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Prepared by:







# Utah Watershed Restoration Initiative Vegetation Monitoring 2022

Written and Edited by

Jason Lane  
Jason Cox  
Ciaran Payne

Tables prepared by

Jason Cox  
Jason Lane  
Ciaran Payne

Data Collection by

Jason Cox	Ari Pepper
Ciaran Payne	David Nester
Jason Lane	Jeffrey Dossdall
Abigail Maloy	Katherine Bown
Alison Martin	Rachael McBride
Angel Perez	Tanner Burr

Cover Photo Credit

Boisduval's Blue (*Icaricia icarioides*) and Shaggy Fleabane (*Erigeron pumilus*) by Jason Cox (2022)

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UTAH DEPARTMENT OF NATURAL RESOURCES  
Division of Wildlife Resources  
1594 West North Temple  
Salt Lake City, Utah 84114



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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-67

Grant Name: Utah Wildlife Habitat Research and Monitoring

Project Name: Utah Wildlife Habitat Monitoring

Need: The ability to detect changes in vegetation composition (range trend) on big game winter ranges is an important part of the Division's 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 will be 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 BLM and USFS allotment management plans, and as one of several sources of information for revising deer and elk herd management unit plans. Range trend data may also be gathered where habitat information is necessary for other wildlife species such as Greater sage-grouse.

Purpose: Monitor, evaluate, and report range trend at designated key areas throughout the state, and inform Division 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 re-monitored every five years, and vegetation condition and trend assessments will be made for key areas. DWR biologists, land management personnel from the USFS and BLM, and private landowners will use the range trend database to evaluate the impact of land management programs on big game habitat and use the information in the development of management plans. Annual reports will be readily available on the Division's website, digitally stored, and in hard copies located in DWR regional offices, BLM and USFS offices, and public libraries. Special studies (habitat project monitoring and big game/livestock forage utilization studies) will give DWR biologists and public land managers' additional information to address local resource management problems.

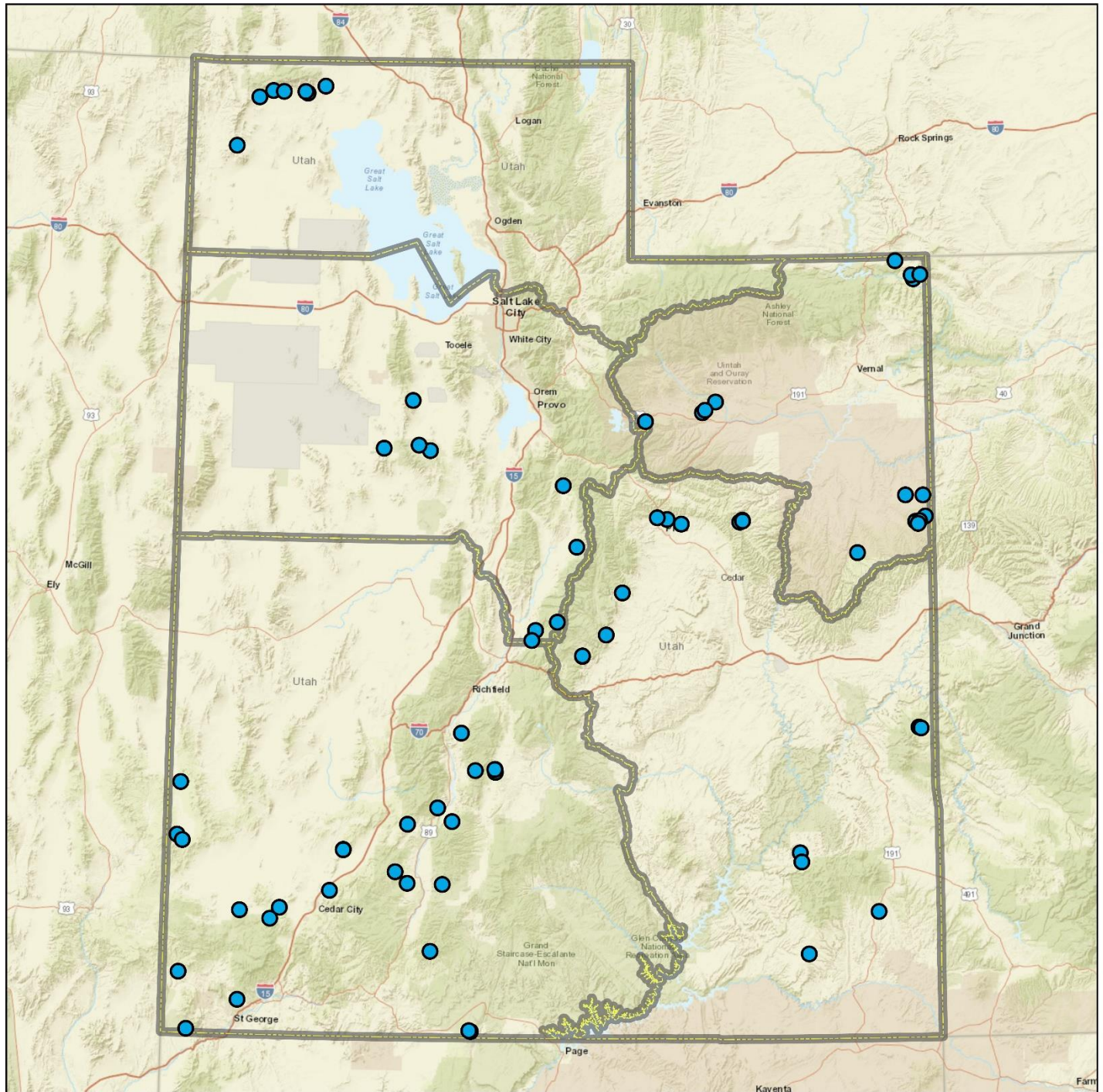
## REMARKS

The work completed during the 2022 field season and reported in this publication is vegetation monitoring data of habitat restoration projects initiated as part of the Watershed Restoration Initiative, which occurred throughout the state of Utah.

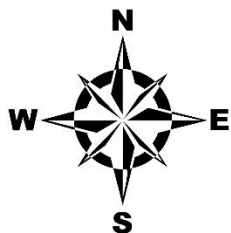
The BLM and USFS offices provided information and/or assistance in completion of the trend studies, which added to the value of this interagency report. Private landowners were cooperative in allowing access to study sites located on their land.



# WRI STUDY SITES SURVEYED IN 2022

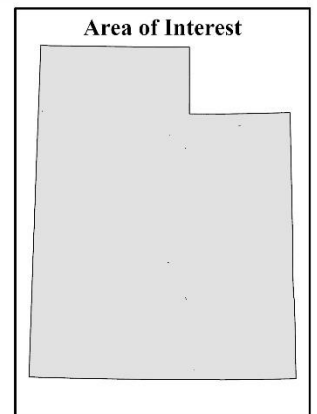


0 15 30 60 90 120 150 180 210 240 Miles



**Study Location**

- 2022 WRI Study Sites
- ▭ Region Boundaries



Credits: Esri, HERE, Garmin, NGA, USGS, NPS



## 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 animals have 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 Utah Division of Wildlife Resources (DWR), Bureau of Land Management (BLM), and US Forest Service (USFS) personnel. Historically, range trend studies were established in conjunction with permanently marked pellet group transects. Once a “key” area is selected, then specific placement for sampling will be 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

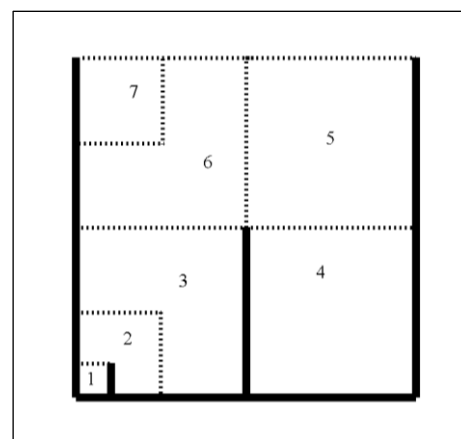
**Study Site Setup:** Study sites are setup to determine vegetation composition. The standard study site setup consists of a 500-foot baseline (five consecutive 100-foot transects) and a 100-foot belt that crosses perpendicular to each transect. Each 100-foot belt is placed at predetermined footmark along each transect and is centered on the 50-foot mark of each belt. When a standard study setup will not fit within the desired study location, the baseline can be modified by doglegging, splitting or shortening the baseline. If the baseline is shortened by removing one or more 100-foot transect(s), the corresponding belt should be moved to another transect. Regardless how the baseline is setup, all five belts need to be included in study site setup. 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.

**1/4 m<sup>2</sup> quadrat:** A 1/4 m<sup>2</sup> quadrat is centered every 5 feet along the left 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.

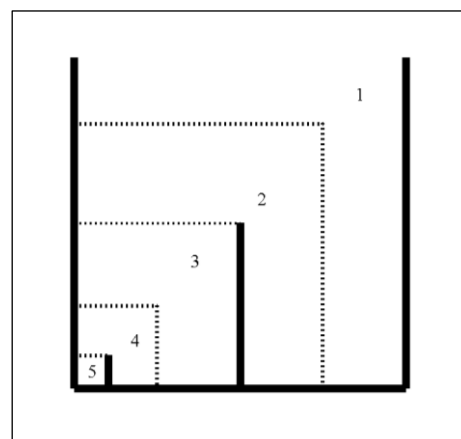
**Quadrat Cover:** Cover is determined using an ocular cover estimation procedure using seven cover classes (Bailey and Poulton 1968, Daubenmire 1959). The seven cover classes are: 1) .01-1%, 2) 1.1-5%, 3) 5.1-25%, 4) 25.1-50%, 5) 50.1-75%, 6) 75.1-95%, and 7) 95.1-100% (Figure 1). For example, to estimate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

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

Higher nested frequency scores represent a higher abundance for that plant species or cover type. These summed values are used to help determine changes in trend



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



**Figure 2** Nested frequency sub-quadrats of the 1/4 m<sup>2</sup> sampling quadrat

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.

**Line Intercept Cover:** 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 et al., 2007).

**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-foot distance tape are counted and recorded in the following size classes:

Size Class I:	less than or equal to 1.5 feet (18 inches). 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. 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. 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. 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

Degree of hedging is measured by the percentage of the twigs or branches that are browsed.

Lightly hedged*:	0 to 40 percent of twigs browsed
Moderately hedged*:	41 to 60 percent of twigs browsed
Heavily hedged*:	Over 60 percent of twigs browsed
Largely available:	One-third to two-thirds of plant available to animal
Mostly unavailable:	Less than one-third of plant available to animal
Unavailable:	In classifying browse to a form class, unavailability may be the result of height, location, or density

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

Shrubs are also rated on their health and placed into one of four vigor classes:

1. Normal and vigorous
2. Insect infested or diseased
3. Poor vigor
  - Chlorotic or discolored leaves, smaller than normal stems or leaves, flowering restricted, partially trampled, pulled up, or otherwise damaged. Stunted growth, partial crown death.
4. Dying
  - Substantial portion of crown dead (more than 50%), more extreme than 3 above. Probably an irreversible condition.

#### Height and Crown

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. Height and Crown measurements were discontinued prior to the 2021 field season.

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 “SeedMix.” *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. 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 on the 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 sites Morris GIP (01R-14) and Scare Canyon (02-46).

#### 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 spatial reference of site location and arrangement. A 7.5 minute topographical map name and public land survey description are located below the map. In addition, UTM coordinates follow the public land survey location. Compass bearings are in degrees relative to magnetic north, unless specified as true north (T). Directions to a site and baseline are provided starting from a prominent location on a mileage and turn-by-turn basis that is closely referenced to the diagrammatic sketch. Also included on this page are the identification and dimensions of the specified transect, which include the browse tag number by which the transect is identified, transect bearing and length, belt placement as it relates to the baseline, and belt marker placement as it relates to the belt itself.

#### Site Information

**Table 1:** The “Disturbance History” table summarizes what type of treatments and/or disturbances have affected the site over its history. Where available, historic treatments have been listed that have occurred on the site prior to establishment. If applicable, treatment projects that are associated with the Utah Watershed Restoration Initiative (WRI) are referenced by their project number. Finalization dates or the date in which a particular disturbance occurred are listed with reported affected acreage of the respective disturbance.

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

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

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

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

### *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 01R-14.3 - Wildlife Seasonal Habitat.** DWR wildlife habitat and seasonality.

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

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

Year	Vegetation Type	Woodland Succession
2008	Juniper/Black Sagebrush	Phase III
2013	Perennial Grass/Wyoming Big Sagebrush	Phase I
2017	Perennial Grass/Wyoming Big Sagebrush	Phase I
2022	Perennial Grass/Wyoming Big Sagebrush	Phase I

### *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 02-46.5 - Soil Analysis Data.** List of chemical and textural soil characteristics determined by laboratory analysis.

Texture	pH	%sand	%silt	%clay	%OM	PPM P	PPM K	ds/m	Sample Date
Loam	5.9	38.5	46.2	15.3	13.4	35.3	361.0	0.3	08/24/2022

## 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 is available for the ecological site. When state-and-transition models are available, the state and community phase is specified for each sample year. 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. The paragraph describes the community dynamics and changes that occur over the duration of the study

## 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 01R-14.6 - Shrub/Tree Summary.** Average modified Daubenmire quadrat and line intercept cover by year for shrubs/trees

Year	Quadrat Cover (%)			Line-intercept Cover (%)		
	Preferred Shrub	Other Shrub	Tree	Preferred Shrub	Other Shrub	Tree
2008	2.5	0.2	7.9	3.1	0.3	38.6
2013	6.0	0.0	0.1	9.5	0.1	-
2017	9.8	0.1	-	11.4	0.4	0.1
2022	10.4	0.7	-	12.0	0.3	0.2

**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 01R-14.7 - Herbaceous Summary.** Nested frequency and average modified Daubenmire quadrat cover by year for herbaceous functional groups

Year	Nested Frequency				Quadrat Cover (%)			
	Annual Grass	Perennial Grass	Annual/Biennial Forb	Perennial Forb	Annual Grass	Perennial Grass	Annual/Biennial Forb	Perennial Forb
2008	76	230	34	108	0.2	2.7	0.1	0.9
2013	339	284	65	103	1.7	11.8	0.2	1.7
2017	292	322	72	32	3.3	17.1	0.1	0.8
2022	225	320	124	30	1.0	13.9	0.4	0.1

**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 01R-14.8 - Basic Ground Cover.** Average modified Daubenmire quadrat cover by year for basic ground cover types.

Year	Cover Type (%)					
	Bare Ground	Cryptogams	Litter	Pavement	Rock	Vegetation
2008	13.4	0.4	53.8	26.7	3.6	14.9
2013	20.7	-	32.4	16.4	8.3	27.7
2017	27.8	0.0	24.7	28.2	5.4	33.6
2022	33.6	0.5	21.3	29.8	6.3	24.4

**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. 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 01R-14.9 - Pellet Group Data.** Quadrat frequency and pellet group transect data for animal pellets. Rabbit pellet groups are not sampled in the pellet group transect.

Year	Cattle	Mule Deer	Rocky Mountain Elk	Rabbit
	Quadrat Frequency			
2008	1	3	-	72
2013	2	-	-	5
2017	2	2	-	30
2022	4	5	-	6
Year	Days Use Per Acre (ha)			
2008	2.2 (5.4)	2.7 (6.6)	-	-
2013	20.3 (50.2)	4.0 (9.9)	-	-
2017	1.5 (3.6)	6.0 (14.9)	0.7 (1.7)	-
2022	11.6 (28.7)	2.7 (6.6)	-	-

\*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 01R-14.10 - 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)	Hordeum jubatum (foxtail barley)	Pascopyrum smithii (western wheatgrass)	Poa secunda (Sandberg bluegrass)	Pseudoroegneria spicata (bluebunch wheatgrass)	Thinopyrum intermedium <sup>i</sup> (intermediate wheatgrass)	Vulpia octoflora <sup>a</sup> (sixweeks fescue)
year	Nested Frequency									
2008	-	-	74	28	-	29	195	9	-	2
2013	124	72	338	35	1	5	123	51	42	13
2017	209	24	282	20	-	26	148	80	38	55
2022	102	7	188	-	-	1	206	152	5	101
year	Average Cover (%)									
2008	-	-	0.2	0.2	-	0.1	2.4	0.1	-	0.0
2013	3.2	2.1	1.7	0.9	0.0	0.0	1.6	2.0	1.9	0.0
2017	8.7	0.6	3.1	0.3	-	0.8	2.4	3.4	0.9	0.2
2022	2.7	0.3	0.6	-	-	0.0	3.5	7.3	0.1	0.3

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

FORB SPECIES	Agoseris glauca (pale agoseris)	Alyssum desertorum <sup>ai</sup> (desert madwort)	Ceratocephala testiculata <sup>ai</sup> (curveseed butterwort)	Chaenactis douglasii (Douglas' dustymaiden)	Collinsia parviflora <sup>a</sup> (maiden blue eyed Mary)	Cryptantha (cryptantha)	Cymopterus (springparsley)	Descurainia pinnata <sup>a</sup> (western tansymustard)	Eriogonum cernuum <sup>a</sup> (nodding buckwheat)	Eriogonum ovalifolium (cushion buckwheat)	Eriogonum shockleyi (Shockley's buckwheat)	Eriogonum umbellatum (sulphur-flower buckwheat)	Medicago sativa <sup>i</sup> (alfalfa)	Microsteris gracilis <sup>a</sup> (slender phlox)	Onobrychis viciifolia <sup>i</sup> (sainfoin)	Penstemon (beardtongue)	Phlox longifolia (longleaf phlox)
year	Nested Frequency																
2008	-	-	3	5	3	3	-	-	-	-	12	34	-	24	-	1	77
2013	7	49	9	2	-	1	3	4	6	-	-	23	2	5	21	6	47
2017	-	65	-	2	-	2	7	5	-	3	3	14	-	-	-	-	4
2022	4	124	8	-	-	1	10	-	-	4	-	5	-	-	-	-	9
year	Average Cover (%)																
2008	-	-	0.0	0.0	0.0	0.0	-	-	-	-	0.1	0.6	-	0.0	-	0.0	0.2
2013	0.0	0.1	0.0	0.0	-	0.0	0.0	0.0	0.0	-	-	0.8	0.1	0.0	0.3	0.2	0.3
2017	-	0.1	-	0.0	-	0.0	0.0	0.0	-	0.0	0.0	0.7	-	-	-	-	0.0
2022	0.0	0.4	0.0	-	-	0.0	0.0	-	-	0.1	-	0.0	-	-	-	-	0.0

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 01R-14.12 - Shrub and Tree Species.** Average modified Daubenmire quadrat and line intercept cover by year.

SHRUB SPECIES	Artemisia nova <sup>p</sup> (black sagebrush)	Artemisia tridentata ssp. vaseyana <sup>p</sup> (mountain big sagebrush)	Bassia prostrata <sup>pi</sup> (forage kochia)	Ericameria nauseosa (rubber rabbitbrush)	Eriogonum microthecum <sup>p</sup> (slender buckwheat)	Juniperus osteosperma <sup>i</sup> (Utah juniper)	Linanthus pungens (granite prickly phlox)	Opuntia polyacantha (plains pricklypear)	Purshia tridentata <sup>p</sup> (antelope bitterbrush)
year	Line Intercept Cover (%)								
2008	3.1	-	-	-	-	38.6	0.2	0.1	-
2013	0.5	4.5	4.4	0.1	0.1	-	-	-	-
2017	1.9	7.8	1.5	0.4	0.2	0.1	-	-	-
2022	3.9	7.7	0.4	0.3	-	0.2	-	-	-
year	Quadrat Cover (%)								
2008	2.5	-	-	-	0.0	7.9	0.2	0.0	0.0
2013	0.5	2.7	2.8	0.0	0.0	0.1	0.0	0.0	-
2017	1.1	6.8	1.8	0.0	0.1	0.0	-	0.1	-
2022	4.5	5.5	0.2	0.7	0.2	0.0	0.0	0.0	-

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

**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 01R-14.13 - Shrub/Tree Characteristics.** Population characteristics of shrub/tree species populations including density reproduction (seedlings), age distribution, utilization, vigor and average size (height/crown) of plants.

Year	Density		Age Class Distribution			Utilization		Poor Vigor (%)	Average Height Crown (cm)
	Plants Per Acre		Excluding Seedlings			Moderate (%)	Heavy (%)		
	Excluding Seedlings	Seedling	Young (%)	Mature (%)	Decadent (%)				
<b>Artemisia nova<sup>p</sup> -- (black sagebrush)</b>									
2008	2800	140	6	32	61	25	20	38	27/46
2013	1180	220	48	53	0	0	0	0	19/35
2017	3260	20	44	55	1	1	0	0	19/38
2022	6360	20	34	65	1	33	12	13	- / -
<b>Artemisia tridentata ssp. vaseyana<sup>p</sup> -- (mountain big sagebrush)</b>									
2008	-	-	-	-	-	-	-	-	-/-
2013	4400	3840	80	21	0	1	1	3	32/45
2017	6700	-	47	53	0	12	7	0	29/50
2022	3900	260	13	81	6	6	5	11	- / -

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.

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 02-46.13a - 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>								
2022	1520	29	21	7	43	0	0	2

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 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 01R-14.14 - Tree Characteristics.** Point-quarter tree density, size class distribution, and average diameter.

Year	Density	Size Class Distribution					Average Diameter (cm)
	Trees per Acre	Seedling (%)	1-4' (%)	4-8' (%)	8-12' (%)	>12' (%)	
<b>Juniperus osteosperma (Utah juniper)</b>							
2008	796	10	15	25	35	15	20.4
2013	21	44	56	-	-	-	4.2
2017	13	80	20	-	-	-	2.4
2022	22	38	63	-	-	-	1.1

## 2022 BIG GAME RANGE TREND STUDIES - WRI PROJECTS

The following table is a list of big game range trend studies that were read in 2021 which had a Watershed Restoration Initiative (WRI) habitat treatment associated with them. The site report for each of these studies can be found in the “[Utah Big Game Range Trend Studies 2022 Wildlife Management Units 16A, 17A, 19A, 19B, 19C, 20, 21A, 21B & 23](#)” 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 #
16A-4	Wash Canyon	Seeding: Aerial	Pole Creek/Bald Mountain Fire Rehabilitation	Nov-18	1823	4773
16A-4	Wash Canyon	Seeding: Aerial	Pole Creek/Bald Mountain Fire Rehabilitation	Jan-19	1823	4773
16A-6	Hop Creek Browse	Seeding: Dribbler	Salt Creek Wildfire Rehabilitation	Dec-07	302	970
16A-6	Hop Creek Browse	Chaining: One-Way Smooth	Salt Creek Wildfire Rehabilitation	Dec-07	302	970
16A-6	Hop Creek Browse	Seeding: Aerial Before	Salt Creek Wildfire Rehabilitation	Nov-07	1197	970
16A-14	Big Hollow	Seeding: Dribbler	Salt Creek Wildfire Rehabilitation	Nov-07	221	970
16A-14	Big Hollow	Chaining: One-Way Ely	Salt Creek Wildfire Rehabilitation	Nov-07	221	970
16A-14	Big Hollow	Seeding: Aerial Before	Salt Creek Wildfire Rehabilitation	Nov-07	1197	970
16A-14	Big Hollow	Seeding: Aerial	Wood Hollow Fire	Jan-13	301	2481
16A-19	Flat Canyon	Seeding: Aerial Before	Chriss Creek PJ Removal Phase 2	Oct-12	333	2223
16A-19	Flat Canyon	Mechanical: Bullhog	Chriss Creek PJ Removal Phase 2	December 2012-March 2013	333	2223
16A-20	Triangle Ranch	Seeding: Dribbler	Triangle Ranch WMA Bullhog Project	Spring 2016	302	3447
16A-20	Triangle Ranch	Mechanical: Bullhog	Triangle Ranch WMA Bullhog Project	July 2015-April 2016	302	3447
16A-22	Levan North	Mechanical: Bullhog	Levan Wildlife Management Area Bullhog	July 2017-June 2019	709	3954
16A-22	Levan North	Seeding: Dribbler	Levan Wildlife Management Area Bullhog	July 2017-June 2019	709	3954
16A-22	Levan North	Hand Crew: Lop and Scatter	Levan Farm WMA Habitat Improvement	Fall 2006	700	271
16A-23	Fountain Green Plateau	Herbicide: Plateau	CRO WMA Upland Game Habitat Improvement - Phase II	Jun-16	94	3461
16A-23	Fountain Green Plateau	Harrow: One-Way Chain	CRO WMA Upland Game Habitat Improvement - Phase II	Oct-16	94	3461
16A-23	Fountain Green Plateau	Seeding: Broadcast Before	CRO WMA Upland Game Habitat Improvement - Phase II	Oct-16	94	3461
16A-23	Fountain Green Plateau	Herbicide: Plateau	Fountain Green WMA Habitat Improvement	Sep-07	275	288
16A-24	Maple Canyon	Mechanical: Bullhog	Maple Canyon WMA Habitat Improvement	September 2012-October 2013	514	2352
16A-25	Santaquin Bench South	Seeding: Transplant	Central Region Shrub Restoration Projects FY2020	October 2020-March 2021	20	4812
17-17	Dutch Canyon	Seeding: Aerial	Saddle Fire Rehabilitation Project	Nov-20	527	5466
17-26	Orem Water Tank	Seeding: Aerial	Range Fire Rehabilitation Project	Nov-20	1966	5542
17-26	Orem Water Tank	Seeding: Broadcast	Timpanogos WMA Fire Rehabilitation and Access Management Project (Proposed)	2022	145	5956
17-26	Orem Water Tank	Mechanical: Scalper	Timpanogos WMA Fire Rehabilitation and Access Management Project (Proposed)	2022	145	5956
17-42	Tank Hollow	Hand Crew: Lop and Scatter	Tank Hollow Habitat Improvement Project	July 2007-December 2008	1117	658
17-42	Tank Hollow	Seeding: Broadcast	Sheepcreek (Wasatch Mtns Unit) Big Game Winter Habitat Improvement FY 23 (Proposed)	Spring-Fall 2023	2981	5967
17-42	Tank Hollow	Seeding: Transplant	Sheepcreek (Wasatch Mtns Unit) Big Game Winter Habitat Improvement FY 23 (Proposed)	Fall 2023	2981	5967
17-44	Billies Mountain	Hand Crew: Lop and Scatter	Spanish Fork River Watershed Post Fire Restoration Phase III (Proposed)	2023	2843	5969
17-45	North Bench	Herbicide: Milestone	Utah County CWMA Priority Weeds Treatment and Restoration-Phase I	2009	50	1116
17-46	Lower Tank Hollow	Seeding: Broadcast	Sheepcreek (Wasatch Mtns Unit) Big Game Winter Habitat Improvement FY 23 (Proposed)	Spring-Fall 2023	2981	5967
17-46	Lower Tank Hollow	Seeding: Transplant	Sheepcreek (Wasatch Mtns Unit) Big Game Winter Habitat Improvement FY 23 (Proposed)	Fall 2023	2981	5967
17-46	Lower Tank Hollow	Hand Crew: Lop and Scatter	Tank Hollow Habitat Improvement Project	July 2007-December 2008	1116	658
17-70	Indian Creek Road	Mechanical: Bullhog	Sheep Creek Phase 1	May-14	552	2629
19A-11	Ibapah Harrow	Hand Crew: Lop and Scatter	Ibapah Sagebrush Improvement - Year 2	October 2008-April 2009	1540	1104

Study #	Study Name	Type	Disturbance Name (If Available)	Date	Acres	WRI Project #
19A-11	Ibapah Harrow	Harrow: Two-Way Dixie	Ibapah Sagebrush Improvement - Year 1	October-November 2007	166	730
19A-11	Ibapah Harrow	Seeding: Broadcast Before	Ibapah Sagebrush Improvement - Year 1	October-November 2007	166	730
19A-12	Clifton Flat	Hand Crew: Lop and Scatter	Clifton Flat Sagebrush Habitat Enhancement (Proposed)	2023	2300	6047
19B-1	Sabie Mountain	Hand Crew: Lop and Scatter	Vernon Ecosystem Phase 4	May-August 2019	7938	4900
19B-5	West Government Creek	Hand Crew: Lop and Scatter	Western Sheeprock Sage Grouse Habitat Improvement	July 2019-June 2020	5059	4939
19B-5	West Government Creek	Hand Crew: Lop and Scatter	West Government	July 2011-May 2012	1613	2024
20-2	Lower Indian Peak	Hand Crew: Lop and Scatter	Indian Peaks WMA Mule Deer Habitat Improvement Project	November 2018-October 2019	991	4818
20-2	Lower Indian Peak	Hand Crew: Lop and Scatter	Indian Peaks WMA Lop and Scatter	May-June 2011	930	1784
20-3	Mountain Home Seeding	Harrow: One-Way Dixie	Mountain Home Habitat Improvement	Fall 2005	746	226
20-3	Mountain Home Seeding	Seeding: Broadcast Before	Mountain Home Habitat Improvement	Fall 2005	746	226
21A-6	Bridge Canyon	Seeding: Aerial After	Devils Den Fire Rehab	Dec-06	3976	660
21A-8	Williams Canyon	Seeding: Aerial Before	Clay Springs Fire Rehab	Fall 2012	13505	2454
21B-13	Walker Creek	Fire: Prescribed Burn	FFO Meadow Phase 2	Mar-16	243	3075
21B-14	Meadow Creek	Seeding: Aerial Before	Meadow Creek Fire Rehabilitation and Stabilization Project	November 2019-January 2020	1444	5148
21B-14	Meadow Creek	Seeding: Aerial After	Meadow Creek Fire Rehabilitation and Stabilization Project	January 2020-June 2021	1444	5148
21B-15	Fillmore Cemetery East	Herbicide: Plateau	Fillmore WMA Juniper Thinning	November-December 2008	156	408
21B-15	Fillmore Cemetery East	Harrow: One-Way Dixie	Fillmore WMA Juniper Thinning	Nov-08	156	408
21B-15	Fillmore Cemetery East	Seeding: Broadcast Before	Fillmore WMA Juniper Thinning	Nov-08	156	408
23-1	Bear Ridge	Hand Crew: Lop (No Scatter)	North Cove Maintenance and Guzzlers	Oct-16	1500	3150
23-1	Bear Ridge	Chaining: Two-Way Ely	North Cove Vegetation Treatment	October-November 2010	3000	1880
23-1	Bear Ridge	Seeding: Aerial Before	North Cove Vegetation Treatment	October-November 2010	1500	1880
23-5	Smith Canyon	Seeding: Aerial Unknown	Monroe Mountain Burn Stabilization	Jul-06	1468	598
23-6	Koosharem Canyon	Hand Crew: Lop and Scatter	Pine Canyon to Koosharem Creek Wildlife Habitat Improvement Project - Phase 2	Between June 2017 and February 2019	1409	3868
23-7	Thompson Creek	Harrow: Dixie	Fishlake NF PJ Maintenance-Sagebrush Enhancement - Year 1	2005	1115	216
23-8	Burrville Cemetery	Hand Crew: Lop and Scatter	Burrville Collaboration Ecosystem Restoration Project	July 2020-June 2022	538	5232



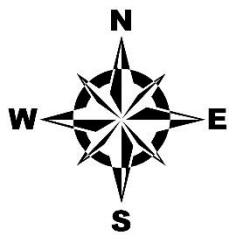
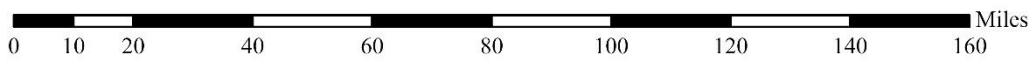
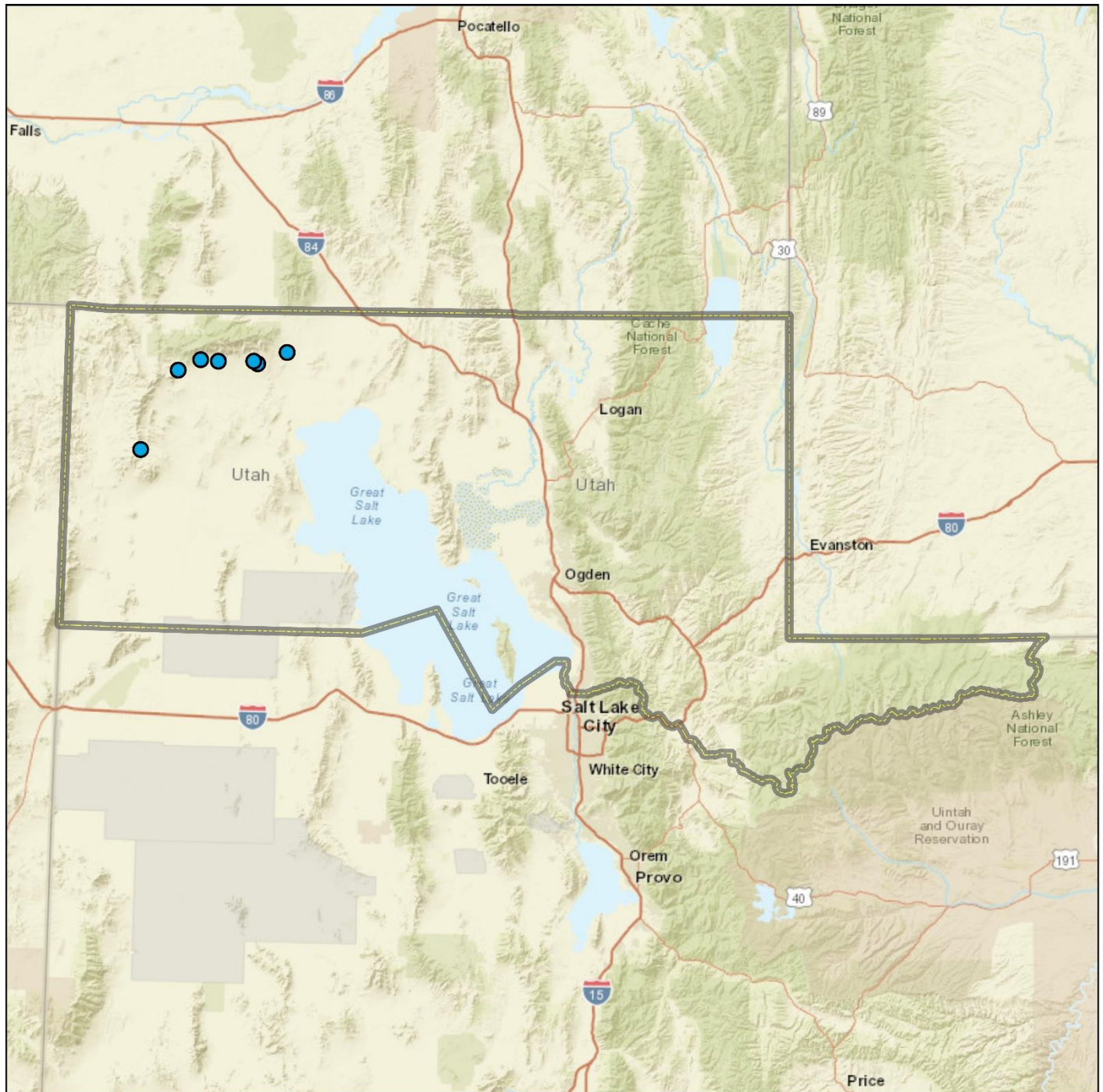
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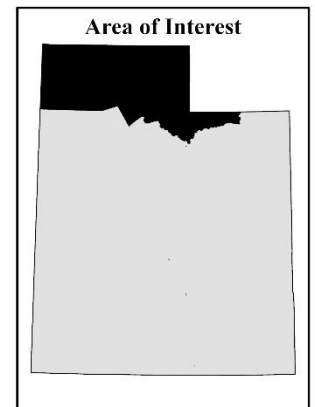
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# NORTHERN REGION



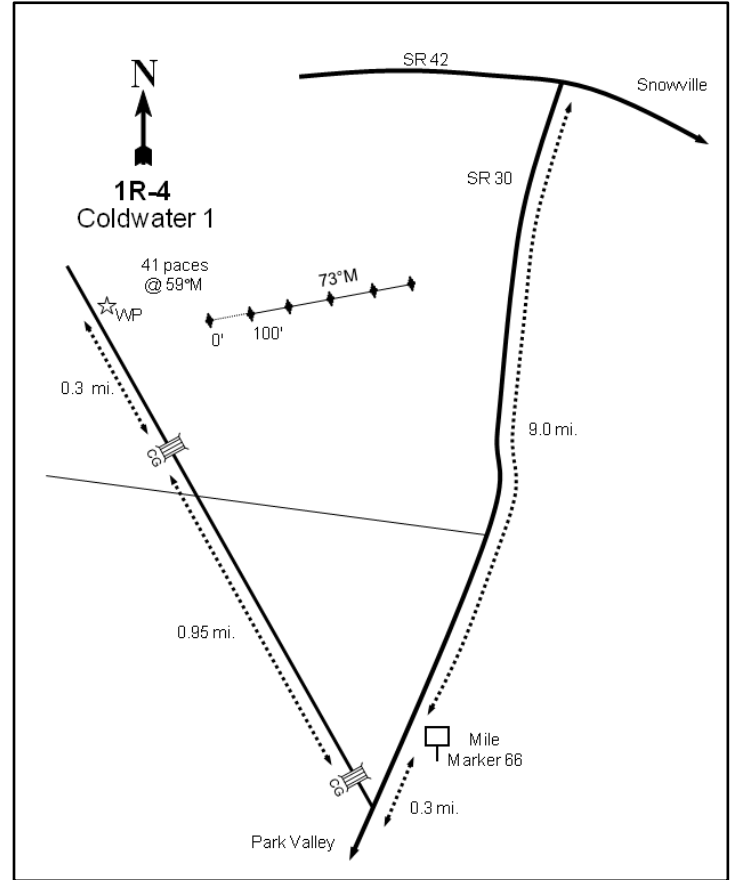
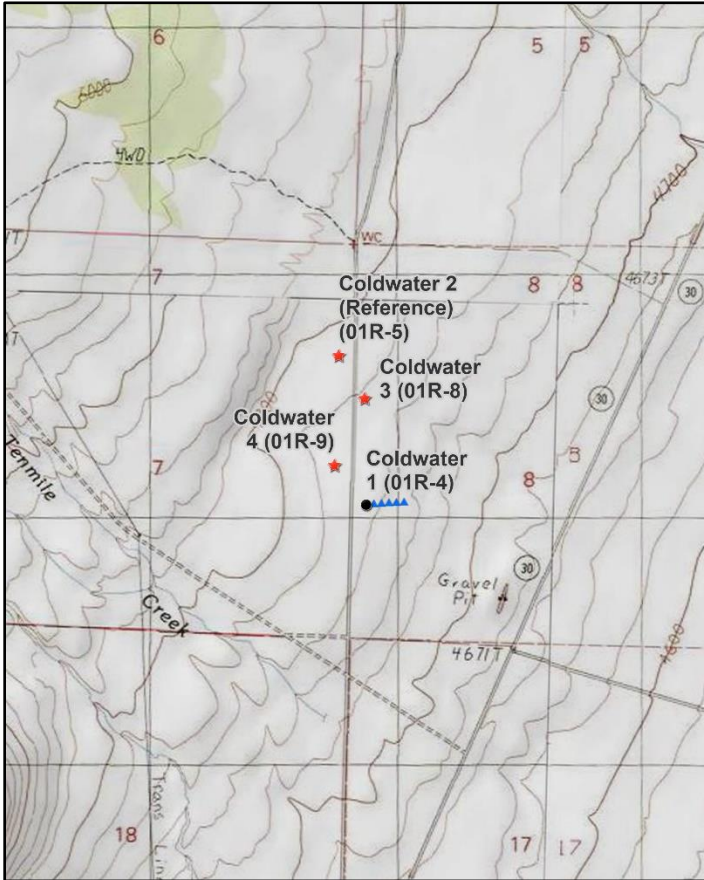
**Region Boundaries**

- Northern Region
- Study Location
- 2022 WRI Study Site



Credits: Esri, HERE, Garmin, NGA, USGS, NPS

## COLDWATER 1 - STUDY NO. 01R-4

**Location Information**

USGS 7.5 min Map Info  
GPS (0' Stake)

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

**Transect Information**

Browse Tag # (0' Stake)	797
Transect Bearing	72° magnetic
Length	500ft
Belt Placement	Line 1 (11ft), Line 2 (34ft), Line 3 (59ft), Line 4 (71ft), Line 5 (95ft)
Belt Marker Placement	No Rebar

**Directions to Site**

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

**Site Information**

Land Ownership	Private
Land Administrator	Private
Allotment	No data
Elevation	4,760ft (1,451m)
Aspect	East
Slope	2%
Sample Dates	06/22/2005, 08/05/2009, 07/08/2013, 07/19/2017, 07/19/2022

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

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

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

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

Mix Name			Application Type	Application Date	Acres
Coldwater Ranch Fluffy Box			Drill	Oct 2007	2000
Type	Species	Common Name	Cultivar/Source ID	Bulk lbs/acre	PLS
F	Achillea millefolium	Western Yarrow		0.05	0.05
S	Artemisia tridentata ssp. wyomingensis	Wyoming Big Sagebrush	Beaver UT	0.30	0.07
S	Bassia prostrata	Forage Kochia	Humbolt NV	0.40	0.33

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

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

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

Year	Vegetation Type	Woodland Succession
2005	Annual Grass-Forb	No Encroachment
2009	Annual Grass-Forb/Perennial Grass	No Encroachment
2013	Annual-Perennial Grass	No Encroachment
2017	Annual-Perennial Grass	No Encroachment
2022	Annual-Perennial Grass	No Encroachment



**Site Notes**

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

**Soils**

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

Texture	pH	%sand	%silt	%clay	%OM	PPM P	PPM K	ds/m	Sample Date
Loam	7.6	34.2	42.0	23.8	1.0	6.5	492.8	0.6	06/22/2005

**Site Potential**

1981 - 2010 Average Annual Precipitation 10 inches  
 NRCS Ecological Site Semidesert Gravelly Loam (Wyoming Big Sagebrush)  
 NRCS Ecological Site # R028AY214UT  
 States and Transitions 2005-2009 - Invasive annuals, Native perennials: Community Phase 4.2  
 2013-Present - Introduced perennial plants: Community Phase 5.1

Upon study establishment in 2005, the plant community on this site was in an annual grass and forb state, dominated by cheatgrass (*Bromus tectorum*), prickly lettuce (*Lactuca serriola*), and prickly Russian thistle (*Salsola tragus*) (Table 01R-04.7, Table 01R-04.10, Table 01R-04.11). Shrubs and perennial grasses were rare (Table 01R-04.6, Table 01R-04.7). In 2007 the site was burned, Plateau herbicide was applied aerially, and perennial introduced and native grasses, forbs, and shrubs were drill seeded (Table 01R-04.1). Following the treatment, seeded perennial grasses established on the site and have been the dominant component since 2013 (Table 01R-04.7). Although cheatgrass has fluctuated following treatment, it has remained a prominent component of the herbaceous understory (Table 01R-04.10). With time, proper grazing management, and lack of disturbance (mechanical, fire, etc.), this site could become a native shrub community with an introduced perennial herbaceous understory (USDA-ARS Jornada Experimental Range, 2022).

