i>Microsteris gracilis</i> <sup>a</sup> (slender phlox)																	
<i>Packera multilobata</i> (lobeleaf groundsel)																	
<i>Penstemon</i> (beardtongue)																	
<i>Penstemon confusus</i> (Owens Valley beardtongue)																	
<i>Penstemon leiophyllus</i> (smoothleaf beardtongue)																	
<i>Phlox longifolia</i> (longleaf phlox)																	
<i>Pleiacanthus spinosus</i> (thorn skeletonweed)																	
<i>Salsola tragus</i> <sup>at</sup> (prickly Russian thistle)																	
<i>Sphaeralcea coccinea</i> (scarlet globemallow)																	
<i>Sphaeralcea grossularifolia</i> (gooseberryleaf globemallow)																	
<i>Tragopogon dubius</i> <sup>at</sup> (yellow salsify)																	
year	Nested Frequency																
2006	2	-	-	-	6	-	12	1	36	-	-	1	-	41	-	3	
2011	39	2	-	10	3	-	5	-	12	-	2	-	1	13	-	-	
2015	-	-	0	1	3	-	1	-	4	1	3	-	-	11	10	-	
2019	30	-	-	16	-	1	8	-	7	-	9	-	-	17	30	-	
year	Average Cover (%)																
2006	0.0	-	-	-	0.0	-	0.1	0.0	0.4	-	-	0.0	-	0.6	-	0.0	
2011	0.2	0.0	-	0.3	0.0	-	0.0	-	0.4	-	0.0	-	0.0	0.3	-	-	
2015	-	-	0.0	0.0	0.0	-	0.0	-	0.1	0.0	0.0	-	-	0.2	0.1	-	
2019	0.5	-	-	0.7	-	0.0	0.0	-	0.1	-	0.0	-	-	0.1	0.3	-	

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

**Table 20R-05.12 - 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>Bassia prostrata</i> <sup>pi</sup> (forage kochia)												
<i>Chrysothamnus depressus</i> <sup>p</sup> (longflower rabbitbrush)												
<i>Chrysothamnus viscidiflorus</i> (yellow rabbitbrush)												
<i>Ericameria nauseosa</i> ssp. <i>nauseosa</i> var. <i>hololeuca</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 monophylla</i> <sup>t</sup> (singleleaf pinyon)												
<i>Purshia tridentata</i> <sup>p</sup> (antelope bitterbrush)												
year	Line Intercept Cover (%)											
2006	1.2	0.2	-	0.1	0.3	2.4	0.2	4.8	-	2.8	1.5	
2011	0.9	0.4	-	0.1	0.5	2.6	0	1.4	-	-	-	
2015	1.3	0.5	-	-	0.1	3.9	0.8	1.8	-	-	1	
2019	5.2	0.3	-	-	1.3	7.7	0.8	2.1	0.2	-	0.9	
year	Quadrat Cover (%)											
2006	1.2	0.8	-	0.0	0.5	1.8	0.2	3.7	0.0	1.4	1.7	
2011	1.1	0.1	-	0.0	0.8	3.2	0.1	0.1	0.0	-	0.6	
2015	1.4	0.6	0.0	0.0	0.3	5.0	1.6	1.0	0.2	0.1	2.2	
2019	4.1	1.0	-	-	1.2	8.2	1.0	1.8	0.6	-	1.7	

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

**Table 20R-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 nova<sup>P</sup> -- (black sagebrush)</b>									
2006	480	240	25	71	4	0	0	4	38/66
2011	480	100	17	83	0	0	0	0	27/51
2015	520	-	27	73	0	0	0	0	31/60
2019	1020	-	28	73	0	10	4	0	38/72
<b>Artemisia tridentata ssp. vaseyana<sup>P</sup> -- (mountain big sagebrush)</b>									
2006	80	140	0	100	0	75	0	0	53/71
2011	220	-	64	36	0	0	0	0	36/46
2015	180	-	11	89	0	11	89	0	43/61
2019	160	20	38	63	0	38	13	0	55/86
<b>Bassia prostrata<sup>PI</sup> -- (forage kochia)</b>									
2006	-	-	-	-	-	-	-	-	-/-
2011	-	-	-	-	-	-	-	-	-/-
2015	20	-	0	100	0	100	0	0	11/16
2019	-	-	-	-	-	-	-	-	-/-
<b>Chrysothamnus depressus<sup>P</sup> -- (longflower rabbitbrush)</b>									
2006	20	-	100	0	0	0	0	0	9/14
2011	40	-	100	0	0	0	0	0	15/18
2015	20	-	0	0	100	0	100	100	-/-
2019	20	-	0	100	0	100	0	0	15/27
<b>Chrysothamnus viscidiflorus -- (yellow rabbitbrush)</b>									
2006	220	80	46	55	0	0	18	0	33/60
2011	360	-	6	94	0	0	0	28	52/45
2015	340	-	35	65	0	0	0	0	35/52
2019	420	-	14	86	0	0	0	0	36/59
<b>Ericameria nauseosa ssp. nauseosa var. hololeuca<sup>P</sup> -- (rubber rabbitbrush)</b>									
2006	1120	460	64	36	0	7	2	29	65/107
2011	1480	-	30	69	1	11	3	5	37/51
2015	1300	-	19	82	0	12	37	0	48/57
2019	1960	2420	43	55	2	11	0	2	56/85
<b>Gutierrezia sarothrae -- (broom snakeweed)</b>									
2006	480	140	4	67	29	0	0	29	22/27
2011	280	-	21	71	7	0	0	7	18/19
2015	2180	-	0	98	2	0	0	2	25/30
2019	2500	1740	74	24	2	0	0	2	25/32
<b>Juniperus osteosperma<sup>I</sup> -- (Utah juniper)</b>									
2006	140	-	29	43	29	0	0	0	-/-
2011	40	-	100	0	0	0	0	0	-/-
2015	40	-	50	50	0	0	0	0	-/-
2019	60	-	0	100	0	0	0	0	-/-
<b>Opuntia -- (pricklypear)</b>									
2006	60	60	0	100	0	0	0	0	8/19
2011	40	-	0	100	0	0	0	0	7/15
2015	120	-	0	100	0	17	0	17	11/32
2019	100	-	0	100	0	0	0	0	10/30
<b>Pinus monophylla<sup>I</sup> -- (singleleaf pinyon)</b>									
2006	60	20	67	33	0	0	0	0	-/-
2011	20	-	100	0	0	0	0	0	-/-
2015	20	-	100	0	0	0	0	0	-/-
2019	20	-	100	0	0	0	0	0	-/-

Year	Density		Age Class Distribution			Utilization		Poor Vigor (%)	Average Height Crown (cm)
	Plants Per Acre		Excluding Seedlings			Moderate (%)	Heavy (%)		
	Excluding Seedlings	Seedling	Young (%)	Mature (%)	Decadent (%)				
<b>Purshia stansburiana<sup>p</sup> -- (Stansbury cliffrose)</b>									
2006	-	-	-	-	-	-	-	-	-/-
2011	-	-	-	-	-	-	-	-	-/-
2015	-	-	-	-	-	-	-	-	-/-
2019	-	-	-	-	-	-	-	-	76/75
<b>Purshia tridentata<sup>p</sup> -- (antelope bitterbrush)</b>									
2006	100	40	0	80	20	60	40	20	72/171
2011	120	-	17	83	0	33	17	17	39/80
2015	180	-	11	89	0	11	89	0	42/95
2019	160	-	0	100	0	25	75	0	46/93

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

**Table 20R-05.14 - Tree Characteristics.** Point-quarter tree density, size class distribution, and average diameter.

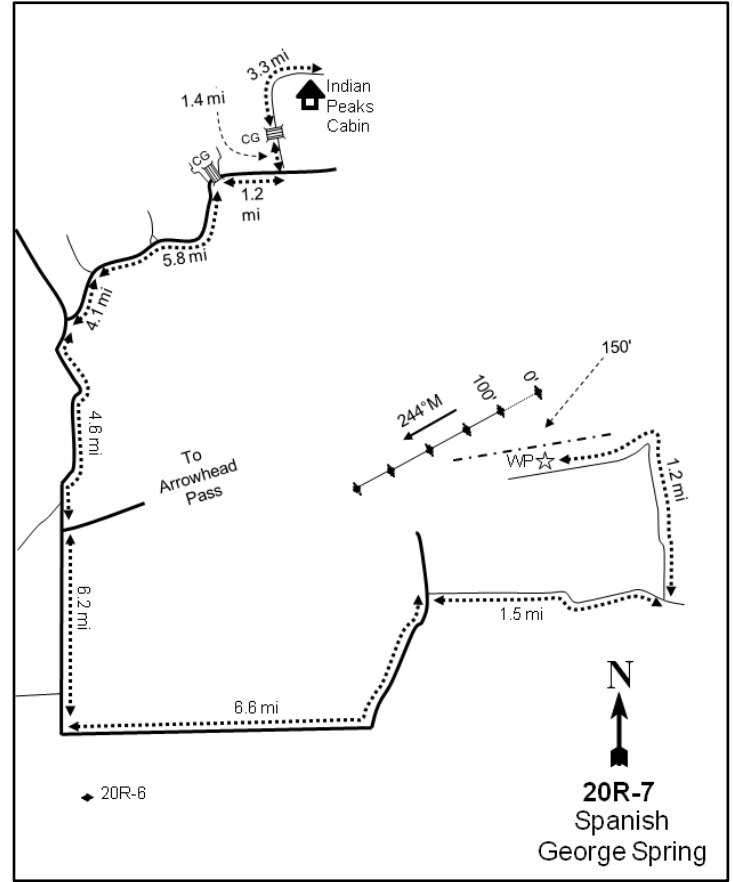
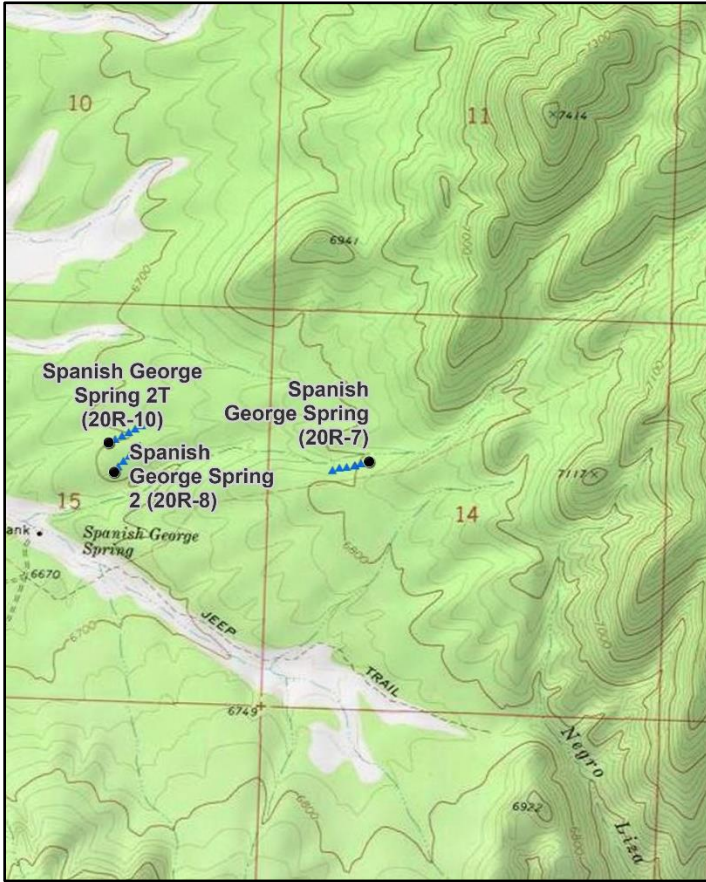
Year	Density	Size Class Distribution					Average Diameter (cm)
	Trees per Acre	Seedling (%)	1-4' (%)	4-8' (%)	8-12' (%)	>12' (%)	
<b>Juniperus osteosperma (Utah juniper)</b>							
2006	96	11	28	56	6	-	12.0
2011	42	-	56	44	-	-	11.3
2015	58	6	19	69	6	-	9.9
2019	59	-	18	76	-	6	15.2
<b>Pinus monophylla (singleleaf pinyon)</b>							
2006	43	18	53	29	-	-	6.8
2011	15	-	70	30	-	-	5.5
2015	41	13	40	47	-	-	6.9
2019	26	14	36	43	7	-	8.5

**Table 20R-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
2006	7.1	13.1	15.0	30.0	-0.1	3.0	0.0	68.1	Good
2011	5.0	0.0	0.0	30.0	-0.5	4.2	0.0	38.7	Poor
2015	8.6	15.0	9.2	29.4	-0.1	2.1	0.0	64.3	Fair-Good
2019	17.9	14.7	15.0	12.1	-0.1	5.9	0.0	65.4	Fair-Good



## SPANISH GEORGE SPRING - STUDY NO. 20R-7



### Location Information

USGS 7.5 min Map Info  
GPS (0' Stake)

Steamboat Mountain S; Township 32S, Range 18W, Section 14  
NAD 83 UTM ZONE 12, 250906 East 4212011 North

### Transect Information

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

Not Available  
244° magnetic  
500ft  
Line 1 (11ft), Line 2 (34ft), Line 3 (59ft), Line 4 (71ft), Line 5 (95ft)  
Standard

### Directions to Site

Drive west from the Indian Peaks cabin for 0.3 miles to a fork, then proceed to the left. Continue 0.1 miles to another fork, again staying left. From there, drive 2.9 miles to a cattle guard. From the cattle guard, drive 1.4 miles to a junction. Turn right and drive 1.2 miles to an intersection. Go straight, crossing another cattle guard. From the cattle guard, drive 5.8 miles (staying on the main road) to a fork. Proceed left and drive 4.1 miles to another fork. Go left again and continue for 4.6 miles to a fork leading to Arrowhead Pass. Stay on the main road for another 6.2 miles. Turn left onto North Hamblin Valley Road and continue onto Spanish George Road. Drive for 6.6 miles (the road will turn north). Turn left onto a dirt road and drive 1.5 miles to an intersection. Turn left (north) and continue for 1.2 miles; the road will make a hairpin turn to the left. The site is 150 feet away from the road on the right (north) side.

**Site Information**

Land Ownership	Federal
Land Administrator	BLM
Allotment	SPANISH GEORGE
Elevation	6,824ft (2,080m)
Aspect	West
Slope	3-5%
Sample Dates	08/04/2015, 08/13/2019

**Table 20R-07.1 Disturbance History.** Recorded history of major disturbances.

Treatment/Disturbance	Name	WRI DB#	Date	Size (acres)
Mechanical - Bullhog	Hamlin Valley Habitat Restoration Project - Sagebrush Restoration Year I	2076	October 2015-February 2016	1423
Seeding - Aerial Before	Hamlin Valley Habitat Restoration Project - Sagebrush Restoration Year I	2076	October 2015	1423
Seeding - Aerial After	Hamlin Valley Habitat Restoration Project - Sagebrush Restoration Year I	2076	January-February 2016	1423

**Table 20R-07.2 Seed Mix.** List of known seeded plant species and rates (if available).

Mix Name			Application Type	Application Date	Acres
Hamlin Valley			Aerial	Oct 2015	1650
Type	Species	Common Name	Cultivar/Source ID	Bulk lbs/acre	PLS
G	<i>Achnatherum hymenoides</i>	Indian Ricegrass	Nezpar	3.00	2.78
G	<i>Elymus lanceolatus</i>	Thickspike Wheatgrass	Bannock	1.48	1.31
G	<i>Pascopyrum smithii</i>	Western Wheatgrass	Arriba	1.48	1.31
G	<i>Pseudoroegneria spicata</i>	Bluebunch Wheatgrass	Anatone	1.12	0.96
G	<i>Pseudoroegneria spicata</i>	Bluebunch Wheatgrass	Anatone	0.55	0.46
G	<i>Pseudoroegneria spicata</i>	Bluebunch Wheatgrass	Anatone	1.33	1.14
F	<i>Achillea millefolium</i>	Western Yarrow	Eagle	0.18	0.16
F	<i>Balsamorhiza sagittata</i>	Arrowleaf Balsamroot	Box	0.08	0.06
F	<i>Hedysarum boreale</i> ssp. <i>boreale</i> var. <i>boreale</i>	Utah Sweetvech	Timp	0.05	0.03
F	<i>Hedysarum boreale</i> ssp. <i>boreale</i> var. <i>boreale</i>	Utah Sweetvech	Timp	0.19	0.14
F	<i>Hedysarum boreale</i> ssp. <i>boreale</i> var. <i>boreale</i>	Utah Sweetvech	Timp	0.06	0.05
F	<i>Heliomeris multiflora</i>	Showy Goldeneye	Sanpete UT	0.02	0.01
F	<i>Heliomeris multiflora</i>	Showy Goldeneye	Sanpete UT	0.12	0.10
F	<i>Heliomeris multiflora</i>	Showy Goldeneye	Sanpete UT	0.04	0.04
F	<i>Linum lewisii</i>	Lewis Flax	Maple Grove	0.09	0.07
F	<i>Linum lewisii</i>	Lewis Flax	Maple Grove	0.18	0.14
F	<i>Lomatium dissectum</i>	Fernleaf Biscuitroot	Washington ID	0.06	0.04
F	<i>Medicago sativa</i>	Alfalfa	Ladak +	0.50	0.44
F	<i>Onobrychis viciifolia</i>	Sainfoin	Eski	1.00	0.97
F	<i>Penstemon pachyphyllus</i>	Thickleaf Penstemon	White Pine NV	0.09	0.07
F	<i>Penstemon palmeri</i>	Palmer Penstemon	Carbon/Emery UT	0.18	0.16
F	<i>Penstemon palmeri</i>	Palmer Penstemon	Iron UT	0.12	0.11
F	<i>Penstemon palmeri</i>	Palmer Penstemon	Sevier UT	0.06	0.06
F	<i>Sanguisorba minor</i>	Small Burnet		0.18	0.16
F	<i>Sanguisorba minor</i>	Small Burnet		0.82	0.75
F	<i>Sphaeralcea coccinea</i>	Scarlet Globemallow	Iron UT	0.10	0.07
F	<i>Sphaeralcea grossulariifolia</i>	Gooseberryleaf Globemallow	Beaver UT	0.06	0.05
F	<i>Sphaeralcea grossulariifolia</i>	Gooseberryleaf Globemallow	Iron UT	0.05	0.04
F	<i>Sphaeralcea grossulariifolia</i>	Gooseberryleaf Globemallow	Iron/Millard UT	0.06	0.04

Mix Name			Application Type	Application Date	Acres
Hamlin Valley Sagebrush			Aerial	Jan 2016	1650
Type	Species	Common Name	Cultivar/Source ID	Bulk lbs/acre	PLS
F	<i>Medicago sativa</i>	Alfalfa	Ladak	0.48	0.45
F	<i>Medicago sativa</i>	Alfalfa	Ranger	0.03	0.03
S	<i>Artemisia nova</i>	Black Sagebrush	Utah UT	0.39	0.07
S	<i>Artemisia tridentata</i> ssp. <i>wyomingensis</i>	Wyoming Big Sagebrush	Beaver UT	0.25	0.04

**Wildlife Habitat and Vegetation History****Table 20R-07.3 - Wildlife Seasonal Habitat.** UDWR wildlife habitat and seasonality.

Species	Habitat	Season
Mule Deer	substantial	year-long
Rocky Mountain Elk	substantial	year-long

**Table 20R-07.4 - 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 III
2019	Rubber Rabbitbrush/Perennial Forb	Phase I

**Site Notes**

No Notes

**Site Potential**

1981 - 2010 Average Annual Precipitation	17 inches
NRCS Ecological Site	Upland Loam (Mountain Big Sagebrush)
NRCS Ecological Site #	R028AY310UT
States and Transitions	A defined state and transition model is available.

When the study site was established in 2015, it was dominated by singleleaf pinyon (*Pinus monophylla*) and Utah juniper (*Juniperus osteosperma*) with a depleted understory and shrub layer. Perennial grasses have increased significantly following treatment, likely in part due to seeding (Table 20R-07.1). The dominant perennial grasses are squirreltail (*Elymus elymoides*) and western wheatgrass (*Pascopyrum smithii*) as of 2019 (Table 20R-07.2, Table 20R-07.10). Forbs were initially very sparse on the site, but have since increased with the dominant species being common yarrow (*Achillea millefolium*) and silvery lupine (*Lupinus argenteus*) (Table 20R-07.11). Shrubs have increased significantly following the treatment with rubber rabbitbrush (*Ericameria nauseosa*) being the dominant species and lesser amounts of mountain big sagebrush (*Artemisia tridentata* ssp. *vaseyana*) also present (Table 20R-07.12, Table 20R-07.13). Although pinyon and juniper have provided little cover after treatment, both species were observed in point-quarter density measurements in 2019 (Table 20R-07.12, Table 20R-07.14). The state and transition model does not describe the current state, but it is likely that in time, the rubber rabbitbrush will decrease and mountain big sagebrush will increase as the site transitions through succession from an early seral state towards a climax community (Jornada, 2019).

**Trend Summary Tables****Table 20R-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
2015	0.4	0.0	13.2	0.4	0.2	77.4
2019	1.5	15.0	0.0	1.3	19.0	-

**Table 20R-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
2015	25	90	-	29	0.1	1.4	-	0.2
2019	153	199	94	139	3.5	7.3	1.3	16.8

**Table 20R-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
2015	7.6	2.8	74.4	15.4	1.1	15.7
2019	3.3	-	75.6	3.8	0.4	40.4

**Table 20R-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	Horse	Rabbit
	Quadrat Frequency				
2015	1	-	-	-	36
2019	3	3	6	-	7
Year	Days Use Per Acre (ha)				
	2015	0.7 (1.8)	0.7 (1.7)	0.7 (1.7)	-
2019	10.2 (25.1)	1.3 (3.3)	6.7 (16.6)	0.6 (1.4)	-

**Table 20R-07.10 - 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)	Elymus lanceolatus (thickspike wheatgrass)	Koeleria macrantha (prairie Junegrass)	Pascopyrum smithii (western wheatgrass)	Pseudoroegneria spicata (bluebunch wheatgrass)	Sporobolus cryptandrus (sand dropseed)
year	Nested Frequency							
2015	-	25	90	-	-	-	-	-
2019	1	153	116	18	2	68	10	4
year	Average Cover (%)							
2015	-	0.1	1.4	-	-	-	-	-
2019	0.0	3.5	3.6	0.7	0.0	2.6	0.3	0.0

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

**Table 20R-07.11 - Forb Species.** Nested frequency and modified Daubenmire average cover by year.

FORB SPECIES	Achillea millefolium (Common yarrow)	Arabis (rockcress)	Chaenactis douglasii (Douglas' dusty-aiden)	Chenopodium fremontii <sup>a</sup> (Fremont's goosefoot)	Cryptantha (cryptantha)	Descurainia pinnata <sup>a</sup> (western tansymustard)	Eriogonum cernuum <sup>a</sup> (nodding buckwheat)	Gayophytum ramosissimum <sup>a</sup> (pinyon groundsmoke)	Gilia inconspicua <sup>a</sup> (shy gilia)	Hedysarum boreale (Utah sweetvetch)	Helianthus annuus <sup>a</sup> (common sunflower)	Linum lewisii (Lewis flax)	Lotus utahensis (Utah bird's-foot trefoil)	Lupinus argenteus (silvery lupine)	Medicago sativa <sup>i</sup> (alfalfa)	Microsteris gracilis <sup>a</sup> (slender phlox)	Penstemon comarrhenus (dusty beardtongue)
year	Nested Frequency																
2015	-	-	-	-	9	-	-	-	-	-	-	-	9	4	-	-	3
2019	44	2	4	2	14	7	39	8	2	2	1	1	3	69	12	15	2
year	Average Cover (%)																
2015	-	-	-	-	0.1	-	-	-	-	-	-	-	0.0	0.0	-	-	0.0
2019	4.4	0.0	0.0	0.0	0.2	0.1	0.9	0.0	0.0	0.0	0.0	0.0	0.0	11.4	0.5	0.1	0.0

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

FORB SPECIES								
Penstemon leiophyllus (smoothleaf beardtongue)								
Penstemon pachyphyllus (thickleaf beardtongue)								
Penstemon palmeri (Palmer's penstemon)								
Phlox austromontana (mountain phlox)								
Phlox longifolia (longleaf phlox)								
Polygonum douglasii <sup>a</sup> (Douglas' knotweed)								
Sphaeralcea coccinea (scarlet globemallow)								
Tragopogon dubius <sup>at</sup> (yellow salsify)								
year	Nested Frequency							
2015	6	-	-	-	1	-	-	-
2019	-	2	1	16	5	26	0	10
year	Average Cover (%)							
2015	0.0	-	-	-	0.0	-	-	-
2019	-	0.0	0.0	0.2	0.0	0.2	0.0	0.1

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

**Table 20R-07.12 - 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)							
Opuntia (pricklypear)							
Pinus monophylla <sup>t</sup> (singleleaf pinyon)							
year	Line Intercept Cover (%)						
2015	-	0.4	-	0.2	39.5	-	37.9
2019	-	1.3	19	-	-	-	-
year	Quadrat Cover (%)						
2015	-	0.4	-	0.0	2.1	0.0	11.0
2019	0.1	1.4	14.9	0.0	0.0	-	-

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

**Table 20R-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 nova<sup>p</sup> -- (black sagebrush)</b>									
2015	-	-	-	-	-	-	-	-	18/27
2019	20	-	0	100	0	0	0	0	31/60
<b>Artemisia tridentata ssp. vaseyana<sup>p</sup> -- (mountain big sagebrush)</b>									
2015	240	20	42	25	33	17	42	33	83/46
2019	100	20	0	100	0	0	0	0	59/84
<b>Ericameria nauseosa -- (rubber rabbitbrush)</b>									
2015	20	-	0	100	0	0	0	0	36/27
2019	4440	9800	76	24	0	0	0	0	96/117
<b>Ericameria nauseosa ssp. nauseosa var. hololeuca<sup>p</sup> -- (rubber rabbitbrush)</b>									
2015	-	-	-	-	-	-	-	-	-/-
2019	-	-	-	-	-	-	-	-	84/102
<b>Gutierrezia sarothrae -- (broom snakeweed)</b>									
2015	80	-	0	100	0	0	0	0	25/26
2019	-	160	0	0	0	0	0	0	30/37
<b>Juniperus osteosperma<sup>i</sup> -- (Utah juniper)</b>									
2015	240	80	33	67	0	0	8	0	-/-
2019	120	-	100	0	0	0	0	0	-/-
<b>Opuntia -- (pricklypear)</b>									
2015	-	20	0	0	0	0	0	0	15/38
2019	-	-	-	-	-	-	-	-	15/70
<b>Pinus monophylla<sup>i</sup> -- (singleleaf pinyon)</b>									
2015	260	780	31	62	8	0	0	8	-/-
2019	40	-	100	0	0	0	0	0	-/-

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

**Table 20R-07.14 - Tree Characteristics.** Point-quarter tree density, size class distribution, and average diameter.

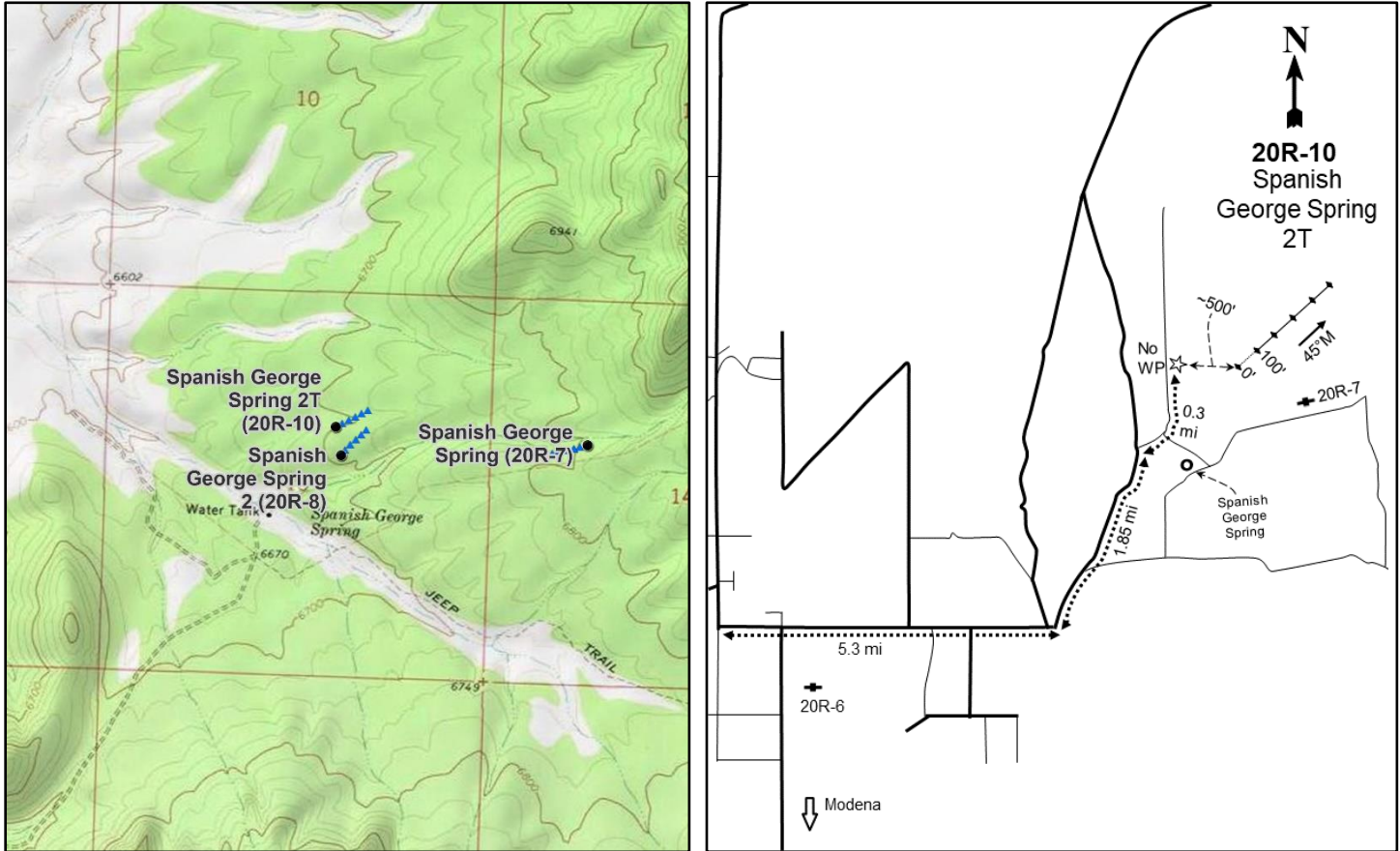
Year	Density	Size Class Distribution					Average Diameter (cm)
	Trees per Acre	Seedling (%)	1-4' (%)	4-8' (%)	8-12' (%)	>12' (%)	
<b>Juniperus osteosperma (Utah juniper)</b>							
2015	85	6	11	6	17	61	16.4
2019	33	43	57	-	-	-	4.1
<b>Pinus monophylla (singleleaf pinyon)</b>							
2015	555	70	5	10	15	-	2.5
2019	7	100	-	-	-	-	1.5

**Table 20R-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
2015	0.5	0.0	0.0	2.8	-0.1	0.4	0.0	3.6	Very Poor
2019	1.6	0.0	0.0	14.6	-2.6	10.0	0.0	23.6	Very Poor



## SPANISH GEORGE SPRING 2T - STUDY NO. 20R-10

**Location Information**

USGS 7.5 min Map Info  
GPS (0' Stake)

Steamboat Mountain S; Township 32S, Range 18W, Section 15  
NAD 83 UTM ZONE 12, 249907 East 4212105 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	Standard

**Directions to Site**

Drive west from the Indian Peaks cabin for 0.3 miles to a fork and turn left. Proceed 0.1 miles to another fork, again staying left. From there, drive 2.9 miles to a cattle guard. From the cattle guard, drive 1.4 miles to a junction. Turn right and proceed 1.2 miles to an intersection. Go straight, crossing another cattle guard. From the cattle guard, drive 5.8 miles (staying on the main road) to a fork. Proceed left and drive 4.1 miles to another fork. Go left again and continue for 4.6 miles to a fork leading to Arrowhead Pass. Stay on the main road for another 6.2 miles. Turn left onto North Hamblin Valley Road and continue onto Spanish George Road. Drive for 6.6 miles (the road will turn north). Turn left onto a dirt road and drive 1.5 miles to an intersection. Turn left (north) and continue for 2.2 miles, passing study #20R-07; the road will make a hairpin turn to the left. A road comes in from the right (north): turn onto this road and continue for 0.1 miles. The site is on the left-hand side of the road, about 150 feet away; there is no witness post.



**Site Information**

Land Ownership	Federal
Land Administrator	BLM
Allotment	SPANISH GEORGE
Elevation	6,700ft (2,042m)
Aspect	Northwest
Slope	5%
Sample Dates	08/13/2019

**Table 20R-10.1 Disturbance History.** Recorded history of major disturbances.

Treatment/Disturbance	Name	WRI DB#	Date	Size (acres)
Mechanical - Bullhog	Hamlin Valley Habitat Restoration Project - Sagebrush Restoration Year 2	3686	October 2016-June 2017	848
Seeding - Aerial Before	Hamlin Valley Habitat Restoration Project - Sagebrush Restoration Year 2	3686	January 2017	848

**Wildlife Habitat and Vegetation History****Table 20R-10.3 - Wildlife Seasonal Habitat.** UDWR wildlife habitat and seasonality.

Species	Habitat	Season
Mule Deer	substantial	year-long
Rocky Mountain Elk	substantial	year-long
Greater Sage-Grouse		
Pronghorn	crucial	year-long

**Table 20R-10.4 - Vegetation History.** The dominant vegetation type(s) and phase of woodland succession (Tausch, Miller, Roundy, & Chambers, 2009).

Year	Vegetation Type	Woodland Succession
2019	Perennial Grass-Forb	Phase I

**Site Notes**

This is a paired site to the Spanish George Spring 2 study. The original Spanish George Spring 2 study did not fall within the treatment.

**Site Potential**

1981 - 2010 Average Annual Precipitation	16 inches
NRCS Ecological Site	Upland Loam (Mountain Big Sagebrush)
NRCS Ecological Site #	R028AY310UT
States and Transitions	A defined state and transition model is available.

At the time of study establishment in 2019, this site was considered to be in a perennial grass and forb-dominated ecological state; the herbaceous understory was robust and moderately diverse (Table 20R-10.7). Perennial grasses were the dominant vegetation component with squirreltail (*Elymus elymoides*) as the most common species (Table 20R-10.10). Perennial forbs, particularly silvery lupine (*Lupinus argenteus*), were also abundant (Table 20R-10.11). Shrubs were relatively sparse with mountain big sagebrush (*Artemisia tridentata* ssp. *vaseyana*) as the dominant species (Table 20R-10.12, Table 20R-11.13). A small population of remnant Utah juniper (*Juniperus osteosperma*) and singleleaf pinyon (*Pinus monophylla*) was observed on site. Although density is low to moderate as of 2019, trees will likely mature and continue to infill on the site in future sample years (Table 20R-10.14). The state and transition model does not describe a state which accurately represents the current community on this site (Jornada, 2019). However, it is likely that this site will remain in a similar community moving in the future without a significant disturbance.

**Trend Summary Tables**

**Table 20R-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
2019	2.2	0.8	-	1.5	1.3	-

**Table 20R-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
2019	51	323	41	154	0.3	11.7	0.2	9.5

**Table 20R-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
2019	21.9	-	58.9	7.7	3.8	21.6

**Table 20R-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			
2019	6	1	4	25
Year	Days Use Per Acre (ha)			
2019	14.5 (35.9)	-	1.3 (3.3)	-

**Table 20R-10.10 - 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)	Elymus lanceolatus (thickspike wheatgrass)	Hesperostipa comata (needle and thread)	Pascopyrum smithii (western wheatgrass)	Pseudoroegneria spicata (bluebunch wheatgrass)	Sporobolus cryptandrus (sand dropseed)
year	Nested Frequency							
2019	13	51	253	62	27	54	1	3
year	Average Cover (%)							
2019	0.2	0.3	7.7	1.3	0.8	1.6	0.0	0.0

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

**Table 20R-10.11 - Forb Species.** Nested frequency and modified Daubenmire average cover by year.

FORB SPECIES	Nested Frequency																
Achillea millefolium (Common yarrow)	9	11	3	2	9	15	3	13	19	5	43	21	65	9	8	4	10
Astragalus beckwithii (Beckwith's milkvetch)	Average Cover (%)																
Astragalus calycosus (Torrey's milkvetch)	0.2	0.1	0.0	0.0	0.2	0.0	0.0	0.1	0.2	0.2	0.3	0.6	6.1	0.0	0.9	0.0	0.3
Cryptantha (cryptantha)																	
Dalea searlsiae (Searl's prairie clover)																	
Descurainia pinnata <sup>a</sup> (western tansymustard)																	
Eriogonum cernuum <sup>a</sup> (nodding buckwheat)																	
Gayophytum ramosissimum <sup>a</sup> (pinyon groundsmoke)																	
Ipomopsis aggregata (scarlet gilia)																	
Ipomopsis congesta (ballhead ipomopsis)																	
Linum lewisii (Lewis flax)																	
Lotus utahensis (Utah bird's-foot trefoil)																	
Lupinus argenteus (silvery lupine)																	
Medicago sativa <sup>t</sup> (alfalfa)																	
Penstemon leonardii (Leonard's beardtongue)																	
Penstemon pachyphyllus (thickleaf beardtongue)																	
Penstemon palmeri (Palmer's penstemon)																	

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

FORB SPECIES	Nested Frequency				
Phlox austromontana (mountain phlox)	3	3	11	3	7
Phlox longifolia (longleaf phlox)	Average Cover (%)				
Polygonum douglasii <sup>a</sup> (Douglas' knotweed)	0.2	0.0	0.0	0.0	0.1
Sphaeralcea coccinea (scarlet globemallow)					
Sphaeralcea grossularifolia (gooseberry/leaf globemallow)					

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

**Table 20R-10.12 - 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)	-	1.5	0.5	0.8
Artemisia tridentata ssp. vaseyana <sup>p</sup> (mountain big sagebrush)	Quadrat Cover (%)			
Ericameria nauseosa (rubber rabbitbrush)	0.2	2.0	0.2	0.7
Gutierrezia sarothrae (broom snakeweed)				

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

**Table 20R-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>									
2019	100	-	40	60	0	80	0	0	37/61
<b>Artemisia tridentata ssp. vaseyana<sup>P</sup> -- (mountain big sagebrush)</b>									
2019	200	60	40	50	10	20	0	10	46/86
<b>Chrysothamnus viscidiflorus ssp. viscidiflorus var. viscidiflorus -- (yellow rabbitbrush)</b>									
2019	-	-	-	-	-	-	-	-	34/51
<b>Ericameria nauseosa -- (rubber rabbitbrush)</b>									
2019	80	-	25	75	0	25	0	0	55/68
<b>Gutierrezia sarothrae -- (broom snakeweed)</b>									
2019	340	-	0	100	0	0	0	0	34/57
<b>Opuntia polyacantha -- (plains pricklypear)</b>									
2019	-	-	-	-	-	-	-	-	14/45
<b>Pinus monophylla<sup>I</sup> -- (singleleaf pinyon)</b>									
2019	80	-	50	0	50	0	0	50	- / -

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

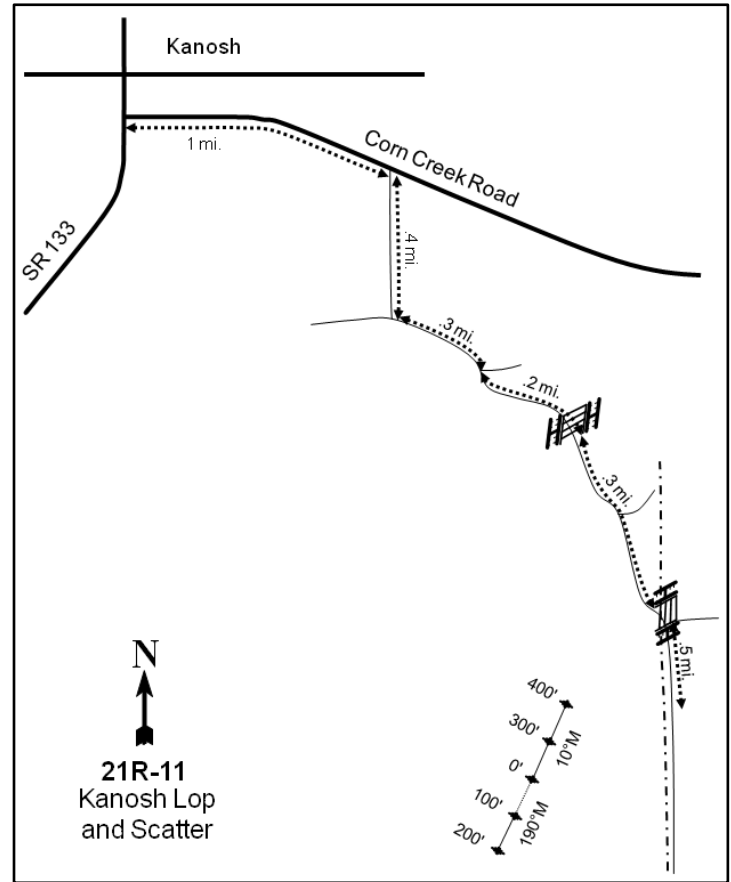
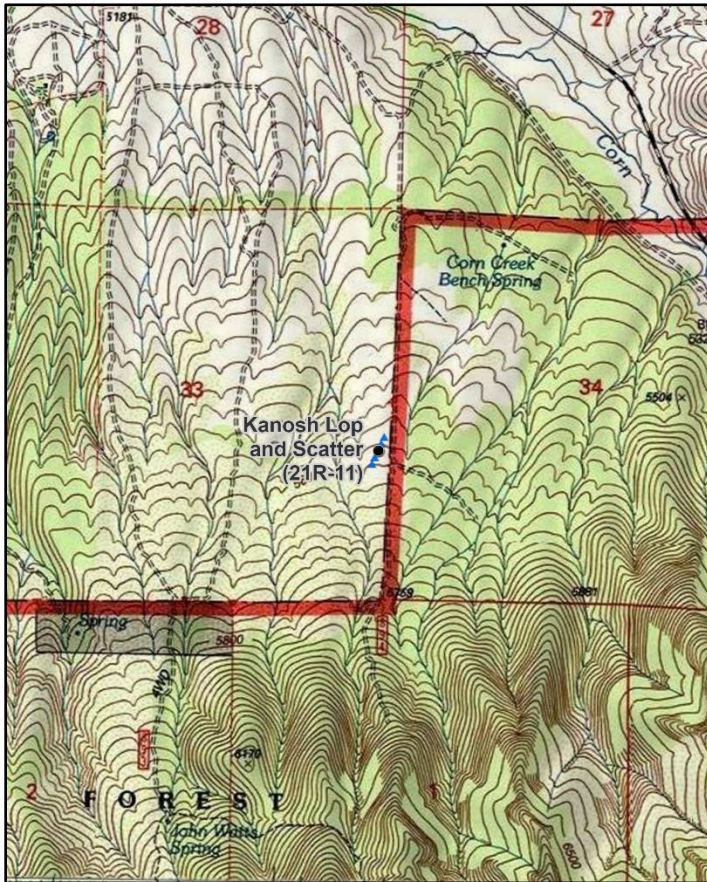
**Table 20R-10.14 - Tree Characteristics.** Point-quarter tree density, size class distribution, and average diameter.

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>							
2019	20	17	83	-	-	-	4.7
<b>Pinus monophylla (singleleaf pinyon)</b>							
2019	68	33	67	-	-	-	2.7

**Table 20R-10.15 – 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
2019	1.9	0.0	0.0	23.3	-0.3	10.0	0.0	34.9	Very Poor-Poor

## KANOSH LOP AND SCATTER - STUDY NO. 21R-11

**Location Information**

USGS 7.5 min Map Info  
GPS (0' Stake)

Kanosh SE; Township 23S, Range 5W, Section 33  
NAD 83 UTM ZONE 12, 377260 East 4291728 North

**Transect Information**

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

Not Available  
190° magnetic (Lines 3-4: 10° magnetic)  
400ft  
Line 1 (11ft & 95ft), Line 2 (34ft), Line 3 (59ft), Line 4 (71ft)  
Standard

**Directions to Site**

From Main Street in Kanosh, turn onto 300 South and drive 1.0 mile to a road on the right (south). Turn right and follow this road 0.4 miles to where the road turns sharply to the left. From this point, drive 0.3 miles to a fork and stay right. Drive on the main road for 0.2 miles to a gate. Continue driving straight along a fenceline for 0.3 miles to another gate. Turn right and drive 0.5 miles to the site on the right (west) side of the road. There is no witness post or browse tag; use a GPS unit to locate the 0-foot stake.

**Site Information**

Land Ownership	State
Land Administrator	UDWR
Allotment	No data
Elevation	5,600ft (1,707m)
Aspect	Northwest
Slope	13%
Sample Dates	08/27/2008, 06/22/2011, 08/11/2014, 08/01/2019

**Table 21R-11.1 Disturbance History.** Recorded history of major disturbances.

Treatment/Disturbance	Name	WRI DB#	Date	Size (acres)
Chaining - Chain Unknown	-	-	1960s	-
Seeding - Seed Unknown	-	-	1960s	-
Hand Crew - Lop and Scatter	Fillmore WMA Juniper thinning	408	May 2008	575

**Wildlife Habitat and Vegetation History****Table 21R-11.3 - Wildlife Seasonal Habitat.** UDWR wildlife habitat and seasonality.

Species	Habitat	Season
Mule Deer	crucial	winter
Rocky Mountain Elk	substantial	winter

**Table 21R-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/Mountain Big Sagebrush	Phase I transitioning to Phase II
2011	Mountain Big Sagebrush/Bitterbrush	Phase I
2014	Mountain Big Sagebrush/Bitterbrush	Phase I
2019	Mountain Big Sagebrush/Bitterbrush	Phase I

**Site Notes**

The study was established to monitor a lop and scatter treatment on the Kanosh (Corn Creek) Unit within the Fillmore Wildlife Management Area (WMA) complex. Part of the study transect was not treated, and untreated sample transects were moved within the treated portion of the project area in 2011.

**Site Potential**

1981 - 2010 Average Annual Precipitation	18 inches
NRCS Ecological Site	Upland Stony Loam (Wyoming Big Sagebrush)
NRCS Ecological Site #	R028AY334UT
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 existed as a mountain big sagebrush (*Artemisia tridentata* ssp. *vaseyana*) and antelope bitterbrush (*Purshia tridentata*) stand that was being encroached by Utah juniper (*Juniperus osteosperma*). However, a lop and scatter treatment occurred in the fall of 2008 that removed most of the juniper trees (Table 21R-11.1). The herbaceous understory has been dominated by perennial grasses and/or annual grasses in all sample years (Table 21R-11.7). Perennial grasses are comprised of a mixture of introduced and native species as of 2019 with crested wheatgrass (*Agropyron cristatum*), Sandberg bluegrass (*Poa secunda*) and bluebunch wheatgrass (*Pseudoroegneria spicata*) as the most common species (Table 21R-11.10). Annual grasses have fluctuated with the 2011 and 2019 sample years showing high amounts of cover (Table 21R-11.10). Forbs have been depleted and have not provided consistent cover, although desert madwort (*Alyssum desertorum*) has displayed an increasing trend (Table 21R-11.11). Mountain big sagebrush and bitterbrush have shown moderate increases in cover following the lop and scatter treatment. Utah juniper has been present in density measurement in all sample years despite treatment, although it has not been sampled in cover measurements since 2008 (Table 21R-11.12, Table 21R-11.13, Table 21R-11.14).

## Trend Summary Tables

**Table 21R-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	16.8	0.3	7.9	24.7	0.1	19.3
2011	25.9	0.4	-	45.2	0.1	-
2014	21.1	0.4	-	35.4	0.7	-
2019	24.8	0.3	-	36.5	0.3	-

**Table 21R-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	310	255	127	63	4.2	7.2	0.4	2.1
2011	394	347	334	85	15.6	16.8	7.1	1.4
2014	263	307	204	25	6.6	13.6	2.5	0.4
2019	461	250	302	26	47.1	9.8	7.9	0.2

**Table 21R-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	11.7	1.2	57.9	6.1	3.9	42.2
2011	4.9	1.1	51.9	2.3	3.0	60.6
2014	5.2	0.3	61.0	2.4	2.2	50.4
2019	1.3	0.3	73.6	1.1	1.6	74.0

**Table 21R-11.9 - Pellet Group Data.** Quadrat frequency and pellet group transect data for animal pellets. Rabbit pellet groups are not sampled in the pellet group transect.

Year	Cattle	Coyote	Mule Deer	Dusky Grouse	Rocky Mountain Elk	Rabbit
	Quadrat Frequency					
2008	-	-	44	-	1	30
2011	-	-	31	-	7	4
2014	-	-	45	1	2	10
2019	-	-	25	-	1	2
Year	Days Use Per Acre (ha)					
2008	-	8.7 (21.5)*	206.4 (509.8)	-	0.7 (1.7)	-
2011	2.2 (5.4)	-	140.1 (346.0)	-	24.1 (59.6)	-
2014	-	-	146.8 (362.5)	-	0.7 (1.7)	-
2019	-	-	60.3 (149.0)	-	2.0 (5.0)	-

Pellets per acre (ha)



**Table 21R-11.10 - Grass Species.** Nested frequency and modified Daubenmire average cover by year.

GRASS SPECIES	Agropyron cristatum <sup>i</sup> (crested wheatgrass)	Bromus arvensis <sup>ai</sup> (field brome)	Bromus inermis <sup>i</sup> (smooth brome)	Bromus tectorum <sup>ai</sup> (cheatgrass)	Elymus elymoides (squirreltail)	Festuca idahoensis (Idaho fescue)	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	24	-	-	310	77	22	-	-	157	14	22
2011	57	57	3	365	92	-	5	22	201	81	20
2014	71	86	-	237	67	-	6	6	134	93	15
2019	91	110	3	449	34	6	-	54	48	53	25
year	Average Cover (%)										
2008	1.0	-	-	4.2	1.3	0.1	-	-	2.5	0.9	1.4
2011	3.7	2.0	0.0	13.6	3.8	-	0.1	0.3	4.3	3.4	1.1
2014	3.6	1.6	-	5.1	1.6	-	0.0	0.1	3.5	4.6	0.2
2019	4.0	4.7	0.0	42.4	0.4	0.0	-	0.8	0.6	2.0	1.9

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

**Table 21R-11.11 - 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)	Arenaria (sandwort)	Astragalus (milkvetch)	Calochortus nuttallii (sego lily)	Ceratocephala testiculata <sup>ai</sup> (curveseed butterwort)	Claytonia perfoliata ssp. perfoliata (miner's lettuce)	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)	Eriogonum umbellatum (sulphur-flower buckwheat)	Erodium cicutarium <sup>ai</sup> (redstem stork's bill)	Galium aparine <sup>a</sup> (stickywilly)	Lactuca serriola <sup>ai</sup> (prickly lettuce)
year	Nested Frequency																
2008	-	-	104	-	20	10	-	10	-	12	-	-	1	5	-	-	-
2011	2	1	264	1	-	5	27	5	10	79	9	8	3	1	15	33	50
2014	-	-	197	-	-	-	8	-	-	5	-	-	-	1	29	6	3
2019	-	-	291	-	-	-	14	-	-	4	9	-	-	1	3	11	-
year	Average Cover (%)																
2008	-	-	0.3	-	1.6	0.2	-	0.0	-	0.0	-	-	0.0	0.0	-	-	-
2011	0.0	0.0	4.4	0.0	-	0.0	0.1	0.0	0.1	0.9	0.0	0.0	0.0	0.0	0.1	0.9	0.3
2014	-	-	2.1	-	-	-	0.0	-	-	0.0	-	-	-	0.0	0.3	0.1	0.0
2019	-	-	7.4	-	-	-	0.1	-	-	0.0	0.1	-	-	0.0	0.0	0.4	-

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

FORB SPECIES	Linum lewisii (Lewis flax)	Lithospermum ruderae (western stone seed)	Microsteris gracilis <sup>a</sup> (slender phlox)	Orogenia linearifolia (Great Basin Indian potato)	Phlox longifolia (longleaf phlox)	Polygonum douglasii <sup>a</sup> (Douglas' knotweed)	Silene antirrhina <sup>a</sup> (sleepy silene)	unknown annual forb <sup>a</sup> (unknown forb)	Zigadenus paniculatus (foothill death camas)
year	Nested Frequency								
2008	-	2	5	-	15	8	-	-	16
2011	22	1	1	6	14	-	82	3	8
2014	11	1	1	-	3	-	-	-	1
2019	4	2	-	-	1	-	8	-	6
year	Average Cover (%)								
2008	-	0.0	0.0	-	0.1	0.0	-	-	0.2
2011	0.2	0.4	0.0	0.0	0.2	-	0.3	0.0	0.3
2014	0.1	0.1	0.0	-	0.0	-	-	-	0.0
2019	0.0	0.0	-	-	0.0	-	0.0	-	0.0

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

**Table 21R-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)	Purshia stansburiana <sup>p</sup> (Stansbury cliffrose)	Purshia tridentata <sup>p</sup> (antelope bitterbrush)	Quercus gambelii <sup>p</sup> (Gambel oak)	Rhus trilobata var. trilobata <sup>p</sup> (skunkbush sumac)	Ribes <sup>p</sup> (currant)
year	Line Intercept Cover (%)							
2008	10.5	0.1	19.3	-	10.4	2.2	1.1	0.5
2011	20	0.1	-	-	22.2	-	3	-
2014	15.3	0.7	-	-	18.7	-	1.4	-
2019	15.2	0.3	-	-	19.9	-	1.4	-
year	Quadrat Cover (%)							
2008	8.4	0.3	7.9	-	6.5	0.5	1.0	0.4
2011	15.0	0.4	-	-	9.5	-	1.4	-
2014	12.2	0.4	-	-	7.4	-	1.5	-
2019	12.3	0.3	-	0.0	11.2	-	1.3	-

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

**Table 21R-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	1580	-	0	34	66	13	4	49	58/86
2011	2240	80	3	75	22	49	5	5	93/107
2014	2580	-	6	78	16	61	17	23	67/108
2019	2240	-	11	68	21	38	5	22	70/93
<b>Chrysothamnus viscidiflorus -- (yellow rabbitbrush)</b>									
2008	-	-	-	-	-	-	-	-	26/49
2011	-	-	-	-	-	-	-	-	27/58
2014	-	-	-	-	-	-	-	-	-/-
2019	-	-	-	-	-	-	-	-	57/116
<b>Gutierrezia sarothrae -- (broom snakeweed)</b>									
2008	160	-	0	75	25	0	0	13	24/31
2011	220	120	36	64	0	0	0	0	26/30
2014	640	-	0	100	0	41	0	0	25/37
2019	280	-	0	100	0	0	0	0	26/29
<b>Juniperus osteosperma<sup>i</sup> -- (Utah juniper)</b>									
2008	180	20	0	100	0	0	0	0	-/-
2011	-	-	-	-	-	-	-	-	-/-
2014	-	-	-	-	-	-	-	-	-/-
2019	-	20	0	0	0	0	0	0	-/-
<b>Purshia stansburiana<sup>p</sup> -- (Stansbury cliffrose)</b>									
2008	-	-	-	-	-	-	-	-	-/-
2011	-	-	-	-	-	-	-	-	205/220
2014	-	-	-	-	-	-	-	-	-/-
2019	-	-	-	-	-	-	-	-	229/236
<b>Purshia tridentata<sup>p</sup> -- (antelope bitterbrush)</b>									
2008	560	-	0	43	57	79	7	54	84/151
2011	740	-	3	78	19	76	3	5	104/171
2014	1140	-	5	90	5	46	42	25	95/151
2019	1040	-	2	87	12	29	67	8	94/159
<b>Quercus gambelii<sup>p</sup> -- (Gambel oak)</b>									
2008	280	-	7	93	0	0	0	0	90/63
2011	-	-	-	-	-	-	-	-	-/-
2014	-	-	-	-	-	-	-	-	-/-
2019	-	-	-	-	-	-	-	-	-/-
<b>Rhus trilobata var. trilobata<sup>p</sup> -- (skunkbush sumac)</b>									
2008	40	-	0	50	50	0	0	50	99/137
2011	20	-	0	100	0	0	0	0	118/228
2014	20	-	0	100	0	0	0	0	133/318
2019	20	-	0	100	0	0	100	0	108/148
<b>Ribes<sup>p</sup> -- (currant)</b>									
2008	20	-	0	0	100	0	0	0	94/300
2011	-	-	-	-	-	-	-	-	-/-
2014	-	-	-	-	-	-	-	-	-/-
2019	-	-	-	-	-	-	-	-	-/-
<b>Tetradymia canescens -- (spineless horsebrush)</b>									
2008	-	-	-	-	-	-	-	-	-/-
2011	-	-	-	-	-	-	-	-	48/132

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

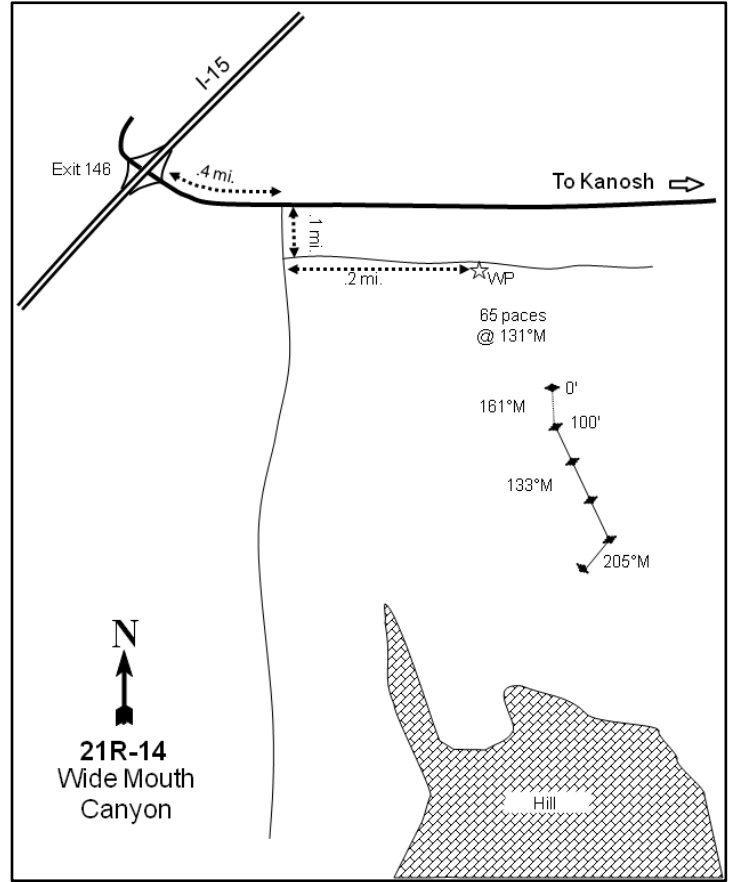
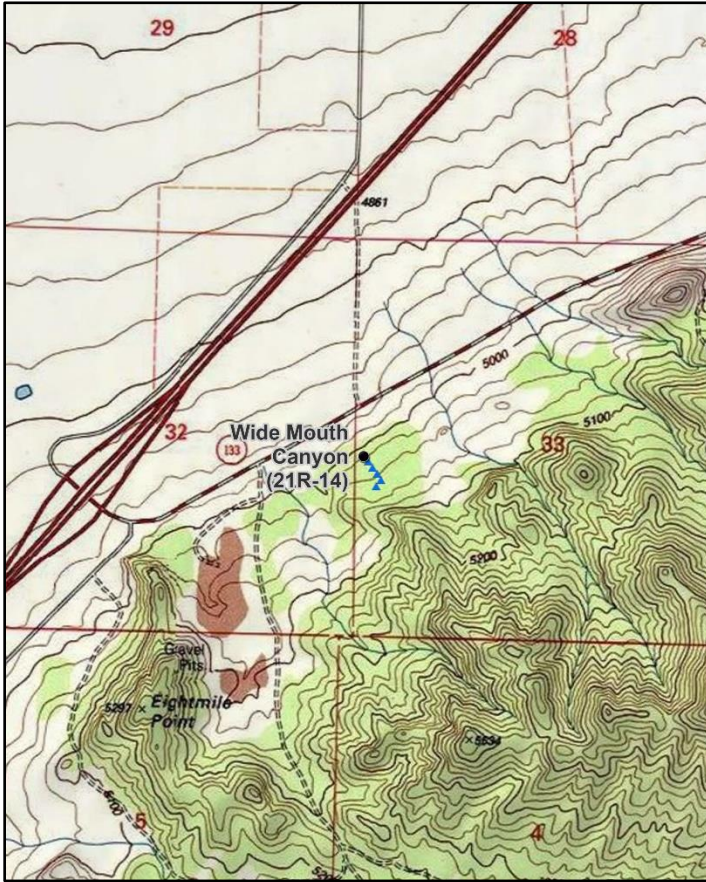
**Table 21R-11.14 - Tree Characteristics.** Point-quarter tree density, size class distribution, and average diameter.

Year	Density	Size Class Distribution					Average Diameter (cm)
	Trees per Acre	Seedling (%)	1-4' (%)	4-8' (%)	8-12' (%)	>12' (%)	
Juniperus osteosperma (Utah juniper)							
2008	220	-	5	30	50	15	13.3
2011	16	14	71	-	14	-	9.4
2014	62	-	33	67	-	-	16.9
2019	40	-	9	36	27	27	15.5

**Table 21R-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
2008	30.0	-1.9	0.3	14.3	-3.2	4.3	0.0	43.9	Poor
2011	30.0	9.3	1.3	30.0	-11.7	2.8	0.0	61.6	Fair
2014	30.0	12.2	2.7	27.2	-5.0	0.7	0.0	67.8	Good
2019	30.0	10.4	2.7	18.0	-20.0	0.3	0.0	41.5	Poor

## WIDE MOUTH CANYON - STUDY NO. 21R-14



### Location Information

USGS 7.5 min Map Info  
GPS (0' Stake)

Sixmile Point SE; Township 23S, Range 6W, Section 33  
NAD 83 UTM ZONE 12, 366026 East 4291976 North

### Transect Information

Browse Tag # (0' Stake)	146
Transect Bearing	161° magnetic (Lines 2-4: 133° magnetic, Line 5: 205° magnetic)
Length	500ft
Belt Placement	Line 1 (11ft), Line 2 (34ft), Line 3 (59ft), Line 4 (71ft), Line 5 (95ft)
Belt Marker Placement	No Rebar

### Directions to Site

Take exit 146 on from I-15 and travel east towards Kanosh. Drive 0.4 miles to a gravel road on the right (south) side of the road. Turn right and travel south on the gravel road for 0.1 miles to a two-track road on the left (east) side of the road. Turn left and travel 0.2 miles to the witness post on the right (south) side of the road. The 0-foot stake is 65 paces away from the witness post at a bearing of 161 degrees magnetic and is marked with browse tag #146.

**Site Information**

Land Ownership	Private
Land Administrator	Private
Allotment	No data
Elevation	4,953ft (1,510m)
Aspect	Northwest
Slope	6%
Sample Dates	06/23/2011, 08/11/2014, 08/07/2019

**Table 21R-14.1 Disturbance History.** Recorded history of major disturbances.

Treatment/Disturbance	Name	WRI DB#	Date	Size (acres)
Chaining - Two-Way Ely	Wide Mouth Canyon Chaining Phase III Project	1972	August 2011-February 2012	237
Herbicide - Plateau	Wide Mouth Canyon Chaining Phase III Project	1972	August 2011-February 2012	237
Seeding - Aerial Before	Wide Mouth Canyon Chaining Phase III Project	1972	August 2011-February 2012	237
Seeding - Dribbler	Wide Mouth Canyon Chaining Phase III Project	1972	August 2011-February 2012	237
Seeding - Aerial After	Wide Mouth Canyon Chaining Phase III Project	1972	February 2012	237

**Table 21R-14.2 Seed Mix.** List of known seeded plant species and rates (if available).

Mix Name			Application Type	Application Date	Acres
Widemouth Canyon Chaining Phase III			Aerial	Sep 2011	240
Type	Species	Common Name	Cultivar/Source ID	Bulk lbs/acre	PLS
G	<i>Achnatherum hymenoides</i>	Indian Ricegrass	Nezpar	1.46	1.34
G	<i>Agropyron cristatum</i>	Crested Wheatgrass	Hycrest II	2.08	1.84
G	<i>Elymus elymoides</i>	Bottlebrush Squirreltail	Millard UT	1.04	0.81
G	<i>Elymus lanceolatus</i>	Thickspike Wheatgrass	Critana	1.88	1.74
G	<i>Poa secunda</i>	Canby Bluegrass	Canbar	0.42	0.20
G	<i>Poa secunda</i>	Sandberg Bluegrass	Mountain Home	0.63	0.56
G	<i>Pseudoroegneria spicata</i>	Bluebunch Wheatgrass	Anatone	2.08	1.89
F	<i>Achillea millefolium</i>	Western Yarrow	Eagle Mountain	0.10	0.09
F	<i>Linum perenne</i>	Blue Flax	Appar	0.21	0.15
F	<i>Medicago sativa</i>	Alfalfa	Nomad	1.04	0.94
F	<i>Sanguisorba minor</i>	Small Burnet	Delar	2.08	1.96

Mix Name			Application Type	Application Date	Acres
Widemouth Canyon Chaining Phase III - Dribbler Mix			Aerial	Sep 2011	240
Type	Species	Common Name	Cultivar/Source ID	Bulk lbs/acre	PLS
S	<i>Atriplex canescens</i>	Fourwing Saltbush	Juab UT	0.25	0.09
S	<i>Purshia stansburiana</i>	Stansbury Cliffrose	Millard UT	0.13	0.10
S	<i>Purshia tridentata</i>	Bitterbrush	Rocky Mountain	0.13	0.08

Mix Name			Application Type	Application Date	Acres
Widemouth Canyon Chaining Phase III - Browse Mix			Aerial	Jan 2012	270
Type	Species	Common Name	Cultivar/Source ID	Bulk lbs/acre	PLS
F	<i>Medicago sativa</i>	Alfalfa	Nomad	0.50	0.45
S	<i>Bassia prostrata</i>	Forage Kochia	Beaver UT	1.04	0.60

**Wildlife Habitat and Vegetation History****Table 21R-14.3 - Wildlife Seasonal Habitat.** UDWR wildlife habitat and seasonality.

Species	Habitat	Season
Mule Deer	crucial	winter

**Table 21R-14.4 - Vegetation History.** The dominant vegetation type(s) and phase of woodland succession (Tausch, Miller, Roundy, & Chambers, 2009).

Year	Vegetation Type	Woodland Succession
2011	Juniper/Wyoming Big Sagebrush/Annual Grass	Phase I transitioning to Phase II
2014	Annual Grass	Phase I
2019	Annual Grass	Phase I

**Site Notes**

The study was established to monitor the effects of a two-way chaining project.

**Site Potential**

1981 - 2010 Average Annual Precipitation 15 inches  
 NRCS Ecological Site Upland Loam (Wyoming Big Sagebrush)  
 NRCS Ecological Site # R028AY309UT  
 States and Transitions No state and transition model is available for this ecological site.

Upon study establishment in 2011, the plant community on this site existed as a stand of Wyoming big sagebrush (*Artemisia tridentata* ssp. *wyomingensis*) that was being encroached by Utah juniper (*Juniperus osteosperma*). After treatment (Table 21R-14.1), juniper and sagebrush cover were greatly reduced, making the introduced annual grass species cheatgrass (*Bromus tectorum*) the dominant vegetation component (Table 21R-14.6, Table 21R-14.7). Perennial grasses have remained depleted and lacking in diversity, with purple threeawn (*Aristida purpurea*) as the most abundant species (Table 21R-14.10). Forbs have also been lacking in cover and diversity with wooly plantain (*Plantago patagonica*) as the dominant species present (Table 21R-14.11). As previously mentioned, Wyoming big sagebrush has shown a decreasing trend, although with time and favorable climatic conditions, it may have the potential to increase (Table 21R-14.12, Table 21R-14.13). Additional treatments could be needed to reduce the amount of cheatgrass and restore the function and diversity of the site.

**Trend Summary Tables**

**Table 21R-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
2011	3.7	0.3	5.4	7.5	0.2	13.7
2014	0.5	0.2	0.0	1.4	0.8	-
2019	0.8	0.2	-	1.1	0.3	-

**Table 21R-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
2011	463	265	243	26	28.9	9.5	2.2	0.2
2014	395	160	246	10	31.1	4.0	4.6	0.2
2019	450	183	356	6	41.6	6.1	8.1	0.1

**Table 21R-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
2011	2.4	5.5	30.5	20.6	0.2	50.4
2014	18.5	0.0	38.2	21.4	0.1	43.6
2019	8.3	0.1	65.8	12.6	0.1	49.1

**Table 21R-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	Horse	Rabbit
	Quadrat Frequency				
2011	4	20	1	-	9
2014	-	3	1	-	10
2019	5	13	1	-	14
Year	Days Use Per Acre (ha)				
2011	0.7 (1.8)	13.4 (33.1)	1.3 (3.3)	-	-
2014	2.2 (5.4)	8.1 (19.9)	2.0 (5.0)	-	-
2019	4.4 (10.8)	2.0 (5.0)	0.7 (1.7)	1.2 (2.9)	-



**Table 21R-14.10 - 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)	Koeleria macrantha (prairie Junegrass)	Muhlenbergia (muhly)	Pascopyrum smithii (western wheatgrass)	Pleuraphis jamesii (James' galleta)	Poa bulbosa <sup>i</sup> (bulbous bluegrass)	Poa fendleriana (muttongrass)	Poa secunda (Sandberg bluegrass)	Secale cereale <sup>ai</sup> (cereal rye)	Sporobolus cryptandrus (sand dropseed)	Vulpia octoflora <sup>ai</sup> (sixweeks fescue)
year	Nested Frequency															
2011	-	-	111	460	-	12	-	-	-	56	1	1	215	-	-	158
2014	-	-	81	389	1	5	3	3	1	30	10	-	57	2	-	52
2019	1	1	117	433	3	-	-	-	-	46	40	1	38	-	10	260
year	Average Cover (%)															
2011	-	-	4.2	28.4	-	0.3	-	-	-	1.3	0.0	0.0	3.8	-	-	0.5
2014	-	-	2.1	30.3	0.0	0.1	0.0	0.0	0.0	0.5	0.7	-	0.6	0.0	-	0.8
2019	0.0	0.0	3.6	36.4	0.0	-	-	-	-	0.9	0.6	0.0	0.6	-	0.2	5.2

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

**Table 21R-14.11 - Forb Species.** Nested frequency and modified Daubenmire average cover by year.

FORB SPECIES	Achillea millefolium (Common yarrow)	Allium acuminatum (tapertip onion)	Alyssum desertorum <sup>ai</sup> (desert madwort)	Calochortus nuttallii (sego lily)	Ceratocephala testiculata <sup>ai</sup> (curveseed butterwort)	Collinsia parviflora <sup>a</sup> (maiden blue eyed Mary)	Cryptantha (cryptantha)	Eriastrum sparsiflorum <sup>a</sup> (Great Basin woollystar)	Eriogonum cernuum <sup>a</sup> (nodding buckwheat)	Erodium cicutarium <sup>ai</sup> (redstem stork's bill)	Gayophytum ramosissimum <sup>a</sup> (pinyon groundsmoke)	Lactuca scariola <sup>ai</sup> (prickly lettuce)	Lygodesmia grandiflora (largeflower skeletonplant)	Phlox longifolia (longleaf phlox)	Physaria (twinpod)	Plantago patagonica <sup>a</sup> (woolly plantain)	Salsola tragus <sup>ai</sup> (prickly Russian thistle)
year	Nested Frequency																
2011	-	13	26	3	12	21	-	3	1	60	-	9	2	8	-	122	-
2014	3	-	-	-	9	-	3	-	-	72	-	33	1	-	3	176	7
2019	5	-	16	-	4	-	-	-	-	179	2	-	-	1	-	314	-
year	Average Cover (%)																
2011	-	0.0	0.1	0.0	0.4	0.2	-	0.0	0.0	0.6	-	0.0	0.0	0.2	-	0.5	-
2014	0.2	-	-	-	0.0	-	0.0	-	-	0.4	-	0.5	0.0	-	0.0	3.5	0.2
2019	0.1	-	0.0	-	0.0	-	-	-	-	1.7	0.0	-	-	0.0	-	6.3	-

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

FORB SPECIES	Silene antirrhina <sup>a</sup> (sleepy silene)
year	Nested Frequency
2011	77
2014	-
2019	16
year	Average Cover (%)
2011	0.3
2014	-
2019	0.1

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

**Table 21R-14.12 - Shrub and Tree Species.** Average modified Daubenmire quadrat and line intercept cover by year.

SHRUB SPECIES	Artemisia tridentata ssp. wyomingensis <sup>p</sup> (Wyoming big sagebrush)	Gutierrezia sarothrae (broom snakeweed)	Juniperus osteosperma <sup>t</sup> (Utah juniper)	Linanthus pungens (granite prickly phlox)	Opuntia (pricklypear)
year	Line Intercept Cover (%)				
2011	7.5	0.1	13.7	0.1	-
2014	1.4	0.2	-	0.6	-
2019	1.1	0.1	-	0.2	-
year	Quadrat Cover (%)				
2011	3.7	0.0	5.4	0.3	0.0
2014	0.5	0.0	0.0	0.2	-
2019	0.8	0.0	-	0.2	0.0

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

**Table 21R-14.13 - Shrub/Tree Characteristics.** Population characteristics of shrub/tree species populations including density reproduction (seedlings), age distribution, utilization, vigor and average size (height/crown) of plants.

Year	Density		Age Class Distribution			Utilization		Poor Vigor (%)	Average Height Crown (cm)
	Plants Per Acre		Excluding Seedlings			Moderate (%)	Heavy (%)		
	Excluding Seedlings	Seedling	Young (%)	Mature (%)	Decadent (%)				
Artemisia tridentata ssp. wyomingensis <sup>p</sup> -- (Wyoming big sagebrush)									
2011	840	-	2	64	33	50	5	12	60/98
2014	460	40	9	78	13	46	25	21	47/80
2019	280	-	7	50	43	50	0	43	53/87
Chrysothamnus viscidiflorus -- (yellow rabbitbrush)									
2011	-	-	-	-	-	-	-	-	36/51
2014	-	-	-	-	-	-	-	-	-/-
2019	-	-	-	-	-	-	-	-	30/32

Year	Density		Age Class Distribution			Utilization		Poor Vigor (%)	Average Height Crown (cm)
	Plants Per Acre		Excluding Seedlings			Moderate (%)	Heavy (%)		
	Excluding Seedlings	Seedling	Young (%)	Mature (%)	Decadent (%)				
<b>Ephedra nevadensis<sup>p</sup> -- (Nevada jointfir)</b>									
2011	20	-	0	0	100	0	0	0	53/119
2014	-	-	-	-	-	-	-	-	40/117
2019	-	-	-	-	-	-	-	-	30/93
<b>Ericameria nauseosa -- (rubber rabbitbrush)</b>									
2011	-	-	-	-	-	-	-	-	-/-
2014	-	-	-	-	-	-	-	-	-/-
2019	-	-	-	-	-	-	-	-	77/144
<b>Gutierrezia sarothrae -- (broom snakeweed)</b>									
2011	20	-	0	100	0	0	0	0	23/28
2014	280	-	7	93	0	79	0	0	25/37
2019	180	-	0	89	11	0	0	11	20/27
<b>Juniperus osteosperma<sup>i</sup> -- (Utah juniper)</b>									
2011	40	20	0	100	0	0	0	0	- / -
2014	-	20	0	0	0	0	0	0	- / -
2019	-	-	-	-	-	-	-	-	-/-
<b>Linanthus pungens -- (granite prickly phlox)</b>									
2011	240	20	0	50	50	0	0	0	20/35
2014	180	-	0	100	0	56	44	0	21/35
2019	100	-	0	100	0	0	0	0	23/30
<b>Opuntia polyacantha -- (plains pricklypear)</b>									
2011	-	-	-	-	-	-	-	-	-/-
2014	-	-	-	-	-	-	-	-	-/-
2019	-	-	-	-	-	-	-	-	14/35
<b>Opuntia -- (pricklypear)</b>									
2011	80	-	0	75	25	0	0	0	16/37
2014	-	-	-	-	-	-	-	-	7/13
2019	20	-	100	0	0	0	0	0	15/29
<b>Tetradymia glabrata -- (littleleaf horsebrush)</b>									
2011	-	-	-	-	-	-	-	-	46/79

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

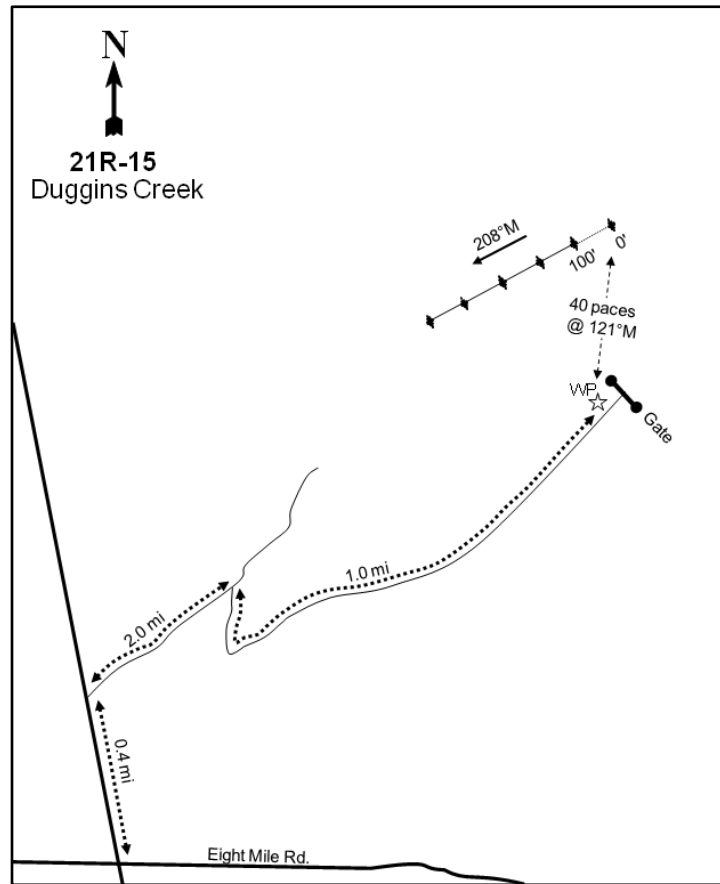
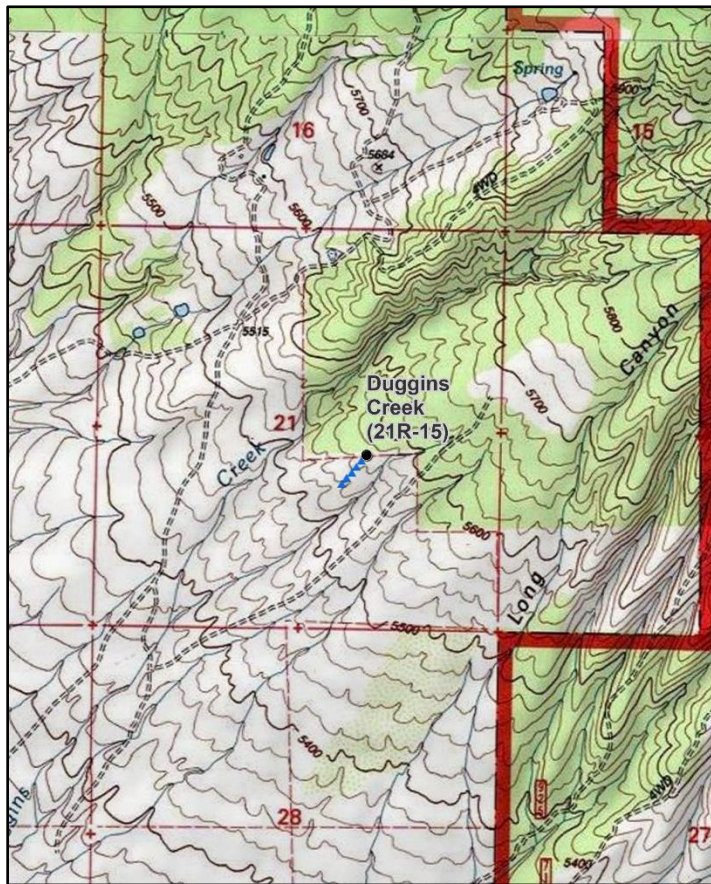
**Table 21R-14.14 - Tree Characteristics.** Point-quarter tree density, size class distribution, and average diameter.

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>							
2011	27	-	-	15	46	38	37.1
2014	5	-	100	-	-	-	4.7
2019	4	-	67	33	-	-	5.7

**Table 21R-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
2011	9.4	5.0	1.2	19.0	-20.0	0.4	0.0	15.0	Very Poor
2014	1.8	0.0	0.0	6.6	-20.0	0.4	0.0	-11.3	Very Poor
2019	1.4	0.0	0.0	11.0	-20.0	0.1	0.0	-7.5	Very Poor

## DUGGINS CREEK - STUDY NO. 21R-15



### Location Information

USGS 7.5 min Map Info  
GPS (0' Stake)

Duggins Creek NE; Township 18S, Range 4W, Section 21  
NAD 83 UTM ZONE 12, 387523 East 4343629 North

### Transect Information

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

Not Available  
208° magnetic  
500ft  
Line 1 (11ft), Line 2 (34ft), Line 3 (59ft), Line 4 (71ft), Line 5 (95ft)  
Standard

### Directions to Site

From the intersection of Eight Mile Road and Whiskey Creek Road, drive north for 0.4 miles, turn right, and continue for 2.0 miles. Turn right and drive 1.0 mile to gate and witness post on the right (north) side of the road and park. From the witness post walk 40 paces at 121 degrees magnetic to the 0-foot stake. The 0-foot stake is not marked with a browse tag.

**Site Information**

Land Ownership	State
Land Administrator	SITLA
Allotment	No data
Elevation	5,562ft (1,695m)
Aspect	Southwest
Slope	6%
Sample Dates	08/27/2012, 08/24/2015, 07/15/2019

**Table 21R-15.1 Disturbance History.** Recorded history of major disturbances.

Treatment/Disturbance	Name	WRI DB#	Date	Size (acres)
Chaining - Chain Unknown	-	-	Early 1980s	-
Seeding - Seed Unknown	-	-	Early 1980s	-
Hand Crew - Lop and Scatter	Whiskey Creek Lop n Scatter Project Phase I	2197	July-August 2012	1902

**Wildlife Habitat and Vegetation History****Table 21R-15.3 - Wildlife Seasonal Habitat.** UDWR wildlife habitat and seasonality.

Species	Habitat	Season
Mule Deer	substantial	winter

**Table 21R-15.4 - Vegetation History.** The dominant vegetation type(s) and phase of woodland succession (Tausch, Miller, Roundy, & Chambers, 2009).

Year	Vegetation Type	Woodland Succession
2012	Stansbury Cliffrose/Wyoming Big Sagebrush/Perennial Grass	Phase I
2015	Stansbury Cliffrose/Wyoming Big Sagebrush/Perennial Grass	Phase I
2019	Stansbury Cliffrose/Wyoming Big Sagebrush	Phase I

**Site Notes**

The site underwent a lop and scatter treatment a few weeks prior to the establishment of the study. For the purposes of gaining pre-treatment data, the canopies of felled trees was included in line-intercept measurements. The stumps of these felled trees were used and height was estimated for point-centered quarter data.

**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	A defined state and transition model is available.

At the time of establishment in 2012, the plant community on this site was a stand of Stansbury cliffrose (*Purshia stansburiana*) and Wyoming big sagebrush (*Artemisia tridentata* ssp. *wyomingensis*) that was being encroached by Utah juniper (*Juniperus osteosperma*). Prior to the 2019 sample year, the understory was dominated by perennial grass species: the dominant perennial grasses were crested wheatgrass (*Agropyron cristatum*) and intermediate wheatgrass (*Thinopyrum intermedium*) in these years (Table 21R-15.10). In 2019, annual grasses became dominant with cheatgrass (*Bromus tectorum*) being the primary species (Table 21R-15.7, Table 21R-15.10). Forbs have not been a significant part of the community in any of the sample years. Wyoming big sagebrush and Stansbury cliffrose have been co-dominant shrubs species with a decreasing trend being noted in cover and density (Table 21R-15.12, Table 21R-15.13). Utah juniper has decreased significantly and has been scarce in density and cover measurements in the post-treatment sample years (Table 21R-15.12, Table 21R-15.14). The state and transition model indicates that the site has moved into one of the states with invasive annuals and without inputs or disturbance, it will likely remain in this ecological state (Jornada, 2019).

**Trend Summary Tables**

**Table 21R-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
2012	7.9	1.1	3.1	9.9	1.1	5.0
2015	8.3	1.1	0.4	13.9	2.1	0.1
2019	7.4	1.4	0.8	7.5	1.5	0.3

**Table 21R-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
2012	272	352	31	-	6.9	23.5	0.1	-
2015	70	344	11	-	0.6	16.2	0.1	-
2019	402	289	342	2	27.3	9.0	8.1	0.0

**Table 21R-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
2012	20.6	0.1	51.2	7.4	3.1	38.2
2015	30.0	0.0	46.1	11.5	3.4	24.3
2019	21.5	0.2	50.2	3.4	3.2	48.8

**Table 21R-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		
2012	2	7	36
2015	6	5	33
2019	13	7	9
Days Use Per Acre (ha)			
2012	21.1 (52.0)	8.7 (21.5)	-
2015	11.6 (28.7)	12.1 (29.8)	-
2019	35.6 (87.9)	3.4 (8.3)	-

**Table 21R-15.10 - 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)	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					
2012	77	269	135	0	274	3
2015	23	70	9	8	335	-
2019	32	402	41	-	261	2
year	Average Cover (%)					
2012	4.2	6.9	3.0	0.0	16.3	0.0
2015	0.9	0.6	0.0	0.0	15.3	-
2019	1.5	27.3	0.9	-	6.6	0.0

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

**Table 21R-15.11 - Forb Species.** Nested frequency and modified Daubenmire average cover by year.

FORB SPECIES	Nested Frequency						
<i>Alyssum alyssoides</i> <sup>ai</sup> (pale madwort)	-	24	7	-	-	-	-
<i>Alyssum desertorum</i> <sup>ai</sup> (desert madwort)	-	11	-	-	-	-	-
<i>Ceratocephala testiculata</i> <sup>ai</sup> (curvseed butterwort)	3	299	119	2	9	13	3
<i>Chamaesyce</i> (sandmat)	Average Cover (%)						
<i>Draba</i> <sup>a</sup> (draba)	-	0.1	0.0	-	-	-	-
<i>Erodium cicutarium</i> <sup>ai</sup> (redstem stork's bill)	-	0.1	-	-	-	-	-
<i>Microsteris gracilis</i> <sup>a</sup> (slender phlox)	0.0	6.8	0.8	0.0	0.0	0.5	0.0

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

**Table 21R-15.12 - 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>wyomingensis</i> <sup>p</sup> (Wyoming big sagebrush)	3.2	0.4	-	0.6	5	0.1	5.8	0.9
<i>Chrysothamnus viscidiflorus</i> ssp. <i>viscidiflorus</i> var. <i>stenophyllus</i> (yellow rabbitbrush)	5.7	0.9	-	1.2	0.1	-	8.2	-
<i>Ephedra nevadensis</i> <sup>p</sup> (Nevada jointfir)	4.3	0.9	0	0.6	0.3	-	3.2	-
<i>Gutierrezia sarothrae</i> (broom snakeweed)	Quadrat Cover (%)							
<i>Juniperus osteosperma</i> <sup>t</sup> (Utah juniper)	2.9	0.2	0.0	0.9	3.1	0.0	4.3	0.6
<i>Linanthus pungens</i> (granite prickly phlox)	3.1	0.4	0.0	0.7	0.4	-	5.2	-
<i>Purshia stansburiana</i> <sup>p</sup> (Stansbury cliffrose)	5.6	0.7	0.0	0.5	0.8	0.1	1.8	-
<i>Purshia tridentata</i> <sup>p</sup> (antelope bitterbrush)								

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



**Table 21R-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 tridentata ssp. wyomingensis<sup>p</sup> -- (Wyoming big sagebrush)</b>									
2012	260	-	15	77	8	62	8	15	85/138
2015	240	-	17	75	8	25	25	0	94/151
2019	220	-	0	73	27	0	9	27	96/144
<b>Chrysothamnus viscidiflorus ssp. viscidiflorus var. stenophyllus -- (yellow rabbitbrush)</b>									
2012	120	-	33	33	33	0	0	67	45/80
2015	160	-	13	63	25	29	14	63	45/75
2019	100	-	0	20	80	0	0	80	44/70
<b>Ephedra nevadensis<sup>p</sup> -- (Nevada jointfir)</b>									
2012	20	-	0	100	0	0	0	100	57/67
2015	80	-	0	100	0	75	25	100	59/65
2019	80	-	0	50	50	0	100	50	62/105
<b>Gutierrezia sarothrae -- (broom snakeweed)</b>									
2012	480	-	0	92	8	0	0	13	24/35
2015	640	-	28	69	3	0	3	3	28/43
2019	1140	20	4	91	5	0	0	4	24/27
<b>Juniperus osteosperma<sup>i</sup> -- (Utah juniper)</b>									
2012	40	-	50	50	0	0	0	0	- / -
2015	40	-	100	0	0	0	0	0	- / -
2019	20	-	0	100	0	0	0	0	- / -
<b>Linanthus pungens -- (granite prickly phlox)</b>									
2012	20	-	0	100	0	0	0	100	13/24
2015	-	-	-	-	-	-	-	-	- / -
2019	80	-	25	50	25	0	0	25	10/13
<b>Opuntia -- (pricklypear)</b>									
2012	20	-	0	100	0	0	0	0	12/31
2015	-	-	-	-	-	-	-	-	- / -
2019	20	-	0	100	0	0	0	0	11/12
<b>Purshia stansburiana<sup>p</sup> -- (Stansbury cliffrose)</b>									
2012	200	-	0	90	10	40	0	20	187/181
2015	280	-	7	93	0	50	21	0	171/154
2019	220	60	0	36	64	46	27	64	191/185
<b>Purshia tridentata<sup>p</sup> -- (antelope bitterbrush)</b>									
2012	20	-	0	100	0	0	100	100	74/123
2015	20	-	100	0	0	0	0	0	160/203
2019	-	-	-	-	-	-	-	-	- / -
<b>Rhus trilobata<sup>p</sup> -- (skunkbush sumac)</b>									
2012	-	-	-	-	-	-	-	-	75/76
2015	-	-	-	-	-	-	-	-	110/92
2019	-	-	-	-	-	-	-	-	70/80

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

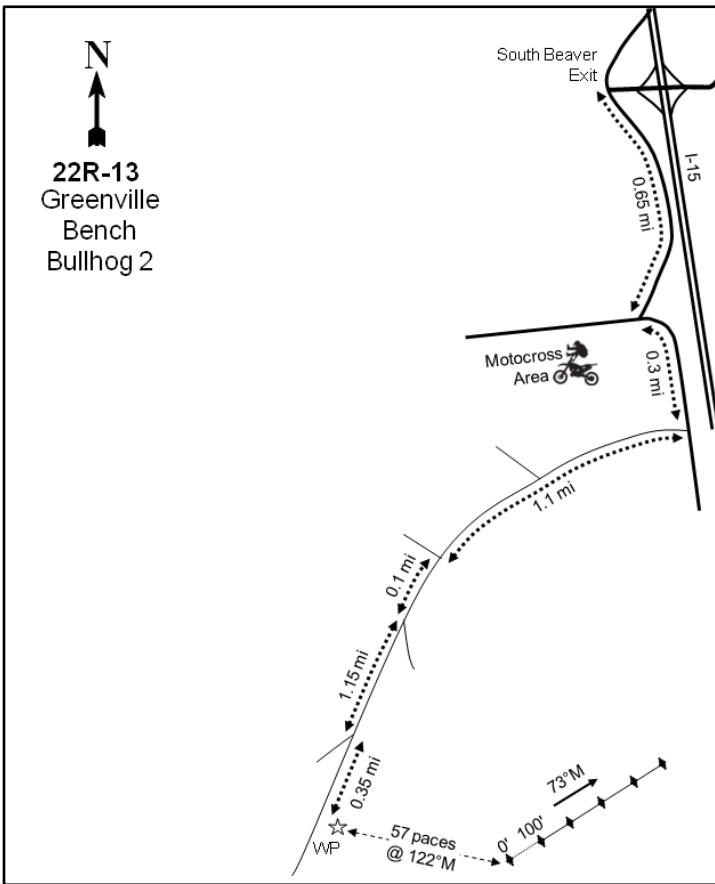
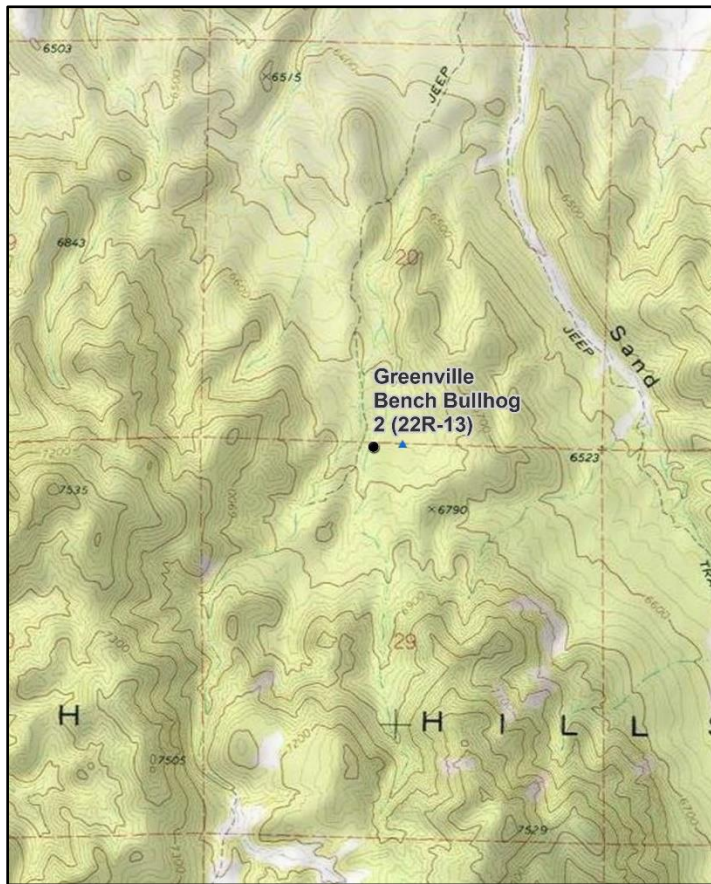
**Table 21R-15.14 - Tree Characteristics.** Point-quarter tree density, size class distribution, and average diameter.

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>							
2012	58	-	6	53	35	6	10.8
2015	5	-	100	-	-	-	2.5
2019	6	-	67	33	-	-	7.3

**Table 21R-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
2012	14.1	12.5	2.5	30.0	-5.1	0.0	0.0	53.9	Fair
2015	19.4	14.0	5.5	30.0	-0.4	0.0	0.0	68.5	Good
2019	10.2	2.2	0.0	18.1	-20.0	0.1	0.0	10.5	Very Poor

## GREENVILLE BENCH BULLHOG 2 - STUDY NO. 22R-13



### Location Information

USGS 7.5 min Map Info  
GPS (0' Stake)

Greenville Bench SE; Township 30S, Range 7W, Section 29  
NAD 83 UTM ZONE 12, 353847 East 4226733 North

### Transect Information

Browse Tag # (0' Stake)	112
Transect Bearing	73° magnetic
Length	400ft
Belt Placement	Line 1 (11ft & 95ft), Line 2 (34ft), Line 3 (59ft), Line 4 (71ft)
Belt Marker Placement	Standard

### Directions to Site

Take exit 109 off of I-15 and travel west on the overpass toward a Chevron Station. Driving from the Chevron Station, travel south on 600 West for 0.7 miles, then turn left before the motocross area. Continue on the road to where the road turns more toward the south. From here, travel 2.0 miles to a road on the right: turn onto this road and travel 1.1 miles to a fork. Stay left and continue 0.1 miles to another fork. Proceed to the right and travel 1.15 miles to another fork. Go left and proceed 0.5 miles on a small two-track in the bottom of a drainage to a witness post to the left (east) side of the two-track. The 0-foot stake is 57 paces from the witness post at 122 degrees magnetic, and is marked with browse tag #112.

**Site Information**

Land Ownership	Federal
Land Administrator	BLM
Allotment	BALD HILLS
Elevation	6,667ft (2,032m)
Aspect	North
Slope	6%
Sample Dates	08/22/2007, 06/28/2011, 07/29/2015, 08/06/2019

**Table 22R-13.1 Disturbance History.** Recorded history of major disturbances.

Treatment/Disturbance	Name	WRI DB#	Date	Size (acres)
Mechanical - Bullhog	BLM Project	-	2008 or 2009	-
Seeding - Aerial	Greenville Bench Aerial Seeding	993	December 2007	11048
Lop and Scatter - Hand Crew	Bone Hollow and Greenville Bench Project Maintenance	4513	November 2018	1939

**Table 22R-13.2 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	<i>Achnatherum hymenoides</i>	Indian Ricegrass		0.19	0.00
G	<i>Achnatherum hymenoides</i>	Indian Ricegrass		0.12	0.00
G	<i>Agropyron cristatum</i>	Crested Wheatgrass	Nordan	0.30	0.27
G	<i>Agropyron desertorum</i>	Crested Wheatgrass	Hycrest	1.00	0.93
G	<i>Agropyron fragile</i>	Siberian Wheatgrass	Vavilov	0.30	0.26
G	<i>Dactylis glomerata</i>	Orchardgrass	Paiute	0.14	0.11
G	<i>Dactylis glomerata</i>	Orchardgrass	Paiute	0.22	0.19
G	<i>Dactylis glomerata</i>	Orchardgrass	Paiute	0.74	0.63
G	<i>Elymus elymoides</i>	Bottlebrush Squirreltail	Toe Jam	0.31	0.29
G	<i>Elymus elymoides</i>	Bottlebrush Squirreltail		0.01	0.00
G	<i>Elymus lanceolatus</i>	Thickspike Wheatgrass	Bannock	0.21	0.00
G	<i>Elymus wawawaiensis</i>	Snake River Wheatgrass	Secar	0.30	0.28
G	<i>Pascopyrum smithii</i>	Western Wheatgrass	Arriba	0.24	0.00
G	<i>Pascopyrum smithii</i>	Western Wheatgrass	Arriba	0.06	0.00
G	<i>Pascopyrum smithii</i>	Western Wheatgrass	Arriba	0.66	0.53
G	<i>Poa secunda</i>	Canby Bluegrass	Canbar	0.43	0.32
G	<i>Poa secunda</i>	Sandberg Bluegrass	Toole MT	0.10	0.09
G	<i>Psathyrostachys juncea</i>	Russian Wildrye		0.04	0.00
G	<i>Pseudoroegneria spicata</i>	Bluebunch Wheatgrass	P-7	0.81	0.75
G	<i>Pseudoroegneria spicata</i>	Bluebunch Wheatgrass	Anatone	0.30	0.25
G	<i>Sporobolus cryptandrus</i>	Sand Dropseed		0.04	0.00
G	<i>Thinopyrum intermedium</i>	Intermediate Wheatgrass	Rush	0.26	0.00
G	<i>Thinopyrum intermedium</i>	Pubescent Wheatgrass	Luna	0.60	0.00
G	<i>Thinopyrum intermedium</i>	Pubescent Wheatgrass		0.66	0.58
G	<i>Thinopyrum intermedium</i>	Pubescent Wheatgrass	Luna	0.61	0.55
F	<i>Achillea millefolium</i>	Western Yarrow		0.02	0.00
F	<i>Linum lewisii</i>	Lewis Flax	Maple Grove	0.20	0.19
F	<i>Linum perenne</i>	Blue Flax		0.02	0.00
F	<i>Linum perenne</i>	Blue Flax	Appar	0.07	0.06
F	<i>Medicago sativa</i>	Alfalfa	Ladak	0.10	0.00
F	<i>Medicago sativa</i>	Alfalfa	Ladak	0.81	0.77
F	<i>Medicago sativa</i>	Alfalfa	Ladak	0.10	0.09
F	<i>Medicago sativa</i>	Alfalfa	Ranger	0.10	0.09
F	<i>Melilotus officinalis</i>	Yellow Sweetclover		0.62	0.51
F	<i>Melilotus officinalis</i>	Yellow Sweetclover		0.37	0.00
F	<i>Melilotus officinalis</i>	Yellow Sweetclover		0.10	0.09
F	<i>Onobrychis viciifolia</i>	Sainfoin	Eski	0.61	0.59
F	<i>Onobrychis viciifolia</i>	Sainfoin	Eski	2.01	1.77
F	<i>Penstemon palmeri</i>	Palmer Penstemon		0.02	0.00

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
F	Penstemon palmeri	Palmer Penstemon	Carbon/Washingto/Iron UT	0.05	0.04
F	Sanguisorba minor	Small Burnet	Delar	2.01	1.86
F	Sanguisorba minor	Small Burnet		0.60	0.00
F	Sanguisorba minor	Small Burnet	Delar	0.61	0.57
F	Sphaeralcea grossulariifolia	Gooseberryleaf Globemallow		0.01	0.00
S	Atriplex canescens	Fourwing Saltbush		0.04	0.00
S	Bassia prostrata	Forage Kochia	Humbolt/Lander NV	0.14	0.09

**Wildlife Habitat and Vegetation History**

**Table 22R-13.3 - Wildlife Seasonal Habitat.** UDWR wildlife habitat and seasonality.

Species	Habitat	Season
Mule Deer	crucial	winter

**Table 22R-13.4 - 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
2011	Annual Forb	Phase I
2015	Perennial Grass/Bitterbrush/Gambel Oak	Phase I
2019	Perennial Grass/Bitterbrush/Gambel Oak	Phase I

**Site Notes**

No Notes

**Soils**

**Table 22R-13.5 - Soil Analysis Data.** List of chemical and textural soil characteristics determined by laboratory analysis.

Texture	pH	%sand	%silt	%clay	%OM	PPM P	PPM K	ds/m	Sample Date
Sandy Loam	6.8	63.4	20.0	16.6	1.6	6.6	124.8	0.5	08/22/2007

**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 establishment in 2007, this site was dominated by twoneedle pinyon (*Pinus edulis*) and Utah juniper (*Juniperus osteosperma*) and was considered to be in Phase III of woodland succession. Many of these trees were removed during a bullhog treatment in 2008 or 2009 and again by a lop and scatter in 2018 (Table 22R-13.1), and the site has been considered to be in Phase I of woodland succession since 2011 (Table 22R-13.4, Table 22R-13.14). Cover of other browse species has increased since that time, and antelope bitterbrush (*Purshia tridentata*) and Gambel oak (*Quercus gambelii*) attained co-dominance in 2015 (Table 22R-13.12). Although the herbaceous understory was initially scarce, diversity and abundance increased over time. Annual forbs were the dominant site component in 2011. Perennial grasses, particularly the native species squirreltail (*Elymus elymoides*) and introduced species intermediate wheatgrass (*Thinopyrum intermedium*), increased and were co-dominant with browse species in 2015 and 2019. The introduced annual grass species cheatgrass (*Bromus tectorum*) has been recorded on the site in varying abundance (Table 22R-13.7, Table 22R-13.10, Table 22R-13.11). The plant community that characterizes this site may share similarities with the Native shrubs >= Introduced perennial plants Phase within the Seeded Range State as is illustrated by the current state and transition model (Jornada, 2019).

**Trend Summary Tables**

**Table 22R-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
2007	1.7	0.0	8.2	4.2	0.1	43.4
2011	3.9	0.2	-	4.4	0.5	0.1
2015	6.3	1.1	0.2	8.3	1.7	2.4
2019	6.5	2.9	-	9.3	3.3	2.1

**Table 22R-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
2007	8	14	101	21	0.0	0.1	0.6	0.1
2011	217	189	397	73	7.7	7.3	20.9	1.6
2015	73	307	45	21	1.1	20.3	0.5	0.4
2019	203	296	188	17	7.2	21.9	1.6	0.6

**Table 22R-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
2007	15.8	1.6	56.7	24.1	3.8	10.3
2011	7.6	-	60.2	2.0	3.3	38.9
2015	8.8	0.0	64.9	8.6	0.4	32.1
2019	10.6	-	73.8	2.9	1.8	35.1

**Table 22R-13.9 - Pellet Group Data.** Quadrat frequency and pellet group transect data for animal pellets. Rabbit pellet groups are not sampled in the pellet group transect.

Year	Cattle	Mule Deer	Rocky Mountain Elk	Rabbit
	Quadrat Frequency			
2007	-	13	1	43
2011	-	6	-	7
2015	-	9	1	18
2019	5	12	-	3
Year	Days Use Per Acre (ha)			
2007	-	11.4 (28.1)	1.3 (3.3)	-
2011	-	10.7 (26.5)	-	-
2015	-	14.7 (36.4)	-	-
2019	8.7 (21.5)	23.4 (57.9)	1.3 (3.3)	-

**Table 22R-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 arvensis <sup>ai</sup> (field brome)	Bromus tectorum <sup>ai</sup> (cheatgrass)	Dactylis glomerata <sup>i</sup> (orchardgrass)	Elymus elymoides (squirreltail)	Hesperostipa comata (needle and thread)	Pascopyrum smithii (western wheatgrass)	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												
2007	1	-	-	8	-	13	-	-	-	-	-	-	-
2011	3	11	4	213	-	170	-	6	1	3	-	4	10
2015	1	10	-	73	2	274	0	-	-	6	2	82	2
2019	0	14	-	203	-	165	-	1	1	18	-	165	10
year	Average Cover (%)												
2007	0.0	-	-	0.0	-	0.1	-	-	-	-	-	-	-
2011	0.0	0.9	0.0	7.7	-	6.0	-	0.1	0.0	0.1	-	0.2	0.0
2015	0.0	1.4	-	1.1	0.0	15.6	0.0	-	-	0.6	0.0	2.6	0.0
2019	0.2	1.0	-	7.2	-	6.4	-	0.1	0.0	2.1	-	12.1	0.0

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

**Table 22R-13.11 - 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 milkvech)	Calochortus nuttallii (sego lily)	Chaenactis douglasii (Douglas' dustymaiden)	Chenopodium leptophyllum <sup>a</sup> (narrowleaf goosefoot)	Cirsium (thistle)	Collinsia parviflora <sup>a</sup> (maiden blue eyed Mary)	Descurainia pinnata <sup>a</sup> (western tansymustard)	Draba <sup>a</sup> (draba)	Eriogonum caespitosum (matted buckwheat)	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)	Hackelia patens (spotted stickseed)	Hymenopappus filifolius (fineleaf hymenopappus)
year	Nested Frequency																
2007	-	4	-	-	-	-	-	-	27	-	3	32	-	1	-	-	-
2011	-	5	1	3	43	-	1	21	41	7	5	10	0	12	32	2	-
2015	-	-	-	-	-	-	8	-	3	1	10	3	1	-	-	-	-
2019	3	1	-	-	1	3	2	1	2	-	7	28	1	9	32	-	2
year	Average Cover (%)																
2007	-	0.0	-	-	-	-	-	-	0.1	-	0.1	0.3	-	0.0	-	-	-
2011	-	0.0	0.0	0.0	0.2	-	0.0	0.1	0.2	0.0	0.2	0.3	0.0	0.0	0.1	0.0	-
2015	-	-	-	-	-	-	0.2	-	0.0	0.0	0.1	0.0	0.0	-	-	-	-
2019	0.2	0.0	-	-	0.0	0.0	0.0	0.0	0.0	-	0.2	0.2	0.2	0.0	0.2	-	0.0

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



FORB SPECIES	Nested Frequency																
<i>Lactuca scariola</i> <sup>ai</sup> (prickly lettuce)	-	-	-	-	24	-	8	3	-	1	41	-	-	-	6	-	-
<i>Linum lewisii</i> (Lewis flax)	329	6	1	3	284	4	-	-	0	-	11	9	16	1	-	3	17
<i>Lygodesmia</i> (skeletonplant)	5	0	-	-	-	-	-	-	-	-	7	2	-	-	-	-	26
<i>Medicago sativa</i> <sup>i</sup> (alfalfa)	20	1	-	-	95	-	-	-	-	1	66	-	-	-	-	-	3
<i>Microsteris gracilis</i> <sup>a</sup> (slender phlox)	Average Cover (%)																
<i>Onobrychis vicifolia</i> <sup>i</sup> (sainfoin)	-	-	-	-	0.1	-	0.0	0.0	-	0.0	0.2	-	-	-	0.0	-	-
<i>Packera multiflora</i> (lobeleaf groundsel)	15.6	0.1	0.0	0.2	4.3	0.2	-	-	0.0	-	0.0	0.7	0.1	0.0	-	0.0	0.3
<i>Penstemon</i> (beardtongue)	0.0	0.0	-	-	-	-	-	-	-	-	0.2	0.0	-	-	-	-	0.3
<i>Penstemon palmeri</i> (Palmer's penstemon)	0.1	0.0	-	-	0.8	-	-	-	-	0.0	0.3	-	-	-	-	-	0.0
<i>Phlox longifolia</i> (longleaf phlox)	Nested Frequency																
<i>Polygonum douglasii</i> <sup>a</sup> (Douglas' knotweed)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
<i>Sanguisorba minor</i> <sup>i</sup> (small burnet)	329	6	1	3	284	4	-	-	0	-	11	9	16	1	-	3	17
<i>Sisymbrium altissimum</i> <sup>ai</sup> (tall tumbleweed)	5	0	-	-	-	-	-	-	-	-	7	2	-	-	-	-	26
<i>Sphaeralcea grossularifolia</i> (gooseberryleaf globemallow)	20	1	-	-	95	-	-	-	-	1	66	-	-	-	-	-	3
<i>Streptanthus cordatus</i> (heartleaf twistflower)	Average Cover (%)																
<i>Taraxacum officinale</i> (common dandelion)	-	-	-	-	0.1	-	0.0	0.0	-	0.0	0.2	-	-	-	0.0	-	-
<i>Tragopogon dubius</i> <sup>ai</sup> (yellow salsify)	15.6	0.1	0.0	0.2	4.3	0.2	-	-	0.0	-	0.0	0.7	0.1	0.0	-	0.0	0.3
	0.0	0.0	-	-	-	-	-	-	-	-	0.2	0.0	-	-	-	-	0.3
	0.1	0.0	-	-	0.8	-	-	-	-	0.0	0.3	-	-	-	-	-	0.0

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

**Table 22R-13.12 - 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)	-	-	0.1	8.8	-	0.9	34.6	0.8	2.5	
<i>Ericameria nauseosa</i> (rubber rabbitbrush)	-	0.3	0.2	0.1	-	0.1	-	2.1	2.2	
<i>Gutierrezia sarothrae</i> (broom snakeweed)	-	1.4	0.3	0.6	-	0.3	1.8	4	4	
<i>Juniperus osteosperma</i> <sup>t</sup> (Utah juniper)	-	3.2	0.1	-	-	0.5	2.1	5.9	2.9	
<i>Opuntia fragilis</i> (brittle pricklypear)	Quadrat Cover (%)									
<i>Peraphyllum ramosissimum</i> <sup>p</sup> (wild crab apple)	-	-	0.0	0.9	0.0	0.1	7.3	0.8	0.8	
<i>Pinus edulis</i> <sup>t</sup> (twoneedle pinyon)	0.4	0.1	0.0	0.0	-	0.0	-	2.0	1.5	
<i>Purshia tridentata</i> <sup>p</sup> (antelope bitterbrush)	-	1.0	0.1	0.0	-	0.3	0.2	3.2	2.7	
<i>Quercus gambelii</i> <sup>p</sup> (Gambel oak)	-	2.9	0.0	-	-	0.1	0.0	4.9	1.5	

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

**Table 22R-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 frigida<sup>P</sup> -- (prairie sagewort)</b>									
2007	-	-	-	-	-	-	-	-	-/-
2011	-	-	-	-	-	-	-	-	30/39
2015	-	-	-	-	-	-	-	-	34/71
2019	-	-	-	-	-	-	-	-	28/95
<b>Artemisia tridentata ssp. vaseyana<sup>P</sup> -- (mountain big sagebrush)</b>									
2007	40	-	0	0	100	0	50	100	- / -
2011	20	-	0	100	0	0	100	0	28/25
2015	-	-	-	-	-	-	-	-	43/52
2019	-	-	-	-	-	-	-	-	51/84
<b>Bassia prostrata<sup>PI</sup> -- (forage kochia)</b>									
2007	-	-	-	-	-	-	-	-	-/-
2011	-	-	-	-	-	-	-	-	-/-
2015	-	-	-	-	-	-	-	-	-/-
2019	-	-	-	-	-	-	-	-	34/60
<b>Cercocarpus ledifolius<sup>P</sup> -- (curl-leaf mountain mahogany)</b>									
2007	20	-	0	100	0	0	100	0	61/75
2011	-	-	-	-	-	-	-	-	77/81
2015	20	-	100	0	0	100	0	0	63/94
2019	-	-	-	-	-	-	-	-	142/155
<b>Chrysothamnus viscidiflorus -- (yellow rabbitbrush)</b>									
2007	-	-	-	-	-	-	-	-	-/-
2011	-	-	-	-	-	-	-	-	-/-
2015	-	-	-	-	-	-	-	-	-/-
2019	-	-	-	-	-	-	-	-	70/86
<b>Ericameria nauseosa -- (rubber rabbitbrush)</b>									
2007	-	-	-	-	-	-	-	-	-/-
2011	40	-	50	50	0	0	0	0	32/54
2015	40	-	0	100	0	0	0	0	91/140
2019	160	-	13	88	0	0	0	0	88/130
<b>Gutierrezia sarothrae -- (broom snakeweed)</b>									
2007	80	-	0	100	0	0	0	0	23/22
2011	60	-	0	100	0	0	0	0	20/26
2015	140	80	14	57	29	0	14	29	30/39
2019	60	-	0	67	33	0	0	0	27/30
<b>Juniperus osteosperma<sup>I</sup> -- (Utah juniper)</b>									
2007	120	-	33	67	0	0	0	0	- / -
2011	-	40	0	0	0	0	0	0	- / -
2015	120	-	83	17	0	0	0	0	- / -
2019	60	-	100	0	0	0	0	0	- / -
<b>Krascheninnikovia lanata<sup>P</sup> -- (winterfat)</b>									
2007	-	-	-	-	-	-	-	-	-/-
2011	-	-	-	-	-	-	-	-	65/83
2015	-	-	-	-	-	-	-	-	-/-
2019	-	-	-	-	-	-	-	-	-/-
<b>Opuntia fragilis -- (brittle pricklypear)</b>									
2007	-	80	0	0	0	0	0	0	9/20
2011	-	-	-	-	-	-	-	-	-/-
2015	-	-	-	-	-	-	-	-	-/-
2019	-	-	-	-	-	-	-	-	-/-

Year	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	-	-	-	-	-	-	-	-	-/-
2011	-	-	-	-	-	-	-	-	12/24
2015	-	-	-	-	-	-	-	-	13/31
2019	-	-	-	-	-	-	-	-	15/48
<b>Peraphyllum ramosissimum<sup>p</sup> -- (wild crab apple)</b>									
2007	120	-	17	33	50	17	33	50	115/129
2011	40	-	0	100	0	50	0	0	55/79
2015	80	-	0	100	0	100	0	25	78/99
2019	80	-	0	100	0	25	75	0	79/124
<b>Pinus edulis<sup>t</sup> -- (twoneedle pinyon)</b>									
2007	300	160	53	47	0	0	0	0	-/-
2011	-	20	0	0	0	0	0	0	-/-
2015	20	20	100	0	0	0	0	0	-/-
2019	20	-	100	0	0	0	0	0	-/-
<b>Purshia tridentata<sup>p</sup> -- (antelope bitterbrush)</b>									
2007	180	20	11	78	11	22	44	11	69/118
2011	160	20	38	63	0	38	13	0	47/88
2015	480	-	8	88	4	58	13	8	57/104
2019	380	-	5	95	0	26	68	0	62/128
<b>Quercus gambelii<sup>p</sup> -- (Gambel oak)</b>									
2007	460	40	13	83	4	0	0	0	117/99
2011	1080	-	0	100	0	0	0	0	-/-
2015	1100	-	20	80	0	31	0	0	92/68
2019	940	-	15	85	0	4	15	0	118/59
<b>Sambucus<sup>p</sup> -- (elderberry)</b>									
2007	-	-	-	-	-	-	-	-	-/-
2011	-	-	-	-	-	-	-	-	93/161
2015	-	-	-	-	-	-	-	-	-/-
2019	-	-	-	-	-	-	-	-	194/186

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

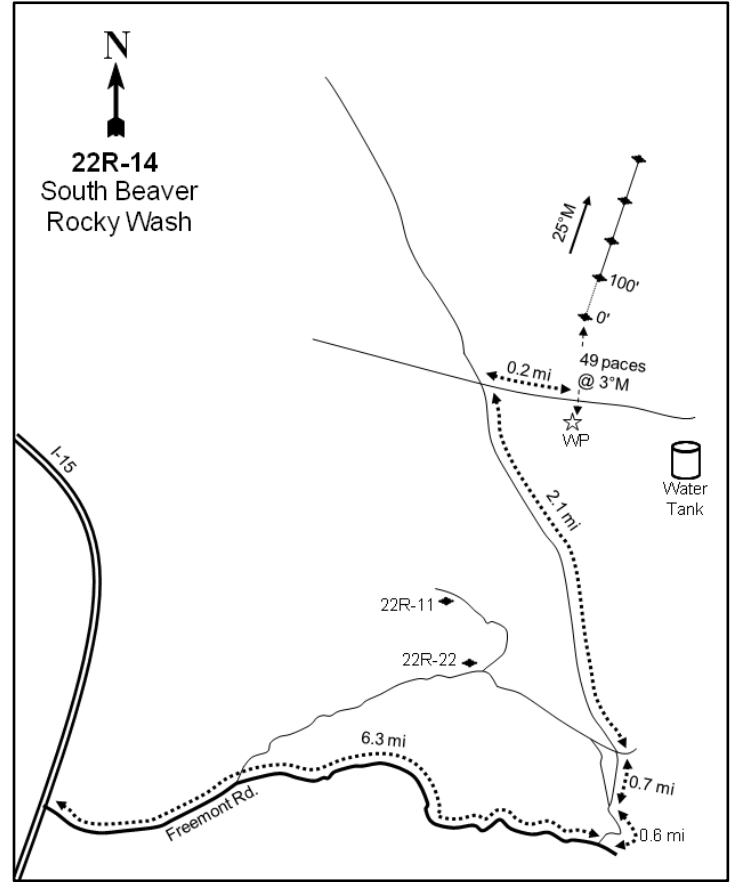
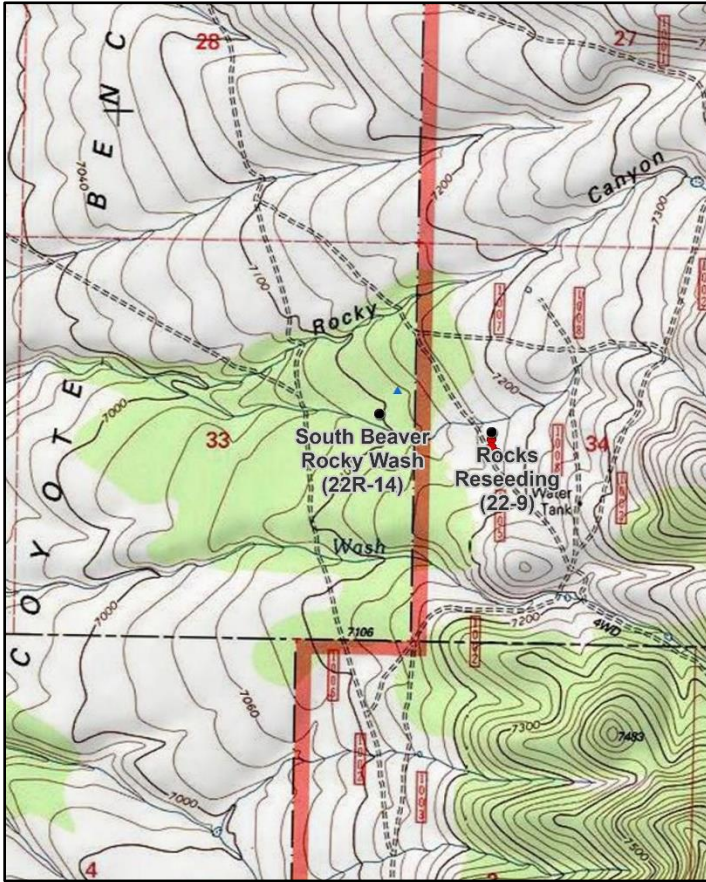
**Table 22R-13.14 - Tree Characteristics.** Point-quarter tree density, size class distribution, and average diameter.