**Trend Summary Tables**

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

Year	Quadrat Cover (%)			Line-intercept Cover (%)		
	Preferred Shrub	Other Shrub	Tree	Preferred Shrub	Other Shrub	Tree
2005	0.0	0.3	-	0.2	0.8	-
2009	-	-	-	-	-	-
2013	0.2	-	-	0.4	-	-
2017	1.0	-	-	1.7	-	-
2022	1.5	-	-	2.6	-	-

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

Year	Nested Frequency				Quadrat Cover (%)			
	Annual Grass	Perennial Grass	Annual/Biennial Forb	Perennial Forb	Annual Grass	Perennial Grass	Annual/Biennial Forb	Perennial Forb
2005	488	55	458	32	47.2	1.9	27.9	0.9
2009	179	107	257	29	10.7	6.3	28.1	2.6
2013	434	247	154	62	8.0	12.8	1.9	1.3
2017	421	309	42	8	19.1	21.5	0.2	0.2
2022	349	322	16	14	4.2	16.2	0.0	0.2

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

Year	Cover Type (%)					
	Bare Ground	Cryptogams	Litter	Pavement	Rock	Vegetation
2005	14.0	0.3	16.8	5.3	1.0	66.9
2009	41.0	-	12.7	19.2	0.6	43.6
2013	23.1	-	43.6	4.8	1.3	32.2
2017	26.7	0.0	36.6	6.4	1.0	46.5
2022	40.4	0.1	39.1	17.8	1.6	22.8

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

Year	Cattle	Mule Deer/Pronghorn	Rabbit
	Quadrat Frequency		
2005	4	-	1
2009	-	-	-
2013	3	1	1
2017	11	-	3
2022	7	1	2
Year	Days Use Per Acre (ha)		
2005	11.6 (28.7)	-	-
2009	3.6 (9.0)	2.7 (6.6)	-
2013	14.5 (35.9)	-	-
2017	8.7 (21.5)	-	-
2022	26.8 (66.3)	1.3 (3.3)	-

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

GRASS SPECIES	Achnatherum hymenoides (Indian ricegrass)	Agropyron cristatum <sup>i</sup> (crested wheatgrass)	Bromus tectorum <sup>ai</sup> (cheatgrass)	Elymus elymoides (squirreltail)	Elymus wawawaiensis (Snake River wheatgrass)	Leymus cinereus (basin wildrye)	Pascopyrum smithii (western wheatgrass)	Poa secunda (Sandberg bluegrass)	Psathyrostachys juncea <sup>i</sup> (Russian wildrye)	Pseudoroegneria spicata (bluebunch wheatgrass)	Thinopyrum intermedium <sup>i</sup> (intermediate wheatgrass)	Vulpia octoflora <sup>a</sup> (sixweeks fescue)
year	Nested Frequency											
2005	7	3	488	5	-	-	-	42	-	-	-	158
2009	10	24	178	4	12	-	3	57	-	-	9	1
2013	3	158	432	11	10	58	3	40	7	-	54	79
2017	-	205	420	-	40	12	31	109	44	-	27	80
2022	-	271	254	-	15	10	2	60	30	10	18	223
year	Average Cover (%)											
2005	0.3	0.1	45.3	0.3	-	-	-	1.1	-	-	-	1.9
2009	0.1	2.1	10.7	0.8	0.8	-	0.0	1.7	-	-	0.7	0.0
2013	0.1	5.7	7.7	0.4	0.5	3.3	0.1	0.4	0.2	-	2.1	0.2
2017	-	13.5	18.7	-	2.1	0.2	0.7	1.8	2.8	-	0.4	0.4
2022	-	12.8	1.1	-	0.2	0.5	0.0	1.0	1.1	0.2	0.4	3.1

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

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

FORB SPECIES	Allium (onion)	Alyssum alyssoides <sup>ai</sup> (pale madwort)	Astragalus (milkvetch)	Cardaria draba <sup>ai</sup> (whitetop)	Ceratocephala testiculata <sup>ai</sup> (curvseed butterwort)	Descurainia pinnata <sup>a</sup> (western tansymustard)	Erigeron pumilus (shaggy fleabane)	Erodium cicutarium <sup>ai</sup> (redstem stork's bill)	Grindelia squarrosa (curlycup gumweed)	Halogeton glomeratus <sup>ai</sup> (saltlover)	Ipomopsis congesta (ballhead ipomopsis)	Lactuca serriola <sup>ai</sup> (prickly lettuce)	Lappula occidentalis <sup>a</sup> (flatspine stickseed)	Lepidium <sup>a</sup> (pepperweed)	Machaeranthera canescens (hoary tansyaster)	Malcolmia africana <sup>ai</sup> (African mustard)	Penstemon (beardtongue)
year	Nested Frequency																
2005	-	-	5	5	237	13	1	13	-	-	-	403	-	-	1	7	-
2009	3	-	-	6	5	3	-	-	-	-	1	-	-	-	-	-	13
2013	-	-	1	23	30	11	15	-	-	1	-	1	-	-	-	-	-
2017	-	-	3	-	16	-	2	-	-	-	-	-	2	24	-	-	-
2022	-	5	-	-	8	-	11	-	2	-	-	-	3	-	-	-	-
year	Average Cover (%)																
2005	-	-	0.2	0.1	3.7	0.1	0.0	0.2	-	-	-	11.8	-	-	0.0	0.1	-
2009	0.0	-	-	0.0	0.0	0.2	-	-	-	-	0.0	-	-	-	-	-	0.6
2013	-	-	0.0	0.1	0.1	0.1	0.1	-	-	0.0	-	0.0	-	-	-	-	-
2017	-	-	0.1	-	0.0	-	0.0	-	-	-	-	-	0.0	0.1	-	-	-
2022	-	0.0	-	-	0.0	-	0.1	-	0.0	-	-	-	0.0	-	-	-	-

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

FORB SPECIES	Phlox longifolia (longleaf phlox)	Salsola tragus <sup>ai</sup> (prickly Russian thistle)	Senecio (ragwort)	Sisymbrium altissimum <sup>ai</sup> (tall tumbledmustard)	Sphaeralcea grossularifolia (gooseberryleaf globemallow)	Tragopogon dubius <sup>ai</sup> (yellow salsify)
year	Nested Frequency					
2005	5	416	2	52	15	27
2009	-	244	-	0	11	38
2013	14	121	-	-	9	24
2017	-	-	-	-	3	-
2022	-	-	-	-	1	-
year	Average Cover (%)					
2005	0.0	9.8	0.0	1.1	0.5	1.1
2009	-	23.4	-	0.1	2.0	4.4
2013	0.2	1.4	-	-	0.9	0.4
2017	-	-	-	-	0.0	-
2022	-	-	-	-	0.1	-

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

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

SHRUB SPECIES	Line Intercept Cover		
	Artemisia tridentata ssp. wyomingensis <sup>p</sup> (Wyoming big sagebrush)	Bassia prostrata <sup>pi</sup> (forage kochia)	Ericameria nauseosa (rubber rabbitbrush)
year	Line Intercept Cover		
2005	0.2	-	0.8
2009	-	-	-
2013	-	0.4	-
2017	-	1.7	-
2022	-	2.6	-
year	Quadrat Cover (%)		
2005	0.0	-	0.3
2009	-	-	-
2013	-	0.2	-
2017	-	1.0	-
2022	-	1.5	-

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

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

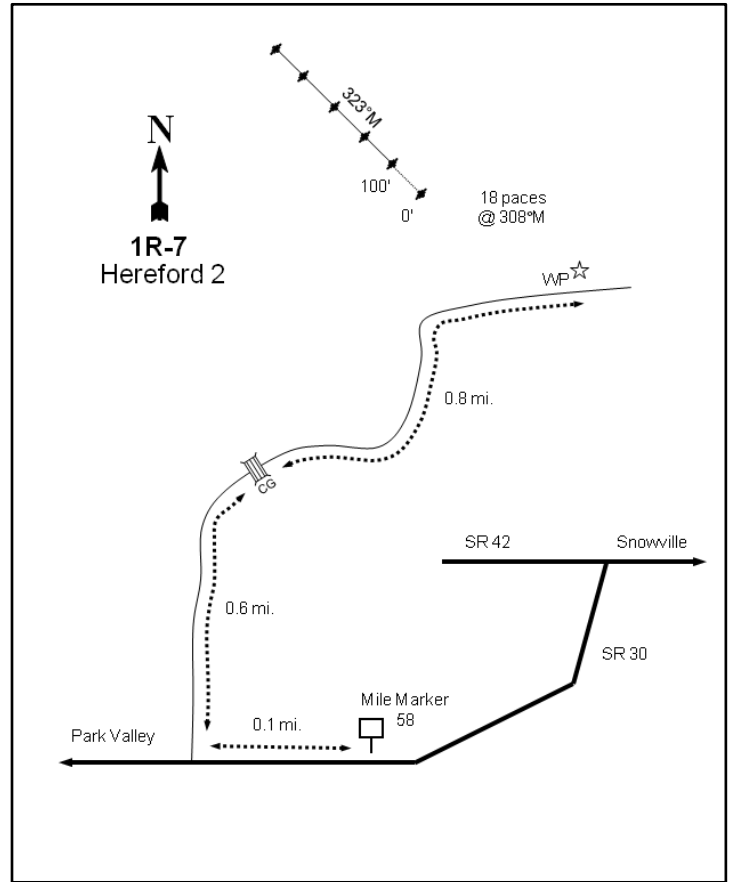
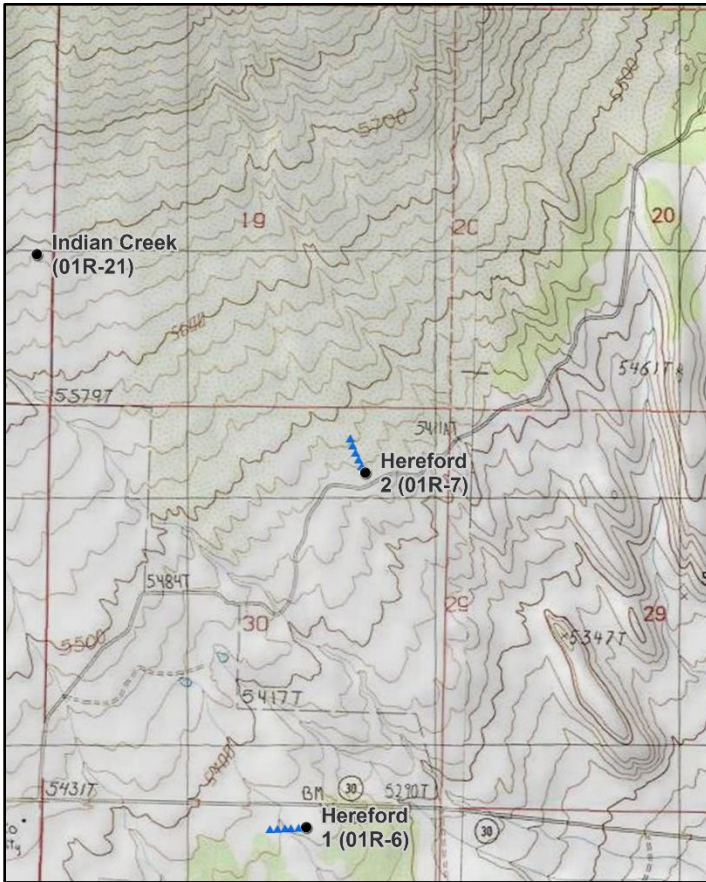
Year	Density		Age Class Distribution			Utilization		Poor Vigor (%)	Average Height Crown (cm)
	Plants Per Acre		Excluding Seedlings			Moderate (%)	Heavy (%)		
	Excluding Seedlings	Seedling	Young (%)	Mature (%)	Decadent (%)				
<b>Artemisia tridentata ssp. wyomingensis<sup>p</sup> -- (Wyoming big sagebrush)</b>									
2005	60	-	0	100	0	0	0	0	53/69
2009	-	-	-	-	-	-	-	-	-/-
2013	-	-	-	-	-	-	-	-	23/24
2017	-	-	-	-	-	-	-	-	-/-
2022	-	-	-	-	-	-	-	-	-/-
<b>Atriplex canescens<sup>p</sup> -- (fourwing saltbush)</b>									
2005	-	-	-	-	-	-	-	-	-/-
2009	-	-	-	-	-	-	-	-	55/120
2013	-	-	-	-	-	-	-	-	-/-
2017	-	-	-	-	-	-	-	-	54/164
2022	-	-	-	-	-	-	-	-	-/-
<b>Bassia prostrata<sup>pi</sup> -- (forage kochia)</b>									
2005	-	-	-	-	-	-	-	-	-/-
2009	-	-	-	-	-	-	-	-	-/-
2013	40	20	0	100	0	0	0	0	47/53
2017	580	-	0	100	0	0	0	0	39/46
2022	2040	80	13	87	0	0	0	0	-/-
<b>Ericameria nauseosa -- (rubber rabbitbrush)</b>									
2005	200	-	0	90	10	0	0	10	48/64
2009	-	-	-	-	-	-	-	-	-/-
2013	-	-	-	-	-	-	-	-	76/89
2017	40	-	0	100	0	0	0	0	30/37
2022	-	-	-	-	-	-	-	-	-/-



Year	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>									
2005	-	-	-	-	-	-	-	-	-/-
2009	-	-	-	-	-	-	-	-	-/-
2013	-	-	-	-	-	-	-	-	-/-
2017	-	-	-	-	-	-	-	-	23/40
2022	20	-	0	100	0	0	0	0	- / -
<b>Opuntia polyacantha -- (plains pricklypear)</b>									
2005	-	-	-	-	-	-	-	-	-/-
2009	-	-	-	-	-	-	-	-	-/-
2013	-	-	-	-	-	-	-	-	-/-
2017	-	-	-	-	-	-	-	-	12/31

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

## HEREFORD 2 - STUDY NO. 01R-7



### Location Information

USGS 7.5 min Map Info  
GPS (0' Stake)

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

### Transect Information

Browse Tag # (0' Stake)	262
Transect Bearing	323° magnetic
Length	500ft
Belt Placement	Line 1 (11ft), Line 2 (34ft), Line 3 (59ft), Line 4 (71ft), Line 5 (95ft)
Belt Marker Placement	No Rebar

### Directions to Site

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

**Site Information**

Land Ownership	Private
Land Administrator	Private
Allotment	No data
Elevation	5,475ft (1,669m)
Aspect	Southeast
Slope	5%
Sample Dates	06/22/2005, 07/20/2010, 07/10/2013, 07/18/2017, 07/19/2022

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

Treatment/Disturbance	Name	WRI DB#	Date	Size (acres)
Hand Crew - Lop and Scatter	Cove Canyon Winter Habitat Juniper Removal	3684	August 2016-May 2017	140
Herbicide - Herbicide Unknown	-	-	2013-2016	-
Chaining - Two-Way Ely	Hereford Grazing Association	250	October 2005	600
Seeding - Rangeland Drill	Hereford Grazing Association	250	October-December 2005	1240
Seeding - Aerial After	Hereford Grazing Association	250	January 2006	1240

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

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

Mix Name			Application Type	Application Date	Acres
Herford Grazing Association 2			Drill	Nov 2005	340
Type	Species	Common Name	Cultivar/Source ID	Bulk lbs/acre	PLS
G	Agropyron cristatum	Crested Wheatgrass	Hycrest	1.47	1.28
G	Agropyron cristatum	Crested Wheatgrass	Ephraim	0.59	0.50
G	Agropyron fragile	Siberian Wheatgrass	Vavilov	0.88	0.84
G	Elymus wawawaiensis	Snake River Wheatgrass	Secar	1.03	0.95
G	Leymus cinereus	Great Basin Wildrye	Trailhead	1.03	0.84
G	Psathyrostachys juncea	Russian Wildrye		1.03	0.87
F	Medicago sativa	Alfalfa	Ladak	0.15	0.14
F	Medicago sativa	Alfalfa	Nomad	0.44	0.41
F	Medicago sativa	Alfalfa	Spredor 4	0.44	0.41
F	Onobrychis viciifolia	Sainfoin	Eski	2.71	2.49
F	Onobrychis viciifolia	Sainfoin	Eski	0.29	0.24
F	Sanguisorba minor	Small Burnet	Delar	2.06	1.91
S	Atriplex canescens	Fourwing Saltbush	Juab/Tooele UT	0.44	0.25

Mix Name			Application Type	Application Date	Acres
Hereford Grazing Association - Kochia			Aerial	Jan 2006	1920
Type	Species	Common Name	Cultivar/Source ID	Bulk lbs/acre	PLS
S	Bassia prostrata	Forage Kochia	Beaver UT	0.68	0.46
S	Bassia prostrata	Forage Kochia	Millard UT	0.32	0.28

**Wildlife Habitat and Vegetation History**

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

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

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

Year	Vegetation Type	Woodland Succession
2005	Juniper/Black Sagebrush	Phase II transitioning to Phase III
2010	Black Sagebrush/Annual Grass/Juniper	Phase I
2013	Black Sagebrush/Juniper	Phase I
2017	Annual-Perennial Grass	Phase I
2022	Annual-Perennial Grass/Mixed Shrub	Phase I

**Site Notes**

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

**Soils**

**Table 01R-07.5 - Soil Analysis Data.** List of chemical and textural soil characteristics determined by laboratory analysis.

Texture	pH	%sand	%silt	%clay	%OM	PPM P	PPM K	ds/m	Sample Date
Loam	7.3	37.2	40.0	22.8	1.9	6.8	243.2	0.5	06/22/2005

**Site Potential**

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

When the study was established in 2005, the plant community on this site was a mixed stand of black sagebrush (*Artemisia nova*) and Utah juniper (*Juniperus osteosperma*) with a diverse component of other shrub species present which provided limited cover (Table 01R-07.12, Table 01R-07.13, Table 01R-07.14). Forbs were also very diverse, but provided little cover. Immediately following the chaining, the herbaceous understory remained diverse but still contributed sparse cover (Table 01R-07.11). Some shrubs increased in cover while others decreased, creating more of a mixed browse community consisting of black sagebrush, broom snakeweed (*Gutierrezia sarothrae*), and forage kochia (*Bassia prostrata*). In addition, juniper was not completely removed from the site. An apparent herbicide treatment occurred between the 2013 and 2017 sample readings, and caused shrub and juniper cover to decrease substantially. However, forage kochia and broom snakeweed have increased since the herbicide treatment (Table 01R-07.1, Table 01R-07.6, Table 01R-07.12, Table 01R-12.13). The introduced annual grass cheatgrass (*Bromus tectorum*) has fluctuated over the sample years, but was very prevalent in 2017, the first sample year following the herbicide treatment (Table 01R-07.7, Table 01R-07.10).

## Trend Summary Tables

**Table 01R-07.6 - Shrub/Tree Summary.** Average modified Daubenmire quadrat and line intercept cover by year for shrubs/trees

Year	Quadrat Cover (%)			Line-intercept Cover (%)		
	Preferred Shrub	Other Shrub	Tree	Preferred Shrub	Other Shrub	Tree
2005	7.5	0.3	5.9	9.2	0.3	15.0
2010	4.2	0.5	3.3	6.3	0.6	3.0
2013	5.3	2.6	1.7	5.5	2.4	4.2
2017	1.6	0.2	0.2	1.5	-	-
2022	6.0	4.1	0.1	6.7	5.1	-

**Table 01R-07.7 - Herbaceous Summary.** Nested frequency and average modified Daubenmire quadrat cover by year for herbaceous functional groups

Year	Nested Frequency				Quadrat Cover (%)			
	Annual Grass	Perennial Grass	Annual/Biennial Forb	Perennial Forb	Annual Grass	Perennial Grass	Annual/Biennial Forb	Perennial Forb
2005	246	73	230	101	1.5	1.6	2.6	1.1
2010	304	118	182	154	12.1	2.3	3.4	5.5
2013	343	122	220	159	3.9	0.9	1.5	1.7
2017	352	195	64	9	19.5	10.1	1.2	0.0
2022	301	226	213	24	2.9	6.9	1.4	0.2

**Table 01R-07.8 - Basic Ground Cover.** Average modified Daubenmire quadrat cover by year for basic ground cover types.

Year	Cover Type (%)					
	Bare Ground	Cryptogams	Litter	Pavement	Rock	Vegetation
2005	33.4	2.4	23.5	32.2	2.5	19.0
2010	29.8	-	31.3	24.1	1.2	32.6
2013	32.1	-	33.7	11.2	7.2	23.7
2017	29.8	-	27.8	26.6	1.7	35.3
2022	28.0	0.0	31.2	28.5	4.2	21.9

**Table 01R-07.9 - Pellet Group Data.** Quadrat frequency and pellet group transect data for animal pellets. Rabbit pellet groups are not sampled in the pellet group transect.

Year	Cattle	Mule Deer/Pronghorn	Rabbit
	Quadrat Frequency		
2005	1	6	64
2010	-	-	1
2013	4	1	18
2017	3	-	37
2022	4	2	12
Year	Days Use Per Acre (ha)		
2005	2.9 (7.2)	-	-
2010	2.2 (5.4)	0.7 (1.7)	-
2013	11.6 (28.7)	-	-
2017	2.9 (7.2)	3.4 (8.3)	-
2022	21.1 (52.0)	1.3 (3.3)	-

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

GRASS SPECIES	Achnatherum hymenoides (Indian ricegrass)	Agropyron cristatum <sup>i</sup> (crested wheatgrass)	Agropyron fragile <sup>i</sup> (Siberian wheatgrass)	Bromus tectorum <sup>ai</sup> (cheatgrass)	Elymus elymoides (squirreltail)	Elymus wawawaiensis (Snake River wheatgrass)	Leymus cinereus (basin wildrye)	Poa bulbosa <sup>i</sup> (bulbous bluegrass)	Poa fendleriana (muttongrass)	Poa secunda (Sandberg bluegrass)	Psathyrostachys juncea <sup>i</sup> (Russian wildrye)	Pseudoroegneria spicata (bluebunch wheatgrass)	Thinopyrum intermedium <sup>i</sup> (intermediate wheatgrass)	Vulpia octoflora <sup>a</sup> (sixweeks fescue)
year	Nested Frequency													
2005	13	28	-	240	7	-	-	-	-	23	-	13	-	13
2010	26	59	-	304	4	-	-	-	11	1	6	17	-	-
2013	18	56	3	343	23	-	0	-	4	10	7	7	3	1
2017	45	103	17	352	4	-	1	5	0	7	43	21	-	1
2022	12	165	34	298	-	0	0	2	1	55	2	-	1	8
year	Average Cover (%)													
2005	0.4	0.3	-	1.4	0.1	-	-	-	-	0.5	-	0.4	-	0.1
2010	0.7	0.9	-	12.1	0.1	-	-	-	0.2	0.1	0.0	0.2	-	-
2013	0.1	0.6	0.0	3.9	0.1	-	0.0	-	0.0	0.0	0.0	0.0	0.0	0.0
2017	2.3	4.3	0.7	19.5	0.0	-	0.2	0.0	0.0	0.1	1.7	0.8	-	0.0
2022	0.1	4.7	0.9	2.8	-	0.0	0.0	0.0	0.0	1.0	0.0	-	0.0	0.0

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

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

FORB SPECIES	Alyssum desertorum <sup>ai</sup> (desert madwort)	Antennaria (pussytoes)	Arabis (rockcress)	Arenaria (sandwort)	Astragalus (milkvetch)	Astragalus utahensis (Utah milkvetch)	Bassia scoparia <sup>ai</sup> (bummingbush)	Calochortus nuttallii (sego lily)	Castilleja angustifolia (northwestern Indian paintbrush)	Ceratocephala testiculata <sup>ai</sup> (curveseed butterwort)	Chaenactis douglasii (Douglas' dustymaiden)	Chenopodium album <sup>a</sup> (lambsquarters)	Collinsia parviflora <sup>a</sup> (maiden blue eyed Mary)	Cordylanthus <sup>a</sup> (bird's-beak)	Cryptantha (cryptantha)	Descurainia pinnata <sup>a</sup> (western tansymustard)	Draba <sup>a</sup> (draba)
year	Nested Frequency																
2005	-	-	4	1	6	3	-	8	-	65	5	-	-	37	11	100	10
2010	-	6	-	3	12	1	-	3	-	-	21	-	-	4	7	14	-
2013	12	-	3	32	6	-	15	-	2	7	86	3	9	12	12	20	4
2017	14	-	-	-	-	-	-	-	-	29	3	-	-	-	-	6	2
2022	89	-	-	-	-	-	-	-	-	135	-	-	4	-	12	8	10
year	Average Cover (%)																
2005	-	-	0.0	0.0	0.0	0.0	-	0.0	-	0.3	0.0	-	-	0.3	0.1	0.9	0.0
2010	-	0.1	-	0.0	0.2	0.0	-	0.0	-	-	0.1	-	-	0.2	0.1	1.0	-
2013	0.0	-	0.0	0.1	0.0	-	0.4	-	0.0	0.0	0.3	0.0	0.0	0.1	0.0	0.0	0.0
2017	0.0	-	-	-	-	-	-	-	-	0.1	0.0	-	-	-	-	0.0	0.0
2022	0.5	-	-	-	-	-	-	-	-	0.7	-	-	0.0	-	0.1	0.0	0.0

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

FORB SPECIES	Erigeron pumilus (shaggy fleabane)	Eriogonum cernuum <sup>a</sup> (nodding buckwheat)	Eriogonum ovalifolium (cushion buckwheat)	Eriogonum umbellatum (sulphur-flower buckwheat)	Gayophytum ramosissimum <sup>a</sup> (pinyon groundsmoke)	Gilia inconspicua <sup>a</sup> (shy gilia)	Halogeton glomeratus <sup>ai</sup> (saltlover)	Lactuca serriola <sup>ai</sup> (prickly lettuce)	Lappula occidentalis <sup>a</sup> (flatspine stickseed)	Machaeranthera canescens (hoary tansyaster)	Medicago sativa <sup>i</sup> (alfalfa)	Packera multilobata (lobeleaf groundsel)	Penstemon (beardtongue)	Phlox austromontana (mountain phlox)	Phlox longifolia (longleaf phlox)	Salsola tragus <sup>ai</sup> (prickly Russian thistle)	Sanguisorba minor <sup>i</sup> (small burnet)
year	Nested Frequency																
2005	1	7	31	16	7	108	-	7	14	-	-	-	2	14	4	-	-
2010	-	-	7	12	-	26	66	75	-	-	36	1	7	9	6	55	67
2013	1	32	-	6	-	132	18	31	4	0	1	13	-	9	3	21	33
2017	-	-	-	-	-	3	-	7	-	-	-	-	-	3	-	-	-
2022	-	1	-	-	-	11	-	6	11	-	-	4	3	-	3	1	-
year	Average Cover (%)																
2005	0.0	0.1	0.2	0.3	0.0	0.9	-	0.0	0.0	-	-	-	0.0	0.2	0.0	-	-
2010	-	-	0.2	0.1	-	0.1	0.7	0.6	-	-	0.7	0.0	0.3	0.2	0.0	0.6	3.1
2013	0.0	0.2	-	0.2	-	0.4	0.0	0.1	0.0	0.0	0.0	0.2	-	0.3	0.0	0.1	0.4
2017	-	-	-	-	-	0.0	-	0.1	-	-	-	-	-	0.0	-	-	-
2022	-	0.0	-	-	-	0.0	-	0.0	0.0	-	-	0.0	0.0	-	0.0	0.0	-

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

FORB SPECIES	Sisymbrium altissimum <sup>ai</sup> (tall tumbled mustard)	Sphaeralcea coccinea (scarlet globemallow)	Streptanthus cordatus (heartleaf twistflower)	Tragopogon dubius <sup>ai</sup> (yellow salsify)	Zigadenus paniculatus (foothill deathcamas)
year	Nested Frequency				
2005	-	-	26	-	-
2010	15	7	7	-	-
2013	20	4	3	1	-
2017	12	3	-	-	-
2022	4	-	-	-	2
year	Average Cover (%)				
2005	-	-	0.1	-	-
2010	0.1	0.3	0.0	-	-
2013	0.1	0.2	0.0	0.0	-
2017	0.9	0.0	-	-	-
2022	0.0	-	-	-	0.0

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



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

SHRUB SPECIES	Line Intercept Cover (%)									
	year	Line Intercept Cover (%)								
Artemisia nova <sup>p</sup> (black sagebrush)	2005	9.2	-	0.1	-	-	0.1	15	0.1	-
Bassia prostrata <sup>pt</sup> (forage kochia)	2010	2.9	3.4	0.3	-	-	0.2	3	-	0.1
Chrysothamnus viscidiflorus (yellow rabbitbrush)	2013	2.8	2.7	0.2	-	-	2.2	4.2	-	-
Ericameria nauseosa (rubber rabbitbrush)	2017	0.1	1.4	-	-	-	-	-	-	-
Eriogonum microthecum <sup>p</sup> (slender buckwheat)	2022	0.8	5.9	-	0.2	-	4.8	-	0.1	-
Gutierrezia sarothrae (broom snakeweed)	year	Quadrat Cover (%)								
Juniperus osteosperma <sup>t</sup> (Utah juniper)	2005	7.5	-	0.0	-	0.0	0.0	5.9	0.2	-
Linanthus pungens (granite prickly phlox)	2010	2.3	1.8	0.2	-	-	0.1	3.3	-	0.1
Opuntia polyacantha (plains pricklypear)	2013	3.1	2.3	0.5	0.4	0.0	1.7	1.7	0.0	0.0
	2017	0.5	1.1	0.0	-	-	0.2	0.2	-	0.0
	2022	1.1	4.8	-	0.0	-	4.1	0.1	0.0	-

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

**Table 01R-07.13 - Shrub/Tree Characteristics.** Population characteristics of shrub/tree species populations including density reproduction (seedlings), age distribution, utilization, vigor and average size (height/crown) of plants.

Year	Density		Age Class Distribution			Utilization		Poor Vigor (%)	Average Height Crown (cm)
	Plants Per Acre		Excluding Seedlings			Moderate (%)	Heavy (%)		
	Excluding Seedlings	Seedling	Young (%)	Mature (%)	Decadent (%)				
<b>Artemisia nova<sup>p</sup> -- (black sagebrush)</b>									
2005	3220	14100	10	49	41	0	0	17	27/62
2010	640	220	6	91	3	0	0	3	37/46
2013	3000	1920	71	29	0	3	0	1	23/38
2017	560	-	57	21	21	0	14	4	21/45
2022	1440	100	28	72	0	24	7	10	- / -
<b>Bassia prostrata<sup>pt</sup> -- (forage kochia)</b>									
2005	-	-	-	-	-	-	-	-	- / -
2010	2040	-	14	86	0	6	3	0	31/34
2013	3600	320	32	68	0	6	0	0	24/36
2017	2020	-	12	85	3	4	0	1	27/38
2022	7200	2360	39	61	1	24	10	1	- / -
<b>Chrysothamnus viscidiflorus -- (yellow rabbitbrush)</b>									
2005	140	-	29	71	0	29	29	0	17/27
2010	100	-	20	80	0	20	0	0	28/33
2013	220	-	55	46	0	0	27	9	25/39
2017	160	-	50	50	0	0	0	0	21/31
2022	-	-	-	-	-	-	-	-	- / -
<b>Eriogonum microthecum<sup>p</sup> -- (slender buckwheat)</b>									
2005	80	-	0	75	25	50	50	25	11/18
2010	-	-	-	-	-	-	-	-	- / -
2013	40	-	50	50	0	50	0	0	9/27
2017	-	-	-	-	-	-	-	-	- / -
2022	-	-	-	-	-	-	-	-	- / -

Year	Density		Age Class Distribution			Utilization		Poor Vigor (%)	Average Height Crown (cm)
	Plants Per Acre		Excluding Seedlings			Moderate (%)	Heavy (%)		
	Excluding Seedlings	Seedling	Young (%)	Mature (%)	Decadent (%)				
<b>Ericameria nauseosa -- (rubber rabbitbrush)</b>									
2005	-	-	-	-	-	-	-	-	-/-
2010	-	-	-	-	-	-	-	-	36/37
2013	20	-	0	100	0	0	0	0	49/58
2017	-	-	-	-	-	-	-	-	-/-
2022	60	-	0	100	0	33	0	0	-/-
<b>Gutierrezia sarothrae -- (broom snakeweed)</b>									
2005	140	200	14	86	0	0	0	0	14/19
2010	380	-	21	79	0	0	0	5	26/41
2013	3000	40	24	76	0	0	0	0	22/33
2017	120	40	0	100	0	0	0	0	18/24
2022	8960	140	2	98	0	0	0	6	-/-
<b>Juniperus osteosperma<sup>1</sup> -- (Utah juniper)</b>									
2005	440	40	50	27	23	0	0	9	-/-
2010	200	40	40	60	0	0	0	0	-/-
2013	140	80	43	29	29	0	0	0	-/-
2017	40	-	100	0	0	0	0	50	-/-
2022	40	-	50	50	0	0	0	0	-/-
<b>Linanthus pungens -- (granite prickly phlox)</b>									
2005	500	-	0	88	12	0	0	0	15/22
2010	20	-	0	100	0	0	0	0	15/29
2013	120	-	50	50	0	0	0	0	16/16
2017	-	-	-	-	-	-	-	-	17/19
2022	40	-	0	100	0	0	0	0	-/-
<b>Opuntia polyacantha -- (plains pricklypear)</b>									
2005	60	-	33	67	0	0	0	0	10/23
2010	80	-	0	100	0	0	0	0	11/23
2013	60	-	33	33	33	0	0	67	17/29
2017	40	-	0	100	0	0	0	0	11/29
2022	20	-	0	0	100	0	0	100	-/-
<b>Tetradymia canescens -- (spineless horsebrush)</b>									
2005	-	-	-	-	-	-	-	-	-/-
2010	-	-	-	-	-	-	-	-	42/28

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

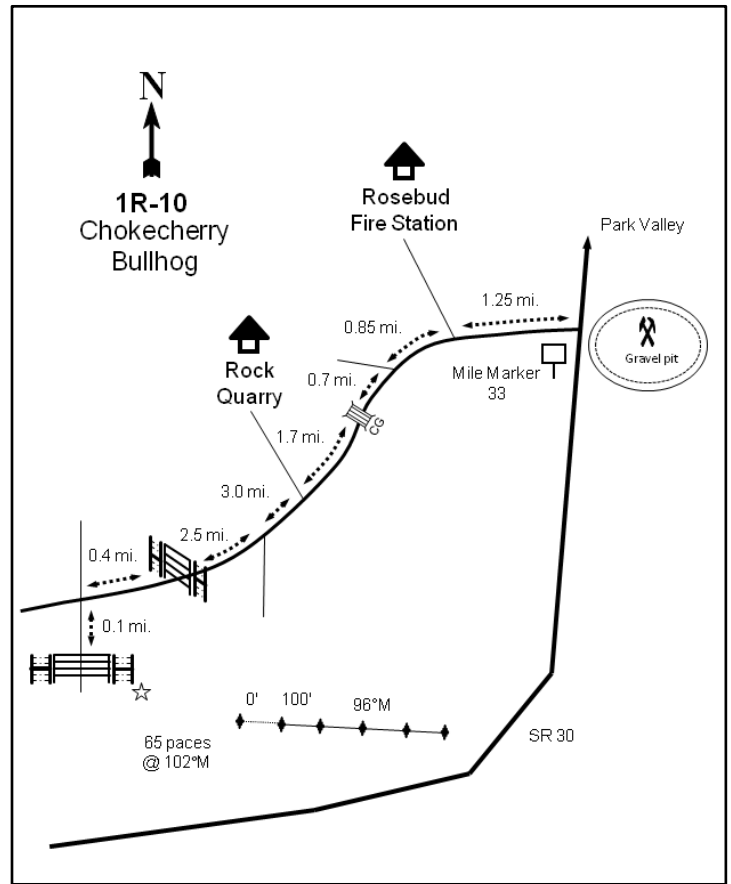
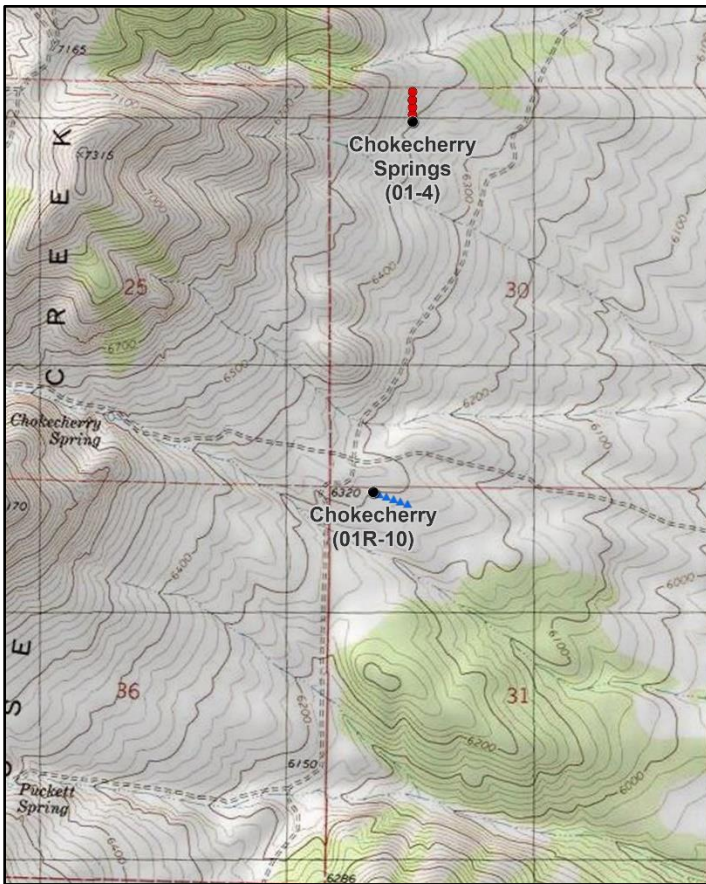
**Table 01R-07.14 - Tree Characteristics.** Point-quarter tree density, size class distribution, and average diameter.

Year	Density	Size Class Distribution					Average Diameter (cm)
	Trees per Acre	Seedling (%)	1-4' (%)	4-8' (%)	8-12' (%)	>12' (%)	
<b>Juniperus osteosperma (Utah juniper)</b>							
2010	311	20	70	5	5	-	7.3
2013	315	5	75	15	5	-	12.7
2017	40	50	50	-	-	-	3.8
2022	39	31	69	-	-	-	2.3

**Table 01R-07.15 - Deer Desirable Components Index: Semidesert 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
2005	11.5	2.7	5.0	3.2	-1.1	2.2	0.0	23.4	Poor-Fair
2010	8.7	14.6	5.1	4.7	-9.1	10.0	0.0	34.1	Fair
2013	7.6	15.0	15.0	1.8	-3.0	3.4	0.0	39.8	Fair
2017	2.2	0.0	0.0	20.1	-14.6	0.1	0.0	7.8	Very Poor
2022	9.9	14.8	15.0	13.7	-2.2	0.3	0.0	51.6	Good

## CHOKECHERRY - STUDY NO. 01R-10



### Location Information

USGS 7.5 min Map Info  
GPS (0' Stake)

Emigrant Pass SW; Township 10N, Range 16W, Section 31  
NAD 83 UTM ZONE 12, 272286 East 4603680 North

### Transect Information

Browse Tag # (0' Stake)	62
Transect Bearing	96° magnetic
Length	500ft
Belt Placement	Line 1 (11ft), Line 2 (34ft), Line 3 (59ft), Line 4 (71ft), Line 5 (95ft)
Belt Marker Placement	Standard

### Directions to Site

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

**Site Information**

Land Ownership	Federal
Land Administrator	BLM
Allotment	MUDDY CREEK
Elevation	6,300ft (1,920m)
Aspect	East
Slope	6%
Sample Dates	06/23/2005, 08/11/2008, 07/09/2013, 07/19/2017, 07/18/2022

**Table 01R-10.1 Disturbance History.** Recorded history of major disturbances.

Treatment/Disturbance	Name	WRI DB#	Date	Size (acres)
Mechanical - Bullhog	Emigrant Pass Sagebrush Habitat	4359	October-December 2019	551
Mechanical - Bullhog	Chokecherry Springs	155	March-June 2005	571
Seeding - Aerial Before	Chokecherry Springs	155	November 2004	571

**Table 01R-10.2 Seed Mix.** List of known seeded plant species and rates (if available).

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

**Wildlife Habitat and Vegetation History****Table 01R-10.3 - Wildlife Seasonal Habitat.** DWR wildlife habitat and seasonality.

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

**Table 01R-10.4 - Vegetation History.** The dominant vegetation type(s) and phase of woodland succession (Tausch, Miller, Roundy, & Chambers, 2009).

Year	Vegetation Type	Woodland Succession
2005	Mountain Big Sagebrush/Juniper	Phase I transitioning to Phase II
2008	Mountain Big Sagebrush	Phase I
2013	Mountain Big Sagebrush	Phase I
2017	Mountain Big Sagebrush/Annual Grass	Phase I
2022	Mountain Big Sagebrush	Phase I

**Site Notes**

No Notes

**Soils****Table 01R-10.5 - Soil Analysis Data.** List of chemical and textural soil characteristics determined by laboratory analysis.

Texture	pH	%sand	%silt	%clay	%OM	PPM P	PPM K	ds/m	Sample Date
Sandy Loam	7.6	58.2	24.0	17.8	1.1	11.5	297.6	0.6	06/23/2005

**Site Potential**

1981 - 2010 Average Annual Precipitation	13 inches
NRCS Ecological Site	Upland Loam (Mountain Big Sagebrush)
NRCS Ecological Site #	R028AY310UT
States and Transitions	2005 - Utah Juniper/Invasive: Community Phase 3.1 2008-Present - Current Potential State: Community Phase 2.1

When the study was established in 2005, this site was dominated by mountain big sagebrush (*Artemisia tridentata* ssp. *vaseyana*) with a diverse component of other shrub species present that provided little cover. Utah juniper (*Juniperus osteosperma*) trees were also observed, contributing moderate cover (Table 01R-10.12). The herbaceous understory was comprised of native perennial grasses and forbs. Cheatgrass (*Bromus tectorum*) and annual forbs were moderately abundant (Table 01R-10.10, Table 01R-10.11). Following the treatment (Table 01R-10.1), shrubs remained as the dominant vegetation component (Table 01R-10.6). The herbaceous understory also remained in good condition, although annual grass was sampled in high abundance in 2017 (Table 01R-10.7) (USDA-ARS Jornada Experimental Range, 2022).

**Trend Summary Tables****Table 01R-10.6 - Shrub/Tree Summary.** Average modified Daubenmire quadrat and line intercept cover by year for shrubs/trees

Year	Quadrat Cover (%)			Line-intercept Cover (%)		
	Preferred Shrub	Other Shrub	Tree	Preferred Shrub	Other Shrub	Tree
2005	21.2	2.4	5.3	22.4	3.1	8.3
2008	14.6	2.0	-	18.5	2.1	0.1
2013	19.5	2.2	0.0	21.7	2.2	-
2017	20.6	2.5	0.0	32.4	1.9	0.1
2022	22.4	2.8	0.6	25.7	2.5	0.2

**Table 01R-10.7 - Herbaceous Summary.** Nested frequency and average modified Daubenmire quadrat cover by year for herbaceous functional groups

Year	Nested Frequency				Quadrat Cover (%)			
	Annual Grass	Perennial Grass	Annual/Biennial Forb	Perennial Forb	Annual Grass	Perennial Grass	Annual/Biennial Forb	Perennial Forb
2005	303	328	289	206	4.3	12.0	7.3	2.6
2008	40	269	56	105	0.1	7.8	0.3	1.4
2013	188	333	168	78	1.1	10.7	0.8	1.6
2017	399	311	106	75	21.2	14.3	1.3	3.4
2022	333	342	305	152	4.3	15.6	3.8	1.3

**Table 01R-10.8 - Basic Ground Cover.** Average modified Daubenmire quadrat cover by year for basic ground cover types.

Year	Cover Type (%)					
	Bare Ground	Cryptogams	Litter	Pavement	Rock	Vegetation
2005	14.9	0.1	32.0	19.0	0.5	50.5
2008	9.4	0.2	59.4	17.9	0.2	23.7
2013	10.1	0.1	54.8	10.3	1.9	40.1
2017	12.0	0.1	46.2	8.8	0.3	51.1
2022	10.1	0.2	48.7	20.8	0.4	48.1

**Table 01R-10.9 - Pellet Group Data.** Quadrat frequency and pellet group transect data for animal pellets. Rabbit pellet groups are not sampled in the pellet group transect.

Year	Cattle	Coyote	Mule Deer	Rocky Mountain Elk	Greater Sage-Grouse	Rabbit
	Quadrat Frequency					
2005	6	-	21	-	-	32
2008	4	-	13	1	1	26
2013	4	-	13	-	-	1
2017	5	-	12	-	-	38
2022	3	-	15	1	-	15
Year	Days Use Per Acre (ha)					
2005	7.2 (17.9)	8.7 (21.5)*	27.5 (67.9)	2.0 (5.0)	-	-
2008	9.4 (23.3)	-	17.4 (43.0)	-	-	-
2013	14.5 (35.9)	-	19.4 (48.0)	-	-	-
2017	18.9 (46.6)	-	22.8 (56.3)	-	-	-
2022	8.0 (19.7)	-	22.8 (56.3)	-	-	-

\*Pellets per acre (ha)

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

GRASS SPECIES	Achmatherum hymenoides (Indian ricegrass)	Achmatherum pinetorum (pine needlegrass)	Bromus tectorum <sup>ai</sup> (cheatgrass)	Carex (sedge)	Elymus elymoides (squirreltail)	Pascopyrum smithii (western wheatgrass)	Poa secunda (Sandberg bluegrass)	Pseudoroegneria spicata (bluebunch wheatgrass)	Vulpia octoflora <sup>a</sup> (sixweeks fescue)
year	Nested Frequency								
2005	10	43	296	3	28	64	241	40	25
2008	21	59	40	-	6	58	195	41	-
2013	14	62	188	4	13	86	255	54	-
2017	17	41	396	10	3	97	232	48	35
2022	11	79	328	2	8	16	277	52	58
year	Average Cover (%)								
2005	0.2	1.8	4.2	0.0	0.4	0.7	7.5	1.4	0.1
2008	0.4	1.9	0.1	-	0.3	1.0	3.4	0.9	-
2013	0.6	1.3	1.1	0.0	0.2	0.6	5.9	2.0	-
2017	0.2	0.6	20.6	0.3	0.0	1.9	9.8	1.4	0.6
2022	0.1	0.8	3.6	0.0	0.1	0.1	13.6	0.9	0.7

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

**Table 01R-10.11 - Forb Species.** Nested frequency and modified Daubenmire average cover by year.

FORB SPECIES	Agoseris glauca (pale agoseris)	Allium (onion)	Allium acuminatum (tapertip onion)	Alyssum desertorum <sup>ai</sup> (desert madwort)	Androsace septentrionalis <sup>a</sup> (pygmyflower rockjasmine)	Apiaceae (parsley family)	Arabis (rockcress)	Astragalus (milkvetch)	Astragalus convallarius (lesser rushy milkvetch)	Astragalus utahensis (Utah milkvetch)	Calochortus nuttallii (sego lily)	Ceratocephala testiculata <sup>ai</sup> (curvseed butterwort)	Chaenactis douglasii (Douglas' dustymaiden)	Collinsia parviflora <sup>a</sup> (maiden blue eyed Mary)	Collomia linearis <sup>a</sup> (tiny trumpet)	Comandra umbellata (bastard toadflax)	Cordylanthus <sup>a</sup> (bird's-beak)
year	Nested Frequency																
2005	2	-	101	-	2	2	-	17	-	5	-	2	4	229	1	2	-
2008	1	-	19	-	-	-	-	7	-	-	-	-	-	29	2	5	-
2013	1	-	3	19	-	-	3	-	-	-	-	3	3	156	-	5	2
2017	-	-	9	40	-	-	-	-	0	-	-	-	-	60	2	14	-
2022	1	21	44	145	-	1	-	8	-	-	3	-	-	238	1	5	-
year	Average Cover (%)																
2005	0.0	-	0.8	-	0.0	0.0	-	0.3	-	0.0	-	0.0	0.0	5.8	0.0	0.1	-
2008	0.0	-	0.1	-	-	-	-	0.0	-	-	-	-	-	0.1	0.0	0.0	-
2013	0.0	-	0.0	0.0	-	-	0.0	-	-	-	-	0.0	0.0	0.6	-	0.1	0.0
2017	-	-	0.0	0.5	-	-	-	-	0.0	-	-	-	-	0.7	0.0	0.1	-
2022	0.0	0.1	0.2	1.9	-	0.0	-	0.1	-	-	0.0	-	-	1.4	0.0	0.1	-

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

FORB SPECIES	Crepis acuminata (tapertip hawkbeard)	Cryptantha (cryptantha)	Cryptantha watsonii <sup>a</sup> (Watson's cryptantha)	Delphinium nuttalianum (two-lobed larkspur)	Descurainia pinnata <sup>a</sup> (western tansymustard)	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 perenne <sup>i</sup> (blue flax)	Lupinus argenteus (silvery lupine)	Medicago sativa <sup>i</sup> (alfalfa)	Microsteris gracilis <sup>a</sup> (slender phlox)	Navarretia intertexta <sup>a</sup> (needleleaf navarretia)	Phlox austromontana (mountain phlox)	Phlox longifolia (longleaf phlox)	Pleiacanthus spinosus (thorn skeletonweed)
year	Nested Frequency																
2005	2	76	-	5	-	38	13	-	1	-	9	-	133	16	-	54	1
2008	-	10	-	-	-	21	1	-	3	-	11	-	11	4	-	72	2
2013	-	7	-	-	-	0	-	-	-	4	18	0	10	10	-	48	-
2017	-	7	6	-	-	-	7	4	1	-	35	0	8	1	5	7	-
2022	3	6	-	-	6	3	23	-	14	-	25	-	107	10	1	65	3
year	Average Cover (%)																
2005	0.0	0.4	-	0.1	-	0.2	0.1	-	0.0	-	0.6	-	1.1	0.1	-	0.3	0.0
2008	-	0.1	-	-	-	0.1	0.0	-	0.0	-	0.9	-	0.0	0.0	-	0.3	0.0
2013	-	0.2	-	-	-	0.0	-	-	-	0.0	1.1	0.0	0.0	0.1	-	0.1	-
2017	-	0.1	0.0	-	-	-	0.0	0.0	0.0	-	3.0	0.1	0.0	0.0	0.0	0.0	-
2022	0.0	0.1	-	-	0.0	0.0	0.1	-	0.0	-	0.2	-	0.4	0.0	0.0	0.4	0.0

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

FORB SPECIES	Tragopogon dubius <sup>ai</sup> (yellow salsify)	unknown annual forb <sup>a</sup> (unknown forb)	Zigadenus paniculatus (foothill deathcamas)
year	Nested Frequency		
2005	-	9	-
2008	-	-	-
2013	-	-	-
2017	3	-	-
2022	-	-	1
year	Average Cover (%)		
2005	-	0.0	-
2008	-	-	-
2013	-	-	-
2017	0.0	-	-
2022	-	-	0.0

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



**Table 01R-10.12 - Shrub and Tree Species.** Average modified Daubenmire quadrat and line intercept cover by year.

SHRUB SPECIES	Line Intercept Cover (%)									
	year									
Artemisia nova <sup>p</sup> (black sagebrush)	2005	-	19.5	3.1	-	8.3	-	-	1.8	1.1
Artemisia tridentata ssp. vaseyana <sup>p</sup> (mountain big sagebrush)	2008	-	16.7	1.9	-	0.1	0.1	0.1	1.6	0.2
Chrysothamnus viscidiflorus ssp. viscidiflorus var. viscidiflorus (yellow rabbitbrush)	2013	-	19.8	2.2	-	-	0	-	1.3	0.6
Ericameria nauseosa (rubber rabbitbrush)	2017	-	28.5	1.9	-	0.1	-	-	3.1	0.8
Juniperus osteosperma <sup>i</sup> (Utah juniper)	2022	-	22.6	1.7	0.7	0.2	-	0.1	2.9	0.2
Linanthus pungens (granite prickly phlox)	year	Quadrat Cover (%)								
Opuntia polyacantha (plains pricklypear)	2005	-	19.4	2.2	-	5.3	0.2	0.0	1.2	0.6
Purshia tridentata <sup>p</sup> (antelope bitterbrush)	2008	-	13.6	2.0	-	0.0	0.1	0.0	0.8	0.1
Symphoricarpos oreophilus <sup>p</sup> (mountain snowberry)	2013	-	17.9	2.1	-	0.0	0.0	0.1	1.2	0.4
	2017	0.4	17.9	1.6	0.8	0.0	0.0	0.0	1.4	0.8
	2022	-	19.9	1.8	0.8	0.6	-	0.2	1.7	0.8

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

**Table 01R-10.13 - Shrub/Tree Characteristics.** Population characteristics of shrub/tree species populations including density reproduction (seedlings), age distribution, utilization, vigor and average size (height/crown) of plants.