Year	Density	Size Class Distribution					Average Diameter (cm)
	Trees per Acre	Seedling (%)	1-4' (%)	4-8' (%)	8-12' (%)	>12' (%)	
<b>Juniperus osteosperma (Utah juniper)</b>							
2007	143	-	10	15	25	50	19.9
2011	10	50	33	-	-	17	11.6
2015	95	65	35	-	-	-	1.9
2019	25	57	43	-	-	-	4.1
<b>Pinus edulis (twoneedle pinyon)</b>							
2007	245	25	40	15	5	15	5.4
2015	35	50	50	-	-	-	2.5
2019	5	-	-	-	-	100	48.0

**Table 22R-13.15 – 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
2007	4.6	0.0	0.0	0.2	0.0	0.2	0.0	4.9	Very Poor
2011	5.5	0.0	0.0	14.5	-5.8	3.2	0.0	17.4	Very Poor
2015	10.3	14.4	6.8	30.0	-0.8	0.7	0.0	61.4	Fair
2019	12.3	15.0	4.0	30.0	-5.4	1.2	0.0	57.0	Fair

## SOUTH BEAVER ROCKY WASH - STUDY NO. 22R-14

**Location Information**

USGS 7.5 min Map Info  
GPS (0' Stake)

Kane Canyon SE; Township 30S, Range 6W, Section 33  
NAD 83 UTM ZONE 12, 365946 East 4224197 North

**Transect Information**

Browse Tag # (0' Stake)	109
Transect Bearing	25° 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 road to the left. Turn onto this road and continue 0.6 miles up the road (which has 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 and proceed 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 and continue for 1 mile on #1002 to a stock pond. Proceed up a steep hill 0.1 miles to a fork, turn left (#1005), and continue 0.2 miles to another fork. Stay right and travel another 0.1 miles to another fork, then proceed left for 0.3 miles to the witness post on the right (south) side of the road. From the witness post, walk 49 paces to the 0-foot stake at 3 degrees magnetic. The 0-foot stake is marked with browse tag #109.

**Site Information**

Land Ownership	Federal
Land Administrator	BLM
Allotment	SOUTH CREEK
Elevation	7,104ft (2,165m)
Aspect	Southwest
Slope	4-5%
Sample Dates	06/09/2008, 06/29/2011, 07/28/2015, 08/08/2019

**Table 22R-14.1 Disturbance History.** Recorded history of major disturbances.

Treatment/Disturbance	Name	WRI DB#	Date	Size (acres)
Hand Crew - Lop and Scatter	Project Maintenance - South Beaver	3296	September-October 2015	4251
Mechanical - Bullhog	South Beaver Vegetation Enhancement Yr 4	1224	July 2008-August 2009	1520
Seeding - Aerial Before	South Beaver Vegetation Enhancement Yr 4	1224	December 2008	1358

**Table 22R-14.2 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	1480	
Type	Species	Common Name	Cultivar/Source ID	Bulk lbs/acre	PLS
G	Agropyron cristatum	Crested Wheatgrass	Nordan	0.30	0.27
G	Agropyron fragile	Siberian Wheatgrass	Vavilov	0.30	0.26
G	Dactylis glomerata	Orchardgrass	Paiute	0.14	0.11
G	Elymus wawawaiensis	Snake River Wheatgrass	Secar	0.30	0.28
G	Poa secunda	Sandberg Bluegrass	Toole MT	0.10	0.09
G	Pseudoroegneria spicata	Bluebunch Wheatgrass	Anatone	0.30	0.25
G	Thinopyrum intermedium	Pubescent Wheatgrass	Luna	0.61	0.55
F	Linum perenne	Blue Flax	Appar	0.07	0.06
F	Medicago sativa	Alfalfa	Ladak	0.10	0.09
F	Medicago sativa	Alfalfa	Ranger	0.10	0.09
F	Melilotus officinalis	Yellow Sweetclover		0.10	0.09
F	Onobrychis viciifolia	Sainfoin	Eski	0.61	0.59
F	Sanguisorba minor	Small Burnet	Delar	0.61	0.57
S	Bassia prostrata	Forage Kochia	Humbolt/Lander NV	0.14	0.09

**Wildlife Habitat and Vegetation History****Table 22R-14.3 - Wildlife Seasonal Habitat.** UDWR wildlife habitat and seasonality.

Species	Habitat	Season
Mule Deer	crucial	winter
Rocky Mountain Elk	substantial	winter
Greater Sage-Grouse	occupied	year-long

**Table 22R-14.4 - Vegetation History.** The dominant vegetation type(s) and phase of woodland succession (Tausch, Miller, Roundy, & Chambers, 2009).

Year	Vegetation Type	Woodland Succession
2008	Pinyon-Juniper/Mountain Big Sagebrush	Phase II transitioning to Phase III
2011	Perennial Grass/Mountain Big Sagebrush/Bitterbrush	Phase I
2015	Perennial Grass/Mountain Big Sagebrush/Bitterbrush	Phase I
2019	Perennial Grass/Mountain Big Sagebrush/Bitterbrush	Phase I

**Site Notes**

No Notes

**Site Potential**

1981 - 2010 Average Annual Precipitation	17 inches
NRCS Ecological Site	Upland Loam (Mountain Big Sagebrush)
NRCS Ecological Site #	R028AY310UT
States and Transitions	A defined state and transition model is available.

Prior to the bullhog treatment in 2008 (22R-14.1), this site was within Phase II transitioning to Phase III of woodland succession. Twoneedle pinyon (*Pinus edulis*) and Utah juniper (*Juniperus osteosperma*) provided the most overstory cover and mountain big sagebrush (*Artemisia tridentata* ssp. *vaseyana*) was dominant in the shrub layer. In the sample years following the treatment, juniper and pinyon became minor components while mountain big sagebrush and antelope bitterbrush (*Purshia tridentata*) increased and became dominant in the community (Table 22R-14.12, Table 22R-14.13, Table 22R-13.14). The herbaceous understory was fairly diverse, yet not abundant before the treatment (Table 22R-14.7). In subsequent sample years, the condition of the herbaceous layer improved and it has become a co-dominant component of the site; it has been mainly comprised of a mix of native and introduced perennial grasses in the post-treatment sample years. The introduced annual grass species cheatgrass (*Bromus tectorum*) has been present in fluctuating amounts (Table 22R-14.10). This study site has been classified as being in Phase I of woodland succession since 2011 (Table 22R-14.4). The cover and density of juniper increased from 2011 to 2015, but a lop (no scatter) project in 2015 (Table 22R-14.1) decreased the amount of infilling trees (Table 22R-14.12, Table 22R-14.13). The plant community that characterizes this site is likely comparable to the Native shrubs => Introduced perennial plants Phase within the current state and transition model (Jornada, 2019).

**Trend Summary Tables****Table 22R-14.6 - Shrub/Tree Summary.** Average modified Daubenmire quadrat and line intercept cover by year for shrubs/trees

Year	Quadrat Cover (%)			Line-intercept Cover (%)		
	Preferred Shrub	Other Shrub	Tree	Preferred Shrub	Other Shrub	Tree
2008	10.7	-	12.7	12.1	-	19.6
2011	5.5	-	0.2	9.4	-	-
2015	14.4	-	0.4	21.1	-	0.3
2019	17.9	-	-	26.6	-	0.1

**Table 22R-14.7 - Herbaceous Summary.** Nested frequency and average modified Daubenmire quadrat cover by year for herbaceous functional groups

Year	Nested Frequency				Quadrat Cover (%)			
	Annual Grass	Perennial Grass	Annual/Biennial Forb	Perennial Forb	Annual Grass	Perennial Grass	Annual/Biennial Forb	Perennial Forb
2008	36	183	99	156	0.3	6.3	0.3	1.0
2011	236	277	227	139	7.0	19.5	3.3	3.0
2015	78	359	38	49	0.4	23.6	0.1	2.1
2019	57	378	141	17	0.4	29.5	1.3	1.3

**Table 22R-14.8 - Basic Ground Cover.** Average modified Daubenmire quadrat cover by year for basic ground cover types.

Year	Cover Type (%)					
	Bare Ground	Cryptogams	Litter	Pavement	Rock	Vegetation
2008	31.8	0.0	39.3	10.8	11.0	27.0
2011	14.5	-	45.4	3.0	6.2	40.8
2015	10.2	0.0	56.6	4.0	5.0	41.5
2019	9.0	2.0	61.5	2.8	8.9	45.0

**Table 22R-14.9 - Pellet Group Data.** Quadrat frequency and pellet group transect data for animal pellets. Rabbit pellet groups are not sampled in the pellet group transect.

Year	Cattle	Mule Deer	Rocky Mountain Elk	Rabbit
	Quadrat Frequency			
2008	1	14	7	90
2011	4	8	4	6
2015	4	9	7	52
2019	5	16	10	14
Year	Days Use Per Acre (ha)			
2008	0.7 (1.8)	29.5 (72.8)	12.8 (31.5)	-
2011	3.6 (9.0)	10.7 (26.5)	18.1 (44.7)	-
2015	-	13.4 (33.1)	6.0 (14.9)	-
2019	4.4 (10.8)	5.3 (13.2)	12.1 (29.8)	-

**Table 22R-14.10 - Grass Species.** Nested frequency and modified Daubenmire average cover by year.

GRASS SPECIES	Nested Frequency												
Achnatherum hymenoides (Indian ricegrass)	5	13	-	36	58	-	-	20	37	23	88	-	
Agropyron cristatum <sup>i</sup> (crested wheatgrass)	22	50	6	236	108	-	-	20	29	22	91	66	
Bromus arvensis <sup>ai</sup> (field brome)	29	86	-	78	150	1	3	75	7	15	63	99	
Bromus tectorum <sup>ai</sup> (cheatgrass)	2	96	-	57	73	-	-	50	5	11	83	189	
Elymus elymoides (squirreltail)	Average Cover (%)												
Hesperostipa comata (needle and thread)	0.0	0.4	-	0.3	1.5	-	-	0.2	0.8	0.3	3.1	-	
Koeleria macrantha (prairie Junegrass)	0.5	2.3	0.0	7.0	5.2	-	-	1.1	1.1	0.3	6.3	2.5	
Pascopyrum smithii (western wheatgrass)	1.0	3.0	-	0.4	6.2	0.0	0.0	4.4	0.2	0.2	3.7	4.9	
Poa fendleriana (muttongrass)	0.2	5.6	-	0.4	2.4	-	-	4.1	0.1	0.7	5.3	11.1	
Poa secunda (Sandberg bluegrass)	Nested Frequency												
Pseudoroegneria spicata (bluebunch wheatgrass)	2008	2011	2015	2019	2008	2011	2015	2019	2008	2011	2015	2019	
Thinopyrum intermedium <sup>i</sup> (intermediate wheatgrass)	5	13	-	36	58	-	-	20	37	23	88	-	

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

**Table 22R-14.11 - Forb Species.** Nested frequency and modified Daubenmire average cover by year.

FORB SPECIES	Nested Frequency																	
Agoseris glauca (pale agoseris)	10	-	2	3	2	1	3	16	-	4	-	9	7	3	-	29	-	
Alyssum desertorum <sup>ai</sup> (desert madwort)	17	12	-	1	3	9	1	84	22	10	4	13	2	3	-	11	80	
Antennaria (pussytoes)	-	24	-	1	-	-	-	-	2	-	-	2	-	3	1	-	8	
Arabis (rockcress)	-	126	-	-	-	-	-	6	4	2	-	-	-	3	-	15	1	
Astragalus convallarius (lesser ruihy milkvetch)	Average Cover (%)																	
Astragalus megacarpus (great bladder milkvetch)	0.1	-	0.0	0.0	0.0	0.0	0.0	0.0	-	0.0	-	0.1	0.0	0.0	-	0.1	-	
Calochortus nuttallii (sego lily)	0.1	0.1	-	0.0	0.0	0.2	0.0	0.7	0.1	0.1	0.1	0.1	0.2	0.0	-	0.1	1.2	
Ceratocephala testiculata <sup>ai</sup> (curvseed butterwort)	-	0.1	-	0.0	-	-	-	-	0.0	-	-	0.0	-	0.0	0.0	-	0.0	
Chaenactis douglasii (Douglas' dustymaiden)	-	1.0	-	-	-	-	-	0.0	0.0	0.0	-	-	-	0.0	-	0.1	0.0	
Collinsia parviflora <sup>a</sup> (maiden blue eyed Mary)	Nested Frequency																	
Crepis acuminata (tapertip hawkbeard)	2008	2011	2015	2019	2008	2011	2015	2019	2008	2011	2015	2019	2008	2011	2015	2019		
Cymopterus (springparsley)	10	12	-	2	3	9	1	16	22	10	4	13	2	3	-	11	80	
Delphinium nuttallianum (two-lobed larkspur)	-	24	-	1	-	-	-	-	2	-	-	2	-	3	1	-	8	
Erigeron aphanactis <sup>a</sup> (rayless shaggy fleabane)	-	126	-	-	-	-	-	6	4	2	-	-	-	3	-	15	1	
Eriogonum racemosum (redroot buckwheat)	Average Cover (%)																	
Gayophytum ramosissimum <sup>a</sup> (pinyon groundsmoke)	0.1	-	0.0	0.0	0.0	0.0	0.0	0.0	-	0.0	-	0.1	0.0	0.0	-	0.1	-	
Lactuca serriola <sup>ai</sup> (prickly lettuce)	0.1	0.1	-	0.0	0.0	0.2	0.0	0.7	0.1	0.1	0.1	0.1	0.2	0.0	-	0.1	1.2	
	-	0.1	-	0.0	-	-	-	-	0.0	-	-	0.0	-	0.0	0.0	-	0.0	
	-	1.0	-	-	-	-	-	0.0	0.0	0.0	-	-	-	0.0	-	0.1	0.0	

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



FORB SPECIES	Linum perenne <sup>i</sup> (blue flax)	Lithospermum incisum (narrowleaf stone seed)	Lomatium (desertparsley)	Lupinus argenteus (silvery lupine)	Machaeranthera canescens (hoary tansyaster)	Medicago sativa <sup>i</sup> (alfalfa)	Melilotus officinalis <sup>i</sup> (sweetclover)	Microsteris gracilis <sup>a</sup> (slender phlox)	Onobrychis viciifolia <sup>i</sup> (sainfoin)	Packera multilobata (lobeleaf groundsel)	Penstemon comarrhenus (dusty beardtongue)	Phlox longifolia (longleaf phlox)	Polygonum douglasii <sup>a</sup> (Douglas' knotweed)	Sanguisorba minor <sup>i</sup> (small burnet)	Tragopogon dubius <sup>ai</sup> (yellow salsify)	Verbascum thapsus <sup>ai</sup> (common mullein)	Zigadenus paniculatus (foothill death camas)
year	Nested Frequency																
2008	-	-	43	3	-	-	-	51	-	6	-	96	11	-	-	-	4
2011	27	4	25	15	6	6	1	125	3	4	0	15	12	4	-	-	3
2015	20	-	-	15	-	-	-	-	-	4	-	8	3	2	1	-	-
2019	-	-	2	10	-	-	-	6	-	-	-	4	22	-	-	1	-
year	Average Cover (%)																
2008	-	-	0.2	0.0	-	-	-	0.1	-	0.0	-	0.5	0.0	-	-	-	0.1
2011	0.9	0.0	0.1	0.4	0.0	0.3	0.1	1.2	0.0	0.2	0.0	0.1	0.0	0.0	-	-	0.0
2015	0.1	-	-	1.8	-	-	-	-	-	0.1	-	0.0	0.0	0.0	0.0	-	-
2019	-	-	0.0	1.2	-	-	-	0.1	-	-	-	0.0	0.1	-	-	0.0	-

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

**Table 22R-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)	Juniperus osteosperma <sup>t</sup> (Utah juniper)	Pinus edulis <sup>t</sup> (twoneedle pinyon)	Purshia stansburiana <sup>p</sup> (Stansbury cliffrose)	Purshia tridentata <sup>p</sup> (antelope bitterbrush)
year	Line Intercept Cover (%)				
2008	8.6	17.6	2	-	3.5
2011	4.7	-	-	-	4.7
2015	10.7	0.3	-	-	10.4
2019	10.5	0.1	-	-	16.1
year	Quadrat Cover (%)				
2008	7.0	11.5	1.2	0.0	3.7
2011	2.9	0.2	-	-	2.6
2015	6.4	0.4	-	-	7.9
2019	10.0	0.0	-	0.1	7.8

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

**Table 22R-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>									
2008	-	20	0	0	0	0	0	0	- / -
2011	-	-	-	-	-	-	-	-	- / -
2015	-	-	-	-	-	-	-	-	- / -
2019	-	-	-	-	-	-	-	-	- / -
<b>Artemisia tridentata ssp. vaseyana<sup>p</sup> -- (mountain big sagebrush)</b>									
2008	3440	240	4	19	77	19	49	54	47/56
2011	1180	160	24	59	17	17	0	15	45/56
2015	2420	60	26	61	12	31	17	17	55/70
2019	1540	5020	7	77	17	44	13	17	59/80
<b>Gutierrezia sarothrae -- (broom snakeweed)</b>									
2008	-	-	-	-	-	-	-	-	- / -
2011	-	-	-	-	-	-	-	-	- / -
2015	-	-	-	-	-	-	-	-	- / -
2019	-	-	-	-	-	-	-	-	30/31
<b>Juniperus osteosperma<sup>i</sup> -- (Utah juniper)</b>									
2008	100	100	40	60	0	0	0	0	- / -
2011	40	60	100	0	0	0	0	0	- / -
2015	160	20	38	63	0	0	0	0	- / -
2019	60	-	67	33	0	0	0	0	- / -
<b>Pinus edulis<sup>t</sup> -- (twoneedle pinyon)</b>									
2008	20	40	0	100	0	0	0	0	- / -
2011	-	-	-	-	-	-	-	-	- / -
2015	-	-	-	-	-	-	-	-	- / -
2019	-	-	-	-	-	-	-	-	- / -
<b>Purshia tridentata<sup>p</sup> -- (antelope bitterbrush)</b>									
2008	420	120	5	76	19	24	71	10	79/120
2011	380	-	11	90	0	26	5	5	40/82
2015	840	-	12	88	0	64	5	0	77/133
2019	480	800	0	100	0	17	79	0	102/175

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

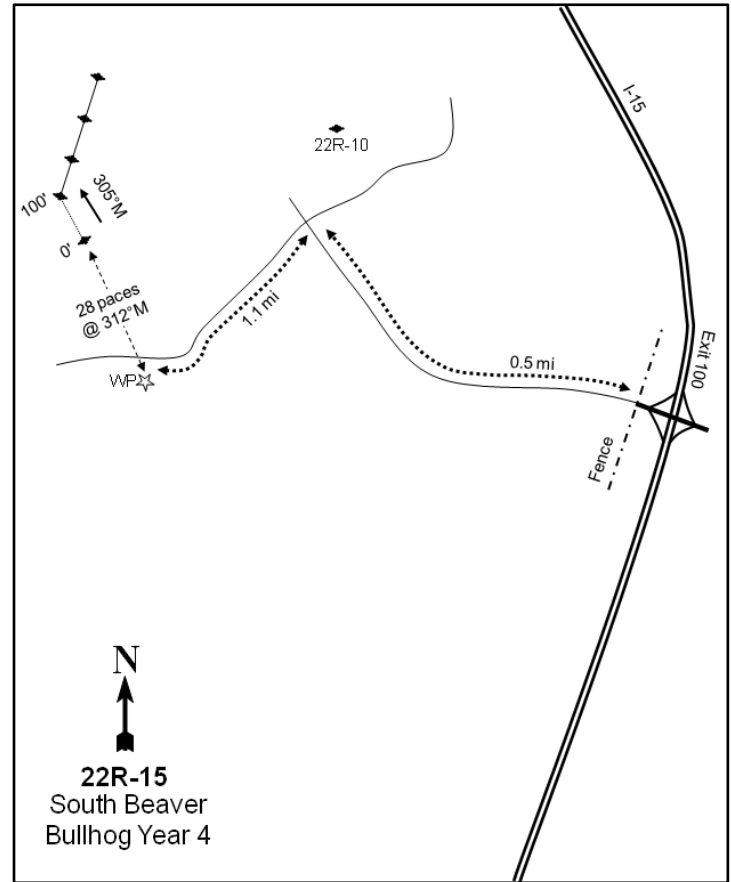
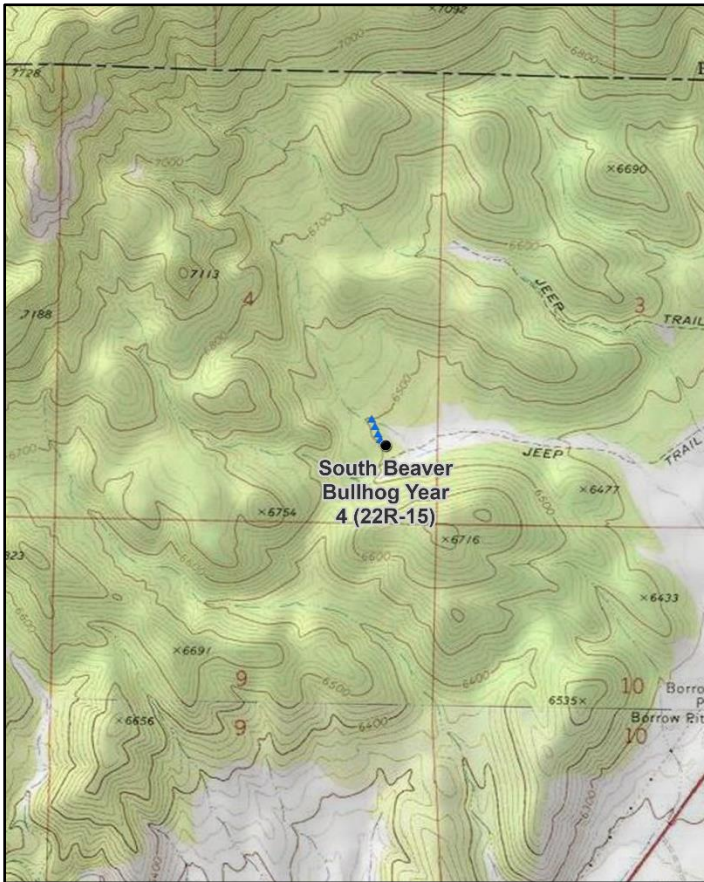
**Table 22R-14.14 - Tree Characteristics.** Point-quarter tree density, size class distribution, and average diameter.

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>							
2008	128	5	5	25	15	50	23.6
2011	60	44	50	6	-	-	2.6
2015	94	40	45	15	-	-	2.6
2019	17	57	43	-	-	-	4.0
<b>Pinus edulis (twoneedle pinyon)</b>							
2008	16	-	33	25	25	17	7.8
2015	182	100	-	-	-	-	2.0
2019	2	100	-	-	-	-	4.0

**Table 22R-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
2008	16.0	-3.1	1.9	12.7	-0.2	2.1	0.0	29.4	Very Poor
2011	12.9	12.5	8.6	30.0	-5.2	6.0	0.0	64.7	Fair-Good
2015	29.0	13.1	9.6	30.0	-0.3	4.2	0.0	85.5	Excellent
2019	30.0	13.0	1.3	30.0	-0.3	2.5	0.0	76.5	Good

## SOUTH BEAVER BULLHOG YEAR 4 - STUDY NO. 22R-15

**Location Information**

USGS 7.5 min Map Info  
GPS (0' Stake)

Greenville Bench SE; Township 31S, Range 7W, Section 04  
NAD 83 UTM ZONE 12, 355468 East 4222011 North

**Transect Information**

Browse Tag # (0' Stake)	106
Transect Bearing	305° magnetic (Lines 2-4: 325° magnetic)
Length	400ft
Belt Placement	Line 1 (11ft), Line 2 (34ft), Line 3 (59ft), Line 4 (71ft), Line 5 (95ft)
Belt Marker Placement	Belt 5: No Rebar

**Directions to Site**

Proceed south of Beaver on I-15 to exit #100. From the off-ramp, turn right and drive west for 0.5 miles to a left turn onto a jeep trail that is difficult to see (the right turn leads to study #22R-10). Drive 1.1 miles on this road to the witness post on the left (south) side of the road. From the witness post, walk 28 paces to the 0-foot stake at 312 degrees magnetic (across the road). The 0-foot stake is marked with browse tag #106.

**Site Information**

Land Ownership	Federal
Land Administrator	BLM
Allotment	FREMONT
Elevation	6,500ft (1,981m)
Aspect	Northeast
Slope	3-8%
Sample Dates	06/11/2008, 06/27/2011, 07/29/2015, 08/06/2019

**Table 22R-15.1 Disturbance History.** Recorded history of major disturbances.

Treatment/Disturbance	Name	WRI DB#	Date	Size (acres)
Hand Crew - Lop and Scatter	Project Maintenance - South Beaver	3296	September-October 2015	4251
Mechanical - Bullhog	South Beaver Vegetation Enhancement Yr 4	1224	July 2008-August 2009	1520
Seeding - Aerial Before	South Beaver Vegetation Enhancement Yr 4	1224	December 2008	1358

**Table 22R-15.2 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-15.3 - Wildlife Seasonal Habitat.** UDWR wildlife habitat and seasonality.

Species	Habitat	Season
Mule Deer	crucial	winter

**Table 22R-15.4 - 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/Mountain Big Sagebrush	Phase III
2011	Mountain Big Sagebrush/Annual Forb	Phase I
2015	Mountain Big Sagebrush/Perennial Grass	Phase I
2019	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	A defined state and transition model is available.

When this site was established in 2008, it was dominated by twoneedle pinyon (*Pinus edulis*), Utah juniper (*Juniperus osteosperma*), and mountain big sagebrush (*Artemisia tridentata* ssp. *vaseyana*), and considered to be within Phase II transitioning to Phase III of woodland succession. A bullhog treatment in 2008-2009 and lop and scatter in 2015 (Table 22R-15.1) removed most of the pinyon and juniper, and the shrub layer has been primarily composed of mountain big sagebrush since that time (Table 22R-15.4, Table 22R-15.12, Table 22R-15.14). The herbaceous understory was in poor condition prior to the treatment, but improved in subsequent sample years. Annual forbs provided most of the herbaceous cover in 2011. However, perennial grasses such as the introduced species intermediate wheatgrass (*Thinopyrum intermedium*) and native species squirreltail (*Elymus elymoides*) increased and became co-dominant vegetation components in 2015. The introduced annual grass species cheatgrass (*Bromus tectorum*) has been observed on the site in low abundance (Table 22R-15.7, Table 22R-15.10, Table 22R-15.11). Stands of pinyon and juniper are located adjacent to the site, but these species are rare on the site itself as of 2019. However, continued tree presence indicates that this site may have the potential for infilling over time (Table 22R-15.14, Photos). The sagebrush-perennial grass community that characterizes this site may be comparable to the Native shrubs => Introduced perennial plants Phase within the Seeded Range State as is defined by the state and transition model (Jornada, 2019).

**Trend Summary Tables****Table 22R-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
2008	9.8	0.3	10.6	8.6	0.1	27.5
2011	4.3	0.5	-	6.8	0.4	-
2015	7.1	2.6	0.0	8.7	1.3	-
2019	8.8	0.9	-	9.4	0.4	0.2

**Table 22R-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
2008	-	38	1	35	-	0.1	0.0	0.8
2011	104	150	375	111	0.8	7.0	15.6	5.0
2015	25	280	5	92	1.1	14.3	0.0	8.2
2019	86	320	155	88	1.8	26.8	2.3	5.9

**Table 22R-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
2008	20.2	0.2	43.9	30.1	5.9	20.2
2011	9.1	0.1	53.0	8.9	2.1	34.5
2015	5.5	0.0	65.6	7.1	2.6	34.6
2019	7.0	0.6	63.0	8.9	2.3	41.9

**Table 22R-15.9 - Pellet Group Data.** Quadrat frequency and pellet group transect data for animal pellets. Rabbit pellet groups are not sampled in the pellet group transect.

Year	Cattle	Mule Deer	Rocky Mountain Elk	Rabbit
	Quadrat Frequency			
2008	-	-	-	80
2011	-	2	-	1
2015	1	4	1	57
2019	1	7	-	34
Year	Days Use Per Acre (ha)			
2008	-	-	-	-
2011	1.5 (3.6)	3.4 (8.3)	-	-
2015	-	-	-	-
2019	8.0 (19.7)	5.3 (13.2)	-	-

**Table 22R-15.10 - 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)	Aristida purpurea (purple threeawn)	Bouteloua gracilis (blue grama)	Bromus arvensis <sup>aii</sup> (field brome)	Bromus tectorum <sup>ai</sup> (cheatgrass)	Elymus elymoides (squirreltail)	Elymus wawawaiensis (Snake River wheatgrass)	Hesperostipa comata (needle and thread)	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														
2008	1	-	-	-	3	-	-	34	-	-	-	-	-	-	-
2011	15	26	42	-	2	12	91	53	25	-	5	19	-	28	3
2015	10	29	23	4	5	-	25	158	5	3	4	7	-	117	-
2019	-	44	38	3	5	10	77	114	-	2	-	28	2	187	6
year	Average Cover (%)														
2008	0.0	-	-	-	0.0	-	-	0.1	-	-	-	-	-	-	-
2011	0.2	0.9	1.4	-	0.0	0.0	0.8	2.1	0.9	-	0.0	0.4	-	1.1	0.0
2015	0.3	1.1	1.5	0.0	0.4	-	1.1	4.4	0.2	0.1	0.0	0.6	-	5.6	-
2019	-	3.8	2.8	0.0	0.2	0.1	1.7	5.6	-	0.1	-	2.9	0.0	11.3	0.0

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

**Table 22R-15.11 - Forb Species.** Nested frequency and modified Daubenmire average cover by year.

FORB SPECIES	Agoseris glauca (pale agoseris)	Ceratocephala testiculata <sup>ai</sup> (curvseed butterwort)	Chaenactis douglasii (Douglas' dustymaiden)	Collinsia parviflora <sup>a</sup> (maiden blue eyed Mary)	Crepis acuminata (tapertip hawksbeard)	Cryptantha (cryptantha)	Cymopterus (springparsley)	Descurainia pinnata <sup>a</sup> (western tansymustard)	Eriogonum cernuum <sup>a</sup> (nodding buckwheat)	Eriogonum racemosum (redroot buckwheat)	Eriogonum umbellatum (sulphur-flower buckwheat)	Erysimum (wallflower)	Gayophytum ramosissimum <sup>a</sup> (pinyon groundsmoke)	Gilia inconspicua <sup>a</sup> (shy gilia)	Hymenopappus filifolius (fineleaf hymenopappus)	Ipomopsis aggregata (scarlet gilia)	Lactuca serriola <sup>ai</sup> (prickly lettuce)
year	Nested Frequency																
2008	0	-	6	-	-	3	4	-	-	-	1	-	-	-	-	2	-
2011	6	1	5	4	4	-	9	42	-	-	31	2	82	86	-	2	344
2015	-	-	-	-	-	9	-	-	-	2	3	-	-	-	5	2	4
2019	-	3	-	17	-	10	3	8	28	-	4	-	28	32	3	-	8
year	Average Cover (%)																
2008	0.0	-	0.0	-	-	0.0	0.0	-	-	-	0.0	-	-	-	-	0.0	-
2011	0.4	0.0	0.2	0.0	0.0	-	0.4	0.2	-	-	0.3	0.0	0.3	0.3	-	0.0	12.9
2015	-	-	-	-	-	0.1	-	-	-	0.0	0.0	-	-	-	0.1	0.1	0.0
2019	-	0.0	-	0.3	-	0.4	0.0	0.0	0.3	-	0.0	-	0.6	0.3	0.2	-	0.2

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

FORB SPECIES	Lappula occidentalis <sup>a</sup> (flatspine stickseed)	Lepidium ramosissimum var. bourgeauanum <sup>a</sup> (Bourgeau's pepperweed)	Linum perenne <sup>i</sup> (blue flax)	Lotus utahensis (Utah bird's-foot trefoil)	Lupinus argenteus (silvery lupine)	Lygodesmia (skeletonplant)	Machaeranthera canescens (hoary tansyaster)	Mentzelia albicaulis <sup>a</sup> (whitestem blazingstar)	Microsteris gracilis <sup>a</sup> (slender phlox)	Packera multilobata (lobeleaf groundsel)	Penstemon (beardtongue)	Penstemon eatonii (firecracker penstemon)	Penstemon palmeri (Palmer's penstemon)	Phlox longifolia (longleaf phlox)	Polygonum douglasii <sup>a</sup> (Douglas' knotweed)	Salsola tragus <sup>a</sup> (prickly Russian thistle)	Sanguisorba minor <sup>i</sup> (small burnet)
year	Nested Frequency																
2008	-	-	-	10	5	-	-	-	-	-	9	-	-	-	-	1	-
2011	9	7	14	23	22	-	2	9	128	6	-	2	7	-	-	-	3
2015	-	-	1	30	44	1	-	-	-	1	5	-	4	1	-	-	0
2019	2	-	-	18	39	-	2	-	78	2	8	6	1	-	9	-	-
year	Average Cover (%)																
2008	-	-	-	0.0	0.6	-	-	-	-	-	0.0	-	-	-	-	0.0	-
2011	0.0	0.0	0.2	1.6	1.8	-	0.0	0.2	1.6	0.1	-	0.0	0.0	-	-	-	0.0
2015	-	-	0.0	2.1	5.6	0.0	-	-	-	0.0	0.0	-	0.0	0.0	-	-	0.0
2019	0.0	-	-	0.3	4.9	-	0.0	-	0.6	0.0	0.0	0.0	0.0	-	0.0	-	-

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

FORB SPECIES	Sisymbrium altissimum <sup>a</sup> (tall tumblemustard)	Tragopogon dubius <sup>a</sup> (yellow salsify)
year	Nested Frequency	
2008	-	-
2011	-	-
2015	-	1
2019	2	-
year	Average Cover (%)	
2008	-	-
2011	-	-
2015	-	0.0
2019	0.1	-

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



**Table 22R-15.12 - 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 (yellow 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)
year	Line Intercept Cover (%)							
2008	-	8.6	-	0.1	14.6	-	-	12.9
2011	0.8	6	-	0.4	-	-	-	0
2015	0.1	8.6	-	1.3	-	-	-	-
2019	-	9.4	-	0.4	-	-	-	0.2
year	Quadrat Cover (%)							
2008	-	9.8	-	0.3	6.0	-	-	4.6
2011	0.1	4.2	-	0.4	-	0.1	-	0.0
2015	0.0	7.1	-	2.6	0.0	-	0.0	-
2019	-	8.8	0.0	0.9	-	0.0	-	0.0

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

**Table 22R-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 frigida<sup>p</sup> -- (prairie sagewort)</b>									
2008	20	-	0	0	100	0	0	100	- / -
2011	80	-	0	100	0	0	0	0	40/46
2015	40	-	0	100	0	0	0	0	15/13
2019	-	-	-	-	-	-	-	-	- / -
<b>Artemisia tridentata ssp. vaseyana<sup>p</sup> -- (mountain big sagebrush)</b>									
2008	3600	60	4	22	74	9	3	45	48/60
2011	1300	-	17	77	6	5	0	5	42/62
2015	1920	60	20	51	29	30	14	26	57/79
2019	1580	380	6	81	13	58	3	14	66/94
<b>Chrysothamnus viscidiflorus -- (yellow rabbitbrush)</b>									
2008	-	20	0	0	0	0	0	0	21/26
2011	-	-	-	-	-	-	-	-	42/63
2015	20	-	0	100	0	0	0	0	59/106
2019	40	-	0	100	0	0	0	0	78/116
<b>Ephedra viridis<sup>p</sup> -- (mormon tea)</b>									
2008	-	-	-	-	-	-	-	-	- / -
2011	-	-	-	-	-	-	-	-	- / -
2015	-	-	-	-	-	-	-	-	71/126
2019	-	-	-	-	-	-	-	-	71/136
<b>Ericameria nauseosa -- (rubber rabbitbrush)</b>									
2008	-	-	-	-	-	-	-	-	- / -
2011	-	-	-	-	-	-	-	-	- / -
2015	20	-	0	100	0	0	0	0	75/114
2019	-	-	-	-	-	-	-	-	- / -

Year	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>									
2008	900	120	11	73	16	29	18	0	15/13
2011	200	-	30	70	0	0	0	0	21/27
2015	1520	20	11	86	4	13	0	11	31/41
2019	880	40	2	91	7	0	0	7	25/28
<b>Juniperus osteosperma<sup>1</sup> -- (Utah juniper)</b>									
2008	40	40	0	100	0	0	0	0	- / -
2011	-	-	-	-	-	-	-	-	- / -
2015	20	-	100	0	0	0	0	0	- / -
2019	-	-	-	-	-	-	-	-	- / -
<b>Linanthus pungens -- (granite prickly phlox)</b>									
2008	40	-	0	50	50	0	50	50	17/23
2011	20	-	0	100	0	0	0	0	21/31
2015	-	-	-	-	-	-	-	-	13/29
2019	40	-	0	100	0	0	0	0	21/27
<b>Opuntia -- (pricklypear)</b>									
2008	20	-	0	100	0	0	0	0	10/26
2011	20	-	0	100	0	0	0	0	14/19
2015	-	40	0	0	0	0	0	0	19/26
2019	-	-	-	-	-	-	-	-	13/26
<b>Pinus edulis<sup>1</sup> -- (twoneedle pinyon)</b>									
2008	200	180	80	20	0	0	0	0	- / -
2011	60	20	100	0	0	0	0	0	- / -
2015	60	-	100	0	0	0	0	0	- / -
2019	20	-	100	0	0	0	0	0	- / -
<b>Purshia tridentata<sup>p</sup> -- (antelope bitterbrush)</b>									
2008	-	-	-	-	-	-	-	-	- / -
2011	-	-	-	-	-	-	-	-	- / -
2015	-	-	-	-	-	-	-	-	69/113
2019	-	-	-	-	-	-	-	-	65/143

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

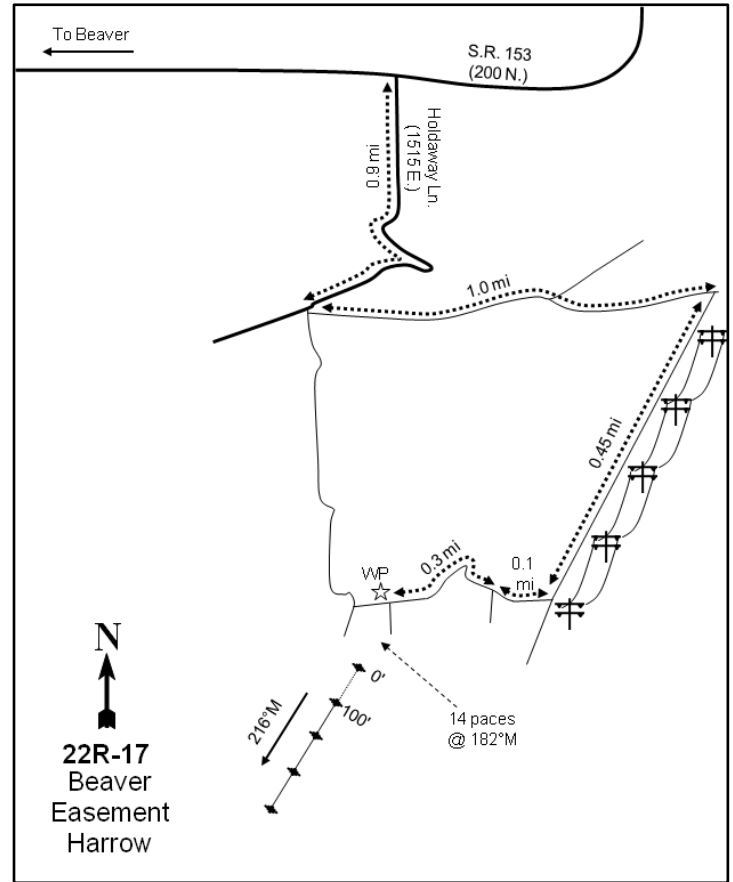
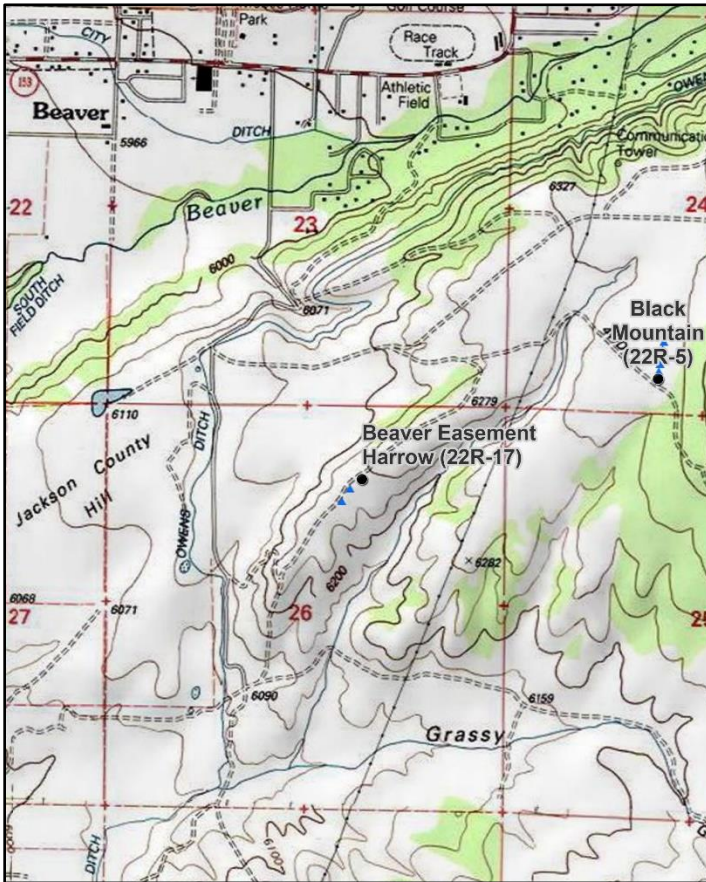
**Table 22R-15.14 - Tree Characteristics.** Point-quarter tree density, size class distribution, and average diameter.

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>							
2008	61	-	13	13	13	60	22.9
2011	4	100	-	-	-	-	1.0
2015	9	-	33	67	-	-	2.7
2019	5	75	25	-	-	-	1.8
<b>Pinus edulis (twoneedle pinyon)</b>							
2008	259	30	35	5	10	20	6.6
2011	5	100	-	-	-	-	2.0
2015	6	40	40	20	-	-	2.0
2019	4	50	50	-	-	-	3.0

**Table 22R-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
2008	10.8	-7.2	2.2	0.3	0.0	1.6	0.0	7.6	Very Poor
2011	8.3	13.4	7.5	14.1	-0.6	9.9	0.0	52.5	Fair
2015	10.9	6.3	9.8	28.6	-0.8	10.0	0.0	64.8	Fair-Good
2019	11.8	11.2	3.2	30.0	-1.3	10.0	0.0	64.8	Fair-Good

## BEAVER EASEMENT HARROW - STUDY NO. 22R-17



### Location Information

USGS 7.5 min Map Info  
GPS (0' Stake)

Black Ridge SW; Township 29S, Range 7W, Section 26  
NAD 83 UTM ZONE 12, 359224 East 4236095 North

### Transect Information

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

104  
217° magnetic  
400ft  
Line 1 (11ft & 95ft), Line 2 (34ft), Line 3 (59ft), Line 4 (71ft)  
Standard

### Directions to Site

Proceed east on 200 North in Beaver to Holdaway Lane (1515 East). Drive 0.9 miles on Holdaway Lane (which turns into a dirt road), then turn left. Drive 1.0 miles to a road on the right, turn, then drive south 0.45 miles on Powerline Road. Turn right, drive 0.1 miles to a fork, and keep right. Drive 0.3 miles to a road on the left and continue to the witness post on the right (north) side of the road. From the witness post, walk 14 paces to the 0-foot stake at 182 degrees magnetic. The 0-foot stake is marked with browse tag #104.

**Site Information**

Land Ownership	Private
Land Administrator	Private
Allotment	LEE SPRINGS
Elevation	6,300ft (1,920m)
Aspect	South
Slope	1%
Sample Dates	06/16/2008, 06/29/2011, 07/28/2015, 08/06/2019

**Table 22R-17.1 Disturbance History.** Recorded history of major disturbances.

Treatment/Disturbance	Name	WRI DB#	Date	Size (acres)
Seeding - Aerial Unknown	-	-	Historic	-
Harrow - Two-Way Dixie	Beaver Easement Property Treatment	1294	September 2008-January 2009	205
Seeding - Broadcast Before	Beaver Easement Property Treatment	1294	November 2008-January 2009	205
Seeding - Aerial After	Beaver Easement Property Treatment	1294	January 2009	205

**Table 22R-17.2 Seed Mix.** List of known seeded plant species and rates (if available).

Mix Name			Application Type	Application Date	Acres
Beaver Easement			Broadcast	Nov 2008	210
Type	Species	Common Name	Cultivar/Source ID	Bulk lbs/acre	PLS
G	Achnatherum hymenoides	Indian Ricegrass	Rimrock	2.14	1.97
G	Pseudoroegneria spicata	Bluebunch Wheatgrass	Anatone	1.43	1.17
G	Thinopyrum intermedium	Intermediate Wheatgrass	Oahe	2.14	1.94
F	Cleome serrulata	Rocky Mountain Beeplant	Iron UT	0.48	0.43
F	Medicago sativa	Alfalfa	LAdak	1.43	1.30
F	Melilotus officinalis	Yellow Sweetclover		0.48	0.43
F	Onobrychis viciifolia	Sainfoin	Eski	3.10	2.72
F	Sanguisorba minor	Small Burnet	Delar	1.90	1.80
F	Sphaeralcea grossulariifolia	Gooseberryleaf Globemallow	Lincoln NV	0.12	0.09

Mix Name			Application Type	Application Date	Acres
Beaver Easement - Kochia			Aerial	Jan 2009	200
Type	Species	Common Name	Cultivar/Source ID	Bulk lbs/acre	PLS
F	Medicago sativa	Alfalfa	Ladak 65	1.00	0.89
S	Bassia prostrata	Forge Kochia	Lander NV	1.00	0.66

**Wildlife Habitat and Vegetation History****Table 22R-17.3 - Wildlife Seasonal Habitat.** UDWR wildlife habitat and seasonality.

Species	Habitat	Season
Mule Deer	crucial	winter

**Table 22R-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	Mountain Big Sagebrush	Phase I
2011	Annual Grass/Mountain Big Sagebrush	Phase I
2015	Annual-Perennial Grass/Mountain Big Sagebrush	Phase I
2019	Annual Grass/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)
NRCS Ecological Site #	R028AY310UT
States and Transitions	A defined state and transition model is available.

Upon study establishment in 2008, the plant community on this site existed as a stand of mountain big sagebrush (*Artemisia tridentata* ssp. *vaseyana*) with a perennial grass-dominated understory, although cheatgrass (*Bromus tectorum*) was common. Following a harrow and seeding treatment in 2011, the plant community transitioned to one dominated by annual grasses -- primarily cheatgrass (*Bromus tectorum*) -- with a reduced sagebrush component (Table 22R-17.7, Table 22R-17.12.). In the 2015 sample year, the herbaceous understory improved with needle and thread (*Hesperostipa comata*) becoming the dominant species. However, cheatgrass has remained abundant, and again became a co-dominant vegetation component in 2019 (Table 22R-17.10). Additional treatments may be needed if cheatgrass persists in significant amounts in future sample years; high amounts of annual grasses can increase fuel loads and may effect the ecological resiliency of a plant community. This cheatgrass-mountain big sagebrush community is not defined by the available state and transition model, but appears to share similarities with the phases within the Yellow rabbitbrush/Invasive Annuals State (Jornada, 2019).

**Trend Summary Tables**

**Table 22R-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	11.6	-	-	15.3	-	-
2011	5.8	-	-	5.4	-	-
2015	7.0	-	-	7.1	-	-
2019	8.1	-	-	9.4	-	-

**Table 22R-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	359	299	408	88	3.4	11.7	6.2	4.0
2011	488	257	287	133	47.9	11.9	6.8	5.9
2015	380	342	156	114	7.5	21.1	0.6	1.7
2019	433	266	379	34	32.5	12.0	8.8	0.2

**Table 22R-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	8.9	0.1	49.7	21.6	2.5	33.4
2011	0.9	0.1	20.0	14.9	4.5	73.8
2015	3.8	-	40.1	30.9	3.7	37.9
2019	2.5	0.0	53.6	21.6	3.9	53.9

**Table 22R-17.9 - Pellet Group Data.** Quadrat frequency and pellet group transect data for animal pellets. Rabbit pellet groups are not sampled in the pellet group transect.

Year	Cattle	Mule Deer	Rocky Mountain Elk	Rabbit
	Quadrat Frequency			
2008	14	30	1	89
2011	3	8	-	7
2015	6	5	-	29
2019	13	3	2	21
Year	Days Use Per Acre (ha)			
2008	13.1 (32.3)	59.0 (145.7)	0.7 (1.7)	-
2011	9.4 (23.3)	6.0 (14.9)	0.7 (1.7)	-
2015	21.1 (52.0)	9.4 (23.2)	-	-
2019	27.6 (68.1)	5.3 (13.2)	0.7 (1.7)	-

**Table 22R-17.10 - Grass Species.** Nested frequency and modified Daubenmire average cover by year.

GRASS SPECIES	Achnatherum hymenoides (Indian ricegrass)	Achnatherum nelsonii (Columbia needlegrass)	Bouteloua gracilis (blue grama)	Bromus tectorum <sup>ai</sup> (cheatgrass)	Elymus elymoides (squirreltail)	Hesperostipa comata (needle and thread)	Pleuraphis jamesii (James' galleta)	Sporobolus cryptandrus (sand dropseed)	Vulpia octoflora <sup>a</sup> (sixweeks fescue)
year	Nested Frequency								
2008	9	-	42	359	21	177	193	-	7
2011	11	-	31	488	4	188	3	96	67
2015	-	5	26	380	12	295	1	108	11
2019	7	-	2	429	26	200	2	109	26
year	Average Cover (%)								
2008	0.6	-	0.3	3.4	0.3	7.1	3.4	-	0.0
2011	0.1	-	0.9	47.5	0.0	8.5	0.0	2.3	0.5
2015	-	0.1	1.0	7.5	0.2	16.6	0.0	3.1	0.0
2019	0.3	-	0.0	32.2	1.2	8.9	0.0	1.6	0.3

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

**Table 22R-17.11 - Forb Species.** Nested frequency and modified Daubenmire average cover by year.

FORB SPECIES	Alyssum desertorum <sup>ai</sup> (desert madwort)	Astragalus argophyllus (silverleaf milkvetch)	Astragalus lentiginosus (freckled milkvetch)	Ceratocephala testiculata <sup>ai</sup> (curvseed butterwort)	Chaetopappa ericoides (rose heath)	Chamaesyce (sandmat)	Chenopodium fremontii <sup>a</sup> (Fremont's goosefoot)	Collinsia parviflora <sup>a</sup> (maiden blue eyed Mary)	Descurainia pinnata <sup>a</sup> (western tansymustard)	Draba <sup>a</sup> (draba)	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)	Lupinus brevicaulis <sup>a</sup> (shortstem lupine)	Phlox hoodii (spiny phlox)	Phlox longifolia (longleaf phlox)
year	Nested Frequency																
2008	97	-	7	357	3	-	3	2	4	3	-	49	-	102	19	-	12
2011	164	3	18	206	2	-	-	-	-	63	-	7	8	67	-	1	3
2015	146	-	2	-	2	-	-	-	2	-	-	1	-	11	-	-	5
2019	362	-	-	36	-	13	-	-	2	6	2	28	-	17	-	-	-
year	Average Cover (%)																
2008	0.3	-	0.0	2.8	0.1	-	0.0	0.0	0.0	0.0	-	0.3	-	2.7	0.2	-	0.1
2011	1.4	0.0	0.7	3.4	0.1	-	-	-	-	0.3	-	0.0	0.0	1.5	-	0.0	0.0
2015	0.5	-	0.2	-	0.0	-	-	-	0.0	-	-	0.0	-	0.1	-	-	0.0
2019	8.3	-	-	0.1	-	0.0	-	-	0.0	0.0	0.0	0.2	-	0.1	-	-	-

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

FORB SPECIES			
	Salsola tragus <sup>ai</sup> (prickly Russian thistle)		
	Sisymbrium altissimum <sup>ai</sup> (tall tumblemustard)		
	Sphaeralcea coccinea (scarlet globemallow)		
year	Nested Frequency		
2008	-	-	72
2011	-	8	112
2015	-	-	108
2019	2	-	21
year	Average Cover (%)		
2008	-	-	3.8
2011	-	0.1	5.0
2015	-	-	1.5
2019	0.0	-	0.1

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

**Table 22R-17.12 - 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 (%)
2008	15.3
2011	5.4
2015	7.1
2019	9.4
year	Quadrat Cover (%)
2008	11.6
2011	5.8
2015	7.0
2019	8.1

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



**Table 22R-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>Artemisia tridentata ssp. vaseyana<sup>p</sup> -- (mountain big sagebrush)</b>									
2008	4980	21360	39	39	22	11	16	12	55/86
2011	3800	1320	53	41	6	10	0	5	34/49
2015	3940	20	27	63	10	31	10	13	38/54
2019	3240	60	22	68	11	40	4	11	43/62
<b>Chrysothamnus viscidiflorus -- (yellow rabbitbrush)</b>									
2008	20	-	0	100	0	0	100	0	- / -
2011	-	-	-	-	-	-	-	-	28/30
2015	20	-	0	100	0	0	0	0	22/25
2019	-	-	-	-	-	-	-	-	31/35
<b>Opuntia polyacantha -- (plains pricklypear)</b>									
2008	-	-	-	-	-	-	-	-	- / -
2011	-	-	-	-	-	-	-	-	- / -
2015	-	-	-	-	-	-	-	-	- / -
2019	-	-	-	-	-	-	-	-	9/17
<b>Pediocactus simpsonii -- (mountain ball cactus)</b>									
2008	20	-	0	100	0	0	0	0	7/9

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

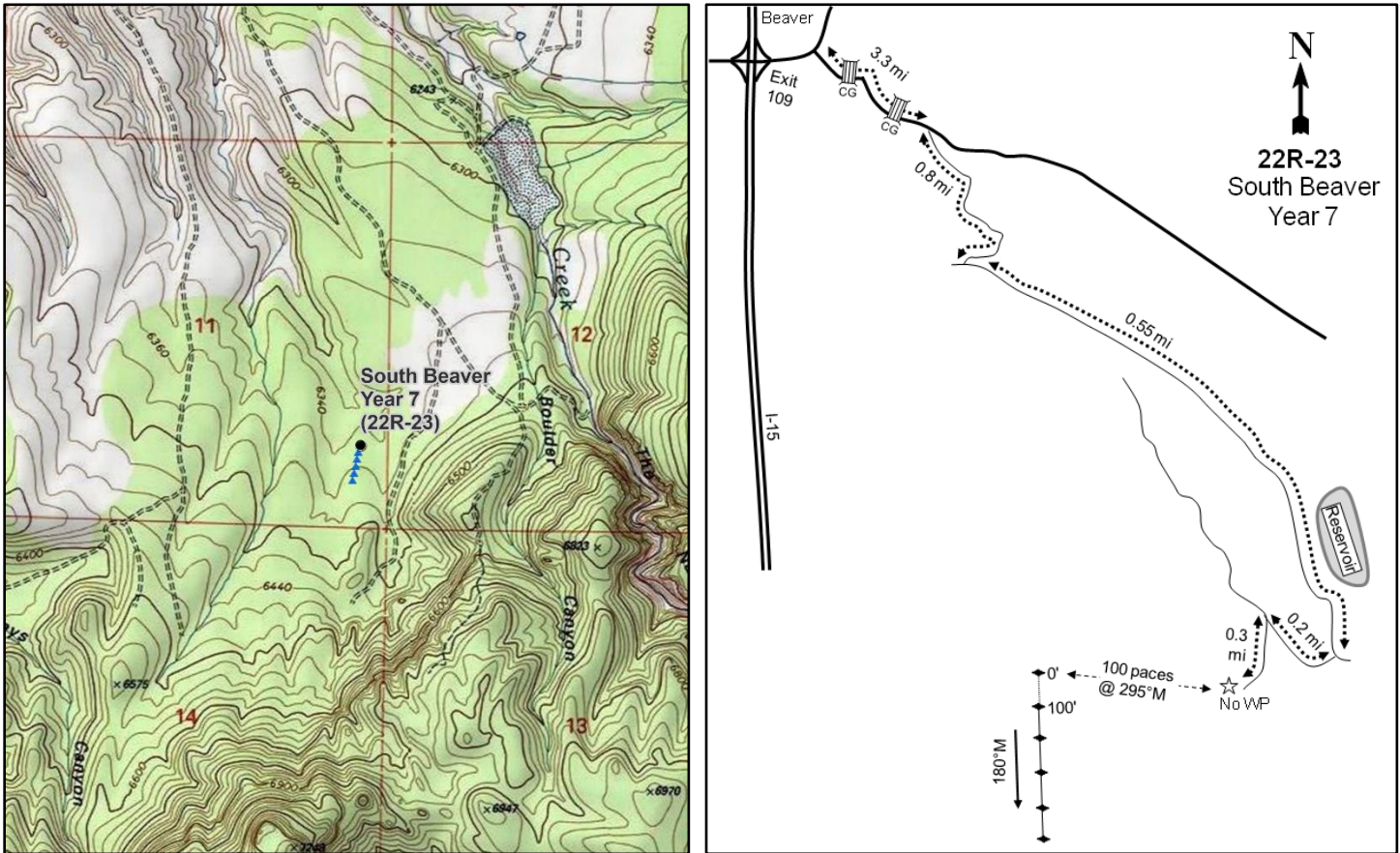
**Table 22R-17.14 - Tree Characteristics.** Point-quarter tree density, size class distribution, and average diameter.

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>							
2011	1	-	100	-	-	-	7.0
2019	1	-	100	-	-	-	5.0

**Table 22R-17.15 – 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	19.1	8.4	15.0	23.5	-2.5	8.1	0.0	71.5	Good
2011	6.8	13.3	15.0	23.8	-20.0	10.0	0.0	48.8	Poor-Fair
2015	8.9	11.9	13.5	30.0	-5.6	3.3	0.0	62.0	Fair
2019	11.8	11.9	10.8	24.1	-20.0	0.3	0.0	38.8	Poor

## SOUTH BEAVER YEAR 7 - STUDY NO. 22R-23

**Location Information**

USGS 7.5 min Map Info  
GPS (0' Stake)

Kane Canyon NW; Township 30S, Range 7W, Section 11  
NAD 83 UTM ZONE 12, 359623 East 4230217 North

**Transect Information**

Browse Tag # (0' Stake)	9164
Transect Bearing	180° magnetic
Length	500ft
Belt Placement	Line 1 (11ft), Line 2 (34ft), Line 3 (59ft), Line 4 (71ft), Line 5 (95ft)
Belt Marker Placement	No Rebar

**Directions to Site**

Travel 3.4 miles east on South Creek Road from exit #109 on I-15. Turn right and travel 0.8 miles to an intersection. Turn right again and continue for 0.55 miles. Turn right, travel 0.2 miles, then turn left and proceed for 0.3 miles. Park here: there is no witness post. Walk 100 paces to the 0-foot stake at 295 degrees magnetic. There may be other routes that are closer to the 0-foot stake, which is marked with browse tag #9164.

**Site Information**

Land Ownership	Federal
Land Administrator	BLM
Allotment	LEE SPRINGS
Elevation	6,350ft (1,935m)
Aspect	Northwest
Slope	6%
Sample Dates	06/26/2012, 07/28/2015, 08/07/2019

**Table 22R-23.1 Disturbance History.** Recorded history of major disturbances.

Treatment/Disturbance	Name	WRI DB#	Date	Size (acres)
Seeding - Aerial Before	South Beaver Vegetation Enhancement Year 7	2227	September 2014	1366
Hand Crew - Lop and Scatter	Project Maintenance - South Beaver Phase II	4831	May-June 2019	6241
Mechanical - Bullhog	South Beaver Vegetation Enhancement Year 7	2227	August-November 2014	1366

**Table 22R-23.2 Seed Mix.** List of known seeded plant species and rates (if available).

Mix Name			Application Type	Application Date	Acres
South Beaver Year 7			Aerial	Sep 2014	850
Type	Species	Common Name	Cultivar/Source ID	Bulk lbs/acre	PLS
G	Achnatherum hymenoides	Indian Ricegrass	Rimrock	1.53	1.42
G	Agropyron desertorum	Crested Wheatgrass	Hycrest II	1.50	1.30
G	Pseudoroegneria spicata	Bluebunch Wheatgrass	Anatone	2.00	1.54
G	Thinopyrum intermedium	Intermediate Wheatgrass	Clarke	1.50	0.93
G	Thinopyrum intermedium	Pubescent Wheatgrass	Luna	0.81	0.66
G	Thinopyrum intermedium	Pubescent Wheatgrass		0.18	0.15
F	Astragalus cicer	Cicer Milkvetch	Lutana	1.00	0.95
F	Linum perenne	Blue Flax	Appar	0.52	0.45
F	Medicago sativa	Alfalfa	Ranger	0.76	0.69
F	Melilotus officinalis	Yellow Sweetclover		1.00	0.88
F	Penstemon palmeri	Palmer Penstemon	Carbon/Emery UT	0.06	0.05
F	Sanguisorba minor	Small Burnet	Delar	1.59	1.44

**Wildlife Habitat and Vegetation History****Table 22R-23.3 - Wildlife Seasonal Habitat.** UDWR wildlife habitat and seasonality.

Species	Habitat	Season
Mule Deer	crucial	winter
Rocky Mountain Elk	substantial	winter

**Table 22R-23.4 - Vegetation History.** The dominant vegetation type(s) and phase of woodland succession (Tausch, Miller, Roundy, & Chambers, 2009).

Year	Vegetation Type	Woodland Succession
2012	Pinyon-Juniper	Phase II transitioning to Phase III
2015	Mountain Big Sagebrush/Broom Snakeweed	Phase I
2019	Mountain Big Sagebrush/Perennial Grass	Phase I

**Site Notes**

No Notes

**Site Potential**

1981 - 2010 Average Annual Precipitation	14 inches
NRCS Ecological Site	Upland Gravelly Loam (Bonneville Big Sagebrush)
NRCS Ecological Site #	R028AY306UT
States and Transitions	A defined state and transition model is available.

Twoneedle pinyon (*Pinus edulis*) and Utah juniper (*Juniperus osteosperma*) dominated this site upon study establishment in 2012, and the site was considered to be in Phase II transitioning to Phase III of woodland succession. Mountain big sagebrush (*Artemisia tridentata* ssp. *vaseyana*) was present in the understory, contributing moderate cover. A bullhog treatment in 2014 (Table 22R-23.12) removed most of the trees, and the study has been within Phase I of encroachment since 2015 (Table 22R-23.4, Table 22R-23.14). Broom snakeweed (*Gutierrezia sarothrae*) and sagebrush increased in 2015 and became co-dominant, but snakeweed decreased in 2019 and became a minor vegetation component (Table 22R-13.12, Table 22R-13.13, Photos). The herbaceous understory was in poor condition prior to the treatment, but improved with the introduction of seeded species. Perennial grasses, primarily the introduced species intermediate wheatgrass (*Thinopyrum intermedium*) and native species squirreltail (*Elymus elymoides*), increased and became co-dominant with sagebrush in 2019 (Table 22R-23.7, Table 22R-23.10). This perennial grass-sagebrush community is likely comparable to the phases within the Current Potential State as described by the available state and transition model (Jornada, 2019). Although juniper density is moderate as of the most recent sampling (Table 22R-23.14), continued presence indicates that this site may have the potential to be infilled over time.

**Trend Summary Tables****Table 22R-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
2012	5.6	0.4	14.1	6.1	0.3	23.6
2015	4.9	3.9	0.0	6.6	4.3	-
2019	5.0	0.0	0.0	9.6	-	-

**Table 22R-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
2012	37	25	31	59	0.1	0.4	0.1	0.7
2015	2	130	42	142	0.0	3.4	0.6	8.6
2019	68	254	287	109	0.9	11.9	6.2	2.2

**Table 22R-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
2012	27.8	1.1	42.1	17.4	5.4	19.8
2015	8.4	0.0	62.8	15.3	3.6	21.7
2019	14.3	0.2	58.0	18.5	3.5	24.3

**Table 22R-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	Horse	Rabbit
	Quadrat Frequency				
2012	-	1	-	-	13
2015	-	6	3	-	19
2019	1	7	-	1	20
Year	Days Use Per Acre (ha)				
2012	-	0.7 (1.7)	-	-	-
2015	-	3.4 (8.3)	14.7 (36.4)	-	-
2019	8.0 (19.7)	3.4 (8.3)	1.3 (3.3)	1.7 (4.3)	-

**Table 22R-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)	Aristida purpurea (purple threeawn)	Bromus tectorum <sup>ai</sup> (cheatgrass)	Elymus elymoides (squirreltail)	Hesperostipa comata (needle and thread)	Pseudoroegneria spicata (bluebunch wheatgrass)	Thinopyrum intermedium <sup>i</sup> (intermediate wheatgrass)
year	Nested Frequency							
2012	-	-	-	37	25	-	-	-
2015	3	40	-	2	49	1	3	72
2019	9	51	3	68	170	-	36	95
year	Average Cover (%)							
2012	-	-	-	0.1	0.4	-	-	-
2015	0.1	0.8	-	0.0	1.2	0.0	0.2	1.2
2019	0.2	1.5	0.1	0.9	4.5	-	0.9	4.8

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

**Table 22R-23.11 - Forb Species.** Nested frequency and modified Daubenmire average cover by year.

FORB SPECIES	Alyssum desertorum <sup>ai</sup> (desert madwort)	Astragalus (milkvetch)	Astragalus lentiginosus (freckled milkvetch)	Ceratocephala testiculata <sup>ai</sup> (curveseed butterwort)	Chaenactis douglasii (Douglas' dustymaiden)	Chaetopappa ericooides (rose heath)	Collinsia parviflora <sup>a</sup> (maiden blue eyed Mary)	Conyza canadensis <sup>a</sup> (Canadian horseweed)	Cryptantha (cryptantha)	Descurainia pinnata <sup>a</sup> (western tansymustard)	Gilia inconspicua <sup>a</sup> (shy gilia)	Lactuca scariola <sup>ai</sup> (prickly lettuce)	Linum perenne <sup>i</sup> (blue flax)	Machaeranthera canescens (hoary tansyaster)	Medicago sativa <sup>i</sup> (alfalfa)	Melilotus officinalis <sup>i</sup> (sweetclover)	Oenothera caespitosa (tufted evening primrose)
year	Nested Frequency																
2012	4	-	18	15	16	-	9	-	4	3	-	-	-	-	-	-	-
2015	-	12	12	-	19	-	-	3	4	7	-	27	63	0	14	19	1
2019	3	-	10	8	39	3	4	-	-	61	228	78	15	4	1	1	-
year	Average Cover (%)																
2012	0.0	-	0.3	0.0	0.1	-	0.0	-	0.0	0.0	-	-	-	-	-	-	-
2015	-	0.5	0.2	-	0.5	-	-	0.0	0.0	0.0	-	0.4	4.9	0.0	0.2	1.5	0.0
2019	0.0	-	0.1	0.0	0.1	0.1	0.0	-	-	0.5	4.7	1.0	0.7	0.0	0.0	0.0	-

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

FORB SPECIES	Penstemon (beardtongue)	Penstemon pachyphyllus (thickleaf beardtongue)	Penstemon palmeri (Palmer's penstemon)	Phlox austromontana (mountain phlox)	Phlox longifolia (longleaf phlox)	Salsola tragus <sup>ai</sup> (prickly Russian thistle)	Sanguisorba minor <sup>i</sup> (small burnet)	Sphaeralcea coccinea (scarlet globemallow)	Streptanthus cordatus (heartleaf twistflower)	Townsendia (Townsend daisy)	Tragopogon dubius <sup>ai</sup> (yellow salsify)
year	Nested Frequency										
2012	8	-	-	7	-	-	-	5	3	-	-
2015	-	14	5	3	2	3	13	15	-	1	4
2019	3	6	-	3	-	3	6	27	-	2	3
year	Average Cover (%)										
2012	0.1	-	-	0.1	-	-	-	0.0	0.0	-	-
2015	-	0.1	0.0	0.1	0.0	0.0	0.3	0.1	-	0.0	0.2
2019	0.0	0.1	-	0.1	-	0.0	0.1	0.8	-	0.0	0.0

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

**Table 22R-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)	Chrysothamnus viscidiflorus (yellow rabbitbrush)	Eriogonum microthecum <sup>p</sup> (slender buckwheat)	Gutierrezia sarothrae (broom snakeweed)	Juniperus osteosperma <sup>t</sup> (Utah juniper)	Opuntia (pricklypear)	Pinus edulis <sup>t</sup> (twoneedle pinyon)
year	Line Intercept Cover (%)						
2012	6.1	-	-	0.3	6.2	0	17.4
2015	6.6	-	-	4.2	-	0.1	-
2019	9.6	-	-	-	-	-	-
year	Quadrat Cover (%)						
2012	5.6	-	-	0.3	5.9	0.0	8.2
2015	4.9	0.1	-	3.7	0.0	0.1	-
2019	5.0	-	0.0	-	0.0	0.0	-

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

**Table 22R-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>									
2012	2340	120	6	45	49	25	0	66	39/52
2015	2040	-	9	73	19	17	10	25	38/58
2019	1740	-	15	64	21	41	14	21	42/68
<b>Chrysothamnus viscidiflorus ssp. viscidiflorus var. stenophyllus -- (yellow rabbitbrush)</b>									
2012	20	-	0	100	0	0	0	0	12/13
2015	-	-	-	-	-	-	-	-	-/-
2019	-	-	-	-	-	-	-	-	-/-
<b>Eriogonum microthecum<sup>p</sup> -- (slender buckwheat)</b>									
2012	80	-	50	50	0	0	0	0	17/30
2015	20	-	0	100	0	0	0	0	20/28
2019	80	-	0	100	0	25	25	0	15/22
<b>Gutierrezia sarothrae -- (broom snakeweed)</b>									
2012	720	40	42	58	0	0	0	3	19/21
2015	4740	40	12	88	0	0	0	0	30/42
2019	40	-	0	0	100	0	0	100	23/30
<b>Juniperus osteosperma<sup>i</sup> -- (Utah juniper)</b>									
2012	120	-	17	83	0	0	0	0	-/-
2015	120	40	100	0	0	0	0	0	-/-
2019	80	-	100	0	0	0	0	0	-/-
<b>Opuntia -- (pricklypear)</b>									
2012	120	-	0	100	0	0	0	0	9/22
2015	100	-	0	100	0	0	0	0	11/30
2019	140	-	0	71	29	0	0	29	9/29
<b>Pinus edulis<sup>i</sup> -- (twoneedle pinyon)</b>									
2012	260	-	62	39	0	0	0	0	-/-
2015	60	-	100	0	0	0	0	33	-/-

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

**Table 22R-23.14 - Tree Characteristics.** Point-quarter tree density, size class distribution, and average diameter.

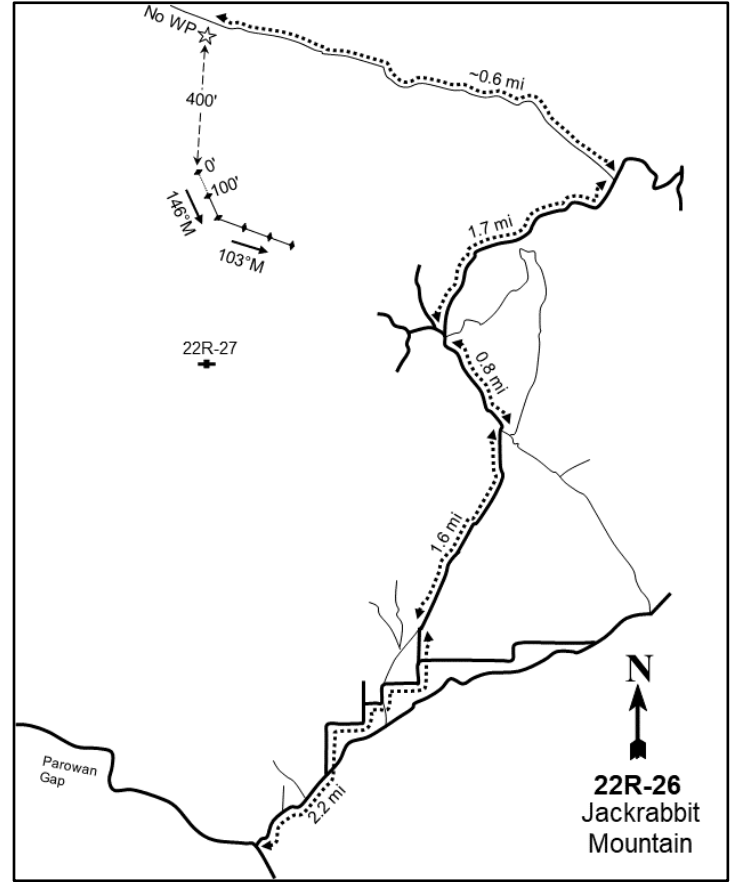
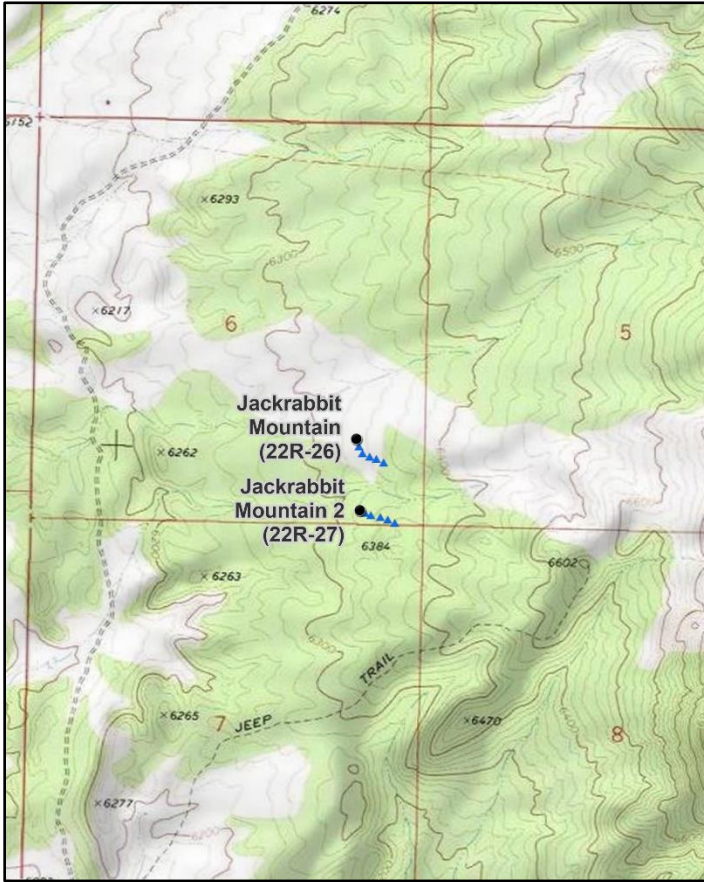
Year	Density	Size Class Distribution					Average Diameter (cm)
	Trees per Acre	Seedling (%)	1-4' (%)	4-8' (%)	8-12' (%)	>12' (%)	
<b>Juniperus osteosperma (Utah juniper)</b>							
2012	116	10	15	35	10	30	17.0
2015	59	86	14	-	-	-	0.9
2019	71	93	7	-	-	-	1.9
<b>Pinus edulis (twoneedle pinyon)</b>							
2012	217	20	20	35	25	-	6.9
2015	15	57	43	-	-	-	2.3
2019	7	80	20	-	-	-	1.8

**Table 22R-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
2012	7.6	0.4	3.0	0.7	-0.1	1.3	0.0	13.0	Very Poor
2015	8.3	9.4	4.4	6.9	0.0	10.0	0.0	38.9	Poor
2019	12.0	8.8	7.5	23.9	-0.6	4.4	0.0	55.8	Fair



## JACKRABBIT MOUNTAIN - STUDY NO. 22R-26



### Location Information

USGS 7.5 min Map Info  
GPS (0' Stake)

Parowan Gap NE; Township 33S, Range 9W, Section 06  
NAD 83 UTM ZONE 12, 332535 East 4202942 North

### Transect Information

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

Not Available  
146° magnetic (Lines 3-5: 103° magnetic)  
500ft  
Line 1 (11ft), Line 2 (34ft), Line 3 (59ft), Line 4 (71ft), Line 5 (95ft)  
No Rebar or Stakes

### Directions to Site

Turn onto North Little Salt Lake Road from North Gap Road near Parowan Gap. Follow North Little Salt Lake Road for 2.2 miles, passing several roads diverging from the main one. Continue on the dirt road for 2.4 miles, again ignoring other roads, to a fork. Proceed right (north) at the fork and continue for 1.7 miles to a faint two-track on the left-hand (west) side of the road. Turn left onto this two-track, drive for approximately 0.6 miles, and park: there is no witness post. The study is approximately 400 feet south of the road. There are no stakes, so use a GPS unit to navigate to the transect.

**Site Information**

Land Ownership	Federal
Land Administrator	BLM
Allotment	BENSON
Elevation	6,300ft (1,920m)
Aspect	West
Slope	6-8%
Sample Dates	08/13/2019

**Table 22R-26.1 Disturbance History.** Recorded history of major disturbances.

Treatment/Disturbance	Name	WRI DB#	Date	Size (acres)
Hand Crew - Lop and Scatter	Chipman Peak-Benson Vegetation Treatment (Proposed)	4786	Fall 2019	438

**Wildlife Habitat and Vegetation History**

**Table 22R-26.3 - Wildlife Seasonal Habitat.** UDWR wildlife habitat and seasonality.

Species	Habitat	Season
Mule Deer	crucial	winter

**Table 22R-26.4 - Vegetation History.** The dominant vegetation type(s) and phase of woodland succession (Tausch, Miller, Roundy, & Chambers, 2009).

Year	Vegetation Type	Woodland Succession
2019	Pinyon-Juniper/Mountain Big Sagebrush	Phase II

**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	A defined state and transition model is available.

This site was dominated by twoneedle pinyon (*Pinus edulis*) and Utah juniper (*Juniperus osteosperma*) and considered to be within Phase II of woodland succession upon study establishment in 2019 (Table 22R-26.4, Table 22R-26.14). A moderate number of browse species were also present, with mountain big sagebrush (*Artemisia tridentata* ssp. *vaseyana*) as a co-dominant site component (Table 22R-26.12, Table 22R-26.13, Photos). The herbaceous understory was moderately diverse and dominated by annual forbs, primarily pinyon groundsmoke (*Gayophytum ramosissimum*) (Table 22R-26.7, Table 22R-26.10, Table 22R-26.11). It is probable that tree encroachment would continue on this site without a major disturbance. However, a lop and scatter treatment scheduled for the fall of 2019 (Table 22R-26.1) will likely remove many of these trees, potentially allowing for increased vigor and productivity of shrub and herbaceous species. The plant community that characterizes this site may be comparable with the Utah juniper > bonneville big sagebrush > native perennials > invasive annuals state Phase within the Utah Juniper/Invasive Annuals State as is defined by the state and transition model (Jornada, 2019).

**Trend Summary Tables**

**Table 22R-26.6 - Shrub/Tree Summary.** Average modified Daubenmire quadrat and line intercept cover by year for shrubs/trees

Year	Quadrat Cover (%)			Line-intercept Cover (%)		
	Preferred Shrub	Other Shrub	Tree	Preferred Shrub	Other Shrub	Tree
2019	8.5	1.0	17.5	7.1	0.8	24.7

**Table 22R-26.7 - Herbaceous Summary.** Nested frequency and average modified Daubenmire quadrat cover by year for herbaceous functional groups

Year	Nested Frequency				Quadrat Cover (%)			
	Annual Grass	Perennial Grass	Annual/Biennial Forb	Perennial Forb	Annual Grass	Perennial Grass	Annual/Biennial Forb	Perennial Forb
2019	16	32	290	49	0.1	0.2	6.5	0.3

**Table 22R-26.8 - Basic Ground Cover.** Average modified Daubenmire quadrat cover by year for basic ground cover types.

Year	Cover Type (%)					
	Bare Ground	Cryptogams	Litter	Pavement	Rock	Vegetation
2019	15.7	0.7	39.0	40.8	6.4	31.0

**Table 22R-26.9 - Pellet Group Data.** Quadrat frequency and pellet group transect data for animal pellets. Rabbit pellet groups are not sampled in the pellet group transect.

Year	Mule Deer	Rabbit
	Quadrat Frequency	
2019	-	40
Year	Days Use Per Acre (ha)	
2019	0.7 (1.7)	-

**Table 22R-26.10 - 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)	Vulpia octoflora <sup>a</sup> (sixweeks fescue)
year	Nested Frequency				
2019	2	9	25	6	7
year	Average Cover (%)				
2019	0.0	0.0	0.1	0.0	0.0

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

**Table 22R-26.11 - Forb Species.** Nested frequency and modified Daubenmire average cover by year.

FORB SPECIES	Nested Frequency													
year	Average Cover (%)													
Astragalus (milkvetch)	20	19	3	3	4	62	3	2	8	4	274	1	13	2
Ceratocephala testiculata <sup>ni</sup> (curveseed butterwort)	0.1	0.0	0.0	0.0	0.0	0.4	0.0	0.0	0.0	0.0	6.0	0.0	0.0	0.0
Chaenactis douglasii (Douglas' dusty- maiden)														
Chamaesyce (sandmat)														
Cryptantha (cryptantha)														
Descurainia pinnata <sup>a</sup> (western tansymustard)														
Draba <sup>a</sup> (draba)														
Eriogonum cernuum <sup>a</sup> (nodding buckwheat)														
Frasera albomarginata (desert fraseria)														
Gayophytum ramosissimum <sup>a</sup> (pinyon groundsmoke)														
Gilia inconspicua <sup>a</sup> (shy gilia)														
Lesquerella (bladderpod)														
Phlox hoodii (spiny phlox)														
Phlox longifolia (longleaf phlox)														

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

**Table 22R-26.12 - 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)	1.7	4.5	0.9	12	0.8	12.7
Artemisia tridentata ssp. vaseyana <sup>p</sup> (mountain big sagebrush)						
Ephedra nevadensis <sup>p</sup> (Nevada jointfir)						
Juniperus osteosperma <sup>t</sup> (Utah juniper)						
Linanthus pungens (granite prickly phlox)						
Pinus edulis <sup>t</sup> (twoneedle pinyon)						
2019	1.4	6.2	0.9	7.0	1.0	10.5

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

**Table 22R-26.13 - Shrub/Tree Characteristics.** Population characteristics of shrub/tree species populations including density reproduction (seedlings), age distribution, utilization, vigor and average size (height/crown) of plants.

Year	Density		Age Class Distribution			Utilization		Poor Vigor (%)	Average Height Crown (cm)
	Plants Per Acre		Excluding Seedlings			Moderate (%)	Heavy (%)		
	Excluding Seedlings	Seedling	Young (%)	Mature (%)	Decadent (%)				
<b>Artemisia nova<sup>P</sup> -- (black sagebrush)</b>									
2019	980	-	2	25	74	2	63	76	32/47
<b>Artemisia tridentata ssp. vaseyana<sup>P</sup> -- (mountain big sagebrush)</b>									
2019	2520	-	1	31	68	0	10	70	47/60
<b>Ephedra nevadensis<sup>P</sup> -- (Nevada jointfir)</b>									
2019	720	-	3	58	39	0	6	39	37/35
<b>Ephedra viridis<sup>P</sup> -- (mormon tea)</b>									
2019	160	-	13	88	0	0	0	38	77/162
<b>Juniperus osteosperma<sup>I</sup> -- (Utah juniper)</b>									
2019	160	-	75	25	0	0	0	0	- / -
<b>Linanthus pungens -- (granite prickly phlox)</b>									
2019	4960	-	10	90	0	0	0	0	13/14
<b>Opuntia polyacantha -- (plains pricklypear)</b>									
2019	20	-	0	100	0	0	0	0	11/39
<b>Peraphyllum ramosissimum<sup>P</sup> -- (wild crab apple)</b>									
2019	-	-	-	-	-	-	-	-	142/148
<b>Pinus edulis<sup>I</sup> -- (twoneedle pinyon)</b>									
2019	80	40	50	50	0	0	0	0	- / -

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

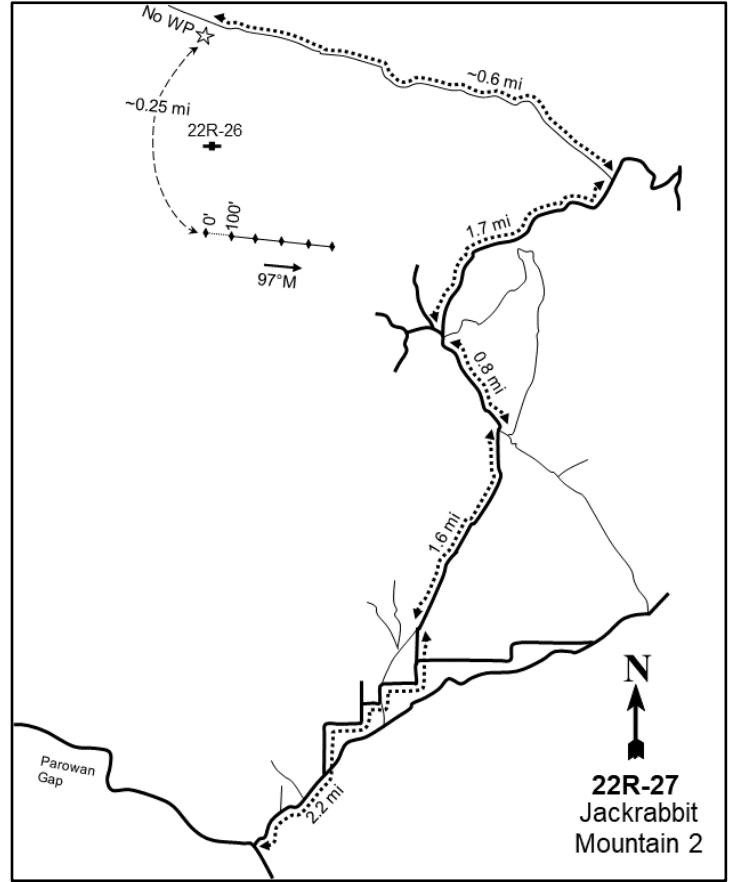
**Table 22R-26.14 - Tree Characteristics.** Point-quarter tree density, size class distribution, and average diameter.

Year	Density	Size Class Distribution					Average Diameter (cm)
	Trees per Acre	Seedling (%)	1-4' (%)	4-8' (%)	8-12' (%)	>12' (%)	
<b>Juniperus osteosperma (Utah juniper)</b>							
2019	84	5	40	25	20	10	14.2
<b>Pinus edulis (twoneedle pinyon)</b>							
2019	129	-	10	50	35	5	13.2

**Table 22R-26.15 – 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
2019	8.9	-4.7	0.7	0.4	0.0	0.5	0.0	5.6	Very Poor

## JACKRABBIT MOUNTAIN 2 - STUDY NO. 22R-27



### Location Information

USGS 7.5 min Map Info  
GPS (0' Stake)

Parowan Gap NE; Township 33S, Range 9W, Section 06  
NAD 83 UTM ZONE 12, 332549 East 4202653 North

### Transect Information

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

Not Available  
97° magnetic  
500ft  
Line 1 (11ft), Line 2 (34ft), Line 3 (59ft), Line 4 (71ft), Line 5 (95ft)  
No Rebar

### Directions to Site

Turn onto North Little Salt Lake Road from North Gap Road near Parowan Gap. Follow North Little Salt Lake Road for 2.2 miles, passing several roads diverging from the main one. Continue on the dirt road for 2.4 miles, again ignoring other roads, to a fork. Proceed right (north) at the fork and continue for 1.7 miles to a faint two-track on the left-hand (west) side of the road. Turn left onto this two-track, drive for roughly 0.6 miles, and park: there is no witness post. The study is approximately 0.25 miles south of the road. There are no stakes, so use a GPS unit to navigate to the transect.



**Site Information**

Land Ownership	Federal
Land Administrator	BLM
Allotment	BENSON
Elevation	6,320ft (1,926m)
Aspect	Southwest
Slope	7%
Sample Dates	08/13/2019

**Table 22R-27.1 Disturbance History.** Recorded history of major disturbances.

Treatment/Disturbance	Name	WRI DB#	Date	Size (acres)
Seeding - Aerial Before	Chipman Peak-Benson Vegetation Treatment (Proposed)	4786	Fall 2019	822
Mechanical - Bullhog	Chipman Peak-Benson Vegetation Treatment (Proposed)	4786	Fall 2019	822

**Wildlife Habitat and Vegetation History**

**Table 22R-27.3 - Wildlife Seasonal Habitat.** UDWR wildlife habitat and seasonality.

Species	Habitat	Season
Mule Deer	crucial	winter

**Table 22R-27.4 - Vegetation History.** The dominant vegetation type(s) and phase of woodland succession (Tausch, Miller, Roundy, & Chambers, 2009).

Year	Vegetation Type	Woodland Succession
2019	Pinyon-Juniper	Phase II transitioning to Phase III

**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	A defined state and transition model is available.

Utah juniper (*Juniperus osteosperma*) and twoneedle pinyon (*Pinus edulis*) dominated this site upon study establishment in 2019, and the site was considered to be within Phase II transitioning to Phase III of woodland succession (Table 22R-27.4, Table 22R-27.14). Shrubs were present in moderate amounts with mountain big sagebrush (*Artemisia tridentata* ssp. *vaseyana*) as the most abundant species (Table 22R-27.12, Table 22R-12.13, Photos). Annual forbs, particularly shy gilia (*Gilia inconspicua*), provided the most cover in the otherwise limited understory (Table 22R-27.7, Table 22R-27.10, Table 22R-27.11). Without a major disturbance, it is probable that further tree encroachment and associated loss of understory productivity and vigor would occur. However, a bullhog and seeding treatment planned for the fall of 2019 (Table 22R-27.1) will likely remove most of the trees and augment the shrub and herbaceous component. The plant community that characterizes this site shares similarities with the Utah juniper > bonnevillie big sagebrush > native perennials > invasive annuals state Phase within the Utah Juniper/Invasive Annuals State as is defined by the state and transition model (Jornada, 2019).

**Trend Summary Tables**

**Table 22R-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
2019	1.3	0.1	25.7	2.0	-	37.5

**Table 22R-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
2019	25	20	256	70	0.1	0.1	3.8	0.6



**Table 22R-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
2019	11.0	0.3	42.5	41.2	10.0	29.7

**Table 22R-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	Rabbit
	Quadrat Frequency	
2019	-	32
Year	Days Use Per Acre (ha)	
2019	2.0 (5.0)	

**Table 22R-27.10 - Grass Species.** Nested frequency and modified Daubenmire average cover by year.

GRASS SPECIES	Nested Frequency			
	year	Nested Frequency		
Bromus tectorum <sup>ai</sup> (cheatgrass)	8	12	9	18
Elymus elymoides (squirreltail)				
Poa secunda (Sandberg bluegrass)				
Vulpia octoflora <sup>a</sup> (sixweeks fescue)				
year	Average Cover (%)			
2019	0.0	0.1	0.0	0.0

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

**Table 22R-27.11 - Forb Species.** Nested frequency and modified Daubenmire average cover by year.

FORB SPECIES	Nested Frequency															
	year	Nested Frequency														
Astragalus (milkvetch)	12	10	9	6	49	1	6	7	8	28	28	236	0	1	10	3
Ceratocephala testiculata <sup>ai</sup> (curveseed butterwort)																
Chamaesyce (sandmat)																
Cryptantha (cryptantha)																
Descurainia pinnata <sup>a</sup> (western tansymustard)																
Draba <sup>a</sup> (draba)																
Eriogonum caespitosum (matted buckwheat)																
Eriogonum cernuum <sup>a</sup> (nodding buckwheat)																
Eriogonum umbellatum (sulphur-flower buckwheat)																
Frasera albomarginata (desert fraseria)																
Gayophytum ramosissimum <sup>a</sup> (pinyon groundsmoke)																
Gilia inconspicua <sup>a</sup> (shy gilia)																
Lappula occidentalis <sup>a</sup> (flatspine stickseed)																
Lesquerella (bladderpod)																
Phlox hoodii (spiny phlox)																
Streptanthus cordatus (heartleaf twistflower)																
year	Average Cover (%)															
2019	0.1	0.0	0.1	0.0	0.2	0.0	0.2	0.0	0.0	0.1	0.4	3.0	0.0	0.0	0.0	0.0

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

**Table 22R-27.12 - Shrub and Tree Species.** Average modified Daubenmire quadrat and line intercept cover by year.

SHRUB SPECIES	Line Intercept Cover (%)					
	year	1.9	0.1	24.2	0	13.3
Artemisia tridentata ssp. vaseyana <sup>p</sup> (mountain big sagebrush)						
Ephedra nevadensis <sup>p</sup> (Nevada jointfir)						
Juniperus osteosperma <sup>t</sup> (Utah juniper)						
Linanthus pungens (granite prickly phlox)						
Pinus edulis <sup>t</sup> (twoneedle pinyon)						
SHRUB SPECIES	Quadrat Cover (%)					
	year	1.3	0.0	16.9	0.1	8.8
Artemisia tridentata ssp. vaseyana <sup>p</sup> (mountain big sagebrush)						
Ephedra nevadensis <sup>p</sup> (Nevada jointfir)						
Juniperus osteosperma <sup>t</sup> (Utah juniper)						
Linanthus pungens (granite prickly phlox)						
Pinus edulis <sup>t</sup> (twoneedle pinyon)						

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

**Table 22R-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>									
2019	20	-	0	0	100	0	0	100	32/62
<b>Artemisia tridentata ssp. vaseyana<sup>p</sup> -- (mountain big sagebrush)</b>									
2019	1180	-	0	15	85	2	44	88	50/61
<b>Ephedra nevadensis<sup>p</sup> -- (Nevada jointfir)</b>									
2019	380	-	21	32	47	11	42	79	34/34
<b>Ephedra viridis<sup>p</sup> -- (mormon tea)</b>									
2019	-	-	-	-	-	-	-	-	62/92
<b>Juniperus osteosperma<sup>t</sup> -- (Utah juniper)</b>									
2019	160	20	0	100	0	0	0	0	- / -
<b>Linanthus pungens -- (granite prickly phlox)</b>									
2019	700	-	9	91	0	0	0	0	11/12
<b>Opuntia polyacantha -- (plains pricklypear)</b>									
2019	20	-	0	100	0	0	0	0	11/27
<b>Peraphyllum ramosissimum<sup>p</sup> -- (wild crab apple)</b>									
2019	20	-	0	100	0	0	100	0	17/23
<b>Pinus edulis<sup>t</sup> -- (twoneedle pinyon)</b>									
2019	140	220	43	57	0	0	0	0	- / -
<b>Purshia tridentata<sup>p</sup> -- (antelope bitterbrush)</b>									
2019	-	-	-	-	-	-	-	-	27/32

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

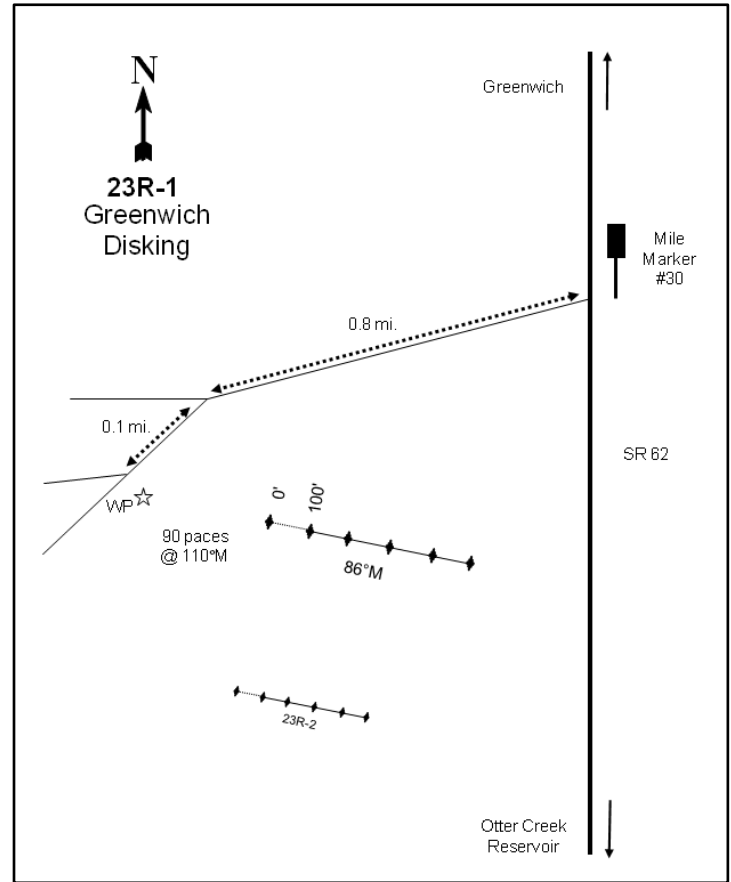
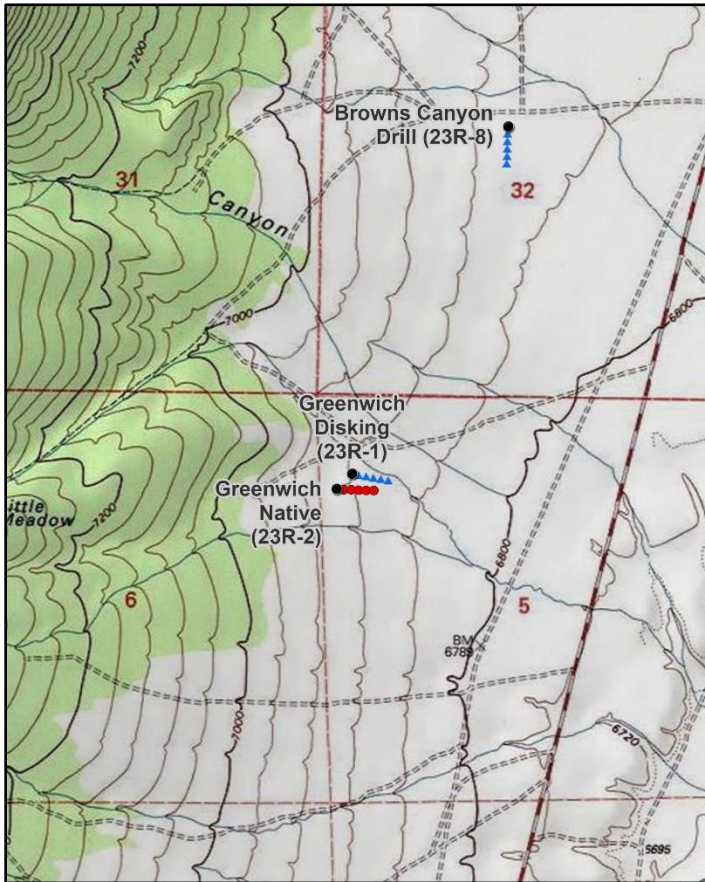
**Table 22R-27.14 - Tree Characteristics.** Point-quarter tree density, size class distribution, and average diameter.

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>							
2019	106	-	30	15	45	10	20.1
<b>Pinus edulis (twoneedle pinyon)</b>							
2019	180	5	35	20	35	5	12.3

**Table 22R-27.15 – 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
2019	2.5	0.0	0.0	0.2	0.0	1.1	0.0	3.7	Very Poor

## GREENWICH DISKING - STUDY NO. 23R-1

**Location Information**

USGS 7.5 min Map Info  
GPS (0' Stake)

Greenwich SW; Township 28S, Range 1W, Section 05  
NAD 83 UTM ZONE 12, 417971 East 4251597 North

**Transect Information**

Browse Tag # (0' Stake)	103
Transect Bearing	86° 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 on Highway 62 between Greenwich and Otter Creek Reservoir. At mile marker 30 there is a road going west: take this road for 0.8 miles to a fork. Stay right at the fork and continue for 0.1 miles to a witness post on the left (south) side of the road. Walk 90 paces at 110 degrees magnetic into the disking to the 0-foot stake. The study is marked with green, steel fenceposts approximately 12-18 inches in height.

**Site Information**

Land Ownership	Federal
Land Administrator	BLM
Allotment	NORTH NARROWS
Elevation	6,870ft (2,094m)
Aspect	Northeast
Slope	5-8%
Sample Dates	08/13/1997, 08/21/2003, 08/10/2004, 06/19/2008, 08/07/2012, 08/26/2019

**Table 23R-01.1 Disturbance History.** Recorded history of major disturbances.

Treatment/Disturbance	Name	WRI DB#	Date	Size (acres)
Disc - Unknown	-	PDB	Fall 1996	-
Seeding - Seed Unknown	-	PDB	Fall 1996	-
Harrow - One-Way Dixie	Narrows Project	PDB	November 2004	3600
Seeding - Broadcast Before	Narrows Project	PDB	November 2004	3600
Seeding - Aerial Unknown	Narrows Project	PDB	December 2004	1650

**Table 23R-01.2 Seed Mix.** List of known seeded plant species and rates (if available).

Mix Name			Application Type	Application Date	Acres
Narrows Project			Broadcast	Nov 2004	3600
Type	Species	Common Name	Cultivar/Source ID	Bulk lbs/acre	PLS
G	Achnatherum hymenoides	Indian Ricegrass		0.21	0.00
G	Achnatherum hymenoides	Indian Ricegrass		0.50	0.00
G	Agropyron cristatum	Crested Wheatgrass		1.00	0.00
G	Festuca ovina	Sheep Fescue		0.83	0.00
G	Festuca ovina	Sheep Fescue		0.08	0.00
G	Festuca ovina	Sheep Fescue		0.08	0.00
G	Leymus cinereus	Great Basin Wildrye		0.50	0.00
G	Poa secunda	Sandberg Bluegrass		0.17	0.00
G	Poa secunda	Sandberg Bluegrass		0.83	0.00
G	Psathyrostachys juncea	Russian Wildrye		0.17	0.00
G	Psathyrostachys juncea	Russian Wildrye		0.83	0.00
G	Thinopyrum intermedium	Pubescent Wheatgrass		2.00	0.00
F	Achillea millefolium	Western Yarrow		0.07	0.06
F	Astragalus cicer	Cicer Milkvetch	Lutana	0.15	0.13
F	Helianthus annuus	Annual Sunflower		0.04	0.03
F	Lactuca serriola	Prickly Lettuce	Sanpete UT	0.01	0.01
F	Linum perenne	Blue Flax		0.43	0.00
F	Linum perenne	Blue Flax		0.56	0.00
F	Medicago sativa	Alfalfa	Ladak +	1.50	1.42
F	Melilotus officinalis	Yellow Sweetclover		1.00	0.00
F	Onobrychis viciifolia	Sainfoin		1.50	1.37
F	Sanguisorba minor	Small Burnet		2.00	0.00
S	Atriplex canescens	Fourwing Saltbush		0.28	0.00
S	Atriplex canescens	Fourwing Saltbush		0.50	0.00
S	Atriplex canescens	Fourwing Saltbush		0.22	0.00

Mix Name			Application Type	Application Date	Acres
Narrows Project Browse			Aerial	Dec 2004	1650
Type	Species	Common Name	Cultivar/Source ID	Bulk lbs/acre	PLS
S	Artemisia tridentata ssp. wyomingensis	Wyoming Big Sagebrush	Sanpete UT	0.33	0.09
S	Bassia prostrata	Forage Kochia	Immigrant	0.67	0.00

**Wildlife Habitat and Vegetation History****Table 23R-01.3 - Wildlife Seasonal Habitat.** UDWR wildlife habitat and seasonality.

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

**Table 23R-01.4 - Vegetation History.** The dominant vegetation type(s) and phase of woodland succession (Tausch, Miller, Roundy, & Chambers, 2009).

Year	Vegetation Type	Woodland Succession
1997	Annual-Perennial Forb-Grass	No Encroachment
2003	Annual Forb	No Encroachment
2004	Annual Forb	No Encroachment
2008	Annual-Perennial Forb-Grass	No Encroachment
2012	Perennial Grass	No Encroachment
2019	Perennial Grass/Wyoming Big Sagebrush	No Encroachment

**Site Notes**

No Notes

**Soils****Table 23R-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	6.4	57.6	25.1	17.3	1.0	22.7	288.0	0.5	08/13/1997

**Site Potential**

1981 - 2010 Average Annual Precipitation                      9 inches  
 NRCS Ecological Site    Semidesert Loam (Wyoming Big Sagebrush)  
 NRCS Ecological Site #    R047XB222UT  
 States and Transitions    No state and transition model is available for this ecological site.

This site was dominated by introduced annual forbs, such as burningbush (*Bassia scoparia*), and perennial forbs and grasses -- mainly crested wheatgrass (*Agropyron cristatum*), intermediate wheatgrass (*Thinopyrum intermedium*), and alfalfa (*Medicago sativa*) -- upon study establishment in 1997. Perennial grasses and forbs decreased in 2003 and 2004, and the annual forb cutleaf nightshade (*Solanum triflorum*) contributed the most vegetation cover in 2003 and 2004. Annual forbs and perennial grasses and forbs again dominated in 2008. The plant community transitioned again in 2012 to one solely dominated by perennial grasses, primarily the introduced species Russian wildrye (*Psathrostachys juncea*) (Table 23R-01.7, Table 23R-01.10, Table 23R-01.11). Shrubs were initially rare on this study site. Wyoming big sagebrush (*Artemisia tridentata* ssp. *wyomingensis*), however, increased in cover following treatment and became a co-dominant vegetation component in 2019 (Table 23R-01.12, Table 23R-01.13).

**Trend Summary Tables****Table 23R-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
1997	0.7	0.1	-	-	-	-
2003	-	-	-	-	-	-
2004	-	-	-	-	-	-
2008	0.7	-	-	-	-	-
2012	5.5	-	-	4.0	-	-
2019	8.3	-	-	9.9	-	-

**Table 23R-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
1997	2	239	162	228	0.0	4.7	5.8	6.4
2003	-	-	5	-	-	-	4.9	-
2004	-	-	158	6	-	-	32.8	0.2
2008	-	221	261	34	-	7.5	3.6	4.2
2012	-	230	106	4	-	10.7	0.8	0.2
2019	4	190	209	11	0.0	13.6	2.6	0.1

**Table 23R-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
1997	51.2	0.2	20.3	4.5	4.4	15.5
2003	49.2	0.1	36.3	3.8	9.3	5.2
2004	46.2	0.0	22.1	5.4	4.3	33.4
2008	53.4	-	34.9	4.1	5.2	15.2
2012	48.1	0.0	31.4	4.9	2.3	16.9
2019	54.3	0.0	30.2	6.3	5.2	23.5

**Table 23R-01.9 - Pellet Group Data.** Quadrat frequency and pellet group transect data for animal pellets. Rabbit pellet groups are not sampled in the pellet group transect.

Year	Cattle	Mule Deer/Domestic Sheep	Rocky Mountain Elk	Greater Sage-Grouse	Rabbit
	Quadrat Frequency				
1997	-	6	-	-	11
2003	1	-	4	-	91
2004	-	3	3	-	64
2008	-	-	2	-	94
2012	1	4	5	-	54
2019	5	1	1	1	66
Year	Days Use Per Acre (ha)				
1997	-	-	-	-	-
2003	-	-	0.7 (1.7)	-	-
2004	2.9 (7.2)	-	7.4 (18.2)	-	-
2008	-	-	6.0 (14.9)	-	-
2012	8.7 (21.5)	-	11.4 (28.1)	-	-
2019	7.2 (17.9)	1.3 (3.3)	2.7 (6.6)	-	-

**Table 23R-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 tectorum <sup>ai</sup> (cheatgrass)	Elymus elymoides (squirreltail)	Festuca idahoensis (Idaho fescue)	Leymus cinereus (basin wildrye)	Poa secunda (Sandberg bluegrass)	Psathyrostachys juncea <sup>i</sup> (Russian wildrye)	Thinopyrum intermedium <sup>i</sup> (intermediate wheatgrass)
year	Nested Frequency								
1997	-	209	2	-	-	-	-	-	83
2003	-	-	-	-	-	-	-	-	-
2004	-	-	-	-	-	-	-	-	-
2008	6	21	-	12	64	2	41	159	5
2012	19	27	-	8	26	12	64	143	-
2019	3	0	4	-	-	-	37	166	-
year	Average Cover (%)								
1997	-	3.5	0.0	-	-	-	-	-	1.2
2003	-	-	-	-	-	-	-	-	-
2004	-	-	-	-	-	-	-	-	-
2008	0.1	0.1	-	0.1	0.6	0.1	0.1	6.3	0.1
2012	0.4	0.7	-	0.0	0.7	0.3	0.9	7.6	-
2019	0.0	0.0	0.0	-	-	-	0.3	13.2	-

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

**Table 23R-01.11 - Forb Species.** Nested frequency and modified Daubenmire average cover by year.

FORB SPECIES	Astragalus (milk vetch)	Bassia scoparia <sup>ai</sup> (burningbush)	Ceratocephala testiculata <sup>ai</sup> (curvseed butterwort)	Cleome serrulata <sup>a</sup> (Rocky Mountain beeplant)	Cryptantha (cryptantha)	Descurainia pinnata <sup>a</sup> (western tansymustard)	Epilobium brachycarpum <sup>a</sup> (tall annual willowherb)	Eriogonum cernuum <sup>a</sup> (nodding buckwheat)	Lactuca serriola <sup>ai</sup> (prickly lettuce)	Lappula occidentalis <sup>a</sup> (flatspine stickseed)	Linum lewisii (Lewis flax)	Marrubium vulgare <sup>i</sup> (horehound)	Medicago sativa <sup>i</sup> (alfalfa)	Mentzelia albicaulis <sup>a</sup> (whitestem blazingstar)	Nicotiana attenuata <sup>a</sup> (coyote tobacco)	Orobanche fasciculata (clustered broomrape)	Phlox longifolia (longleaf phlox)
year	Nested Frequency																
1997	2	156	-	-	-	-	7	-	-	-	-	-	226	-	-	-	-
2003	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
2004	0	-	-	4	-	0	-	-	-	1	-	-	6	-	1	-	-
2008	-	-	-	-	-	-	-	4	-	107	34	0	-	3	-	-	-
2012	1	-	3	-	3	3	-	-	1	84	-	-	-	-	-	-	-
2019	2	2	-	-	3	87	-	-	-	170	-	-	-	10	-	4	2
year	Average Cover (%)																
1997	0.0	5.7	-	-	-	-	0.1	-	-	-	-	-	6.1	-	-	-	-
2003	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
2004	0.0	-	-	1.2	-	0.0	-	-	-	0.0	-	-	0.2	-	0.1	-	-
2008	-	-	-	-	-	-	-	0.0	-	2.2	4.1	0.1	-	0.0	-	-	-
2012	0.1	-	0.0	-	0.0	0.0	-	-	0.0	0.6	-	-	-	-	-	-	-
2019	0.0	0.0	-	-	0.1	0.7	-	-	-	1.8	-	-	-	0.0	-	0.0	0.0

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

FORB SPECIES	Salsola tragus <sup>ai</sup> (prickly Russian thistle)	Sanguisorba minor <sup>i</sup> (small burnet)	Sisymbrium altissimum <sup>ai</sup> (tall tumblemustard)	Solanum triflorum <sup>a</sup> (cutleaf nightshade)
year	Nested Frequency			
1997	-	33	-	-
2003	-	-	-	5
2004	6	-	-	152
2008	233	-	-	-
2012	41	-	1	1
2019	-	-	3	2
year	Average Cover (%)			
1997	-	0.2	-	-
2003	-	-	-	4.9
2004	0.2	-	-	31.2
2008	1.3	-	-	-
2012	0.1	-	0.0	0.0
2019	-	-	0.0	0.0

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



**Table 23R-01.12 - Shrub and Tree Species.** Average modified Daubenmire quadrat and line intercept cover by year.

SHRUB SPECIES	Artemisia tridentata ssp. wyomingensis <sup>p</sup> (Wyoming big sagebrush)	Atriplex canescens <sup>p</sup> (fourwing saltbush)	Atriplex confertifolia <sup>p</sup> (shadscale saltbush)	Bassia prostrata <sup>pi</sup> (forage kochia)	Opuntia (pricklypear)
year	Line Intercept Cover (%)				
1997	-	-	-	-	-
2003	-	-	-	-	-
2004	-	-	-	-	-
2008	0	-	-	-	-
2012	3.9	-	-	0.1	-
2019	9.9	-	-	-	-
year	Quadrat Cover (%)				
1997	0.6	0.0	0.1	-	0.1
2003	-	-	-	-	-
2004	-	-	-	-	-
2008	0.7	-	-	-	-
2012	5.4	-	-	0.1	-
2019	8.3	-	-	-	-

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

**Table 23R-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 tridentata ssp. wyomingensis<sup>p</sup> -- (Wyoming big sagebrush)</b>									
1997	740	20	65	30	5	0	0	0	35/60
2003	-	-	-	-	-	-	-	-	52/78
2004	20	20	100	0	0	0	0	0	53/69
2008	300	20	20	80	0	20	0	20	32/43
2012	3740	1800	72	28	1	8	0	3	76/76
2019	2480	20	9	88	3	24	11	14	52/69
<b>Atriplex canescens<sup>p</sup> -- (fourwing saltbush)</b>									
1997	720	20	100	0	0	0	0	0	28/24
2003	-	-	-	-	-	-	-	-	-/-
2004	20	-	100	0	0	0	100	0	-/-
2008	-	-	-	-	-	-	-	-	-/-
2012	-	-	-	-	-	-	-	-	-/-
2019	-	-	-	-	-	-	-	-	-/-
<b>Bassia prostrata<sup>pi</sup> -- (forage kochia)</b>									
1997	-	-	-	-	-	-	-	-	-/-
2003	-	-	-	-	-	-	-	-	-/-
2004	-	-	-	-	-	-	-	-	-/-
2008	-	-	-	-	-	-	-	-	-/-
2012	420	80	100	0	0	38	0	0	-/-
2019	-	-	-	-	-	-	-	-	-/-

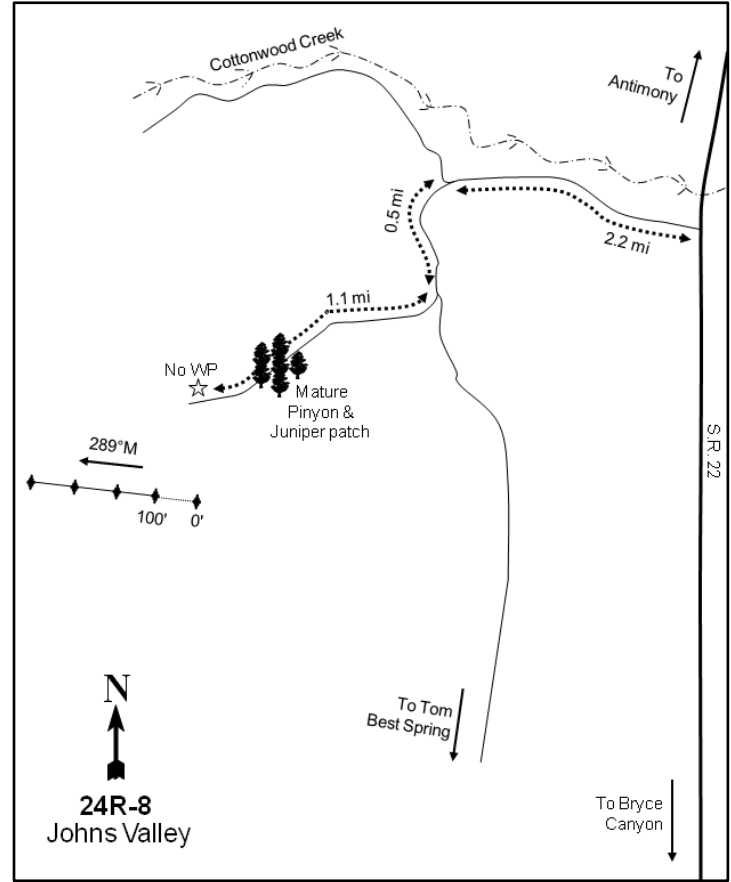
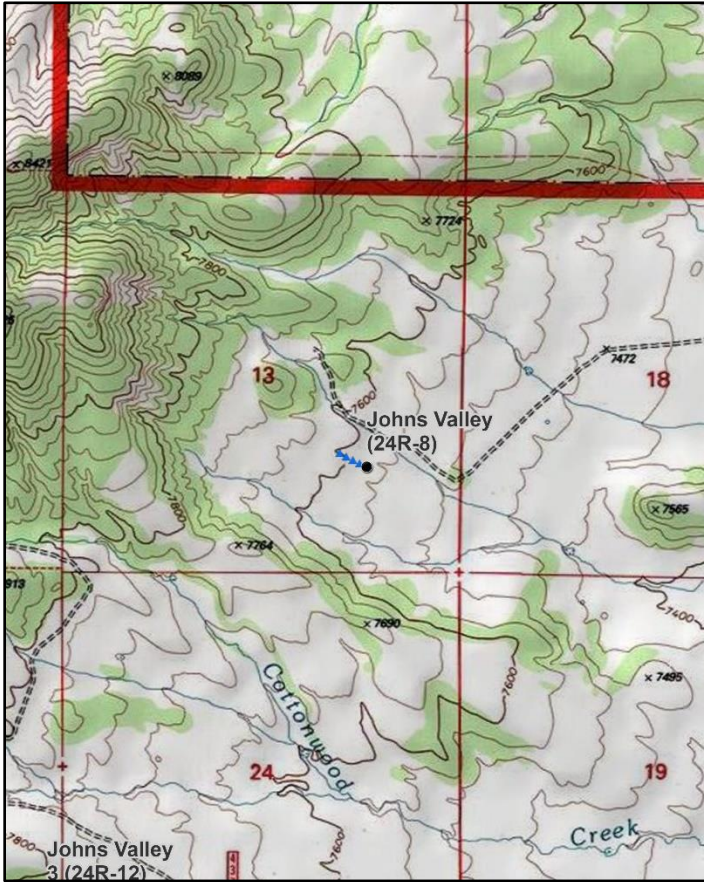
Year	Density		Age Class Distribution			Utilization		Poor Vigor (%)	Average Height Crown (cm)
	Plants Per Acre		Excluding Seedlings			Moderate (%)	Heavy (%)		
	Excluding Seedlings	Seedling	Young (%)	Mature (%)	Decadent (%)				
<b>Chrysothamnus viscidiflorus ssp. viscidiflorus var. stenophyllus -- (yellow rabbitbrush)</b>									
1997	-	-	-	-	-	-	-	-	-/-
2003	-	-	-	-	-	-	-	-	-/-
2004	-	-	-	-	-	-	-	-	-/-
2008	-	-	-	-	-	-	-	-	37/44
2012	20	-	0	100	0	0	0	100	10/7
2019	-	-	-	-	-	-	-	-	-/-
<b>Ericameria nauseosa -- (rubber rabbitbrush)</b>									
1997	-	-	-	-	-	-	-	-	-/-
2003	-	-	-	-	-	-	-	-	-/-
2004	-	-	-	-	-	-	-	-	-/-
2008	-	-	-	-	-	-	-	-	-/-
2012	-	-	-	-	-	-	-	-	81/130
2019	-	-	-	-	-	-	-	-	70/135
<b>Gutierrezia sarothrae -- (broom snakeweed)</b>									
1997	-	-	-	-	-	-	-	-	-/-
2003	-	-	-	-	-	-	-	-	-/-
2004	-	-	-	-	-	-	-	-	-/-
2008	-	-	-	-	-	-	-	-	-/-
2012	-	-	-	-	-	-	-	-	22/36
2019	-	-	-	-	-	-	-	-	24/25
<b>Opuntia -- (pricklypear)</b>									
1997	20	-	0	100	0	0	0	0	14/29

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

**Table 23R-01.15 – 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
1997	0.9	0.0	0.0	9.4	0.0	10.0	0.0	20.3	Poor
2003	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	Very Poor
2004	0.0	0.0	0.0	0.0	0.0	0.5	0.0	0.5	Very Poor
2008	0.0	0.0	0.0	15.1	0.0	8.4	0.0	23.5	Poor-Fair
2012	5.0	0.0	0.0	21.5	0.0	0.4	0.0	26.9	Poor-Fair
2019	12.4	14.0	4.5	27.2	0.0	0.2	0.0	58.2	Good

## JOHNS VALLEY - STUDY NO. 24R-8

**Location Information**

USGS 7.5 min Map Info  
GPS (0' Stake)

Cow Creek SE; Township 33S, Range 3W, Section 13  
NAD 83 UTM ZONE 12, 406657 East 4198823 North

**Transect Information**

Browse Tag # (0' Stake)	191
Transect Bearing	289° 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**

Driving from State Route 22, turn west onto Cottonwood Road. Continue west for 2.2 miles and turn right, traveling south towards Tom Best Spring. Turn right onto a two-track road and travel south for 0.5 miles. The 0-foot stake is 100 paces south of the road and is marked with browse tag #191.