Year	Density		Age Class Distribution			Utilization		Poor Vigor (%)	Average Height Crown (cm)
	Plants Per Acre		Excluding Seedlings			Moderate (%)	Heavy (%)		
	Excluding Seedlings	Seedling	Young (%)	Mature (%)	Decadent (%)				
<b>Amelanchier utahensis<sup>p</sup> -- (Utah serviceberry)</b>									
2005	-	-	-	-	-	-	-	-	-/-
2008	-	-	-	-	-	-	-	-	-/-
2013	-	-	-	-	-	-	-	-	-/-
2017	-	-	-	-	-	-	-	-	67/87
2022	-	-	-	-	-	-	-	-	-/-
<b>Artemisia nova<sup>p</sup> -- (black sagebrush)</b>									
2005	20	60	0	100	0	0	0	0	-/-
2008	-	-	-	-	-	-	-	-	-/-
2013	-	-	-	-	-	-	-	-	28/108
2017	120	-	0	100	0	0	0	0	43/55
2022	80	-	0	75	25	75	25	25	-/-
<b>Artemisia tridentata ssp. vaseyana<sup>p</sup> -- (mountain big sagebrush)</b>									
2005	3940	8640	6	66	29	12	4	14	65/93
2008	3480	40	2	36	63	24	1	32	55/83
2013	3720	20	16	68	17	16	0	27	49/79
2017	4300	-	10	80	11	14	2	5	59/87
2022	3820	-	7	72	20	19	5	28	-/-
<b>Chrysothamnus viscidiflorus ssp. viscidiflorus var. stenophyllus -- (yellow rabbitbrush)</b>									
2005	-	-	-	-	-	-	-	-	-/-
2008	-	-	-	-	-	-	-	-	-/-
2013	-	-	-	-	-	-	-	-	-/-
2017	20	-	0	100	0	0	0	0	24/43
2022	-	-	-	-	-	-	-	-	-/-

Year	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>									
2005	960	-	0	94	6	2	0	4	29/52
2008	1240	80	3	74	23	0	0	23	24/37
2013	1060	20	6	94	0	15	2	47	28/46
2017	1140	-	5	95	0	2	4	0	31/45
2022	1260	-	0	89	11	0	0	18	- / -
<b>Ericameria nauseosa -- (rubber rabbitbrush)</b>									
2005	-	-	-	-	-	-	-	-	48/42
2008	-	-	-	-	-	-	-	-	56/59
2013	20	-	0	100	0	0	0	0	28/47
2017	20	-	0	100	0	0	0	0	65/70
2022	40	-	0	50	50	0	0	50	- / -
<b>Juniperus osteosperma<sup>i</sup> -- (Utah juniper)</b>									
2005	40	40	50	50	0	0	0	0	- / -
2008	80	-	100	0	0	0	0	0	- / -
2013	60	40	100	0	0	0	0	0	- / -
2017	280	-	57	43	0	0	0	0	- / -
2022	280	80	79	14	7	0	0	7	- / -
<b>Linanthus pungens -- (granite prickly phlox)</b>									
2005	380	-	0	95	5	0	0	0	19/29
2008	140	-	0	71	29	0	0	0	15/17
2013	60	-	0	100	0	0	0	0	15/22
2017	80	-	0	100	0	0	0	0	17/19
2022	20	-	0	100	0	0	0	0	- / -
<b>Opuntia polyacantha -- (plains pricklypear)</b>									
2005	140	-	0	100	0	0	0	0	12/24
2008	180	-	0	67	33	0	0	33	11/27
2013	100	-	0	100	0	0	0	0	12/25
2017	160	-	0	100	0	0	0	0	11/19
2022	180	-	0	78	22	0	0	22	- / -
<b>Purshia tridentata<sup>p</sup> -- (antelope bitterbrush)</b>									
2005	80	-	0	100	0	50	50	0	86/138
2008	80	-	0	25	75	25	0	25	85/138
2013	140	-	14	86	0	71	0	14	90/132
2017	120	-	17	83	0	67	0	0	95/155
2022	200	-	0	70	30	40	60	50	- / -
<b>Symphoricarpos oreophilus<sup>p</sup> -- (mountain snowberry)</b>									
2005	60	-	33	67	0	0	0	0	74/169
2008	80	-	50	50	0	0	0	0	63/127
2013	120	-	0	100	0	0	0	0	55/126
2017	100	-	0	100	0	20	0	0	64/140
2022	180	-	0	100	0	33	0	0	- / -

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

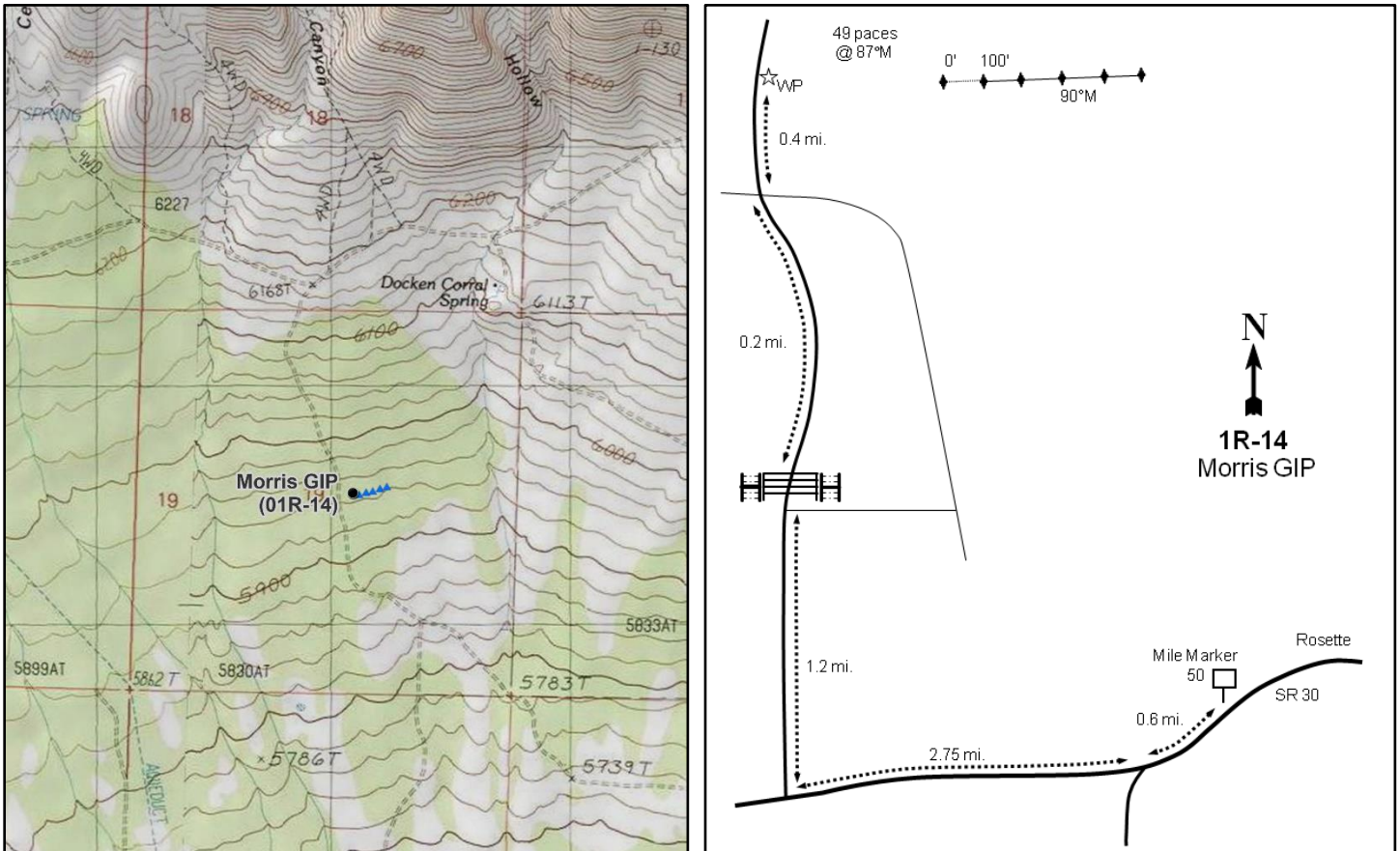
**Table 01R-10.14 - Tree Characteristics.** Point-quarter tree density, size class distribution, and average diameter.

Year	Density	Size Class Distribution					Average Diameter (cm)
	Trees per Acre	Seedling (%)	1-4' (%)	4-8' (%)	8-12' (%)	>12' (%)	
<b>Juniperus osteosperma (Utah juniper)</b>							
2005	74	-	-	58	21	21	18.4
2008	5	-	67	33	-	-	16.3
2013	13	11	78	11	-	-	3.6
2017	21	22	33	44	-	-	4.3
2022	71	47	47	6	-	-	2.9

**Table 01R-10.15 - Deer Desirable Components Index: Upland 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
2005	28.2	7.5	3.3	24.0	-3.2	5.3	0.0	64.9	Fair-Good
2008	23.5	-3.9	1.0	15.7	-0.1	2.9	0.0	39.1	Poor
2013	27.3	10.4	7.5	21.4	-0.8	3.2	0.0	69.1	Good
2017	30.0	12.2	5.1	28.6	-15.9	6.8	0.0	66.7	Fair-Good
2022	30.0	8.6	3.2	30.0	-3.3	2.7	0.0	71.2	Good

## MORRIS GIP - STUDY NO. 01R-14



### Location Information

USGS 7.5 min Map Info  
GPS (0' Stake)

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

### Transect Information

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

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

### Directions to Site

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

**Site Information**

Land Ownership	Private
Land Administrator	Private
Allotment	No data
Elevation	5,914ft (1,803m)
Aspect	South
Slope	6%
Sample Dates	08/13/2008, 07/10/2013, 07/18/2017, 07/20/2022

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

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

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

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

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

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

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

Year	Vegetation Type	Woodland Succession
2008	Juniper/Black Sagebrush	Phase III
2013	Perennial Grass/Wyoming Big Sagebrush	Phase I
2017	Perennial Grass/Wyoming Big Sagebrush	Phase I
2022	Perennial Grass/Wyoming Big Sagebrush	Phase I

**Site Notes**

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

**Site Potential**

1981 - 2010 Average Annual Precipitation	13 inches
NRCS Ecological Site	Upland Shallow Loam (Black Sagebrush)
NRCS Ecological Site #	R028AY325UT
States and Transitions	2008 - Juniper Invasion/Non-native Weed State: Community Phase 3.1 2013 - Juniper Invasion/Non-native Weed State: Community Phase 3.2 2017-Present - Current Potential State: Community Phase 2.1

Upon study establishment in 2008, the plant community on this site was a mixed stand of Utah juniper (*Juniperus osteosperma*) and black sagebrush (*Artemisia nova*) with a diverse component of other shrub species present that provided limited cover (Table 01R-14.12). Sandberg bluegrass (*Poa secunda*) made up a majority of the herbaceous understory with limited cover being provided by perennial and annual grass and forb species (Table 01R-14.10, Table 01R-14.11). Following the treatment (Table 01R-14.1), the site was dominated by Wyoming big sagebrush (*A. tridentata* ssp. *wyomingensis*), black sagebrush (*Artemisia nova*), and forage kochia (*Bassia prostrata*) (Table 01R-14.12). The initial post-treatment herbaceous understory was comprised mainly of seeded perennial introduced grasses, although forb cover remained limited. However, over time bluebunch wheatgrass (*Pseudoroegneria spicata*) and Sandberg bluegrass (*Poa secunda*) have become the dominant herbaceous plant species (Table 01R-14.7, Table 01R-14.10, Table 01R-14.11) (USDA-ARS Jornada Experimental Range, 2022).

**Trend Summary Tables****Table 01R-14.6 - Shrub/Tree Summary.** Average modified Daubenmire quadrat and line intercept cover by year for shrubs/trees

Year	Quadrat Cover (%)			Line-intercept Cover (%)		
	Preferred Shrub	Other Shrub	Tree	Preferred Shrub	Other Shrub	Tree
2008	2.5	0.2	7.9	3.1	0.3	38.6
2013	6.0	0.0	0.1	9.5	0.1	-
2017	9.8	0.1	-	11.4	0.4	0.1
2022	10.4	0.7	-	12.0	0.3	0.2

**Table 01R-14.7 - Herbaceous Summary.** Nested frequency and average modified Daubenmire quadrat cover by year for herbaceous functional groups

Year	Nested Frequency				Quadrat Cover (%)			
	Annual Grass	Perennial Grass	Annual/Biennial Forb	Perennial Forb	Annual Grass	Perennial Grass	Annual/Biennial Forb	Perennial Forb
2008	76	230	34	108	0.2	2.7	0.1	0.9
2013	339	284	65	103	1.7	11.8	0.2	1.7
2017	292	322	72	32	3.3	17.1	0.1	0.8
2022	225	320	124	30	1.0	13.9	0.4	0.1

**Table 01R-14.8 - Basic Ground Cover.** Average modified Daubenmire quadrat cover by year for basic ground cover types.

Year	Cover Type (%)					
	Bare Ground	Cryptogams	Litter	Pavement	Rock	Vegetation
2008	13.4	0.4	53.8	26.7	3.6	14.9
2013	20.7	-	32.4	16.4	8.3	27.7
2017	27.8	0.0	24.7	28.2	5.4	33.6
2022	33.6	0.5	21.3	29.8	6.3	24.4

**Table 01R-14.9 - Pellet Group Data.** Quadrat frequency and pellet group transect data for animal pellets. Rabbit pellet groups are not sampled in the pellet group transect.

Year	Cattle	Mule Deer	Rocky Mountain Elk	Rabbit
	Quadrat Frequency			
2008	1	3	-	72
2013	2	-	-	5
2017	2	2	-	30
2022	4	5	-	6
Year	Days Use Per Acre (ha)			
2008	2.2 (5.4)	2.7 (6.6)	-	-
2013	20.3 (50.2)	4.0 (9.9)	-	-
2017	1.5 (3.6)	6.0 (14.9)	0.7 (1.7)	-
2022	11.6 (28.7)	2.7 (6.6)	-	-

**Table 01R-14.10 - 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)	Hordeum jubatum (foxtail barley)	Pascopyrum smithii (western wheatgrass)	Poa secunda (Sandberg bluegrass)	Pseudoroegneria spicata (bluebunch wheatgrass)	Thinopyrum intermedium <sup>i</sup> (intermediate wheatgrass)	Vulpia octoflora <sup>a</sup> (sixweeks fescue)
year	Nested Frequency									
2008	-	-	74	28	-	29	195	9	-	2
2013	124	72	338	35	1	5	123	51	42	13
2017	209	24	282	20	-	26	148	80	38	55
2022	102	7	188	-	-	1	206	152	5	101
year	Average Cover (%)									
2008	-	-	0.2	0.2	-	0.1	2.4	0.1	-	0.0
2013	3.2	2.1	1.7	0.9	0.0	0.0	1.6	2.0	1.9	0.0
2017	8.7	0.6	3.1	0.3	-	0.8	2.4	3.4	0.9	0.2
2022	2.7	0.3	0.6	-	-	0.0	3.5	7.3	0.1	0.3

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

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

FORB SPECIES	Agoseris glauca (pale agoseris)	Alyssum desertorum <sup>ai</sup> (desert madwort)	Ceratocephala testiculata <sup>ai</sup> (curvseed butterwort)	Chaenactis douglasii (Douglas' dustymaiden)	Collinsia parviflora <sup>a</sup> (maiden blue eyed Mary)	Cryptantha (cryptantha)	Cymopterus (springparsley)	Descurainia pinnata <sup>a</sup> (western tansymustard)	Eriogonum cernuum <sup>a</sup> (nodding buckwheat)	Eriogonum ovalifolium (cushion buckwheat)	Eriogonum shockleyi (Shockley's buckwheat)	Eriogonum umbellatum (sulphur-flower buckwheat)	Medicago sativa <sup>i</sup> (alfalfa)	Microsteris gracilis <sup>a</sup> (slender phlox)	Onobrychis viciifolia <sup>i</sup> (sainfoin)	Penstemon (beardtongue)	Phlox longifolia (longleaf phlox)
year	Nested Frequency																
2008	-	-	3	5	3	3	-	-	-	-	12	34	-	24	-	1	77
2013	7	49	9	2	-	1	3	4	6	-	-	23	2	5	21	6	47
2017	-	65	-	2	-	2	7	5	-	3	3	14	-	-	-	-	4
2022	4	124	8	-	-	1	10	-	-	4	-	5	-	-	-	-	9
year	Average Cover (%)																
2008	-	-	0.0	0.0	0.0	0.0	-	-	-	-	0.1	0.6	-	0.0	-	0.0	0.2
2013	0.0	0.1	0.0	0.0	-	0.0	0.0	0.0	0.0	-	-	0.8	0.1	0.0	0.3	0.2	0.3
2017	-	0.1	-	0.0	-	0.0	0.0	0.0	-	0.0	0.0	0.7	-	-	-	-	0.0
2022	0.0	0.4	0.0	-	-	0.0	0.0	-	-	0.1	-	0.0	-	-	-	-	0.0

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

FORB SPECIES			
	Polygonum douglasii <sup>a</sup> (Douglas' knotweed)		
	Sanguisorba minor <sup>i</sup> (small burnet)		
	Tragopogon dubius <sup>ai</sup> (yellow salsify)		
year	Nested Frequency		
2008	4	-	-
2013	-	2	-
2017	-	-	2
2022	-	-	-
year	Average Cover (%)		
2008	0.0	-	-
2013	-	0.0	-
2017	-	-	0.0
2022	-	-	-

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

**Table 01R-14.12 - Shrub and Tree Species.** Average modified Daubenmire quadrat and line intercept cover by year.

SHRUB SPECIES																	
	Artemisia nova <sup>p</sup> (black sagebrush)		Artemisia tridentata ssp. vaseyana <sup>p</sup> (mountain big sagebrush)		Bassia prostrata <sup>pi</sup> (forage kochia)		Ericameria nauseosa (rubber rabbitbrush)		Eriogonum microthecum <sup>p</sup> (slender buckwheat)		Juniperus osteosperma <sup>t</sup> (Utah juniper)		Linanthus pungens (granite prickly phlox)		Opuntia polyacantha (plains pricklypear)		Purshia tridentata <sup>p</sup> (antelope bitterbrush)
year	Line Intercept Cover (%)																
2008	3.1	-	-	-	-	38.6	0.2	0.1	-								
2013	0.5	4.5	4.4	0.1	0.1	-	-	-	-								
2017	1.9	7.8	1.5	0.4	0.2	0.1	-	-	-								
2022	3.9	7.7	0.4	0.3	-	0.2	-	-	-								
year	Quadrat Cover (%)																
2008	2.5	-	-	-	0.0	7.9	0.2	0.0	0.0								
2013	0.5	2.7	2.8	0.0	0.0	0.1	0.0	0.0	-								
2017	1.1	6.8	1.8	0.0	0.1	0.0	-	0.1	-								
2022	4.5	5.5	0.2	0.7	0.2	0.0	0.0	0.0	-								

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



**Table 01R-14.13 - Shrub/Tree Characteristics.** Population characteristics of shrub/tree species populations including density reproduction (seedlings), age distribution, utilization, vigor and average size (height/crown) of plants.

Year	Density		Age Class Distribution			Utilization		Poor Vigor (%)	Average Height Crown (cm)
	Plants Per Acre		Excluding Seedlings			Moderate (%)	Heavy (%)		
	Excluding Seedlings	Seedling	Young (%)	Mature (%)	Decadent (%)				
<b>Artemisia nova<sup>P</sup> -- (black sagebrush)</b>									
2008	2800	140	6	32	61	25	20	38	27/46
2013	1180	220	48	53	0	0	0	0	19/35
2017	3260	20	44	55	1	1	0	0	19/38
2022	6360	20	34	65	1	33	12	13	- / -
<b>Artemisia tridentata ssp. vaseyana<sup>P</sup> -- (mountain big sagebrush)</b>									
2008	-	-	-	-	-	-	-	-	-/-
2013	4400	3840	80	21	0	1	1	3	32/45
2017	6700	-	47	53	0	12	7	0	29/50
2022	3900	260	13	81	6	6	5	11	- / -
<b>Atriplex canescens<sup>P</sup> -- (fourwing saltbush)</b>									
2008	-	-	-	-	-	-	-	-	-/-
2013	-	-	-	-	-	-	-	-	31/27
2017	-	-	-	-	-	-	-	-	-/-
2022	-	-	-	-	-	-	-	-	-/-
<b>Bassia prostrata<sup>PI</sup> -- (forage kochia)</b>									
2008	-	-	-	-	-	-	-	-	-/-
2013	5240	1240	41	59	0	3	0	23	22/28
2017	4000	180	12	87	1	8	0	0	12/19
2022	1240	-	14	84	2	8	16	11	- / -
<b>Chrysothamnus viscidiflorus -- (yellow rabbitbrush)</b>									
2008	-	-	-	-	-	-	-	-	-/-
2013	20	-	100	0	0	0	0	0	- / -
2017	-	-	-	-	-	-	-	-	35/57
2022	-	-	-	-	-	-	-	-	-/-
<b>Eriogonum microthecum<sup>P</sup> -- (slender buckwheat)</b>									
2008	480	-	13	88	0	38	29	0	13/17
2013	280	-	21	79	0	43	0	36	13/27
2017	860	-	7	93	0	5	0	0	9/18
2022	860	-	2	98	0	2	5	5	- / -
<b>Ericameria nauseosa -- (rubber rabbitbrush)</b>									
2008	-	-	-	-	-	-	-	-	-/-
2013	20	-	0	100	0	0	100	0	42/51
2017	20	-	0	100	0	0	0	0	55/77
2022	20	-	0	0	100	0	0	100	- / -
<b>Juniperus osteosperma<sup>I</sup> -- (Utah juniper)</b>									
2008	700	160	23	77	0	0	0	0	- / -
2013	40	20	100	0	0	0	0	0	- / -
2017	40	-	100	0	0	0	0	0	- / -
2022	40	-	100	0	0	0	0	50	- / -
<b>Linanthus pungens -- (granite prickly phlox)</b>									
2008	280	-	14	79	7	0	0	0	10/16
2013	40	-	50	50	0	0	0	100	18/38
2017	40	-	0	100	0	0	0	0	14/26
2022	40	-	0	100	0	0	0	50	- / -
<b>Opuntia polyacantha -- (plains pricklypear)</b>									
2008	340	-	12	65	24	0	0	12	10/31
2013	260	-	39	54	8	0	0	8	12/21
2017	240	-	17	83	0	0	0	0	8/20
2022	200	-	0	100	0	0	0	30	- / -

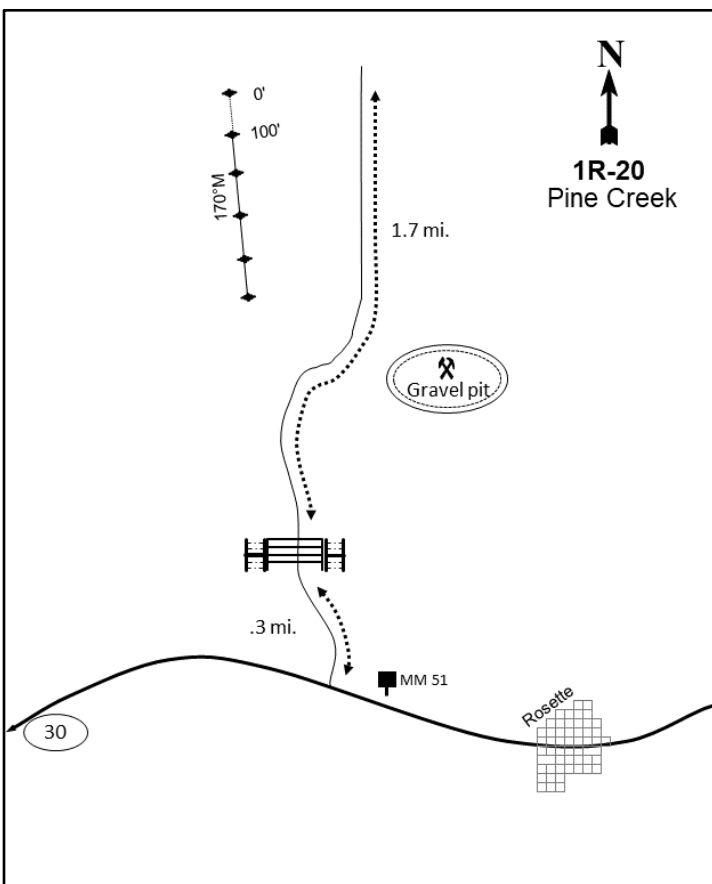
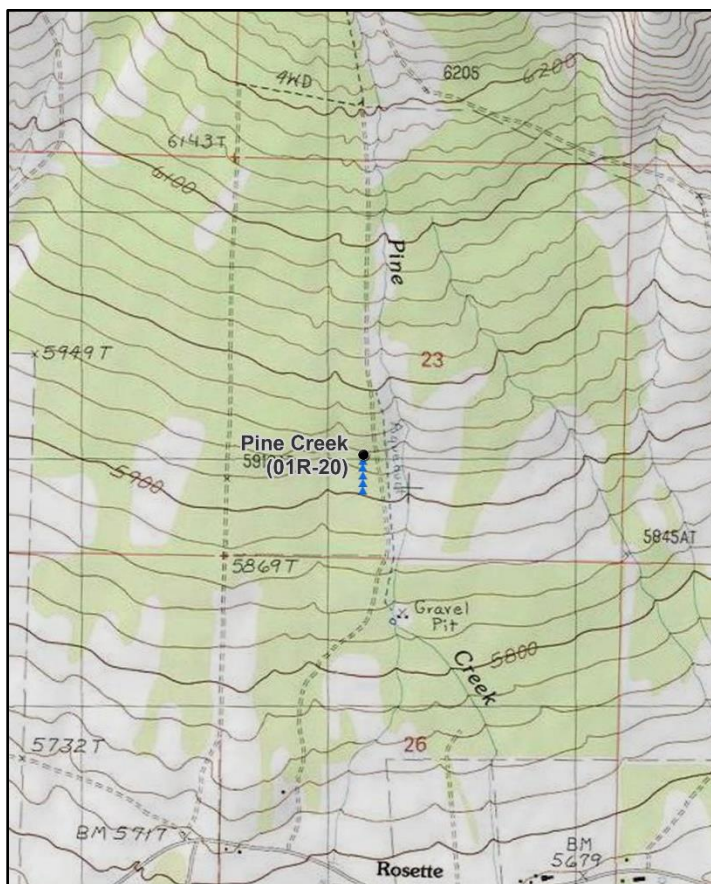
Year	Density		Age Class Distribution			Utilization		Poor Vigor (%)	Average Height Crown (cm)
	Plants Per Acre		Excluding Seedlings			Moderate (%)	Heavy (%)		
	Excluding Seedlings	Seedling	Young (%)	Mature (%)	Decadent (%)				
<b>Purshia tridentata<sup>p</sup> -- (antelope bitterbrush)</b>									
2008	-	-	-	-	-	-	-	-	37/112
2013	-	-	-	-	-	-	-	-	46/114
2017	-	-	-	-	-	-	-	-	67/158
2022	20	-	0	100	0	0	100	0	- / -
<b>Symphoricarpos oreophilus<sup>p</sup> -- (mountain snowberry)</b>									
2008	-	-	-	-	-	-	-	-	44/81
2013	-	-	-	-	-	-	-	-	- / -
2017	-	-	-	-	-	-	-	-	- / -
2022	40	-	100	0	0	50	0	0	- / -

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

**Table 01R-14.14 - Tree Characteristics.** Point-quarter tree density, size class distribution, and average diameter.

Year	Density	Size Class Distribution					Average Diameter (cm)
	Trees per Acre	Seedling (%)	1-4' (%)	4-8' (%)	8-12' (%)	>12' (%)	
<b>Juniperus osteosperma (Utah juniper)</b>							
2008	796	10	15	25	35	15	20.4
2013	21	44	56	-	-	-	4.2
2017	13	80	20	-	-	-	2.4
2022	22	38	63	-	-	-	1.1

## PINE CREEK - STUDY NO. 01R-20



### Location Information

USGS 7.5 min Map Info  
GPS (0' Stake)

Rosette NE; Township 13N, Range 14W, Section 23  
NAD 83 UTM ZONE 12, 299088 East 4634216 North

### Transect Information

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

### Directions to Site

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

**Site Information**

Land Ownership	Private
Land Administrator	Private
Allotment	No data
Elevation	5,931ft (1,808m)
Aspect	South
Slope	5%
Sample Dates	09/03/2014, 07/19/2017, 07/19/2022

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

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

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

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

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

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

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

Year	Vegetation Type	Woodland Succession
2014	Juniper	Phase III
2017	Annual-Perennial Grass	Phase I
2022	Annual-Perennial Grass	Phase I

**Site Notes**

In 2017 sample year it appeared that mountain brome (*Bromus marginatus*) was seeded on the site, but was not listed in the available seed mix (Table 01R-20.2). The site may have been reseeded, possibly by a rangeland drill, in 2015-2016.

**Site Potential**

1981 - 2010 Average Annual Precipitation 12 inches  
 NRCS Ecological Site Upland Stony Loam (Black Sagebrush)  
 NRCS Ecological Site # R025XY318UT  
 States and Transitions 2014 - Juniper Invasion/Non-native Weed State: Community Phase 3.1  
 2017-Present - Juniper Invasion/Non-native Weed State: Community Phase 3.2

The site was established in 2014, was encroached by Utah juniper (*Juniperus osteosperma*), and was considered to be in Phase III of woodland succession (Table 01R-20.4, Table 01R-20.12, Table 01R-20.14). The understory was comprised mainly of native perennial grass species (Table 01R-20.7), although diversity of shrubs and the overall herbaceous understory was low. Following the bullhog treatment (Table 01R-20.1), the site transitioned to an annual-perennial grass community (Table 01R-20.7, Table 01R-20.10, Table 01R-20.11). Juniper trees were effectively removed by the treatment, but shrubs remained rare (Table 01R-20.6, Table 01R-20.14) (USDA-ARS Jornada Experimental Range, 2022).

**Trend Summary Tables**

**Table 01R-20.6 - Shrub/Tree Summary.** Average modified Daubenmire quadrat and line intercept cover by year for shrubs/trees

Year	Quadrat Cover (%)			Line-intercept Cover (%)		
	Preferred Shrub	Other Shrub	Tree	Preferred Shrub	Other Shrub	Tree
2014	-	2.5	15.9	-	1.7	38.9
2017	-	0.5	-	-	0.1	-
2022	-	0.0	-	-	-	-

**Table 01R-20.7 - Herbaceous Summary.** Nested frequency and average modified Daubenmire quadrat cover by year for herbaceous functional groups

Year	Nested Frequency				Quadrat Cover (%)			
	Annual Grass	Perennial Grass	Annual/Biennial Forb	Perennial Forb	Annual Grass	Perennial Grass	Annual/Biennial Forb	Perennial Forb
2014	233	238	28	40	2.4	8.3	0.1	0.1
2017	427	227	1	186	36.1	11.9	0.0	10.3
2022	261	287	40	107	2.1	14.2	0.1	1.5

**Table 01R-20.8 - Basic Ground Cover.** Average modified Daubenmire quadrat cover by year for basic ground cover types.

Year	Cover Type (%)					
	Bare Ground	Cryptogams	Litter	Pavement	Rock	Vegetation
2014	9.9	3.5	45.8	29.5	1.9	28.3
2017	4.4	0.1	57.4	6.5	1.6	52.0
2022	9.8	-	74.0	8.1	3.0	18.3

**Table 01R-20.9 - Pellet Group Data.** Quadrat frequency and pellet group transect data for animal pellets. Rabbit pellet groups are not sampled in the pellet group transect.

Year	Cattle	Mule Deer	Rabbit
	Quadrat Frequency		
2014	-	1	8
2017	2	3	10
2022	11	16	4
Year	Days Use Per Acre (ha)		
2014	-	1.3 (3.3)	-
2017	2.9 (7.2)	4.0 (9.9)	-
2022	34.1 (84.3)	7.4 (18.2)	-

**Table 01R-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 marginatus (mountain brome)	Bromus tectorum <sup>ai</sup> (cheatgrass)	Elymus elymoides (squirreltail)	Poa fendleriana (muttongrass)	Poa secunda (Sandberg bluegrass)	Vulpia octoflora <sup>a</sup> (sixweeks fescue)
year	Nested Frequency							
2014	2	-	-	227	55	4	198	10
2017	5	131	63	427	31	-	95	8
2022	3	173	61	257	76	4	158	36
year	Average Cover (%)							
2014	0.0	-	-	2.4	2.0	0.2	6.1	0.0
2017	0.0	5.0	1.8	36.0	0.8	-	4.3	0.1
2022	0.1	7.3	1.6	2.0	1.6	0.1	3.4	0.1

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

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

FORB SPECIES	Astragalus filipes (basalt milkvech)	Ceratocephala testiculata <sup>ai</sup> (curveseed butterwort)	Cryptantha (cryptantha)	Cymopterus (springparsley)	Descurainia pinnata <sup>a</sup> (western tansymustard)	Gilia inconspicua <sup>a</sup> (shy gilia)	Lactuca serriola <sup>ai</sup> (prickly lettuce)	Lappula occidentalis <sup>ai</sup> (flat-spine stickseed)	Lomatium (desertparsley)	Onobrychis vicifolia <sup>i</sup> (sainfoin)	Penstemon (beardtongue)	Phlox longifolia (longleaf phlox)	Sanguisorba minor <sup>i</sup> (small burnet)	Tragopogon dubius <sup>ai</sup> (yellow salsify)
year	Nested Frequency													
2014	-	-	3	-	18	-	-	13	-	-	1	37	-	-
2017	7	-	-	-	-	-	1	-	3	17	-	21	162	-
2022	11	19	-	4	17	4	1	3	-	-	-	60	51	2
year	Average Cover (%)													
2014	-	-	0.0	-	0.1	-	-	0.0	-	-	0.0	0.1	-	-
2017	0.1	-	-	-	-	-	0.0	-	0.0	0.3	-	0.3	9.6	-
2022	0.2	0.1	-	0.0	0.0	0.0	0.0	0.0	-	-	-	0.2	1.2	0.0

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

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

SHRUB SPECIES	Line Intercept		
	Juniperus osteosperma <sup>i</sup> (Utah juniper)	38.9	1.7
Opuntia polyacantha (plains pricklypear)	-	0.1	
	-	0	
year	Quadrat Cover (%)		
	2014	15.9	2.5
	2017	-	0.5
	2022	-	0.0

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

**Table 01R-20.13 - Shrub/Tree Characteristics.** Population characteristics of shrub/tree species populations including density reproduction (seedlings), age distribution, utilization, vigor and average size (height/crown) of plants.

Year	Density		Age Class Distribution			Utilization		Poor Vigor (%)	Average Height Crown (cm)
	Plants Per Acre		Excluding Seedlings			Moderate (%)	Heavy (%)		
	Excluding Seedlings	Seedling	Young (%)	Mature (%)	Decadent (%)				
<b>Artemisia tridentata ssp. vaseyana<sup>p</sup> -- (mountain big sagebrush)</b>									
2014	-	-	-	-	-	-	-	-	-/-
2017	-	-	-	-	-	-	-	-	83/55
2022	20	-	0	100	0	100	0	0	-/-
<b>Bassia prostrata<sup>pi</sup> -- (forage kochia)</b>									
2014	-	-	-	-	-	-	-	-	-/-
2017	-	-	-	-	-	-	-	-	-/-
2022	20	-	0	100	0	0	0	0	-/-
<b>Juniperus osteosperma<sup>i</sup> -- (Utah juniper)</b>									
2014	540	-	11	85	4	0	4	30	-/-
2017	60	-	33	67	0	0	0	33	-/-
2022	20	-	100	0	0	0	0	0	-/-
<b>Opuntia polyacantha -- (plains pricklypear)</b>									
2014	2780	-	2	98	0	0	0	1	10/34
2017	940	-	0	100	0	0	0	9	10/20
2022	360	-	6	94	0	0	0	44	-/-

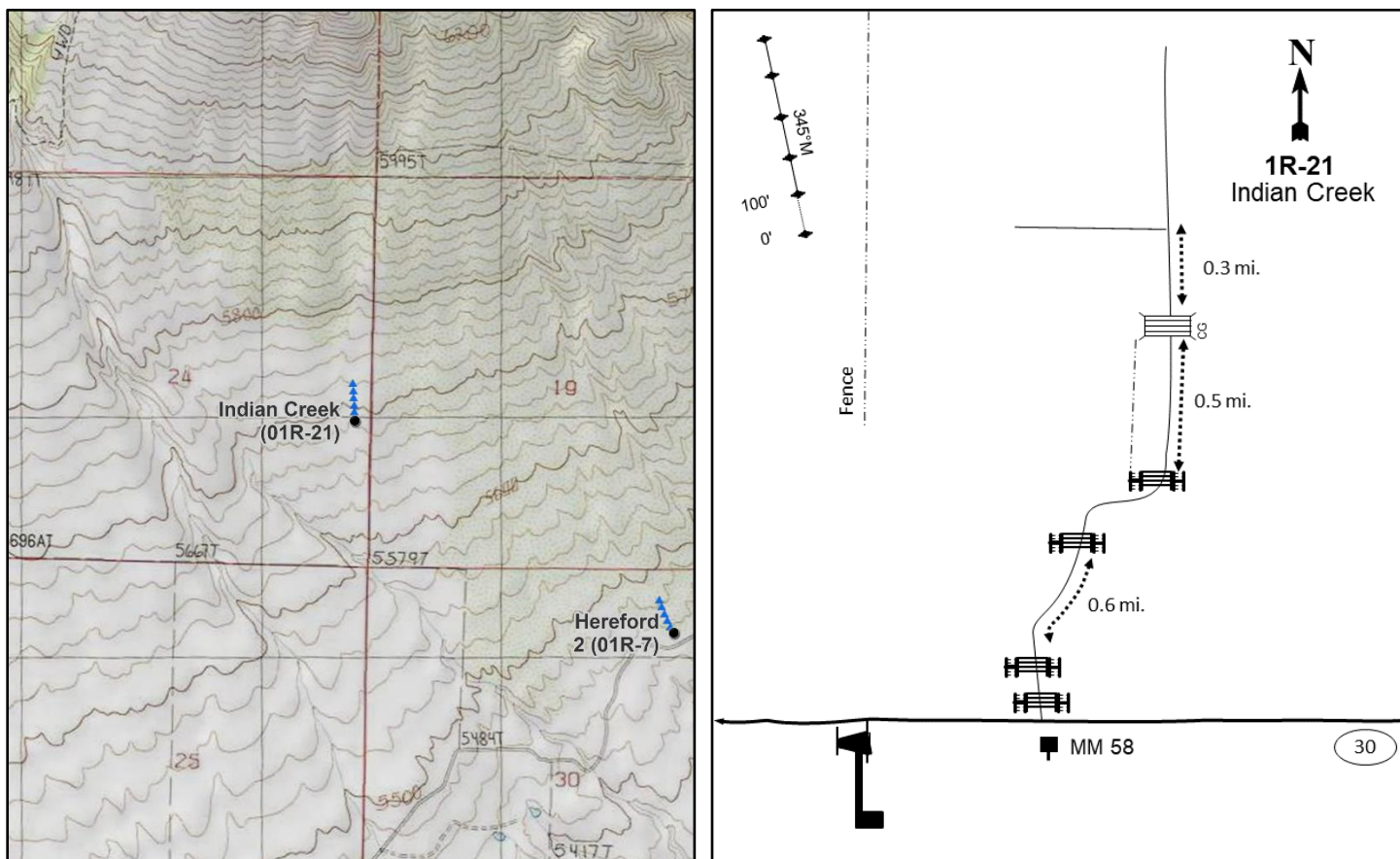
t - Tree Species; p - Preferred Browse; i - Introduced Species

**Table 01R-20.14 - Tree Characteristics.** Point-quarter tree density, size class distribution, and average diameter.

Year	Density	Size Class Distribution					Average Diameter (cm)
	Trees per Acre	Seedling (%)	1-4' (%)	4-8' (%)	8-12' (%)	>12' (%)	
<b>Juniperus osteosperma (Utah juniper)</b>							
2014	488	-	10	45	35	10	24.7
2017	6	40	60	-	-	-	1.9
2022	10	75	25	-	-	-	1.5



## INDIAN CREEK - STUDY NO. 01R-21



### Location Information

USGS 7.5 min Map Info  
GPS (0' Stake)

Park Valley NE; Township 13N, Range 13W, Section 24  
NAD 83 UTM ZONE 12, 311333 East 4634184 North

### Transect Information

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

Not Available  
345° magnetic  
500ft  
Line 1 (11ft), Line 2 (34ft), Line 3 (59ft), Line 4 (71ft), Line 5 (95ft)  
Standard

### Directions to Site

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

**Site Information**

Land Ownership	Federal
Land Administrator	BLM
Allotment	FISHER CREEK
Elevation	5,696ft (1,736m)
Aspect	WEST
Slope	4%
Sample Dates	09/04/2014, 07/19/2017, 07/20/2022

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

Treatment/Disturbance	Name	WRI DB#	Date	Size (acres)
Seeding - Aerial Before	Park Valley PJ Treatment Project Phase 1	2874	October 2014	707
Mechanical - Bullhog	Park Valley PJ Treatment Project Phase 1	2874	October 2014-June 2015	1408
Herbicide - Plateau	Park Valley Bullhog - Herbicide Maintenance	5485	September 2020	728

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

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

**Wildlife Habitat and Vegetation History**

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

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

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

Year	Vegetation Type	Woodland Succession
2014	Juniper	Phase II transitioning to Phase III
2017	Black Sagebrush/Annual-Perennial Grass/Perennial Forb	Phase I
2022	Black Sagebrush/Perennial Grass	Phase I

**Site Notes**

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

**Site Potential**

1981 - 2010 Average Annual Precipitation	12 inches
NRCS Ecological Site	Upland Stony Loam (Black Sagebrush)
NRCS Ecological Site #	R025XY318UT
States and Transitions	2014 - Juniper Invasion/Non-native Weed State: Community Phase 3.1 2017 - Juniper Invasion/Non-native Weed State: Community Phase 3.2 2022-Present - Current Potential State: Community Phase 2.1

This study site was established in 2014 and was dominated by Utah Juniper (*Juniperus osteosperma*) with a small component of black sagebrush (*Artemisia nova*) also present (Table 01R-21.12, Table 01R-21.13, Table 01R-21.14). The herbaceous understory consisted mostly of perennial grass and forb species, although cover was relatively low. The introduced annual grass species cheatgrass (*Bromus tectorum*) was also sampled in low abundance. Following the treatment in 2017 (Table 01R-21.1), the site transitioned to a black sagebrush and perennial grass-forb community (Table 01R-21.6, Table 01R-21.7). Cheatgrass was also prevalent in 2017, but has since decreased in cover (Table 01R-21.10). Juniper was effectively removed by the treatment. However, point-quarter density and line intercept cover of juniper increased between 2017 and 2022, indicating that further infilling may occur in future sample years (Table 01R-21.12, Table 01R-21.14) (USDA-ARS Jornada Experimental Range, 2022).

**Trend Summary Tables****Table 01R-21.6 - Shrub/Tree Summary.** Average modified Daubenmire quadrat and line intercept cover by year for shrubs/trees

Year	Quadrat Cover (%)			Line-intercept Cover (%)		
	Preferred Shrub	Other Shrub	Tree	Preferred Shrub	Other Shrub	Tree
2014	5.5	1.1	17.8	5.3	0.7	27.2
2017	2.1	3.4	0.7	5.0	5.6	-
2022	7.1	1.9	0.6	8.4	2.5	0.3

**Table 01R-21.7 - Herbaceous Summary.** Nested frequency and average modified Daubenmire quadrat cover by year for herbaceous functional groups

Year	Nested Frequency				Quadrat Cover (%)			
	Annual Grass	Perennial Grass	Annual/Biennial Forb	Perennial Forb	Annual Grass	Perennial Grass	Annual/Biennial Forb	Perennial Forb
2014	98	119	21	107	0.2	3.0	0.1	1.6
2017	315	152	67	220	13.8	4.9	0.7	11.4
2022	289	227	224	168	1.0	5.7	0.8	2.6

**Table 01R-21.8 - Basic Ground Cover.** Average modified Daubenmire quadrat cover by year for basic ground cover types.

Year	Cover Type (%)					
	Bare Ground	Cryptogams	Litter	Pavement	Rock	Vegetation
2014	17.4	1.3	33.3	36.1	6.6	27.9
2017	11.1	0.0	52.8	17.3	1.1	30.1
2022	14.9	0.0	52.8	21.9	2.4	19.7

**Table 01R-21.9 - Pellet Group Data.** Quadrat frequency and pellet group transect data for animal pellets. Rabbit pellet groups are not sampled in the pellet group transect.