**Site Information**

Land Ownership	Federal
Land Administrator	USFS
Allotment	Widtsoe C&H
Elevation	7,600ft (2,316m)
Aspect	East
Slope	4%
Sample Dates	07/13/2011, 08/18/2015, 08/28/2019

**Table 24R-08.1 Disturbance History.** Recorded history of major disturbances.

Treatment/Disturbance	Name	WRI DB#	Date	Size (acres)
Mechanical - Bullhog	2012 John's Valley Sage-Steppe Restoration	2055	January-July 2013	1236
Chaining - Chain Unknown	-	-	Historic	7685
Seeding - Seed Unknown	-	-	Historic	7685

**Wildlife Habitat and Vegetation History****Table 24R-08.3 - Wildlife Seasonal Habitat.** UDWR wildlife habitat and seasonality.

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

**Table 24R-08.4 - 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	Phase II
2015	Mountain Big Sagebrush	Phase I
2019	Mountain Big Sagebrush	Phase I

**Site Notes**

No Notes

**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	A defined state and transition model is available.

Upon study establishment in 2011, this site was in Phase II of woodland succession and was encroached by twoneedle pinyon (*Pinus edulis*), Utah juniper (*Juniperus osteosperma*), and Rocky Mountain juniper (*Juniperus scopulorum*); mountain big sagebrush (*Artemisia tridentata* ssp. *vaseyana*) was the dominant shrub species. Following the bullhog treatment in 2013 (Table 24R-08.13), tree presence was greatly reduced and sagebrush increased substantially in cover, becoming the sole dominant vegetation component in 2015 (Table 24R-08.4, Table 24R-08.12, Table 24R-08.13, Table 24R-08.14). The herbaceous understory has been abundant in all sample years. However, a majority of the herbaceous cover has been provided by mainly native perennial grasses and graminoids, including obtuse sedge (*Carex obtusata*), blue grama (*Bouteloua gracilis*), and needle and thread (*Hesperostipa comata*); forbs have remained comparatively rare (Table 24R-08.7, Table 24R-08.10, Table 24R-08.11). This mountain big sagebrush-dominated plant community may be comparable to the Mountain Big Sagebrush-steppe/Introduced Non-natives State as is illustrated by the available state and transition model (Jornada, 2019). Although currently in Phase I of succession as of 2019 (Table 24R-08.4), continued presence of trees suggests that there may be potential for infilling in future years.

**Trend Summary Tables**

**Table 24R-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
2011	10.2	0.8	6.5	15.6	1.3	16.2
2015	13.9	1.6	0.1	18.9	0.6	0.3
2019	14.5	0.9	0.4	25.3	1.2	0.3

**Table 24R-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
2011	-	335	46	102	-	13.2	0.2	1.7
2015	-	346	3	65	-	22.7	0.0	0.8
2019	-	355	34	100	-	23.1	0.4	2.2

**Table 24R-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
2011	44.5	2.1	27.6	4.0	6.8	30.1
2015	33.5	1.1	47.9	2.1	8.1	33.9
2019	32.0	2.2	46.6	4.9	7.9	33.3

**Table 24R-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			
2011	1	9	2	28
2015	-	1	-	19
2019	4	5	5	31
Days Use Per Acre (ha)				
2011	1.5 (3.6)	6.0 (14.9)	4.7 (11.6)	-
2015	2.2 (5.4)	2.0 (5.0)	0.7 (1.7)	-
2019	2.9 (7.2)	1.3 (3.3)	7.4 (18.2)	-

**Table 24R-08.10 - Grass Species.** Nested frequency and modified Daubenmire average cover by year.

GRASS SPECIES	Achmatherum hymenoides (Indian ricegrass)	Achmatherum lettermanii (Letterman's needlegrass)	Agropyron cristatum <sup>i</sup> (crested wheatgrass)	Bouteloua gracilis (blue grama)	Carex obtusata (obtuse sedge)	Elymus elymoides (squirreltail)	Elymus lanceolatus (thickspike wheatgrass)	Hesperostipa comata (needle and thread)	Poa fendleriana (muttongrass)
year	Nested Frequency								
2011	3	3	102	85	201	29	7	85	17
2015	5	18	55	122	225	38	25	64	-
2019	6	18	49	114	264	12	25	79	13
year	Average Cover (%)								
2011	0.2	0.0	3.2	1.5	5.9	0.5	0.0	1.6	0.3
2015	0.2	1.0	3.3	7.7	5.7	1.2	0.8	2.9	-
2019	0.3	0.3	2.9	3.6	11.6	0.1	0.1	3.7	0.3

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

**Table 24R-08.11 - Forb Species.** Nested frequency and modified Daubenmire average cover by year.

FORB SPECIES	Chaenactis douglasii (Douglas' dustymaiden)	Cryptantha (cryptantha)	Descurainia pinnata <sup>a</sup> (western tansymustard)	Draba <sup>a</sup> (draba)	Erigeron divergens <sup>a</sup> (spreading 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)	Hymenopappus filifolius (fineleaf hymenopappus)	Lotus utahensis (Utah bird's-foot trefoil)	Lygodesmia (skeletonplant)	Machaeranthera canescens (hoary tansyaster)	Packera multilobata (lobeleaf groundsel)	Penstemon comarrhenus (dusty beardtongue)	Phlox longifolia (longleaf phlox)
year	Nested Frequency																
2011	1	11	16	3	3	6	3	21	-	27	6	30	-	2	1	2	5
2015	-	13	-	-	-	-	9	13	5	3	10	12	-	-	3	1	3
2019	2	20	10	-	-	5	3	12	1	27	10	29	2	-	5	6	6
year	Average Cover (%)																
2011	0.0	0.1	0.0	0.0	0.1	0.0	0.0	0.3	-	0.1	0.2	0.4	-	0.0	0.0	0.3	0.0
2015	-	0.1	-	-	-	-	0.1	0.1	0.1	0.0	0.3	0.1	-	-	0.0	0.0	0.0
2019	0.0	0.2	0.0	-	-	0.0	0.3	0.5	0.0	0.3	0.3	0.5	0.0	-	0.1	0.0	0.0

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

FORB SPECIES	Sphaeralcea coccinea (scarlet globemallow)	Tragopogon dubius <sup>ai</sup> (yellow salsify)	Trifolium gymnocarpon (hollyleaf clover)
year	Nested Frequency		
2011	4	0	32
2015	8	-	2
2019	17	-	12
year	Average Cover (%)		
2011	0.0	0.0	0.2
2015	0.0	-	0.0
2019	0.3	-	0.0

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

**Table 24R-08.12 - 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)	6.6	7.8	-	-	-	1	4.4	0.3	-	-	-	11.8	1.2	
Artemisia tridentata ssp. vaseyana <sup>p</sup> (mountain big sagebrush)	7.2	10.3	0	-	-	0.3	0.2	0.3	-	-	-	0.1	1.4	
Cercocarpus ledifolius <sup>p</sup> (curl-leaf mountain mahogany)	8.8	15	0.2	0.2	0.2	0.7	-	0.1	-	-	-	0.3	1.3	
Chrysothamnus viscidiflorus ssp. viscidiflorus var. viscidiflorus (yellow rabbitbrush)														
Ericameria nauseosa (rubber rabbitbrush)														
Gutierrezia sarothrae (broom snakeweed)														
Juniperus scopulorum <sup>t</sup> (Rocky Mountain juniper)														
Linanthus pungens (granite prickly phlox)														
Opuntia (pricklypear)														
Opuntia polyacantha (plains pricklypear)														
Pediocactus simpsonii (mountain ball cactus)														
Pinus edulis <sup>t</sup> (twoneedle pinyon)														
Purshia tridentata <sup>p</sup> (antelope bitterbrush)														
year	Quadrat Cover (%)													
2011	4.9	4.9	-	-	-	0.4	3.4	0.4	-	-	0.0	3.1	0.4	
2015	3.9	9.4	0.0	-	0.0	1.1	0.1	0.5	0.0	-	-	0.0	0.6	
2019	4.7	9.4	0.0	0.1	0.0	0.3	0.4	0.5	0.0	0.0	-	0.0	0.4	

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

**Table 24R-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 nova<sup>p</sup> -- (black sagebrush)</b>									
2011	2600	60	12	65	23	2	0	15	32/58
2015	2100	40	1	89	11	16	77	5	30/57
2019	2680	-	2	73	25	4	5	25	31/61
<b>Artemisia tridentata ssp. vaseyana<sup>p</sup> -- (mountain big sagebrush)</b>									
2011	1660	40	0	58	42	42	1	16	55/92
2015	2220	-	16	78	6	18	23	5	50/78
2019	1740	-	10	83	7	38	0	12	67/105
<b>Cercocarpus ledifolius<sup>p</sup> -- (curl-leaf mountain mahogany)</b>									
2011	20	-	0	100	0	0	100	0	66/84
2015	20	-	0	100	0	0	100	0	55/69
2019	20	-	0	100	0	0	100	0	80/86
<b>Chrysothamnus viscidiflorus ssp. viscidiflorus var. viscidiflorus -- (yellow rabbitbrush)</b>									
2011	20	-	0	100	0	0	0	0	14/28
2015	-	-	-	-	-	-	-	-	14/25
2019	40	-	0	100	0	0	0	0	26/37
<b>Ericameria nauseosa -- (rubber rabbitbrush)</b>									
2011	-	-	-	-	-	-	-	-	88/85
2015	20	-	100	0	0	0	0	0	41/26
2019	80	-	25	75	0	0	0	0	75/67
<b>Gutierrezia sarothrae -- (broom snakeweed)</b>									
2011	1580	-	1	99	0	0	0	0	21/22
2015	1360	-	22	77	2	0	0	2	23/26
2019	1140	-	4	97	0	0	0	0	21/20
<b>Juniperus scopulorum<sup>t</sup> -- (Rocky Mountain juniper)</b>									
2011	40	-	0	100	0	0	0	0	- / -
2015	20	-	0	100	0	0	0	0	- / -
2019	20	-	0	100	0	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 (%)				
<b>Linanthus pungens -- (granite prickly phlox)</b>									
2011	560	-	4	82	14	0	0	0	16/21
2015	460	-	0	100	0	0	13	0	16/23
2019	340	-	6	94	0	0	0	0	20/27
<b>Opuntia polyacantha -- (plains pricklypear)</b>									
2011	-	-	-	-	-	-	-	-	-/-
2015	-	-	-	-	-	-	-	-	-/-
2019	20	-	100	0	0	0	0	0	16/69
<b>Opuntia -- (pricklypear)</b>									
2011	20	-	0	100	0	0	0	0	14/43
2015	40	-	0	100	0	0	0	0	10/18
2019	60	-	0	100	0	0	0	0	10/33
<b>Pediocactus simpsonii -- (mountain ball cactus)</b>									
2011	40	-	0	100	0	0	0	0	4/4
2015	-	-	-	-	-	-	-	-	-/-
2019	-	-	-	-	-	-	-	-	-/-
<b>Pinus edulis<sup>t</sup> -- (twoneedle pinyon)</b>									
2011	180	-	33	67	0	0	0	0	- / -
2015	40	40	100	0	0	0	0	0	- / -
2019	60	20	67	33	0	0	0	0	- / -
<b>Purshia tridentata<sup>p</sup> -- (antelope bitterbrush)</b>									
2011	40	-	0	100	0	100	0	0	48/91
2015	100	-	40	60	0	40	60	0	48/89
2019	200	-	0	100	0	0	100	0	67/113
<b>Ribes<sup>p</sup> -- (currant)</b>									
2011	-	-	-	-	-	-	-	-	-/-
2015	-	-	-	-	-	-	-	-	25/30

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

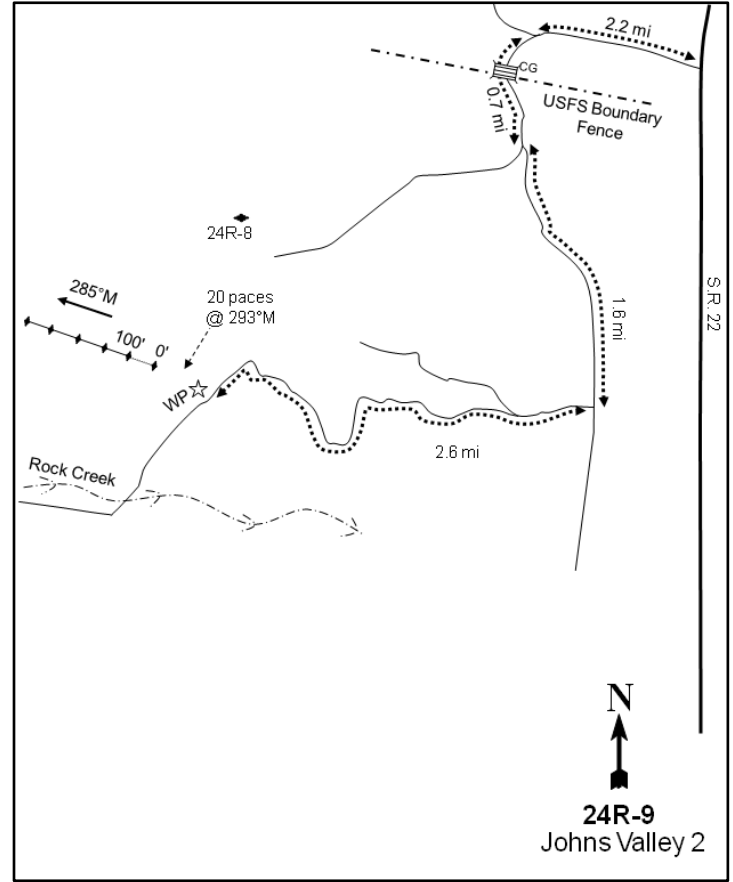
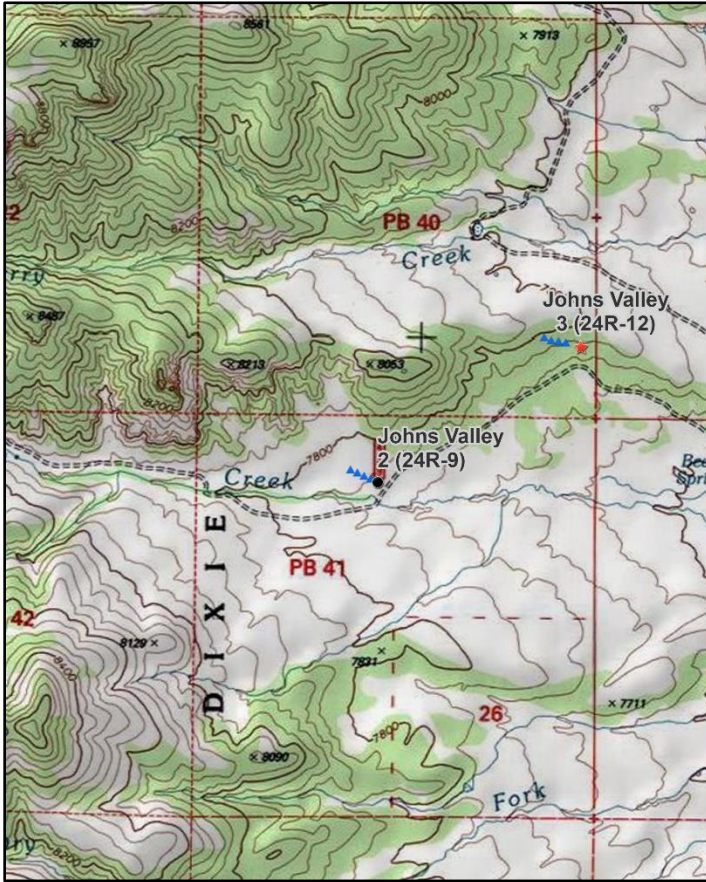
**Table 24R-08.14 - Tree Characteristics.** Point-quarter tree density, size class distribution, and average diameter.

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>							
2011	4	-	25	25	25	25	12.0
2015	2	-	100	-	-	-	21.0
<b>Juniperus scopulorum (Rocky Mountain juniper)</b>							
2011	17	8	8	33	33	17	13.5
2015	14	10	40	50	-	-	11.8
2019	14	-	33	67	-	-	6.4
<b>Pinus edulis (twoneedle pinyon)</b>							
2011	80	-	5	26	37	32	13.8
2015	18	29	71	-	-	-	3.0
2019	23	36	64	-	-	-	2.7

**Table 24R-08.15 – 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
2011	19.8	5.7	2.6	26.5	0.0	3.4	0.0	58.0	Fair
2015	24.0	12.8	6.1	30.0	0.0	1.6	0.0	74.4	Good
2019	30.0	11.2	3.4	30.0	0.0	4.4	0.0	79.1	Good-Excellent

## JOHNS VALLEY 2 - STUDY NO. 24R-9

**Location Information**

USGS 7.5 min Map Info  
GPS (0' Stake)

Cow Creek SW; Township 33S, Range 3W, Section 41  
NAD 83 UTM ZONE 12, 404537 East 4196535 North

**Transect Information**

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

9153  
285° magnetic  
400ft  
Line 1 (11ft & 95ft), Line 2 (34ft), Line 3 (59ft), Line 4 (71ft)  
Belts 1, 4, 5: No Rebar

**Directions to Site**

From Johns Valley Road, travel 2.2 miles west on Cottonwood Road, then turn right. Travel 0.3 miles to the U.S. Forest Service boundary. Continue for 0.4 miles to a fork in the road. Stay left at the fork, continue for 1.6 miles, and turn right. Travel for 2.6 miles to a witness post on the right (north) side of the road. From the witness post, walk 20 paces at 293 degrees magnetic to the 0-foot stake.

**Site Information**

Land Ownership	Federal
Land Administrator	USFS
Allotment	Widtsoe C&H
Elevation	7,770ft (2,368m)
Aspect	East
Slope	8%
Sample Dates	08/08/2012, 08/19/2015, 08/28/2019

**Table 24R-09.1 Disturbance History.** Recorded history of major disturbances.

Treatment/Disturbance	Name	WRI DB#	Date	Size (acres)
Chaining - Chain Unknown	-	-	Historic	7685
Seeding - Seed Unknown	-	-	Historic	7685
Mechanical - Bullhog	-	-	2012	-

**Wildlife Habitat and Vegetation History****Table 24R-09.3 - Wildlife Seasonal Habitat.** UDWR wildlife habitat and seasonality.

Species	Habitat	Season
Mule Deer	crucial	winter
Rocky Mountain Elk	crucial	winter

**Table 24R-09.4 - Vegetation History.** The dominant vegetation type(s) and phase of woodland succession (Tausch, Miller, Roundy, & Chambers, 2009).

Year	Vegetation Type	Woodland Succession
2012	Mixed Shrub	Phase I
2015	Perennial Grass/Mixed Shrub	Phase I
2019	Perennial Grass/Mixed Shrub	Phase I

**Site Notes**

No Notes

**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	A defined state and transition model is available.

Since study establishment in 2012, this site has been co-dominated by basin big sagebrush (*Artemisia tridentata* ssp. *tridentata*), yellow rabbitbrush (*Chrysothamnus viscidiflorus* ssp. *viscidiflorus* var. *viscidiflorus*), and rubber rabbitbrush (*Ericameria nauseosa*). Following the 2012 sampling, a bullhog treatment (Table 24R-09.1) removed most of the Rocky Mountain juniper (*Juniperus scopulorum*) trees that were scattered throughout the site (Table 24R-09.12, Table 24R-09.13, Table 24R-09.14). The herbaceous understory has remained abundant but has not been overly diverse. The introduced perennial grass species crested wheatgrass (*Agropyron cristatum*) has provided much of the herbaceous cover throughout the study period, and perennial grasses have been a co-dominant vegetation component since 2015 (Table 24R-09.7, Table 24R-09.10). The basin big sagebrush-yellow rabbitbrush-rubber rabbitbrush community that characterizes this state is not illustrated by the available state and transition model (Jornada, 2019). Although the site is classified as being within Phase I of woodland succession as of 2019 (Table 24R-09.4), continued tree presence indicates that there may be potential for infilling in future sample years.

## Trend Summary Tables

**Table 24R-09.6 - Shrub/Tree Summary.** Average modified Daubenmire quadrat and line intercept cover by year for shrubs/trees

Year	Quadrat Cover (%)			Line-intercept Cover (%)		
	Preferred Shrub	Other Shrub	Tree	Preferred Shrub	Other Shrub	Tree
2012	10.4	13.1	3.2	11.3	18.0	3.5
2015	9.2	15.4	-	12.5	21.5	-
2019	13.1	17.1	-	15.4	25.9	-

**Table 24R-09.7 - Herbaceous Summary.** Nested frequency and average modified Daubenmire quadrat cover by year for herbaceous functional groups

Year	Nested Frequency				Quadrat Cover (%)			
	Annual Grass	Perennial Grass	Annual/Biennial Forb	Perennial Forb	Annual Grass	Perennial Grass	Annual/Biennial Forb	Perennial Forb
2012	-	340	-	56	-	15.0	-	3.9
2015	0	353	-	52	0.0	26.2	-	2.6
2019	-	355	1	60	-	26.7	0.1	2.1

**Table 24R-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
2012	40.5	1.1	33.7	0.8	0.6	41.0
2015	35.0	0.2	49.9	0.9	1.1	43.5
2019	34.1	0.2	42.5	2.9	2.0	49.1

**Table 24R-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				
2012	8	8	2	-	2
2015	7	5	3	-	19
2019	6	13	3	-	31
Year	Days Use Per Acre (ha)				
2012	32.7 (80.7)	-	6.0 (14.9)	-	-
2015	26.8 (66.3)	-	7.4 (18.2)	-	-
2019	8.0 (19.7)	8.7 (21.5)	14.1 (34.8)	0.6 (1.4)	-

**Table 24R-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)	Bouteloua gracilis (blue grama)	Bromus tectorum <sup>ai</sup> (cheatgrass)	Carex (sedge)	Hesperostipa comata (needle and thread)	Pascopyrum smithii (western wheatgrass)
year	Nested Frequency						
2012	6	294	3	-	4	-	71
2015	0	314	-	0	-	4	82
2019	8	305	-	-	-	4	89
year	Average Cover (%)						
2012	0.1	13.3	0.0	-	0.4	-	1.2
2015	0.0	24.5	-	0.0	-	0.0	1.5
2019	0.2	24.4	-	-	-	0.1	2.0

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

**Table 24R-09.11 - Forb Species.** Nested frequency and modified Daubenmire average cover by year.

FORB SPECIES	Arabis (rockcress)	Astragalus kentrophyta (spiny milkvetch)	Calochortus nuttallii (sego lily)	Castilleja angustifolia (northwestern Indian paintbrush)	Castilleja linariifolia (Wyoming Indian paintbrush)	Cordylanthus <sup>a</sup> (bird's-beak)	Cryptantha (cryptantha)	Erigeron pumilus (shaggy fleabane)	Ipomopsis aggregata (scarlet gilia)	Lupinus argenteus (silvery lupine)	Medicago sativa <sup>1</sup> (alfalfa)	Packera multilobata (lobeleaf groundsel)	Penstemon (beardtongue)	Phlox longifolia (longleaf phlox)	Pleiacanthus spinosus (thorn skeletonweed)	Sphaeralcea coccinea (scarlet globemallow)	Streptanthus cordatus (heartleaf twistflower)
year	Nested Frequency																
2012	-	-	-	9	-	-	-	5	-	20	2	2	11	6	3	2	-
2015	7	0	-	4	-	-	1	5	4	10	1	11	9	-	3	-	-
2019	-	-	4	3	29	1	7	4	-	8	-	-	12	-	-	3	2
year	Average Cover (%)																
2012	-	-	-	0.2	-	-	-	0.0	-	3.3	0.1	0.0	0.1	0.0	0.1	0.0	-
2015	0.0	0.0	-	0.0	-	-	0.0	0.0	0.0	2.0	0.0	0.1	0.1	-	0.4	-	-
2019	-	-	0.0	0.0	0.7	0.1	0.1	0.1	-	0.9	-	-	0.3	-	-	0.0	0.0

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

FORB SPECIES	Symphytotrichum (aster)
year	Nested Frequency
2012	2
2015	-
2019	-
year	Average Cover (%)
2012	0.0
2015	-
2019	-

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

**Table 24R-09.12 - Shrub and Tree Species.** Average modified Daubenmire quadrat and line intercept cover by year.

SHRUB SPECIES	Line Intercept Cover (%)										
	year										
Artemisia frigida <sup>p</sup> (prairie sagewort)	0.1	10.8	5.4	11.1	1.2	3.5	-	0.3	0	0.4	-
Artemisia tridentata ssp. tridentata <sup>p</sup> (basin big sagebrush)	-	12.5	9.9	10.4	0.7	-	0.1	0.2	-	-	0.2
Chrysothamnus viscidiflorus ssp. viscidiflorus var. viscidiflorus (yellow rabbitbrush)	-	15.4	12.3	10.3	3.3	-	-	-	-	-	0
Ericameria nauseosa (rubber rabbitbrush)	Quadrat Cover (%)										
Gutierrezia sarothrae (broom snakeweed)	0.1	9.9	4.2	7.5	0.8	3.2	-	0.6	0.0	0.4	0.0
Juniperus scopulorum <sup>t</sup> (Rocky Mountain juniper)	0.2	9.1	6.3	7.6	1.3	-	0.0	0.2	-	-	0.0
Linanthus pungens (granite prickly phlox)	0.1	12.9	7.6	7.4	1.9	-	0.0	0.1	-	0.0	0.0
Opuntia polyacantha (plains pricklypear)	0.1	9.9	4.2	7.5	0.8	3.2	-	0.6	0.0	0.4	0.0
Pinus edulis <sup>t</sup> (twoneedle pinyon)	0.2	9.1	6.3	7.6	1.3	-	0.0	0.2	-	-	0.0
Symphoricarpos oreophilus <sup>p</sup> (mountain snowberry)	0.1	12.9	7.6	7.4	1.9	-	0.0	0.1	-	0.0	0.0
Tetradymia canescens (spineless horsebrush)	0.1	9.9	4.2	7.5	0.8	3.2	-	0.6	0.0	0.4	0.0

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

**Table 24R-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 frigida<sup>p</sup> -- (prairie sagewort)</b>									
2012	80	-	0	100	0	0	0	0	17/24
2015	80	-	0	100	0	75	25	0	20/30
2019	100	-	20	80	0	0	0	0	28/23
<b>Artemisia tridentata ssp. tridentata<sup>p</sup> -- (basin big sagebrush)</b>									
2012	1540	40	4	87	9	30	7	3	89/118
2015	1360	20	6	78	16	24	4	13	88/112
2019	1420	-	9	82	10	18	0	20	95/125
<b>Bassia prostrata<sup>pi</sup> -- (forage kochia)</b>									
2012	-	-	-	-	-	-	-	-	-/-
2015	20	-	0	100	0	0	0	0	-/-
2019	-	-	-	-	-	-	-	-	-/-
<b>Chrysothamnus viscidiflorus ssp. viscidiflorus var. viscidiflorus -- (yellow rabbitbrush)</b>									
2012	2200	-	3	93	5	3	0	8	37/54
2015	2820	-	4	93	3	15	13	4	47/61
2019	3140	-	4	94	2	0	0	2	50/61
<b>Ericameria nauseosa -- (rubber rabbitbrush)</b>									
2012	1260	-	6	76	18	10	0	0	102/110
2015	1320	-	14	71	15	11	5	17	91/114
2019	1100	-	7	69	24	2	0	27	99/125
<b>Gutierrezia sarothrae -- (broom snakeweed)</b>									
2012	660	-	6	94	0	0	0	0	25/33
2015	1720	180	8	92	0	0	0	0	27/35
2019	2540	-	4	96	0	0	0	0	27/31
<b>Juniperus scopulorum<sup>t</sup> -- (Rocky Mountain juniper)</b>									
2012	100	-	20	80	0	0	0	0	-/-
2015	-	-	-	-	-	-	-	-	-/-
2019	-	20	0	0	0	0	0	0	-/-

Year	Density		Age Class Distribution			Utilization		Poor Vigor (%)	Average Height Crown (cm)
	Plants Per Acre		Excluding Seedlings			Moderate (%)	Heavy (%)		
	Excluding Seedlings	Seedling	Young (%)	Mature (%)	Decadent (%)				
<b>Linanthus pungens -- (granite prickly phlox)</b>									
2012	-	-	-	-	-	-	-	-	-/-
2015	120	-	0	100	0	0	0	0	9/8
2019	300	-	0	100	0	0	0	0	17/23
<b>Opuntia polyacantha -- (plains pricklypear)</b>									
2012	100	-	0	100	0	0	0	0	12/34
2015	120	-	0	100	0	0	0	0	11/26
2019	120	-	0	100	0	0	0	0	11/25
<b>Pinus edulis<sup>t</sup> -- (twoneedle pinyon)</b>									
2012	20	-	100	0	0	0	0	0	- / -
2015	-	-	-	-	-	-	-	-	-/-
2019	-	-	-	-	-	-	-	-	-/-
<b>Purshia tridentata<sup>p</sup> -- (antelope bitterbrush)</b>									
2012	-	-	-	-	-	-	-	-	-/-
2015	-	-	-	-	-	-	-	-	-/-
2019	-	160	0	0	0	0	0	0	- / -
<b>Symphoricarpos oreophilus<sup>p</sup> -- (mountain snowberry)</b>									
2012	20	-	0	100	0	0	0	0	41/69
2015	-	-	-	-	-	-	-	-	65/111
2019	20	-	0	100	0	0	0	0	55/139
<b>Tetradymia canescens -- (spineless horsebrush)</b>									
2012	80	-	25	75	0	0	0	0	27/44
2015	140	-	14	86	0	0	29	0	21/25
2019	140	-	0	100	0	0	0	0	34/38

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

**Table 24R-09.14 - Tree Characteristics.** Point-quarter tree density, size class distribution, and average diameter.

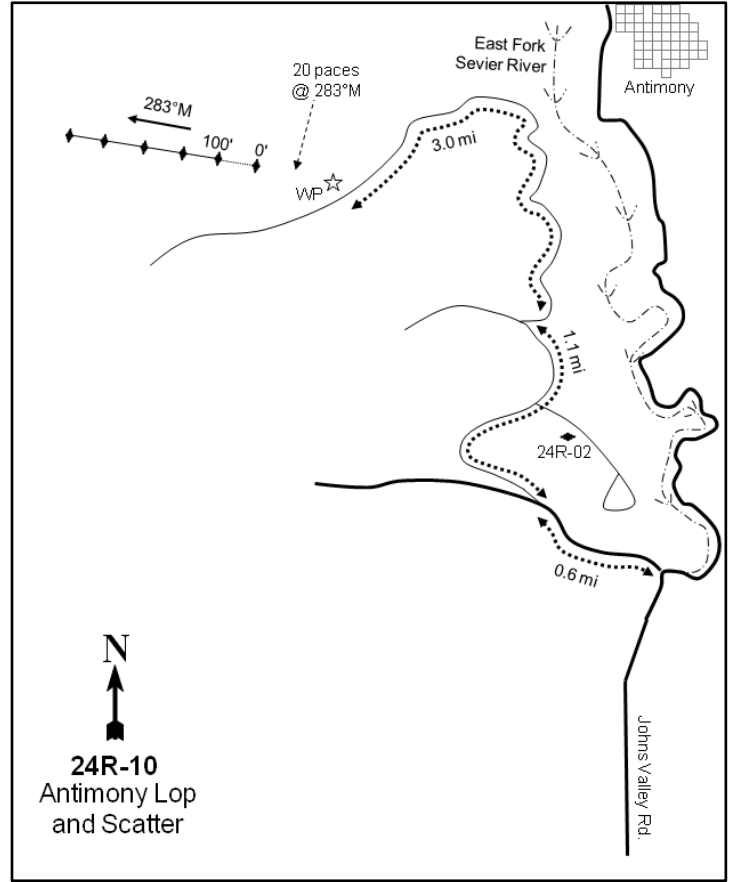
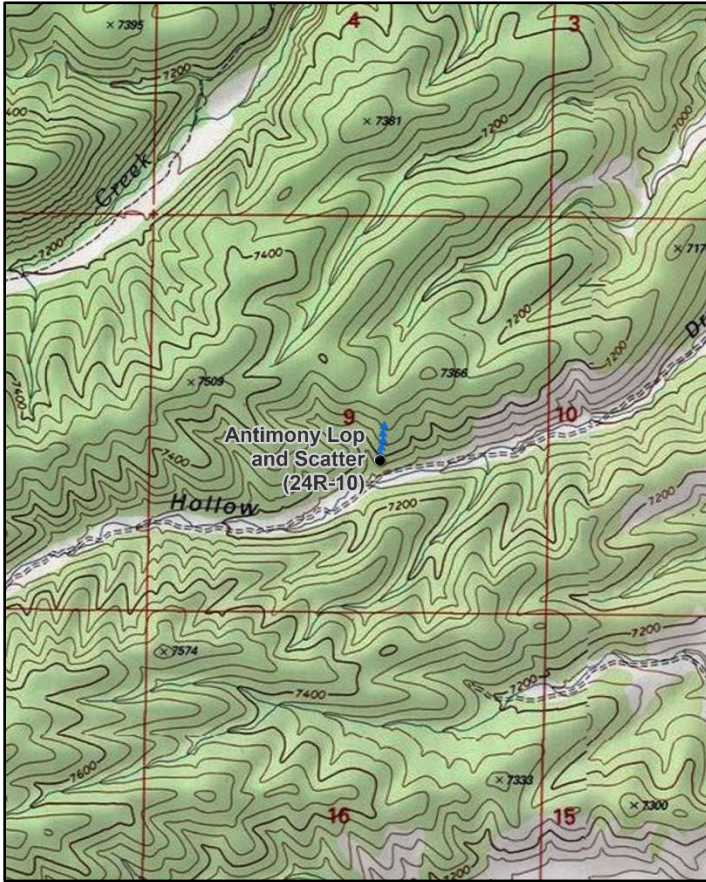
Year	Density	Size Class Distribution					Average Diameter (cm)
	Trees per Acre	Seedling (%)	1-4' (%)	4-8' (%)	8-12' (%)	>12' (%)	
<b>Juniperus scopulorum (Rocky Mountain juniper)</b>							
2012	74	-	8	8	31	54	23.6
2015	8	-	67	33	-	-	14.7
2019	9	-	-	100	-	-	5.0
<b>Pinus edulis (twoneedle pinyon)</b>							
2012	7	-	50	-	50	-	6.5
2015	7	-	100	-	-	-	2.5
2019	14	-	100	-	-	-	4.0

**Table 24R-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
2012	14.0	12.4	1.9	29.9	0.0	7.8	0.0	65.9	Fair-Good
2015	15.6	10.1	3.0	30.0	0.0	5.3	0.0	64.0	Fair-Good
2019	19.3	12.0	4.3	30.0	0.0	4.2	0.0	69.7	Good



## ANTIMONY LOP AND SCATTER - STUDY NO. 24R-10



### Location Information

USGS 7.5 min Map Info  
GPS (0' Stake)

Deep Creek SE; Township 32S, Range 2W, Section 09  
NAD 83 UTM ZONE 12, 411332 East 4210195 North

### Transect Information

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

Not Available  
347° magnetic  
500ft  
Line 1 (11ft), Line 2 (34ft), Line 3 (59ft), Line 4 (71ft), Line 5 (95ft)  
Belt 3: No Rebar

### Directions to Site

From Johns Valley Road near Deer Creek, travel 0.6 miles and turn right. Travel 1.1 miles and continue for another 3.0 miles to a parking spot and witness post on the right (north) side of the road. Using a GPS, walk to the 0-foot stake of the new transect that is in the chained area.

**Site Information**

Land Ownership	Federal
Land Administrator	BLM
Allotment	PINE CREEK ANTIMONY
Elevation	7,200ft (2,195m)
Aspect	South
Slope	30-40%
Sample Dates	08/08/2012, 08/18/2015, 08/28/2019

**Table 24R-10.1 Disturbance History.** Recorded history of major disturbances.

Treatment/Disturbance	Name	WRI DB#	Date	Size (acres)
Hand Crew - Lop and Scatter	Antimony Fuels Reduction and Habitat Improvement FY14	2597	November 2014-February 2015	587
Fire - Prescribed	Antimony Fuels Reduction and Habitat Improvement FY14	2597	November 2014-February 2015	736

**Wildlife Habitat and Vegetation History****Table 24R-10.3 - Wildlife Seasonal Habitat.** UDWR wildlife habitat and seasonality.

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

**Table 24R-10.4 - 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	Perennial Grass	No Encroachment
2019	Perennial Grass-Annual Forb	Phase I

**Site Notes**

When the site was established in 2012, the lop and scatter treatment had already occurred a few week prior. To better capture pre-treatment data, the site was placed in an untreated portion of the project. Then in 2015 the site was moved a few hundred feet to be within the treatment area. The pre-treatment and post-treatment transects are very similar and for the purposes of this report are considered to be the same study site and are being analyzed together.

**Site Potential**

1981 - 2010 Average Annual Precipitation	11 inches
NRCS Ecological Site	Upland Stony Loam (Mountain Big Sagebrush)
NRCS Ecological Site #	R047XB336UT
States and Transitions	A defined state and transition model is available.

When the study was established in 2012, this site was in Phase III of woodland succession with Utah juniper (*Juniperus osteosperma*) providing most of the vegetation cover (Table 24R-10.4, Table 24R-10.14). Forbs and grasses were moderately sparse and not very diverse. After the lop and scatter and prescribed burn treatment (Table 24R-10.1), perennial grass and forb cover increased with perennial grasses species being the dominant vegetation component in 2015. Annual forbs increased in 2019 and became co-dominant along with perennial grasses (Table 24R-10.7, Table 24R-10.10, Table 24R-10.11). This perennial grass-annual forb community may function similarly to the increased perennial grasses/scattered shrub Phase within the Native Perennial Grasses State that is illustrated by the state and transition model (Jornada, 2019). Although pinyon and juniper were absent in the first post-treatment sample year, they have begun to re-establish as of 2019 (Table 24R-10.14). The re-establishment and increase of trees indicates that the site may have the potential for further infilling as time since treatment increases.

**Trend Summary Tables**

**Table 24R-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
2012	1.1	0.2	16.0	1.7	-	25.7
2015	0.1	2.0	-	0.1	0.5	-
2019	0.2	0.7	-	0.6	0.9	-

**Table 24R-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
2012	-	144	35	42	-	4.5	0.2	0.6
2015	2	256	54	25	0.0	16.9	3.0	1.6
2019	66	314	294	56	1.5	22.9	17.4	1.6

**Table 24R-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
2012	10.8	0.0	29.0	29.8	32.5	22.1
2015	31.0	0.8	10.5	28.8	30.3	20.7
2019	17.4	-	15.3	26.8	35.8	35.0

**Table 24R-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			
2012	-	3	-	2
2015	-	2	-	9
2019	10	-	-	5
Year	Days Use Per Acre (ha)			
2012	-	6.7 (16.6)	-	-
2015	1.5 (3.6)	-	0.7 (1.7)	-
2019	3.6 (9.0)	0.7 (1.7)	0.7 (1.7)	-

**Table 24R-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 tectorum <sup>ai</sup> (cheatgrass)	Carex (sedge)	Elymus elymoides (squirreltail)	Hesperostipa comata (needle and thread)	Poa fendleriana (muttongrass)	Poa secunda (Sandberg bluegrass)	Sporobolus cryptandrus (sand dropseed)
year	Nested Frequency										
2012	-	-	-	132	-	4	-	9	-	-	-
2015	14	3	-	178	2	-	78	68	0	-	-
2019	34	-	2	224	66	-	61	125	7	1	6
year	Average Cover (%)										
2012	-	-	-	4.4	-	0.0	-	0.1	-	-	-
2015	1.5	0.0	-	8.1	0.0	-	2.3	4.9	0.0	-	-
2019	1.3	-	0.0	13.8	1.5	-	1.5	6.2	0.0	0.0	0.1

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

**Table 24R-10.11 - Forb Species.** Nested frequency and modified Daubenmire average cover by year.

FORB SPECIES	Alicia hutchinsifolia <sup>a</sup> (desert pale gilia)	Arabis (rockcress)	Astragalus brandegeei (Brandegee's milkvetch)	Astragalus lentiginosus (freckled milkvetch)	Calochortus nuttallii (sego lily)	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)	Gilia inconspicua <sup>a</sup> (shy gilia)	Lactuca serriola <sup>ai</sup> (prickly lettuce)	Lappula occidentalis <sup>a</sup> (flatspine stickseed)	Lupinus brevicaulis <sup>a</sup> (shortstem lupine)	Lygodesmia juncea (rush skeletonplant)	Mentzelia albicaulis <sup>a</sup> (whitestem blazingstar)
year	Nested Frequency																
2012	-	6	-	26	-	6	-	-	-	35	4	-	-	-	-	-	-
2015	-	-	-	4	1	-	1	18	-	6	-	9	-	-	-	0	7
2019	21	-	23	15	-	-	39	85	1	102	-	95	16	48	56	0	68
year	Average Cover (%)																
2012	-	0.0	-	0.6	-	0.0	-	-	-	0.2	0.0	-	-	-	-	-	-
2015	-	-	-	0.0	0.0	-	0.2	1.0	-	0.2	-	0.0	-	-	-	0.2	0.2
2019	0.3	-	0.2	0.2	-	-	0.4	2.1	0.0	3.8	-	3.6	0.6	1.4	1.0	0.0	1.5

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

FORB SPECIES	Nicotiana attenuata <sup>a</sup> (coyote tobacco)	Salsola tragus <sup>ai</sup> (prickly Russian thistle)	Sisymbrium altissimum <sup>ai</sup> (tall tumbled mustard)	Sphaeralcea grossularifolia (gooseberryleaf globemallow)	Tragopogon dubius <sup>ai</sup> (yellow salsify)
year	Nested Frequency				
2012	-	-	-	-	-
2015	15	5	-	20	-
2019	-	78	7	18	12
year	Average Cover (%)				
2012	-	-	-	-	-
2015	0.4	1.0	-	1.4	-
2019	-	2.1	0.4	1.2	0.3

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

**Table 24R-10.12 - 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)	2012	1.7	-	-	6.9	-	-	-	18.8
Bassia prostrata <sup>pi</sup> (forage kochia)	2015	-	0.1	0.5	-	-	-	-	-
Gutierrezia sarothrae (broom snakeweed)	2019	-	-	0.9	-	0.6	-	-	-
Juniperus osteosperma <sup>i</sup> (Utah juniper)	year	Quadrat Cover (%)							
Krascheninnikovia lanata <sup>p</sup> (winterfat)	2012	1.1	-	0.2	4.3	-	0.0	-	11.6
Opuntia (pricklypear)	2015	-	0.0	2.0	-	0.1	-	-	-
Pediocactus simpsonii (mountain ball cactus)	2019	-	-	0.7	-	0.2	-	0.0	-
Pinus edulis <sup>i</sup> (twoneedle pinyon)									

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

**Table 24R-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>									
2012	220	-	0	64	36	9	18	18	50/80
2015	-	-	-	-	-	-	-	-	-/-
2019	-	-	-	-	-	-	-	-	-/-
<b>Atriplex canescens<sup>p</sup> -- (fourwing saltbush)</b>									
2012	-	-	-	-	-	-	-	-	-/-
2015	-	-	-	-	-	-	-	-	61/59
2019	20	-	0	100	0	0	0	0	93/134
<b>Bassia prostrata<sup>pi</sup> -- (forage kochia)</b>									
2012	-	-	-	-	-	-	-	-	-/-
2015	20	-	0	100	0	0	0	0	5/22
2019	-	-	-	-	-	-	-	-	-/-
<b>Chrysothamnus viscidiflorus ssp. viscidiflorus var. viscidiflorus -- (yellow rabbitbrush)</b>									
2012	-	-	-	-	-	-	-	-	11/12
2015	-	-	-	-	-	-	-	-	-/-
2019	60	-	33	67	0	0	0	0	-/-
<b>Ericameria nauseosa -- (rubber rabbitbrush)</b>									
2012	-	-	-	-	-	-	-	-	-/-
2015	-	-	-	-	-	-	-	-	-/-
2019	20	-	0	100	0	0	0	0	70/72
<b>Gutierrezia sarothrae -- (broom snakeweed)</b>									
2012	440	-	55	46	0	0	0	0	17/22
2015	260	-	8	92	0	0	0	0	28/42
2019	1060	-	13	87	0	0	0	0	24/29
<b>Juniperus osteosperma<sup>i</sup> -- (Utah juniper)</b>									
2012	100	-	0	100	0	0	0	20	-/-
2015	-	-	-	-	-	-	-	-	-/-
2019	-	-	-	-	-	-	-	-	-/-

Year	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>									
2012	-	-	-	-	-	-	-	-	-/-
2015	40	-	0	100	0	0	0	0	37/33
2019	60	-	33	67	0	0	0	0	49/62
<b>Opuntia -- (pricklypear)</b>									
2012	-	-	-	-	-	-	-	-	7/28
2015	-	-	-	-	-	-	-	-	9/17
2019	-	-	-	-	-	-	-	-	11/37
<b>Pediocactus simpsonii -- (mountain ball cactus)</b>									
2012	-	-	-	-	-	-	-	-	-/-
2015	-	-	-	-	-	-	-	-	-/-
2019	20	-	0	100	0	0	0	0	2/3
<b>Pinus edulis<sup>t</sup> -- (twoneedle pinyon)</b>									
2012	100	-	20	80	0	0	0	0	- / -
2015	-	-	-	-	-	-	-	-	-/-
2019	-	-	-	-	-	-	-	-	-/-
<b>Sclerocactus -- (fishhook cactus)</b>									
2012	-	-	-	-	-	-	-	-	-/-
2015	-	-	-	-	-	-	-	-	8/29
2019	-	-	-	-	-	-	-	-	10/39

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

**Table 24R-10.14 - Tree Characteristics.** Point-quarter tree density, size class distribution, and average diameter.

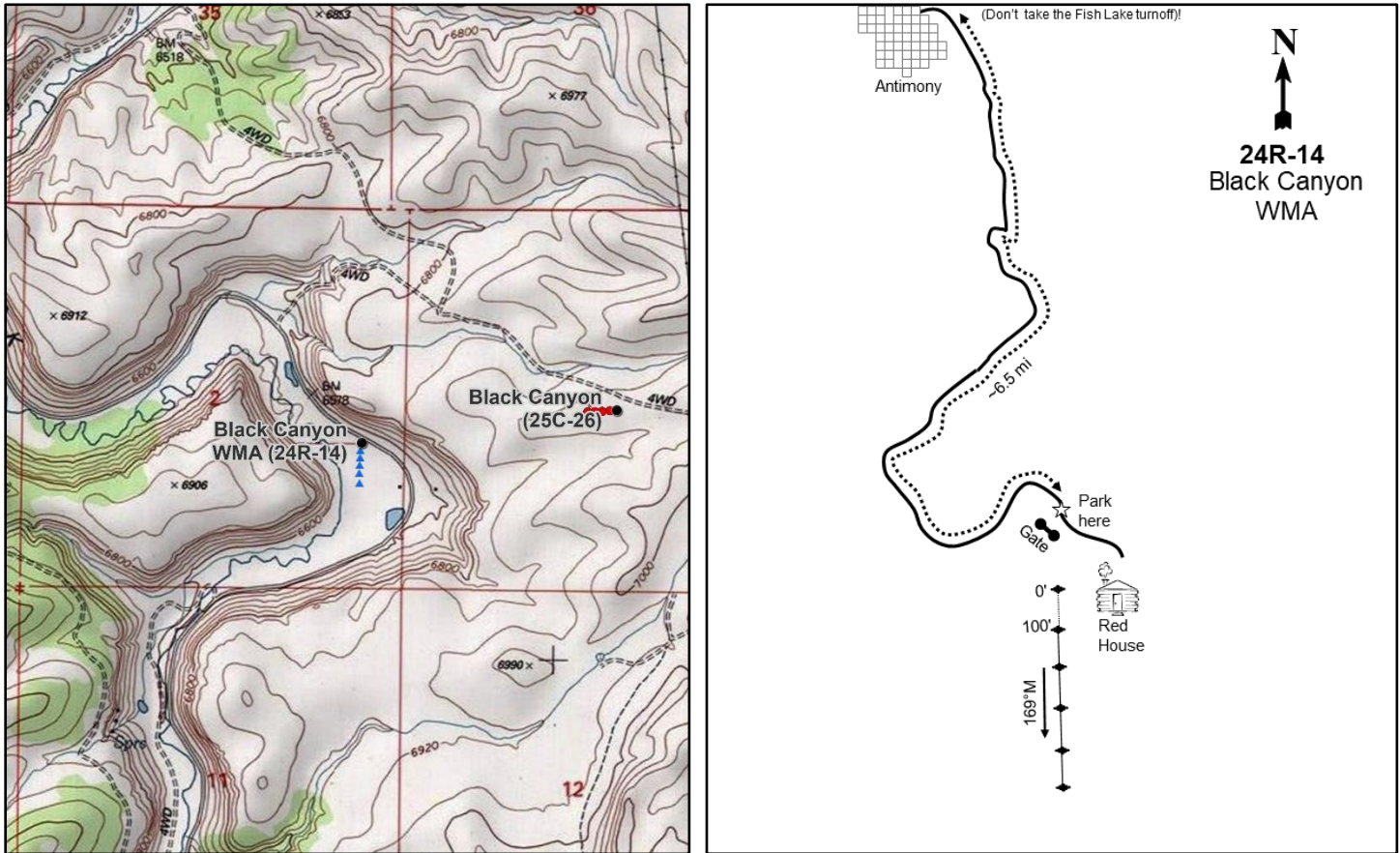
Year	Density	Size Class Distribution					Average Diameter (cm)
	Trees per Acre	Seedling (%)	1-4' (%)	4-8' (%)	8-12' (%)	>12' (%)	
<b>Juniperus osteosperma (Utah juniper)</b>							
2012	33	-	-	7	13	80	49.1
2019	12	83	17	-	-	-	1.6
<b>Pinus edulis (twoneedle pinyon)</b>							
2012	166	-	10	10	15	65	22.9
2019	2	100	-	-	-	-	1.0

**Table 24R-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
2012	2.1	0.0	0.0	9.0	0.0	1.3	0.0	12.4	Very Poor
2015	0.2	0.0	0.0	30.0	0.0	3.2	0.0	33.3	Very Poor-Poor
2019	0.8	0.0	0.0	30.0	-1.2	3.3	0.0	32.9	Very Poor



## BLACK CANYON WMA - STUDY NO. 24R-14



### Location Information

USGS 7.5 min Map Info  
GPS (0' Stake)

Antimony SW; Township 32S, Range 2W, Section 02  
NAD 83 UTM ZONE 12, 415041 East 4211773 North

### Transect Information

Browse Tag # (0' Stake)	557
Transect Bearing	169° 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 Antimony, travel south on South Black Canyon Road for about 6.5 miles. There will be a gate and a red house on the right (west) side of the road. Park here; the transect is near the gate and the 0-foot stake is marked with browse tag #557.



**Site Information**

Land Ownership	State
Land Administrator	UDWR
Allotment	PINE CREEK ANTIMONY
Elevation	6,588ft (2,008m)
Aspect	South
Slope	1%
Sample Dates	08/31/2016, 08/29/2019

**Table 24R-14.1 Disturbance History.** Recorded history of major disturbances.

Treatment/Disturbance	Name	WRI DB#	Date	Size (acres)
Seeding - Unknown	-	-	Historic	-
Herbicide - Tordon	Black Canyon WMA Rabbitbrush Removal Phase 2	3069	October-November 2016	24
Mechanical - Mower	Black Canyon WMA Rabbitbrush Removal Phase 2	3069	October-November 2016	24

**Table 24R-14.2 Seed Mix.** List of known seeded plant species and rates (if available).

Mix Name			Application Type	Application Date	Acres
Kingston/Black Canyon WMA			Drill	Nov 2012	38
Type	Species	Common Name	Cultivar/Source ID	Bulk lbs/acre	PLS
G	<i>Achnatherum hymenoides</i>	Indian Ricegrass	Emery UT	1.50	1.14
G	<i>Agropyron cristatum</i>	Crested Wheatgrass	Nordan	2.00	1.87
G	<i>Leymus cinereus</i>	Great Basin Wildrye	UDWR IntMtn Tetra	1.00	0.85
G	<i>Thinopyrum intermedium</i>	Intermediate Wheatgrass	Clarke	2.00	1.76
G	<i>Thinopyrum ponticum</i>	Tall Wheatgrass	Alkar	2.00	1.88
F	<i>Helianthus annuus</i>	Annual Sunflower	Montezuma CO	1.50	1.41
F	<i>Melilotus officinalis</i>	Yellow Sweetclover		1.50	1.40
S	<i>Artemisia tridentata</i> ssp. <i>vaseyana</i>	Mountain Big Sagebrush	Sanpete UT	0.50	0.18

Mix Name			Application Type	Application Date	Acres
Kingston/Black Canyon WMA - Kochia			Broadcast	Jan 2013	38
Type	Species	Common Name	Cultivar/Source ID	Bulk lbs/acre	PLS
S	<i>Bassia prostrata</i>	Forage Kochia	Beaver UT	1.00	0.62

**Wildlife Habitat and Vegetation History****Table 24R-14.3 - Wildlife Seasonal Habitat.** UDWR wildlife habitat and seasonality.

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

**Table 24R-14.4 - Vegetation History.** The dominant vegetation type(s) and phase of woodland succession (Tausch, Miller, Roundy, & Chambers, 2009).

Year	Vegetation Type	Woodland Succession
2016	Rubber Rabbitbrush/Perennial Grass	NA
2019	Perennial Grass-Annual Forb	NA

**Site Notes**

No Notes

**Site Potential**

1981 - 2010 Average Annual Precipitation	9 inches
NRCS Ecological Site	Upland - Interzonal Loamy Bottom (Basin Wildrye)
NRCS Ecological Site #	R047XB016UT
States and Transitions	No state and transition model is available for this ecological site.

Upon study establishment in 2016, this site was dominated by rubber rabbitbrush (*Ericameria nauseosa*) (Table 24R-14.12) and a diverse mixture of perennial grasses. In addition, the annual grass species cheatgrass (*Bromus tectorum*) provided notable cover. A mower and herbicide treatment in October-November of 2016 (Table 24R-14.1) removed a majority of the rubber rabbitbrush, causing the site to transition to one dominated by perennial grasses and annual forbs. However, cheatgrass did exhibit a significant increase; high amounts of annual grasses can increase fuel loads and may affect the resilience of a plant community (Table 24R-14.7, Table 24R-14.10, Table 24R-14.11).

**Trend Summary Tables**

**Table 24R-14.6 - Shrub/Tree Summary.** Average modified Daubenmire quadrat and line intercept cover by year for shrubs/trees

Year	Quadrat Cover (%)			Line-intercept Cover (%)		
	Preferred Shrub	Other Shrub	Tree	Preferred Shrub	Other Shrub	Tree
2016	-	7.8	-	-	9.7	-
2019	-	0.9	-	-	0.6	-

**Table 24R-14.7 - Herbaceous Summary.** Nested frequency and average modified Daubenmire quadrat cover by year for herbaceous functional groups

Year	Nested Frequency				Quadrat Cover (%)			
	Annual Grass	Perennial Grass	Annual/Biennial Forb	Perennial Forb	Annual Grass	Perennial Grass	Annual/Biennial Forb	Perennial Forb
2016	262	277	91	202	11.8	23.0	5.9	9.5
2019	276	291	315	240	20.1	30.9	31.7	16.6

**Table 24R-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
2016	13.1	0.0	43.1	1.3	1.4	54.5
2019	12.8	0.0	36.0	0.2	0.9	82.5

**Table 24R-14.9 - Pellet Group Data.** Quadrat frequency and pellet group transect data for animal pellets. Rabbit pellet groups are not sampled in the pellet group transect.

Year	Cattle	Mule Deer	Rocky Mountain Elk	Horse	Rabbit
	Quadrat Frequency				
2016	1	16	1	1	13
2019	4	4	-	-	2
Year	Days Use Per Acre (ha)				
2016	2.9 (7.2)	23.4 (57.9)	-	-	-
2019	4.4 (10.8)	4.7 (11.6)	0.7 (1.7)	-	-

**Table 24R-14.10 - Grass Species.** Nested frequency and modified Daubenmire average cover by year.

GRASS SPECIES	Agrostis stolonifera <sup>i</sup> (creeping bentgrass)	Bouteloua gracilis (blue grama)	Bromus arvensis <sup>ai</sup> (field brome)	Bromus inermis <sup>i</sup> (smooth brome)	Bromus tectorum <sup>ai</sup> (cheatgrass)	Deschampsia cespitosa (tufted hairgrass)	Elymus lanceolatus (thickspike wheatgrass)	Elymus trachycaulus (slender wheatgrass)	Juncus ensifolius (swordleaf rush)	Leymus cinereus (basin wildrye)	Pascopyrum smithii (western wheatgrass)	Phalaris arundinacea (reed canarygrass)	Phleum pratense <sup>i</sup> (timothy)	Poa pratensis <sup>i</sup> (Kentucky bluegrass)	Psathyrostachys juncea <sup>i</sup> (Russian wildrye)	Sporobolus cryptandrus (sand dropseed)	Thinopyrum intermedium <sup>i</sup> (intermediate wheatgrass)
year	Nested Frequency																
2016	13	2	-	6	262	-	-	-	13	7	110	36	1	78	49	2	4
2019	10	5	9	21	268	5	195	12	-	8	1	-	-	65	18	-	-
year	Average Cover (%)																
2016	0.4	0.0	-	0.2	11.8	-	-	-	0.3	1.3	5.0	3.9	0.0	3.3	3.8	0.2	0.0
2019	0.5	0.8	0.7	1.3	19.4	0.1	13.6	0.4	-	0.9	0.0	-	-	4.0	2.0	-	-

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

GRASS SPECIES	
	Thinopyrum ponticum <sup>i</sup> (tall wheatgrass)
year	Nested Frequency
2016	68
2019	74
year	Average Cover (%)
2016	4.5
2019	7.2

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

**Table 24R-14.11 - Forb Species.** Nested frequency and modified Daubenmire average cover by year.

FORB SPECIES																		
Ambrosia artemisiifolia <sup>a</sup> (annual ragweed)																		
Bassia scoparia <sup>ai</sup> (burningbush)																		
Camelina microcarpa <sup>ai</sup> (littlepod false flax)																		
Chenopodium fremontii <sup>ai</sup> (Fremont's goosefoot)																		
Cirsium (thistle)																		
Clematis (leather flower)																		
Cleome serrulata <sup>a</sup> (Rocky Mountain beeplant)																		
Comandra umbellata (bastard toadflax)																		
Convolvulus arvensis <sup>ni</sup> (field bindweed)																		
Descurainia pinnata <sup>a</sup> (western tansymustard)																		
Equisetum laevigatum (smooth horsetail)																		
Iva axillaris (povertyweed)																		
Lactuca serriola <sup>ai</sup> (prickly lettuce)																		
Melilotus officinalis <sup>i</sup> (sweetclover)																		
Potentilla (cinquefoil)																		
Salsola tragus <sup>ni</sup> (prickly Russian thistle)																		
Sisymbrium altissimum <sup>ni</sup> (tall tumbleweed)																		
year	Nested Frequency																	
2016	2	68	-	8	3	18	0	1	4	5	116	63	4	5	2	3	7	
2019	-	305	10	-	-	-	40	-	0	39	208	42	-	4	-	-	6	
year	Average Cover (%)																	
2016	0.0	4.9	-	0.5	0.0	0.4	0.0	0.0	0.1	0.0	4.7	3.7	0.0	0.0	0.1	0.3	0.1	
2019	-	27.7	0.5	-	-	-	1.8	-	0.0	1.3	11.6	3.4	-	0.2	-	-	0.5	

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

FORB SPECIES	Sphaeralcea coccinea (scarlet globemallow)	Symphoricarichum ascendens (western aster)	Tragopogon dubius <sup>ai</sup> (yellow salsify)	Viola (violet)
year	Nested Frequency			
2016	-	3	3	8
2019	2	11	-	-
year	Average Cover (%)			
2016	-	0.1	0.1	0.2
2019	0.0	1.4	-	-

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

**Table 24R-14.12 - Shrub and Tree Species.** Average modified Daubenmire quadrat and line intercept cover by year.

SHRUB SPECIES	Ericameria nauseosa (rubber rabbitbrush)
year	Line Intercept Cover (%)
2016	9.7
2019	0.6
year	Quadrat Cover (%)
2016	7.8
2019	0.9

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

**Table 24R-14.13 - Shrub/Tree Characteristics.** Population characteristics of shrub/tree species populations including density reproduction (seedlings), age distribution, utilization, vigor and average size (height/crown) of plants.

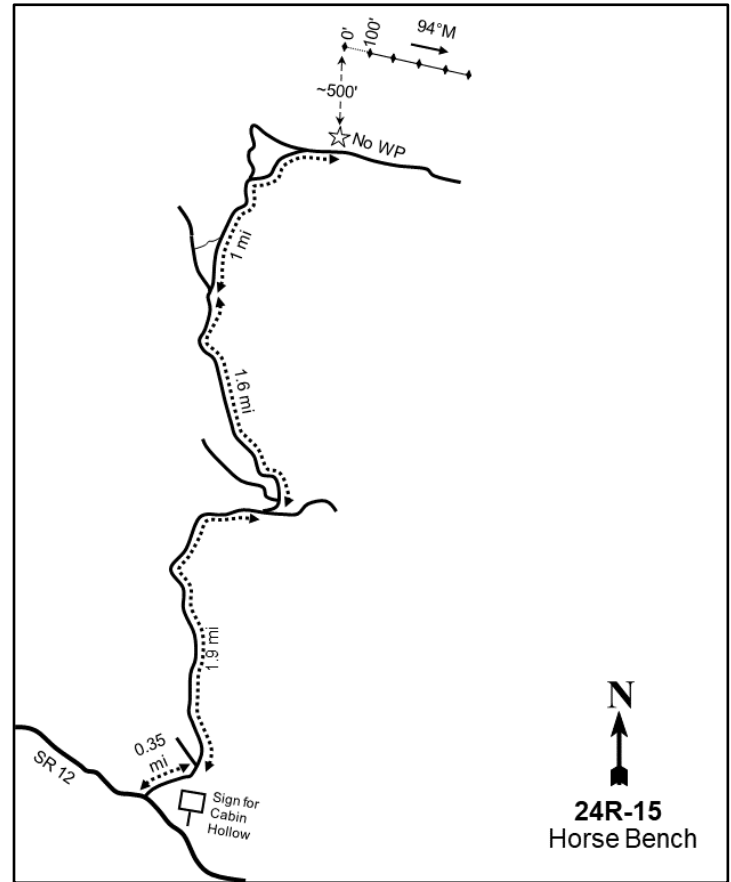
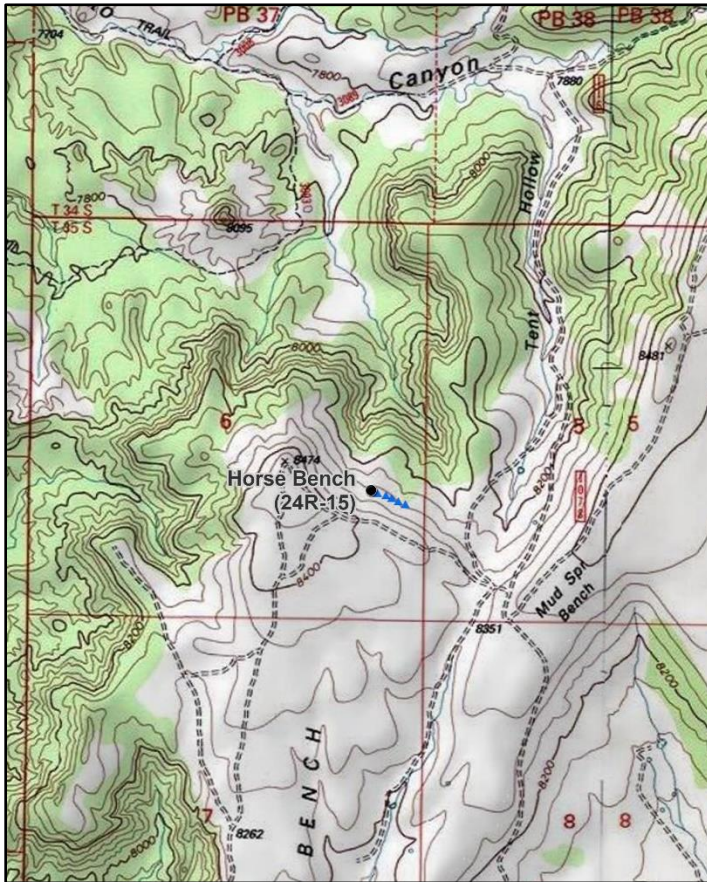
Year	Density		Age Class Distribution			Utilization		Poor Vigor (%)	Average Height Crown (cm)
	Plants Per Acre		Excluding Seedlings			Moderate (%)	Heavy (%)		
	Excluding Seedlings	Seedling	Young (%)	Mature (%)	Decadent (%)				
<b>Artemisia tridentata ssp. vaseyana<sup>p</sup> -- (mountain big sagebrush)</b>									
2016	-	-	-	-	-	-	-	-	86/85
2019	-	-	-	-	-	-	-	-	-/-
<b>Atriplex canescens<sup>p</sup> -- (fourwing saltbush)</b>									
2016	60	-	0	100	0	0	0	0	110/184
2019	-	-	-	-	-	-	-	-	-/-
<b>Ericameria nauseosa -- (rubber rabbitbrush)</b>									
2016	820	-	2	90	7	0	0	10	113/138
2019	60	-	0	100	0	0	0	0	98/124
<b>Salix lucida -- (shining willow)</b>									
2016	60	-	100	0	0	0	100	0	-/-

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

**Table 24R-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
2016	0.0	0.0	0.0	30.0	-8.8	10.0	-2.0	29.2	Very Poor
2019	0.0	0.0	0.0	30.0	-15.1	10.0	-2.0	22.9	Very Poor

## HORSE BENCH - STUDY NO. 24R-15

**Location Information**

USGS 7.5 min Map Info  
GPS (0' Stake)

Casto Canyon SE; Township 35S, Range 4W, Section 06  
NAD 83 UTM ZONE 12, 388917 East 4182939 North

**Transect Information**

Browse Tag # (0' Stake)	80
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**

Traveling east on State Route 12 just after Red Canyon, turn left onto a road marked by a sign for Cabin Hollow, then continue 0.35 miles to a fork. Proceed right at the fork and drive for 1.9 miles to another fork. Stay to the left and then to the right at an additional fork just afterwards, then continue for 1.6 miles. Proceed to the left at this fork and drive for 1.0 miles, staying toward the right and ignoring diverging roads, then park; there is no witness post. The study site is approximately 500 feet downhill in a relatively flat area. There are no stakes, so a GPS unit will be needed to navigate to exact stake locations.

**Site Information**

Land Ownership	Federal
Land Administrator	USFS
Allotment	Pines C&H
Elevation	8,100ft (2,469m)
Aspect	North
Slope	10-20%
Sample Dates	08/15/2019

**Table 24R-15.1 Disturbance History.** Recorded history of major disturbances.

Treatment/Disturbance	Name	WRI DB#	Date	Size (acres)
Mechanical - Bullhog	Powell District Mud Springs phase II (Proposed)	4993	Summer 2019	895

**Wildlife Habitat and Vegetation History****Table 24R-15.3 - Wildlife Seasonal Habitat.** UDWR wildlife habitat and seasonality.

Species	Habitat	Season
Mule Deer	substantial	summer
Rocky Mountain Elk	substantial	year-long
Greater Sage-Grouse		
Pronghorn	crucial	year-long

**Table 24R-15.4 - Vegetation History.** The dominant vegetation type(s) and phase of woodland succession (Tausch, Miller, Roundy, & Chambers, 2009).

Year	Vegetation Type	Woodland Succession
2019	Ponderosa Pine/Mixed Shrub	Phase I

**Site Notes**

No Notes

**Site Potential**

1981 - 2010 Average Annual Precipitation	18 inches
NRCS Ecological Site	Mountain Loam (Shrub)
NRCS Ecological Site #	R047XA434UT
States and Transitions	A defined state and transition model is available.

Upon establishment in 2019, this site was dominated by ponderosa pine (*Pinus ponderosa*) and a very diverse shrub component including mountain snowberry (*Symphoricarpos oreophilus*), black sagebrush (*Artemisia nova*), and mountain big sagebrush (*Artemisia tridentata* ssp. *vaseyana*), among others. Other conifers such as white fir (*Abies concolor*) and Rocky Mountain juniper (*Juniperus scopulorum*) were also present in low amounts (Table 24R-15.12, Table 24R-15.13, Table 24R-15.14). However, the study and surrounding area had been very recently treated by a bullhog (Table 24R-15.1, Photos), suggesting that conifer density was higher in the weeks leading up to study establishment. The herbaceous understory was moderately abundant and diverse, with native perennial grasses and forbs contributing the most cover (Table 24R-15.7, Table 24R-15.10, Table 24R-15.11). The ponderosa pine-mixed shrub plant community that characterizes this site is not exactly described by the state and transition model, but may share functional similarities with the phases within the Current Potential State (Jornada, 2019).

**Trend Summary Tables****Table 24R-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
2019	18.8	2.5	17.1	29.5	1.2	30.3

**Table 24R-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
2019	-	169	56	135	-	4.2	1.5	4.0



**Table 24R-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
2019	15.5	0.4	70.4	0.8	6.5	40.8

**Table 24R-15.9 - Pellet Group Data.** Quadrat frequency and pellet group transect data for animal pellets. Rabbit pellet groups are not sampled in the pellet group transect.

Year	Cattle	Mule Deer	Rocky Mountain Elk	Rabbit
	Quadrat Frequency			
2019	4	6	2	6
Year	Days Use Per Acre (ha)			
2019	1.5 (3.6)	24.1 (59.6)	2.0 (5.0)	-

**Table 24R-15.10 - Grass Species.** Nested frequency and modified Daubenmire average cover by year.

GRASS SPECIES								
Achnatherum lettermanii (Letterman's needlegrass)								
Carex (sedge)								
Elymus elymoides (squirreltail)								
Elymus lanceolatus (thickspike wheatgrass)								
Hesperostipa comata (needle and thread)								
Poa fendleriana (muttongrass)								
Poa pratensis <sup>i</sup> (Kentucky bluegrass)								
Poa secunda (Sandberg bluegrass)								
year	Nested Frequency							
2019	72	27	19	46	1	51	9	2
year	Average Cover (%)							
2019	1.2	0.9	0.3	0.6	0.0	1.2	0.1	0.0

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

**Table 24R-15.11 - Forb Species.** Nested frequency and modified Daubenmire average cover by year.

FORB SPECIES																	
Achillea millefolium (Common yarrow)																	
Antennaria (pussytoes)																	
Astragalus convallarius (lesser rushy milkvetch)																	
Calochortus nuttallii (sego lily)																	
Castilleja linariifolia (Wyoming Indian paintbrush)																	
Cirsium (thistle)																	
Cordylanthus <sup>a</sup> (bird's-beak)																	
Cryptantha (cryptantha)																	
Erigeron eatonii (Eaton's fleabane)																	
Erigeron pumilus (shaggy fleabane)																	
Eriogonum racemosum (redroot buckwheat)																	
Hymenoxys richardsonii (pinyon rubberweed)																	
Lotus utahensis (Utah bird's-foot trefoil)																	
Lupinus (lupine)																	
Lupinus argenteus (silvery lupine)																	
Packera multiflora (lobeleaf groundsel)																	
Penstemon strictus (Rocky Mountain penstemon)																	
year	Nested Frequency																
2019	6	1	22	3	1	3	53	3	7	2	48	6	3	8	35	3	4
year	Average Cover (%)																
2019	0.0	0.0	0.3	0.0	0.0	0.0	1.5	0.0	0.1	0.0	0.3	0.0	0.0	0.0	2.4	0.0	0.0

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

FORB SPECIES	Nested Frequency					
Phlox austromontana (mountain phlox)	8	3	5	3	6	17
Phlox longifolia (longleaf phlox)						
Polygonum douglasii <sup>a</sup> (Douglas' knotweed)						
Potentilla gracilis (slender cinquefoil)						
Sphaeralcea coccinea (scarlet globemallow)						
Symphoricarpos ascendens (western aster)						
year	Average Cover (%)					
2019	0.4	0.0	0.0	0.0	0.1	0.2

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

**Table 24R-15.12 - 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)	0.2	9.5	1.7	0.5	0.7	0.4	0	0.1	-	0.2	30.2	5	0.4	-	12	0.1
Artemisia nova <sup>p</sup> (black sagebrush)																
Artemisia tridentata ssp. vaseyana <sup>p</sup> (mountain big sagebrush)																
Ceanothus (ceanothus)																
Chrysothamnus depressus <sup>p</sup> (longflower rabbitbrush)																
Chrysothamnus viscidiflorus ssp. viscidiflorus var. viscidiflorus (yellow rabbitbrush)																
Ericameria parryi (Parry's rabbitbrush)																
Juniperus scopulorum <sup>i</sup> (Rocky Mountain juniper)																
Linanthus pungens (granite prickly phlox)																
Opuntia polyacantha (plains pricklypear)																
Pinus ponderosa <sup>i</sup> (ponderosa pine)																
Purshia tridentata <sup>p</sup> (antelope bitterbrush)																
Ribes <sup>p</sup> (currant)																
Rosa woodsii <sup>p</sup> (Woods' rose)																
Symphoricarpos oreophilus <sup>p</sup> (mountain snowberry)																
Tetradymia canescens (spineless horsebrush)																
year	Quadrat Cover (%)															
2019	0.4	5.1	2.4	0.3	1.1	1.7	0.1	0.0	0.0	0.0	17.0	3.3	0.1	0.0	6.3	0.4

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

**Table 24R-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>Amelanchier utahensis<sup>p</sup> -- (Utah serviceberry)</b>									
2019	340	-	29	29	41	6	29	41	46/46
<b>Artemisia nova<sup>p</sup> -- (black sagebrush)</b>									
2019	3960	-	1	55	45	19	13	44	42/51
<b>Artemisia tridentata ssp. vaseyana<sup>p</sup> -- (mountain big sagebrush)</b>									
2019	540	-	4	26	70	0	30	67	59/64
<b>Ceanothus -- (ceanothus)</b>									
2019	160	-	0	100	0	25	0	0	30/54
<b>Chrysothamnus depressus<sup>p</sup> -- (longflower rabbitbrush)</b>									
2019	1280	20	0	94	6	5	11	6	16/24
<b>Chrysothamnus viscidiflorus ssp. viscidiflorus var. viscidiflorus -- (yellow rabbitbrush)</b>									
2019	1100	-	9	75	16	0	0	16	43/36
<b>Ericameria nauseosa -- (rubber rabbitbrush)</b>									
2019	20	-	0	100	0	0	0	0	40/28

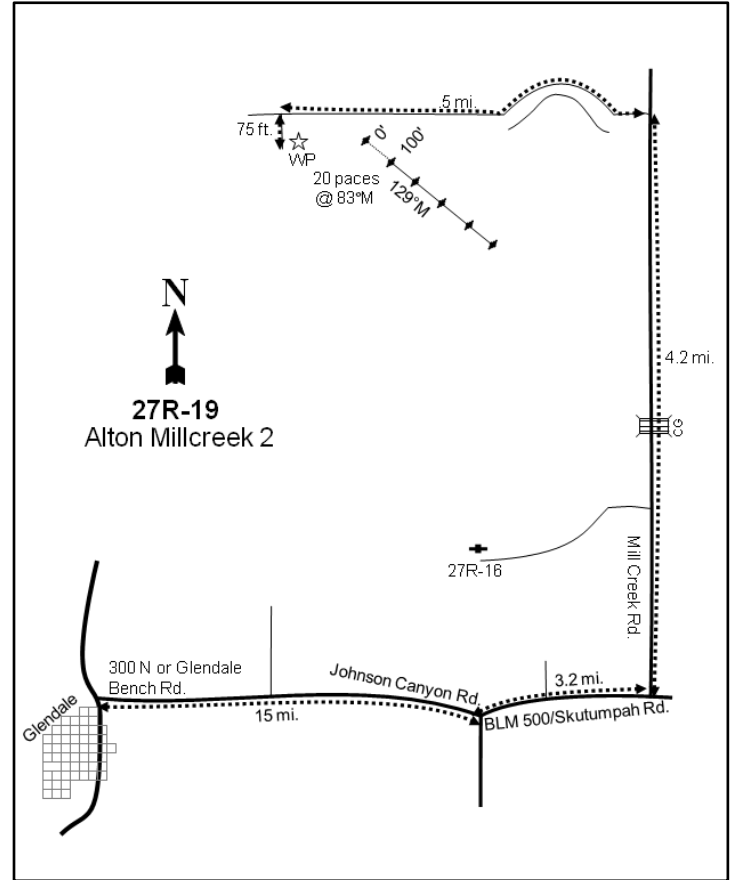
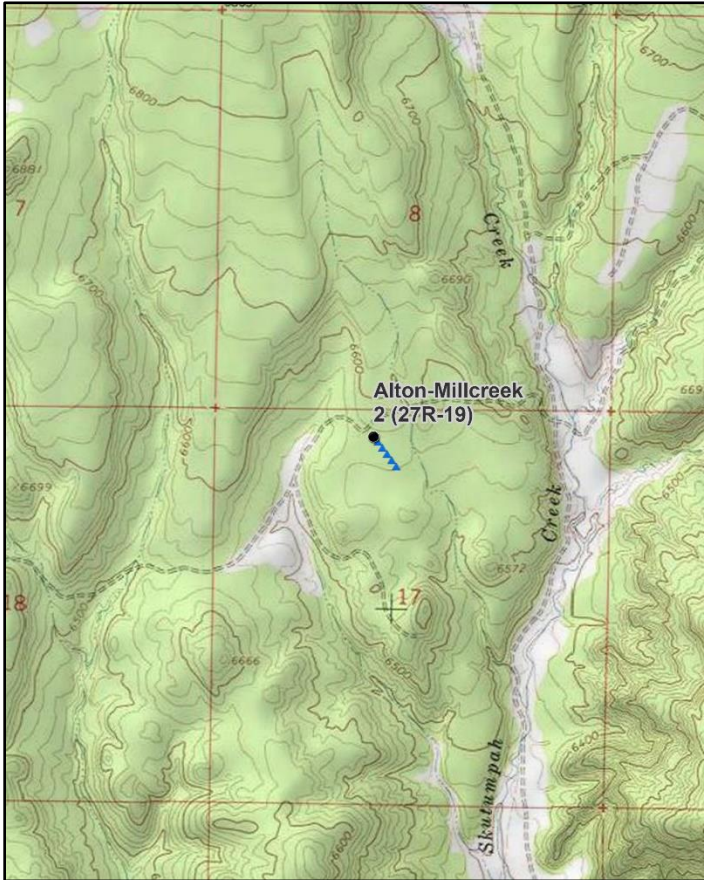
Year	Density		Age Class Distribution			Utilization		Poor Vigor (%)	Average Height Crown (cm)
	Plants Per Acre		Excluding Seedlings			Moderate (%)	Heavy (%)		
	Excluding Seedlings	Seedling	Young (%)	Mature (%)	Decadent (%)				
<b>Ericameria parryi -- (Parry's rabbitbrush)</b>									
2019	200	-	0	100	0	0	10	0	23/28
<b>Gutierrezia sarothrae -- (broom snakeweed)</b>									
2019	60	-	0	100	0	0	0	0	16/16
<b>Juniperus scopulorum<sup>t</sup> -- (Rocky Mountain juniper)</b>									
2019	20	-	0	100	0	0	0	0	- / -
<b>Linanthus pungens -- (granite prickly phlox)</b>									
2019	140	-	0	100	0	0	0	0	13/17
<b>Mahonia repens -- (creeping barberry)</b>									
2019	40	-	0	100	0	0	0	0	8/13
<b>Opuntia polyacantha -- (plains pricklypear)</b>									
2019	20	-	0	100	0	0	0	0	13/23
<b>Purshia tridentata<sup>p</sup> -- (antelope bitterbrush)</b>									
2019	1840	-	4	80	15	47	10	10	56/82
<b>Ribes<sup>p</sup> -- (currant)</b>									
2019	40	-	0	100	0	0	0	0	66/67
<b>Rosa woodsii<sup>p</sup> -- (Woods' rose)</b>									
2019	60	-	0	67	33	0	0	33	39/34
<b>Symphoricarpos oreophilus<sup>p</sup> -- (mountain snowberry)</b>									
2019	4360	60	5	90	5	6	1	5	28/47
<b>Tetradymia canescens -- (spineless horsebrush)</b>									
2019	240	-	0	83	17	0	0	17	37/35

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

**Table 24R-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>Abies concolor (white fir)</b>							
2019	12	-	-	75	-	25	12.0
<b>Juniperus scopulorum (Rocky Mountain juniper)</b>							
2019	10	-	13	63	13	13	8.3
<b>Pinus ponderosa (ponderosa pine)</b>							
2019	20	-	-	-	17	83	44.3

## ALTON-MILLCREEK 2 - STUDY NO. 27R-19

**Location Information**

USGS 7.5 min Map Info  
GPS (0' Stake)

Skutumpah Creek NW; Township 40S, Range 4W, Section 17  
NAD 83 UTM ZONE 12, 381746 East 4133372 North

**Transect Information**

Browse Tag # (0' Stake)	259
Transect Bearing	129° magnetic
Length	500ft
Belt Placement	Line 1 (11ft), Line 2 (34ft), Line 3 (59ft), Line 4 (71ft), Line 5 (95ft)
Belt Marker Placement	No Rebar

**Directions to Site**

From the junction of US-89 and 300 North (Glendale Bench Road) in Glendale, drive east on 300 North for 15 miles to a fork or a road leading to the northeast (there is a sign that says Deer Spring Ranch and Cannonville). Turn left and drive 3.2 miles to a road on the left with a stop sign. Turn left (north) onto Mill Creek Road and drive for 4.2 miles. Turn left here, pass through a gate, and continue for 0.5 miles to a two-track road to the left (alternatively, Mill Creek Road curves around and leads up the hill to the same two-track). 75 feet down the two-track is the witness post on the left (south) side of the road. The 0-foot stake is 20 paces away from the witness post at 83 degrees magnetic and is marked with browse tag #259.

**Site Information**

Land Ownership	Federal
Land Administrator	BLM
Allotment	BALD KNOLL
Elevation	6,600ft (2,012m)
Aspect	Southeast
Slope	2%
Sample Dates	06/19/2007, 07/15/2010, 08/13/2014, 08/14/2019

**Table 27R-19.1 Disturbance History.** Recorded history of major disturbances.

Treatment/Disturbance	Name	WRI DB#	Date	Size (acres)
Hand Crew - Lop and Scatter	Alton/Mill Creek Sagebrush Restoration - Year 1	188	December 2005-February 2006	1630
Mechanical - Bullhog	Alton/Mill Creek Sagebrush Restoration - Year 3	900	October 2008-February 2009	912
Seeding - Aerial Before	Mill Creek Aerial Seeding	1313	October 2008	912

**Table 27R-19.2 Seed Mix.** List of known seeded plant species and rates (if available).

Mix Name			Application Type	Application Date	Acres
Mill Creek Seeding			Aerial	Oct 2008	900
Type	Species	Common Name	Cultivar/Source ID	Bulk lbs/acre	PLS
G	Achnatherum hymenoides	Indian Ricegrass	Rimrock	1.39	1.28
G	Agropyron cristatum	Crested Wheatgrass	Douglas	1.22	1.00
G	Agropyron cristatum	Crested Wheatgrass	Nordan	0.86	0.80
G	Agropyron cristatum	Crested Wheatgrass	Nordan	0.36	0.32
G	Elymus wawawaiensis	Snake River Wheatgrass	Secar	2.50	1.90
G	Thinopyrum intermedium	Intermediate Wheatgrass	Oahe	0.97	0.93
G	Thinopyrum intermedium	Intermediate Wheatgrass	Oahe	1.00	0.91
F	Linum perenne	Blue Flax	Appar	0.50	0.42
F	Medicago sativa	Alfalfa	Ladak	1.00	0.91
F	Sanguisorba minor	Small Burnet	Delar	1.00	0.86
S	Bassia prostrata	Forage Kochia	Immigrant	0.50	0.35

**Wildlife Habitat and Vegetation History****Table 27R-19.3 - Wildlife Seasonal Habitat.** UDWR wildlife habitat and seasonality.

Species	Habitat	Season
Mule Deer	substantial	summer
Rocky Mountain Elk	substantial	year-long

**Table 27R-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	Utah Juniper	Phase I transitioning to Phase II
2010	Annual-Perennial Forb/Perennial Grass	Phase I
2014	Perennial Grass	Phase I
2019	Perennial Grass/Mountain Big Sagebrush	Phase I

**Site Notes**

A dead elk was found on the study site in 2007.

**Site Potential**

1981 - 2010 Average Annual Precipitation	15 inches
NRCS Ecological Site	Upland Loam (Mountain Big Sagebrush-Indian Ricegrass)
NRCS Ecological Site #	R047XB308UT
States and Transitions	A defined state and transition model is available.

Upon study establishment in 2007, this was a Utah juniper (*Juniperus osteosperma*) and twoneedle pinyon (*Pinus edulis*)-encroached site with a depleted understory. Following treatment (Table 27R-19.1), however, the site transitioned into a perennial grass-dominated state. The herbaceous understory re-established following the seeding and perennial grasses increased -- intermediate wheatgrass (*Thinopyrum intermedium*) and crested wheatgrass (*Agropyron cristatum*) became the dominant grass species (Table 27R-19.6, Table 27R-19.7, Table 27R-19.10). Forbs were scarce prior to treatment. However, forb cover has shown steady increases following treatment, with mat penstemon (*Penstemon caespitosus*) as the dominant perennial species (Table 27R-19.11). Shrub cover has also steadily increased after treatment with most of the cover being provided by mountain big sagebrush (*Artemisia tridentata* ssp. *vaseyana*), although black sagebrush (*A. nova*) contributed a majority of the shrub cover prior to treatment (Table 27R-19.12, Table 27R-19.13). Although cover and density decreased following the bullhog treatment, pinyon and juniper have been observed in low amounts in all post-treatment years (Table 27R-19.12, Table 27R-19.14). The state and transition model indicates that there is a potential for fluctuations to occur between introduced perennial grass dominance and a sagebrush co-dominant state depending on management practices (Jornada, 2019).

**Trend Summary Tables****Table 27R-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	1.3	-	4.2	1.7	-	18.6
2010	0.8	-	0.0	1.7	-	-
2014	2.4	-	0.0	2.8	-	0.2
2019	5.5	-	-	6.4	-	-

**Table 27R-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	42	8	17	107	0.1	0.0	0.1	1.0
2010	11	112	180	159	0.0	3.9	5.7	5.6
2014	17	290	32	144	0.1	9.8	0.2	3.5
2019	18	320	100	146	0.1	25.0	1.1	6.5

**Table 27R-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	48.6	3.0	45.3	0.4	0.3	6.9
2010	40.3	-	54.5	0.2	0.3	15.6
2014	40.5	0.0	47.3	0.6	0.1	18.4
2019	38.5	0.4	46.8	0.3	0.4	36.0

**Table 27R-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	-	2	1	53
2010	-	4	1	12
2014	10	14	6	28
2019	6	10	8	41
Year	Days Use Per Acre (ha)			
2007	-	7.4 (18.2)	1.3 (3.3)	-
2010	-	14.1 (34.8)	7.4 (18.2)	-
2014	21.1 (52.0)	13.4 (33.1)	14.7 (36.4)	-
2019	14.5 (35.9)	25.5 (62.9)	8.1 (19.9)	-

**Table 27R-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)	Bromus tectorum <sup>ai</sup> (cheatgrass)	Elymus elymoides (squirreltail)	Elymus lanceolatus (thickspike wheatgrass)	Poa fendleriana (muttongrass)	Poa pratensis <sup>i</sup> (Kentucky bluegrass)	Pseudoroegneria spicata (bluebunch wheatgrass)	Thinopyrum intermedium <sup>i</sup> (intermediate wheatgrass)	Vulpia octoflora <sup>a</sup> (sixweeks fescue)
year	Nested Frequency										
2007	-	-	-	33	8	-	-	-	-	-	9
2010	1	-	52	9	13	26	2	-	3	34	5
2014	-	3	153	17	1	86	-	2	22	132	-
2019	2	-	94	9	9	-	-	1	6	261	10
year	Average Cover (%)										
2007	-	-	-	0.1	0.0	-	-	-	-	-	0.0
2010	0.0	-	1.1	0.0	0.1	1.5	0.0	-	0.0	1.1	0.0
2014	-	0.1	4.5	0.1	0.0	1.1	-	0.1	0.8	3.2	-
2019	0.0	-	4.0	0.0	0.2	-	-	0.0	0.5	20.3	0.0

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

**Table 27R-19.11 - Forb Species.** Nested frequency and modified Daubenmire average cover by year.

FORB SPECIES	Arabis (rockcress)	Astragalus 2 (Milkvetch)	Astragalus convallarius (lesser rushy milkvetch)	Calochortus nuttallii (sego lily)	Caulanthus crassicaulis <sup>a</sup> (thickstem wild cabbage)	Chaenactis douglasii (Douglas' dustymaiden)	Collinsia parviflora <sup>a</sup> (maiden blue eyed Mary)	Cordylanthus <sup>a</sup> (bird's-beak)	Cryptantha (cryptantha)	Cymopterus (springparsley)	Descurainia pinnata <sup>a</sup> (western tansymustard)	Draba <sup>a</sup> (draba)	Erigeron flagellaris (trailing fleabane)	Eriogonum cernuum <sup>a</sup> (nodding buckwheat)	Eriogonum racemosum (redroot buckwheat)	Eriogonum umbellatum (sulphur-flower buckwheat)	Erodium cicutarium <sup>ai</sup> (redstem stork's bill)
year	Nested Frequency																
2007	-	-	-	-	2	3	-	-	-	-	10	-	-	-	-	1	-
2010	1	1	2	-	-	2	2	46	-	1	4	-	-	9	-	12	3
2014	-	-	-	-	-	3	-	14	-	-	-	-	2	2	-	12	4
2019	-	-	-	7	1	6	22	8	4	-	0	6	-	1	2	13	-
year	Average Cover (%)																
2007	-	-	-	-	0.0	0.0	-	-	-	-	0.1	-	-	-	-	0.0	-
2010	0.0	0.0	0.0	-	-	0.0	0.0	1.4	-	0.1	0.0	-	-	0.0	-	0.1	0.0
2014	-	-	-	-	-	0.0	-	0.1	-	-	-	-	0.0	0.0	-	0.1	0.0
2019	-	-	-	0.0	0.0	0.0	0.3	0.1	0.0	-	0.0	0.0	-	0.0	0.0	0.2	-

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>a</sup> (flatspine stickseed)	Linum lewisii (Lewis flax)	Lupinus (lupine)	Medicago sativa <sup>i</sup> (alfalfa)	Microsteris gracilis <sup>a</sup> (slender phlox)	Penstemon (beardtongue)	Penstemon caespitosus (mat penstemon)	Phlox longifolia (longleaf phlox)	Polygonum douglasii <sup>a</sup> (Douglas' knotweed)	Sanguisorba minor <sup>i</sup> (small burnet)	Sphaeralcea grossularifolia (gooseberryleaf globemallow)	Taraxacum officinale (common dandelion)	Tragopogon dubius <sup>ai</sup> (yellow salsify)	Trifolium (clover)
year	Nested Frequency																
2007	-	4	-	-	-	-	-	2	-	99	2	-	-	-	-	-	3
2010	38	83	57	10	36	18	14	11	1	90	1	4	9	-	1	-	15
2014	-	3	2	5	22	-	1	-	1	112	3	6	6	3	-	2	10
2019	6	14	21	4	2	34	3	9	-	96	6	4	3	4	3	24	-
year	Average Cover (%)																
2007	-	0.0	-	-	-	-	-	0.0	-	0.9	0.0	-	-	-	-	-	0.0
2010	1.1	1.2	1.4	0.5	1.4	0.5	0.1	0.0	0.0	2.9	0.0	0.0	0.1	-	0.0	-	0.3
2014	-	0.0	0.0	0.0	0.7	-	0.0	-	0.0	2.5	0.1	0.0	0.1	0.0	-	0.0	0.0
2019	0.0	0.0	0.1	0.0	0.0	0.5	0.5	0.1	-	5.0	0.0	0.0	0.2	0.0	0.0	0.4	-

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

**Table 27R-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)	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 (%)					
2007	1.6	-	18	0.6	-	0.1
2010	0.9	0.8	-	-	-	-
2014	1.2	1.6	0.2	-	-	-
2019	2	4.3	-	-	0.1	-
year	Quadrat Cover (%)					
2007	1.3	0.0	3.8	0.3	-	0.0
2010	0.3	0.5	-	0.0	-	-
2014	0.8	1.6	0.0	-	-	-
2019	1.9	3.2	-	-	0.4	-

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

**Table 27R-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.

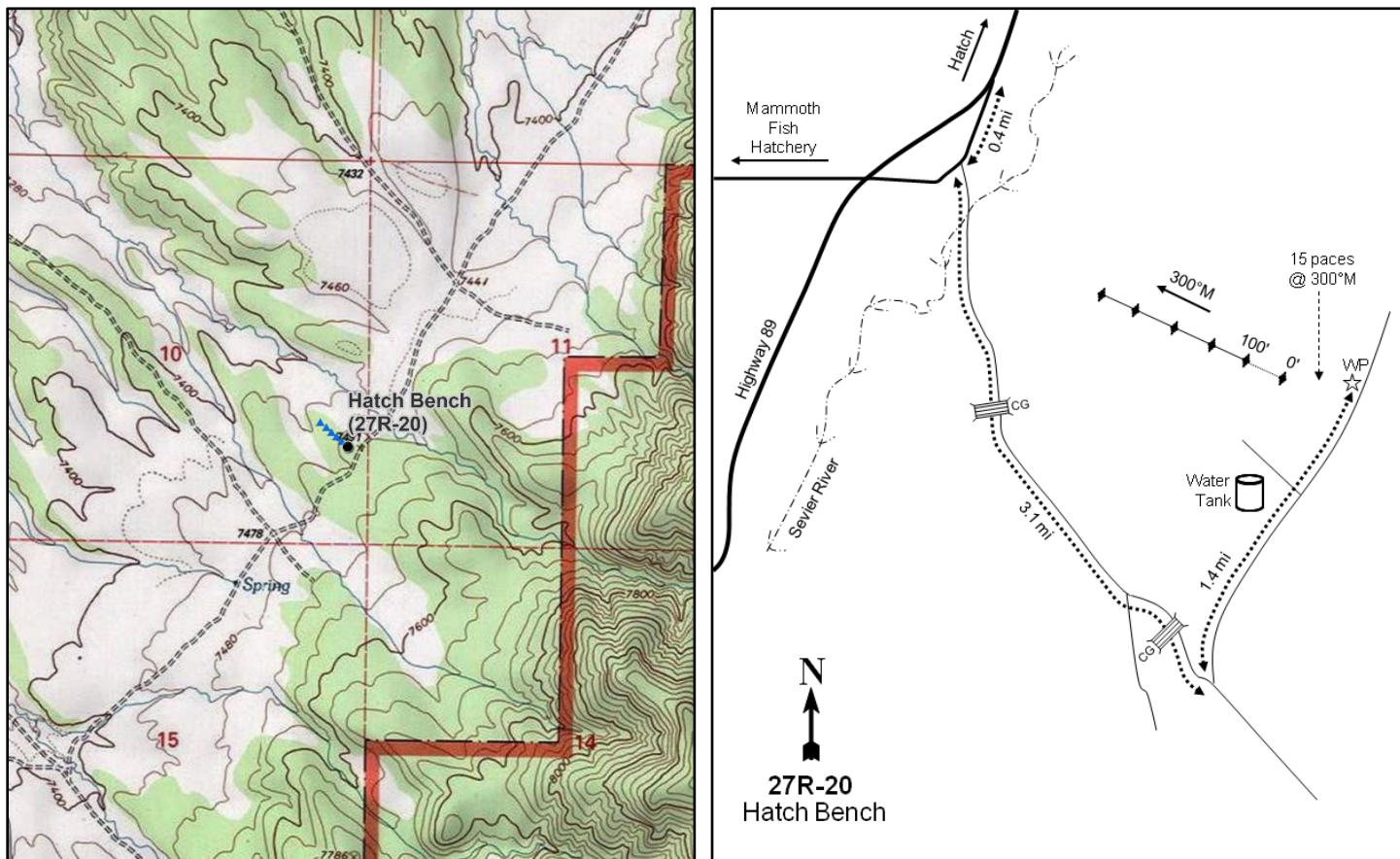
Year	Density		Age Class Distribution			Utilization		Poor Vigor (%)	Average Height Crown (cm)
	Plants Per Acre		Excluding Seedlings			Moderate (%)	Heavy (%)		
	Excluding Seedlings	Seedling	Young (%)	Mature (%)	Decadent (%)				
<b>Artemisia nova<sup>P</sup> -- (black sagebrush)</b>									
2007	860	-	0	35	65	35	65	40	28/48
2010	340	40	24	77	0	35	0	0	37/46
2014	2100	260	74	26	0	34	0	0	34/59
2019	1920	-	20	78	2	7	1	2	35/51
<b>Artemisia tridentata ssp. vaseyana<sup>P</sup> -- (mountain big sagebrush)</b>									
2007	140	-	14	29	57	14	86	43	44/46
2010	540	-	63	37	0	0	0	0	41/43
2014	1280	540	48	52	0	80	17	0	34/50
2019	3440	40	14	85	1	1	0	1	37/50
<b>Ericameria nauseosa -- (rubber rabbitbrush)</b>									
2007	-	-	-	-	-	-	-	-	-/-
2010	-	-	-	-	-	-	-	-	-/-
2014	40	-	0	100	0	50	50	0	54/48
2019	-	-	-	-	-	-	-	-	84/87
<b>Gutierrezia sarothrae -- (broom snakeweed)</b>									
2007	-	-	-	-	-	-	-	-	-/-
2010	-	-	-	-	-	-	-	-	-/-
2014	-	-	-	-	-	-	-	-	-/-
2019	-	-	-	-	-	-	-	-	30/40
<b>Juniperus osteosperma<sup>t</sup> -- (Utah juniper)</b>									
2007	460	80	22	52	26	0	26	30	-/-
2010	20	-	100	0	0	0	0	0	-/-
2014	80	100	75	25	0	0	0	0	-/-
2019	100	-	100	0	0	0	0	0	-/-
<b>Opuntia polyacantha -- (plains pricklypear)</b>									
2007	-	-	-	-	-	-	-	-	-/-
2010	-	-	-	-	-	-	-	-	-/-
2014	-	-	-	-	-	-	-	-	-/-
2019	-	-	-	-	-	-	-	-	7/34
<b>Pinus edulis<sup>t</sup> -- (twoneedle pinyon)</b>									
2007	60	40	33	67	0	0	0	33	-/-
2010	-	20	0	0	0	0	0	0	-/-
2014	-	-	-	-	-	-	-	-	-/-
2019	-	-	-	-	-	-	-	-	-/-
<b>Purshia tridentata<sup>P</sup> -- (antelope bitterbrush)</b>									
2007	-	-	-	-	-	-	-	-	37/89
2010	-	-	-	-	-	-	-	-	36/52
2014	-	-	-	-	-	-	-	-	41/142
2019	20	-	0	100	0	100	0	0	64/200
<b>Quercus gambelii<sup>P</sup> -- (Gambel oak)</b>									
2007	-	-	-	-	-	-	-	-	91/79
2010	-	-	-	-	-	-	-	-	58/110
2014	-	-	-	-	-	-	-	-	79/72
2019	-	-	-	-	-	-	-	-	100/138

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

**Table 27R-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	237	-	45	25	5	25	16.6
2010	9	75	25	-	-	-	1.5
2014	43	40	60	-	-	-	2.4
2019	30	31	69	-	-	-	1.8
<b>Pinus edulis (twoneedle pinyon)</b>							
2007	37	-	64	27	9	-	6.8
2010	1	50	50	-	-	-	1.5
2014	3	50	50	-	-	-	1.5

## HATCH BENCH - STUDY NO. 27R-20



### Location Information

USGS 7.5 min Map Info  
GPS (0' Stake)

George Mountain NE; Township 37S, Range 5W, Section 10  
NAD 83 UTM ZONE 12, 376709 East 4162864 North

### Transect Information

Browse Tag # (0' Stake)	758
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	No Rebar

### Directions to Site

From Highway 89 near Hatch, drive 0.4 miles on South Old Highway 89 and turn left (east). Continue for 3.1 miles and turn left. Travel for 1.4 miles to the witness post on the left (west) side of the road. The 0-foot stake is 15 paces away from the witness post at 300 degrees magnetic.

**Site Information**

Land Ownership	State
Land Administrator	SITLA
Allotment	No data
Elevation	7,511ft (2,289m)
Aspect	Northwest
Slope	6%
Sample Dates	08/22/2012, 08/17/2015, 08/14/2019

**Table 27R-20.1 Disturbance History.** Recorded history of major disturbances.

Treatment/Disturbance	Name	WRI DB#	Date	Size (acres)
Chaining - Two-Way Ely	Hatch Bench Vegetation Enhancement Phase I	2069	September-October 2012	1134
Seeding - Aerial Before	Hatch Bench Vegetation Enhancement Phase I	2069	September 2012	1134
Seeding - Dribbler	Hatch Bench Vegetation Enhancement Phase I	2069	September 2012	1134
Seeding - Aerial After	Hatch Bench Vegetation Enhancement Phase I	2069	January 2013	1134
Hand Crew - Lop and Scatter	Hatch Bench Vegetation Enhancement Phase II	2690	July 2013-January 2015	2990

**Table 27R-20.2 Seed Mix.** List of known seeded plant species and rates (if available).

Mix Name			Application Type	Application Date	Acres
Hatch Bench Vegetation Enhancement			Aerial	Sep 2012	1134
Type	Species	Common Name	Cultivar/Source ID	Bulk lbs/acre	PLS
G	<i>Achnatherum hymenoides</i>	Indian Ricegrass	Rimrock	0.75	0.70
G	<i>Agropyron cristatum</i>	Crested Wheatgrass	Douglas	0.49	0.46
G	<i>Agropyron desertorum</i>	Crested Wheatgrass	Hycrest II	0.53	0.47
G	<i>Poa secunda</i>	Canby Bluegrass	Canbar	0.49	0.26
G	<i>Pseudoroegneria spicata</i>	Bluebunch Wheatgrass	Anatone	0.53	0.52
G	<i>Thinopyrum ponticum</i>	Tall Wheatgrass	Alkar	0.31	0.29
G	<i>Thinopyrum ponticum</i>	Tall Wheatgrass	Alkar	0.68	0.64
F	<i>Achillea millefolium</i>	Western Yarrow	Eagle Mountain	0.10	0.09
F	<i>Astragalus cicer</i>	Cicer Milkvetch	Lutana	0.23	0.18
F	<i>Astragalus cicer</i>	Cicer Milkvetch	Lutana	1.28	0.93
F	<i>Medicago sativa</i>	Alfalfa	Ladak DL	1.98	1.84
F	<i>Melilotus officinalis</i>	Yellow Sweetclover		0.53	0.50
F	<i>Penstemon palmeri</i>	Palmer Penstemon	Carbon/Emery UT	0.24	0.19
F	<i>Sanguisorba minor</i>	Small Burnet	Delar	1.85	1.65

Mix Name			Application Type	Application Date	Acres
Hatch Bench Vegetation Enhancement - Dribbler Mix			Dribbler	Sep 2012	1134
Type	Species	Common Name	Cultivar/Source ID	Bulk lbs/acre	PLS
F	<i>Balsamorhiza sagittata</i>	Arrowleaf Balsamroot	Paiute UT	0.04	0.03
F	<i>Sanguisorba minor</i>	Small Burnet	Delar	0.18	0.16
S	<i>Ephedra viridis</i>	Green Ephedra		0.02	0.01
S	<i>Ephedra viridis</i>	Green Ephedra	Emery UT	0.09	0.08
S	<i>Purshia tridentata</i>	Bitterbrush	Garfield UT	0.20	0.16

Mix Name			Application Type	Application Date	Acres
Hatch Bench Vegetation Enhancement - Browse Mix			Aerial	Jan 2013	1134
Type	Species	Common Name	Cultivar/Source ID	Bulk lbs/acre	PLS
S	<i>Artemisia tridentata</i> ssp. <i>vaseyana</i>	Mountain Big Sagebrush	Sevier UT	0.25	0.07
S	<i>Artemisia tridentata</i> ssp. <i>wyomingensis</i>	Wyoming Big Sagebrush	Paiute UT	0.35	0.10
S	<i>Bassia prostrata</i>	Forage Kochia	Beaver UT	0.06	0.04
S	<i>Bassia prostrata</i>	Forage Kochia	Beaver/Millard UT	0.18	0.12

**Wildlife Habitat and Vegetation History****Table 27R-20.3 - Wildlife Seasonal Habitat.** UDWR wildlife habitat and seasonality.

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

**Table 27R-20.4 - 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	Perennial Grass-Forb	Phase I

**Site Notes**

The 0, 100, 200, 300, and 400-foot stakes are rebar.

**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	A defined state and transition model is available.

When the study was established in 2012, this was a Rocky Mountain juniper (*Juniperus scopulorum*) and twoneedle pinyon (*Pinus edulis*)-encroached site with a depleted understory. Following treatment later that year (Table 27R-20.1), the site transitioned into a perennial grass-dominated state. The herbaceous understory re-established following the seeding with an increase in perennial grasses -- intermediate wheatgrass (*Thinopyrum intermedium*) and crested wheatgrass (*Agropyron cristatum*) have been the dominant grass species in both post-treatment years (Table 27R-20.7, Table 27R-20.10). Forbs were scarce prior to treatment. However, forb cover has increased after the chaining and seeding, with common yarrow (*Achillea millefolium*), chickpea milkvetch (*Astragalus cicer*), and alfalfa (*Medicago sativa*) as the dominant species (Table 27R-20.11). Shrub cover has also steadily increased following treatment with a majority of the cover being contributed by mountain big sagebrush (*Artemisia tridentata* ssp. *vaseyana*), although black sagebrush (*A. nova*) provided the most shrub cover prior to treatment (Table 27R-20.12, Table 27R-20.13). Although cover and density of pinyon and juniper decreased following treatment, they have remained present in all post-treatment years (Table 27R-20.12, Table 27R-20.14). The state and transition model indicates that there is a potential for fluctuations to occur between introduced perennial grass dominance and a sagebrush co-dominant state depending on management practices (Jornada, 2019).

**Trend Summary Tables****Table 27R-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
2012	1.6	0.2	13.4	1.6	0.2	29.6
2015	2.4	3.1	0.2	3.1	2.9	0.8
2019	4.5	1.7	1.2	2.4	1.4	0.4

**Table 27R-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
2012	-	1	-	54	-	0.0	-	0.3
2015	13	192	36	195	0.2	12.8	0.6	9.5
2019	20	250	29	196	0.3	23.5	0.2	12.5

**Table 27R-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
2012	31.0	2.9	37.8	29.1	0.8	17.3
2015	23.3	0.0	61.9	9.3	1.8	25.2
2019	18.2	0.0	51.3	13.0	1.3	41.5

**Table 27R-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			
2012	-	-	-	-
2015	1	2	5	4
2019	7	10	2	22
Year	Days Use Per Acre (ha)			
	2012	-	-	0.7 (1.7)
2015	15.3 (37.7)	1.3 (3.3)	4.0 (9.9)	-
2019	4.4 (10.8)	8.1 (19.9)	6.0 (14.9)	-

**Table 27R-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)	Carex (sedge)	Elymus elymoides (squirreltail)	Festuca idahoensis (Idaho fescue)	Hesperostipa comata (needle and thread)	Koeleria macrantha (prairie Junegrass)	Poa secunda (Sandberg bluegrass)	Pseudoroegneria spicata (bluebunch wheatgrass)	Thinopyrum ponticum <sup>i</sup> (tall wheatgrass)
year	Nested Frequency										
2012	0	-	-	-	1	-	-	-	-	-	-
2015	36	74	13	-	32	2	0	0	13	15	84
2019	27	80	20	2	47	7	3	4	17	42	104
year	Average Cover (%)										
2012	0.0	-	-	-	0.0	-	-	-	-	-	-
2015	1.0	2.6	0.2	-	0.8	0.0	0.0	0.0	0.5	1.4	6.5
2019	1.6	5.0	0.3	0.4	1.5	0.2	0.4	0.2	1.2	3.6	9.5

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

**Table 27R-20.11 - Forb Species.** Nested frequency and modified Daubenmire average cover by year.

FORB SPECIES	Achillea millefolium (Common yarrow)	Agoseris glauca (pale agoseris)	Amaranthus <sup>ai</sup> (pigweed)	Arabis (rockcress)	Astragalus argophyllus (silvertleaf milkvetch)	Astragalus calycosus (Torrey's milkvetch)	Astragalus cibirius (browse milkvetch)	Astragalus cicer <sup>i</sup> (chickpea milkvetch)	Calylophus lavandulifolius (lavenderleaf sundrops)	Chaenactis douglasii (Douglas' dustymaiden)	Chamaesyce albomarginata (whitemargin sandmat)	Chenopodium leptophyllum <sup>a</sup> (narrowleaf goosefoot)	Conyza canadensis <sup>a</sup> (Canadian horseweed)	Cordylanthus <sup>a</sup> (bird's-beak)	Cryptantha (cryptantha)	Descurainia pinnata <sup>a</sup> (western tansymustard)	Draba <sup>a</sup> (draba)
year	Nested Frequency																
2012	-	-	-	2	10	-	-	-	-	8	18	-	-	-	6	-	-
2015	15	1	2	-	5	3	7	14	-	8	39	-	5	3	3	13	-
2019	40	1	-	-	8	5	-	37	1	12	21	12	-	-	5	10	2
year	Average Cover (%)																
2012	-	-	-	0.0	0.1	-	-	-	-	0.0	0.1	-	-	-	0.0	-	-
2015	1.0	0.0	0.0	-	0.3	0.0	0.1	0.7	-	0.0	0.8	-	0.1	0.1	0.1	0.3	-
2019	2.3	0.0	-	-	1.0	0.1	-	3.5	0.0	0.4	0.3	0.0	-	-	0.0	0.1	0.0

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



FORB SPECIES																	
Erigeron divergens <sup>a</sup> (spreading fleabane)																	
Eriogonum racemosum (redroot buckwheat)																	
Eriogonum umbellatum (sulphur-flower buckwheat)																	
Ipomopsis aggregata (scarlet gilia)																	
Lactuca serriola <sup>ai</sup> (prickly lettuce)																	
Machaeranthera canescens (hoary tansyaster)																	
Madia glomerata <sup>a</sup> (mountain tarweed)																	
Medicago sativa <sup>i</sup> (alfalfa)																	
Melilotus officinalis <sup>i</sup> (sweetclover)																	
Oenothera (evening primrose)																	
Packera multilobata (lobeleaf groundsel)																	
Penstemon comarrhenus (dusty beardtongue)																	
Penstemon palmeri (Palmer's penstemon)																	
Pleiocanthus spinosus (thorn skeletonweed)																	
Sanguisorba minor <sup>i</sup> (small burnet)																	
Sphaeralcea coccinea (scarlet globemallow)																	
Streptanthus cordatus (heartleaf twistflower)																	
year	Nested Frequency																
2012	-	3	-	-	-	-	-	-	-	-	7	1	-	2	-	-	4
2015	-	3	0	0	11	1	2	15	2	9	95	5	3	6	41	39	4
2019	1	1	-	2	-	2	-	6	-	1	11	3	3	20	13	73	1
year	Average Cover (%)																
2012	-	0.0	-	-	-	-	-	-	-	-	0.0	0.0	-	0.0	-	-	0.0
2015	-	0.0	0.0	0.0	0.0	0.0	0.1	0.8	0.2	0.2	2.2	0.1	0.2	0.1	1.7	1.0	0.0
2019	0.0	0.0	-	0.1	-	0.0	-	1.2	-	0.1	0.1	0.0	0.0	0.4	0.3	2.5	0.0

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

FORB SPECIES			
Symphyotrichum ascendens (western aster)			
Taraxacum officinale (common dandelion)			
Tragopogon dubius <sup>ai</sup> (yellow salsify)			
year	Nested Frequency		
2012	-	-	-
2015	-	-	0
2019	8	1	4
year	Average Cover (%)		
2012	-	-	-
2015	-	-	0.0
2019	0.2	0.0	0.1

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

**Table 27R-20.12 - 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 scopulorum <sup>t</sup> (Rocky Mountain juniper)	Opuntia (pricklypear)	Pinus edulis <sup>t</sup> (twoneedle pinyon)	Pinus ponderosa <sup>t</sup> (ponderosa pine)	Symphoricarpos oreophilus <sup>p</sup> (mountain snowberry)	Yucca (yucca)
year	Line Intercept Cover (%)									
2012	1.6	-	-	-	2.2	0.2	27.4	-	-	0
2015	2.3	0.6	0.9	1.7	0.7	-	0.1	-	0.2	0.3
2019	0.9	1.3	1.2	0.2	0.4	-	-	-	0.2	-
year	Quadrat Cover (%)									
2012	1.6	-	-	-	2.5	0.1	10.9	-	-	0.1
2015	1.9	0.5	0.6	2.2	0.2	-	0.0	0.0	0.0	0.2
2019	2.9	1.5	0.6	0.8	0.3	-	0.9	-	0.0	0.3

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

**Table 27R-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 nova<sup>p</sup> -- (black sagebrush)</b>									
2012	1100	-	4	47	49	60	2	31	30/44
2015	600	20	13	83	3	0	13	10	34/59
2019	500	20	8	92	0	16	4	0	45/78
<b>Artemisia tridentata ssp. vaseyana<sup>p</sup> -- (mountain big sagebrush)</b>									
2012	-	-	-	-	-	-	-	-	-/-
2015	260	60	62	39	0	15	0	0	44/40
2019	340	20	12	88	0	12	6	0	61/68
<b>Bassia prostrata<sup>pi</sup> -- (forage kochia)</b>									
2012	-	-	-	-	-	-	-	-	-/-
2015	60	-	0	100	0	0	100	0	12/24
2019	-	-	-	-	-	-	-	-	-/-
<b>Chrysothamnus viscidiflorus ssp. viscidiflorus var. viscidiflorus -- (yellow rabbitbrush)</b>									
2012	-	-	-	-	-	-	-	-	-/-
2015	-	-	-	-	-	-	-	-	-/-
2019	-	-	-	-	-	-	-	-	44/41
<b>Ericameria nauseosa -- (rubber rabbitbrush)</b>									
2012	-	-	-	-	-	-	-	-	-/-
2015	60	-	33	67	0	0	0	0	69/72
2019	80	-	0	100	0	0	0	0	86/103
<b>Gutierrezia sarothrae -- (broom snakeweed)</b>									
2012	40	-	0	100	0	0	0	0	19/15
2015	920	-	4	96	0	0	0	0	30/46
2019	560	40	0	100	0	0	0	0	22/28
<b>Juniperus scopulorum<sup>t</sup> -- (Rocky Mountain juniper)</b>									
2012	60	40	100	0	0	0	0	0	-/-
2015	60	20	67	33	0	0	0	33	-/-
2019	140	-	71	29	0	0	0	0	-/-

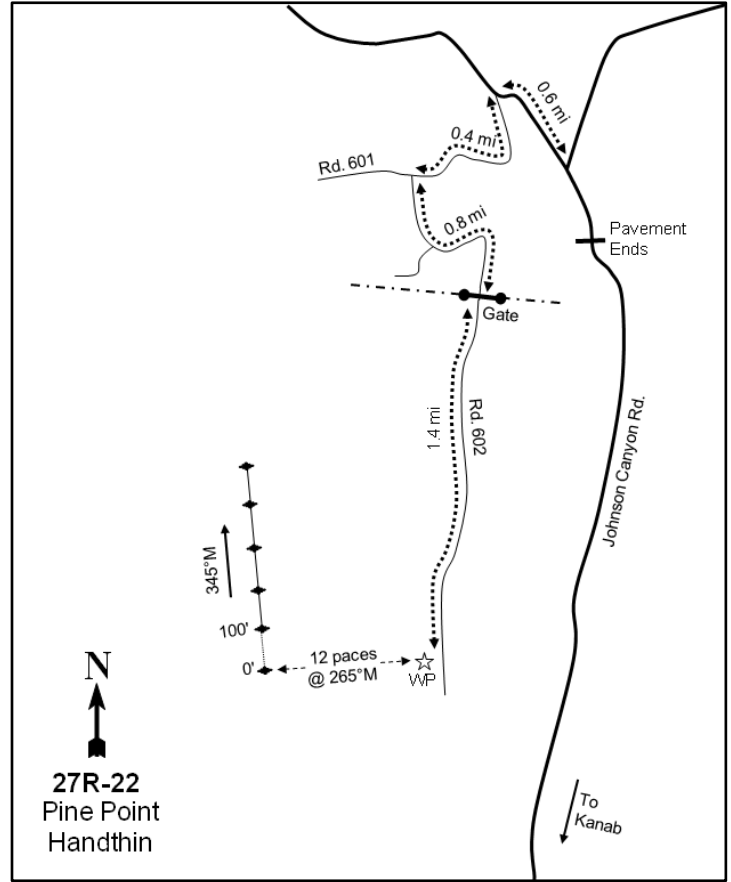
Year	Density		Age Class Distribution			Utilization		Poor Vigor (%)	Average Height Crown (cm)
	Plants Per Acre		Excluding Seedlings			Moderate (%)	Heavy (%)		
	Excluding Seedlings	Seedling	Young (%)	Mature (%)	Decadent (%)				
<b>Opuntia -- (pricklypear)</b>									
2012	20	-	0	100	0	0	0	100	7/23
2015	-	-	-	-	-	-	-	-	5/20
2019	-	-	-	-	-	-	-	-	7/13
<b>Pinus edulis<sup>t</sup> -- (twoneedle pinyon)</b>									
2012	560	200	54	39	7	0	0	14	- / -
2015	80	140	75	25	0	0	0	0	- / -
2019	200	20	100	0	0	0	0	0	- / -
<b>Pinus ponderosa<sup>t</sup> -- (ponderosa pine)</b>									
2012	-	-	-	-	-	-	-	-	- / -
2015	20	20	100	0	0	0	0	0	- / -
2019	-	-	-	-	-	-	-	-	- / -
<b>Purshia stansburiana<sup>p</sup> -- (Stansbury cliffrose)</b>									
2012	-	-	-	-	-	-	-	-	- / -
2015	-	-	-	-	-	-	-	-	- / -
2019	-	-	-	-	-	-	-	-	- / -
<b>Purshia tridentata<sup>p</sup> -- (antelope bitterbrush)</b>									
2012	-	-	-	-	-	-	-	-	36/80
2015	-	-	-	-	-	-	-	-	44/127
2019	-	-	-	-	-	-	-	-	40/104
<b>Sambucus<sup>p</sup> -- (elderberry)</b>									
2012	-	-	-	-	-	-	-	-	- / -
2015	-	-	-	-	-	-	-	-	- / -
2019	-	-	-	-	-	-	-	-	118/104
<b>Symphoricarpos oreophilus<sup>p</sup> -- (mountain snowberry)</b>									
2012	40	-	0	100	0	0	0	0	19/37
2015	60	-	0	100	0	0	0	0	26/75
2019	140	-	0	100	0	0	0	0	23/34
<b>Tetradymia canescens -- (spineless horsebrush)</b>									
2012	-	-	-	-	-	-	-	-	- / -
2015	-	-	-	-	-	-	-	-	- / -
2019	-	-	-	-	-	-	-	-	32/46
<b>Yucca -- (yucca)</b>									
2012	140	-	57	43	0	0	0	0	24/25
2015	280	-	57	43	0	0	0	0	38/61
2019	100	-	0	100	0	0	0	0	43/54

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

**Table 27R-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>							
2012	62	6	12	18	35	29	14.9
2015	31	7	80	13	-	-	4.9
2019	28	6	44	50	-	-	9.3
<b>Pinus edulis (twoneedle pinyon)</b>							
2012	666	16	26	16	16	26	7.5
2015	47	60	40	-	-	-	3.6
2019	74	42	58	-	-	-	3.5
<b>Pinus ponderosa (ponderosa pine)</b>							
2012	2	-	-	-	-	100	22.5
2015	16	-	100	-	-	-	2.0
2019	1	-	100	-	-	-	23.0

## PINE POINT HANDTHIN - STUDY NO. 27R-22



### Location Information

USGS 7.5 min Map Info  
GPS (0' Stake)

Cutler Point NE; Township 41S, Range 5W, Section 23  
NAD 83 UTM ZONE 12, 376910 East 4121269 North

### Transect Information

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

81  
344° magnetic  
500ft  
Line 1 (11ft), Line 2 (34ft), Line 3 (59ft), Line 4 (71ft), Line 5 (95ft)  
Standard

### Directions to Site

From the junction of Johnson Canyon Road and Road #601, drive south for 0.4 miles on Road #601 and turn onto Road #602. Drive 0.8 miles to a gate. Continue for 1.4 miles to a witness post on the right (west) side of the road. The 0-foot stake is 12 paces away from the witness post at 265 degrees magnetic and is marked by browse tag #81.