Year	Cattle	Mule Deer	Rabbit
	Quadrat Frequency		
2014	-	1	20
2017	1	1	27
2022	10	1	-
Year	Days Use Per Acre (ha)		
2014	11.6 (28.7)	1.3 (3.3)	-
2017	3.6 (9.0)	-	-
2022	35.6 (87.9)	1.3 (3.3)	-

**Table 01R-21.10 - Grass Species.** Nested frequency and modified Daubenmire average cover by year.

GRASS SPECIES	Achnatherum hymenoides (Indian ricegrass)	Agropyron cristatum <sup>i</sup> (crested wheatgrass)	Bromus tectorum <sup>ai</sup> (cheatgrass)	Elymus elymoides (squirreltail)	Elymus lanceolatus (thickspike wheatgrass)	Elymus wawawaiensis (Snake River wheatgrass)	Pascopyrum smithii (western wheatgrass)	Poa secunda (Sandberg bluegrass)	Psathyrostachys juncea <sup>i</sup> (Russian wildrye)	Pseudoroegneria spicata (bluebunch wheatgrass)
year	Nested Frequency									
2014	2	-	98	1	-	-	3	85	-	54
2017	12	24	315	11	0	-	19	53	-	69
2022	3	97	289	16	5	4	7	110	14	70
year	Average Cover (%)									
2014	0.0	-	0.2	0.0	-	-	0.0	2.1	-	0.8
2017	0.3	0.3	13.8	0.1	0.0	-	0.4	1.0	-	2.8
2022	0.0	2.0	1.0	0.1	0.2	0.1	0.2	1.2	0.3	1.6

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

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

FORB SPECIES	Achillea millefolium (Common yarrow)	Allium acuminatum (tapertip onion)	Alyssum desertorum <sup>ai</sup> (desert madwort)	Antennaria dimorpha (low pussytoes)	Arenaria (sandwort)	Astragalus beckwithii (Beckwith's milkvetch)	Astragalus calycosus (Torrey's milkvetch)	Astragalus purshii (woollypod milkvetch)	Calochortus nuttallii (sego lily)	Ceratocephala testiculata <sup>ai</sup> (curveseed butterwort)	Chaenactis douglasii (Douglas' dustymaiden)	Cordylanthus <sup>a</sup> (bird's-beak)	Cryptantha (cryptantha)	Descurainia pinnata <sup>a</sup> (western tansymustard)	Eriogonum (buckwheat)	Eriogonum caespitosum (matted buckwheat)	Eriogonum ovalifolium (cushion buckwheat)
year	Nested Frequency																
2014	-	-	-	17	2	4	1	-	-	7	1	9	12	8	8	4	-
2017	1	1	2	3	2	55	2	1	2	35	6	-	18	7	-	3	4
2022	1	2	16	-	-	-	-	-	3	214	5	-	26	4	-	18	7
year	Average Cover (%)																
2014	-	-	-	0.1	0.0	0.0	0.0	-	-	0.0	0.0	0.1	0.1	0.0	0.0	0.2	-
2017	0.0	0.0	0.0	0.0	0.0	1.4	0.0	0.0	0.0	0.5	0.0	-	0.1	0.0	-	0.3	0.1
2022	0.0	0.0	0.0	-	-	-	-	-	0.0	0.7	0.0	-	0.1	0.0	-	0.5	0.1

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

FORB SPECIES	Eriogonum racemosum (redroot buckwheat)	Eriogonum umbellatum (sulphur-flower buckwheat)	Gilia inconspicua <sup>a</sup> (shy gilia)	Lactuca serriola <sup>ai</sup> (prickly lettuce)	Lesquerella (bladderpod)	Linum perenne <sup>i</sup> (blue flax)	Medicago sativa <sup>i</sup> (alfalfa)	Onobrychis viciifolia <sup>i</sup> (sainfoin)	Packera multilobata (lobeleaf groundsel)	Phlox austromontana (mountain phlox)	Phlox longifolia (longleaf phlox)	Polygonum douglasii <sup>a</sup> (Douglas' knotweed)	Sanguisorba minor <sup>i</sup> (small burnet)	Senecio integerrimus <sup>a</sup> (lambstongue ragwort)	Streptanthus cordatus (heartleaf twistflower)	Tragopogon dubius <sup>ai</sup> (yellow salsify)	Zigadenus paniculatus (foothill deathcamas)
year	Nested Frequency																
2014	3	4	-	-	6	-	-	-	-	62	7	-	-	-	3	-	-
2017	2	7	-	17	-	89	14	4	-	38	16	5	61	1	9	-	2
2022	2	24	8	2	-	4	27	-	2	39	34	-	34	-	-	3	3
year	Average Cover (%)																
2014	0.0	0.1	-	-	0.0	-	-	-	-	1.0	0.0	-	-	-	0.0	-	-
2017	0.1	0.1	-	0.1	-	4.1	0.4	0.2	-	1.1	0.0	0.0	3.1	0.0	0.1	-	0.1
2022	0.0	0.1	0.0	0.0	-	0.0	0.2	-	0.0	0.8	0.1	-	0.6	-	-	0.0	0.0

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

**Table 01R-21.12 - Shrub and Tree Species.** Average modified Daubenmire quadrat and line intercept cover by year.

SHRUB SPECIES	Artemisia nova <sup>p</sup> (black sagebrush)	Chrysothamnus viscidiflorus ssp. viscidiflorus var. stenophyllus (yellow rabbitbrush)	Eriogonum microthecum <sup>p</sup> (slender buckwheat)	Gutierrezia sarothrae (broom snakeweed)	Juniperus osteosperma <sup>t</sup> (Utah juniper)	Linanthus pungens (granite prickly phlox)	Opuntia polyacantha (plains pricklypear)
year	Line Intercept Cover (%)						
2014	5.3	0.2	-	0.2	27.2	0.3	-
2017	4.9	0.9	0.1	3.7	-	1	-
2022	8.3	0.5	0.1	1.5	0.3	0.5	-
year	Quadrat Cover (%)						
2014	5.5	0.5	0.0	0.3	17.8	0.3	-
2017	2.0	0.4	0.1	2.2	0.7	0.8	0.1
2022	7.1	0.2	0.0	1.3	0.6	0.5	0.0

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

**Table 01R-21.13 - Shrub/Tree Characteristics.** Population characteristics of shrub/tree species populations including density reproduction (seedlings), age distribution, utilization, vigor and average size (height/crown) of plants.

Year	Density		Age Class Distribution			Utilization		Poor Vigor (%)	Average Height Crown (cm)
	Plants Per Acre		Excluding Seedlings			Moderate (%)	Heavy (%)		
	Excluding Seedlings	Seedling	Young (%)	Mature (%)	Decadent (%)				
<b>Artemisia nova<sup>p</sup> -- (black sagebrush)</b>									
2014	3200	320	18	66	17	26	13	27	24/45
2017	2320	-	9	91	1	0	0	0	22/41
2022	5940	100	28	69	3	10	1	19	- / -
<b>Chrysothamnus viscidiflorus ssp. viscidiflorus var. stenophyllus -- (yellow rabbitbrush)</b>									
2014	740	60	46	54	0	3	0	3	18/25
2017	820	-	17	83	0	34	0	2	20/30
2022	1740	40	44	55	1	0	2	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>Eriogonum microthecum<sup>p</sup> -- (slender buckwheat)</b>									
2014	40	-	0	50	50	0	0	50	10/28
2017	60	-	0	100	0	0	0	0	11/14
2022	120	-	17	83	0	50	0	0	- / -
<b>Ericameria nauseosa -- (rubber rabbitbrush)</b>									
2014	-	-	-	-	-	-	-	-	- / -
2017	-	-	-	-	-	-	-	-	- / -
2022	20	-	0	0	100	0	0	100	- / -
<b>Gutierrezia sarothrae -- (broom snakeweed)</b>									
2014	580	40	14	83	3	0	0	7	17/20
2017	1520	80	0	100	0	0	0	0	24/35
2022	5900	80	19	81	0	0	0	27	- / -
<b>Juniperus osteosperma<sup>i</sup> -- (Utah juniper)</b>									
2014	420	80	71	29	0	0	0	43	- / -
2017	240	-	50	50	0	0	0	0	- / -
2022	260	20	69	31	0	0	0	23	- / -
<b>Linanthus pungens -- (granite prickly phlox)</b>									
2014	1000	-	10	78	12	6	0	42	13/18
2017	720	-	3	97	0	0	0	0	18/24
2022	1080	-	2	89	9	0	0	39	- / -
<b>Opuntia polyacantha -- (plains pricklypear)</b>									
2014	120	-	0	100	0	0	0	0	11/26
2017	60	-	0	100	0	0	0	0	10/22
2022	100	-	0	80	20	0	0	40	- / -

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

**Table 01R-21.14 - Tree Characteristics.** Point-quarter tree density, size class distribution, and average diameter.

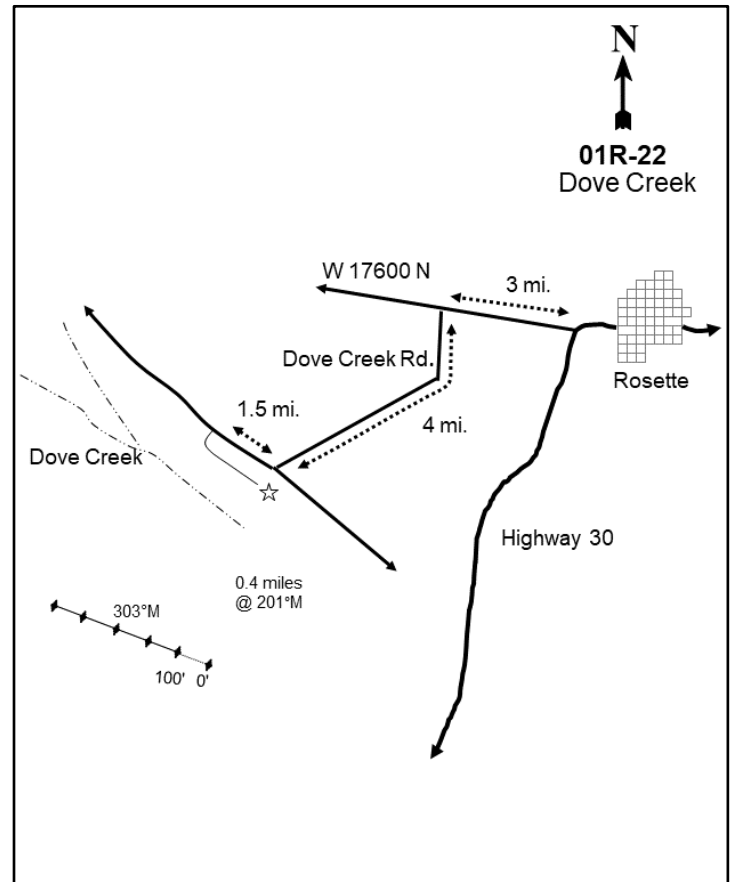
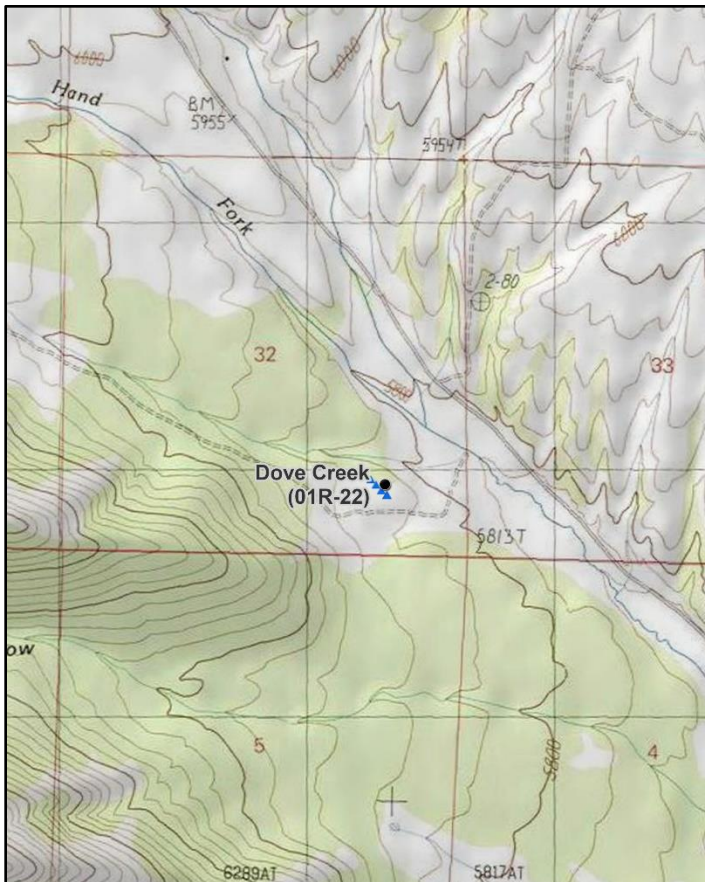
Year	Density	Size Class Distribution					Average Diameter (cm)
	Trees per Acre	Seedling (%)	1-4' (%)	4-8' (%)	8-12' (%)	>12' (%)	
<b>Juniperus osteosperma (Utah juniper)</b>							
2014	429	-	40	25	30	5	10.9
2017	122	22	78	-	-	-	1.8
2022	249	30	65	5	-	-	2.3

**Table 01R-21.15 - Deer Desirable Components Index: Upland 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
2014	6.6	9.9	8.8	6.0	-0.2	3.2	0.0	34.3	Very Poor-Poor
2017	6.3	0.0	0.0	9.7	-10.3	10.0	0.0	15.7	Very Poor
2022	10.5	14.2	14.1	11.4	-0.7	5.2	0.0	54.7	Fair



## DOVE CREEK - STUDY NO. 01R-22

**Location Information**

USGS 7.5 min Map Info  
GPS (0' Stake)

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

**Transect Information**

Browse Tag # (0' Stake)	512
Transect Bearing	303° magnetic
Length	500ft
Belt Placement	Line 1 (11ft), Line 2 (34ft), Line 3 (59ft), Line 4 (71ft), Line 5 (95ft)
Belt Marker Placement	Standard

**Directions to Site**

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



**Site Information**

Land Ownership	State
Land Administrator	SITLA
Allotment	No data
Elevation	5,839ft (1,780m)
Aspect	Southeast
Slope	3%
Sample Dates	07/17/2017, 07/20/2022

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

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

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

Mix Name			Application Type	Application Date	Acres
Park Valley Winter Range			Aerial	Nov 2015	1385
Type	Species	Common Name	Cultivar/Source ID	Bulk lbs/acre	PLS
G	Achnatherum hymenoides	Indian Ricegrass	Rimrock	0.40	0.35
G	Agropyron fragile	Siberian Wheatgrass	Vavilov II	2.09	1.97
G	Elymus lanceolatus	Thickspike Wheatgrass	Bannock	1.99	1.77
G	Elymus wawawaiensis	Snake River Wheatgrass	Secar	2.02	1.84
G	Poa secunda	Canby Bluegrass	Canbar	0.51	0.41
G	Psathyrostachys juncea	Russian Wildrye	Bozoisky II	0.90	0.85
F	Achillea millefolium	Western Yarrow	Lincoln WA	0.01	0.01
F	Achillea millefolium	Western Yarrow	Lincoln WA	0.06	0.05
F	Linum perenne	Blue Flax	Appar	1.01	0.86
F	Medicago sativa	Alfalfa	Ranger	0.72	0.68
F	Onobrychis viciifolia	Sainfoin	Eski	1.01	0.98
F	Sanguisorba minor	Small Burnet		1.52	1.30

Mix Name			Application Type	Application Date	Acres
Park Valley Winter Range Kochia			Aerial	Feb 2016	1385
Type	Species	Common Name	Cultivar/Source ID	Bulk lbs/acre	PLS
		Rice Hulls		0.29	0.00
F	Medicago sativa	Alfalfa	Ladak	0.51	0.47
S	Bassia prostrata	Forage Kochia	Millard/Beaver UT	0.51	0.38

Mix Name			Application Type	Application Date	Acres
Park Valley Winter Range Bitterbrush			Drill	Feb 2016	1370
Type	Species	Common Name	Cultivar/Source ID	Bulk lbs/acre	PLS
S	Purshia tridentata	Bitterbrush	Oneida, ID	0.15	0.13

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

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

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

Year	Vegetation Type	Woodland Succession
2017	Mountain Big Sagebrush/Perennial Grass	Phase I
2022	Mountain Big Sagebrush/Perennial Grass	Phase I

**Site Notes**

No Notes

**Site Potential**

1981 - 2010 Average Annual Precipitation 11 inches  
 NRCS Ecological Site Upland Loam (Mountain Big Sagebrush)  
 NRCS Ecological Site # R028AY310UT  
 States and Transitions 2017-Present - Current Potential State: Community Phase 2.1

When the study was established in 2017, the plant community was a stand of mountain big sagebrush (*Artemisia tridentata* ssp. *vaseyana*) (Table 01R-22.12). In 2016 -- prior to study establishment -- Utah juniper (*Juniperus osteosperma*) trees were bullhogged (Table 01R-22.1). Few trees were sampled following the treatment and nearly all of those that were present were seedlings and young trees that were missed or partially treated (Table 01R-22.14); this extant tree component indicates that there may be potential for encroachment in the future. The herbaceous understory has remained in fairly good condition, but cheatgrass (*Bromus tectorum*) is moderately abundant as of 2022 although it provides little cover (Table 01R-22.7, Table 01R-22.10, Table 01R-22.11) (USDA-ARS Jornada Experimental Range, 2022).

**Trend Summary Tables****Table 01R-22.6 - Shrub/Tree Summary.** Average modified Daubenmire quadrat and line intercept cover by year for shrubs/trees

Year	Quadrat Cover (%)			Line-intercept Cover (%)		
	Preferred Shrub	Other Shrub	Tree	Preferred Shrub	Other Shrub	Tree
2017	9.6	0.3	0.8	11.3	0.6	0.9
2022	12.2	0.1	1.1	15.6	0.4	0.9

**Table 01R-22.7 - Herbaceous Summary.** Nested frequency and average modified Daubenmire quadrat cover by year for herbaceous functional groups

Year	Nested Frequency				Quadrat Cover (%)			
	Annual Grass	Perennial Grass	Annual/Biennial Forb	Perennial Forb	Annual Grass	Perennial Grass	Annual/Biennial Forb	Perennial Forb
2017	150	298	199	259	9.4	14.6	2.3	8.0
2022	175	343	219	300	1.8	10.4	1.0	4.3

**Table 01R-22.8 - Basic Ground Cover.** Average modified Daubenmire quadrat cover by year for basic ground cover types.

Year	Cover Type (%)					
	Bare Ground	Cryptogams	Litter	Pavement	Rock	Vegetation
2017	12.9	2.8	55.7	4.4	0.3	39.1
2022	13.9	0.2	66.1	7.1	0.9	29.7

**Table 01R-22.9 - Pellet Group Data.** Quadrat frequency and pellet group transect data for animal pellets. Rabbit pellet groups are not sampled in the pellet group transect.

Year	Cattle	Mule Deer/Domestic Sheep	Rabbit
	Quadrat Frequency		
2017	7	1	8
2022	4	8	10
Year	Days Use Per Acre (ha)		
2017	6.5 (16.1)	-	-
2022	5.1 (12.6)	0.7 (1.7)	-

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

GRASS SPECIES											
Achnatherum hymenoides (Indian ricegrass)											
Agropyron cristatum <sup>i</sup> (crested wheatgrass)											
Agropyron fragile <sup>i</sup> (Siberian wheatgrass)											
Bromus tectorum <sup>ai</sup> (cheatgrass)											
Elymus elymoides (squirreltail)											
Elymus lanceolatus (thickspike wheatgrass)											
Pascopyron smithii (western wheatgrass)											
Poa secunda (Sandberg bluegrass)											
Psathyrostachys juncea <sup>i</sup> (Russian wildrye)											
Pseudoroegneria spicata (bluebunch wheatgrass)											
year	Nested Frequency										
2017	15	-	13	150	63	77	-	221	5	45	
2022	-	11	15	175	58	4	85	262	-	79	
year	Average Cover (%)										
2017	0.4	-	0.4	9.4	1.5	2.8	-	8.1	0.0	1.4	
2022	-	0.1	0.1	1.8	0.4	0.0	0.8	8.5	-	0.6	

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

**Table 01R-22.11 - Forb Species.** Nested frequency and modified Daubenmire average cover by year.

FORB SPECIES																		
Achillea millefolium (Common yarrow)																		
Agoseris glauca (pale agoseris)																		
Allium acuminatum (tapertip onion)																		
Alyssum desertorum <sup>ai</sup> (desert madwort)																		
Arabis (rockcross)																		
Astragalus beckwithii (Beckwith's milkvetch)																		
Astragalus cibaricus (browse milkvetch)																		
Balsamorhiza hookeri (Hooker's balsamroot)																		
Castilleja angustifolia (northwestern Indian paintbrush)																		
Ceratocephala testiculata <sup>ai</sup> (curveseed butterwort)																		
Chaenactis douglasii (Douglas' dustymaiden)																		
Cirsium (thistle)																		
Collinsia parviflora <sup>a</sup> (maiden blue eyed Mary)																		
Cordylanthus <sup>a</sup> (bird's-beak)																		
Crepis acuminata (tapertip hawksbeard)																		
Cryptantha gracilis <sup>a</sup> (narrowstem cryptantha)																		
Descurainia pinnata <sup>a</sup> (western tansymustard)																		
year	Nested Frequency																	
2017	17	22	51	4	-	34	5	3	2	-	13	-	132	7	5	4	24	
2022	18	59	35	13	2	5	-	-	18	2	12	3	171	-	4	1	61	
year	Average Cover (%)																	
2017	0.4	0.1	0.3	0.0	-	1.2	0.2	0.0	0.0	-	0.2	-	0.5	0.2	0.1	0.1	0.1	
2022	0.7	0.5	0.2	0.0	0.0	0.0	-	-	0.2	0.0	0.1	0.0	0.5	-	0.0	0.0	0.2	

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

FORB SPECIES																		
Epilobium brachycarpum <sup>a</sup> (tall annual willowherb)																		
Fritillaria atropurpurea (spotted fritillary)																		
Ionactis alpina (Lava aster)																		
Lactuca serriola <sup>ai</sup> (prickly lettuce)																		
Lappula occidentalis <sup>a</sup> (flatspine stickseed)																		
Linum perenne <sup>i</sup> (blue flax)																		
Lomatium (desertparsley)																		
Machaeranthera canescens (hoary tansyaster)																		
Medicago sativa <sup>i</sup> (alfalfa)																		
Microsteris gracilis <sup>a</sup> (slender phlox)																		
Onobrychis vicifolia <sup>i</sup> (sainfoin)																		
Penstemon (beardtongue)																		
Phlox hoodii (spiny phlox)																		
Phlox longifolia (longleaf phlox)																		
Polygonum douglasii <sup>a</sup> (Douglas' knotweed)																		
Sanguisorba minor <sup>i</sup> (small burnet)																		
Senecio integerrimus <sup>a</sup> (lambstongue ragwort)																		
year	Nested Frequency																	
2017	9	4	2	13	-	89	4	-	29	93	2	5	11	142	1	25	-	
2022	7	-	18	2	1	44	27	1	9	64	-	-	7	226	-	-	17	
year	Average Cover (%)																	
2017	0.3	0.0	0.0	0.1	-	2.9	0.0	-	0.1	0.8	0.0	0.2	0.2	1.6	0.0	0.2	-	
2022	0.0	-	0.2	0.0	0.0	0.2	0.1	0.0	0.1	0.2	-	-	0.0	1.9	-	-	0.0	

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

FORB SPECIES		
Tragopogon dubius <sup>ai</sup> (yellow salsify)		
Veronica biloba <sup>ai</sup> (two-lobed speedwell)		
year	Nested	
2017	10	24
2022	7	3
year	Average Cover (%)	
2017	0.0	0.1
2022	0.0	0.0

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

**Table 01R-22.12 - Shrub and Tree Species.** Average modified Daubenmire quadrat and line intercept cover by year.

SHRUB SPECIES	Line Intercept Cover (%)							
	year							
Artemisia tridentata ssp. vaseyana <sup>p</sup> (mountain big sagebrush)	2017	11.3	-	0.2	0.9	-	0	0.4
	2022	15.6	-	0.3	0.9	-	-	0.1
Bassia prostrata <sup>pi</sup> (forage kochia)	2017	9.6	0.0	0.2	0.8	0.1	0.0	0.0
	2022	12.2	0.0	0.0	1.1	0.0	-	0.0
Ericameria nauseosa (rubber rabbitbrush)	2017	9.6	0.0	0.2	0.8	0.1	0.0	0.0
	2022	12.2	0.0	0.0	1.1	0.0	-	0.0
Juniperus osteosperma <sup>i</sup> (Utah juniper)	2017	9.6	0.0	0.2	0.8	0.1	0.0	0.0
	2022	12.2	0.0	0.0	1.1	0.0	-	0.0
Opuntia polyacantha (plains pricklypear)	2017	9.6	0.0	0.2	0.8	0.1	0.0	0.0
	2022	12.2	0.0	0.0	1.1	0.0	-	0.0
Purshia tridentata <sup>p</sup> (antelope bitterbrush)	2017	9.6	0.0	0.2	0.8	0.1	0.0	0.0
	2022	12.2	0.0	0.0	1.1	0.0	-	0.0
Tetradymia canescens (spineless horsebrush)	2017	9.6	0.0	0.2	0.8	0.1	0.0	0.0
	2022	12.2	0.0	0.0	1.1	0.0	-	0.0

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

**Table 01R-22.13 - Shrub/Tree Characteristics.** Population characteristics of shrub/tree species populations including density reproduction (seedlings), age distribution, utilization, vigor and average size (height/crown) of plants.

Year	Density		Age Class Distribution			Utilization		Poor Vigor (%)	Average Height Crown (cm)
	Plants Per Acre		Excluding Seedlings			Moderate (%)	Heavy (%)		
	Excluding Seedlings	Seedling	Young (%)	Mature (%)	Decadent (%)				
<b>Artemisia tridentata ssp. vaseyana<sup>p</sup> -- (mountain big sagebrush)</b>									
2017	4460	720	14	72	15	5	0	4	46/65
2022	6440	160	22	69	9	2	0	16	- / -
<b>Bassia prostrata<sup>pi</sup> -- (forage kochia)</b>									
2017	60	40	100	0	0	0	0	0	3/4
2022	40	-	50	50	0	0	0	0	- / -
<b>Chrysothamnus viscidiflorus ssp. viscidiflorus var. stenophyllus -- (yellow rabbitbrush)</b>									
2017	-	-	-	-	-	-	-	-	26/40
2022	-	-	-	-	-	-	-	-	- / -
<b>Chrysothamnus viscidiflorus ssp. viscidiflorus var. viscidiflorus -- (yellow rabbitbrush)</b>									
2017	-	-	-	-	-	-	-	-	49/78
2022	40	-	0	100	0	0	0	50	- / -
<b>Ericameria nauseosa -- (rubber rabbitbrush)</b>									
2017	100	-	40	60	0	0	0	0	55/57
2022	100	-	0	100	0	20	0	0	- / -
<b>Juniperus osteosperma<sup>i</sup> -- (Utah juniper)</b>									
2017	180	40	56	44	0	0	0	11	- / -
2022	220	-	82	18	0	0	9	0	- / -
<b>Opuntia polyacantha -- (plains pricklypear)</b>									
2017	180	-	11	89	0	11	0	11	9/20
2022	200	-	0	80	20	0	0	20	- / -
<b>Purshia tridentata<sup>p</sup> -- (antelope bitterbrush)</b>									
2017	60	-	100	0	0	0	0	0	- / -
2022	-	-	-	-	-	-	-	-	- / -
<b>Symphoricarpos oreophilus<sup>p</sup> -- (mountain snowberry)</b>									
2017	140	-	14	86	0	0	0	0	31/61
2022	40	-	0	100	0	0	0	50	- / -
<b>Tetradymia canescens -- (spineless horsebrush)</b>									
2017	20	-	0	100	0	0	0	0	39/64
2022	40	-	0	100	0	0	50	0	- / -

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

**Table 01R-22.14 - Tree Characteristics.** Point-quarter tree density, size class distribution, and average diameter.

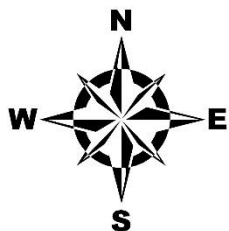
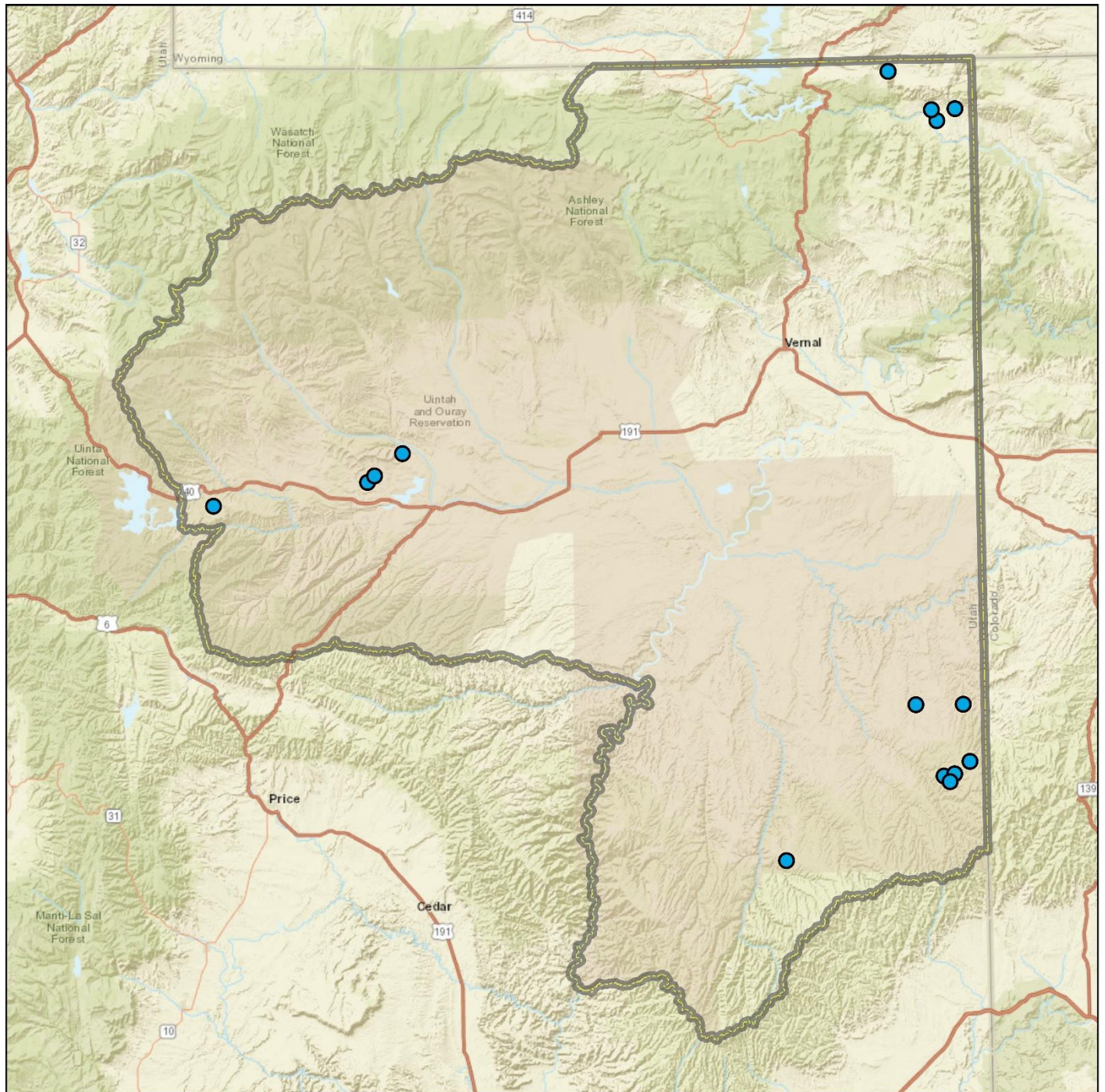
Year	Density	Size Class Distribution					Average Diameter (cm)
	Trees per Acre	Seedling (%)	1-4' (%)	4-8' (%)	8-12' (%)	>12' (%)	
Juniperus osteosperma (Utah juniper)							
2017	122	53	47	-	-	-	4.7
2022	130	30	70	-	-	-	2.9

**Table 01R-22.15 - Deer Desirable Components Index: Upland Potential Scale.**

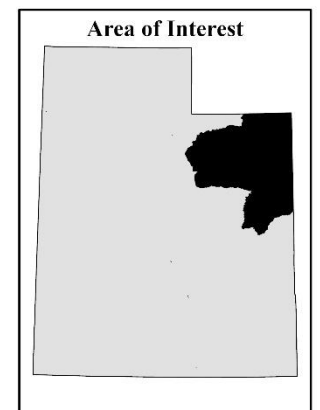
Year	Preferred Browse Cover	Preferred Browse Decadence	Preferred Browse Young	Perennial Grass Cover	Annual Grass Cover	Perennial Forb Cover	Noxious Weeds	Total Score	Ranking
2017	14.1	10.6	6.8	29.1	-7.0	10.0	0.0	63.5	Fair-Good
2022	19.5	12.3	10.9	20.9	-1.4	8.7	0.0	70.9	Good



# NORTHEASTERN REGION



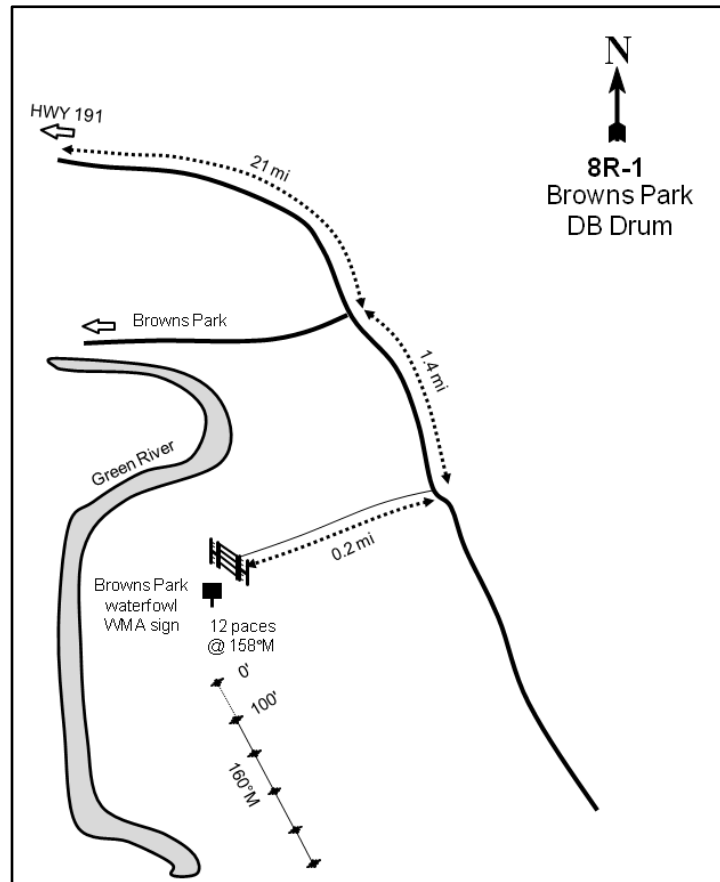
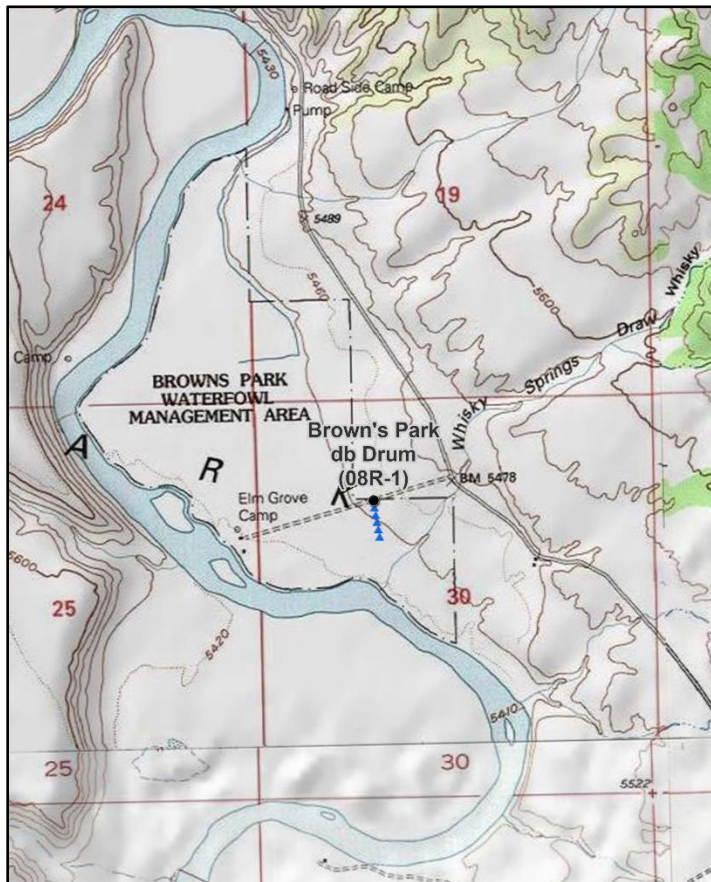
**Region Boundaries**  
[Grey outline symbol] Northeastern Region  
**Study Location**  
[Blue circle symbol] 2022 WRI Study Sites



Credits: Esri, HERE, Garmin, NGA, USGS, NPS



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



### Location Information

USGS 7.5 min Map Info  
GPS (0' Stake)

Clay Basin SE; Township 2N, Range 25E, Section 30  
NAD 83 UTM ZONE 12, 656749 East 4527529 North

### Transect Information

Browse Tag # (0' Stake)	84
Transect Bearing	160° magnetic
Length	500ft
Belt Placement	Line 1 (11ft), Line 2 (34ft), Line 3 (59ft), Line 4 (71ft), Line 5 (95ft)
Belt Marker Placement	Standard

### Directions to Site

From Dutch John, proceed north toward Antelope Flat on Highway US 191 for approximately 8 miles. Turn east onto the Antelope Flat Road (before reaching the Wyoming border) toward Goslin Mountain. Drive for 21 miles to a fork. Continue south on the main road for 1.4 miles to another fork. Turn right (west) and drive 0.2 miles to a DWR gate. From the southernmost post of the gate, walk 12 paces at 158 degrees magnetic to the 0-foot stake which is marked with browse tag #84.

**Site Information**

Land Ownership	State
Land Administrator	DWR
Allotment	No data
Elevation	5,445ft (1,660m)
Aspect	Southwest
Slope	1-4%
Sample Dates	07/28/2005, 07/29/2008, 06/13/2012, 08/09/2016, 08/03/2022

**Table 08R-01.1 Disturbance History.** Recorded history of major disturbances.

Treatment/Disturbance	Name	WRI DB#	Date	Size (acres)
Herbicide - 2,4-D/Tordon	Brown's Park	26	June 2005	141
Aerator - Double Drum/Seed	Brown's Park	26	2005	141

**Table 08R-01.2 Seed Mix.** List of known seeded plant species and rates (if available).

Mix Name			Application Type	Application Date	Acres
Brown's Park Greasewood			Aerator	Sep 2005	150
Type	Species	Common Name	Cultivar/Source ID	Bulk lbs/acre	PLS
G	Agropyron cristatum	Crested Wheatgrass	Douglas	2.00	1.59
G	Elymus lanceolatus	Thickspike Wheatgrass	Critana	2.00	1.70
G	Leymus cinereus	Great Basin Wildrye	Trailhead	2.00	1.76
G	Psathyrostachys juncea	Russian Wildrye		2.00	1.80
F	Medicago sativa	Alfalfa	Ladak+	1.00	0.95
F	Sanguisorba minor	Small Burnet	Delar	2.00	1.88
S	Bassia prostrata	Forage Kochia	Beaver UT	1.50	0.60

**Wildlife Habitat and Vegetation History****Table 08R-01.3 - Wildlife Seasonal Habitat.** DWR wildlife habitat and seasonality.

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

**Table 08R-01.4 - Vegetation History.** The dominant vegetation type(s) and phase of woodland succession (Tausch, Miller, Roundy, & Chambers, 2009).

Year	Vegetation Type	Woodland Succession
2005	Black Greasewood	No Encroachment
2008	Black Greasewood	No Encroachment
2012	Black Greasewood	No Encroachment
2016	Black Greasewood	No Encroachment
2022	Black Greasewood	No Encroachment

**Site Notes**

No Notes

**Soils****Table 08R-01.5 - Soil Analysis Data.** List of chemical and textural soil characteristics determined by laboratory analysis.

Texture	pH	%sand	%silt	%clay	%OM	PPM P	PPM K	ds/m	Sample Date
Sandy Loam	7.9	60.2	24.0	15.8	0.3	11.5	761.6	1.3	07/28/2005

**Site Potential**

1981 - 2010 Average Annual Precipitation	8 inches
NRCS Ecological Site	Semidesert - Alkali Flat (Black Greasewood)
NRCS Ecological Site #	R034BY006UT
States and Transitions	No state and transition model is available for this ecological site.

Despite a project to revitalize the deer winter range, this site has remained as a black greasewood (*Sarcobatus vermiculatus*) dominated plant community since the outset of the study in 2005. In 2008, cover of greasewood decreased substantially, but has steadily increased during each subsequent sampling (Table 08R-01.1, Table 08R-01.12, Table 08R-01.13). The herbaceous understory has been dominated by annual forbs since study establishment (Table 08R-01.7, Table 08R-01.11). The invasive annual grass cheatgrass (*Bromus tectorum*) has been observed with low abundance in various sample years (Table 08R-01.10). It is likely that without significant input this site will remain in a degraded state without increasing herbaceous and browse species diversity.

**Trend Summary Tables****Table 08R-01.6 - Shrub/Tree Summary.** Average modified Daubenmire quadrat and line intercept cover by year for shrubs/trees

Year	Quadrat Cover (%)			Line-intercept Cover (%)		
	Preferred Shrub	Other Shrub	Tree	Preferred Shrub	Other Shrub	Tree
2005	0.7	28.8	-	0.4	39.8	-
2008	0.0	8.0	-	0.2	9.4	-
2012	-	12.7	-	-	16.5	-
2016	0.1	18.2	-	0.5	19.9	-
2022	0.4	22.9	-	0.4	31.5	-

**Table 08R-01.7 - Herbaceous Summary.** Nested frequency and average modified Daubenmire quadrat cover by year for herbaceous functional groups

Year	Nested Frequency				Quadrat Cover (%)			
	Annual Grass	Perennial Grass	Annual/Biennial Forb	Perennial Forb	Annual Grass	Perennial Grass	Annual/Biennial Forb	Perennial Forb
2005	5	3	174	14	0.0	0.0	5.3	0.6
2008	7	18	338	-	0.0	0.5	25.6	-
2012	3	12	182	-	0.0	0.3	5.2	-
2016	8	17	256	81	0.1	0.6	24.3	2.4
2022	14	28	196	37	0.3	1.7	15.7	0.2

**Table 08R-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
2005	20.6	3.6	65.9	0.1	0.2	33.5
2008	29.6	0.6	49.7	0.2	0.2	33.2
2012	22.3	0.4	70.5	0.1	0.2	17.1
2016	17.5	4.2	54.5	0.0	0.2	44.3
2022	36.2	3.0	44.6	0.7	0.3	40.1

**Table 08R-01.9 - Pellet Group Data.** Quadrat frequency and pellet group transect data for animal pellets. Rabbit pellet groups are not sampled in the pellet group transect.

Year	Cattle	Mule Deer	Rocky Mountain Elk	Rabbit
	Quadrat Frequency			
2005	-	10	3	40
2008	-	6	1	56
2012	-	25	10	16
2016	-	6	-	74
2022	-	4	-	-
Year	Days Use Per Acre (ha)			
2005	-	5.3 (13.2)	43.6 (107.6)	-
2008	0.7 (1.8)	15.4 (38.1)	1.3 (3.3)	-
2012	-	97.2 (240.0)	-	-
2016	-	12.1 (29.8)	1.3 (3.3)	-
2022	-	31.5 (77.8)	-	-

**Table 08R-01.10 - 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)	Elymus lanceolatus (thickspike wheatgrass)	Leymus cinereus (basin wildrye)	Psathyrostachys juncea <sup>i</sup> (Russian wildrye)	Vulpia octoflora <sup>a</sup> (sixweeks fescue)
year	Nested Frequency						
2005	-	-	3	-	-	-	5
2008	1	-	7	-	1	11	7
2012	-	3	4	2	6	1	-
2016	5	-	5	-	6	3	8
2022	-	12	-	-	4	24	8
year	Average Cover (%)						
2005	-	-	0.0	-	-	-	0.0
2008	0.0	-	0.2	-	0.1	0.2	0.0
2012	-	0.0	0.0	0.0	0.2	0.0	-
2016	0.0	-	0.0	-	0.2	0.3	0.1
2022	-	0.3	-	-	0.2	1.6	0.0

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

**Table 08R-01.11 - Forb Species.** Nested frequency and modified Daubenmire average cover by year.

FORB SPECIES	Alyssum desertorum <sup>ai</sup> (desert madwort)	Bassia scoparia <sup>ai</sup> (bumingbush)	Chenopodium album <sup>a</sup> (lambsquarters)	Chenopodium leptophyllum <sup>a</sup> (narrowleaf goosefoot)	Descurainia pinnata <sup>a</sup> (western tansymustard)	Eriogonum cernuum <sup>a</sup> (nodding buckwheat)	Halogeton glomeratus <sup>ai</sup> (saltflower)	Lepidium latifolium <sup>ni</sup> (broadleaved pepperweed)	Salsola tragus <sup>ai</sup> (prickly Russian thistle)	Sisymbrium altissimum <sup>ai</sup> (tall tumblemustard)
year	Nested Frequency									
2005	63	65	66	6	17	6	-	14	2	-
2008	19	335	2	-	-	-	-	-	6	2
2012	-	175	3	1	4	-	-	-	5	-
2016	3	225	-	11	7	-	3	81	2	83
2022	-	182	-	-	3	-	24	37	-	-
year	Average Cover (%)									
2005	1.0	2.4	1.6	0.0	0.2	0.1	-	0.6	0.0	-
2008	0.1	25.4	0.0	-	-	-	-	-	0.2	0.0
2012	-	5.1	0.0	0.0	0.0	-	-	-	0.0	-
2016	0.0	16.6	-	0.0	0.1	-	0.0	2.4	0.0	7.5
2022	-	14.3	-	-	0.0	-	1.4	0.2	-	-

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

**Table 08R-01.12 - Shrub and Tree Species.** Average modified Daubenmire quadrat and line intercept cover by year.

SHRUB SPECIES	Atriplex canescens <sup>p</sup> (fourwing saltbush)	Atriplex confertifolia <sup>p</sup> (shadscale saltbush)	Chrysothamnus viscidiflorus ssp. viscidiflorus var. viscidiflorus (yellow rabbitbrush)	Ericameria nauseosa (rubber rabbitbrush)	Gutierrezia sarothrae (broom snakeweed)	Opuntia (pricklypear)	Sarcobatus vermiculatus (greasewood)
year	Line Intercept Cover (%)						
2005	-	0.4	0.5	-	0.2	0.1	39
2008	-	0.2	-	-	-	-	9.4
2012	-	-	-	-	-	0.5	16
2016	0.5	-	-	-	1.2	0.2	18.5
2022	0.4	-	-	-	-	-	31.5
year	Quadrat Cover (%)						
2005	-	0.7	0.0	0.1	0.0	0.1	28.4
2008	0.0	0.0	-	-	0.0	-	7.9
2012	-	-	0.1	-	-	0.1	12.4
2016	0.1	-	-	-	0.7	0.1	17.4
2022	0.4	-	-	-	-	-	22.9

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

**Table 08R-01.13 - Shrub/Tree Characteristics.** Population characteristics of shrub/tree species populations including density reproduction (seedlings), age distribution, utilization, vigor and average size (height/crown) of plants.

Year	Density		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>									
2005	-	-	-	-	-	-	-	-	65/57
2008	-	-	-	-	-	-	-	-	-/-
2012	-	-	-	-	-	-	-	-	56/89
2016	-	-	-	-	-	-	-	-	-/-
2022	-	-	-	-	-	-	-	-	-/-
<b>Artemisia tridentata ssp. vaseyana<sup>p</sup> -- (mountain big sagebrush)</b>									
2005	-	-	-	-	-	-	-	-	-/-
2008	-	-	-	-	-	-	-	-	-/-
2012	-	-	-	-	-	-	-	-	-/-
2016	-	-	-	-	-	-	-	-	-/-
2022	60	-	0	100	0	0	0	0	-/-
<b>Atriplex canescens<sup>p</sup> -- (fourwing saltbush)</b>									
2005	-	-	-	-	-	-	-	-	-/-
2008	20	-	100	0	0	0	0	0	-/-
2012	-	-	-	-	-	-	-	-	46/45
2016	40	-	50	50	0	50	0	0	85/80
2022	20	-	0	100	0	0	0	0	-/-
<b>Atriplex confertifolia<sup>p</sup> -- (shadscale saltbush)</b>									
2005	220	20	0	73	27	0	0	55	37/51
2008	20	-	0	100	0	0	0	0	34/21
2012	40	-	0	100	0	0	0	0	28/34
2016	-	-	-	-	-	-	-	-	39/34
2022	-	-	-	-	-	-	-	-	-/-

Year	Density		Age Class Distribution			Utilization		Poor Vigor (%)	Average Height Crown (cm)
	Plants Per Acre		Excluding Seedlings			Moderate (%)	Heavy (%)		
	Excluding Seedlings	Seedling	Young (%)	Mature (%)	Decadent (%)				
<b>Bassia prostrata<sup>pi</sup> -- (forage kochia)</b>									
2005	-	-	-	-	-	-	-	-	-/-
2008	-	-	-	-	-	-	-	-	19/12
2012	-	-	-	-	-	-	-	-	-/-
2016	-	-	-	-	-	-	-	-	-/-
2022	-	-	-	-	-	-	-	-	-/-
<b>Chrysothamnus viscidiflorus ssp. viscidiflorus var. viscidiflorus -- (yellow rabbitbrush)</b>									
2005	120	-	0	67	33	17	0	33	41/54
2008	-	-	-	-	-	-	-	-	47/51
2012	20	-	0	0	100	0	100	100	48/58
2016	-	-	-	-	-	-	-	-	36/33
2022	-	-	-	-	-	-	-	-	-/-
<b>Ericameria nauseosa -- (rubber rabbitbrush)</b>									
2005	-	-	-	-	-	-	-	-	66/90
2008	-	-	-	-	-	-	-	-	-/-
2012	-	-	-	-	-	-	-	-	-/-
2016	-	-	-	-	-	-	-	-	-/-
2022	-	-	-	-	-	-	-	-	-/-
<b>Gutierrezia sarothrae -- (broom snakeweed)</b>									
2005	400	-	65	30	5	0	0	5	25/28
2008	260	-	0	100	0	0	0	0	30/35
2012	-	-	-	-	-	-	-	-	18/28
2016	500	-	0	100	0	0	0	0	30/34
2022	-	-	-	-	-	-	-	-	-/-
<b>Opuntia -- (pricklypear)</b>									
2005	120	-	0	100	0	0	0	0	10/37
2008	60	-	0	67	33	0	0	33	7/15
2012	60	-	0	100	0	0	0	0	14/39
2016	100	-	0	100	0	0	0	0	10/23
2022	20	-	100	0	0	0	0	0	- / -
<b>Sarcobatus vermiculatus -- (greasewood)</b>									
2005	2700	-	2	36	62	2	0	100	122/154
2008	660	-	12	85	3	0	0	12	88/133
2012	560	20	4	93	4	4	7	4	118/187
2016	2540	1060	76	24	0	0	0	7	142/200
2022	3000	1440	39	58	3	0	1	3	- / -

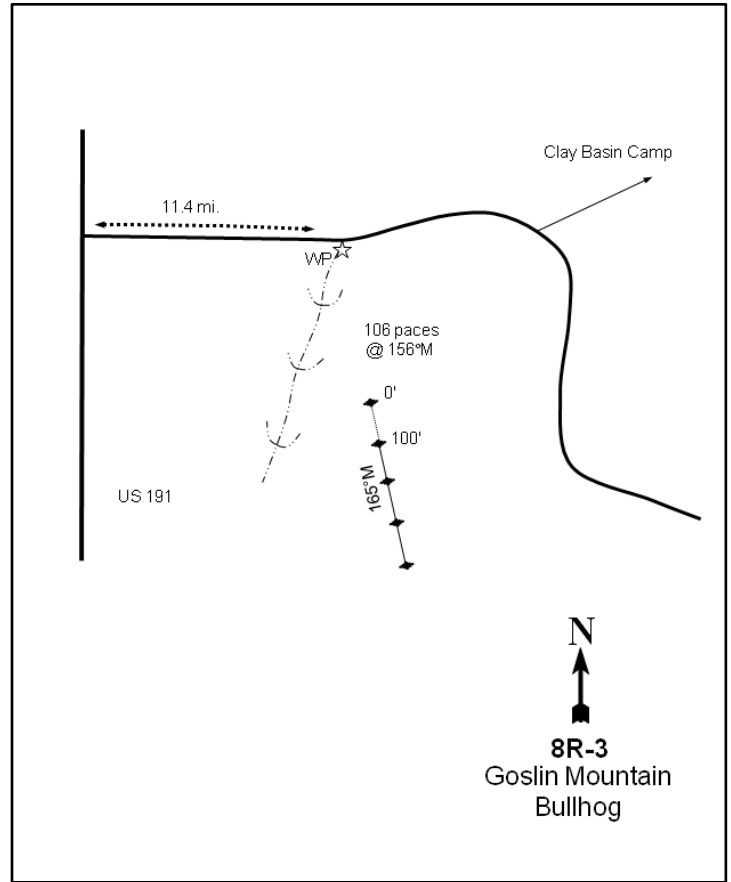
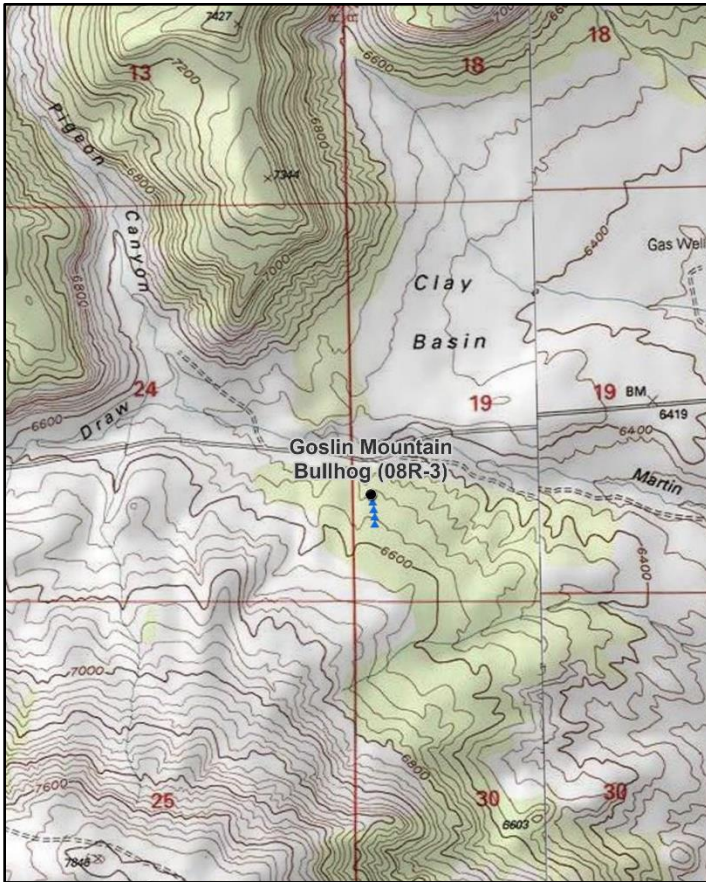
t - Tree Species; p - Preferred Browse; i - Introduced Species

**Table 08R-01.15 - Deer Desirable Components Index: Semidesert 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
2005	0.4	0.0	0.0	0.0	0.0	0.0	-2.0	-1.6	Very Poor
2008	0.2	0.0	0.0	1.0	0.0	0.0	0.0	1.2	Very Poor
2012	0.0	0.0	0.0	0.6	0.0	0.0	0.0	0.5	Very Poor
2016	0.6	0.0	0.0	1.2	0.0	0.0	-2.0	-0.3	Very Poor
2022	0.5	0.0	0.0	3.5	-0.2	0.0	-2.0	1.8	Very Poor



## GOSLIN MOUNTAIN BULLHOG - STUDY NO. 08R-3



### Location Information

USGS 7.5 min Map Info  
GPS (0' Stake)

Goslin Mountain NE; Township 3N, Range 24E, Section 19  
NAD 83 UTM ZONE 12, 646494 East 4537900 North

### Transect Information

Browse Tag # (0' Stake)	271
Transect Bearing	140° magnetic
Length	400ft
Belt Placement	Line 1 (11ft & 95ft), Line 2 (34ft), Line 3 (59ft), Line 4 (71ft)
Belt Marker Placement	No Rebar

### Directions to Site

From Dutch John, proceed north towards Antelope Flat on US 191 for approximately 8 miles. Before the Wyoming border, turn east onto Antelope Flat Road and drive on this road for 11.4 miles. There is a half-high witness post on the right (south) side of the road. The 0-foot stake is 106 paces away from the half-high witness post at 156 degrees magnetic and is marked with browse tag #271.



**Site Information**

Land Ownership	Federal
Land Administrator	BLM
Allotment	CLAY BASIN
Elevation	6,500ft (1,981m)
Aspect	North
Slope	5-8%
Sample Dates	07/28/2008, 07/27/2010, 07/09/2013, 08/08/2017, 08/03/2022

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

Treatment/Disturbance	Name	WRI DB#	Date	Size (acres)
Mechanical - Bullhog	Goslin Bullhog Phase II	1090	March-May 2009	2595
Seeding - Aerial Before	Goslin Bullhog Phase II	1090	October 2008	2595
Fire - Wildfire	Richard Mountain	-	August 2020	7632
Herbicide - Plateau	Herbicide Treatments - Richard Mtn and Little Davenport	5107	September 2020	8513
Herbicide - Herbicide Unknown	Richard Mountain Fire Weed/Herbicide Treatment (Proposed)	5905	Fall 2022	1318

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

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

**Wildlife Habitat and Vegetation History****Table 08R-03.3 - Wildlife Seasonal Habitat.** DWR 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

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

Year	Vegetation Type	Woodland Succession
2008	Pinyon-Juniper/Black Sagebrush	Phase III
2010	Perennial Grass/Sagebrush/Bitterbrush	Phase I
2013	Perennial Grass/Sagebrush/Bitterbrush	Phase I
2017	Perennial Grass/Sagebrush/Bitterbrush	Phase I
2022	Perennial Grass	No Encroachment

**Site Notes**

An unknown skull plate was found near the transect in 2017. Stake 4 was replaced in 2022, and a bear was seen being chased by hounds (bear hunt) during the same year.

**Site Potential**

1981 - 2010 Average Annual Precipitation	11 inches
NRCS Ecological Site	Upland Loam (Mountain Big Sagebrush)
NRCS Ecological Site #	R047XC310UT
States and Transitions	No state and transition model is available for this ecological site.

When the site was established in 2008, Utah juniper (*Juniperus osteosperma*) contributed most of the cover in the overstory, and the site was considered to be within Phase III of woodland succession (Table 08R-03.4). The shrub layer consisted of black sagebrush (*Artemisia nova*) and antelope bitterbrush (*Purshia tridentata*) with only a few other shrub species present which provided limited cover. Following the treatment, the site transitioned from a tree-dominated state to one dominated by mountain big sagebrush (*A. tridentata* ssp. *vaseyana*), black sagebrush, and bitterbrush (Table 08R-03.1, Table 08R-03.12, Table 08R-03.13, Table 08R-03.14). A diverse mixture of native perennial grasses, including (but not limited to) Indian ricegrass (*Achnatherum hymenoides*), western wheatgrass (*Pascopyrum smithii*), and bluebunch wheatgrass (*Pseudoroegneria spicata*) has contributed most of the herbaceous cover throughout the duration of the study; perennial grasses have been a (co-)dominant site component in all post-treatment sample years. Although diverse, forbs have provided limited cover throughout the study period. A fire in 2020 removed the majority of the shrub component, and the site was dominated by perennial grasses -- namely the seeded species thickspike wheatgrass (*Elymus lanceolatus*) -- in 2022 (Table 08R-03.1, Table 08R-03.2, Table 08R-03.7, Table 08R-03.10, Table 08R-03.11, Table 8R-03.12).

**Trend Summary Tables****Table 08R-03.6 - Shrub/Tree Summary.** Average modified Daubenmire quadrat and line intercept cover by year for shrubs/trees

Year	Quadrat Cover (%)			Line-intercept Cover (%)		
	Preferred Shrub	Other Shrub	Tree	Preferred Shrub	Other Shrub	Tree
2008	4.4	0.5	6.3	4.4	0.1	18.2
2010	6.7	0.5	0.3	8.1	0.3	0.4
2013	8.9	0.4	-	10.9	0.3	0.1
2017	15.7	0.7	0.2	20.3	0.5	0.6
2022	0.6	1.3	-	0.6	1.9	-

**Table 08R-03.7 - Herbaceous Summary.** Nested frequency and average modified Daubenmire quadrat cover by year for herbaceous functional groups

Year	Nested Frequency				Quadrat Cover (%)			
	Annual Grass	Perennial Grass	Annual/Biennial Forb	Perennial Forb	Annual Grass	Perennial Grass	Annual/Biennial Forb	Perennial Forb
2008	-	259	15	134	-	10.0	0.2	2.7
2010	-	246	12	148	-	16.5	0.1	4.6
2013	-	279	17	130	-	16.3	0.1	2.6
2017	23	348	25	132	0.2	27.0	0.1	3.7
2022	-	161	0	34	-	11.7	0.0	2.0

**Table 08R-03.8 - Basic Ground Cover.** Average modified Daubenmire quadrat cover by year for basic ground cover types.

Year	Cover Type (%)					
	Bare Ground	Cryptogams	Litter	Pavement	Rock	Vegetation
2008	26.7	7.0	49.7	8.1	0.8	22.9
2010	16.1	0.2	67.8	1.1	0.0	29.7
2013	12.4	0.2	72.1	0.8	0.3	31.6
2017	9.6	1.5	66.7	0.9	0.1	47.4
2022	68.0	0.1	10.4	11.5	3.0	15.4

**Table 08R-03.9 - Pellet Group Data.** Quadrat frequency and pellet group transect data for animal pellets. Rabbit pellet groups are not sampled in the pellet group transect.

Year	Cattle	Coyote	Mule Deer	Rocky Mountain Elk	Rabbit
	Quadrat Frequency				
2008	-	-	18	4	56
2010	-	-	3	3	1
2013	-	-	8	2	4
2017	-	-	19	-	12
2022	-	-	1	-	1
Year	Days Use Per Acre (ha)				
2008	7.2 (17.9)	17.4 (43.0)*	22.8 (56.3)	6.0 (14.9)	-
2010	2.2 (5.4)	-	14.1 (34.8)	-	-
2013	-	-	20.8 (51.3)	8.7 (21.5)	-
2017	-	-	35.5 (87.7)	2.0 (5.0)	-
2022	-	-	-	0.7 (1.7)	-

\*Pellets per acre (ha)

**Table 08R-03.10 - Grass Species.** Nested frequency and modified Daubenmire average cover by year.

GRASS SPECIES	Achnatherum hymenoides (Indian ricegrass)	Achnatherum lettermanii (Letterman's needlegrass)	Agropyron cristatum <sup>i</sup> (crested wheatgrass)	Bromus tectorum <sup>ai</sup> (cheatgrass)	Carex rossii (Ross' sedge)	Dactylis glomerata <sup>i</sup> (orchardgrass)	Elymus elymoides (squirreltail)	Elymus lanceolatus (thickspike wheatgrass)	Elymus wawawaiensis (Snake River wheatgrass)	Hesperostipa comata (needle and thread)	Koeleria macrantha (prairie Junegrass)	Pascopyrum smithii (western wheatgrass)	Poa fendleriana (muttongrass)	Poa secunda (Sandberg bluegrass)	Pseudoroegneria spicata (bluebunch wheatgrass)	Thinopyrum intermedium <sup>i</sup> (intermediate wheatgrass)
year	Nested Frequency															
2008	33	23	-	-	43	-	26	-	-	3	32	22	74	98	20	-
2010	29	11	-	-	30	5	52	-	-	15	107	48	21	14	17	3
2013	52	12	2	-	40	9	71	-	-	10	26	68	55	49	56	16
2017	43	-	0	23	12	7	57	-	5	25	48	145	37	112	80	10
2022	6	-	-	-	16	-	15	101	-	15	2	9	7	18	25	-
year	Average Cover (%)															
2008	1.0	0.5	-	-	0.9	-	0.4	-	-	0.2	0.9	0.1	2.6	2.8	0.7	-
2010	2.7	0.3	-	-	1.0	0.2	2.1	-	-	0.8	5.2	2.0	0.8	0.5	0.6	0.2
2013	3.1	0.2	0.0	-	0.5	0.1	2.6	-	-	0.7	0.8	1.6	2.4	1.1	2.8	0.2
2017	2.9	-	0.0	0.2	0.3	0.5	1.7	-	0.4	1.3	1.3	8.3	1.4	3.5	5.4	0.1
2022	0.5	-	-	-	0.3	-	0.7	7.7	-	0.5	0.0	0.6	0.1	0.1	1.4	-

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

**Table 08R-03.11 - Forb Species.** Nested frequency and modified Daubenmire average cover by year.

FORB SPECIES	Agoseris glauca (pale agoseris)	Alyssum desertorum <sup>ni</sup> (desert madwort)	Antennaria (pussytoes)	Arabis (rockcress)	Astragalus (milkvetch)	Astragalus convallarius (lesser rushy milkvetch)	Astragalus purshii (woollypod milkvetch)	Chaenactis douglasii (Douglas' dustymaiden)	Chenopodium fremontii <sup>a</sup> (Fremont's goosefoot)	Chorisporea tenella <sup>ni</sup> (crossflower)	Collinsia parviflora <sup>a</sup> (maiden blue eyed Mary)	Crepis acuminata (tapertip hawksbeard)	Cryptantha (cryptantha)	Cymopterus (springparsley)	Descurainia pinnata <sup>a</sup> (western tansymustard)	Epilobium brachycarpum <sup>a</sup> (tall annual willowherb)	Erigeron (fleabane)
year	Nested Frequency																
2008	5	-	12	5	2	16	4	-	-	-	2	-	26	7	8	3	8
2010	-	-	22	-	2	6	3	-	5	-	-	-	28	-	1	-	10
2013	6	3	21	2	-	1	2	-	3	-	-	-	34	1	6	3	3
2017	5	5	13	5	-	-	-	3	-	1	-	-	15	1	16	-	8
2022	-	-	-	-	-	3	-	-	-	-	-	1	-	-	-	-	-
year	Average Cover (%)																
2008	0.0	-	0.1	0.0	0.0	0.1	0.0	-	-	-	0.0	-	0.2	0.0	0.2	0.0	0.0
2010	-	-	0.5	-	0.0	0.0	0.1	-	0.0	-	-	-	0.7	-	0.0	-	0.3
2013	0.0	0.0	0.3	0.0	-	0.0	0.0	-	0.0	-	-	-	0.3	0.0	0.1	0.0	0.0
2017	0.0	0.0	0.4	0.0	-	-	-	0.0	-	0.0	-	-	0.3	0.0	0.1	-	0.0
2022	-	-	-	-	-	0.1	-	-	-	-	-	0.0	-	-	-	-	-

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

FORB SPECIES	Erigeron pumilus (shaggy fleabane)	Gayophytum ramosissimum <sup>a</sup> (pinyon groundsmoke)	Heterotheca villosa (hairy false goldenaster)	Ipomopsis aggregata (scarlet gilia)	Machaeranthera canescens (hoary tansyaster)	Machaeranthera grindelioides (rayless tansyaster)	Medicago sativa <sup>i</sup> (alfalfa)	Onobrychis viciifolia <sup>i</sup> (sainfoin)	Orthocarpus <sup>a</sup> (owl's-clover)	Packera multilobata (lobeleaf groundsel)	Penstemon pachyphyllus (thickleaf beardtongue)	Petroradia pumila (rock goldenrod)	Phlox hoodii (spiny phlox)	Phlox longifolia (longleaf phlox)	Polygonum douglasii <sup>a</sup> (Douglas' knotweed)	Sanguisorba minor <sup>a</sup> (small burnet)	Taraxacum officinale (common dandelion)
year	Nested Frequency																
2008	-	-	-	19	2	-	-	-	-	6	6	43	13	2	4	-	-
2010	-	2	1	31	19	-	-	-	-	12	2	38	5	10	4	13	-
2013	5	-	11	2	24	-	-	5	2	7	1	37	18	7	-	6	-
2017	4	-	3	47	2	-	-	-	-	4	3	48	1	2	3	4	-
2022	-	0	-	2	1	3	0	-	-	4	3	6	-	2	-	-	6
year	Average Cover (%)																
2008	-	-	-	0.1	0.2	-	-	-	-	0.2	0.3	1.4	0.1	0.0	0.0	-	-
2010	-	0.0	0.0	1.1	0.2	-	-	-	-	0.1	0.1	0.9	0.0	0.0	0.0	0.5	-
2013	0.0	-	0.0	0.0	0.2	-	-	0.0	0.0	0.0	0.0	1.0	0.1	0.0	-	0.4	-
2017	0.0	-	0.1	0.5	0.0	-	-	-	-	0.0	0.0	2.2	0.0	0.0	0.0	0.0	-
2022	-	0.0	-	0.0	0.4	0.0	0.6	-	-	0.0	0.0	0.3	-	0.1	-	-	0.3

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

FORB SPECIES	
	Trifolium (clover)
year	Nested
2008	7
2010	1
2013	2
2017	3
2022	5
year	Average Cover (%)
2008	0.0
2010	0.0
2013	0.0
2017	0.0
2022	0.0

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

**Table 08R-03.12 - Shrub and Tree Species.** Average modified Daubenmire quadrat and line intercept cover by year.

SHRUB SPECIES										
Artemisia nova <sup>p</sup> (black sagebrush)										
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)										
Gutierrezia sarothrae (broom snakeweed)										
Juniperus osteosperma <sup>t</sup> (Utah juniper)										
Linanthus pungens (granite prickly phlox)										
Opuntia (pricklypear)										
Purshia tridentata <sup>p</sup> (antelope bitterbrush)										
Symphoricarpos oreophilus <sup>p</sup> (mountain snowberry)										
year	Line Intercept Cover (%)									
2008	2.5	0.5	-	0.3	-	18.2	-	0.1	1.1	-
2010	2.9	2.1	0.3	0.3	-	0.4	-	0	2.8	-
2013	3.4	5.1	0.2	0.1	-	0.1	0.1	0	2.3	-
2017	5.3	8.5	-	0.2	-	0.6	0.4	0.1	6.3	-
2022	-	-	1.8	0.4	-	-	-	0.1	-	0.2
year	Quadrat Cover (%)									
2008	2.9	0.3	-	0.4	-	6.3	-	0.5	0.7	-
2010	2.1	2.1	0.0	0.4	-	0.3	0.1	0.3	2.0	0.1
2013	3.1	2.9	0.0	0.5	-	0.0	0.2	0.2	2.2	0.1
2017	4.6	5.9	0.1	0.6	-	0.2	0.3	0.3	4.3	0.4
2022	-	-	1.3	0.2	0.0	-	-	0.0	-	0.4

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

**Table 08R-03.13 - Shrub/Tree Characteristics.** Population characteristics of shrub/tree species populations including density reproduction (seedlings), age distribution, utilization, vigor and average size (height/crown) of plants.

Year	Density		Age Class Distribution			Utilization		Poor Vigor (%)	Average Height Crown (cm)
	Plants Per Acre		Excluding Seedlings			Moderate (%)	Heavy (%)		
	Excluding Seedlings	Seedling	Young (%)	Mature (%)	Decadent (%)				
<b>Amelanchier utahensis<sup>P</sup> -- (Utah serviceberry)</b>									
2008	20	-	100	0	0	0	100	0	- / -
2010	-	-	-	-	-	-	-	-	- / -
2013	-	-	-	-	-	-	-	-	- / -
2017	20	-	100	0	0	0	0	0	8/10
2022	-	-	-	-	-	-	-	-	- / -
<b>Artemisia nova<sup>P</sup> -- (black sagebrush)</b>									
2008	1880	160	12	46	43	12	1	32	29/47
2010	1600	2320	35	57	8	1	0	4	26/47
2013	3800	600	45	51	4	6	4	6	21/44
2017	4180	-	19	77	4	9	0	2	19/38
2022	-	-	-	-	-	-	-	-	- / -
<b>Artemisia tridentata ssp. vaseyana<sup>P</sup> -- (mountain big sagebrush)</b>									
2008	300	20	0	20	80	13	67	60	48/66
2010	880	1180	48	50	2	0	0	2	54/74
2013	2120	220	66	33	1	7	1	12	44/70
2017	2260	-	12	88	1	6	3	0	37/56
2022	-	-	-	-	-	-	-	-	- / -
<b>Cercocarpus montanus<sup>P</sup> -- (alderleaf mountain mahogany)</b>									
2008	-	-	-	-	-	-	-	-	- / -
2010	-	-	-	-	-	-	-	-	67/98
2013	-	-	-	-	-	-	-	-	- / -
2017	-	-	-	-	-	-	-	-	- / -
2022	-	-	-	-	-	-	-	-	- / -
<b>Chrysothamnus viscidiflorus ssp. viscidiflorus var. viscidiflorus -- (yellow rabbitbrush)</b>									
2008	20	-	0	100	0	0	0	0	20/17
2010	40	-	100	0	0	0	0	0	27/38
2013	100	-	60	40	0	20	0	20	33/38
2017	120	-	0	100	0	0	0	0	42/58
2022	260	-	15	85	0	0	0	0	- / -
<b>Eriogonum microthecum<sup>P</sup> -- (slender buckwheat)</b>									
2008	660	20	6	91	3	21	18	3	18/24
2010	180	-	11	89	0	0	0	11	19/33
2013	460	-	4	96	0	0	0	0	18/25
2017	160	-	0	100	0	0	0	0	18/27
2022	160	-	0	100	0	0	0	0	- / -
<b>Ericameria nauseosa -- (rubber rabbitbrush)</b>									
2008	-	-	-	-	-	-	-	-	- / -
2010	-	-	-	-	-	-	-	-	- / -
2013	-	-	-	-	-	-	-	-	- / -
2017	-	-	-	-	-	-	-	-	70/84
2022	-	-	-	-	-	-	-	-	- / -
<b>Gutierrezia sarothrae -- (broom snakeweed)</b>									
2008	-	-	-	-	-	-	-	-	- / -
2010	-	-	-	-	-	-	-	-	- / -
2013	-	-	-	-	-	-	-	-	- / -
2017	-	-	-	-	-	-	-	-	- / -
2022	20	-	0	100	0	0	0	0	- / -

Year	Density		Age Class Distribution			Utilization		Poor Vigor (%)	Average Height Crown (cm)
	Plants Per Acre		Excluding Seedlings			Moderate (%)	Heavy (%)		
	Excluding Seedlings	Seedling	Young (%)	Mature (%)	Decadent (%)				
<b>Juniperus osteosperma<sup>t</sup> -- (Utah juniper)</b>									
2008	540	20	30	56	15	0	0	7	- / -
2010	120	80	100	0	0	0	0	33	- / -
2013	200	20	100	0	0	0	0	0	- / -
2017	220	-	46	55	0	0	0	0	- / -
2022	-	-	-	-	-	-	-	-	- / -
<b>Linanthus pungens -- (granite prickly phlox)</b>									
2008	60	-	0	0	100	0	0	33	10/17
2010	40	-	0	100	0	0	0	0	20/35
2013	120	-	0	100	0	0	0	50	23/34
2017	220	-	0	100	0	27	0	46	11/21
2022	-	-	-	-	-	-	-	-	- / -
<b>Opuntia -- (pricklypear)</b>									
2008	340	-	6	47	47	0	0	41	11/34
2010	320	-	0	100	0	0	0	6	11/28
2013	380	-	16	84	0	0	0	0	11/23
2017	380	-	0	100	0	0	0	11	11/25
2022	180	-	22	44	33	0	0	33	- / -
<b>Pediocactus simpsonii -- (mountain ball cactus)</b>									
2008	-	-	-	-	-	-	-	-	4/7
2010	-	-	-	-	-	-	-	-	4/5
2013	-	-	-	-	-	-	-	-	- / -
2017	-	-	-	-	-	-	-	-	4/10
2022	-	-	-	-	-	-	-	-	- / -
<b>Pinus edulis<sup>t</sup> -- (twoneedle pinyon)</b>									
2008	-	-	-	-	-	-	-	-	- / -
2010	-	-	-	-	-	-	-	-	- / -
2013	-	20	0	0	0	0	0	0	- / -
2017	-	-	-	-	-	-	-	-	- / -
2022	-	-	-	-	-	-	-	-	- / -
<b>Purshia tridentata<sup>p</sup> -- (antelope bitterbrush)</b>									
2008	380	-	5	58	37	47	11	16	31/85
2010	440	20	18	77	5	36	0	5	46/102
2013	380	-	5	95	0	68	0	21	45/120
2017	420	-	0	95	5	24	29	5	55/144
2022	20	-	100	0	0	100	0	0	- / -
<b>Symphoricarpos oreophilus<sup>p</sup> -- (mountain snowberry)</b>									
2008	40	-	0	100	0	50	0	0	28/43
2010	20	-	0	100	0	0	0	0	37/101
2013	20	-	0	100	0	0	0	0	46/92
2017	40	-	0	100	0	0	0	0	37/78
2022	20	-	0	100	0	0	100	0	- / -

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



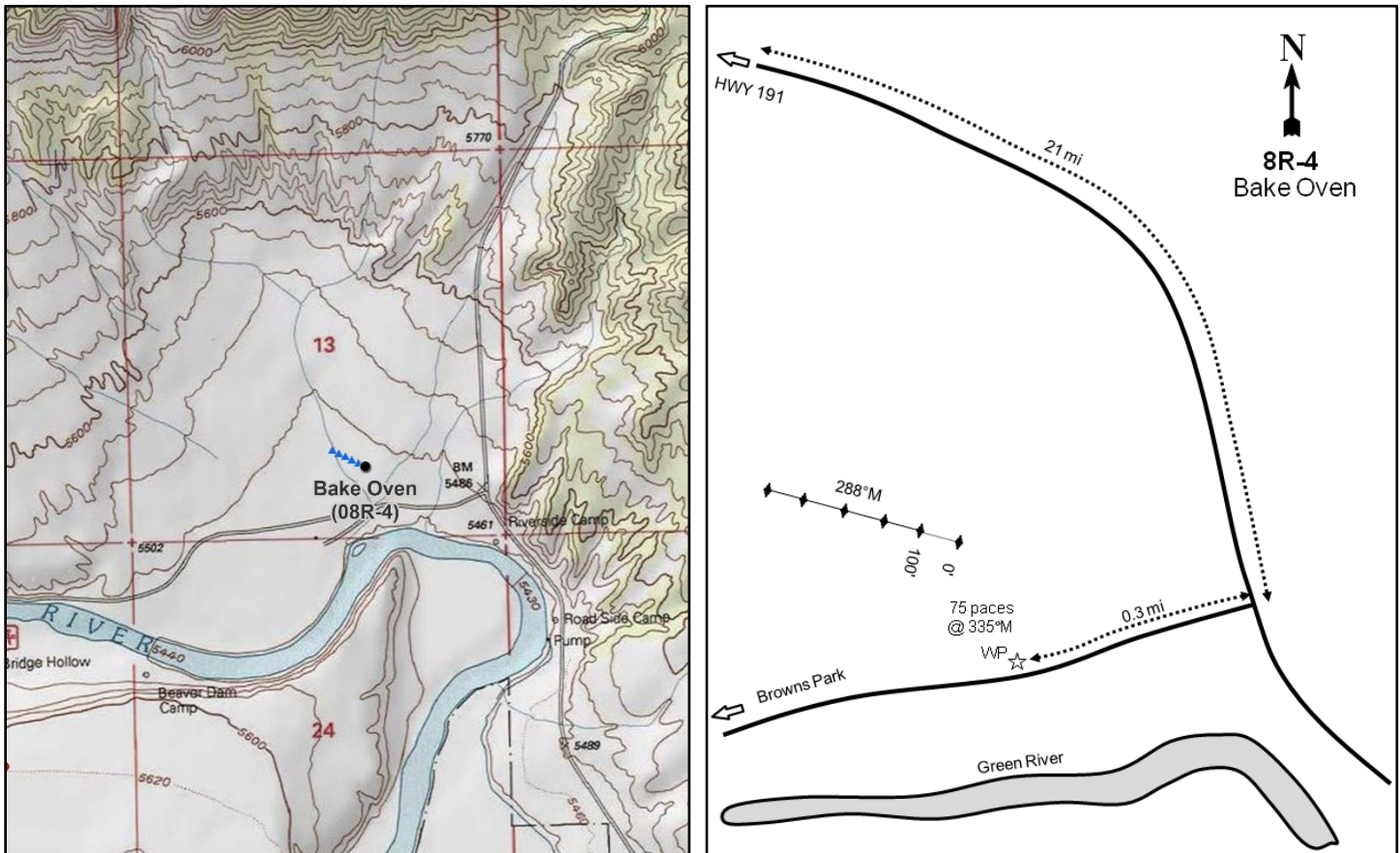
**Table 08R-03.14 - Tree Characteristics.** Point-quarter tree density, size class distribution, and average diameter.

Year	Density	Size Class Distribution					Average Diameter (cm)
	Trees per Acre	Seedling (%)	1-4' (%)	4-8' (%)	8-12' (%)	>12' (%)	
<b>Juniperus osteosperma (Utah juniper)</b>							
2008	431	-	10	10	35	45	44.4
2010	91	15	85	-	-	-	5.4
2013	52	13	88	-	-	-	4.1
2017	69	11	84	5	-	-	19.9
<b>Pinus edulis (twoneedle pinyon)</b>							
2008	22	100	-	-	-	-	1.0
2010	3	50	50	-	-	-	2.0
2017	6	-	100	-	-	-	8.0

**Table 08R-03.15 - Deer Desirable Components Index: Upland 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	19.9	0.0	5.5	0.0	31.2	Very Poor
2010	10.8	13.5	15.0	30.0	0.0	9.3	0.0	78.6	Good-Excellent
2013	14.2	14.5	15.0	30.0	0.0	5.1	0.0	78.8	Good-Excellent
2017	27.0	14.1	4.9	30.0	-0.2	7.5	0.0	83.3	Excellent
2022	0.7	0.0	0.0	23.5	0.0	4.1	0.0	28.2	Very Poor

## BAKE OVEN - STUDY NO. 08R-4

**Location Information**

USGS 7.5 min Map Info  
GPS (0' Stake)

Clay Basin SE; Township 2N, Range 24E, Section 13  
NAD 83 UTM ZONE 12, 655632 East 4529839 North

**Transect Information**

Browse Tag # (0' Stake)	Not Available
Transect Bearing	288° magnetic
Length	500ft
Belt Placement	Line 1 (11ft), Line 2 (34ft), Line 3 (59ft), Line 4 (71ft), Line 5 (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 for 0.3 miles to a witness post on the right-hand (north) side of the road. From the witness post, walk 75 paces at 335 degrees magnetic to the 0-foot stake; there is no browse tag.

**Site Information**

Land Ownership	Federal
Land Administrator	BLM
Allotment	BRIDGEPORT
Elevation	5,460ft (1,664m)
Aspect	South
Slope	5%
Sample Dates	06/13/2012, 08/09/2016, 08/03/2022

**Table 08R-04.1 Disturbance History.** Recorded history of major disturbances.

Treatment/Disturbance	Name	WRI DB#	Date	Size (acres)
Herbicide - Arsenal	Bake Oven Sagebrush Restoration	2268	September 2013	150
Seeding - Truax Drill	Bake Oven Sagebrush Restoration	2268	September 2013	150
Seeding - Aerial After	Bake Oven Sagebrush Restoration	2268	January 2014	150
Harrow - Two-Way Chain	Bake Oven Sagebrush Restoration	2268	January 2014	150

**Table 08R-04.2 Seed Mix.** List of known seeded plant species and rates (if available).

Mix Name			Application Type	Application Date	Acres
Bake Oven Sagebrush Restoration			Drill	Sep 2013	150
Type	Species	Common Name	Cultivar/Source ID	Bulk lbs/acre	PLS
G	Agropyron cristatum	Crested Wheatgrass	Hycrest	2.00	1.74
G	Agropyron fragile	Siberian Wheatgrass	Vavilov	1.00	0.79
G	Elymus wawawaiensis	Snake River Wheatgrass	Secar	2.00	1.83
G	Pascopyrum smithii	Western Wheatgrass	Arriba	2.00	1.75
F	Cleome serrulata	Rocky Mountain Beeplant		0.33	0.32
F	Cleome serrulata	Rocky Mountain Beeplant	Garfield UT	0.67	0.62
F	Medicago sativa	Alfalfa	Big Sky Ladak	1.00	0.94
F	Sanguisorba minor	Small Burnet	Delar	0.50	0.44
F	Sphaeralcea munroana	Munro Globemallow	Piute UT	0.50	0.29
S	Atriplex canescens	Fourwing Saltbush	Emery UT	2.00	1.05
S	Atriplex canescens	Fourwing Saltbush	Uintah UT	2.00	1.22

Mix Name			Application Type	Application Date	Acres
Bake Oven Sagebrush Restoration			Aerial	Jan 2014	150
Type	Species	Common Name	Cultivar/Source ID	Bulk lbs/acre	PLS
S	Artemisia tridentata ssp. wyomingensis	Wyoming Big Sagebrush	Uintah UT	0.50	0.07
S	Bassia prostrata	Forage Kochia	Beaver/Millard UT	0.50	0.42

**Wildlife Habitat and Vegetation History****Table 08R-04.3 - Wildlife Seasonal Habitat.** DWR wildlife habitat and seasonality.

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

**Table 08R-04.4 - Vegetation History.** The dominant vegetation type(s) and phase of woodland succession (Tausch, Miller, Roundy, & Chambers, 2009).

Year	Vegetation Type	Woodland Succession
2012	Black Greasewood	No Encroachment
2016	Perennial Grass	No Encroachment
2022	Annual-Perennial Weed	No Encroachment

**Site Notes**

The length of all lines besides line 5 is 101.5 feet. In 2022, stake 5 was moved so that line 5 would only be 100 feet long and belt 5 was moved to the 95-foot mark.

**Site Potential**

1981 - 2010 Average Annual Precipitation	8 inches
NRCS Ecological Site	Semidesert - Alkali Flat (Black Greasewood)
NRCS Ecological Site #	R034BY006UT
States and Transitions	2012 - Current Potential State: Community Phase 2.1 2016 - Range Seeding State: Community Phase 3.1 2022-Present - Current Potential State: Community Phase 2.3

When the study was established in 2012, the plant community existed as an invaded shrub type with black greasewood (*Sarcobatus vermiculatus*) as the dominant species (Table 08R-04.12). The herbaceous understory was in very poor condition: mostly weedy species were sampled and nearly no grass species were observed. During the initial post-treatment sampling in 2014, the community type transitioned from greasewood-dominated to one mainly comprised of perennial wheatgrass species (*Agropyron sp.*) and the noxious weed broadleaved pepperweed (*Lepidium latifolium*). Pepperweed has since decreased substantially and was not sampled in 2022; wheatgrass species have also decreased. Prickly Russian thistle (*Salsola tragus*) increased in abundance and became the dominant species in 2022 (Table 08R-04.10, Table 08R-04.11) (USDA-ARS Jornada Experimental Range, 2022).

**Trend Summary Tables****Table 08R-04.6 - Shrub/Tree Summary.** Average modified Daubenmire quadrat and line intercept cover by year for shrubs/trees

Year	Quadrat Cover (%)			Line-intercept Cover (%)		
	Preferred Shrub	Other Shrub	Tree	Preferred Shrub	Other Shrub	Tree
2012	0.1	19.1	-	0.2	27.5	-
2016	-	0.2	-	-	0.1	-
2022	-	1.0	-	-	1.5	-

**Table 08R-04.7 - Herbaceous Summary.** Nested frequency and average modified Daubenmire quadrat cover by year for herbaceous functional groups

Year	Nested Frequency				Quadrat Cover (%)			
	Annual Grass	Perennial Grass	Annual/Biennial Forb	Perennial Forb	Annual Grass	Perennial Grass	Annual/Biennial Forb	Perennial Forb
2012	3	-	117	11	0.0	-	1.0	0.0
2016	76	258	208	206	1.5	16.2	7.0	8.9
2022	55	63	256	-	0.8	2.9	20.3	-

**Table 08R-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
2012	63.0	1.5	21.2	5.9	0.4	20.7
2016	28.2	0.2	42.3	1.5	0.3	36.1
2022	72.7	0.1	15.2	2.9	0.2	23.6

**Table 08R-04.9 - Pellet Group Data.** Quadrat frequency and pellet group transect data for animal pellets. Rabbit pellet groups are not sampled in the pellet group transect.

Year	Cattle	Mule Deer	Rabbit
	Quadrat Frequency		
2012	-	3	22
2016	-	13	69
2022	2	9	9
Year	Days Use Per Acre (ha)		
2012	-	10.0 (24.8)	-
2016	3.6 (9.0)	5.3 (13.2)	-
2022	10.2 (25.1)	3.4 (8.3)	-

**Table 08R-04.10 - Grass Species.** Nested frequency and modified Daubenmire average cover by year.

GRASS SPECIES	Nested Frequency					
Agropyron cristatum <sup>i</sup> (crested wheatgrass)						
Agropyron fragile <sup>i</sup> (Siberian wheatgrass)						
Bromus tectorum <sup>ai</sup> (cheatgrass)						
Elymus wawawaiensis (Snake River wheatgrass)						
Pascopyrum smithii (western wheatgrass)						
Vulpia octoflora <sup>a</sup> (sixweeks fescue)						
year	Average Cover (%)					
2012	-	-	3	-	-	1
2016	49	210	71	26	1	8
2022	53	5	53	5	-	2
year	Average Cover (%)					
2012	-	-	0.0	-	-	0.0
2016	2.1	13.4	1.4	0.7	0.0	0.0
2022	2.7	0.2	0.8	0.1	-	0.0

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

**Table 08R-04.11 - Forb Species.** Nested frequency and modified Daubenmire average cover by year.

FORB SPECIES	Nested Frequency										
Alyssum desertorum <sup>ai</sup> (desert madwort)											
Bassia scoparia <sup>ai</sup> (bumblingbush)											
Chenopodium leptophyllum <sup>a</sup> (narrowleaf goosefoot)											
Cleome serrulata <sup>a</sup> (Rocky Mountain beeplant)											
Cryptantha gracilis <sup>a</sup> (narrowstem cryptantha)											
Halogeton glomeratus <sup>ai</sup> (saltlover)											
Lactuca serriolata <sup>ai</sup> (prickly lettuce)											
Lepidium latifolium <sup>ni</sup> (broadleaved pepperweed)											
Salsola tragus <sup>ai</sup> (prickly Russian thistle)											
Sisymbrium altissimum <sup>ai</sup> (tall tumblemustard)											
year	Average Cover (%)										
2012	-	-	-	-	0.2	0.7	-	0.0	0.0	-	-
2016	0.8	-	0.0	0.3	-	-	0.0	8.9	4.0	1.9	-
2022	0.1	2.2	-	0.0	-	0.0	-	-	17.8	-	-

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

**Table 08R-04.12 - Shrub and Tree Species.** Average modified Daubenmire quadrat and line intercept cover by year.

SHRUB SPECIES	Line Intercept Cover (%)			
	Artemisia frigida <sup>p</sup> (prairie sagewort)	Atriplex confertifolia <sup>p</sup> (shadscale saltbush)	Opuntia polyacantha (plains pricklypear)	Sarcobatus vermiculatus (greasewood)
year	Line Intercept Cover (%)			
2012	0.1	0.1	5.8	21.7
2016	-	-	0.1	-
2022	-	-	0.2	1.3
year	Quadrat Cover (%)			
2012	0.1	0.0	5.7	13.5
2016	-	-	0.2	-
2022	-	-	0.6	0.4

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

**Table 08R-04.13 - Shrub/Tree Characteristics.** Population characteristics of shrub/tree species populations including density reproduction (seedlings), age distribution, utilization, vigor and average size (height/crown) of plants.