**Site Information**

Land Ownership	Federal
Land Administrator	BLM
Allotment	PINE POINT
Elevation	6,400ft (1,951m)
Aspect	Northeast
Slope	1-4%
Sample Dates	08/14/2012, 08/20/2015, 08/14/2019

**Table 27R-22.1 Disturbance History.** Recorded history of major disturbances.

Treatment/Disturbance	Name	WRI DB#	Date	Size (acres)
Hand Crew - Lop and Scatter	Pine Point Handthin	2359	December 2012-May 2013	2525
Seeding - Aerial Before	Pine Point Handthin	2359	November 2012	2525

**Table 27R-22.2 Seed Mix.** List of known seeded plant species and rates (if available).

Mix Name			Application Type	Application Date	Acres
Pine Point Handthin			Aerial	Nov 2012	1280
Type	Species	Common Name	Cultivar/Source ID	Bulk lbs/acre	PLS
G	Achnatherum hymenoides	Indian Ricegrass	Rimrock	1.48	1.39
G	Agropyron cristatum	Crested Wheatgrass	Nordan	1.99	1.87
G	Elymus lanceolatus	Thickspike Wheatgrass	Critana	0.98	0.95
G	Elymus wawawaiensis	Snake River Wheatgrass	Secar	1.25	1.15
G	Psathyrostachys juncea	Russian Wildrye		0.78	0.59
G	Sporobolus cryptandrus	Sand Dropseed		0.16	0.14
G	Thinopyrum intermedium	Intermediate Wheatgrass	Clarke	1.99	1.75
F	Linum perenne	Blue Flax	Appar	0.20	0.17
F	Medicago sativa	Alfalfa	Ladak +	0.51	0.49
F	Sanguisorba minor	Small Burnet	Delar	1.02	0.95
S	Atriplex canescens	Fourwing Saltbush	Beaver UT	0.16	0.09
S	Bassia prostrata	Forage Kochia	Beaver UT	0.47	0.29
S	Purshia tridentata	Bitterbrush	Elko NV	0.16	0.12

**Wildlife Habitat and Vegetation History****Table 27R-22.3 - Wildlife Seasonal Habitat.** UDWR wildlife habitat and seasonality.

Species	Habitat	Season
Mule Deer	substantial	winter
Rocky Mountain Elk	substantial	year-long

**Table 27R-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	Pinyon-Juniper/Mountain Big Sagebrush	Phase II transitioning to Phase III
2015	Mountain Big Sagebrush/Perennial Grass	Phase I
2019	Mountain Big Sagebrush/Perennial Grass	Phase I

**Site Notes**

No Notes

**Site Potential**

1981 - 2010 Average Annual Precipitation	15 inches
NRCS Ecological Site	Upland Loam (Mountain Big Sagebrush)
NRCS Ecological Site #	R035XY308UT
States and Transitions	A defined state and transition model is available.

Upon study establishment in 2012, this site was in a Utah juniper (*Juniperus osteosperma*) and twoneedle pinyon (*Pinus edulis*)-encroached state with a depleted understory and shrub layer. Following treatment later that year, the site transitioned into a mountain big sagebrush (*Artemisia tridentata* ssp. *vaseyana*) and perennial grass-dominated state. The herbaceous understory re-established following the seeding, with Indian ricegrass (*Achnatherum hymenoides*), needle and thread (*Hesperostipa comata*), and intermediate wheatgrass (*Thinopyrum intermedium*) as the dominant grass species (Table 27R-22.7). Annual grasses (*Bromus tectorum*) have been consistently present on the site in low amounts (Table 27R-22.10). Perennial forbs were rare prior to treatment, but have increased in cover and frequency afterwards with lobeleaf groundsel (*Packera multilobata*) and Utah bird's-foot trefoil (*Lotus utahensis*) as the dominant species (Table 27R-22.11). Shrub cover has steadily increased following treatment with most of the cover provided by mountain big sagebrush (*Artemisia tridentata* ssp. *vaseyana*). Rocky Mountain juniper and twoneedle pinyon decreased in cover and density following treatment, but have remained present in both post-treatment years (Table 27R-19.12, Table 27R-19.14). The state and transition model indicates that the site will likely remain in the Mountain Big Sagebrush/Perennial Grass Phase within the Current Potential State assuming good management practices (Jornada, 2019).

**Trend Summary Tables**

**Table 27R-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	6.8	0.0	8.9	6.5	-	16.6
2015	10.6	0.2	0.5	16.7	-	0.6
2019	17.3	0.2	1.5	20.9	0.2	1.4

**Table 27R-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	281	136	12	75	5.5	2.5	0.0	0.4
2015	61	247	16	174	0.6	12.3	0.1	5.0
2019	117	233	109	190	2.0	11.1	0.9	9.5

**Table 27R-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	56.2	0.1	39.1	-	0.0	22.6
2015	40.1	0.0	50.1	-	0.6	23.9
2019	27.1	0.8	55.7	0.0	0.0	40.6

**Table 27R-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	-	2	1	15
2015	2	4	-	40
2019	1	7	2	35
Year	Days Use Per Acre (ha)			
2012	3.6 (9.0)	-	-	-
2015	4.4 (10.8)	6.0 (14.9)	-	-
2019	28.3 (69.9)	9.4 (23.2)	2.7 (6.6)	-

**Table 27R-22.10 - 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)	Hesperostipa comata (needle and thread)	Pascopyrum smithii (western wheatgrass)	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										
2012	3	-	99	13	48	23	4	-	32	40	237
2015	42	8	34	51	64	56	13	0	60	49	35
2019	45	4	69	37	100	29	18	-	17	49	70
year	Average Cover (%)										
2012	0.1	-	1.0	0.2	0.5	0.5	0.0	-	0.2	1.0	4.4
2015	2.2	0.5	0.4	2.3	3.2	1.6	0.6	0.0	1.0	0.9	0.2
2019	1.5	0.4	1.8	0.6	3.9	0.9	1.5	-	0.1	2.3	0.3

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

**Table 27R-22.11 - Forb Species.** Nested frequency and modified Daubenmire average cover by year.

FORB SPECIES	Arabis (rockcress)	Asteraceae (null)	Astragalus (milkvetch)	Calochortus nuttallii (sego lily)	Chamaesyce (sandmat)	Collinsia parviflora <sup>a</sup> (maiden blue eyed Mary)	Descurainia pinnata <sup>a</sup> (western tansymustard)	Draba <sup>a</sup> (draba)	Erigeron (fleabane)	Erigeron pumilus (shaggy fleabane)	Erigeron (buckwheat)	Erigeronum racemosum (redroot buckwheat)	Erigeronum umbellatum (sulphur-flower buckwheat)	Gayophytum ramosissimum <sup>a</sup> (pinyon groundsmoke)	Gilia inconspicua <sup>a</sup> (shy gilia)	Linum lewisii (Lewis flax)	Lotus utahensis (Utah bird's-foot trefoil)
year	Nested Frequency																
2012	1	4	-	-	3	-	4	3	39	5	-	3	2	-	-	-	7
2015	2	1	1	1	31	-	6	-	9	46	12	-	1	-	-	1	53
2019	6	-	-	8	2	24	1	-	12	40	-	-	6	4	49	3	71
year	Average Cover (%)																
2012	0.0	0.0	-	-	0.0	-	0.0	0.0	0.1	0.1	-	0.0	0.0	-	-	-	0.1
2015	0.0	0.0	0.0	0.0	0.1	-	0.0	-	0.7	1.5	0.6	-	0.0	-	-	0.0	0.5
2019	0.0	-	-	0.0	0.0	0.2	0.0	-	0.1	0.8	-	-	0.2	0.0	0.5	0.2	4.5

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



FORB SPECIES	Microsteris gracilis <sup>a</sup> (slender phlox)	Oenothera (evening primrose)	Packera multilobata (lobeleaf groundsel)	Penstemon comarrhenus (dusty beardtongue)	Phlox austromontana (mountain phlox)	Phlox longifolia (longleaf phlox)	Plantago patagonica <sup>a</sup> (woolly plantain)	Senecio spartioides (broom-like ragwort)	Silene antirrhina <sup>a</sup> (sleepy silene)	Sphaeralcea parvifolia (smallflower globemallow)	Tragopogon dubius <sup>at</sup> (yellow salsify)
year	Nested Frequency										
2012	-	-	4	3	8	3	4	3	1	-	-
2015	-	7	73	12	6	-	10	-	-	13	-
2019	3	0	84	4	17	5	39	-	-	2	1
year	Average Cover (%)										
2012	-	-	0.0	0.0	0.0	0.0	0.0	0.0	0.0	-	-
2015	-	0.2	1.0	0.2	0.1	-	0.1	-	-	0.1	-
2019	0.0	0.0	3.1	0.0	0.5	0.0	0.2	-	-	0.0	0.0

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

**Table 27R-22.12 - 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)	Ephedra viridis <sup>p</sup> (mormon tea)	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 (%)						
2012	6.5	-	-	14	-	2.6	0
2015	15.3	1.4	-	0.6	-	-	-
2019	19.5	1.4	0.2	1.4	-	-	0
year	Quadrat Cover (%)						
2012	6.6	0.1	0.0	7.4	-	1.5	0.0
2015	9.2	1.5	0.2	0.5	-	-	-
2019	16.2	1.0	0.2	1.5	0.0	-	0.1

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

**Table 27R-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>									
2012	-	-	-	-	-	-	-	-	532/782
2015	-	-	-	-	-	-	-	-	-/-
2019	-	-	-	-	-	-	-	-	377/595
<b>Artemisia tridentata ssp. vaseyana<sup>p</sup> -- (mountain big sagebrush)</b>									
2012	6600	1280	87	12	1	0	0	2	74/106
2015	5700	240	47	53	0	11	3	0	69/106
2019	4300	20	4	84	12	7	5	12	68/99

Year	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>									
2012	-	-	-	-	-	-	-	-	75/91
2015	-	-	-	-	-	-	-	-	-/-
2019	-	-	-	-	-	-	-	-	66/44
<b>Ephedra viridis<sup>p</sup> -- (mormon tea)</b>									
2012	80	-	100	0	0	0	0	0	99/162
2015	-	-	-	-	-	-	-	-	85/161
2019	300	-	0	100	0	0	0	0	78/106
<b>Gutierrezia sarothrae -- (broom snakeweed)</b>									
2012	20	-	100	0	0	0	0	0	-/-
2015	40	20	0	100	0	0	0	0	29/41
2019	140	-	29	57	14	0	0	14	29/33
<b>Juniperus osteosperma<sup>i</sup> -- (Utah juniper)</b>									
2012	160	-	0	100	0	0	0	0	-/-
2015	80	-	100	0	0	0	0	0	-/-
2019	100	-	0	100	0	0	0	0	-/-
<b>Opuntia -- (pricklypear)</b>									
2012	-	-	-	-	-	-	-	-	8/17
2015	-	-	-	-	-	-	-	-	-/-
2019	20	-	0	100	0	0	0	0	6/12
<b>Pinus edulis<sup>i</sup> -- (twoneedle pinyon)</b>									
2012	20	-	0	100	0	0	0	0	-/-
2015	-	-	-	-	-	-	-	-	-/-
2019	-	-	-	-	-	-	-	-	-/-
<b>Purshia tridentata<sup>p</sup> -- (antelope bitterbrush)</b>									
2012	40	-	0	0	100	50	0	50	61/142
2015	20	-	0	0	100	0	100	100	42/71
2019	-	-	-	-	-	-	-	-	91/125
<b>Quercus gambelii<sup>p</sup> -- (Gambel oak)</b>									
2012	-	-	-	-	-	-	-	-	347/265
2015	-	-	-	-	-	-	-	-	-/-
2019	-	-	-	-	-	-	-	-	187/149

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

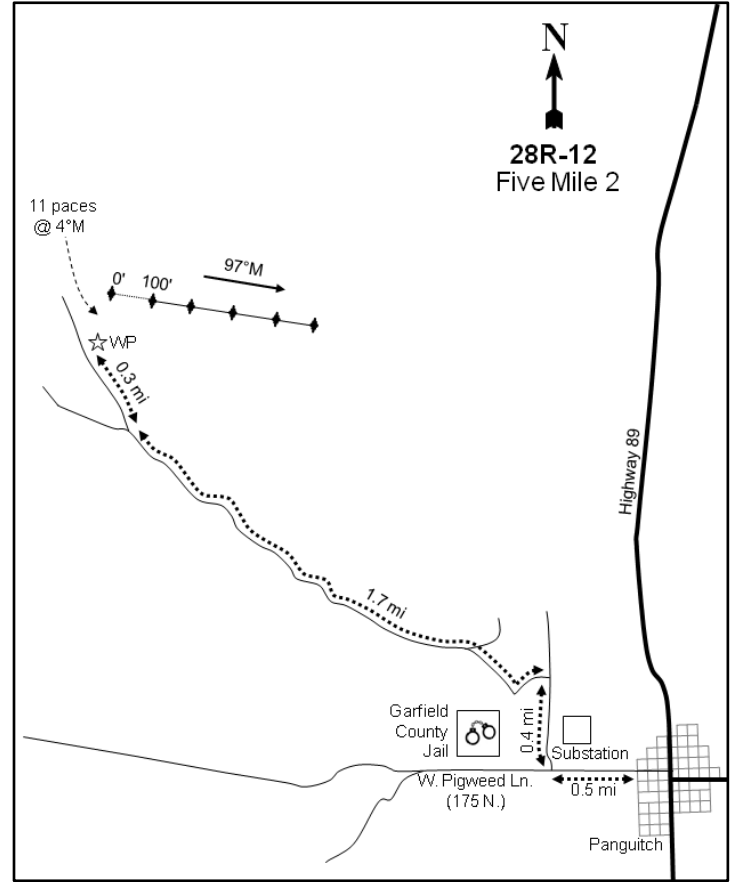
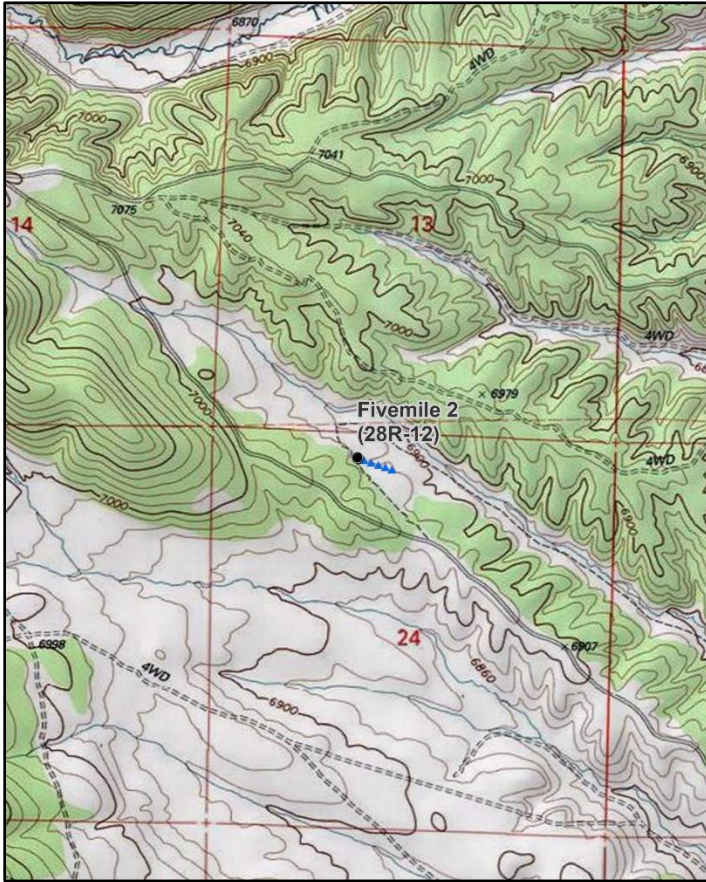
**Table 27R-22.14 - Tree Characteristics.** Point-quarter tree density, size class distribution, and average diameter.

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	113	-	-	5	53	42	26.3
2015	27	-	86	14	-	-	11.2
2019	20	9	45	45	-	-	11.6
<b>Pinus edulis (twoneedle pinyon)</b>							
2012	26	-	-	9	36	55	19.5
2019	3	-	100	-	-	-	6.0

**Table 27R-22.15 – 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
2012	8.1	14.6	15.0	4.9	-4.1	0.9	0.0	39.5	Poor
2015	20.9	13.7	15.0	24.5	-0.5	10.0	0.0	83.7	Excellent
2019	26.1	11.6	1.7	22.3	-1.5	10.0	0.0	70.2	Good

## FIVEMILE 2 - STUDY NO. 28R-12



### Location Information

USGS 7.5 min Map Info  
GPS (0' Stake)

Panguitch NW; Township 34S, Range 6W, Section 24  
NAD 83 UTM ZONE 12, 369741 East 4189766 North

### Transect Information

Browse Tag # (0' Stake)	186
Transect Bearing	97° 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

Driving from the intersection of 200 North and Main Street in Panguitch, drive east on 200 North to 300 West. Turn left, traveling south to 175 North. Continue right (east) for 0.5 miles, passing a substation on the right. Go right (north) for 0.4 miles, passing the Garfield County Jail, to a road on the left. Turn left onto this road and continue for 1.7 miles to a fork. Proceed to the right and drive 0.3 miles to a witness post on the right (east) side of the road. From the witness post, the 0-foot stake is 11 paces away at 4 degrees magnetic and is marked with browse tag #186.

**Site Information**

Land Ownership	Federal
Land Administrator	BLM
Allotment	SHEARING CORRAL
Elevation	6,868ft (2,093m)
Aspect	Northwest
Slope	3-5%
Sample Dates	06/20/2007, 07/12/2011, 08/19/2015, 08/12/2019

**Table 28R-12.1 Disturbance History.** Recorded history of major disturbances.

Treatment/Disturbance	Name	WRI DB#	Date	Size (acres)
Hand Crew - Lop and Scatter	Five Mile Hollow Sagebrush Restoration - Year 3	901	November 2008-May 2009	6465

**Wildlife Habitat and Vegetation History****Table 28R-12.3 - Wildlife Seasonal Habitat.** UDWR wildlife habitat and seasonality.

Species	Habitat	Season
Mule Deer	crucial	winter

**Table 28R-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 II transitioning to Phase III
2011	Black Sagebrush	Phase I
2015	Black Sagebrush/Perennial Grass	Phase I
2019	Black Sagebrush/Perennial Grass	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 #	R047XB309UT
States and Transitions	A defined state and transition model is available.

Upon study establishment in 2007, this site was dominated by twoneedle pinyon (*Pinus edulis*) and was considered to be within Phase II transitioning to Phase III of woodland succession (Table 28R-12.4). Following the lop and scatter treatment in 2011 (Table 28R-12.1), cover of pinyon decreased substantially while black sagebrush (*Artemisia nova*) cover and density increased, making it the dominant browse species (Table 28R-12.12, Table 28R-12.13). The herbaceous understory was sparse in 2007 and 2011. However, herbaceous cover has increased significantly since that time (Table 28R-12.7), and the understory has been primarily composed of the perennial grass species blue grama (*Bouteloua gracilis*) in all sample years. Diversity for both forbs and grasses has remained low throughout the study period (Table 28R-12.10, Table 28R-12.11). Barring a major disturbance or infilling by pinyon and juniper, it is predicted that this site will continue to exist as a sagebrush-dominated plant community.

**Trend Summary Tables****Table 28R-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	6.4	0.0	7.9	6.3	0.1	17.3
2011	8.5	0.1	0.1	9.4	0.2	0.2
2015	12.8	1.1	-	13.9	1.6	-
2019	12.8	1.0	-	14.4	0.4	-

**Table 28R-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	-	161	29	-	-	5.2	0.1	-
2011	-	178	222	30	-	5.9	3.5	0.2
2015	-	309	26	3	-	23.6	0.1	0.0
2019	-	326	101	26	-	24.8	1.3	0.2

**Table 28R-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	36.2	5.3	39.4	11.3	1.8	20.8
2011	36.3	0.8	44.4	5.9	0.8	18.5
2015	24.8	1.2	50.1	9.3	2.9	33.7
2019	20.0	0.4	44.7	11.5	2.3	39.6

**Table 28R-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		
2007	16	-	86
2011	31	-	6
2015	9	-	48
2019	20	-	37
Days Use Per Acre (ha)			
2007	34.2 (84.4)	2.0 (5.0)	-
2011	40.2 (99.3)	-	-
2015	7.4 (18.2)	0.7 (1.7)	-
2019	12.8 (31.5)	-	-

**Table 28R-12.10 - Grass Species.** Nested frequency and modified Daubenmire average cover by year.

GRASS SPECIES	Achnatherum hymenoides (Indian ricegrass)	Bouteloua gracilis (blue grama)	Elymus elymoides (squirreltail)	Pleuraphis jamesii (James' galleta)
year	Nested Frequency			
2007	7	153	10	4
2011	-	157	25	7
2015	0	300	25	7
2019	1	319	25	-
year	Average Cover (%)			
2007	0.1	5.1	0.0	0.0
2011	-	5.6	0.3	0.0
2015	0.0	22.5	0.9	0.2
2019	0.1	24.3	0.4	-

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

**Table 28R-12.11 - Forb Species.** Nested frequency and modified Daubenmire average cover by year.

FORB SPECIES	Astragalus lentiginosus (freckled milkvetch)	Calochortus nuttallii (sego lily)	Chenopodium fremontii <sup>a</sup> (Fremont's goosefoot)	Chenopodium leptophyllum <sup>a</sup> (narrowleaf goosefoot)	Descurainia pinnata <sup>a</sup> (western tansymustard)	Eriogonum cernuum <sup>a</sup> (nodding buckwheat)	Gayophytum ramosissimum <sup>a</sup> (pinyon groundsmoke)	Lactuca serriola <sup>ai</sup> (prickly lettuce)	Lappula occidentalis <sup>a</sup> (flatspine stickseed)	Orobancha fasciculata (clustered broomrape)	Phlox longifolia (longleaf phlox)
year	Nested Frequency										
2007	-	-	-	-	16	9	5	2	-	-	-
2011	27	2	50	79	127	17	83	12	38	-	1
2015	3	-	4	14	1	6	2	-	-	-	-
2019	18	1	4	22	46	35	12	-	15	3	4
year	Average Cover (%)										
2007	-	-	-	-	0.0	0.0	0.0	0.0	-	-	-
2011	0.2	0.0	1.2	0.4	1.0	0.1	0.5	0.2	0.2	-	0.0
2015	0.0	-	0.0	0.0	0.0	0.0	0.0	-	-	-	-
2019	0.1	0.0	0.0	0.1	0.6	0.4	0.2	-	0.1	0.0	0.0

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

**Table 28R-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)	Ericameria nauseosa (rubber rabbitbrush)	Gutierrezia sarothrae (broom snakeweed)	Opuntia (pricklypear)	Pinus edulis <sup>t</sup> (twoneedle pinyon)
year	Line Intercept Cover (%)					
2007	4.5	1.8	-	0.1	-	17.3
2011	6.9	2.5	-	0.2	-	0.2
2015	9.8	4.1	0.4	1.2	-	-
2019	9.8	4.6	-	0.4	-	-
year	Quadrat Cover (%)					
2007	4.7	1.7	-	0.0	0.0	7.9
2011	6.2	2.3	-	0.1	-	0.1
2015	9.1	3.7	0.4	0.7	-	-
2019	8.3	4.5	0.1	0.9	-	-

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

**Table 28R-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 nova<sup>P</sup> -- (black sagebrush)</b>									
2007	2780	500	2	39	59	22	25	58	31/50
2011	2960	5540	16	55	28	24	4	20	31/52
2015	4200	180	25	69	6	19	25	2	33/59
2019	3980	-	6	61	33	28	16	32	42/68
<b>Artemisia tridentata ssp. vaseyana<sup>P</sup> -- (mountain big sagebrush)</b>									
2007	540	100	4	56	41	26	0	48	85/85
2011	760	7940	11	50	40	29	8	3	92/101
2015	2260	20	66	32	3	7	3	3	72/94
2019	1760	60	17	61	22	24	18	23	77/90
<b>Ericameria nauseosa -- (rubber rabbitbrush)</b>									
2007	-	-	-	-	-	-	-	-	-/-
2011	-	20	0	0	0	0	0	0	-/-
2015	40	-	0	100	0	0	0	0	72/88
2019	40	-	0	0	100	0	0	100	86/103
<b>Ericameria nauseosa ssp. nauseosa var. speciosa<sup>P</sup> -- (rubber rabbitbrush)</b>									
2007	-	-	-	-	-	-	-	-	-/-
2011	-	-	-	-	-	-	-	-	-/-
2015	-	-	-	-	-	-	-	-	-/-
2019	-	-	-	-	-	-	-	-	106/118
<b>Gutierrezia sarothrae -- (broom snakeweed)</b>									
2007	360	280	78	22	0	0	0	0	9/9
2011	500	60	4	96	0	0	0	0	24/20
2015	2200	40	36	65	0	0	0	0	27/30
2019	1200	20	3	97	0	2	0	0	21/19
<b>Juniperus osteosperma<sup>t</sup> -- (Utah juniper)</b>									
2007	20	-	100	0	0	0	0	100	-/-
2011	-	-	-	-	-	-	-	-	-/-
2015	-	-	-	-	-	-	-	-	-/-
2019	-	-	-	-	-	-	-	-	-/-
<b>Opuntia -- (pricklypear)</b>									
2007	20	20	100	0	0	0	0	0	10/26
2011	-	-	-	-	-	-	-	-	12/32
2015	-	-	-	-	-	-	-	-	7/31
2019	20	-	0	100	0	0	0	0	8/17
<b>Pediocactus simpsonii -- (mountain ball cactus)</b>									
2007	-	-	-	-	-	-	-	-	-/-
2011	-	-	-	-	-	-	-	-	-/-
2015	-	-	-	-	-	-	-	-	-/-
2019	-	-	-	-	-	-	-	-	3/7
<b>Pinus edulis<sup>t</sup> -- (twoneedle pinyon)</b>									
2007	180	40	22	78	0	0	0	0	-/-
2011	40	20	100	0	0	0	0	0	-/-
2015	-	20	0	0	0	0	0	0	-/-
2019	-	-	-	-	-	-	-	-	-/-
<b>Ribes aureum<sup>P</sup> -- (golden currant)</b>									
2007	-	-	-	-	-	-	-	-	-/-
2011	-	-	-	-	-	-	-	-	-/-
2015	-	-	-	-	-	-	-	-	123/169
2019	-	-	-	-	-	-	-	-	124/180

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



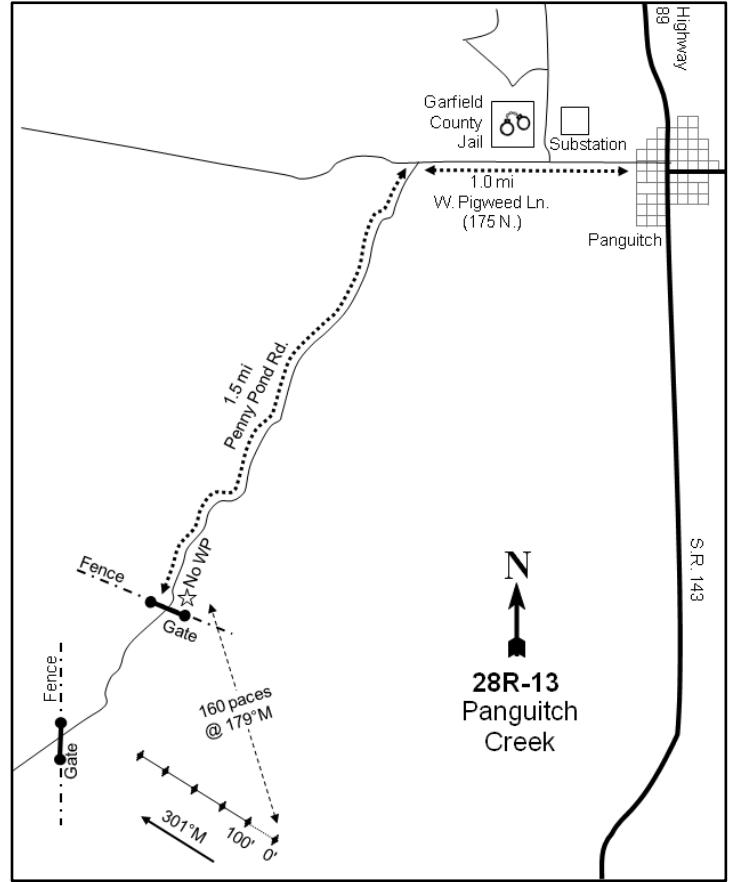
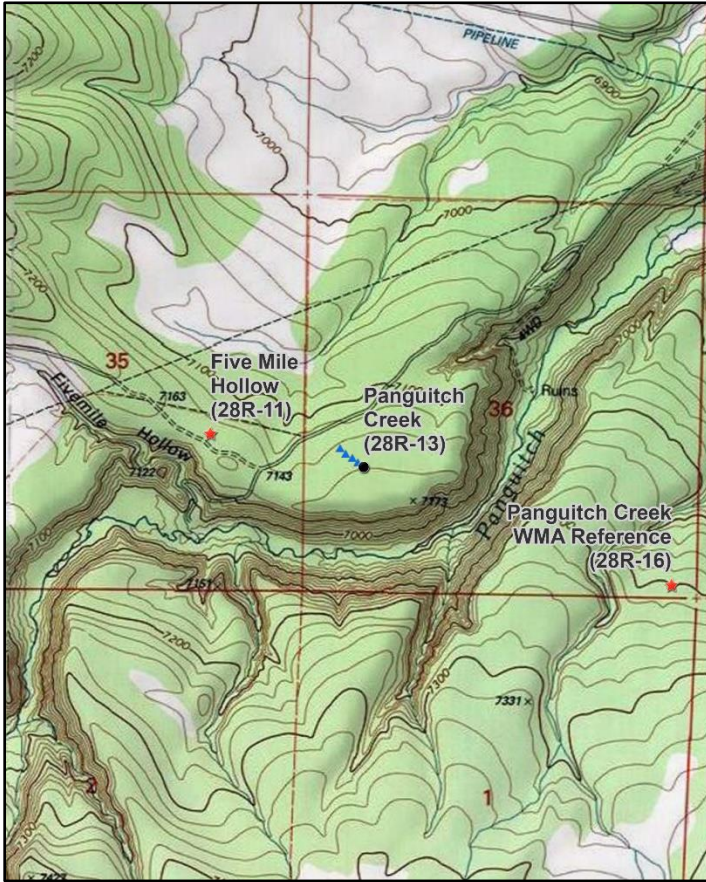
**Table 28R-12.14 - Tree Characteristics.** Point-quarter tree density, size class distribution, and average diameter.

Year	Density	Size Class Distribution					Average Diameter (cm)
	Trees per Acre	Seedling (%)	1-4' (%)	4-8' (%)	8-12' (%)	>12' (%)	
Pinus edulis (twoneedle pinyon)							
2007	101	-	5	40	30	25	18.8
2011	11	56	44	-	-	-	1.8
2015	22	44	56	-	-	-	2.9
2019	6	50	50	-	-	-	2.8

**Table 28R-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
2007	7.9	-1.1	1.3	10.3	0.0	0.0	0.0	18.4	Very Poor
2011	11.8	5.6	7.3	11.8	0.0	0.5	0.0	36.9	Very Poor-Poor
2015	17.4	13.4	15.0	30.0	0.0	0.0	0.0	75.8	Good
2019	18.0	6.3	4.8	30.0	0.0	0.4	0.0	59.4	Fair

## PANGUITCH CREEK - STUDY NO. 28R-13



### Location Information

USGS 7.5 min Map Info  
GPS (0' Stake)

Panguitch SW; Township 34S, Range 6W, Section 36  
NAD 83 UTM ZONE 12, 369328 East 4185567 North

### Transect Information

Browse Tag # (0' Stake)	108
Transect Bearing	294° 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

Driving from US-89 in Panguitch, travel west on 200 North. Drive to 300 West and turn left (south), then make an immediate right (west) onto 175 North (Penny Pond Road). Drive 0.5 miles to a four-way intersection. Continue straight (west) for 0.5 miles to a fork in the road. Proceed to the left and drive 0.9 miles to another fork in the road. Take the right fork and drive 0.7 miles to a fence; continue straight (right fork leads to study #28R-11) to the site. The 0-foot stake is 160 paces (960 feet) away at 179 degrees magnetic from where the fence and road meet. The 0-foot stake is marked with browse tag #108.

**Site Information**

Land Ownership	State
Land Administrator	UDWR
Allotment	No data
Elevation	7,100ft (2,164m)
Aspect	Northwest
Slope	2-5%
Sample Dates	06/10/2008, 07/11/2011, 08/19/2015, 08/12/2019

**Table 28R-13.1 Disturbance History.** Recorded history of major disturbances.

Treatment/Disturbance	Name	WRI DB#	Date	Size (acres)
Mechanical - Bullhog	Panguitch Creek WMA PJ Thinning	1206	Spring 2009	28
Seeding - Aerial Before	Panguitch Creek WMA PJ Thinning	1206	November 2008	383

**Table 28R-13.2 Seed Mix.** List of known seeded plant species and rates (if available).

Mix Name			Application Type	Application Date	Acres
Panguitch Creek WMA PJ Chain/Bullhog			Aerial	Nov 2008	383
Type	Species	Common Name	Cultivar/Source ID	Bulk lbs/acre	PLS
G	Achnatherum hymenoides	Indian Ricegrass	Rimrock	0.91	0.84
G	Elymus elymoides	Bottlebrush Squirreltail	Toe Jam	0.13	0.11
G	Elymus wawawaiensis	Snake River Wheatgrass	Secar	1.04	0.80
G	Poa secunda	Canby Bluegrass	Canbar	0.39	0.34
G	Psathyrostachys juncea	Russian Wildrye	Bozoisky	1.04	0.89
G	Thinopyrum intermedium	Intermediate Wheatgrass	Oahe	1.57	1.42
F	Linum perenne	Blue Flax	Appar	0.39	0.33
F	Medicago sativa	Alfalfa	Ladak	0.52	0.47
F	Medicago sativa	Alfalfa	Ranger	0.52	0.48
F	Penstemon palmeri	Palmer Penstemon	White Pine NV	0.26	0.20
F	Sanguisorba minor	Small Burnet	Delar	1.17	1.01
S	Artemisia tridentata ssp. vaseyana	Mountain Big Sagebrush	Sanpete UT	0.52	0.09
S	Bassia prostrata	Forage Kochia	Immigrant	0.52	0.36

Mix Name			Application Type	Application Date	Acres
Panguitch Creek Chaining Dribbler			Dribbler	Nov 2008	332
Type	Species	Common Name	Cultivar/Source ID	Bulk lbs/acre	PLS
S	Bassia prostrata	Forage Kochia	Immigrant	0.30	0.21
S	Cercocarpus ledifolius	Curleaf Mountain Mahogany	Sevier UT	0.15	0.10
S	Purshia stansburiana	Stansbury Cliffrose	Millard UT	0.11	0.09
S	Purshia stansburiana	Stansbury Cliffrose	Millard UT	0.08	0.05
S	Purshia tridentata	Bitterbrush	Lincoln NV	0.45	0.36

**Wildlife Habitat and Vegetation History****Table 28R-13.3 - Wildlife Seasonal Habitat.** UDWR wildlife habitat and seasonality.

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

**Table 28R-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	Pinyon-Juniper	Phase III
2011	Pinyon-Juniper/Perennial Forb	Phase II
2015	Pinyon-Juniper/Broom Snakeweed	Phase II
2019	Pinyon-Juniper/Black Sagebrush	Phase II

**Site Notes**

Following a 2008-2009 bullhog and seeding treatment, the study transect was rotated on the zero foot stake in 2011 to be within the treated portions of the project.

**Site Potential**

1981 - 2010 Average Annual Precipitation	13 inches
NRCS Ecological Site	Upland Loam (Black Sagebrush)
NRCS Ecological Site #	R047XB309UT
States and Transitions	A defined state and transition model is available.

This site was dominated by twoneedle pinyon (*Pinus edulis*) and was within Phase III of woodland succession when the study was established in 2008. Cover of pinyon decreased in 2011 following a bullhog and seeding treatment (Table 28R-13.1, Table 28R-13.12), but it continued to be a dominant vegetation component. The site has remained in Phase II of woodland succession in all post-treatment sample years (Table 28R-13.4). The herbaceous understory was depauperate in 2008 and cryptantha (*Cryptantha sp.*) was the sole species present on the site, providing minimal cover. Diversity of both grasses and forbs increased following treatment, but they have generally remained minor vegetation components (Table 28R-13.10, Table 28R-13.11). Shrub cover has increased over time; broom snakeweed (*Gutierrezia sarothrae*) dominated the shrub understory in 2015 and black sagebrush (*Artemisia nova*) was the dominant species in 2019. Both pinyon and Utah juniper (*Juniperus osteosperma*) have been present in all post-treatment years (Table 28R-13.12, Table 28R-13.13, Table 28R-13.14). Without a further tree-removing disturbance, this site will likely again transition from a Phase II woodland to a Phase III woodland.

**Trend Summary Tables****Table 28R-13.6 - Shrub/Tree Summary.** Average modified Daubenmire quadrat and line intercept cover by year for shrubs/trees

Year	Quadrat Cover (%)			Line-intercept Cover (%)		
	Preferred Shrub	Other Shrub	Tree	Preferred Shrub	Other Shrub	Tree
2008	0.9	0.0	16.3	0.8	-	40.9
2011	2.9	1.0	0.9	2.3	1.1	5.6
2015	4.5	6.1	1.3	3.7	7.2	7.4
2019	3.3	3.6	2.5	5.6	3.2	5.6

**Table 28R-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	-	-	-	12	-	-	-	0.1
2011	-	59	87	146	-	1.0	1.6	7.7
2015	-	127	6	68	-	3.5	0.0	0.6
2019	-	96	58	190	-	2.7	0.5	6.3

**Table 28R-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	22.2	0.3	59.6	17.1	2.7	17.6
2011	15.2	0.2	62.1	8.4	3.5	14.4
2015	14.1	0.1	66.6	9.6	7.8	13.8
2019	25.1	0.0	59.5	9.5	4.6	19.0

**Table 28R-13.9 - Pellet Group Data.** Quadrat frequency and pellet group transect data for animal pellets. Rabbit pellet groups are not sampled in the pellet group transect.

Year	Mule Deer	Rocky Mountain Elk	Rabbit
	Quadrat Frequency		
2008	14	-	67
2011	15	1	5
2015	16	-	27
2019	35	3	45
Year	Days Use Per Acre (ha)		
2008	16.1 (39.7)	-	-
2011	15.4 (38.1)	0.7 (1.7)	-
2015	24.8 (61.2)	-	-
2019	22.1 (54.6)	0.7 (1.7)	-

**Table 28R-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)	Bouteloua gracilis (blue grama)	Elymus elymoides (squirreltail)	Elymus wawawaiensis (Snake River wheatgrass)	Pleuraphis jamesii (James' galleta)	Poa secunda (Sandberg bluegrass)	Psathyrostachys juncea <sup>i</sup> (Russian wildrye)	Thinopyrum intermedium <sup>i</sup> (intermediate wheatgrass)
year	Nested Frequency								
2008	-	-	-	-	-	-	-	-	-
2011	3	4	5	29	1	-	-	3	17
2015	5	-	18	83	11	3	2	16	3
2019	8	-	15	76	-	-	-	5	2
year	Average Cover (%)								
2008	-	-	-	-	-	-	-	-	-
2011	0.0	0.0	0.3	0.3	0.0	-	-	0.0	0.2
2015	0.3	-	0.3	2.3	0.3	0.0	0.0	0.2	0.0
2019	0.0	-	0.6	2.0	-	-	-	0.1	0.0

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

**Table 28R-13.11 - Forb Species.** Nested frequency and modified Daubenmire average cover by year.

FORB SPECIES	Arabis (rockcross)	Asteraceae (null)	Astragalus convallarius (lesser rushy milkvetch)	Astragalus lentiginosus (freckled milkvetch)	Astragalus miser (timber milkvetch)	Chaenactis douglasii (Douglas' dustymaiden)	Chenopodium fremontii <sup>a</sup> (Fremont's goosefoot)	Cryptantha (cryptantha)	Cryptantha <sup>a</sup> (annual cryptantha)	Descurainia pinnata <sup>a</sup> (western tansymustard)	Eriogonum cernuum <sup>a</sup> (nodding buckwheat)	Ipomopsis aggregata (scarlet gilia)	Lactuca serriola <sup>at</sup> (prickly lettuce)	Lappula occidentalis <sup>a</sup> (flatspine stickseed)	Linum perenne <sup>i</sup> (blue flax)	Medicago sativa <sup>i</sup> (alfalfa)	Penstemon palmeri (Palmer's penstemon)
year	Nested Frequency																
2008	-	-	-	-	-	-	-	12	-	-	-	-	-	-	-	-	-
2011	-	-	-	102	1	-	-	21	-	43	5	25	43	-	27	2	6
2015	1	1	-	20	-	2	-	26	-	-	2	7	1	-	7	-	15
2019	-	-	1	154	3	3	3	37	11	29	3	6	-	2	-	-	8
year	Average Cover (%)																
2008	-	-	-	-	-	-	-	0.1	-	-	-	-	-	-	-	-	-
2011	-	-	-	5.6	0.0	-	-	0.6	-	0.7	0.1	0.7	0.8	-	0.6	0.1	0.1
2015	0.0	0.0	-	0.1	-	0.0	-	0.1	-	-	0.0	0.0	0.0	-	0.0	-	0.3
2019	-	-	0.0	5.7	0.0	0.0	0.0	0.4	0.0	0.3	0.0	0.1	-	0.0	-	-	0.0

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

FORB SPECIES	Salsola tragus <sup>ai</sup> (prickly Russian thistle)	Sanguisorba minor <sup>i</sup> (small burnet)	Sisymbrium altissimum <sup>ai</sup> (tall tumblemustard)	Solanum triflorum <sup>ai</sup> (cutleaf nightshade)	Taraxacum officinale (common dandelion)
year	Nested Frequency				
2008	-	-	-	-	-
2011	-	0	-	-	-
2015	3	-	-	-	3
2019	12	-	0	4	6
year	Average Cover (%)				
2008	-	-	-	-	-
2011	-	0.0	-	-	-
2015	0.0	-	-	-	0.0
2019	0.1	-	0.0	0.0	0.1

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

**Table 28R-13.12 - 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)	Opuntia (pricklypear)	Pinus edulis <sup>t</sup> (twoneedle pinyon)	Rhus trilobata var. trilobata <sup>p</sup> (skunkbush sumac)
year	Line Intercept Cover (%)							
2008	0.8	-	-	-	0	-	40.9	-
2011	2.3	0	-	1.1	2.3	-	3.3	-
2015	3.4	0.3	-	7.2	3.4	-	4	-
2019	5.2	0.4	-	3.1	-	0.1	5.6	-
year	Quadrat Cover (%)							
2008	0.9	-	-	0.0	0.0	-	16.3	-
2011	2.8	0.0	-	1.0	0.8	0.0	0.2	0.0
2015	4.5	0.0	-	6.1	0.5	-	0.8	0.0
2019	3.3	0.0	0.1	3.2	-	0.2	2.5	0.0

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

**Table 28R-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 nova<sup>p</sup> -- (black sagebrush)</b>									
2008	600	20	0	13	87	23	23	73	19/43
2011	1180	1000	19	58	24	15	0	10	26/54
2015	2860	140	57	41	2	9	17	2	24/51
2019	3020	140	28	64	8	9	36	9	30/57
<b>Artemisia tridentata ssp. vaseyana<sup>p</sup> -- (mountain big sagebrush)</b>									
2008	-	-	-	-	-	-	-	-	-/-
2011	80	-	100	0	0	0	0	0	22/28
2015	120	20	50	50	0	33	17	0	29/46
2019	140	-	0	86	14	14	43	14	32/53
<b>Bassia prostrata<sup>pi</sup> -- (forage kochia)</b>									
2008	-	-	-	-	-	-	-	-	-/-
2011	-	-	-	-	-	-	-	-	-/-
2015	-	-	-	-	-	-	-	-	19/14
2019	-	-	-	-	-	-	-	-	-/-
<b>Ericameria nauseosa -- (rubber rabbitbrush)</b>									
2008	-	-	-	-	-	-	-	-	-/-
2011	-	-	-	-	-	-	-	-	-/-
2015	-	-	-	-	-	-	-	-	48/32
2019	80	-	75	25	0	0	0	0	86/115
<b>Gutierrezia sarothrae -- (broom snakeweed)</b>									
2008	740	400	11	89	0	0	0	0	8/5
2011	2720	660	27	73	1	0	0	1	26/25
2015	16600	80	25	75	1	0	0	1	22/24
2019	5780	-	5	92	3	0	0	3	19/19
<b>Juniperus osteosperma<sup>t</sup> -- (Utah juniper)</b>									
2008	-	20	0	0	0	0	0	0	-/-
2011	20	20	0	100	0	0	0	0	-/-
2015	20	40	0	100	0	0	0	0	-/-
2019	60	-	100	0	0	0	0	0	-/-
<b>Opuntia -- (pricklypear)</b>									
2008	80	20	0	75	25	0	0	0	11/32
2011	-	-	-	-	-	-	-	-	11/28
2015	20	-	0	100	0	0	0	0	9/23
2019	80	-	25	75	0	0	0	0	11/30
<b>Pediocactus simpsonii -- (mountain ball cactus)</b>									
2008	-	-	-	-	-	-	-	-	-/-
2011	-	-	-	-	-	-	-	-	3/7
2015	-	-	-	-	-	-	-	-	-/-
2019	20	-	0	100	0	0	0	0	3/6
<b>Pinus edulis<sup>t</sup> -- (twoneedle pinyon)</b>									
2008	1000	80	46	52	2	0	0	0	-/-
2011	80	180	50	50	0	0	0	0	-/-
2015	100	380	60	40	0	0	0	0	-/-
2019	120	40	67	33	0	0	0	0	-/-
<b>Rhus trilobata var. trilobata<sup>p</sup> -- (skunkbush sumac)</b>									
2008	-	-	-	-	-	-	-	-	52/56
2011	20	-	100	0	0	100	0	0	29/28
2015	-	-	-	-	-	-	-	-	52/64
2019	20	-	0	0	100	100	0	100	24/33

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



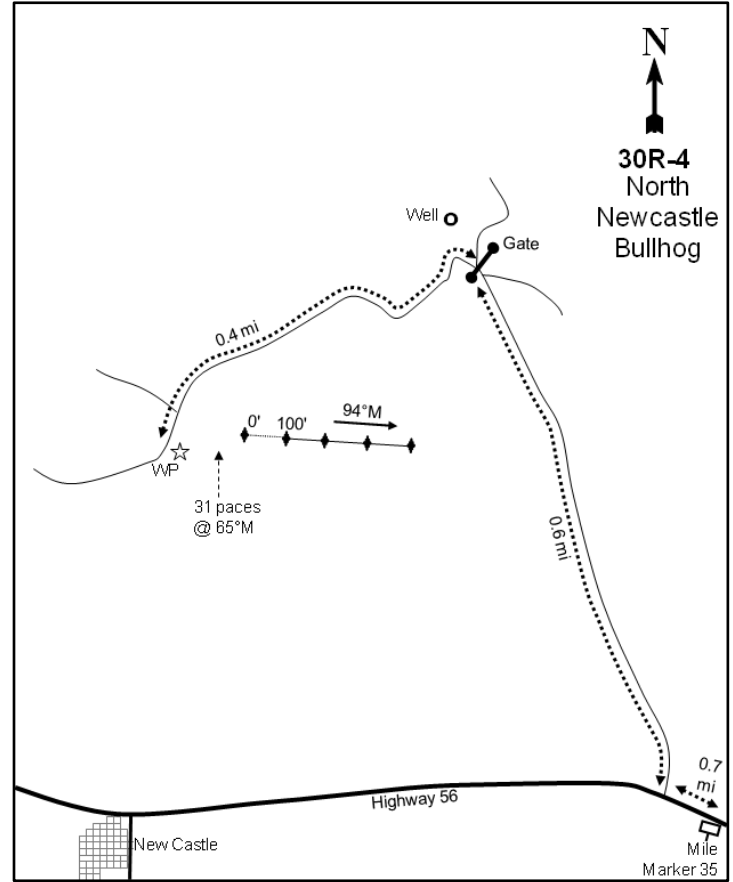
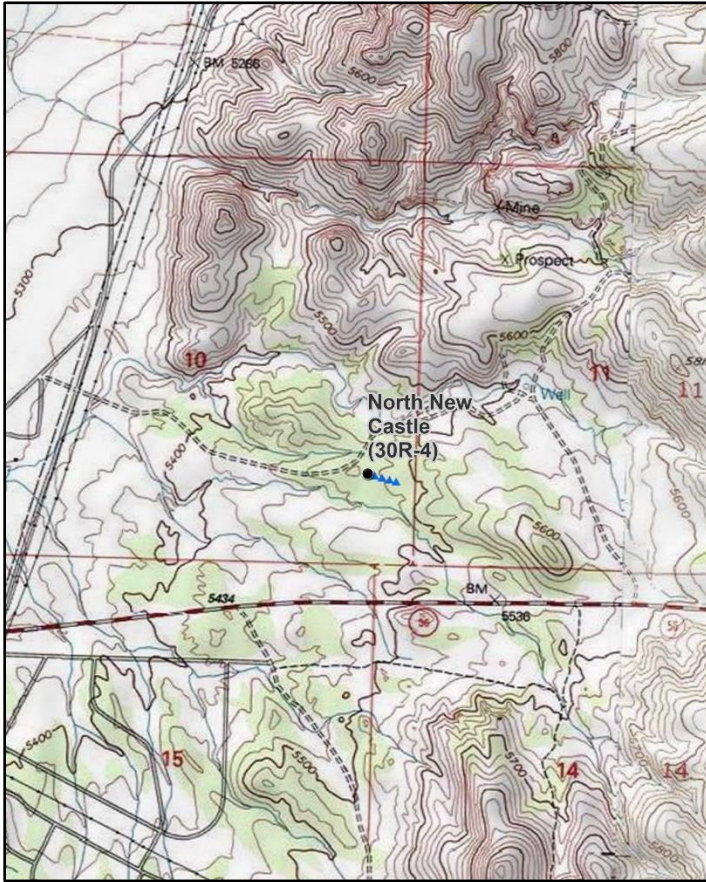
**Table 28R-13.14 - Tree Characteristics.** Point-quarter tree density, size class distribution, and average diameter.

Year	Density	Size Class Distribution					Average Diameter (cm)
	Trees per Acre	Seedling (%)	1-4' (%)	4-8' (%)	8-12' (%)	>12' (%)	
<b>Juniperus osteosperma (Utah juniper)</b>							
2008	22	-	25	50	25	-	9.0
2011	15	43	14	-	-	43	16.6
2015	20	11	56	11	22	-	8.7
2019	16	60	20	20	-	-	6.6
<b>Pinus edulis (twoneedle pinyon)</b>							
2008	483	5	40	30	15	10	7.8
2011	96	47	16	-	-	37	12.8
2015	158	30	50	-	5	15	7.5
2019	59	25	31	6	-	38	14.7

**Table 28R-13.15 – 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	1.0	0.0	0.0	0.0	0.0	0.2	0.0	1.2	Very Poor
2011	2.9	0.0	0.0	2.0	0.0	10.0	0.0	14.9	Very Poor
2015	4.6	0.0	0.0	7.0	0.0	1.2	0.0	12.8	Very Poor
2019	7.0	12.5	13.2	5.5	0.0	10.0	0.0	48.2	Poor-Fair

## NORTH NEW CASTLE - STUDY NO. 30R-4



### Location Information

USGS 7.5 min Map Info	Newcastle SE; Township 36S, Range 15W, Section 10
GPS (0' Stake)	NAD 83 UTM ZONE 12, 278431 East 4173311 North

### Transect Information

Browse Tag # (0' Stake)	217
Transect Bearing	94° 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

Driving from Cedar City, travel west on Highway 56 and turn right 0.7 miles after mile marker 35. Drive 0.6 miles to a well on the right. Proceed left at the fork, continue to a gate, stay left, and drive 0.1 miles to another fork. Stay left, drive 0.3 miles to a left turn, and continue 0.1 miles to the witness post on the right (south) side of the road. The 0-foot stake is 31 paces from the witness post at 65 degrees magnetic and is marked with browse tag #217.

**Site Information**

Land Ownership	Federal
Land Administrator	BLM
Allotment	SILVER PEAK
Elevation	5,480ft (1,670m)
Aspect	Southeast
Slope	4%
Sample Dates	06/24/2008, 06/14/2011, 08/06/2015, 08/12/2019

**Table 30R-04.1 Disturbance History.** Recorded history of major disturbances.

Treatment/Disturbance	Name	WRI DB#	Date	Size (acres)
Mechanical - Bullhog	North Newcastle	446	December 2008-January 2009	870
Seeding - Aerial Before	North Newcastle	446	October 2008	870
Hand Crew - Lop and Scatter	Enterprise/Hwy 56 Project Maintenance	3431	August-December 2015	1323

**Table 30R-04.2 Seed Mix.** List of known seeded plant species and rates (if available).

Mix Name			Application Type	Application Date	Acres
North Newcastle			Aerial	Oct 2008	1000
Type	Species	Common Name	Cultivar/Source ID	Bulk lbs/acre	PLS
G	Agropyron cristatum	Crested Wheatgrass	Douglas	0.50	0.39
G	Agropyron desertorum	Crested Wheatgrass	Hycrest	0.55	0.44
G	Elymus wawawaiensis	Snake River Wheatgrass	Secar	1.00	0.76
G	Pascopyrum smithii	Western Wheatgrass	Arriba	1.00	0.94
G	Poa secunda	Big Bluegrass	Sherman	0.50	0.35
G	Thinopyrum intermedium	Intermediate Wheatgrass	Rush	0.12	0.11
G	Thinopyrum intermedium	Intermediate Wheatgrass	Oahe	1.35	1.29
F	Achillea millefolium	Western Yarrow		0.10	0.10
F	Medicago sativa	Alfalfa	Ladak	0.50	0.47
F	Medicago sativa	Alfalfa	Ranger	0.50	0.46
F	Onobrychis viciifolia	Sainfoin	Eski	2.00	1.75
F	Sanguisorba minor	Small Burnet	Delar	1.50	1.39

**Wildlife Habitat and Vegetation History****Table 30R-04.3 - Wildlife Seasonal Habitat.** UDWR wildlife habitat and seasonality.

Species	Habitat	Season
Mule Deer	crucial	winter

**Table 30R-04.4 - 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/Mixed Shrub	Phase II
2011	Annual Grass/Mixed Shrub	Phase I
2015	Mixed Shrub/Perennial Grass	Phase I
2019	Mixed Shrub/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	A defined state and transition model is available.

Upon study establishment in 2008, Utah juniper (*Juniperus osteosperma*) and twoneedle pinyon (*Pinus edulis*) co-dominated this site along with mixed shrubs such as broom snakeweed (*Gutierrezia sarothrae*) and sagebrush (*Artemisia sp.*). Pinyon and juniper have become minor species in the community since the bullhog and seeding treatment in the fall-winter of 2008 (Table 30R-04.1), leaving the mixed shrubs as the dominant community components (Table 30R-04.12, Table 30R-04.13, Photos). The herbaceous understory was present, but not abundant prior to treatment. Diversity and cover of herbaceous species increased in the sample years following treatment (Table 30R-04.7), and the introduced annual grass species cheatgrass (*Bromus tectorum*) was dominant in 2011. Cheatgrass

decreased in 2015 and James' galleta (*Pleuraphis jamesii*) has been the primary component of the herbaceous layer since that year (Table 30R-04.10). Forbs have slightly increased in diversity following the bullhog treatment, but have remained scarce; rose heath (*Chaetopappa ericoides*) is the dominant forb species on the site (Table 30R-04.11). Although there is potential for infill by juniper and pinyon, neither density nor cover of either species has increased in the sample years following the treatment, indicating that this is likely not an immediate concern (Table 30R-04.12, Table 30R-04.13).