Year	Density		Age Class Distribution			Utilization		Poor Vigor (%)	Average Height Crown (cm)
	Plants Per Acre		Excluding Seedlings			Moderate (%)	Heavy (%)		
	Excluding Seedlings	Seedling	Young (%)	Mature (%)	Decadent (%)				
<b>Artemisia frigida<sup>p</sup> -- (prairie sagewort)</b>									
2012	340	-	0	82	18	0	100	100	9/14
2016	-	-	-	-	-	-	-	-	-/-
2022	-	-	-	-	-	-	-	-	-/-
<b>Artemisia tridentata ssp. wyomingensis<sup>p</sup> -- (Wyoming big sagebrush)</b>									
2012	-	-	-	-	-	-	-	-	-/-
2016	-	-	-	-	-	-	-	-	-/-
2022	-	-	-	-	-	-	-	-	-/-
<b>Atriplex confertifolia<sup>p</sup> -- (shadscale saltbush)</b>									
2012	160	-	13	88	0	38	0	25	24/31
2016	-	20	0	0	0	0	0	0	-/-
2022	-	-	-	-	-	-	-	-	-/-
<b>Opuntia polyacantha -- (plains pricklypear)</b>									
2012	1220	-	0	87	13	0	0	13	14/80
2016	480	-	4	50	46	0	0	46	9/16
2022	520	-	0	100	0	0	0	0	-/-
<b>Sarcobatus vermiculatus -- (greasewood)</b>									
2012	1920	-	3	79	18	0	2	15	67/98
2016	40	-	100	0	0	0	0	0	39/52
2022	60	-	0	100	0	0	0	0	-/-

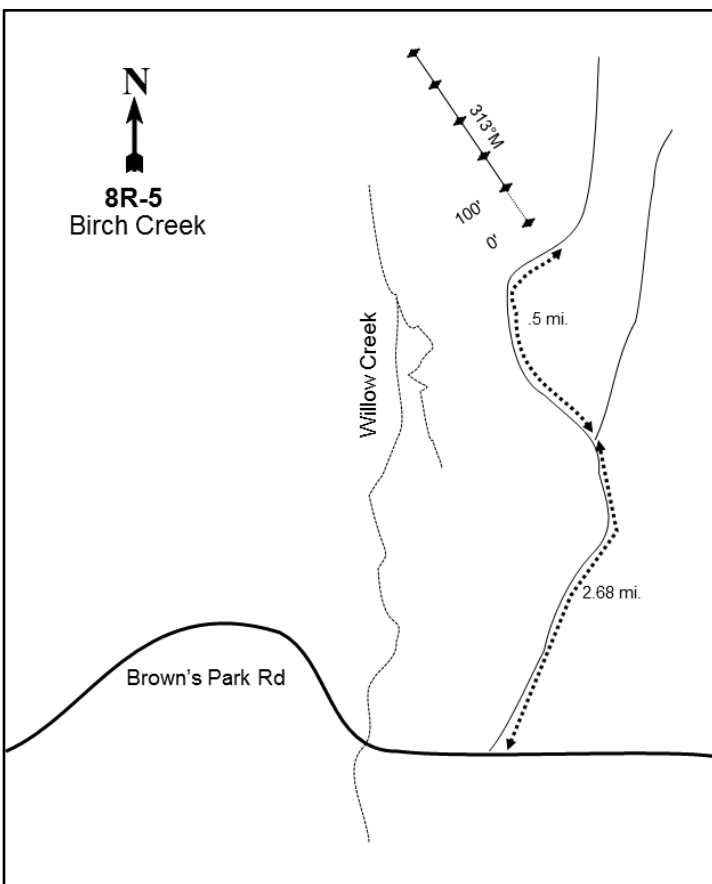
t - Tree Species; p - Preferred Browse; i - Introduced Species

**Table 08R-04.15 - Deer Desirable Components Index: Semidesert 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	0.2	0.0	0.0	0.0	0.0	0.0	-2.0	-1.8	Very Poor
2016	0.0	0.0	0.0	30.0	-1.1	0.0	-2.0	26.9	Poor-Fair
2022	0.0	0.0	0.0	5.9	-0.6	0.0	0.0	5.2	Very Poor



## BIRCH CREEK - STUDY NO. 08R-5



### Location Information

USGS 7.5 min Map Info  
GPS (0' Stake)

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

### Transect Information

Browse Tag # (0' Stake)	714
Transect Bearing	335° magnetic
Length	500ft
Belt Placement	Line 1 (11ft), Line 2 (34ft), Line 3 (59ft), Line 4 (71ft), Line 5 (95ft)
Belt Marker Placement	Standard

### Directions to Site

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



**Site Information**

Land Ownership	State
Land Administrator	SITLA
Allotment	No data
Elevation	6,220ft (1,896m)
Aspect	South
Slope	3-5%
Sample Dates	08/20/2014, 08/07/2017, 08/03/2022

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

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

**Table 08R-05.2 Seed Mix.** List of known seeded plant species and rates (if available).

Mix Name			Application Type	Application Date	Acres
Birch Creek PJ Removal			Aerial	Nov 2014	275
Type	Species	Common Name	Cultivar/Source ID	Bulk lbs/acre	PLS
G	Agropyron cristatum	Crested Wheatgrass	Nordan	0.36	0.29
G	Bouteloua gracilis	Blue Grama	Hachita	0.18	0.10
G	Elymus wawawaiensis	Snake River Wheatgrass	Discovery	1.09	0.98
G	Leymus cinereus	Great Basin Wildrye	Magnar	0.55	0.44
G	Leymus cinereus	Great Basin Wildrye	Trailhead	0.36	0.30
G	Nassella viridula	Green Needlegrass	Lodorm	0.82	0.33
G	Pascopyrum smithii	Western Wheatgrass	Arriba	1.45	1.37
G	Poa secunda	Big Bluegrass	Sherman	0.18	0.11
G	Poa secunda	Canby Bluegrass	Canbar	0.18	0.15
G	Psathyrostachys juncea	Russian Wildrye	Bozoisky II	0.36	0.30
G	Pseudoroegneria spicata	Bluebunch Wheatgrass	Anatone	1.09	0.94
F	Achillea millefolium	Western Yarrow	Lincoln WA	0.10	0.09
F	Linum perenne	Blue Flax	Appar	0.73	0.64
F	Medicago sativa	Alfalfa	Ladak +	1.00	0.93
S	Atriplex canescens	Fourwing Saltbush	Emery UT	1.00	0.82

Mix Name			Application Type	Application Date	Acres
Birch Creek - Sagebrush			Aerial	Jan 2015	300
Type	Species	Common Name	Cultivar/Source ID	Bulk lbs/acre	PLS
S	Artemisia nova	Black Sagebrush	Caribou ID	0.76	0.16
S	Artemisia nova	Black Sagebrush	Caribou ID	0.76	0.16
S	Artemisia tridentata ssp. wyomingensis	Wyoming Big Sagebrush	Beaver UT	1.11	0.20
S	Artemisia tridentata ssp. wyomingensis	Wyoming Big Sagebrush	Beaver UT	1.11	0.20

**Wildlife Habitat and Vegetation History****Table 08R-05.3 - Wildlife Seasonal Habitat.** DWR 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	brood-rearing

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

Year	Vegetation Type	Woodland Succession
2014	Juniper/Mountain Big Sagebrush	Phase II transitioning to Phase III
2017	Broom Snakeweed/Mountain Big Sagebrush	Phase I
2022	Mountain Big Sagebrush/Perennial Grass	Phase I

**Site Notes**

Elk were seen in the area in 2017.

**Site Potential**

1981 - 2010 Average Annual Precipitation	10 inches
NRCS Ecological Site	Upland Loam (Mountain Big Sagebrush)
NRCS Ecological Site #	R047XC310UT
States and Transitions	No state and transition model is available for this ecological site.

When this study was established in 2014, it was considered to be within Phase II transitioning to Phase III of woodland succession, with Utah juniper (*Juniperus osteosperma*) as a dominant component (Photos, Table 08R-05.4, Table 08R-05.14). Mountain big sagebrush (*Artemisia tridentata* ssp. *vaseyana*) comprised a majority of the shrub layer, although most plants were decadent. A bullhog and seeding treatment later that year (Table 08R-05.1) removed most of the trees, and the site transitioned into one dominated by broom snakeweed (*Gutierrezia sarothrae*) and mountain big sagebrush in 2017 (Table 08R-05.12, Table 08R-05.13). The herbaceous understory was depauperate in both species diversity and quantity prior to treatment, but increased on both counts in 2017. Initially, perennial forbs, mainly blue flax (*Linum perenne*), provided the majority of cover after treatment, but over time flax decreased substantially and was not sampled in 2022 (Table 08R-05.7, Table 08R-05.10, Table 08R-05.11). Perennial grasses and mountain big sagebrush have increased in cover and were co-dominant site components in 2022 (Table 08R-05.6, Table 08R-05.7).

**Trend Summary Tables****Table 08R-05.6 - Shrub/Tree Summary.** Average modified Daubenmire quadrat and line intercept cover by year for shrubs/trees

Year	Quadrat Cover (%)			Line-intercept Cover (%)		
	Preferred Shrub	Other Shrub	Tree	Preferred Shrub	Other Shrub	Tree
2014	1.6	2.8	13.9	3.4	2.4	27.7
2017	1.9	7.9	1.8	2.8	7.4	1.8
2022	4.3	4.5	0.8	7.6	4.3	2.6

**Table 08R-05.7 - Herbaceous Summary.** Nested frequency and average modified Daubenmire quadrat cover by year for herbaceous functional groups

Year	Nested Frequency				Quadrat Cover (%)			
	Annual Grass	Perennial Grass	Annual/Biennial Forb	Perennial Forb	Annual Grass	Perennial Grass	Annual/Biennial Forb	Perennial Forb
2014	-	28	33	8	-	0.3	0.1	0.0
2017	112	213	128	215	1.6	5.1	1.0	8.0
2022	154	292	45	44	1.8	11.2	0.2	0.9

**Table 08R-05.8 - Basic Ground Cover.** Average modified Daubenmire quadrat cover by year for basic ground cover types.

Year	Cover Type (%)					
	Bare Ground	Cryptogams	Litter	Pavement	Rock	Vegetation
2014	41.4	2.7	33.3	16.1	3.0	19.3
2017	21.6	0.5	52.3	7.0	2.4	28.1
2022	37.5	0.8	44.0	9.0	3.1	21.4

**Table 08R-05.9 - Pellet Group Data.** Quadrat frequency and pellet group transect data for animal pellets. Rabbit pellet groups are not sampled in the pellet group transect.

Year	Cattle	Mule Deer	Rocky Mountain Elk	Rabbit
	Quadrat Frequency			
2014	-	5	-	7
2017	-	11	3	26
2022	4	9	-	2
Year	Days Use Per Acre (ha)			
2014	-	1.3 (3.3)	-	-
2017	-	13.4 (33.1)	0.7 (1.7)	-
2022	24.7 (61.0)	50.9 (125.8)	1.3 (3.3)	-

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

GRASS SPECIES	Achnatherum hymenoides (Indian ricegrass)	Agropyron cristatum <sup>i</sup> (crested wheatgrass)	Bouteloua gracilis (blue grama)	Bromus arvensis <sup>ai</sup> (field brome)	Bromus tectorum <sup>ai</sup> (cheatgrass)	Elymus elymoides (squirreltail)	Elymus lanceolatus (thickspike wheatgrass)	Elymus wawawaiensis (Snake River wheatgrass)	Hesperostipa comata (needle and thread)	Pascopyrum smithii (western wheatgrass)	Poa secunda (Sandberg bluegrass)	Psathyrostachys juncea <sup>i</sup> (Russian wildrye)	Pseudoroegneria spicata (bluebunch wheatgrass)	Vulpia octoflora <sup>a</sup> (sixweeks fescue)
year	Nested Frequency													
2014	-	-	-	-	-	27	-	-	-	-	1	-	-	-
2017	-	30	3	-	101	79	-	32	11	19	24	13	68	20
2022	18	38	-	2	122	136	19	-	5	17	44	8	112	69
year	Average Cover (%)													
2014	-	-	-	-	-	0.3	-	-	-	-	0.0	-	-	-
2017	-	0.2	0.0	-	1.3	1.4	-	1.0	0.3	0.1	0.4	0.2	1.6	0.3
2022	0.4	0.8	-	0.0	0.8	2.8	0.3	-	0.1	0.5	0.8	0.5	5.0	1.0

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

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

FORB SPECIES	Achillea millefolium (Common yarrow)	Arabis (rockcress)	Calochortus nuttallii (sego lily)	Caulanthus crassicaulis <sup>a</sup> (thickstem wild cabbage)	Cryptantha (cryptantha)	Descurainia pinnata <sup>a</sup> (western tansymustard)	Eriogonum ovalifolium (cushion buckwheat)	Gilia inconspicua <sup>a</sup> (shy gilia)	Ipomopsis aggregata (scarlet gilia)	Lactuca serriola <sup>ai</sup> (prickly lettuce)	Linum perenne <sup>i</sup> (blue flax)	Machaeranthera canescens (hoary tansyaster)	Medicago sativa <sup>i</sup> (alfalfa)	Penstemon (beardtongue)	Penstemon pachyphyllus (thickleaf beardtongue)	Phlox hoodii (spiny phlox)
year	Nested Frequency															
2014	-	2	-	-	-	33	-	-	-	-	-	-	-	3	-	3
2017	5	2	-	4	6	1	-	118	11	8	198	2	25	8	-	3
2022	1	-	3	2	7	4	2	41	-	-	-	-	20	3	7	2
year	Average Cover (%)															
2014	-	0.0	-	-	-	0.1	-	-	-	-	-	-	-	0.0	-	0.0
2017	0.2	0.0	-	0.0	0.0	0.0	-	0.8	0.2	0.2	7.3	0.0	0.1	0.1	-	0.0
2022	0.0	-	0.0	0.0	0.0	0.0	0.0	0.2	-	-	-	-	0.7	0.0	0.1	0.0

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

**Table 08R-05.12 - Shrub and Tree Species.** Average modified Daubenmire quadrat and line intercept cover by year.

SHRUB SPECIES	Line Intercept Cover (%)					
	Artemisia nova <sup>p</sup> (black sagebrush)	Artemisia tridentata ssp. vaseyana <sup>p</sup> (mountain big sagebrush)	Gutierrezia sarothrae (broom snakeweed)	Juniperus osteosperma <sup>t</sup> (Utah juniper)	Opuntia polyacantha (plains pricklypear)	Pinus edulis <sup>t</sup> (twoneedle pinyon)
year	Line Intercept Cover (%)					
2014	-	3.4	-	26.6	2.4	1.1
2017	-	2.8	6.3	1.8	1.1	-
2022	1.2	6.4	2.7	2.5	1.6	0.1
year	Quadrat Cover (%)					
2014	-	1.6	0.0	13.0	2.7	0.8
2017	-	1.9	6.2	1.8	1.8	-
2022	0.8	3.5	3.5	0.8	1.0	0.0

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

**Table 08R-05.13 - Shrub/Tree Characteristics.** Population characteristics of shrub/tree species populations including density reproduction (seedlings), age distribution, utilization, vigor and average size (height/crown) of plants.

Year	Density		Age Class Distribution			Utilization		Poor Vigor (%)	Average Height Crown (cm)
	Plants Per Acre		Excluding Seedlings			Moderate (%)	Heavy (%)		
	Excluding Seedlings	Seedling	Young (%)	Mature (%)	Decadent (%)				
<b>Artemisia nova<sup>p</sup> -- (black sagebrush)</b>									
2014	-	-	-	-	-	-	-	-	-/-
2017	-	-	-	-	-	-	-	-	8/17
2022	2240	80	71	28	1	8	6	8	-/-
<b>Artemisia tridentata ssp. vaseyana<sup>p</sup> -- (mountain big sagebrush)</b>									
2014	1140	20	2	11	88	9	47	95	31/56
2017	3640	1880	62	29	9	6	3	5	28/41
2022	6840	20	59	37	4	29	2	24	-/-
<b>Echinocereus -- (hedgehog cactus)</b>									
2014	-	-	-	-	-	-	-	-	12/30
2017	-	-	-	-	-	-	-	-	-/-
2022	-	-	-	-	-	-	-	-	-/-
<b>Gutierrezia sarothrae -- (broom snakeweed)</b>									
2014	120	420	33	67	0	0	0	67	18/23
2017	4340	40	14	86	0	0	0	0	27/40
2022	7020	60	25	75	1	0	0	9	-/-
<b>Juniperus osteosperma<sup>t</sup> -- (Utah juniper)</b>									
2014	460	-	44	52	4	0	4	4	-/-
2017	300	-	20	80	0	0	0	0	-/-
2022	220	-	64	36	0	0	0	0	-/-
<b>Opuntia polyacantha -- (plains pricklypear)</b>									
2014	1340	-	2	66	33	18	0	46	10/44
2017	1700	-	1	99	0	0	0	0	10/37
2022	3140	-	2	61	37	0	0	37	-/-
<b>Pinus edulis<sup>t</sup> -- (twoneedle pinyon)</b>									
2014	80	40	75	25	0	0	0	0	-/-
2017	80	-	50	50	0	0	0	0	-/-
2022	80	-	50	50	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 (%)				
Symphoricarpos oreophilus <sup>p</sup> -- (mountain snowberry)									
2014	-	-	-	-	-	-	-	-	8/32

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

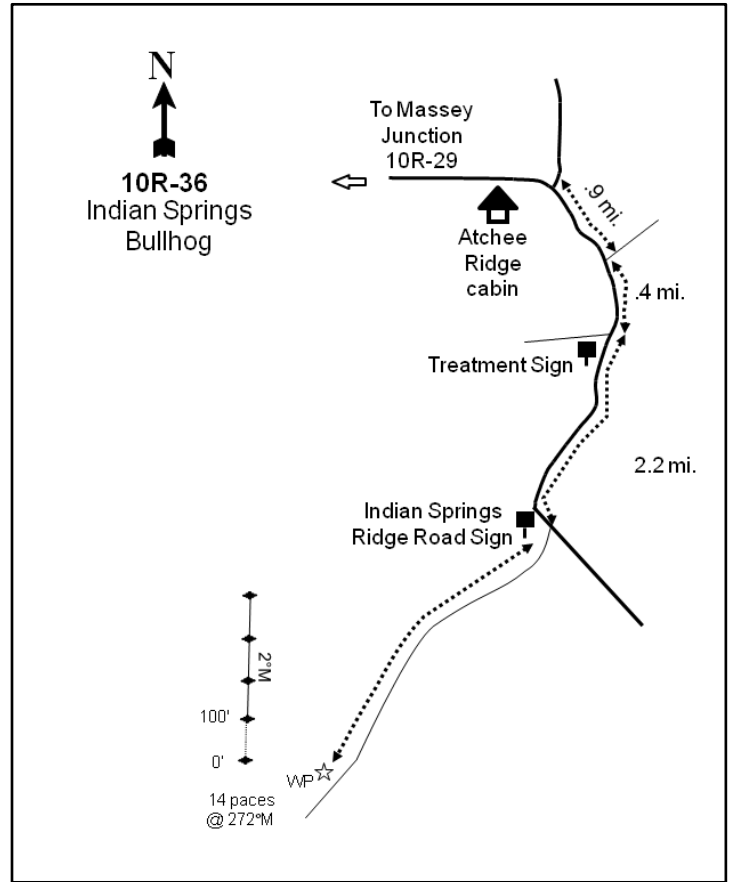
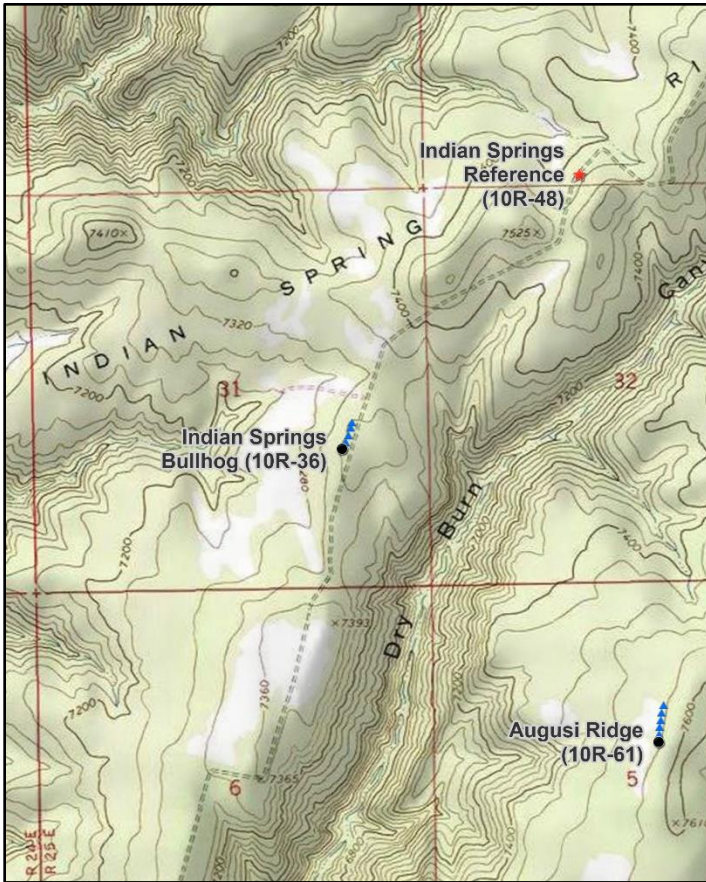
**Table 08R-05.14 - Tree Characteristics.** Point-quarter tree density, size class distribution, and average diameter.

Year	Density	Size Class Distribution					Average Diameter (cm)
	Trees per Acre	Seedling (%)	1-4' (%)	4-8' (%)	8-12' (%)	>12' (%)	
Juniperus osteosperma (Utah juniper)							
2014	291	-	40	40	20	-	11.1
2017	199	15	75	10	-	-	13.7
2022	200	5	85	10	-	-	6.7
Pinus edulis (twoneedle pinyon)							
2014	70	36	29	14	21	-	5.9
2017	39	15	85	-	-	-	2.8
2022	41	15	85	-	-	-	3.1

**Table 08R-05.15 - Deer Desirable Components Index: Upland 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
2014	4.3	0.0	0.0	0.5	0.0	0.0	0.0	4.8	Very Poor
2017	3.5	0.0	0.0	10.3	-1.2	10.0	0.0	22.6	Very Poor
2022	9.5	14.0	15.0	22.4	-1.3	1.9	0.0	61.4	Fair

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



### Location Information

USGS 7.5 min Map Info  
GPS (0' Stake)

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

### Transect Information

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

530  
2° magnetic  
400ft  
Line 1 (11ft & 95ft), Line 2 (34ft), Line 3 (59ft), Line 4 (71ft)  
Standard

### Directions to Site

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

**Site Information**

Land Ownership	Federal
Land Administrator	BLM
Allotment	ATCHEE RIDGE AMP
Elevation	7,350ft (2,240m)
Aspect	West
Slope	1%
Sample Dates	06/27/2006, 07/15/2009, 06/09/2010, 08/19/2014, 08/28/2018, 08/03/2022

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

Treatment/Disturbance	Name	WRI DB#	Date	Size (acres)
Hand Crew - Lop and Scatter	Indian Spring Phase I Maintenance	3304	May 2016	319
Mechanical - Bullhog	Indian Springs Ridge Bullhog	362	January-February 2007	320
Seeding - Aerial Before	Indian Springs Ridge Bullhog	362	December 2006	320

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

Mix Name			Application Type	Application Date	Acres
Indian Springs PJ Removal			Aerial	Dec 2006	350
Type	Species	Common Name	Cultivar/Source ID	Bulk lbs/acre	PLS
G	Agropyron cristatum	Crested Wheatgrass	Douglas	0.57	0.48
G	Bouteloua gracilis	Blue Grama		0.26	0.09
G	Dactylis glomerata	Orchardgrass	Paiute	0.20	0.19
G	Elymus lanceolatus	Thickspike Wheatgrass	Bannock	0.71	0.66
G	Elymus trachycaulus	Slender Wheatgrass	San Luis	0.50	0.47
G	Pascopyrum smithii	Western Wheatgrass	Arriba	0.71	0.58
G	Poa secunda	Sandberg Bluegrass	Toole MT	0.50	0.43
G	Poa secunda	Canby Bluegrass	Canbar	0.29	0.25
G	Pseudoroegneria spicata	Bluebunch Wheatgrass	Anatone	0.50	0.43
F	Achillea millefolium	Western Yarrow	Western Yarrow	0.06	0.06
F	Linum perenne	Blue Flax	Appar	0.29	0.26
F	Medicago sativa	Alfalfa	Ladak	1.00	0.94
F	Onobrychis viciifolia	Sainfoin	Eski	3.00	2.76
F	Sanguisorba minor	Small Burnet	Delar	2.00	1.86
S	Artemisia tridentata ssp. wyomingensis	Wyoming Big Sagebrush	Sanpete UT	1.00	0.20
S	Atriplex canescens	Fourwing Saltbush	Juab/Millard UT	1.00	0.38
S	Bassia prostrata	Forage Kochia	Beaver UT	0.29	0.20

**Wildlife Habitat and Vegetation History**

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

Species	Habitat	Season
American Bison	potential	year-long
Mule Deer	substantial	summer
Rocky Mountain Elk	crucial	winter

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

Year	Vegetation Type	Woodland Succession
2006	Pinyon	Phase III
2009	Black Sagebrush/Bitterbrush	Phase I
2010	Black Sagebrush/Bitterbrush	Phase I
2014	Black Sagebrush/Bitterbrush	Phase I
2018	Black Sagebrush/Bitterbrush	Phase I
2022	Black Sagebrush/Bitterbrush	Phase I

**Site Notes**

In 2009 the baseline was moved slightly south and east of the original location to keep the study within the treatment area. However, the new location makes it so that the ends of the belts cross the road. In 2022, it was noted that identification between needle and thread (*Hesperostipa comata*) and prairie junegrass (*Koeleria macrantha*) was very difficult when there were no seedheads.



## Soils

**Table 10R-36.5 - Soil Analysis Data.** List of chemical and textural soil characteristics determined by laboratory analysis.

Texture	pH	% sand	% silt	% clay	% OM	PPM P	PPM K	ds/m	Sample Date
Clay Loam	7.0	27.3	38.4	34.3	6.3	12.6	115.2	1.2	06/27/2006

## Site Potential

1981 - 2010 Average Annual Precipitation	17 inches
NRCS Ecological Site	Mountain Shallow Loam (Black Sagebrush)
NRCS Ecological Site #	R048AY433UT
States and Transitions	No state and transition model is available for this ecological site.

When this study was established in 2006, it was in Phase III of woodland succession with twoneedle pinyon (*Pinus edulis*) as the dominant overstory species (Table 10R-36.4, Table 10R-26.14). A number of other browse species were also present, but they contributed low cover. Black sagebrush (*Artemisia nova*) and bitterbrush (*Purshia tridentata*) became the dominant browse species after much of the tree component was removed by a 2007 bullhog treatment (Table 10R-36.1, Table 10R-36.12). The herbaceous understory was sparse prior to the bullhog. Perennial grasses exhibited an overall increase and have contributed the most cover of any herbaceous component in most post-treatment sample years. Perennial forbs have been diverse and provided moderate amounts of cover following treatment (Table 10R-36.7, Table 10R-36.10, Table 10R-36.11). Although most trees were removed by the bullhog project, point-quarter data shows that they have been present in all post-treatment sample years (Table 10R-36.14): this may indicate that the site is at risk of infilling in the future.

## Trend Summary Tables

**Table 10R-36.6 - Shrub/Tree Summary.** Average modified Daubenmire quadrat and line intercept cover by year for shrubs/trees

Year	Quadrat Cover (%)			Line-intercept Cover (%)		
	Preferred Shrub	Other Shrub	Tree	Preferred Shrub	Other Shrub	Tree
2006	11.2	0.0	14.8	10.5	-	46.6
2009	10.7	0.5	0.3	12.0	0.6	0.8
2010	9.3	0.2	0.6	12.9	1.0	0.7
2014	11.3	0.9	1.1	14.6	1.0	2.2
2018	14.9	0.6	0.1	16.5	0.6	0.4
2022	18.1	0.7	0.2	22.2	1.6	0.8

**Table 10R-36.7 - Herbaceous Summary.** Nested frequency and average modified Daubenmire quadrat cover by year for herbaceous functional groups

Year	Nested Frequency				Quadrat Cover (%)			
	Annual Grass	Perennial Grass	Annual/Biennial Forb	Perennial Forb	Annual Grass	Perennial Grass	Annual/Biennial Forb	Perennial Forb
2006	-	109	11	150	-	2.3	0.2	4.2
2009	4	253	-	253	0.0	14.4	-	10.7
2010	12	268	3	287	0.2	9.6	0.0	10.3
2014	19	327	30	266	0.1	21.3	0.3	9.7
2018	11	359	5	228	0.0	18.1	0.0	8.0
2022	7	333	47	221	0.0	14.0	0.2	7.9

**Table 10R-36.8 - Basic Ground Cover.** Average modified Daubenmire quadrat cover by year for basic ground cover types.

Year	Cover Type (%)					
	Bare Ground	Cryptogams	Litter	Pavement	Rock	Vegetation
2006	16.0	2.7	50.4	14.3	11.3	27.9
2009	19.6	0.5	42.9	12.4	1.8	37.3
2010	23.9	0.1	39.1	5.8	1.8	35.4
2014	26.9	0.1	44.1	6.4	1.8	40.7
2018	22.8	0.3	53.4	11.3	2.8	33.1
2022	29.3	0.3	44.8	21.0	2.9	37.5

**Table 10R-36.9 - Pellet Group Data.** Quadrat frequency and pellet group transect data for animal pellets. Rabbit pellet groups are not sampled in the pellet group transect.

Year	Cattle	Mule Deer	Rocky Mountain Elk	Greater Sage-Grouse	Rabbit
	Quadrat Frequency				
2006	-	1	11	-	27
2009	1	2	10	-	9
2010	-	3	4	-	2
2014	-	10	10	1	3
2018	-	10	16	-	-
2022	-	13	13	-	-
Year	Days Use Per Acre (ha)				
2006	-	10.0 (24.8)	16.8 (41.4)	-	-
2009	0.7 (1.8)	9.4 (23.2)	20.8 (51.3)	-	-
2010	2.2 (5.4)	12.8 (31.5)	12.1 (29.8)	-	-
2014	4.4 (10.8)	18.1 (44.7)	26.8 (66.2)	-	-
2018	-	33.5 (82.8)	29.5 (72.8)	-	-
2022	-	35.5 (87.7)	48.9 (120.8)	-	-

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

GRASS SPECIES	Achnatherum hymenoides (Indian ricegrass)	Agropyron cristatum <sup>i</sup> (crested wheatgrass)	Bouteloua gracilis (blue grama)	Bromus tectorum <sup>ai</sup> (cheatgrass)	Carex (sedge)	Carex rossii (Ross' sedge)	Elymus elymoides (squirreltail)	Elymus lanceolatus (thickspike wheatgrass)	Elymus trachycaulus (slender wheatgrass)	Hesperostipa comata (needle and thread)	Koeleria macrantha (prairie Junegrass)	Pascopyrum smithii (western wheatgrass)	Poa fendleriana (muttongrass)	Poa secunda (Sandberg bluegrass)	Psathyrostachys juncea <sup>i</sup> (Russian wildrye)	Pseudoroegneria spicata (bluebunch wheatgrass)
year	Nested Frequency															
2006	2	-	-	-	57	-	-	-	-	-	38	-	15	9	-	11
2009	14	8	4	4	34	-	4	6	48	23	58	2	77	29	-	27
2010	20	2	6	12	-	-	3	9	16	11	113	25	91	16	-	23
2014	28	15	1	19	40	-	21	69	4	52	92	22	62	14	-	52
2018	17	3	-	11	24	55	29	177	-	5	188	-	14	15	3	62
2022	7	-	-	7	-	54	9	117	-	45	194	18	16	10	-	21
year	Average Cover (%)															
2006	0.0	-	-	-	1.2	-	-	-	-	-	0.5	-	0.4	0.1	-	0.1
2009	0.8	0.1	0.0	0.0	1.3	-	0.2	0.3	3.9	0.7	1.5	0.0	3.3	1.0	-	1.3
2010	0.7	0.0	0.0	0.2	-	-	0.0	0.2	0.6	0.2	3.6	0.2	2.7	0.4	-	0.9
2014	0.8	0.5	0.0	0.1	2.5	-	0.3	4.1	0.1	3.3	2.4	0.6	3.8	0.2	-	2.7
2018	0.4	0.0	-	0.0	0.5	2.1	0.7	4.3	-	0.3	5.6	-	0.3	0.5	0.0	3.4
2022	0.0	-	-	0.0	-	1.7	0.1	3.9	-	1.8	4.9	0.7	0.6	0.0	-	0.2

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

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

FORB SPECIES	Agoseris glauca (pale agoseris)	Antennaria microphylla (little leaf pussytoes)	Antennaria parvifolia (small-leaf pussytoes)	Arabis (rockcress)	Astragalus spatulatus (tufted milkvetch)	Astragalus utahensis (Utah milkvetch)	Castilleja linariifolia (Wyoming Indian paintbrush)	Collinsia parviflora <sup>a</sup> (maiden blue eyed Mary)	Comandra umbellata (bastard toadflax)	Cordylanthus <sup>a</sup> (bird's-beak)	Crepis acuminata (tapertip hawkbeard)	Delphinium nuttallianum (two-lobed larkspur)	Descurainia pinnata <sup>a</sup> (western tansymustard)	Erigeron eatonii (Eaton's fleabane)	Erigeron pumilus (shaggy fleabane)	Eriogonum alatum (winged buckwheat)	Ipomopsis aggregata (scarlet gilia)
year	Nested Frequency																
2006	-	-	-	7	19	-	-	2	15	9	-	-	-	-	8	11	1
2009	2	15	-	-	73	2	25	-	37	-	14	-	-	-	9	7	-
2010	33	25	-	1	99	1	54	-	44	-	2	3	-	5	24	3	-
2014	5	19	-	-	89	-	34	-	21	26	-	-	3	11	11	13	-
2018	3	26	-	8	81	-	12	-	1	-	2	-	-	2	4	10	-
2022	-	40	0	11	1	-	25	-	12	6	1	-	7	24	45	21	3
year	Average Cover (%)																
2006	-	-	-	0.0	0.1	-	-	0.0	0.1	0.2	-	-	-	-	0.1	0.2	0.0
2009	0.0	0.2	-	-	0.9	0.0	0.8	-	0.3	-	0.1	-	-	-	0.1	0.1	-
2010	0.2	0.4	-	0.0	1.7	0.0	0.8	-	0.3	-	0.1	0.0	-	0.1	0.1	0.0	-
2014	0.0	0.1	-	-	1.6	-	0.3	-	0.1	0.3	-	-	0.0	0.2	0.1	0.1	-
2018	0.0	0.6	-	0.0	1.6	-	0.2	-	0.0	-	0.0	-	-	0.0	0.0	0.1	-
2022	-	0.6	0.0	0.1	0.0	-	0.4	-	0.0	0.0	0.0	-	0.0	0.6	0.4	0.2	0.0

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

FORB SPECIES	Lepidium <sup>a</sup> (pepperweed)	Lesquerella (bladderpod)	Linum lewisii (Lewis flax)	Machaeranthera canescens (hoary tansyaster)	Machaeranthera grindelioides (rayless tansyaster)	Medicago sativa <sup>a</sup> (alfalfa)	Onobrychis viciifolia <sup>i</sup> (sainfoin)	Packera multilobata (lobeleaf groundsel)	Penstemon (beardtongue)	Penstemon watsonii (Watson's penstemon)	Petrorhiza pumila (rock goldenrod)	Phlox austromontana (mountain phlox)	Phlox longifolia (longleaf phlox)	Potentilla gracilis (slender cinquefoil)	Sanguisorba minor <sup>i</sup> (small burnet)	Sphaeralcea coccinea (scarlet globemallow)	Stenotus acaulis (stemless mock goldenweed)
year	Nested Frequency																
2006	-	19	-	-	1	-	-	1	6	-	41	77	-	-	-	-	-
2009	-	48	0	-	-	6	14	32	10	9	36	88	18	1	14	-	2
2010	-	64	10	-	4	13	-	29	5	14	30	92	11	-	11	-	7
2014	2	48	9	-	-	6	-	27	24	4	59	90	2	-	8	1	36
2018	-	6	6	1	-	10	-	2	2	2	55	76	-	-	2	-	27
2022	32	-	10	-	-	11	-	15	13	14	55	78	3	-	-	-	30
year	Average Cover (%)																
2006	-	0.1	-	-	0.0	-	-	0.0	0.0	-	1.3	2.3	-	-	-	-	-
2009	-	0.5	0.3	-	-	0.0	0.2	0.3	0.2	0.1	1.5	3.4	0.1	0.0	0.5	-	0.0
2010	-	0.6	0.0	-	0.1	0.2	-	0.1	0.1	0.3	0.7	3.5	0.0	-	0.0	-	0.7
2014	0.0	0.3	0.0	-	-	0.4	-	0.2	0.3	0.1	1.5	3.3	0.0	-	0.2	0.0	0.9
2018	-	0.0	0.0	0.0	-	0.2	-	0.0	0.0	0.0	2.0	2.3	-	-	0.0	-	0.6
2022	0.2	-	0.1	-	-	0.5	-	0.1	0.1	0.1	1.1	2.4	0.0	-	-	-	0.7

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

FORB SPECIES	Symphyotrichum (aster)	Taraxacum officinale (common dandelion)	Tetraneuris acaulis (stemless four-nerve daisy)	Tragopogon dubius <sup>ai</sup> (yellow salsify)	Zigadenus paniculatus (foothill deathcamas)
year	Nested Frequency				
2006	-	-	-	-	-
2009	18	-	12	-	3
2010	-	1	7	3	8
2014	-	-	-	-	-
2018	-	7	21	5	-
2022	-	-	13	2	-
year	Average Cover (%)				
2006	-	-	-	-	-
2009	0.6	-	0.3	-	0.0
2010	-	0.0	0.1	0.0	0.1
2014	-	-	-	-	-
2018	-	0.0	0.1	0.0	-
2022	-	-	0.3	0.0	-

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

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

SHRUB SPECIES	Amelanchier utahensis <sup>p</sup> (Utah serviceberry)	Artemisia nova <sup>p</sup> (black sagebrush)	Artemisia tridentata ssp. vaseyana <sup>p</sup> (mountain big sagebrush)	Atriplex canescens <sup>p</sup> (fourwing saltbush)	Bassia prostrata <sup>pi</sup> (forage kochia)	Cercocarpus montanus <sup>p</sup> (alderleaf mountain mahogany)	Chrysothamnus depressus <sup>p</sup> (longflower rabbitbrush)	Chrysothamnus viscidiflorus ssp. viscidiflorus var. viscidiflorus (yellow rabbitbrush)	Eriogonum microthecum <sup>p</sup> (slender buckwheat)	Gutierrezia sarothrae (broom snakeweed)	Juniperus osteosperma <sup>i</sup> (Utah juniper)	Juniperus scopulorum <sup>i</sup> (Rocky Mountain juniper)	Linanthus pungens (granite prickly phlox)	Pediocactus simpsonii (mountain ball cactus)	Pinus edulis <sup>i</sup> (twoneedle piñon)	Pseudotsuga menziesii <sup>i</sup> (Douglas-fir)	Purshia tridentata <sup>p</sup> (antelope bitterbrush)
year	Line Intercept Cover (%)																
2006	4.5	1.6	-	-	-	0.9	0.5	-	-	-	3.8	-	-	-	42.7	0.1	0.7
2009	0.2	4.7	-	-	-	-	2.8	0.6	-	-	0.8	-	-	-	-	-	4.3
2010	0.5	4.6	-	-	-	0.2	2.9	1	-	-	0.7	-	-	-	0	-	4.7
2014	0.4	6	-	-	-	0.1	2.2	-	-	1	2.1	0.1	-	-	-	-	5.8
2018	0.2	7.1	-	-	-	0.4	2.5	0.1	-	0.5	0.4	-	-	-	0	-	6.3
2022	0.5	10.7	0.1	-	-	0.3	3.2	0.4	-	1.2	0.7	-	-	-	-	0.1	7.4
year	Quadrat Cover (%)																
2006	3.4	4.0	-	-	-	1.5	0.4	-	-	-	1.1	-	0.0	-	13.5	0.1	0.9
2009	0.3	4.3	-	-	-	0.4	3.0	0.5	0.0	-	0.1	-	-	0.0	0.2	-	2.8
2010	0.1	3.9	-	-	-	0.0	2.6	0.2	-	-	0.5	-	-	0.0	0.1	-	2.5
2014	0.6	3.6	-	-	-	0.0	3.6	0.0	-	0.9	1.1	0.0	-	-	0.1	-	3.4
2018	0.1	6.0	-	-	-	0.0	4.1	0.2	-	0.5	0.1	-	-	-	0.0	-	4.6
2022	0.4	8.2	0.0	0.0	0.0	0.0	4.4	0.4	-	0.4	0.2	-	-	-	0.0	0.0	5.1

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

SHRUB SPECIES	Line Intercept	
	<i>Quercus gambelii</i> <sup>p</sup> (Gambel oak)	
<i>Symphoricarpos oreophilus</i> <sup>p</sup> (mountain snowberry)		
year	Line Intercept	
2006	2	0.3
2009	-	-
2010	-	-
2014	-	0.1
2018	-	-
2022	-	-
year	Quadrat Cover (%)	
2006	1.0	0.2
2009	-	-
2010	-	0.1
2014	-	0.0
2018	-	-
2022	-	-

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

**Table 10R-36.13 - Shrub/Tree Characteristics.** Population characteristics of shrub/tree species populations including density reproduction (seedlings), age distribution, utilization, vigor and average size (height/crown) of plants.

Year	Density		Age Class Distribution			Utilization		Poor Vigor (%)	Average Height Crown (cm)
	Plants Per Acre		Excluding Seedlings			Moderate (%)	Heavy (%)		
	Excluding Seedlings	Seedling	Young (%)	Mature (%)	Decadent (%)				
<b>Amelanchier utahensis<sup>p</sup> -- (Utah serviceberry)</b>									
2006	860	220	26	70	5	21	0	0	135/109
2009	-	-	-	-	-	-	-	-	38/60
2010	40	40	50	50	0	50	0	0	48/71
2014	60	-	33	67	0	33	33	33	50/67
2018	60	-	33	33	33	0	67	33	49/74
2022	60	-	33	67	0	67	33	0	- / -
<b>Artemisia nova<sup>p</sup> -- (black sagebrush)</b>									
2006	1720	80	4	49	48	4	1	29	31/49
2009	-	-	-	-	-	-	-	-	32/46
2010	3800	840	33	62	5	10	7	4	23/47
2014	5960	120	39	54	8	31	12	7	22/41
2018	6660	160	34	61	5	3	1	5	23/47
2022	8200	2400	19	78	4	30	22	14	- / -
<b>Artemisia tridentata ssp. vaseyana<sup>p</sup> -- (mountain big sagebrush)</b>									
2006	-	-	-	-	-	-	-	-	- / -
2009	-	-	-	-	-	-	-	-	- / -
2010	-	-	-	-	-	-	-	-	- / -
2014	-	-	-	-	-	-	-	-	- / -
2018	-	-	-	-	-	-	-	-	- / -
2022	40	-	0	100	0	0	50	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>Atriplex canescens<sup>P</sup> -- (fourwing saltbush)</b>									
2006	-	-	-	-	-	-	-	-	-/-
2009	-	-	-	-	-	-	-	-	-/-
2010	20	-	0	100	0	0	100	0	46/48
2014	-	-	-	-	-	-	-	-	-/-
2018	-	-	-	-	-	-	-	-	-/-
2022	-	-	-	-	-	-	-	-	-/-
<b>Bassia prostrata<sup>PI</sup> -- (forage kochia)</b>									
2006	-	-	-	-	-	-	-	-	-/-
2009	-	-	-	-	-	-	-	-	21/35
2010	-	-	-	-	-	-	-	-	-/-
2014	-	-	-	-	-	-	-	-	-/-
2018	-	-	-	-	-	-	-	-	-/-
2022	20	80	100	0	0	0	0	0	- / -
<b>Cercocarpus montanus<sup>P</sup> -- (alderleaf mountain mahogany)</b>									
2006	280	-	7	64	29	50	14	14	93/75
2009	-	-	-	-	-	-	-	-	40/41
2010	180	-	78	22	0	44	11	0	33/39
2014	40	-	0	100	0	100	0	0	54/75
2018	120	-	0	100	0	17	67	0	46/58
2022	140	20	0	100	0	29	14	0	- / -
<b>Chrysothamnus depressus<sup>P</sup> -- (longflower rabbitbrush)</b>									
2006	1260	-	0	86	14	16	62	10	10/20
2009	-	-	-	-	-	-	-	-	15/30
2010	3900	-	4	96	0	0	0	0	11/26
2014	4260	-	5	93	2	28	3	2	13/28
2018	5540	20	9	85	6	28	26	14	11/27
2022	4820	560	0	100	0	14	20	7	- / -
<b>Chrysothamnus viscidiflorus ssp. viscidiflorus var. viscidiflorus -- (yellow rabbitbrush)</b>									
2006	-	-	-	-	-	-	-	-	-/-
2009	-	-	-	-	-	-	-	-	25/33
2010	440	-	0	100	0	0	0	0	27/37
2014	80	-	0	100	0	0	0	0	32/39
2018	160	-	25	75	0	13	0	13	43/54
2022	80	-	0	100	0	25	0	0	- / -
<b>Eriogonum microthecum<sup>P</sup> -- (slender buckwheat)</b>									
2006	-	-	-	-	-	-	-	-	-/-
2009	-	-	-	-	-	-	-	-	3/9
2010	-	-	-	-	-	-	-	-	-/-
2014	-	-	-	-	-	-	-	-	-/-
2018	-	-	-	-	-	-	-	-	-/-
2022	-	-	-	-	-	-	-	-	-/-
<b>Ericameria nauseosa -- (rubber rabbitbrush)</b>									
2006	-	-	-	-	-	-	-	-	-/-
2009	-	-	-	-	-	-	-	-	-/-
2010	-	-	-	-	-	-	-	-	-/-
2014	-	-	-	-	-	-	-	-	-/-
2018	-	-	-	-	-	-	-	-	74/104
2022	-	-	-	-	-	-	-	-	-/-

Year	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>Escobaria vivipara -- (spynstar)</b>									
2006	-	-	-	-	-	-	-	-	-/-
2009	-	-	-	-	-	-	-	-	-/-
2010	-	-	-	-	-	-	-	-	-/-
2014	-	-	-	-	-	-	-	-	-/-
2018	20	-	0	100	0	0	0	0	7/7
2022	-	-	-	-	-	-	-	-	-/-
<b>Gutierrezia sarothrae -- (broom snakeweed)</b>									
2006	-	-	-	-	-	-	-	-	-/-
2009	-	-	-	-	-	-	-	-	20/27
2010	-	-	-	-	-	-	-	-	-/-
2014	1520	20	1	99	0	21	0	8	15/23
2018	2340	-	15	85	0	0	0	0	12/14
2022	2000	-	0	100	0	0	0	8	-/-
<b>Juniperus osteosperma<sup>1</sup> -- (Utah juniper)</b>									
2006	180	80	67	33	0	0	0	11	-/-
2009	-	-	-	-	-	-	-	-	-/-
2010	100	20	100	0	0	0	0	0	-/-
2014	140	20	100	0	0	14	0	14	-/-
2018	100	-	80	20	0	0	0	0	-/-
2022	140	-	86	14	0	0	0	0	-/-
<b>Krascheninnikovia lanata<sup>P</sup> -- (winterfat)</b>									
2006	-	-	-	-	-	-	-	-	-/-
2009	-	-	-	-	-	-	-	-	19/31
2010	-	-	-	-	-	-	-	-	-/-
2014	-	-	-	-	-	-	-	-	-/-
2018	-	-	-	-	-	-	-	-	-/-
2022	-	-	-	-	-	-	-	-	-/-
<b>Linanthus pungens -- (granite prickly phlox)</b>									
2006	20	-	0	100	0	0	0	0	-/-
2009	-	-	-	-	-	-	-	-	-/-
2010	-	-	-	-	-	-	-	-	-/-
2014	-	-	-	-	-	-	-	-	-/-
2018	-	-	-	-	-	-	-	-	-/-
2022	-	-	-	-	-	-	-	-	-/-
<b>Pediocactus simpsonii -- (mountain ball cactus)</b>									
2006	40	-	0	100	0	0	0	0	2/5
2009	-	-	-	-	-	-	-	-	-/-
2010	20	-	0	100	0	0	0	0	3/6
2014	-	-	-	-	-	-	-	-	-/-
2018	-	-	-	-	-	-	-	-	-/-
2022	-	-	-	-	-	-	-	-	-/-
<b>Pinus edulis<sup>1</sup> -- (twoneedle pinyon)</b>									
2006	1200	980	65	32	3	0	3	2	-/-
2009	-	-	-	-	-	-	-	-	-/-
2010	80	60	100	0	0	0	0	0	-/-
2014	100	20	100	0	0	0	0	0	-/-
2018	220	-	100	0	0	0	0	0	-/-
2022	140	40	100	0	0	0	0	0	-/-



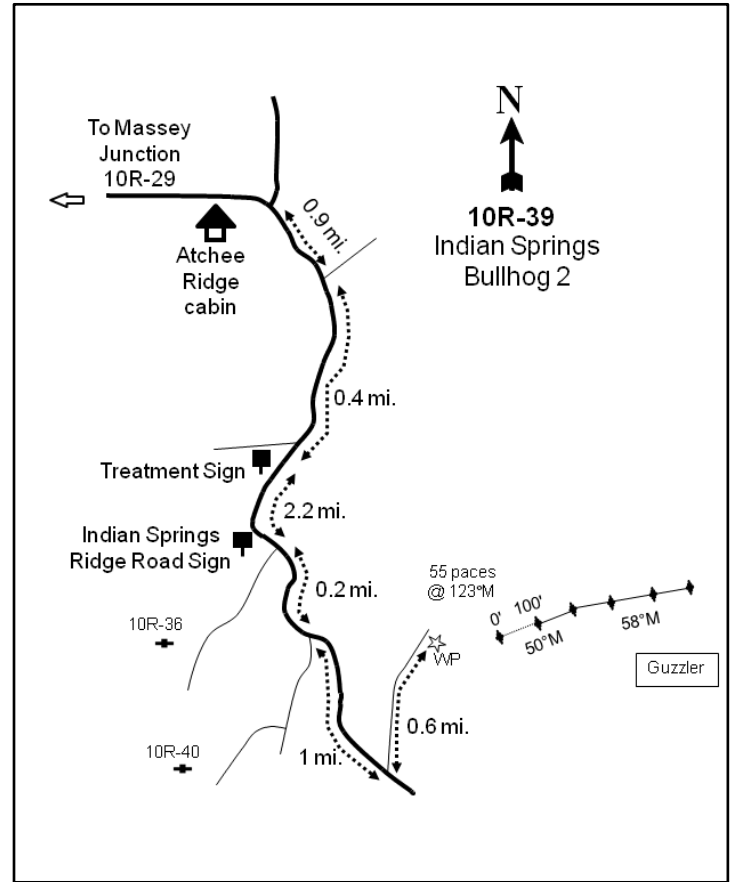
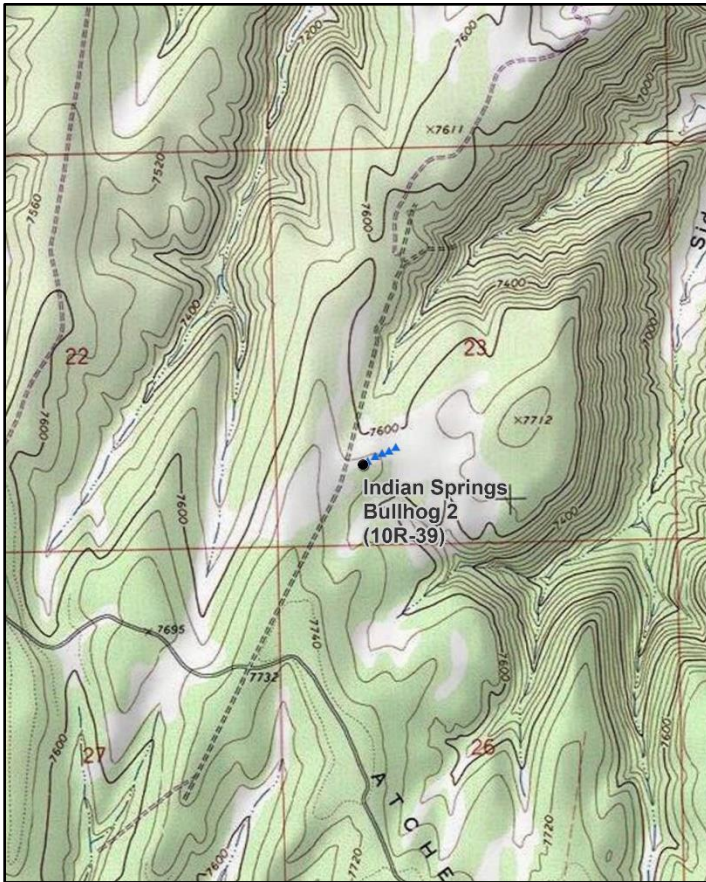
Year	Density		Age Class Distribution			Utilization		Poor Vigor (%)	Average Height Crown (cm)
	Plants Per Acre		Excluding Seedlings			Moderate (%)	Heavy (%)		
	Excluding Seedlings	Seedling	Young (%)	Mature (%)	Decadent (%)				
<b>Pseudotsuga menziesii<sup>i</sup> -- (Douglas-fir)</b>									
2006	80	20	100	0	0	0	0	0	- / -
2009	-	-	-	-	-	-	-	-	- / -
2010	-	-	-	-	-	-	-	-	- / -
2014	-	-	-	-	-	-	-	-	- / -
2018	-	-	-	-	-	-	-	-	- / -
2022	20	20	100	0	0	0	0	0	- / -
<b>Purshia tridentata<sup>p</sup> -- (antelope bitterbrush)</b>									
2006	340	-	24	47	29	47	0	18	43/92
2009	-	-	-	-	-	-	-	-	41/106
2010	460	-	0	100	0	56	22	0	46/124
2014	620	-	3	97	0	19	77	0	48/117
2018	420	-	0	100	0	5	91	5	54/171
2022	680	-	15	79	6	12	88	6	- / -
<b>Quercus gambelii<sup>p</sup> -- (Gambel oak)</b>									
2006	780	420	49	46	5	0	0	5	70/76
2009	-	-	-	-	-	-	-	-	- / -
2010	-	-	-	-	-	-	-	-	- / -
2014	-	-	-	-	-	-	-	-	- / -
2018	-	-	-	-	-	-	-	-	34/53
2022	-	-	-	-	-	-	-	-	- / -
<b>Symphoricarpos oreophilus<sup>p</sup> -- (mountain snowberry)</b>									
2006	40	-	0	100	0	0	0	0	28/44
2009	-	-	-	-	-	-	-	-	76/128
2010	80	-	25	75	0	0	0	0	67/127
2014	40	-	0	100	0	0	0	0	41/64
2018	-	-	-	-	-	-	-	-	57/122
2022	20	-	100	0	0	0	0	100	- / -
<b>Tetradymia canescens -- (spineless horsebrush)</b>									
2006	-	-	-	-	-	-	-	-	- / -
2009	-	-	-	-	-	-	-	-	- / -
2010	20	-	0	100	0	0	0	0	15/37
2014	20	-	0	100	0	0	0	0	- / -
2018	20	-	0	100	0	0	0	0	17/41

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

**Table 10R-36.14 - Tree Characteristics.** Point-quarter tree density, size class distribution, and average diameter.

Year	Density	Size Class Distribution					Average Diameter (cm)
	Trees per Acre	Seedling (%)	1-4' (%)	4-8' (%)	8-12' (%)	>12' (%)	
<b>Juniperus osteosperma (Utah juniper)</b>							
2006	166	28	39	6	11	17	7.2
2009	65	81	19	-	-	-	1.9
2010	87	44	56	-	-	-	2.3
2014	151	38	54	8	-	-	3.0
2018	66	40	60	-	-	-	1.9
2022	84	19	75	6	-	-	2.9
<b>Pinus edulis (twoneedle pinyon)</b>							
2006	608	25	35	10	20	10	8.2
2009	123	58	42	-	-	-	2.0
2010	105	53	47	-	-	-	1.8
2014	208	16	84	-	-	-	2.2
2018	41	75	25	-	-	-	1.5
2022	53	43	57	-	-	-	1.9
<b>Pseudotsuga menziesii (Douglas-fir)</b>							
2018	17	100	-	-	-	-	1.0

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



### Location Information

USGS 7.5 min Map Info  
GPS (0' Stake)

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

### Transect Information

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

### Directions to Site

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

**Site Information**

Land Ownership	Federal
Land Administrator	BLM
Allotment	ATCHEE RIDGE AMP
Elevation	7,600ft (2,316m)
Aspect	Northeast
Slope	1-8%
Sample Dates	07/17/2007, 08/03/2011, 08/19/2014, 08/27/2018, 08/03/2022

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

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

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

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

**Wildlife Habitat and Vegetation History**

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

Species	Habitat	Season
American Bison	potential	year-long
Mule Deer	crucial	summer
Rocky Mountain Elk	crucial	summer

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

Year	Vegetation Type	Woodland Succession
2007	Pinyon	Phase II
2011	Perennial Grass-Forb	Phase I
2014	Perennial Grass-Forb	Phase I
2018	Perennial Grass-Forb/Mixed Browse	Phase I
2022	Perennial Grass-Forb/Mixed Browse	Phase I

**Site Notes**

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

**Soils**

**Table 10R-39.5 - Soil Analysis Data.** List of chemical and textural soil characteristics determined by laboratory analysis.

Texture	pH	%sand	%silt	%clay	%OM	PPM P	PPM K	ds/m	Sample Date
Loam	6.8	45.1	34.4	20.5	5.5	11.1	86.4	0.8	07/17/2007

**Site Potential**

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

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

**Trend Summary Tables**

**Table 10R-39.6 - Shrub/Tree Summary.** Average modified Daubenmire quadrat and line intercept cover by year for shrubs/trees

Year	Quadrat Cover (%)			Line-intercept Cover (%)		
	Preferred Shrub	Other Shrub	Tree	Preferred Shrub	Other Shrub	Tree
2007	12.6	0.2	8.3	20.6	0.4	22.5
2011	3.3	0.4	-	4.9	0.6	-
2014	6.0	1.2	-	9.8	1.9	-
2018	5.5	1.6	-	8.1	1.5	-
2022	8.7	6.7	-	12.0	7.4	-

**Table 10R-39.7 - Herbaceous Summary.** Nested frequency and average modified Daubenmire quadrat cover by year for herbaceous functional groups

Year	Nested Frequency				Quadrat Cover (%)			
	Annual Grass	Perennial Grass	Annual/Biennial Forb	Perennial Forb	Annual Grass	Perennial Grass	Annual/Biennial Forb	Perennial Forb
2007	40	238	57	250	0.5	7.6	0.2	7.4
2011	41	159	61	162	1.3	10.2	2.6	7.2
2014	182	254	145	171	8.2	16.5	3.1	6.2
2018	31	375	23	149	0.2	17.4	0.1	3.8
2022	37	353	75	161	0.2	25.0	0.3	4.8

**Table 10R-39.8 - Basic Ground Cover.** Average modified Daubenmire quadrat cover by year for basic ground cover types.

Year	Cover Type (%)					
	Bare Ground	Cryptogams	Litter	Pavement	Rock	Vegetation
2007	21.2	2.3	52.5	1.7	1.8	38.2
2011	59.2	-	9.8	12.1	2.7	27.4
2014	34.6	-	36.8	1.5	4.9	42.4
2018	40.9	0.7	37.1	6.6	4.3	25.0
2022	37.3	0.0	33.0	11.3	5.1	42.7

**Table 10R-39.9 - Pellet Group Data.** Quadrat frequency and pellet group transect data for animal pellets. Rabbit pellet groups are not sampled in the pellet group transect.

Year	Cattle	Mule Deer	Rocky Mountain Elk	Rabbit
	Quadrat Frequency			
2007	1	9	21	24
2011	-	-	9	-
2014	1	2	20	11
2018	4	13	12	2
2022	2	2	7	1
Year	Days Use Per Acre (ha)			
2007	1.5 (3.6)	8.1 (19.9)	84.5 (208.6)	-
2011	-	15.4 (38.1)	3.4 (8.3)	-
2014	10.2 (25.1)	5.3 (13.2)	23.4 (57.9)	-
2018	15.3 (37.7)	8.1 (19.9)	11.4 (28.1)	-
2022	2.9 (7.2)	20.1 (49.7)	9.4 (23.2)	-

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

GRASS SPECIES	Achnatherum hymenoides (Indian ricegrass)	Agropyron cristatum <sup>i</sup> (crested wheatgrass)	Bouteloua gracilis (blue grama)	Bromus arvensis <sup>ai</sup> (field brome)	Bromus tectorum <sup>ai</sup> (cheatgrass)	Carex obtusata (obtuse sedge)	Carex rossii (Ross' sedge)	Dactylis glomerata <sup>i</sup> (orchardgrass)	Elymus elymoides (squirreltail)	Elymus lanceolatus (thickspike wheatgrass)	Elymus trachycaulus (slender wheatgrass)	Hesperostipa comata (needle and thread)	Koeleria macrantha (prairie Junegrass)	Leymus cinereus (basin wildrye)	Poa fendleriana (muttongrass)	Poa pratensis <sup>i</sup> (Kentucky bluegrass)	Poa secunda (Sandberg bluegrass)
year	Nested Frequency																
2007	4	-	23	-	40	-	66	-	22	80	-	36	21	-	71	-	38
2011	0	8	10	-	41	-	30	-	0	128	-	12	8	-	5	1	10
2014	10	56	24	4	178	-	20	4	2	88	19	29	2	8	19	-	25
2018	5	112	48	-	31	84	23	13	70	138	3	1	10	-	46	4	31
2022	8	79	3	1	36	16	28	-	29	203	-	47	31	0	74	-	12
year	Average Cover (%)																
2007	0.1	-	0.5	-	0.5	-	1.1	-	0.2	1.1	-	1.6	0.8	-	1.9	-	0.3
2011	0.1	0.4	0.4	-	1.3	-	0.6	-	0.0	6.8	-	0.8	0.2	-	0.5	0.0	0.5
2014	0.4	2.8	0.9	0.0	8.2	-	0.5	0.0	0.0	4.9	0.9	2.2	0.1	0.1	0.2	-	1.2
2018	0.2	4.9	1.8	-	0.2	2.1	1.2	0.2	0.9	2.5	0.1	0.0	0.1	-	1.2	0.2	0.3
2022	0.1	3.7	0.4	0.0	0.2	0.3	0.7	-	1.3	12.0	-	1.7	0.9	0.0	2.3	-	0.7

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

GRASS SPECIES		
	Psathyrostachys juncea <sup>i</sup> (Russian wildrye)	
	Pseudoroegneria spicata (bluebunch wheatgrass)	
year	Nested	
2007	-	2
2011	-	-
2014	9	33
2018	27	14
2022	12	17
year	Average Cover (%)	
2007	-	0.0
2011	-	-
2014	0.2	2.2
2018	1.0	0.8
2022	0.2	0.8

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

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

FORB SPECIES																		
Agoseris glauca (pale agoseris)																		
Alyssum desertorum <sup>ai</sup> (desert madwort)																		
Androsace septentrionalis <sup>ai</sup> (pygmyflower rockjasmine)																		
Antennaria (pussytoes)																		
Arabis (rockcress)																		
Artemisia ludoviciana (white sagebrush)																		
Astragalus (milkvetch)																		
Astragalus utahensis (Utah milkvetch)																		
Balsamorhiza sagittata (arrowleaf balsamroot)																		
Calochortus nuttallii (sego lily)																		
Castilleja flava (yellow Indian paintbrush)																		
Castilleja linariifolia (Wyoming Indian paintbrush)																		
Ceratocephala testiculata <sup>ai</sup> (curvseed butterwort)																		
Chaenactis douglasii (Douglas' dustymaiden)																		
Chenopodium fremontii <sup>a</sup> (Fremont's goosefoot)																		
Chenopodium leptophyllum <sup>a</sup> (narrowleaf goosefoot)																		
Cirsium (thistle)																		
year	Nested Frequency																	
2007	2	-	-	44	20	4	8	-	1	-	-	8	-	-	-	-	-	-
2011	0	-	1	27	-	-	7	10	-	1	1	-	-	2	2	15	-	-
2014	-	2	-	11	4	-	-	3	-	2	-	-	-	-	4	-	0	-
2018	-	-	-	5	-	-	4	-	-	-	-	-	5	-	2	1	-	-
2022	5	27	-	5	-	-	-	-	-	-	-	-	22	-	3	-	-	-
year	Average Cover (%)																	
2007	0.0	-	-	1.2	0.0	0.0	0.0	-	0.1	-	-	0.1	-	-	-	-	-	-
2011	0.0	-	0.0	1.0	-	-	0.5	0.1	-	0.0	0.0	-	-	0.0	0.0	1.3	-	-
2014	-	0.0	-	0.3	0.0	-	-	0.1	-	0.0	-	-	-	-	0.0	-	0.0	0.0
2018	-	-	-	0.1	-	-	0.0	-	-	-	-	-	0.0	-	0.0	0.0	-	-
2022	0.0	0.1	-	0.2	-	-	-	-	-	-	-	-	0.0	-	0.0	-	-	-

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



FORB SPECIES	Collinsia parviflora <sup>a</sup> (maiden blue eyed Mary)	Comandra umbellata (bastard toadflax)	Crepis acuminata (tapertip hawkbeard)	Cryptantha (cryptantha)	Delphinium ×occidentale (western larkspur)	Descurainia pinnata <sup>a</sup> (western tansymustard)	Erigeron (fleabane)	Erigeron eatonii (Eaton's fleabane)	Erigeron pumilus (shaggy fleabane)	Erigonum alatum (winged buckwheat)	Erigonum umbellatum (sulphur-flower buckwheat)	Gayophytum ramosissimum <sup>a</sup> (pinyon groundsmoke)	Gilia inconspicua <sup>a</sup> (shy gilia)	Grindelia squarrosa (curlycup gumweed)	Heterotheca villosa (hairy false goldenaster)	Ipomopsis aggregata (scarlet gilia)	Lappula occidentalis <sup>a</sup> (flatspine stickseed)
year	Nested Frequency																
2007	2	11	10	4	6	-	23	-	5	15	-	7	19	-	0	45	-
2011	1	16	16	-	-	-	1	1	-	-	2	26	-	0	-	-	-
2014	-	11	-	-	-	74	-	-	1	-	1	7	-	-	7	-	21
2018	-	4	-	1	-	-	-	1	1	-	-	-	-	-	14	-	15
2022	-	6	13	4	-	-	-	2	7	-	-	6	-	3	7	-	26
year	Average Cover (%)																
2007	0.0	0.3	0.2	0.1	0.0	-	0.2	-	0.0	0.2	-	0.0	0.1	-	0.0	0.2	-
2011	0.0	0.1	0.2	-	-	-	0.0	0.0	-	-	0.0	0.7	-	0.1	-	-	-
2014	-	0.1	-	-	-	0.9	-	-	0.0	-	0.0	0.1	-	-	0.3	-	0.4
2018	-	0.0	-	0.0	-	-	-	0.0	0.0	-	-	-	-	-	0.5	-	0.1
2022	-	0.1	0.1	0.0	-	-	-	0.0	0.2	-	-	0.0	-	0.1	1.1	-	0.1

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

FORB SPECIES	Linum perenne <sup>i</sup> (blue flax)	Lupinus argenteus (silvery lupine)	Machaeranthera canescens (hoary tansyaster)	Machaeranthera grindelioides (rayless tansyaster)	Medicago sativa <sup>i</sup> (alfalfa)	Microsteris gracilis <sup>a</sup> (slender phlox)	Onobrychis viciifolia <sup>i</sup> (sainfoin)	Packera multilobata (lobeleaf groundsel)	Penstemon (beardtongue)	Penstemon caespitosus (mat penstemon)	Penstemon pachyphyllus (thickleaf beardtongue)	Penstemon watsonii (Watson's penstemon)	Phlox austromontana (mountain phlox)	Phlox longifolia (longleaf phlox)	Polygonum douglasii <sup>a</sup> (Douglas' knotweed)	Sanguisorba minor <sup>i</sup> (small burnet)	Schoenocrambe limifolia (flaxleaf plainsmustard)
year	Nested Frequency																
2007	-	-	4	-	-	5	-	1	83	-	-	11	64	65	23	-	3
2011	13	2	-	-	10	-	21	10	45	-	-	10	11	46	33	10	-
2014	58	-	1	3	15	38	11	1	19	-	-	10	25	3	-	1	20
2018	54	-	8	-	11	-	1	3	1	1	-	24	36	-	2	-	-
2022	3	3	4	-	8	3	-	5	2	2	3	39	44	39	5	-	-
year	Average Cover (%)																
2007	-	-	0.0	-	-	0.0	-	0.0	2.2	-	-	0.2	1.5	0.5	0.1	-	0.0
2011	0.3	0.0	-	-	0.1	-	0.3	0.1	2.4	-	-	1.0	0.1	0.5	0.5	0.1	-
2014	0.5	-	0.0	0.0	0.8	1.0	0.3	0.0	0.3	-	-	0.4	2.2	0.0	-	0.0	0.5
2018	0.6	-	0.2	-	0.1	-	0.0	0.0	0.0	0.0	-	0.2	1.5	-	0.0	-	-
2022	0.0	0.1	0.0	-	0.1	0.0	-	0.0	0.0	0.0	0.0	0.9	1.4	0.2	0.0	-	-

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

FORB SPECIES	Nested Frequency							
<i>Sedum lanceolatum</i> (spearleaf stonecrop)	5	12	-	11	2	-	-	2
<i>Senecio integerrimus</i> <sup>a</sup> (lambstongue ragwort)	-	-	-	8	-	3	-	1
<i>Sisymbrium altissimum</i> <sup>ai</sup> (tall tumblemustard)	-	2	32	25	-	3	-	-
<i>Sphaeralcea coccinea</i> (scarlet globemallow)	-	-	-	37	-	6	1	-
<i>Stenotus acaulis</i> (stemless mock goldenweed)	-	1	2	21	-	-	-	-
<i>Taraxacum officinale</i> (common dandelion)	-	-	-	-	-	-	-	-
<i>Tragopogon dubius</i> <sup>ai</sup> (yellow salsify)	-	-	-	-	-	-	-	-
<i>Zigadenus paniculatus</i> (foothill deathcamas)	-	-	-	-	-	-	-	-

year	Average Cover (%)							
2007	0.0	0.0	-	0.1	0.0	-	-	0.0
2011	-	-	-	0.0	-	0.0	-	0.0
2014	-	0.0	0.8	0.5	-	0.0	-	-
2018	-	-	-	0.4	-	0.0	0.0	-
2022	-	0.0	0.0	0.2	-	-	-	-

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

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

SHRUB SPECIES	Line Intercept Cover (%)																
<i>Amelanchier utahensis</i> <sup>p</sup> (Utah serviceberry)	8.1	5.6	1.4	0.1	0.2	-	-	0.1	0.6	0.1	0	21.9	2.9	0.7	1.8	-	
<i>Artemisia tridentata</i> ssp. <i>vaseyana</i> <sup>p</sup> (mountain big sagebrush)	2.6	-	-	-	0.6	-	-	-	-	-	-	-	0.2	1.2	0.9	-	
<i>Cercocarpus montanus</i> <sup>p</sup> (alderleaf mountain mahogany)	5.2	-	-	-	1.9	-	-	-	-	-	-	-	0.7	2.4	1.5	-	
<i>Chrysothamnus depressus</i> <sup>p</sup> (longflower rabbitbrush)	3.2	0.6	0.2	-	1.5	-	-	-	-	-	-	-	0.1	1.5	2.5	-	
<i>Chrysothamnus viscidiflorus</i> ssp. <i>viscidiflorus</i> var. <i>viscidiflorus</i> (yellow rabbitbrush)	2022	6.5	1	-	6.8	0.4	-	0.2	-	-	-	-	0.5	1.5	2.5	-	
<i>Ericameria nauseosa</i> (rubber rabbitbrush)	Quadrat Cover (%)																
<i>Ericameria nauseosa</i> ssp. <i>nauseosa</i> var. <i>speciosa</i> <sup>p</sup> (rubber rabbitbrush)	2007	4.2	4.1	0.9	0.1	0.0	-	0.1	0.2	0.4	0.0	0.0	7.9	2.1	0.2	0.8	0.0
<i>Gutierrezia sarothrae</i> (broom snakeweed)	2011	1.8	0.0	-	-	0.4	-	-	-	-	-	-	-	0.2	1.3	0.1	-
<i>Juniperus osteosperma</i> <sup>i</sup> (Utah juniper)	2014	3.5	0.0	0.0	0.0	1.2	-	-	-	-	-	-	-	0.2	1.3	1.1	-
<i>Opuntia fragilis</i> (brittle pricklypear)	2018	2.8	0.0	0.1	0.0	1.6	-	-	0.0	-	-	-	-	0.1	1.4	0.9	-
<i>Pediocactus simpsonii</i> (mountain ball cactus)	2022	5.4	0.2	0.0	0.0	6.4	0.0	-	0.3	-	0.0	-	-	0.2	1.6	1.2	-
<i>Pinus edulis</i> <sup>i</sup> (twoneedle pinyon)																	
<i>Purshia tridentata</i> <sup>p</sup> (antelope bitterbrush)																	
<i>Quercus gambelii</i> <sup>p</sup> (Gambel oak)																	
<i>Symphoricarpos oreophilus</i> <sup>p</sup> (mountain snowberry)																	
<i>Tetradymia canescens</i> (spineless horsebrush)																	

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

**Table 10R-39.13 - Shrub/Tree Characteristics.** Population characteristics of shrub/tree species populations including density reproduction (seedlings), age distribution, utilization, vigor and average size (height/crown) of plants.

Year	Density		Age Class Distribution			Utilization		Poor Vigor (%)	Average Height Crown (cm)
	Plants Per Acre		Excluding Seedlings			Moderate (%)	Heavy (%)		
	Excluding Seedlings	Seedling	Young (%)	Mature (%)	Decadent (%)				
<b>Amelanchier utahensis<sup>P</sup> -- (Utah serviceberry)</b>									
2007	1160	140	29	69	2	28	0	3	101/97
2011	800	400	80	20	0	3	10	3	47/75
2014	800	80	15	85	0	60	18	3	64/90
2018	540	-	4	96	0	44	44	7	60/99
2022	920	120	15	85	0	26	46	2	- / -
<b>Artemisia frigida<sup>P</sup> -- (prairie sagewort)</b>									
2007	-	-	-	-	-	-	-	-	-/-
2011	-	-	-	-	-	-	-	-	-/-
2014	-	-	-	-	-	-	-	-	-/-
2018	20	-	0	100	0	100	0	0	7/20
2022	20	-	0	100	0	0	0	0	- / -
<b>Artemisia tridentata ssp. vaseyana<sup>P</sup> -- (mountain big sagebrush)</b>									
2007	1920	320	2	52	46	33	4	21	55/69
2011	-	160	0	0	0	0	0	0	28/63
2014	80	-	25	75	0	25	25	0	32/49
2018	140	-	43	57	0	29	0	14	42/72
2022	640	20	69	31	0	44	0	6	- / -
<b>Cercocarpus montanus<sup>P</sup> -- (alderleaf mountain mahogany)</b>									
2007	440	-	46	46	9	27	5	5	119/101
2011	60	20	67	33	0	33	33	0	35/51
2014	20	-	0	100	0	100	0	0	50/58
2018	60	-	0	100	0	33	67	0	60/67
2022	40	-	0	100	0	50	50	0	- / -
<b>Chrysothamnus depressus<sup>P</sup> -- (longflower rabbitbrush)</b>									
2007	280	20	0	93	7	29	29	7	15/23
2011	-	-	-	-	-	-	-	-	15/30
2014	20	-	0	100	0	0	0	0	12/19
2018	60	-	0	100	0	0	33	33	6/17
2022	60	-	0	100	0	67	0	67	- / -
<b>Chrysothamnus viscidiflorus ssp. viscidiflorus var. viscidiflorus -- (yellow rabbitbrush)</b>									
2007	100	-	0	100	0	0	0	0	37/33
2011	100	-	0	100	0	0	0	0	37/52
2014	900	-	51	49	0	11	2	2	40/64
2018	1460	-	4	44	52	22	21	80	30/52
2022	3040	-	0	100	0	0	0	5	- / -
<b>Ericameria nauseosa -- (rubber rabbitbrush)</b>									
2007	-	-	-	-	-	-	-	-	-/-
2011	-	-	-	-	-	-	-	-	-/-
2014	-	-	-	-	-	-	-	-	67/56
2018	-	-	-	-	-	-	-	-	37/59
2022	20	-	0	100	0	0	0	0	- / -
<b>Ericameria nauseosa ssp. nauseosa var. speciosa<sup>P</sup> -- (rubber rabbitbrush)</b>									
2007	100	-	0	100	0	0	0	0	43/60
2011	-	-	-	-	-	-	-	-	-/-
2014	-	-	-	-	-	-	-	-	80/77
2018	20	-	0	100	0	0	100	0	59/84
2022	-	-	-	-	-	-	-	-	-/-

Year	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	60	-	0	67	33	0	0	33	15/19
2011	-	-	-	-	-	-	-	-	23/29
2014	-	-	-	-	-	-	-	-	25/30
2018	40	-	0	50	50	0	0	50	13/25
2022	100	20	0	60	40	0	0	60	- / -
<b>Juniperus osteosperma<sup>1</sup> -- (Utah juniper)</b>									
2007	80	-	75	25	0	0	0	0	- / -
2011	-	-	-	-	-	-	-	-	- / -
2014	-	-	-	-	-	-	-	-	- / -
2018	-	-	-	-	-	-	-	-	- / -
2022	-	-	-	-	-	-	-	-	- / -
<b>Opuntia fragilis -- (brittle pricklypear)</b>									
2007	80	-	0	100	0	0	0	0	7/21
2011	40	-	100	0	0	0	0	0	- / -
2014	20	-	0	100	0	0	0	0	9/16
2018	-	-	-	-	-	-	-	-	11/45
2022	160	-	75	25	0	0	0	25	- / -
<b>Pediocactus simpsonii -- (mountain ball cactus)</b>									
2007	20	-	0	100	0	0	0	0	- / -
2011	-	-	-	-	-	-	-	-	5/7
2014	-	-	-	-	-	-	-	-	- / -
2018	-	-	-	-	-	-	-	-	- / -
2022	-	-	-	-	-	-	-	-	- / -
<b>Pinus edulis<sup>t</sup> -- (twoneedle pinyon)</b>									
2007	480	100	63	33	4	0	4	4	- / -
2011	-	-	-	-	-	-	-	-	- / -
2014	-	-	-	-	-	-	-	-	- / -
2018	-	-	-	-	-	-	-	-	- / -
2022	-	-	-	-	-	-	-	-	- / -
<b>Purshia tridentata<sup>p</sup> -- (antelope bitterbrush)</b>									
2007	560	-	7	89	4	54	7	0	43/73
2011	60	140	33	67	0	0	0	67	44/89
2014	100	-	20	80	0	40	20	20	39/71
2018	100	-	0	100	0	0	80	20	34/88
2022	240	40	0	100	0	58	42	8	- / -
<b>Quercus gambelii<sup>p</sup> -- (Gambel oak)</b>									
2007	660	-	94	6	0	0	0	0	133/57
2011	340	-	100	0	0	100	0	0	33/42
2014	1180	-	9	92	0	37	20	0	78/62
2018	520	-	8	92	0	0	0	0	67/56
2022	140	-	0	86	14	100	0	0	- / -
<b>Sambucus<sup>p</sup> -- (elderberry)</b>									
2007	-	-	-	-	-	-	-	-	- / -
2011	-	-	-	-	-	-	-	-	- / -
2014	40	-	0	100	0	50	0	0	69/71
2018	-	-	-	-	-	-	-	-	96/56
2022	-	-	-	-	-	-	-	-	- / -
<b>Symphoricarpos oreophilus<sup>p</sup> -- (mountain snowberry)</b>									
2007	2040	40	36	64	0	0	0	0	31/54
2011	60	-	0	100	0	0	0	0	29/69
2014	440	-	5	91	5	50	14	27	31/83
2018	800	-	3	95	3	15	28	20	41/75
2022	500	-	8	88	4	4	32	4	- / -

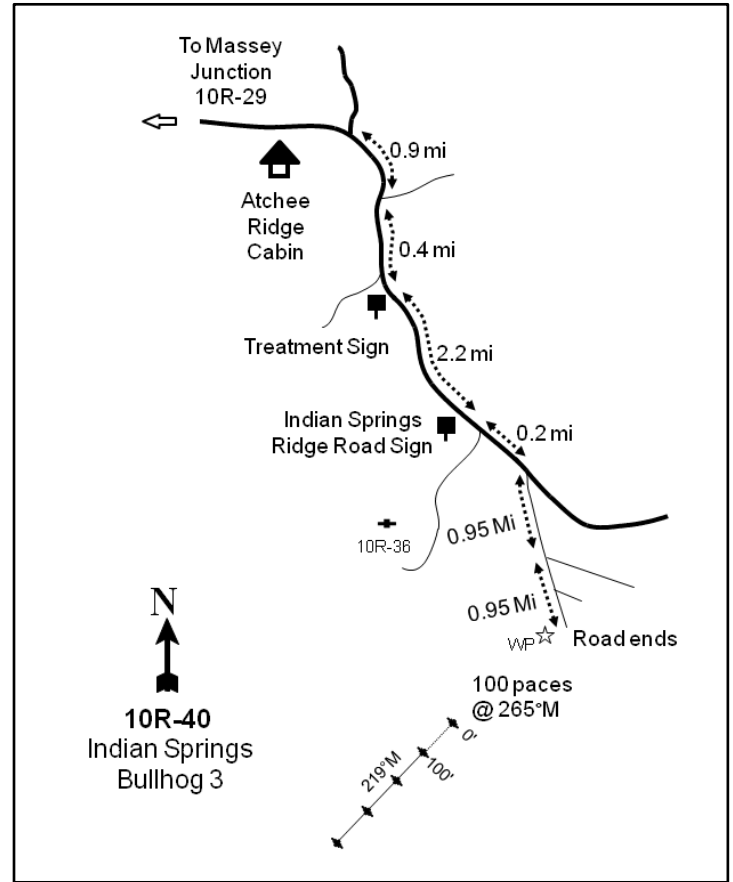
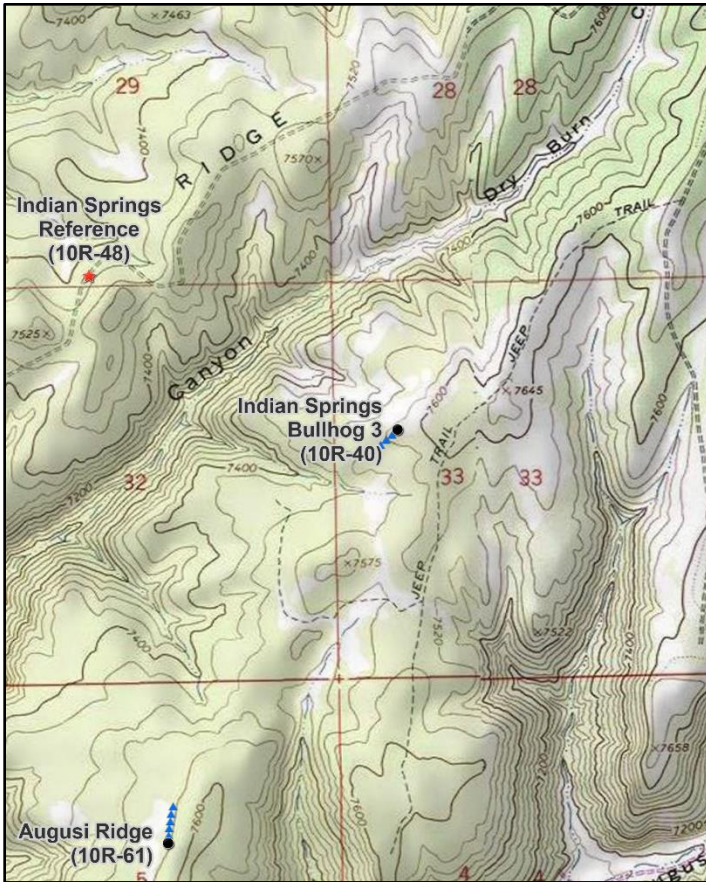
Year	Density		Age Class Distribution			Utilization		Poor Vigor (%)	Average Height Crown (cm)
	Plants Per Acre		Excluding Seedlings			Moderate (%)	Heavy (%)		
	Excluding Seedlings	Seedling	Young (%)	Mature (%)	Decadent (%)				
Tetradymia canescens -- (spineless horsebrush)									
2007	20	-	0	100	0	0	0	0	15/18
2011	20	-	100	0	0	0	0	0	15/23
2014	-	-	-	-	-	-	-	-	16/22

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

**Table 10R-39.14 - Tree Characteristics.** Point-quarter tree density, size class distribution, and average diameter.

Year	Density	Size Class Distribution					Average Diameter (cm)
	Trees per Acre	Seedling (%)	1-4' (%)	4-8' (%)	8-12' (%)	>12' (%)	
Juniperus osteosperma (Utah juniper)							
2007	28	-	45	27	27	-	8.6
2011	2	-	100	-	-	-	3.0
Pinus edulis (twoneedle pinyon)							
2007	245	6	29	6	47	12	11.7
2011	5	50	-	-	25	25	11.5
2018	4	-	-	-	100	-	19.0
2022	1	-	-	-	100	-	24.0

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



### Location Information

USGS 7.5 min Map Info  
GPS (0' Stake)

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

### Transect Information

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

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

### Directions to Site

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

**Site Information**

Land Ownership	Federal
Land Administrator	BLM
Allotment	ATCHEE RIDGE AMP
Elevation	7,600ft (2,316m)
Aspect	Southwest
Slope	3-7%
Sample Dates	07/17/2007, 08/02/2011, 08/19/2014, 08/29/2018, 08/02/2022

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

Treatment/Disturbance	Name	WRI DB#	Date	Size (acres)
Hand Crew - Lop and Scatter	Indian Springs Bullhog Maintenance	2640	May 2014	610
Mechanical - Bullhog	Indian Springs Bullhog Phase 2	677	June-July 2009	350

**Wildlife Habitat and Vegetation History**

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

Species	Habitat	Season
American Bison	potential	year-long
Mule Deer	substantial	summer
Rocky Mountain Elk	crucial	summer

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

Year	Vegetation Type	Woodland Succession
2007	Pinyon	Phase II transitioning to Phase III
2011	Perennial Grass	Phase I
2014	Perennial Grass	Phase I
2018	Perennial Grass/Mixed Browse	Phase I
2022	Perennial Grass/Mixed Browse	Phase I

**Site Notes**

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

**Soils**

**Table 10R-40.5 - Soil Analysis Data.** List of chemical and textural soil characteristics determined by laboratory analysis.

Texture	pH	%sand	%silt	%clay	%OM	PPM P	PPM K	ds/m	Sample Date
Loam	6.8	42.1	35.4	22.5	6.3	27.8	185.6	1.2	07/17/2007

**Site Potential**

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

When the study was established in 2007, this site was considered to be within Phase II transitioning to Phase III of woodland succession, being dominated by mainly twoneedle pinyon (*Pinus edulis*) with a robust component of Utah juniper (*Juniperus osteosperma*) and true mountain mahogany (*Cercocarpus montanus*). Other browse species were present, but they provided little cover. A bullhog treatment in 2009 (Table 10R-40.1) removed much of the shrub and tree components. Shrub cover has increased over the post-treatment sample years, and they are becoming a major component of the site as of 2022 (Table 10R-40.4, Table 10R-40.12, Table 10R-40.13). Prior to treatment, the herbaceous understory was diverse, but not particularly abundant. Perennial grass cover increased following the bullhog project, and it has been a (co-)dominant vegetation component since 2011. The introduced annual grass species cheatgrass (*Bromus tectorum*) has been observed in low to moderate amounts since 2011, and may pose a threat to the site's ecological resilience should it increase in the future (Table 10R-40.7, Table 10R-40.10, Table 10R-40.11). Although density is low as of 2022, trees have maintained a post-treatment presence on site (Table 10R-40.14), indicating that infilling may occur over time.



**Trend Summary Tables**

**Table 10R-40.6 - Shrub/Tree Summary.** Average modified Daubenmire quadrat and line intercept cover by year for shrubs/trees

Year	Quadrat Cover (%)			Line-intercept Cover (%)		
	Preferred Shrub	Other Shrub	Tree	Preferred Shrub	Other Shrub	Tree
2007	3.8	-	7.4	8.0	-	33.3
2011	3.1	-	-	2.7	-	-
2014	3.6	0.3	-	4.5	0.5	-
2018	6.5	1.2	-	7.4	1.3	0.2
2022	11.4	3.4	0.0	12.1	3.7	0.7

**Table 10R-40.7 - Herbaceous Summary.** Nested frequency and average modified Daubenmire quadrat cover by year for herbaceous functional groups

Year	Nested Frequency				Quadrat Cover (%)			
	Annual Grass	Perennial Grass	Annual/Biennial Forb	Perennial Forb	Annual Grass	Perennial Grass	Annual/Biennial Forb	Perennial Forb
2007	-	84	5	106	-	2.2	0.0	1.7
2011	10	98	20	101	0.4	7.6	0.6	3.5
2014	177	311	34	92	5.2	21.9	0.8	2.4
2018	50	349	9	111	0.4	16.3	0.1	3.1
2022	86	318	30	159	0.4	15.6	0.4	5.3

**Table 10R-40.8 - Basic Ground Cover.** Average modified Daubenmire quadrat cover by year for basic ground cover types.

Year	Cover Type (%)					
	Bare Ground	Cryptogams	Litter	Pavement	Rock	Vegetation
2007	13.2	0.4	63.3	18.0	2.0	15.4
2011	5.7	-	76.4	5.7	0.1	15.2
2014	7.4	0.0	77.7	3.4	-	32.7
2018	6.3	0.0	77.6	6.0	-	23.6
2022	3.7	-	72.5	10.7	0.0	32.9

**Table 10R-40.9 - Pellet Group Data.** Quadrat frequency and pellet group transect data for animal pellets. Rabbit pellet groups are not sampled in the pellet group transect.

Year	Cattle	Mule Deer	Rocky Mountain Elk	Rabbit
	Quadrat Frequency			
2007	-	6	6	18
2011	1	5	6	-
2014	-	8	20	1
2018	3	10	22	1
2022	1	22	21	7
Year	Days Use Per Acre (ha)			
2007	-	11.4 (28.1)	15.4 (38.1)	-
2011	-	8.7 (21.5)	2.7 (6.6)	-
2014	1.5 (3.6)	10.7 (26.5)	28.1 (69.5)	-
2018	9.4 (23.3)	20.1 (49.7)	47.6 (117.5)	-
2022	1.5 (3.6)	14.1 (34.8)	18.1 (44.7)	-

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

GRASS SPECIES	Achnatherum hymenoides (Indian ricegrass)	Bouteloua gracilis (blue grama)	Bromus tectorum <sup>ai</sup> (cheatgrass)	Carex rossii (Ross' sedge)	Elymus elymoides (squirreltail)	Hesperostipa comata (needle and thread)	Koeleria macrantha (prairie Junegrass)	Piptatheropsis micrantha (littelseed ricegrass)	Poa fendleriana (muttongrass)
year	Nested Frequency								
2007	-	-	-	47	-	-	-	-	41
2011	4	14	10	39	12	3	13	-	30
2014	17	20	177	57	212	-	5	1	94
2018	19	40	50	77	254	-	22	1	54
2022	54	33	86	22	245	-	1	3	52
year	Average Cover (%)								
2007	-	-	-	1.0	-	-	-	-	1.1
2011	1.9	0.7	0.4	2.2	0.5	0.0	0.8	-	1.5
2014	3.2	2.2	5.2	5.3	7.5	-	0.6	0.1	2.9
2018	0.7	2.4	0.4	4.4	6.8	-	0.4	0.1	1.4
2022	2.4	2.5	0.4	0.8	8.8	-	0.0	0.0	1.0

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

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

FORB SPECIES	Achillea millefolium (Common yarrow)	Amaranthus retroflexus <sup>a</sup> (redroot amaranth)	Antennaria parvifolia (small-leaf pussytoes)	Arabis holboellii <sup>a</sup> (Holboell's rockcress)	Chaenactis douglasii (Douglas' dustymaiden)	Chenopodium fremontii <sup>a</sup> (Fremont's goosefoot)	Chenopodium leptophyllum <sup>a</sup> (narrowleaf goosefoot)	Cirsium vulgare <sup>ai</sup> (bull thistle)	Descurainia pinnata <sup>a</sup> (western tansymustard)	Erigeron eatonii (Eaton's fleabane)	Heterotheca villosa (hairy false goldenaster)	Ipomopsis aggregata (scarlet gilia)	Lesquerella (bladderpod)	Machaeranthera canescens (hoary tansyaster)	Machaeranthera grindelioides (rayless tansyaster)	Nicotiana attenuata <sup>a</sup> (coyote tobacco)	Packera multilobata (lobeleaf groundsel)
year	Nested Frequency																
2007	-	-	2	5	7	-	-	-	-	17	-	-	6	-	1	-	-
2011	-	-	2	14	27	3	-	-	-	7	-	-	17	-	-	0	5
2014	-	0	22	6	2	6	-	17	-	2	-	1	3	-	16	-	2
2018	-	-	22	2	25	3	-	4	-	4	4	-	4	-	-	-	3
2022	2	-	26	4	25	7	3	1	8	15	23	3	1	2	5	-	2
year	Average Cover (%)																
2007	-	-	0.0	0.0	0.1	-	-	-	-	0.1	-	-	0.0	-	0.0	-	-
2011	-	-	0.0	0.3	0.4	0.0	-	-	-	0.0	-	-	0.3	-	-	0.0	0.1
2014	-	0.1	0.6	0.0	0.0	0.0	-	0.2	-	0.0	-	0.0	0.0	-	0.1	-	0.0
2018	-	-	0.7	0.0	0.2	0.0	-	0.0	-	0.0	0.0	-	0.0	-	-	-	0.0
2022	0.0	-	1.3	0.2	0.3	0.0	0.0	0.2	0.0	0.3	0.9	0.0	0.0	0.0	0.1	-	0.0

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

FORB SPECIES	Penstemon caespitosus (mat penstemon)	Penstemon pachyphyllus (thickleaf beardtongue)	Penstemon watsonii (Watson's penstemon)	Petroradia pumila (rock goldenrod)	Phlox austromontana (mountain phlox)	Polygonum douglasii <sup>a</sup> (Douglas' knotweed)	Salsola tragus <sup>ai</sup> (prickly Russian thistle)	Senecio spartioides (broom-like ragwort)	Sisymbrium altissimum <sup>ai</sup> (tall tumblemustard)	Sphaeralcea coccinea (scarlet globemallow)	Sphaeralcea grossularifolia (gooseberryleaf globemallow)	Symphotrichum (aster)	Taraxacum officinale (common dandelion)	Tetradneuris acaulis (stemless four-nerve daisy)	Tragopogon dubius <sup>ai</sup> (yellow salsify)
year	Nested Frequency														
2007	5	9	3	14	62	-	-	-	-	-	-	-	-	-	-
2011	5	9	19	-	28	-	-	9	3	-	-	1	-	2	-
2014	-	9	13	4	34	-	1	-	5	-	5	-	1	2	-
2018	3	12	8	3	35	-	-	-	-	3	7	4	2	5	-
2022	3	8	16	-	43	1	-	-	2	3	21	14	1	-	5
year	Average Cover (%)														
2007	0.0	0.0	0.0	0.4	1.0	-	-	-	-	-	-	-	-	-	-
2011	0.2	0.5	0.6	-	0.8	-	-	0.7	0.2	-	-	0.0	-	0.0	-
2014	-	0.2	0.4	0.1	0.7	-	0.0	-	0.4	-	0.0	-	0.0	0.1	-
2018	0.1	0.2	0.1	0.0	1.1	-	-	-	-	0.0	0.0	0.1	0.0	0.2	-
2022	0.1	0.1	0.3	-	1.2	0.0	-	-	0.0	0.0	0.1	0.6	0.0	-	0.0

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

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

SHRUB SPECIES	Amelanchier utahensis <sup>p</sup> (Utah serviceberry)	Artemisia frigida <sup>p</sup> (prairie sagewort)	Artemisia nova <sup>p</sup> (black sagebrush)	Artemisia tridentata ssp. vaseyana <sup>p</sup> (mountain big sagebrush)	Cercocarpus montanus <sup>p</sup> (alderleaf mountain mahogany)	Chrysothamnus viscidiflorus sp. viscidiflorus var. viscidiflorus (yellow rabbitbrush)	Ericameria nauseosa (rubber rabbitbrush)	Gutierrezia sarothrae (broom snakeweed)	Juniperus osteosperma <sup>t</sup> (Utah juniper)	Pinus edulis <sup>t</sup> (twoneedle pinyon)	Purshia tridentata <sup>p</sup> (antelope bitterbrush)	Symphoricarpos oreophilus <sup>p</sup> (mountain snowberry)
year	Line Intercept Cover (%)											
2007	1.5	-	-	-	4.8	-	-	-	6.9	26.4	0.9	0.8
2011	1	-	-	0.1	0.2	-	-	-	-	-	0.6	0.8
2014	1.1	-	-	0.2	0.6	-	0.5	-	-	-	0.8	1.8
2018	0.8	-	-	0.5	0.9	-	1.2	0.1	0	0.2	1.7	3.5
2022	2.4	-	1.2	1.2	0.8	0.2	3.4	0.1	0.5	0.2	4.1	2.4
year	Quadrat Cover (%)											
2007	0.3	-	-	0.0	2.4	-	-	-	1.9	5.5	0.7	0.5
2011	1.2	-	-	0.0	0.4	-	-	-	-	-	0.5	1.0
2014	0.4	-	-	0.0	0.7	-	0.3	-	-	-	1.3	1.3
2018	0.1	-	-	0.2	1.0	-	1.1	0.0	0.0	0.0	2.3	2.9
2022	1.0	0.0	0.7	1.1	1.0	0.2	3.1	0.2	0.0	0.0	3.9	3.7

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

**Table 10R-40.13 - Shrub/Tree Characteristics.** Population characteristics of shrub/tree species populations including density reproduction (seedlings), age distribution, utilization, vigor and average size (height/crown) of plants.