### Trend Summary Tables

**Table 30R-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
2008	3.5	4.9	2.9	4.6	3.9	3.9
2011	5.3	3.6	0.4	6.5	4.1	1.7
2015	5.9	3.8	0.6	9.6	3.5	1.6
2019	5.6	6.6	-	8.3	7.1	1.3

**Table 30R-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
2008	153	188	108	67	0.4	5.0	0.8	0.7
2011	329	255	53	110	8.7	6.5	0.4	2.1
2015	152	298	6	164	1.4	15.8	0.1	2.8
2019	166	304	166	160	3.0	8.0	3.8	3.3

**Table 30R-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
2008	39.1	0.1	22.3	31.0	2.0	18.2
2011	35.7	-	19.3	8.6	1.2	33.7
2015	48.5	-	29.1	19.5	2.3	26.3
2019	41.0	0.0	34.2	15.0	2.1	25.8

**Table 30R-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			
2008	5	13	2	95
2011	6	-	-	6
2015	11	-	-	41
2019	25	-	-	43
Year	Days Use Per Acre (ha)			
2008	0.7 (1.8)	8.1 (19.9)	-	-
2011	10.9 (26.9)	3.4 (8.3)	-	-
2015	20.3 (50.2)	2.7 (6.6)	-	-
2019	38.5 (95.0)	0.7 (1.7)	-	-

**Table 30R-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)	Aristida purpurea (purple threeawn)	Bouteloua gracilis (blue grama)	Bromus tectorum <sup>ai</sup> (cheatgrass)	Elymus elymoides (squirreltail)	Hesperostipa comata (needle and thread)	Pascopyrum smithii (western wheatgrass)	Pleuraphis jamesii (James' galleta)	Secale cereale <sup>ai</sup> (cereal rye)	Thinopyrum intermedium <sup>i</sup> (intermediate wheatgrass)	Vulpia octoflora <sup>a</sup> (sixweeks fescue)
year	Nested Frequency											
2008	53	-	-	-	153	20	6	-	148	-	-	-
2011	55	18	-	6	329	69	2	11	171	-	3	-
2015	61	4	22	-	151	81	20	9	223	1	4	-
2019	52	2	18	6	166	18	37	-	255	-	-	4
year	Average Cover (%)											
2008	0.7	-	-	-	0.4	0.1	0.1	-	4.1	-	-	-
2011	1.1	0.1	-	0.2	8.7	1.2	0.0	0.1	3.8	-	0.0	-
2015	1.5	0.1	0.3	-	1.4	2.2	0.8	0.0	10.7	0.0	0.0	-
2019	0.5	0.1	0.1	0.4	3.0	0.3	0.7	-	6.0	-	-	0.0

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

**Table 30R-04.11 - Forb Species.** Nested frequency and modified Daubenmire average cover by year.

FORB SPECIES	Astragalus (milkvetch)	Astragalus beckwithii (Beckwith's milkvetch)	Astragalus calycosus (Torrey's milkvetch)	Astragalus lentiginosus (freckled milkvetch)	Calochortus flexuosus (winding mariposa lily)	Chaenactis douglasii (Douglas' dustymaiden)	Chaetopappa ericoides (rose heath)	Chamaesyce albomarginata (whitemargin sandmat)	Chenopodium fremontii <sup>a</sup> (Fremont's goosefoot)	Cordylanthus <sup>a</sup> (bird's-beak)	Cryptantha (cryptantha)	Cryptantha gracilis <sup>a</sup> (narrowstem cryptantha)	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)	Gilia inconspicua <sup>a</sup> (shy gilia)
year	Nested Frequency																
2008	0	-	0	-	-	1	41	16	-	68	1	-	-	-	43	-	3
2011	-	2	8	6	13	4	55	18	2	15	-	2	5	8	-	-	16
2015	-	3	15	-	-	2	106	34	-	4	-	1	-	-	1	-	-
2019	-	-	10	-	3	1	115	39	3	40	-	3	22	-	12	8	107
year	Average Cover (%)																
2008	0.0	-	0.0	-	-	0.0	0.4	0.1	-	0.6	0.0	-	-	-	0.2	-	0.0
2011	-	0.1	0.2	0.0	0.0	0.0	1.4	0.1	0.0	0.0	-	0.0	0.0	0.0	-	-	0.1
2015	-	0.0	0.2	-	-	0.0	2.1	0.2	-	0.0	-	0.0	-	-	0.0	-	-
2019	-	-	0.0	-	0.0	0.0	2.5	0.7	0.0	1.5	-	0.0	0.4	-	0.0	0.0	1.5

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

FORB SPECIES	Ipomopsis congesta (ballhead ipomopsis)	Lepidium ramosissimum <sup>a</sup> (manybranched pepperweed)	Lygodesmia grandiflora (largeflower skeletonplant)	Microsteris gracilis <sup>a</sup> (slender phlox)	Navarretia intertexta <sup>a</sup> (needleleaf navarretia)	Penstemon confusus (Owens Valley beardtongue)	Phlox austromontana (mountain phlox)	Phlox longifolia (longleaf phlox)	Sisymbrium altissimum <sup>at</sup> (tall tumblemustard)	Streptanthus cordatus (heartleaf twistflower)
year	Nested Frequency									
2008	1	-	2	-	-	2	-	6	-	3
2011	3	5	7	11	-	2	-	13	0	6
2015	-	-	-	-	-	12	2	30	0	5
2019	-	9	9	-	10	3	-	5	-	9
year	Average Cover (%)									
2008	0.0	-	0.0	-	-	0.0	-	0.0	-	0.0
2011	0.0	0.0	0.1	0.2	-	0.0	-	0.1	0.0	0.0
2015	-	-	-	-	-	0.1	0.0	0.1	0.0	0.0
2019	-	0.2	0.1	-	0.1	0.0	-	0.0	-	0.0

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

**Table 30R-04.12 - 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 nevadensis <sup>p</sup> (Nevada jointfir)	Eriogonum microthecum <sup>p</sup> (slender buckwheat)	Gutierrezia sarothrae (broom snakeweed)	Juniperus osteosperma <sup>t</sup> (Utah juniper)	Pinus edulis <sup>t</sup> (twoneedle pinyon)
year	Line Intercept Cover (%)							
2008	1.6	1.2	0.8	1.6	0.2	3.1	2.7	1.2
2011	1.4	2	2.3	2.9	0.2	1.8	1.7	-
2015	1.7	2.5	2.1	4.7	0.7	1.4	1.6	-
2019	2.2	2.7	2.2	3.2	0.2	4.9	1.3	-
year	Quadrat Cover (%)							
2008	0.8	1.9	1.4	0.7	0.1	3.6	1.9	1.0
2011	2.1	0.5	1.6	2.3	0.4	2.0	0.4	-
2015	0.1	2.2	1.6	3.2	0.4	2.2	0.6	-
2019	0.9	3.0	1.5	1.4	0.3	5.1	0.0	-

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

**Table 30R-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 nova<sup>P</sup> -- (black sagebrush)</b>									
2008	480	40	4	38	58	25	13	54	37/74
2011	760	40	3	84	13	3	0	11	24/54
2015	380	40	5	90	5	11	58	5	32/64
2019	500	-	8	84	8	8	0	20	39/77
<b>Artemisia tridentata ssp. vaseyana<sup>P</sup> -- (mountain big sagebrush)</b>									
2008	200	-	0	80	20	30	0	20	42/74
2011	400	60	35	65	0	10	5	40	37/62
2015	420	-	5	86	10	5	95	10	41/76
2019	300	-	0	73	27	40	40	33	47/100
<b>Chrysothamnus viscidiflorus -- (yellow rabbitbrush)</b>									
2008	1740	60	1	69	30	26	44	24	17/25
2011	1740	20	6	94	0	0	0	0	20/30
2015	1480	-	5	93	1	23	49	5	20/30
2019	1340	-	2	85	13	10	64	51	18/33
<b>Ephedra nevadensis<sup>P</sup> -- (Nevada jointfir)</b>									
2008	860	-	2	65	33	0	95	28	34/66
2011	860	-	2	98	0	33	12	5	35/58
2015	1560	120	21	67	13	32	37	14	48/81
2019	1160	-	12	88	0	10	69	0	44/76
<b>Ephedra viridis<sup>P</sup> -- (mormon tea)</b>									
2008	-	-	-	-	-	-	-	-	-/-
2011	-	-	-	-	-	-	-	-	-/-
2015	20	-	0	100	0	100	0	0	-/-
2019	-	-	-	-	-	-	-	-	47/89
<b>Eriogonum microthecum<sup>P</sup> -- (slender buckwheat)</b>									
2008	1220	-	3	97	0	13	72	2	12/17
2011	580	40	17	83	0	7	0	10	14/21
2015	840	20	0	100	0	21	14	0	17/23
2019	380	-	5	95	0	21	16	11	13/13
<b>Gutierrezia sarothrae -- (broom snakeweed)</b>									
2008	4460	-	0	99	1	0	0	0	18/25
2011	1480	-	15	84	1	0	1	1	18/28
2015	2580	140	5	94	1	1	0	1	20/26
2019	3820	80	1	99	1	0	0	3	21/29
<b>Juniperus osteosperma<sup>1</sup> -- (Utah juniper)</b>									
2008	20	-	100	0	0	0	0	0	-/-
2011	20	-	100	0	0	0	0	0	-/-
2015	20	-	0	100	0	0	0	0	-/-
2019	-	-	-	-	-	-	-	-	-/-
<b>Opuntia -- (pricklypear)</b>									
2008	-	-	-	-	-	-	-	-	15/38
2011	-	-	-	-	-	-	-	-	-/-
2015	-	-	-	-	-	-	-	-	-/-
2019	-	-	-	-	-	-	-	-	10/13
<b>Pinus edulis<sup>1</sup> -- (twoneedle pinyon)</b>									
2008	20	-	0	100	0	0	0	0	-/-
2011	-	-	-	-	-	-	-	-	-/-
2015	-	-	-	-	-	-	-	-	-/-
2019	-	-	-	-	-	-	-	-	-/-



Year	Density		Age Class Distribution			Utilization		Poor Vigor (%)	Average Height Crown (cm)
	Plants Per Acre		Excluding Seedlings			Moderate (%)	Heavy (%)		
	Excluding Seedlings	Seedling	Young (%)	Mature (%)	Decadent (%)				
Salvia dorrii -- (purple sage)									
2008	-	-	-	-	-	-	-	-	24/56
2011	-	-	-	-	-	-	-	-	16/65
2015	-	-	-	-	-	-	-	-	21/66
2019	-	-	-	-	-	-	-	-	18/62

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

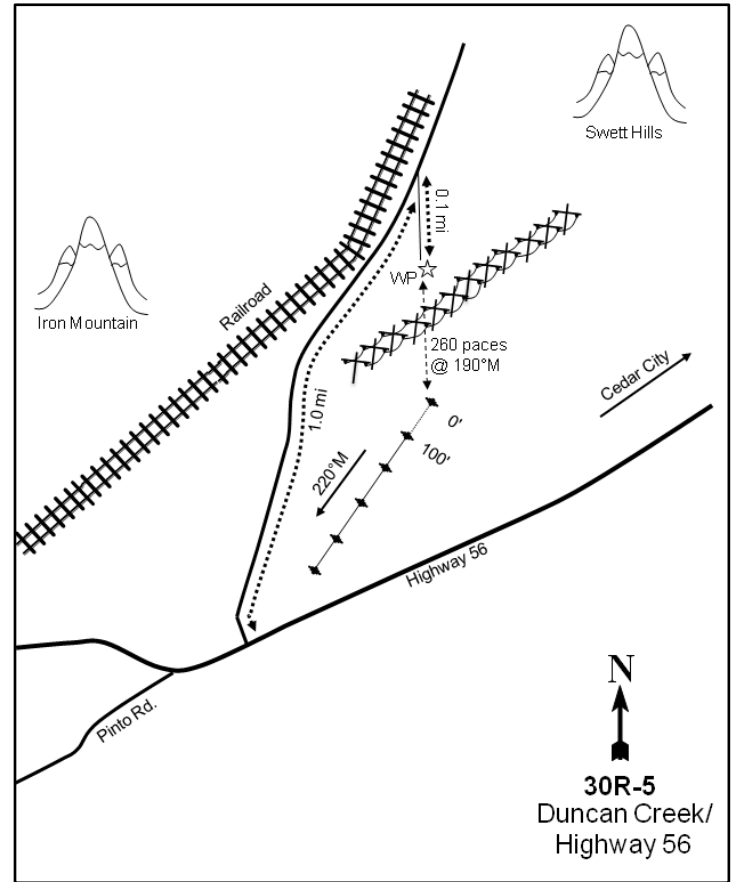
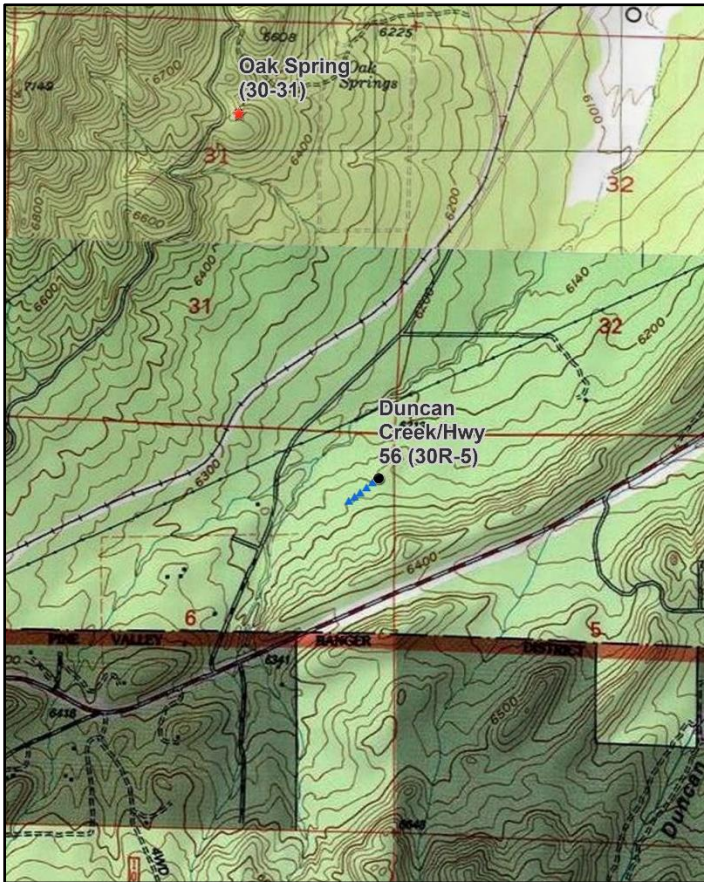
**Table 30R-04.14 - Tree Characteristics.** Point-quarter tree density, size class distribution, and average diameter.

Year	Density	Size Class Distribution					Average Diameter (cm)
	Trees per Acre	Seedling (%)	1-4' (%)	4-8' (%)	8-12' (%)	>12' (%)	
Juniperus osteosperma (Utah juniper)							
2008	68	-	6	22	11	61	38.7
2011	22	-	38	-	50	13	47.1
2015	41	23	38	-	-	38	27.5
2019	23	20	40	-	-	40	28.7
Pinus edulis (twoneedle pinyon)							
2008	1	-	-	100	-	-	12.0
2015	1	-	100	-	-	-	2.0

**Table 30R-04.15 – Deer Desirable Components Index: Mid Potential Scale.**

Year	Preferred Browse Cover	Preferred Browse Decadence	Preferred Browse Young	Perennial Grass Cover	Annual Grass Cover	Perennial Forb Cover	Noxious Weeds	Total Score	Ranking
2008	5.8	0.0	0.0	10.0	-0.3	1.4	0.0	16.9	Very Poor
2011	8.1	14.1	6.4	12.9	-6.6	4.2	0.0	39.3	Poor
2015	12.0	12.1	6.1	30.0	-1.0	5.7	0.0	64.9	Fair-Good
2019	10.4	11.8	3.5	16.1	-2.3	6.6	0.0	46.0	Poor

## DUNCAN CREEK/HWY 56 - STUDY NO. 30R-5

**Location Information**

USGS 7.5 min Map Info  
GPS (0' Stake)

Stoddard Mountain NW; Township 37S, Range 13W, Section 06  
NAD 83 UTM ZONE 12, 292948 East 4165856 North

**Transect Information**

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

9165  
220° magnetic  
500ft  
Line 1 (11ft), Line 2 (34ft), Line 3 (59ft), Line 4 (71ft), Line 5 (95ft)  
Standard

**Directions to Site**

Driving from Highway 56, turn north on Iron Mountain Road, drive 1.0 miles, and turn right. Drive 0.1 miles to a witness post south of the road. From the witness post, walk 260 paces at 190 degrees magnetic to the 0-foot stake which is marked by browse tag #9165.

**Site Information**

Land Ownership	Federal
Land Administrator	BLM
Allotment	No data
Elevation	6,260ft (1,908m)
Aspect	Northwest
Slope	10%
Sample Dates	06/27/2012, 08/03/2015, 08/14/2019

**Table 30R-05.1 Disturbance History.** Recorded history of major disturbances.

Treatment/Disturbance	Name	WRI DB#	Date	Size (acres)
Mechanical - Bullhog	Duncan Creek/Hwy 56 Interface - Phase 1	2303	October 2012-April 2013	2146
Seeding - Aerial Unknown	Duncan Creek/Hwy 56 Interface - Phase 1	2303	October 2012-April 2013	2146

**Table 30R-05.2 Seed Mix.** List of known seeded plant species and rates (if available).

Mix Name			Application Type	Application Date	Acres
Duncan Creek/HWY 56 Interface Phase I			Aerial	Nov 2012	2080
Type	Species	Common Name	Cultivar/Source ID	Bulk lbs/acre	PLS
G	Achnatherum hymenoides	Indian Ricegrass	Emery UT	0.54	0.44
G	Achnatherum hymenoides	Indian Ricegrass	Nezpar	0.48	0.45
G	Agropyron desertorum	Crested Wheatgrass	Hycrest II	1.49	1.35
G	Elymus lanceolatus	Thickspike Wheatgrass	Critana	1.01	0.98
G	Pascopyrum smithii	Western Wheatgrass	Arriba	0.67	0.55
G	Pascopyrum smithii	Western Wheatgrass	Arriba	0.34	0.28
G	Poa secunda	Sandberg Bluegrass	UP/Colorado Plateau	0.50	0.43
G	Pseudoroegneria spicata	Bluebunch Wheatgrass	P-7	1.51	1.34
F	Linum perenne	Blue Flax	Appar	1.01	0.93
F	Melilotus officinalis	Yellow Sweetclover		0.38	0.36
F	Melilotus officinalis	Yellow Sweetclover		0.12	0.11
F	Sanguisorba minor	Small Burnet	Delar	1.01	0.94

Mix Name			Application Type	Application Date	Acres
Duncan Creek/HWY 56 Interface Phase I - Kochia			Aerial	Jan 2013	2080
Type	Species	Common Name	Cultivar/Source ID	Bulk lbs/acre	PLS
F	Medicago sativa	Alfalfa	Spredor 4	1.01	0.89
S	Bassia prostrata	Forage Kochia	Beaver UT	1.01	0.46

**Wildlife Habitat and Vegetation History****Table 30R-05.3 - Wildlife Seasonal Habitat.** UDWR wildlife habitat and seasonality.

Species	Habitat	Season
Mule Deer	crucial	winter

**Table 30R-05.4 - 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/Alderleaf Mountain Mahogany	Phase III
2015	Perennial Grass/Alderleaf Mountain Mahogany	Phase I
2019	Perennial Grass/Alderleaf Mountain Mahogany	Phase I

**Site Notes**

No Notes

**Site Potential**

1981 - 2010 Average Annual Precipitation	17 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.

At the time of study establishment in 2012, this site was dominated by Utah juniper (*Juniperus osteosperma*), twoneedle pinyon (*Pinus edulis*), and alderleaf mountain mahogany (*Cercocarpus montanus*). However, a bullhog and seeding project in the winter of 2012 (Table 30R-05.1) removed a majority of the trees on the site. In addition to decreases in cover and abundance, the tree population has transitioned into a younger age class following treatment (Table 30R-05.12, Table 30R-05.14). Shrub species have shown an overall increase in cover and density with alderleaf mountain mahogany as the dominant species (Table 30R-05.12). The herbaceous understory was sparse prior to treatment, but perennial grasses established and have become a dominant component of the understory following the seeding. Dominant perennial grass species include western wheatgrass (*Pascopyrum smithii*), bluebunch wheatgrass (*Pseudoroegneria spicata*) and crested wheatgrass (*Agropyron cristatum*). Cheatgrass (*Bromus tectorum*) has been sampled in all years in low abundance (Table 30R-05.10). Forbs displayed an initial increase following the seeding with most of the cover provided by blue flax (*Linum perenne*). However, cover of blue flax has decreased in subsequent years (Table 30R-05.11). Although density is moderate as of 2019 (Table 30R-05.14), the persistent tree component indicates that this site may have the potential to be infilled in future sample years without further disturbance.

**Trend Summary Tables****Table 30R-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
2012	6.3	0.2	21.0	8.7	-	45.4
2015	3.0	0.2	0.0	6.7	-	0.3
2019	5.9	-	0.0	12.1	-	0.3

**Table 30R-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
2012	22	-	65	70	0.0	-	0.2	1.6
2015	75	241	54	152	1.9	19.2	1.0	6.3
2019	61	354	84	74	0.4	31.2	0.8	1.8

**Table 30R-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
2012	19.7	2.4	50.9	7.2	9.6	28.4
2015	9.4	0.0	77.1	2.6	4.8	29.6
2019	8.3	0.0	70.9	3.1	6.5	34.1

**Table 30R-05.9 - Pellet Group Data.** Quadrat frequency and pellet group transect data for animal pellets. Rabbit pellet groups are not sampled in the pellet group transect.

Year	Mule Deer	Rocky Mountain Elk	Horse	Rabbit
	Quadrat Frequency			
2012	2	-	-	6
2015	18	1	-	28
2019	13	-	-	29
Year	Days Use Per Acre (ha)			
2012	12.1 (29.8)	-	-	-
2015	23.4 (57.9)	-	-	-
2019	28.8 (71.2)	-	0.6 (1.4)	-

**Table 30R-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)	Aristida purpurea (purple threeawn)	Bromus tectorum <sup>ai</sup> (cheatgrass)	Elymus elymoides (squirreltail)	Elymus lanceolatus (thickspike wheatgrass)	Pascopyrum smithii (western wheatgrass)	Poa secunda (Sandberg bluegrass)	Pseudoroegneria spicata (bluebunch wheatgrass)	Thinopyrum intermedium <sup>i</sup> (intermediate wheatgrass)
year	Nested Frequency									
2012	-	-	-	22	-	-	-	-	-	-
2015	2	91	4	75	14	36	76	18	84	2
2019	2	90	-	61	44	75	182	19	108	-
year	Average Cover (%)									
2012	-	-	-	0.0	-	-	-	-	-	-
2015	0.8	4.1	0.1	1.9	0.5	2.3	5.3	0.6	5.6	0.0
2019	0.2	6.2	-	0.4	1.6	3.7	9.4	0.2	10.0	-

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

**Table 30R-05.11 - Forb Species.** Nested frequency and modified Daubenmire average cover by year.

FORB SPECIES	Arabis (rockcross)	Astragalus beckwithii (Beckwith's milkvetch)	Calochortus flexuosus (winding mariposa lily)	Calochortus nuttallii (sego lily)	Caulanthus crassicaulis <sup>a</sup> (thickstem wild cabbage)	Ceratocephala testiculata <sup>ai</sup> (curveseed butterwort)	Collinsia parviflora <sup>a</sup> (maiden blue eyed Mary)	Comandra umbellata (bastard toadflax)	Cryptantha (cryptantha)	Cymopterus (springparsley)	Descurainia pinnata <sup>a</sup> (western tansymustard)	Draba cuneifolia <sup>a</sup> (wedgeleaf draba)	Erigeron flagellaris (trailing fleabane)	Eriogonum umbellatum (sulphur-flower buckwheat)	Gilia inconspicua <sup>a</sup> (shy gilia)	Lactuca serriola <sup>ai</sup> (prickly lettuce)	Lappula occidentalis <sup>a</sup> (flatspine stickseed)
year	Nested Frequency																
2012	1	-	-	-	-	17	28	3	1	2	7	27	-	7	-	1	-
2015	3	1	-	-	8	-	-	-	-	-	5	8	1	1	-	33	3
2019	-	-	3	4	1	2	-	-	1	3	13	15	0	1	60	12	7
year	Average Cover (%)																
2012	0.0	-	-	-	-	0.1	0.1	0.0	0.0	0.0	0.0	0.1	-	0.2	-	0.0	-
2015	0.0	0.0	-	-	0.1	-	-	-	-	-	0.0	0.1	0.0	0.1	-	0.7	0.0
2019	-	-	0.0	0.0	0.0	0.0	-	-	0.0	0.0	0.0	0.1	0.0	0.0	0.4	0.1	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)	Melilotus officinalis <sup>i</sup> (sweetclover)	Packera multilobata (lobeleaf groundsel)	Pedicularis centranthera (dwarf lousewort)	Penstemon caespitosus (mat penstemon)	Penstemon confusus (Owens Valley beardtongue)	Penstemon leonardii (Leonard's beardtongue)	Phlox austromontana (mountain phlox)	Phlox longifolia (longleaf phlox)	Physaria (twinpod)	Physaria chambersii (Chambers' twinpod)	Salsola tragus <sup>ai</sup> (prickly Russian thistle)	Sanguisorba minor <sup>i</sup> (small burnet)	Silene antirrhina <sup>a</sup> (sleepy silene)	Sphaeralcea grossularifolia (gooseberry/leaf globemallow)
year	Nested Frequency																
2012	-	-	-	-	-	42	7	-	2	3	1	-	3	-	-	7	-
2015	118	-	7	1	0	4	-	1	12	8	3	1	-	4	26	-	1
2019	17	4	4	-	7	-	-	-	9	3	-	-	-	-	21	-	-
year	Average Cover (%)																
2012	-	-	-	-	-	1.1	0.2	-	0.1	0.0	0.0	-	0.0	-	-	0.0	-
2015	4.4	-	0.1	0.0	0.0	0.0	-	0.0	0.6	0.1	0.0	0.0	-	0.0	1.0	-	0.0
2019	0.2	0.1	0.2	-	0.1	-	-	-	0.3	0.1	-	-	-	-	0.8	-	-

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

FORB SPECIES	Streptanthus cordatus (heartleaf twistflower)	Tragopogon dubius <sup>ai</sup> (yellow salsify)	Zigadenus paniculatus (foothill deathcamas)
year	Nested Frequency		
2012	3	-	-
2015	-	-	-
2019	4	2	3
year	Average Cover (%)		
2012	0.0	-	-
2015	-	-	-
2019	0.0	0.0	0.0

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

**Table 30R-05.12 - Shrub and Tree Species.** Average modified Daubenmire quadrat and line intercept cover by year.

SHRUB SPECIES	Amelanchier utahensis <sup>p</sup> (Utah serviceberry)	Artemisia frigida <sup>p</sup> (prairie sagewort)	Bassia prostrata <sup>pi</sup> (forage kochia)	Cercocarpus montanus <sup>p</sup> (alderleaf mountain mahogany)	Juniperus osteosperma <sup>i</sup> (Utah juniper)	Opuntia (pricklypear)	Peraphyllum ramosissimum <sup>p</sup> (wild crab apple)	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 (%)									
2012	2	-	-	5.7	29.2	-	0.4	16.2	-	0.6
2015	1.2	-	-	4.4	0.3	-	0.6	-	-	0.5
2019	0.5	-	-	8	0.3	-	2.9	-	0.3	0.4
year	Quadrat Cover (%)									
2012	1.5	-	-	3.7	13.7	0.2	0.9	7.3	-	0.1
2015	0.4	0.0	0.2	1.6	0.0	0.2	0.8	0.0	0.0	0.0
2019	0.7	-	0.1	3.0	0.0	-	1.9	0.0	0.1	0.1

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

**Table 30R-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>Amelanchier utahensis<sup>p</sup> -- (Utah serviceberry)</b>									
2012	680	80	53	41	6	9	0	3	73/78
2015	640	-	78	22	0	6	0	0	56/86
2019	300	-	0	100	0	40	0	0	74/86
<b>Artemisia frigida<sup>p</sup> -- (prairie sagewort)</b>									
2012	-	-	-	-	-	-	-	-	-/-
2015	-	-	-	-	-	-	-	-	34/71
2019	-	-	-	-	-	-	-	-	-/-
<b>Bassia prostrata<sup>pi</sup> -- (forage kochia)</b>									
2012	-	-	-	-	-	-	-	-	-/-
2015	180	-	0	100	0	0	0	0	25/31
2019	80	-	0	100	0	0	50	0	17/28
<b>Cercocarpus montanus<sup>p</sup> -- (alderleaf mountain mahogany)</b>									
2012	320	-	0	88	13	38	6	6	120/140
2015	720	-	53	47	0	44	11	3	75/91
2019	580	60	3	90	7	52	24	7	95/102
<b>Echinocereus -- (hedgehog cactus)</b>									
2012	-	-	-	-	-	-	-	-	17/47
2015	-	-	-	-	-	-	-	-	-/-
2019	-	-	-	-	-	-	-	-	-/-
<b>Ericameria nauseosa -- (rubber rabbitbrush)</b>									
2012	-	-	-	-	-	-	-	-	-/-
2015	-	-	-	-	-	-	-	-	-/-
2019	-	-	-	-	-	-	-	-	80/101
<b>Gutierrezia sarothrae -- (broom snakeweed)</b>									
2012	-	-	-	-	-	-	-	-	-/-
2015	-	-	-	-	-	-	-	-	-/-
2019	-	-	-	-	-	-	-	-	55/86



Year	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	360	20	17	78	6	0	0	0	- / -
2015	60	60	100	0	0	0	0	0	- / -
2019	140	20	100	0	0	0	0	14	- / -
<b>Opuntia polyacantha -- (plains pricklypear)</b>									
2012	-	-	-	-	-	-	-	-	- / -
2015	-	-	-	-	-	-	-	-	- / -
2019	-	-	-	-	-	-	-	-	10/29
<b>Opuntia -- (pricklypear)</b>									
2012	200	-	0	60	40	0	0	40	12/32
2015	300	-	33	67	0	20	0	0	9/17
2019	-	-	-	-	-	-	-	-	8/24
<b>Peraphyllum ramosissimum<sup>p</sup> -- (wild crab apple)</b>									
2012	120	-	17	83	0	0	0	0	47/57
2015	120	20	83	17	0	17	83	0	48/75
2019	80	-	0	100	0	25	75	0	55/74
<b>Pinus edulis<sup>t</sup> -- (twoneedle pinyon)</b>									
2012	480	280	50	50	0	0	0	0	- / -
2015	-	40	0	0	0	0	0	0	- / -
2019	60	-	100	0	0	0	0	33	- / -
<b>Pinus monophylla<sup>t</sup> -- (singleleaf pinyon)</b>									
2012	-	-	-	-	-	-	-	-	- / -
2015	20	-	100	0	0	0	0	0	- / -
2019	-	-	-	-	-	-	-	-	- / -
<b>Purshia tridentata<sup>p</sup> -- (antelope bitterbrush)</b>									
2012	20	-	100	0	0	100	0	0	31/75
2015	40	-	0	100	0	50	50	50	41/131
2019	40	-	0	100	0	0	50	0	62/157
<b>Quercus gambelii<sup>p</sup> -- (Gambel oak)</b>									
2012	180	-	100	0	0	0	0	0	73/74
2015	200	-	100	0	0	0	0	100	69/71
2019	120	-	100	0	0	17	83	0	58/66

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

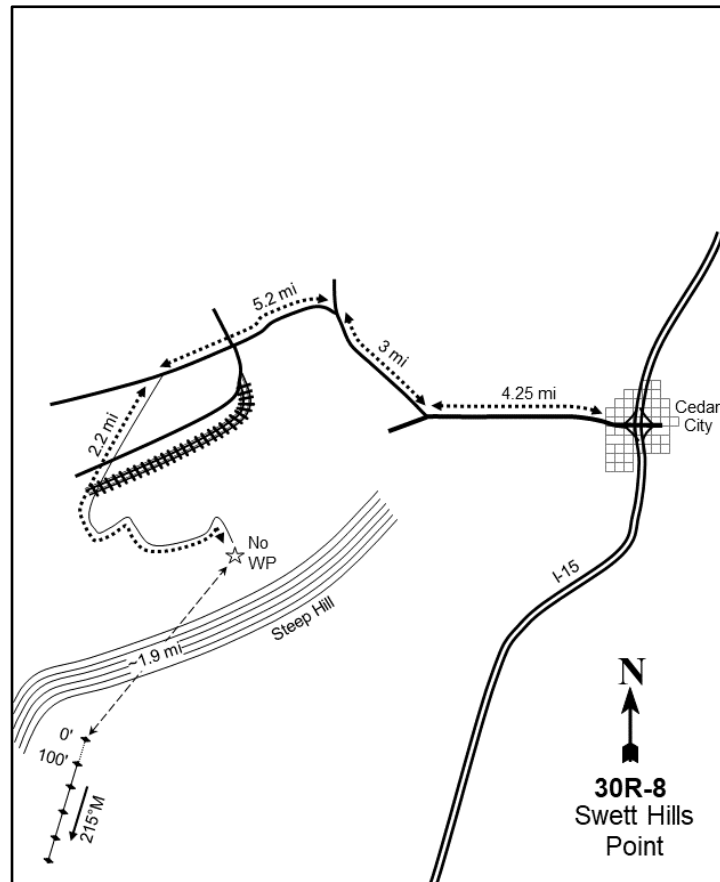
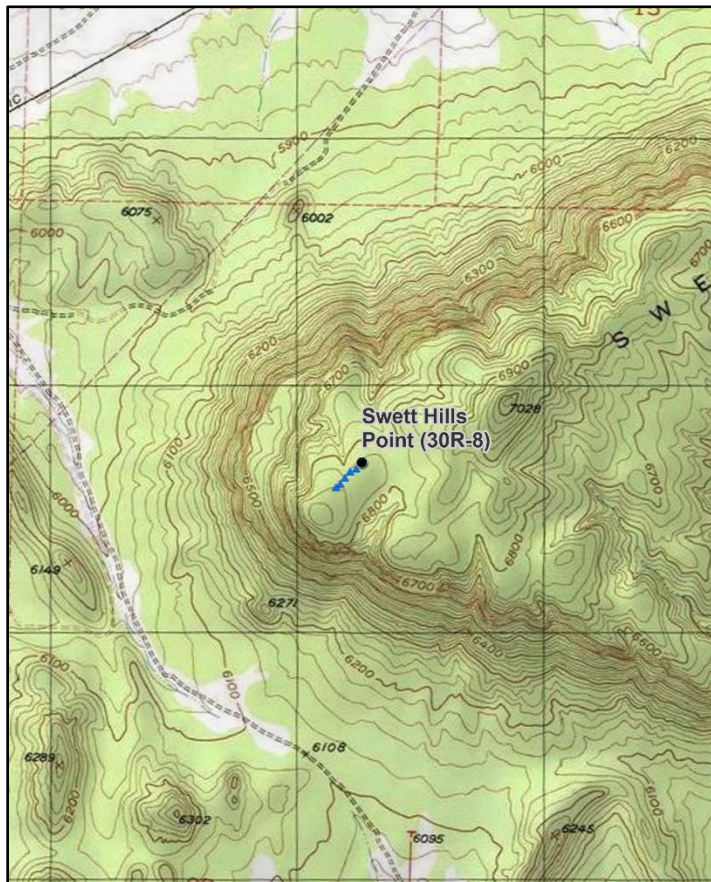
**Table 30R-05.14 - Tree Characteristics.** Point-quarter tree density, size class distribution, and average diameter.

Year	Density	Size Class Distribution					Average Diameter (cm)
	Trees per Acre	Seedling (%)	1-4' (%)	4-8' (%)	8-12' (%)	>12' (%)	
<b>Juniperus osteosperma (Utah juniper)</b>							
2012	224	-	5	10	15	70	29.9
2015	29	50	50	-	-	-	3.1
2019	29	44	56	-	-	-	2.4
<b>Pinus edulis (twoneedle pinyon)</b>							
2012	326	-	45	40	10	5	4.9
2015	47	25	75	-	-	-	2.1
2019	35	25	75	-	-	-	3.0

**Table 30R-05.15 – 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
2012	12.6	12.1	9.9	0.0	0.0	3.2	0.0	37.7	Very Poor
2015	9.5	15.0	15.0	30.0	-1.4	10.0	0.0	78.1	Good
2019	16.5	13.6	2.8	30.0	-0.3	3.6	0.0	66.2	Fair

### SWETT HILLS POINT - STUDY NO. 30R-8



**Location Information**

USGS 7.5 min Map Info  
GPS (0' Stake)

Desert Mound SE; Township 36S, Range 13W, Section 21  
NAD 83 UTM ZONE 12, 296197 East 4169873 North

**Transect Information**

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

540  
215° magnetic  
500ft  
Line 1 (11ft), Line 2 (34ft), Line 3 (59ft), Line 4 (71ft), Line 5 (95ft)  
Belt 1: 5 ft, Belt 2: 2 ft, Belt 3: 5 ft

**Directions to Site**

From I-15, turn west onto State Route 56, proceed for 16.4 miles to Comstock Road, then turn right. Proceed for 3.4 miles to a "T" junction and turn right. Continue for another 0.2 miles and turn right again. Pass under the railroad bridge. On the other side of the bridge, turn left and drive parallel to the tracks for 0.1 miles. Turn right and follow a faint road through the trees into a chaining project. Park along the stringer of trees and locate a route up the hill. Hike to the site; the hike will be approximately 1 mile horizontally and will have an approximately 1000 foot gain in elevation.

**Site Information**

Land Ownership	Federal
Land Administrator	BLM
Allotment	SWETT HILLS
Elevation	6,850ft (2,088m)
Aspect	West
Slope	8%
Sample Dates	08/14/2019

**Table 30R-08.1 Disturbance History.** Recorded history of major disturbances.

Treatment/Disturbance	Name	WRI DB#	Date	Size (acres)
Hand Crew - Lop and Scatter	Duncan Creek - Final Phase	3563	October 2016-May 2017	1279

**Wildlife Habitat and Vegetation History****Table 30R-08.3 - Wildlife Seasonal Habitat.** UDWR wildlife habitat and seasonality.

Species	Habitat	Season
Mule Deer	crucial	winter

**Table 30R-08.4 - Vegetation History.** The dominant vegetation type(s) and phase of woodland succession (Tausch, Miller, Roundy, & Chambers, 2009).

Year	Vegetation Type	Woodland Succession
2019	Gambel Oak/Perennial Grass	Phase I

**Site Notes**

No Notes

**Site Potential**

1981 - 2010 Average Annual Precipitation	14 inches
NRCS Ecological Site	Mountain Shallow Loam (Oak)
NRCS Ecological Site #	R047XB448UT
States and Transitions	No state and transition model is available for this ecological site.

As of study establishment in 2019, this site is in a Gambel oak (*Quercus gambelii*)-dominated ecological state with a moderately robust perennial grass understory. Perennial grasses are relatively abundant with muttongrass (*Poa fendleriana*) contributing the most cover (Table 30R-08.10). Although forbs are moderately diverse, they do not provide significant cover; the most common forbs are maiden blue eyed Mary (*Collinsia parviflora*) and hairy false goldenaster (*Heterotheca villosa*) (Table 30R-08.7, Table 30R-08.11). The shrub component is dominated by Gambel oak with lesser amounts of curl-leaf mountain mahogany (*Cercocarpus ledifolius*) and slender buckwheat (*Eriogonum microthecum*) also present (Table 30R-08.12, Table 30R-08.13). Trees were not observed in cover data, but there was a significant amount of litter present from trees that had recently been cut (Table 30R-08.12, Photos). Both Utah juniper (*Juniperus osteosperma*) and twoneedle pinyon (*Pinus edulis*) were sampled in density measurements in low numbers (Table 30R-08.14).

**Trend Summary Tables****Table 30R-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
2019	19.2	0.9	-	24.0	2.3	-

**Table 30R-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
2019	124	189	167	66	3.2	12.1	3.3	1.7

**Table 30R-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
2019	7.4	0.1	51.7	4.4	30.7	32.5

**Table 30R-08.9 - Pellet Group Data.** Quadrat frequency and pellet group transect data for animal pellets. Rabbit pellet groups are not sampled in the pellet group transect.

Year	Mule Deer	Rocky Mountain Elk	Rabbit
	Quadrat Frequency		
2019	25	1	26
Year	Days Use Per Acre (ha)		
2019	45.6 (112.6)	-	-

**Table 30R-08.10 - Grass Species.** Nested frequency and modified Daubenmire average cover by year.

GRASS SPECIES	Achnatherum hymenoides (Indian ricegrass)	Aristida purpurea (purple threeawn)	Bromus tectorum <sup>ai</sup> (cheatgrass)	Carex rossii (Ross' sedge)	Elymus elymoides (squirreltail)	Hesperostipa comata (needle and thread)	Poa fendleriana (muttongrass)	Poa secunda (Sandberg bluegrass)
year	Nested Frequency							
2019	2	8	124	31	26	1	162	5
year	Average Cover (%)							
2019	0.1	0.2	3.2	1.0	1.2	0.2	9.3	0.1

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

**Table 30R-08.11 - Forb Species.** Nested frequency and modified Daubenmire average cover by year.

FORB SPECIES	Arabis (rockcress)	Artemisia carruthii (Carruth's sagewort)	Collinsia parviflora <sup>a</sup> (maiden blue eyed Mary)	Cryptantha (cryptantha)	Descurainia pinnata <sup>a</sup> (western tansymustard)	Draba <sup>a</sup> (draba)	Gayophytum ramosissimum <sup>a</sup> (pinyon groundsmoke)	Gilia inconspicua <sup>a</sup> (shy gilia)	Heterotheca villosa (hairy false goldenaster)	Lappula occidentalis <sup>ai</sup> (flatspine stickseed)	Lomatium (desertparsley)	Lygodesmia grandiflora (largeflower skeletonplant)	Melilotus officinalis <sup>i</sup> (sweetclover)	Microsteris gracilis <sup>a</sup> (slender phlox)	Packera multilobata (lobeleaf groundsel)	Penstemon eatonii (firecracker penstemon)	Petrorhiza pumila (rock goldenrod)
year	Nested Frequency																
2019	2	5	102	1	37	7	3	46	31	16	2	2	1	30	21	2	2
year	Average Cover (%)																
2019	0.0	0.1	1.5	0.0	0.9	0.0	0.0	0.6	1.3	0.1	0.0	0.0	0.0	0.2	0.1	0.0	0.1

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

<b>FORB SPECIES</b>	Sisymbrium altissimum <sup>ai</sup> (tall tumblemustard)
year	Nested Frequency
2019	2
year	Average Cover (%)
2019	0.0

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

**Table 30R-08.12 - Shrub and Tree Species.** Average modified Daubenmire quadrat and line intercept cover by year.

<b>SHRUB SPECIES</b>	Artemisia tridentata ssp. vaseyana <sup>p</sup> (mountain big sagebrush)	Cercocarpus ledifolius <sup>p</sup> (curl-leaf mountain mahogany)	Echinocereus (hedgohog cactus)	Ericameria nauseosa (rubber rabbitbrush)	Eriogonum microthecum <sup>p</sup> (slender buckwheat)	Gutierrezia sarothrae (broom snakeweed)	Opuntia polyacantha (plains pricklypear)	Quercus gambelii <sup>p</sup> (Gambel oak)
year	Line Intercept Cover (%)							
2019	0	1.5	0.1	0.6	1	0.4	1.2	21.5
year	Quadrat Cover (%)							
2019	0.0	1.0	0.0	0.0	1.3	0.2	0.8	16.9

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

**Table 30R-08.13 - Shrub/Tree Characteristics.** Population characteristics of shrub/tree species populations including density reproduction (seedlings), age distribution, utilization, vigor and average size (height/crown) of plants.

Year	Density		Age Class Distribution			Utilization		Poor Vigor (%)	Average Height Crown (cm)
	Plants Per Acre		Excluding Seedlings			Moderate (%)	Heavy (%)		
	Excluding Seedlings	Seedling	Young (%)	Mature (%)	Decadent (%)				
Artemisia tridentata ssp. vaseyana <sup>p</sup> -- (mountain big sagebrush)									
2019	40	-	0	100	0	0	50	0	39/59
Cercocarpus ledifolius <sup>p</sup> -- (curl-leaf mountain mahogany)									
2019	100	-	20	80	0	40	40	20	114/132
Echinocereus -- (hedgohog cactus)									
2019	20	-	0	100	0	0	0	0	6/17
Eriogonum microthecum <sup>p</sup> -- (slender buckwheat)									
2019	1100	-	0	100	0	47	11	0	12/28
Ericameria nauseosa -- (rubber rabbitbrush)									
2019	-	-	-	-	-	-	-	-	95/103
Escobaria -- (foxtail cactus)									
2019	40	-	0	100	0	0	0	0	13/30
Gutierrezia sarothrae -- (broom snakeweed)									
2019	400	80	0	100	0	0	0	0	25/34
Opuntia polyacantha -- (plains pricklypear)									
2019	840	-	0	95	5	2	0	5	10/37

Year	Density		Age Class Distribution			Utilization		Poor Vigor (%)	Average Height Crown (cm)
	Plants Per Acre		Excluding Seedlings			Moderate (%)	Heavy (%)		
	Excluding Seedlings	Seedling	Young (%)	Mature (%)	Decadent (%)				
Pinus edulis <sup>t</sup> -- (twoneedle pinyon)									
2019	40	-	100	0	0	0	0	0	- / -
Quercus gambelii <sup>p</sup> -- (Gambel oak)									
2019	4260	100	15	84	1	5	5	3	78/70

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

**Table 30R-08.14 - Tree Characteristics.** Point-quarter tree density, size class distribution, and average diameter.

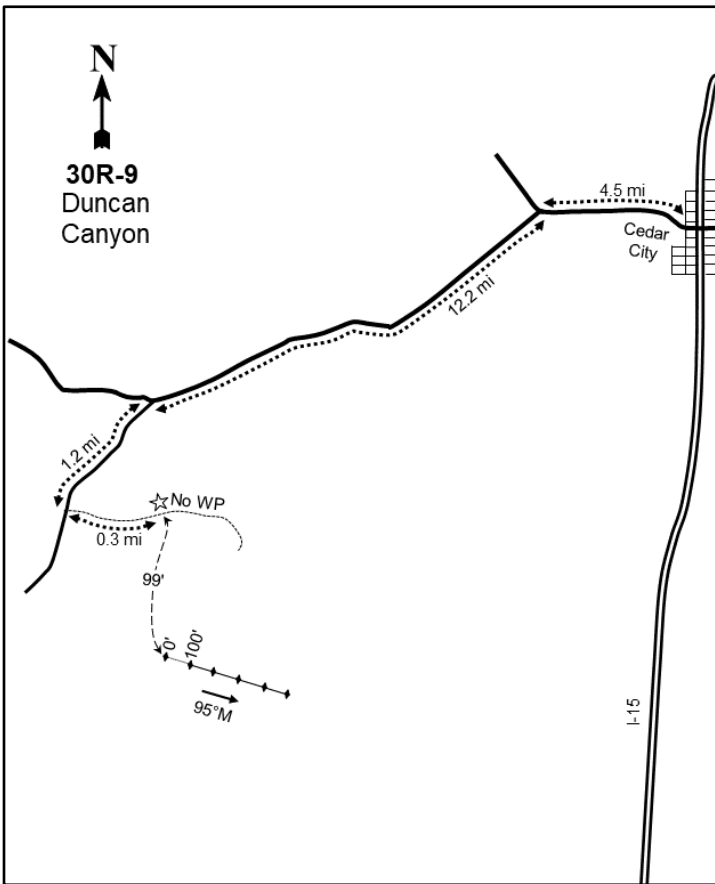
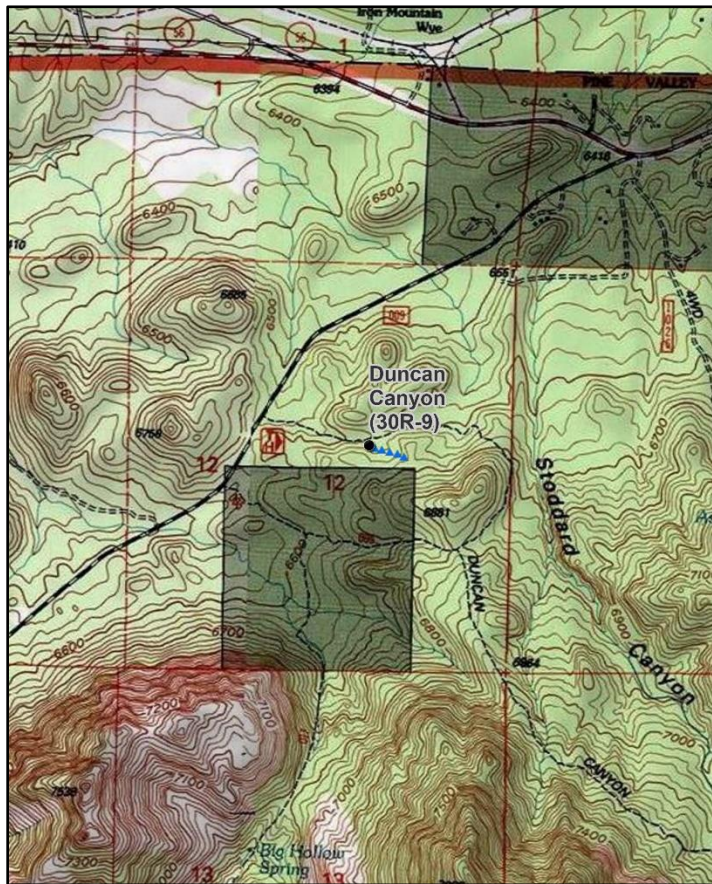
Year	Density	Size Class Distribution					Average Diameter (cm)
	Trees per Acre	Seedling (%)	1-4' (%)	4-8' (%)	8-12' (%)	>12' (%)	
Juniperus osteosperma (Utah juniper)							
2019	4	50	-	50	-	-	11.0
Pinus edulis (twoneedle pinyon)							
2019	40	33	67	-	-	-	1.8

**Table 30R-08.15 – 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
2019	25.0	14.6	7.2	24.2	-2.4	3.4	0.0	72.0	Fair-Good



## DUNCAN CANYON - STUDY NO. 30R-9



### Location Information

USGS 7.5 min Map Info  
GPS (0' Stake)

Stoddard Mountain NW; Township 37S, Range 14W, Section 12  
NAD 83 UTM ZONE 12, 290743 East 4163731 North

### Transect Information

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

Not Available  
95° 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 I-15, turn west onto State Route 56 and proceed for 16.7 miles to Pinto Road. Turn left (south) onto Pinto Road and drive for 1.2 miles to a turnout and parking area on the left. Park here and hike up the small trail (going past the stock pond) for approximately 1000 feet to where the site is located.



**Site Information**

Land Ownership	Federal
Land Administrator	USFS
Allotment	Iron Town
Elevation	6,630ft (2,021m)
Aspect	North
Slope	3%
Sample Dates	08/14/2019

**Table 30R-09.1 Disturbance History.** Recorded history of major disturbances.

Treatment/Disturbance	Name	WRI DB#	Date	Size (acres)
Bullhog - Mechanical	Pinto Watershed and Defensible Fire Space Restoration Project Phase I (Proposed)	4779	2020	1800
Seeding - Aerial Before	Pinto Watershed and Defensible Fire Space Restoration Project Phase I (Proposed)	4779	2020	1800

**Wildlife Habitat and Vegetation History****Table 30R-09.3 - Wildlife Seasonal Habitat.** UDWR wildlife habitat and seasonality.

Species	Habitat	Season
Mule Deer	substantial	winter

**Table 30R-09.4 - Vegetation History.** The dominant vegetation type(s) and phase of woodland succession (Tausch, Miller, Roundy, & Chambers, 2009).

Year	Vegetation Type	Woodland Succession
2019	Pinyon-Juniper	Phase III

**Site Notes**

No Notes

**Site Potential**

1981 - 2010 Average Annual Precipitation	18 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.

As of study establishment in 2019, this site is a twoneedle pinyon (*Pinus edulis*) and Utah juniper (*Juniperus osteosperma*)-dominated ecological site within Phase III of woodland succession (Table 30R-09.4, Table 30R-09.12, Table 30R-09.14). The herbaceous understory is sparse and provides little cover (Table 30R-09.7). Forbs are moderately diverse, but cover and frequency are low (Table 30R-09.11). Browse species are present on the site in low amounts with alderleaf mountain mahogany (*Cercocarpus montanus*) and Utah serviceberry (*Amelanchier utahensis*) as the most common species (Table 30R-09.12, Table 30R-09.13). Without disturbance, it is probable that this site would continue to remain in this tree-dominated state with reduced understory vigor in future sample years. However, a bullhog and seeding project scheduled for 2020 (Table 30R-09.1) will likely remove many of the trees and augment the understory components.

**Trend Summary Tables****Table 30R-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
2019	6.7	0.1	14.0	6.1	-	48.6

**Table 30R-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
2019	5	35	255	92	0.0	0.4	2.4	2.7

**Table 30R-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
2019	27.1	2.0	58.2	8.4	7.2	22.1

**Table 30R-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	Rabbit
	Quadrat Frequency		
2019	-	8	30
Year	Days Use Per Acre (ha)		
2019	2.2 (5.4)	12.1 (29.8)	-

**Table 30R-09.10 - Grass Species.** Nested frequency and modified Daubenmire average cover by year.

GRASS SPECIES	Nested Frequency		
	Bromus tectorum <sup>ai</sup> (cheatgrass)		
Elymus elymoides (squirreltail)			
Poa fendleriana (muttongrass)			
year	Average Cover (%)		
2019	0.0	0.2	0.2

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

**Table 30R-09.11 - Forb Species.** Nested frequency and modified Daubenmire average cover by year.

FORB SPECIES	Nested Frequency																
Arabis holboellii <sup>a</sup> (Holboell's rockcress)	22	2	144	7	52	4	7	10	4	21	18	4	1	107	8	4	31
Chaenactis douglasii (Douglas' dustymaiden)																	
Collinsia parviflora <sup>a</sup> (maiden blue eyed Mary)																	
Collomia linearis <sup>a</sup> (tiny trumpet)																	
Descurainia pinnata <sup>a</sup> (western tansymustard)																	
Draba <sup>a</sup> (draba)																	
Erigeron eatonii (Eaton's fleabane)																	
Eriogonum umbellatum (sulphur-flower buckwheat)																	
Gayophytum ramosissimum <sup>a</sup> (pinyon groundsmoke)																	
Gilia inconspicua <sup>a</sup> (shy gilia)																	
Lappula occidentalis <sup>a</sup> (flatspine stickseed)																	
Lesquerella (bladderpod)																	
Lotus utahensis (Utah bird's-foot trefoil)																	
Microsteris gracilis <sup>a</sup> (slender phlox)																	
Pedicularis centranthera (dwarf lousewort)																	
Penstemon eatonii (firecracker penstemon)																	
Penstemon leonardii (Leonard's beardtongue)																	
year	Average Cover (%)																
2019	0.1	0.0	0.7	0.0	0.3	0.0	0.1	0.3	0.0	0.1	0.1	0.0	0.1	0.3	0.0	0.0	0.8

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

FORB SPECIES				
	Phlox austromontana (mountain phlox)			
	Polygonum douglasii <sup>a</sup> (Douglas' knotweed)			
	Streptanthus cordatus (heartleaf twistflower)			
	Trifolium (clover)			
year	Nested Frequency			
2019	40	109	1	4
year	Average Cover (%)			
2019	1.4	0.8	0.0	0.0

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

**Table 30R-09.12 - 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)							
	Cercocarpus montanus <sup>p</sup> (alderleaf mountain mahogany)							
	Juniperus osteosperma <sup>i</sup> (Utah juniper)							
	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)							
year	Line Intercept Cover (%)							
2019	1.5	-	4.1	25.9	-	0.5	22.7	-
year	Quadrat Cover (%)							
2019	2.4	0.1	3.8	2.9	0.1	0.2	11.1	0.1

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

**Table 30R-09.13 - Shrub/Tree Characteristics.** Population characteristics of shrub/tree species populations including density reproduction (seedlings), age distribution, utilization, vigor and average size (height/crown) of plants.

Year	Density		Age Class Distribution			Utilization		Poor Vigor (%)	Average Height Crown (cm)
	Plants Per Acre		Excluding Seedlings			Moderate (%)	Heavy (%)		
	Excluding Seedlings	Seedling	Young (%)	Mature (%)	Decadent (%)				
Amelanchier utahensis <sup>p</sup> -- (Utah serviceberry)									
2019	880	120	21	80	0	14	9	0	54/64
Artemisia nova <sup>p</sup> -- (black sagebrush)									
2019	40	-	0	100	0	0	0	0	42/53
Arctostaphylos pungens -- (pointleaf manzanita)									
2019	-	-	-	-	-	-	-	-	33/134
Artemisia tridentata ssp. vaseyana <sup>p</sup> -- (mountain big sagebrush)									
2019	-	-	-	-	-	-	-	-	54/65
Cercocarpus montanus <sup>p</sup> -- (alderleaf mountain mahogany)									
2019	680	-	12	68	21	21	71	18	72/96
Juniperus osteosperma <sup>t</sup> -- (Utah juniper)									
2019	80	-	25	75	0	0	0	0	- / -
Opuntia polyacantha -- (plains pricklypear)									
2019	60	-	0	100	0	0	0	0	14/40
Peraphyllum ramosissimum <sup>p</sup> -- (wild crab apple)									
2019	340	-	35	53	12	12	0	12	41/45
Pinus edulis <sup>t</sup> -- (twoneedle pinyon)									
2019	600	260	60	40	0	0	0	0	- / -
Purshia tridentata <sup>p</sup> -- (antelope bitterbrush)									
2019	80	-	0	100	0	0	100	0	28/72
Quercus gambelii <sup>p</sup> -- (Gambel oak)									
2019	180	20	100	0	0	0	0	0	74/73

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

**Table 30R-09.14 - Tree Characteristics.** Point-quarter tree density, size class distribution, and average diameter.

Year	Density	Size Class Distribution					Average Diameter (cm)
	Trees per Acre	Seedling (%)	1-4' (%)	4-8' (%)	8-12' (%)	>12' (%)	
Juniperus osteosperma (Utah juniper)							
2019	196	-	5	15	-	80	30.4
Pinus edulis (twoneedle pinyon)							
2019	459	-	5	15	5	75	20.9

**Table 30R-09.15 – 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
2019	8.9	10.6	7.9	0.8	0.0	5.5	0.0	33.7	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).
QUGA	Gambel Oak	Major component of the site (typically >5% cover).

Vegetation Type Code	Vegetation Community Type Name*	Description
QUTU	Live Oak	Major component of the site (typically >5% cover).
SYOR	Snowberry	Major component of the site (typically >5% cover).
AMAL	Serviceberry	Major component of the site (typically >5% cover).
PUTR	Bitterbrush	Major component of the site (typically >5% cover).
PUGL	Desert Bitterbrush	Major component of the site (typically >5% cover).
ARCT2	Manzanita	Major component of the site (typically >5% cover).
CEMOM	True Mountain Mahogany	Major component of the site (typically >5% cover).
CELEL	Curlleaf 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		