Year	Density		Age Class Distribution			Utilization		Poor Vigor (%)	Average Height Crown (cm)
	Plants Per Acre		Excluding Seedlings			Moderate (%)	Heavy (%)		
	Excluding Seedlings	Seedling	Young (%)	Mature (%)	Decadent (%)				
<b>Amelanchier utahensis<sup>P</sup> -- (Utah serviceberry)</b>									
2007	80	-	50	50	0	0	25	0	201/187
2011	320	-	94	6	0	0	0	0	65/77
2014	300	20	7	93	0	7	60	0	60/76
2018	240	-	17	83	0	42	0	0	73/114
2022	200	-	10	90	0	50	30	0	- / -
<b>Artemisia frigida<sup>P</sup> -- (prairie sagewort)</b>									
2007	-	-	-	-	-	-	-	-	- / -
2011	-	-	-	-	-	-	-	-	- / -
2014	-	-	-	-	-	-	-	-	- / -
2018	-	-	-	-	-	-	-	-	- / -
2022	20	-	0	100	0	0	0	0	- / -
<b>Artemisia nova<sup>P</sup> -- (black sagebrush)</b>									
2007	-	-	-	-	-	-	-	-	- / -
2011	-	-	-	-	-	-	-	-	35/56
2014	40	-	100	0	0	50	0	0	18/42
2018	40	-	0	100	0	0	0	0	21/44
2022	2820	-	62	38	0	41	1	0	- / -
<b>Artemisia tridentata ssp. vaseyana<sup>P</sup> -- (mountain big sagebrush)</b>									
2007	40	20	0	0	100	0	0	0	47/59
2011	20	-	0	100	0	0	0	0	53/71
2014	40	-	0	100	0	0	0	0	51/81
2018	80	660	50	50	0	0	0	0	86/154
2022	400	-	70	30	0	30	0	0	- / -
<b>Cercocarpus montanus<sup>P</sup> -- (alderleaf mountain mahogany)</b>									
2007	460	160	17	74	9	48	17	4	130/130
2011	220	-	91	9	0	55	9	9	66/82
2014	260	40	8	92	0	8	85	0	48/53
2018	140	-	14	86	0	29	71	0	55/64
2022	180	-	0	100	0	33	56	0	- / -
<b>Chrysothamnus viscidiflorus ssp. viscidiflorus var. viscidiflorus -- (yellow rabbitbrush)</b>									
2007	-	-	-	-	-	-	-	-	- / -
2011	-	-	-	-	-	-	-	-	- / -
2014	-	-	-	-	-	-	-	-	24/29
2018	-	-	-	-	-	-	-	-	46/94
2022	100	-	20	80	0	0	0	0	- / -
<b>Ericameria nauseosa -- (rubber rabbitbrush)</b>									
2007	-	-	-	-	-	-	-	-	- / -
2011	20	-	100	0	0	0	0	0	51/65
2014	80	-	25	75	0	25	0	0	72/92
2018	160	-	25	50	25	25	13	25	75/107
2022	760	-	34	66	0	0	0	0	- / -
<b>Gutierrezia sarothrae -- (broom snakeweed)</b>									
2007	-	-	-	-	-	-	-	-	- / -
2011	-	-	-	-	-	-	-	-	- / -
2014	20	-	0	100	0	0	0	0	27/50
2018	100	-	0	100	0	0	0	0	16/28
2022	160	60	0	100	0	0	0	0	- / -

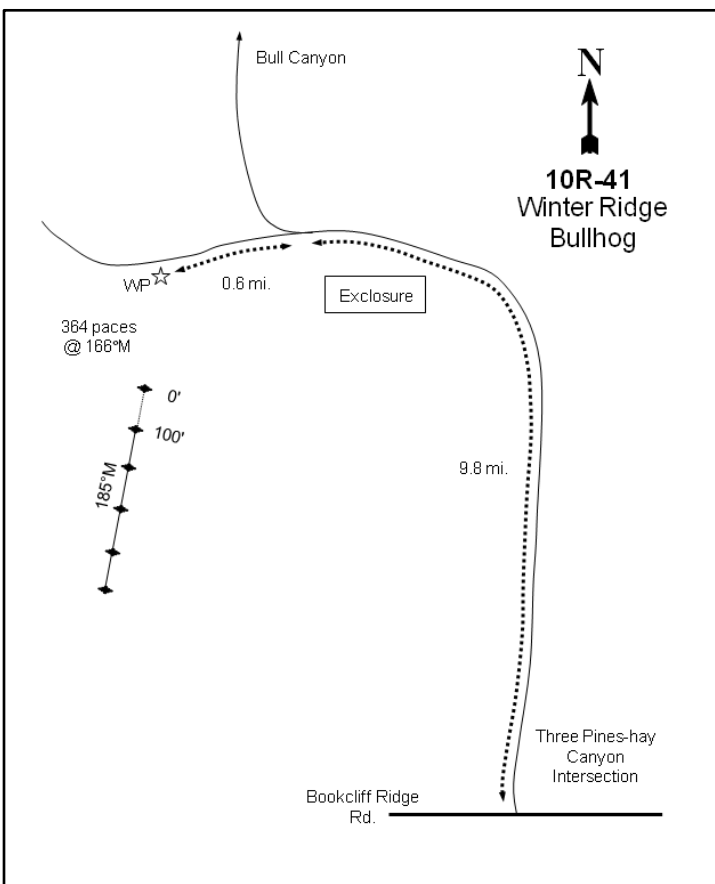
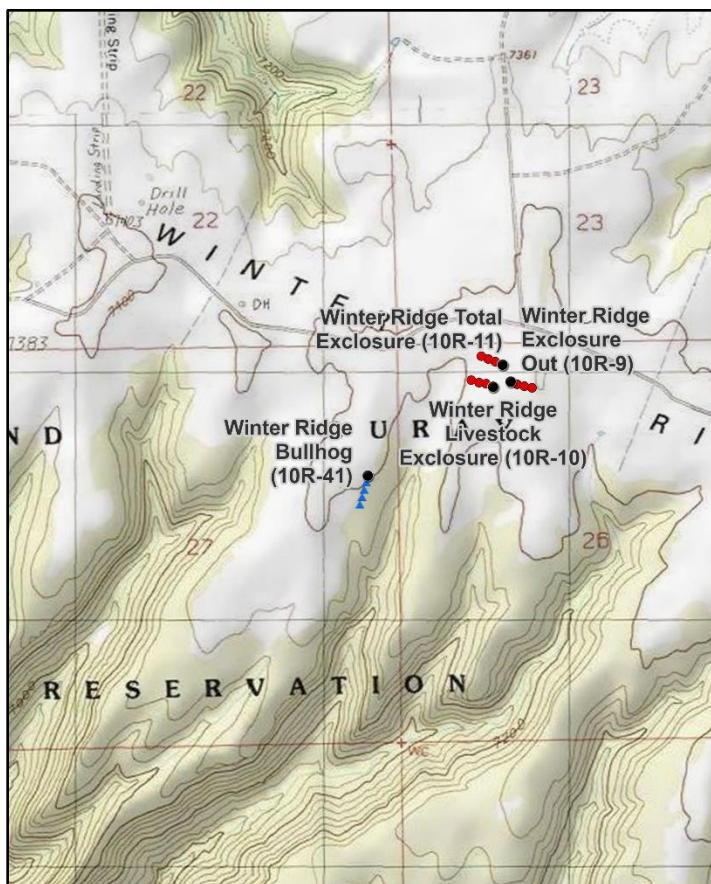
Year	Density		Age Class Distribution			Utilization		Poor Vigor (%)	Average Height Crown (cm)
	Plants Per Acre		Excluding Seedlings			Moderate (%)	Heavy (%)		
	Excluding Seedlings	Seedling	Young (%)	Mature (%)	Decadent (%)				
<b>Juniperus osteosperma<sup>t</sup> -- (Utah juniper)</b>									
2007	220	60	27	64	9	0	0	9	- / -
2011	-	-	-	-	-	-	-	-	- / -
2014	-	20	0	0	0	0	0	0	- / -
2018	20	-	100	0	0	0	0	0	- / -
2022	20	-	100	0	0	0	0	0	- / -
<b>Pinus edulis<sup>t</sup> -- (twoneedle pinyon)</b>									
2007	420	540	48	48	5	0	0	0	- / -
2011	-	-	-	-	-	-	-	-	- / -
2014	-	-	-	-	-	-	-	-	- / -
2018	40	-	100	0	0	0	0	0	- / -
2022	20	-	100	0	0	0	0	0	- / -
<b>Purshia tridentata<sup>p</sup> -- (antelope bitterbrush)</b>									
2007	380	-	5	74	21	16	0	5	41/72
2011	160	-	88	13	0	38	0	0	35/88
2014	300	40	20	80	0	33	67	7	34/69
2018	220	-	0	100	0	0	100	0	38/105
2022	500	-	8	92	0	20	76	0	- / -
<b>Sambucus<sup>p</sup> -- (elderberry)</b>									
2007	-	-	-	-	-	-	-	-	- / -
2011	-	-	-	-	-	-	-	-	18/26
2014	-	-	-	-	-	-	-	-	- / -
2018	-	-	-	-	-	-	-	-	53/72
2022	-	-	-	-	-	-	-	-	- / -
<b>Symphoricarpos oreophilus<sup>p</sup> -- (mountain snowberry)</b>									
2007	500	20	44	56	0	0	0	0	25/45
2011	100	-	0	100	0	20	0	0	41/114
2014	260	-	15	85	0	46	46	0	52/110
2018	260	-	8	92	0	31	0	0	70/138
2022	380	60	11	90	0	5	0	0	- / -

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

**Table 10R-40.14 - Tree Characteristics.** Point-quarter tree density, size class distribution, and average diameter.

Year	Density	Size Class Distribution					Average Diameter (cm)
	Trees per Acre	Seedling (%)	1-4' (%)	4-8' (%)	8-12' (%)	>12' (%)	
<b>Juniperus osteosperma (Utah juniper)</b>							
2007	93	5	21	21	26	26	25.2
2011	28	67	33	-	-	-	2.4
2014	16	43	43	-	-	14	7.7
2018	20	50	43	-	-	7	5.3
2022	30	13	73	13	-	-	3.3
<b>Juniperus scopulorum (Rocky Mountain juniper)</b>							
2022	1	-	100	-	-	-	3.0
<b>Pinus edulis (twoneedle pinyon)</b>							
2007	403	10	10	5	20	55	23.8
2011	11	83	-	17	-	-	1.7
2014	1	-	-	100	-	-	5.5
2018	14	57	43	-	-	-	1.6
2022	16	13	88	-	-	-	2.5

## WINTER RIDGE BULLHOG - STUDY NO. 10R-41



### Location Information

USGS 7.5 min Map Info  
GPS (0' Stake)

Tenmile Canyon North; Township 15S, Range 21E, Section 27  
NAD 83 UTM ZONE 12, 625125 East 4371785 North

### Transect Information

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

141  
185° magnetic  
400ft  
Line 1 (11ft & 95ft), Line 2 (34ft), Line 3 (59ft), Line 4 (71ft)  
Standard

### Directions to Site

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

**Site Information**

Land Ownership	State
Land Administrator	SITLA
Allotment	HORSE POINT
Elevation	7,400ft (2,256m)
Aspect	Southeast
Slope	4%
Sample Dates	07/18/2007, 06/23/2010, 08/28/2013, 08/16/2017, 08/01/2022

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

Treatment/Disturbance	Name	WRI DB#	Date	Size (acres)
Hand Crew - Lop and Scatter	Willow Watershed Improvements FY2023 (Proposed)	5934	Fall 2022 or Spring 2023	10455
Mechanical - Bullhog	Winter Ridge Bullhog	685	January-February 2009	474

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

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

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

Year	Vegetation Type	Woodland Succession
2007	Pinyon-Juniper	Phase II transitioning to Phase III
2010	Mountain Big Sagebrush	Phase I
2013	Mountain Big Sagebrush	Phase I
2017	Mountain Big Sagebrush/Pinyon-Juniper	Phase I transitioning to Phase II
2022	Mountain Big Sagebrush/Pinyon-Juniper	Phase I transitioning to Phase II

**Site Notes**

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

**Soils****Table 10R-41.5 - Soil Analysis Data.** List of chemical and textural soil characteristics determined by laboratory analysis.

Texture	pH	%sand	%silt	%clay	%OM	PPM P	PPM K	ds/m	Sample Date
Clay Loam	7.3	28.2	40.4	31.5	3.8	9.2	51.2	0.6	07/18/2007

**Site Potential**

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

When the study was established in 2007, the site was a mixed stand of twoneedle pinyon (*Pinus edulis*) and Utah juniper (*Juniperus osteosperma*) with a shrub component of mountain big sagebrush (*Artemisia tridentata* ssp. *vaseyana*) (Table 10R-41.12). The herbaceous understory was sparse but mainly consisted of native perennial grass and forb species (Table 10R-41.10, Table 10R-41.11). After the bullhog treatment (Table 10R-41.1), mountain big sagebrush became the dominant species with increased cover and recruitment of young plants to the population (Table 10R-41.12, Table 10R-41.13). In addition, the herbaceous understory increased in both forb and grass cover following the bullhog treatment (Table 10R-41.10, Table 10R-41.11). Although the treatment led to reduced cover of conifer trees, they have remained a notable component of the site. Considering the significant presence of extant trees, this site is at high risk of infilling in the future (Table 10R-41.14).



## Trend Summary Tables

**Table 10R-41.6 - Shrub/Tree Summary.** Average modified Daubenmire quadrat and line intercept cover by year for shrubs/trees

Year	Quadrat Cover (%)			Line-intercept Cover (%)		
	Preferred Shrub	Other Shrub	Tree	Preferred Shrub	Other Shrub	Tree
2007	3.2	0.9	6.6	3.2	1.0	30.3
2010	1.9	0.7	2.9	2.3	0.4	3.6
2013	4.0	1.9	2.7	4.2	2.0	4.1
2017	4.6	4.2	6.0	4.5	4.2	6.6
2022	5.2	0.7	8.0	6.1	0.5	7.6

**Table 10R-41.7 - Herbaceous Summary.** Nested frequency and average modified Daubenmire quadrat cover by year for herbaceous functional groups

Year	Nested Frequency				Quadrat Cover (%)			
	Annual Grass	Perennial Grass	Annual/Biennial Forb	Perennial Forb	Annual Grass	Perennial Grass	Annual/Biennial Forb	Perennial Forb
2007	-	195	4	190	-	2.4	0.0	2.6
2010	-	205	13	195	-	2.8	0.2	5.0
2013	-	277	1	226	-	7.3	0.0	7.5
2017	-	331	2	254	-	10.0	0.1	10.9
2022	-	344	-	207	-	6.9	-	4.6

**Table 10R-41.8 - Basic Ground Cover.** Average modified Daubenmire quadrat cover by year for basic ground cover types.

Year	Cover Type (%)					
	Bare Ground	Cryptogams	Litter	Pavement	Rock	Vegetation
2007	40.1	4.1	44.9	2.3	5.0	16.6
2010	25.5	1.1	59.7	0.0	1.3	15.1
2013	31.8	0.3	49.6	0.4	1.0	22.6
2017	32.4	0.2	55.1	0.4	1.6	30.9
2022	37.6	1.0	53.5	0.8	1.4	24.9

**Table 10R-41.9 - Pellet Group Data.** Quadrat frequency and pellet group transect data for animal pellets. Rabbit pellet groups are not sampled in the pellet group transect.

Year	Cattle	Mule Deer	Rocky Mountain Elk	Horse	Rabbit
	Quadrat Frequency				
2007	-	1	10	3	51
2010	-	-	-	1	3
2013	-	14	4	4	5
2017	5	7	1	7	4
2022	2	8	-	10	14
Days Use Per Acre (ha)					
2007	2.9 (7.2)	2.7 (6.6)	6.0 (14.9)	5.2 (12.9)	-
2010	0.7 (1.8)	-	-	5.2 (12.9)	-
2013	3.6 (9.0)	6.7 (16.6)	4.0 (9.9)	1.2 (2.9)	-
2017	16.7 (41.2)	8.7 (21.5)	2.0 (5.0)	7.5 (18.6)	-
2022	4.4 (10.8)	2.0 (5.0)	-	26.2 (64.6)	-

**Table 10R-41.10 - Grass Species.** Nested frequency and modified Daubenmire average cover by year.

GRASS SPECIES	Achnatherum hymenoides (Indian ricegrass)	Achnatherum lettermanii (Letterman's needlegrass)	Bouteloua gracilis (blue grama)	Carex (sedge)	Elymus elymoides (squirreltail)	Elymus lanceolatus (thickspike wheatgrass)	Hesperostipa comata (needle and thread)	Koeleria macrantha (prairie Junegrass)	Poa fendleriana (muttongrass)	Poa secunda (Sandberg bluegrass)	Pseudoroegneria spicata (bluebunch wheatgrass)
year	Nested Frequency										
2007	34	-	6	25	12	5	51	51	-	46	26
2010	-	-	14	31	13	17	95	40	13	42	19
2013	17	3	49	75	35	104	93	29	18	3	9
2017	9	-	34	48	19	253	63	16	14	13	15
2022	34	-	12	80	72	184	67	34	1	15	-
year	Average Cover (%)										
2007	0.4	-	0.1	0.1	0.0	0.0	0.5	0.3	-	0.4	0.5
2010	-	-	0.1	0.3	0.2	0.1	1.0	0.4	0.1	0.3	0.2
2013	0.5	0.0	1.1	0.5	0.3	1.1	2.7	0.5	0.3	0.0	0.2
2017	0.4	-	1.2	0.3	0.4	4.9	1.6	0.5	0.2	0.1	0.4
2022	0.4	-	0.9	0.9	0.7	3.0	0.4	0.4	0.0	0.2	-

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

**Table 10R-41.11 - Forb Species.** Nested frequency and modified Daubenmire average cover by year.

FORB SPECIES	Antennaria microphylla (litleleaf pussytoes)	Arabis (rockcress)	Arenaria (sandwort)	Astragalus (milkvetch)	Astragalus convallarius (lesser rushy milkvetch)	Astragalus spatulatus (tufted milkvetch)	Castilleja linariifolia (Wyoming Indian paintbrush)	Cirsium (thistle)	Cryptantha (cryptantha)	Erigeron (fleabane)	Erigeron pumilus (shaggy fleabane)	Eriogonum alatum (winged buckwheat)	Hymenopappus filifolius (fineleaf hymenopappus)	Lactuca serriola <sup>ai</sup> (prickly lettuce)	Lappula occidentalis <sup>a</sup> (flatspine stickseed)	Lesquerella (bladderpod)	Machaeranthera canescens (hoary tansyaster)
year	Nested Frequency																
2007	-	9	24	4	2	12	-	-	-	22	-	1	-	-	-	68	-
2010	7	6	22	-	1	30	4	-	5	3	9	4	-	3	2	81	-
2013	81	21	23	-	1	-	-	4	22	-	30	21	-	-	1	20	1
2017	36	14	-	-	-	81	10	3	19	-	9	14	1	-	-	32	11
2022	19	-	7	-	-	-	6	-	14	32	2	4	21	-	-	37	-
year	Average Cover (%)																
2007	-	0.1	0.1	0.0	0.0	0.0	-	-	-	0.2	-	0.0	-	-	-	0.3	-
2010	0.0	0.0	0.0	-	0.0	0.9	0.0	-	0.0	0.1	0.1	0.0	-	0.0	0.1	1.2	-
2013	2.4	0.1	0.4	-	0.0	-	-	0.0	0.1	-	0.3	0.1	-	-	0.0	0.1	0.0
2017	0.9	0.1	-	-	-	3.2	0.0	0.0	0.1	-	0.0	0.1	0.0	-	-	0.1	0.1
2022	0.6	-	0.0	-	-	-	0.0	-	0.1	0.1	0.0	0.0	0.2	-	-	0.2	-

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

FORB SPECIES											
Machaeranthera grindelioides (rayless tansyaster)											
Packera multilobata (lobeleaf groundsel)											
Penstemon (beardtongue)											
Penstemon caespitosus (mat penstemon)											
Phlox griseola (grayleaf phlox)											
Phlox longifolia (longleaf phlox)											
Stenotus acaulis (stemless mock goldenweed)											
Streptanthus cordatus (heartleaf twistflower)											
Taraxacum officinale (common dandelion)											
Tetraneuris acaulis (stemless four-nerve daisy)											
Tragopogon dubius <sup>at</sup> (yellow salsify)											
year	Nested Frequency										
2007	15	-	5	31	74	-	-	-	-	46	4
2010	22	3	-	46	61	1	-	-	-	37	8
2013	30	23	1	65	57	9	-	-	-	60	-
2017	50	7	-	86	81	-	9	2	4	29	2
2022	53	-	-	61	60	2	45	1	-	5	-
year	Average Cover (%)										
2007	0.1	-	0.0	0.5	0.6	-	-	-	-	0.6	0.0
2010	0.4	0.0	-	0.6	1.0	0.0	-	-	-	0.5	0.0
2013	0.7	0.1	0.0	1.0	0.8	0.1	-	-	-	1.2	-
2017	0.6	0.0	-	2.8	1.9	-	0.4	0.0	0.0	0.4	0.1
2022	0.7	-	-	0.7	1.4	0.0	0.3	0.0	-	0.2	-

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

**Table 10R-41.12 - Shrub and Tree Species.** Average modified Daubenmire quadrat and line intercept cover by year.

SHRUB SPECIES									
Artemisia tridentata ssp. vaseyana <sup>p</sup> (mountain big sagebrush)									
Chrysothamnus depressus <sup>p</sup> (longflower rabbitbrush)									
Gutierrezia sarothrae (broom snakeweed)									
Juniperus osteosperma <sup>t</sup> (Utah juniper)									
Krascheninnikovia lanata <sup>p</sup> (winterfat)									
Opuntia fragilis (brittle pricklypear)									
Pinus edulis <sup>t</sup> (twoneedle pinyon)									
Purshia tridentata <sup>p</sup> (antelope bitterbrush)									
year	Line Intercept Cover (%)								
2007	3.1	0.1	1	11.9	-	0	18.4	-	-
2010	2.2	0.1	0.4	2.7	-	-	0.9	-	-
2013	3.7	0.5	2	2.9	-	-	1.2	-	-
2017	3.9	0.6	4.2	3.3	-	-	3.3	-	-
2022	6	0.1	0.5	2.7	-	-	4.9	-	-
year	Quadrat Cover (%)								
2007	3.2	0.0	0.9	1.8	-	0.0	4.8	-	-
2010	1.6	0.3	0.7	1.2	-	0.0	1.7	0.0	-
2013	3.6	0.3	1.9	1.1	-	0.0	1.6	0.0	-
2017	4.4	0.2	4.2	2.0	0.0	-	3.9	-	-
2022	5.0	0.2	0.7	2.2	-	-	5.8	-	-

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

**Table 10R-41.13 - Shrub/Tree Characteristics.** Population characteristics of shrub/tree species populations including density reproduction (seedlings), age distribution, utilization, vigor and average size (height/crown) of plants.

Year	Density		Age Class Distribution			Utilization		Poor Vigor (%)	Average Height Crown (cm)
	Plants Per Acre		Excluding Seedlings			Moderate (%)	Heavy (%)		
	Excluding Seedlings	Seedling	Young (%)	Mature (%)	Decadent (%)				
<b>Artemisia tridentata ssp. vaseyana<sup>p</sup> -- (mountain big sagebrush)</b>									
2007	1560	20	5	30	65	19	5	46	48/58
2010	1080	20	7	59	33	19	2	20	46/50
2013	1180	300	12	73	15	17	3	12	52/68
2017	1520	300	32	55	13	12	9	4	64/77
2022	3700	220	68	27	6	39	9	7	- / -
<b>Chrysothamnus depressus<sup>p</sup> -- (longflower rabbitbrush)</b>									
2007	500	-	0	72	28	4	12	12	10/14
2010	760	-	8	87	5	26	0	0	13/19
2013	620	-	7	94	0	3	0	0	14/30
2017	1120	-	7	93	0	46	38	0	11/22
2022	1220	-	5	89	7	5	66	7	- / -
<b>Gutierrezia sarothrae -- (broom snakeweed)</b>									
2007	3600	360	5	94	1	0	0	1	20/15
2010	2260	140	48	52	0	0	0	0	15/15
2013	3820	160	7	90	3	1	0	9	20/25
2017	11620	420	11	89	0	0	0	0	15/18
2022	3380	640	5	94	1	0	0	1	- / -
<b>Juniperus osteosperma<sup>t</sup> -- (Utah juniper)</b>									
2007	120	-	50	50	0	0	0	0	- / -
2010	20	60	100	0	0	0	0	0	- / -
2013	100	20	100	0	0	0	0	0	- / -
2017	180	-	44	56	0	0	0	0	- / -
2022	200	20	100	0	0	0	0	0	- / -
<b>Krascheninnikovia lanata<sup>p</sup> -- (winterfat)</b>									
2007	-	-	-	-	-	-	-	-	- / -
2010	20	-	0	100	0	0	0	0	23/16
2013	-	-	-	-	-	-	-	-	24/20
2017	20	-	0	100	0	100	0	0	23/17
2022	-	-	-	-	-	-	-	-	- / -
<b>Opuntia fragilis -- (brittle pricklypear)</b>									
2007	60	20	0	100	0	0	0	0	6/16
2010	40	-	0	100	0	0	0	50	7/23
2013	100	20	0	100	0	0	0	40	6/17
2017	20	-	0	100	0	0	0	0	6/10
2022	120	-	0	100	0	0	0	0	- / -
<b>Pinus edulis<sup>t</sup> -- (twoneedle pinyon)</b>									
2007	660	240	67	33	0	3	0	0	- / -
2010	280	220	100	0	0	0	0	0	- / -
2013	440	120	100	0	0	0	5	5	- / -
2017	500	140	76	24	0	0	0	0	- / -
2022	560	80	79	21	0	0	0	0	- / -
<b>Purshia tridentata<sup>p</sup> -- (antelope bitterbrush)</b>									
2007	-	-	-	-	-	-	-	-	- / -
2010	-	-	-	-	-	-	-	-	- / -
2013	20	-	100	0	0	0	0	100	21/33
2017	-	-	-	-	-	-	-	-	26/63
2022	20	-	0	100	0	100	0	0	- / -

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

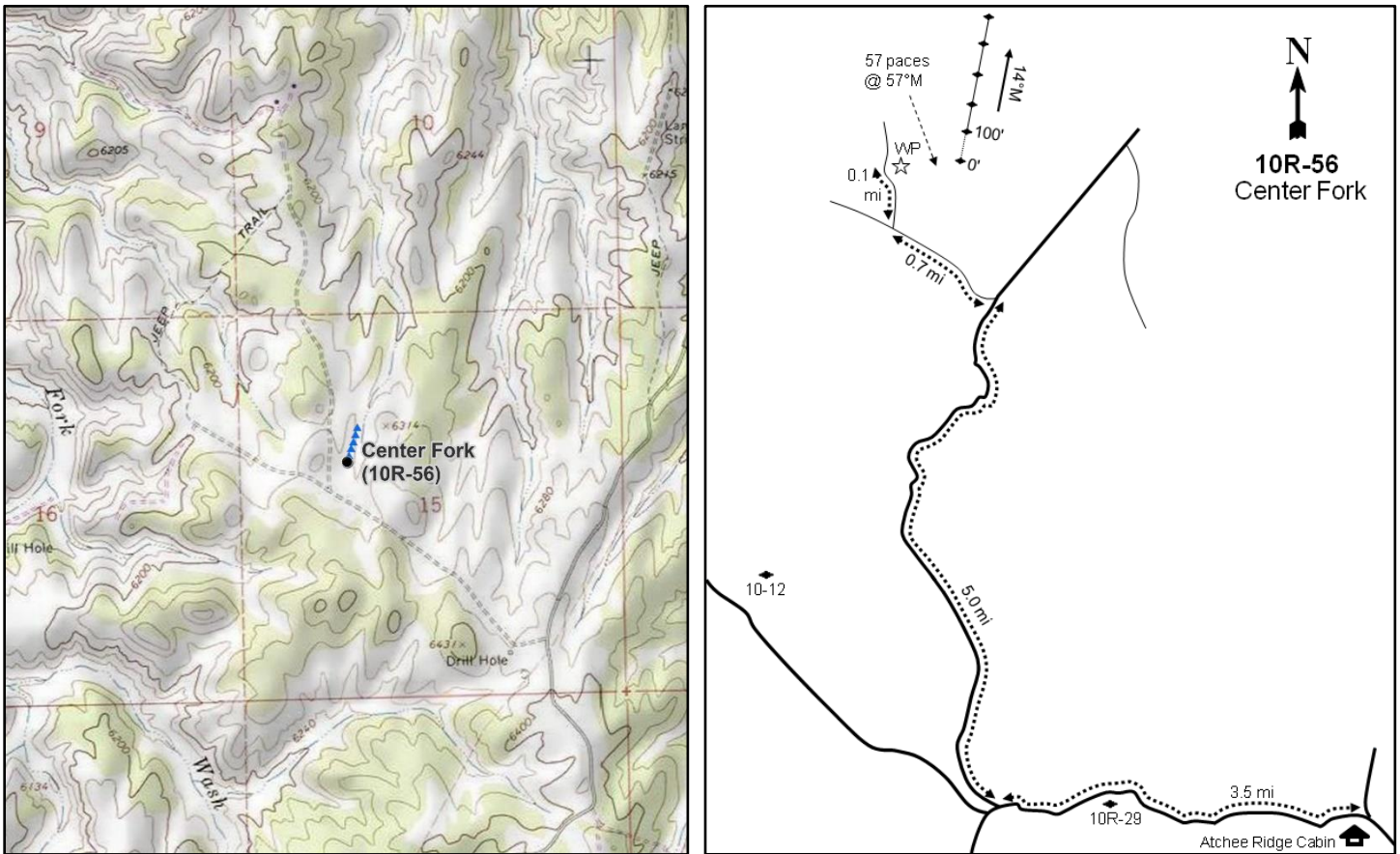
**Table 10R-41.14 - Tree Characteristics.** Point-quarter tree density, size class distribution, and average diameter.

Year	Density	Size Class Distribution					Average Diameter (cm)
	Trees per Acre	Seedling (%)	1-4' (%)	4-8' (%)	8-12' (%)	>12' (%)	
<b>Juniperus osteosperma (Utah juniper)</b>							
2007	103	5	40	20	20	15	14.1
2010	56	-	71	6	-	24	12.1
2013	66	5	68	-	5	21	15.7
2017	54	13	50	19	-	19	8.6
2022	66	16	37	32	-	16	8.5
<b>Pinus edulis (twoneedle pinyon)</b>							
2007	836	45	20	20	15	-	6.2
2010	155	10	70	10	5	5	3.4
2013	218	10	60	20	5	5	5.9
2017	135	-	60	30	5	5	5.7
2022	221	5	40	45	-	10	6.5
<b>Pseudotsuga menziesii (Douglas-fir)</b>							
2017	1	-	100	-	-	-	1.2

**Table 10R-41.15 - Deer Desirable Components Index: Mountain 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	4.0	0.0	0.0	4.8	0.0	5.3	0.0	14.1	Very Poor
2010	2.9	0.0	0.0	5.5	0.0	9.9	0.0	18.3	Very Poor
2013	5.3	0.0	0.0	14.5	0.0	10.0	0.0	29.8	Very Poor
2017	5.6	0.0	0.0	19.9	0.0	10.0	0.0	35.6	Very Poor
2022	7.6	13.2	15.0	13.9	0.0	9.3	0.0	59.0	Fair

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



### Location Information

USGS 7.5 min Map Info  
GPS (0' Stake)

Rainbow SW; Township 12S, Range 24E, Section 15  
NAD 83 UTM ZONE 12, 652379 East 4404614 North

### Transect Information

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

171  
14° magnetic  
500ft  
Line 1 (11ft), Line 2 (34ft), Line 3 (59ft), Line 4 (71ft), Line 5 (95ft)  
Standard

### Directions to Site

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

**Site Information**

Land Ownership	Federal
Land Administrator	BLM
Allotment	ASPHALT DRAW
Elevation	6,300ft (1,920m)
Aspect	Northeast
Slope	10%
Sample Dates	06/02/2015, 08/28/2018, 08/02/2022

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

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

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

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

**Wildlife Habitat and Vegetation History**

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

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

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

Year	Vegetation Type	Woodland Succession
2015	Annual Grass-Forb	No Encroachment
2018	Annual Grass	No Encroachment
2022	Annual Grass-Forb	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	2015-Present - Invasive Annual State: Community Phase 4.1

Upon study establishment in 2015, this site was an introduced annual grass/forb community type that was dominated by the annual grass cheatgrass (*Bromus tectorum*) with tall tumblemustard (*Sisymbrium altissimum*) providing much of the forb cover. Cheatgrass has remained as a dominant or co-dominant vegetation component. Although forb cover was low in 2018, the introduced annual species prickly Russian thistle (*Salsola tragus*) increased in 2022 and annual forbs were again co-dominant in that year (Table 10R-56.7, Table 10R-56.10, Table 10R-56.11). Browse cover exhibited a slight increase following treatment, but it has remained minimal overall with broom snakeweed (*Gutierrezia sarothrae*) as the dominant species in all sample years (Table 10R-56.12, Table 10R-56.13). Although cheatgrass cover has decreased each year, it is still abundant (Table 10R-56.10): high amounts of annual grasses may threaten the ecological resilience of a plant community.



**Trend Summary Tables**

**Table 10R-56.6 - Shrub/Tree Summary.** Average modified Daubenmire quadrat and line intercept cover by year for shrubs/trees

Year	Quadrat Cover (%)			Line-intercept Cover (%)		
	Preferred Shrub	Other Shrub	Tree	Preferred Shrub	Other Shrub	Tree
2015	0.8	1.7	-	0.6	2.2	-
2018	1.8	4.6	-	1.8	3.3	-
2022	3.3	5.3	-	3.4	5.4	-

**Table 10R-56.7 - Herbaceous Summary.** Nested frequency and average modified Daubenmire quadrat cover by year for herbaceous functional groups

Year	Nested Frequency				Quadrat Cover (%)			
	Annual Grass	Perennial Grass	Annual/Biennial Forb	Perennial Forb	Annual Grass	Perennial Grass	Annual/Biennial Forb	Perennial Forb
2015	444	102	406	52	28.5	5.1	18.7	0.9
2018	330	113	145	16	12.1	5.5	3.5	0.1
2022	272	44	424	25	6.5	1.1	20.5	0.6

**Table 10R-56.8 - Basic Ground Cover.** Average modified Daubenmire quadrat cover by year for basic ground cover types.

Year	Cover Type (%)					
	Bare Ground	Cryptogams	Litter	Pavement	Rock	Vegetation
2015	14.4	-	27.4	25.3	5.7	50.1
2018	12.8	-	49.1	28.2	5.9	24.9
2022	10.0	0.3	26.3	53.4	8.4	36.6

**Table 10R-56.9 - Pellet Group Data.** Quadrat frequency and pellet group transect data for animal pellets. Rabbit pellet groups are not sampled in the pellet group transect.

Year	Cattle	Mule Deer	Rocky Mountain Elk	Horse	Rabbit
	Quadrat Frequency				
2015	-	11	3	-	3
2018	1	2	12	-	13
2022	-	8	18	-	1
Year	Days Use Per Acre (ha)				
2015	-	19.4 (48.0)	8.1 (19.9)	-	-
2018	-	13.4 (33.1)	17.4 (43.0)	-	-
2022	-	10.0 (24.8)	23.4 (57.9)	2.3 (5.7)	-

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

GRASS SPECIES	Nested Frequency								
	Achmatherum hymenoides (Indian ricegrass)	Agropyron cristatum <sup>i</sup> (crested wheatgrass)	Bromus tectorum <sup>ai</sup> (cheatgrass)	Elymus elymoides (squirreltail)	Elymus lanceolatus (thickspike wheatgrass)	Poa fendleriana (muttongrass)	Poa secunda (Sandberg bluegrass)	Pseudopogon spicata (bluebunch wheatgrass)	Sporobolus cryptandrus (sand dropseed)
year	Nested Frequency								
2015	13	3	444	2	84	2	9	0	-
2018	4	-	330	14	81	3	8	10	2
2022	21	-	272	-	1	2	14	10	-
year	Average Cover (%)								
2015	1.5	0.0	28.5	0.0	3.2	0.0	0.3	0.0	-
2018	0.7	-	12.1	0.2	3.6	0.1	0.2	0.6	0.0
2022	0.6	-	6.5	-	0.0	0.1	0.3	0.0	-

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

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

FORB SPECIES	Nested Frequency																
year	Average Cover (%)																
Alyssum desertorum <sup>ai</sup> (desert madwort)	-	6	1	12	9	8	37	3	2	0	28	334	14	244	0	1	
Astragalus convallarius (lesser rushy milkvetch)	5	5	-	4	4	-	27	-	-	-	-	85	-	46	11	-	
Castilleja linariifolia (Wyoming Indian paintbrush)	48	17	-	14	4	-	116	-	3	-	-	406	-	67	3	2	
Descurainia pinnata <sup>a</sup> (western tansymustard)	year																
Halogeton glomeratus <sup>ai</sup> (saltlover)	2015	-	0.2	0.0	0.1	0.1	0.1	0.3	0.2	0.0	0.0	0.2	6.7	0.2	11.6	0.0	0.1
Lactuca serriola <sup>ai</sup> (prickly lettuce)	2018	0.0	0.1	-	0.0	0.0	-	0.3	-	-	-	-	2.3	-	0.9	0.1	-
Lappula occidentalis <sup>a</sup> (flatspine stickseed)	2022	0.8	0.3	-	0.1	0.0	-	1.0	-	0.0	-	-	16.3	-	2.3	0.2	0.1
Medicago sativa <sup>i</sup> (alfalfa)	year																
Oenothera (evening primrose)	2015	-	0.2	0.0	0.1	0.1	0.1	0.3	0.2	0.0	0.0	0.2	6.7	0.2	11.6	0.0	0.1
Penstemon pachyphyllus (thickleaf beardtongue)	2018	0.0	0.1	-	0.0	0.0	-	0.3	-	-	-	-	2.3	-	0.9	0.1	-
Phlox longifolia (longleaf phlox)	2022	0.8	0.3	-	0.1	0.0	-	1.0	-	0.0	-	-	16.3	-	2.3	0.2	0.1
Salsola tragus <sup>ai</sup> (prickly Russian thistle)	year																
Schoenocrambe linifolia (flaxleaf plainsmustard)	2015	-	0.2	0.0	0.1	0.1	0.1	0.3	0.2	0.0	0.0	0.2	6.7	0.2	11.6	0.0	0.1
Sisymbrium altissimum <sup>ai</sup> (tall tumbledustard)	2018	0.0	0.1	-	0.0	0.0	-	0.3	-	-	-	-	2.3	-	0.9	0.1	-
Sphaeralcea coccinea (scarlet globemallow)	2022	0.8	0.3	-	0.1	0.0	-	1.0	-	0.0	-	-	16.3	-	2.3	0.2	0.1
Sphaeralcea grossularifolia (gooseberry/leaf globemallow)	year																

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

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

SHRUB SPECIES	Line Intercept Cover (%)					
year	Quadrat Cover (%)					
Artemisia frigida <sup>p</sup> (prairie sagewort)	2015	0.1	0.3	0.2	2.2	-
Atriplex confertifolia <sup>p</sup> (shadscale saltbush)	2018	-	1.4	0.4	3.3	-
Bassia prostrata <sup>pi</sup> (forage kochia)	2022	0.2	2.3	0.9	5.4	-
Gutierrezia sarothrae (broom snakeweed)	year					
Sarcobatus vermiculatus (greasewood)	2015	0.2	0.2	0.4	1.7	-
	2018	0.0	1.2	0.6	4.6	-
	2022	0.0	2.6	0.6	5.2	0.1

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

**Table 10R-56.13 - Shrub/Tree Characteristics.** Population characteristics of shrub/tree species populations including density reproduction (seedlings), age distribution, utilization, vigor and average size (height/crown) of plants.

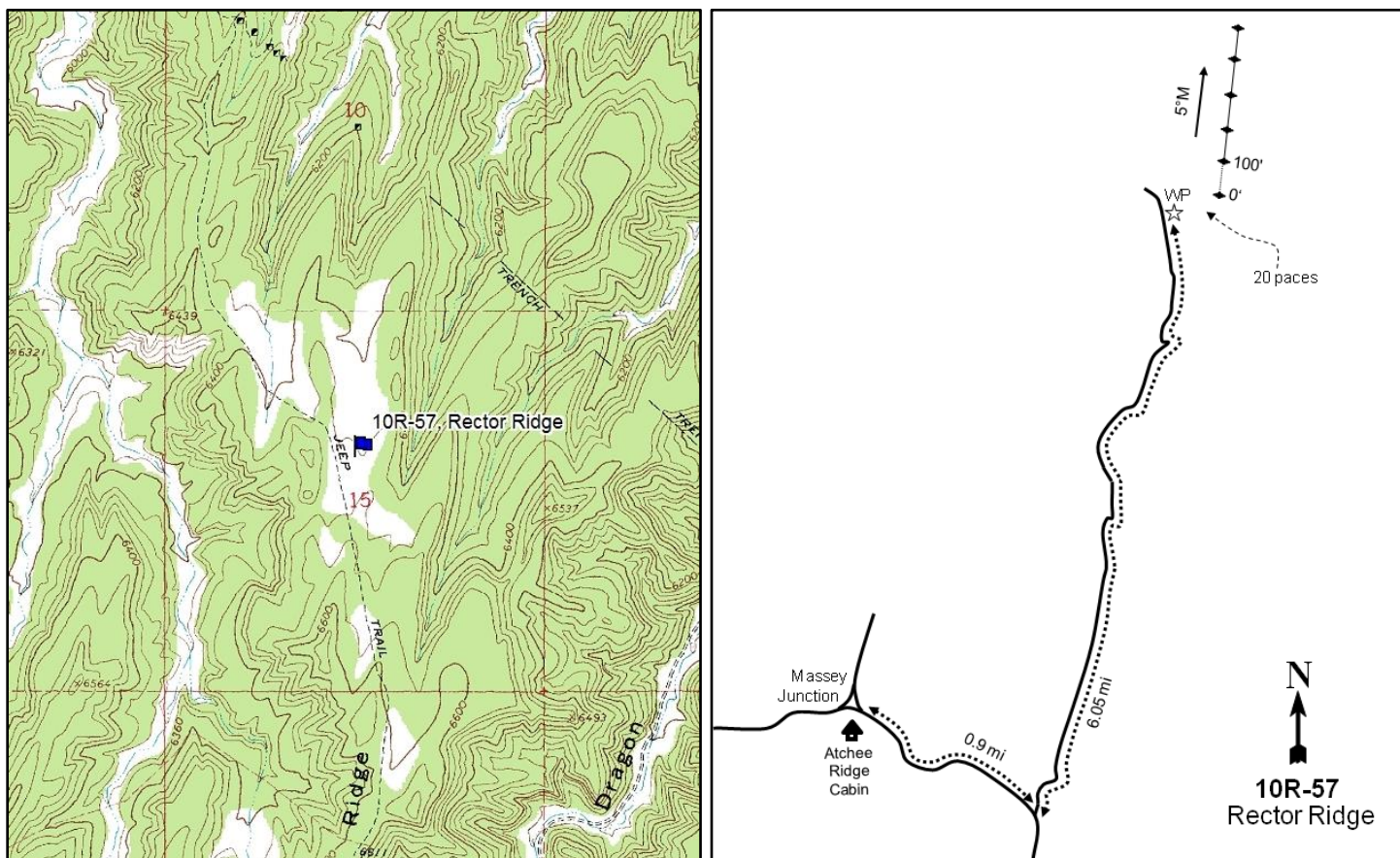
Year	Density		Age Class Distribution			Utilization		Poor Vigor (%)	Average Height Crown (cm)
	Plants Per Acre		Excluding Seedlings			Moderate (%)	Heavy (%)		
	Excluding Seedlings	Seedling	Young (%)	Mature (%)	Decadent (%)				
<b>Artemisia frigida<sup>p</sup> -- (prairie sagewort)</b>									
2015	360	40	11	89	0	0	0	0	22/20
2018	120	-	17	17	67	0	0	67	14/24
2022	100	-	0	80	20	40	0	20	- / -
<b>Artemisia tridentata ssp. vaseyana<sup>p</sup> -- (mountain big sagebrush)</b>									
2015	20	-	100	0	0	0	0	0	23/26
2018	-	-	-	-	-	-	-	-	27/33
2022	20	-	0	100	0	0	0	0	- / -
<b>Atriplex confertifolia<sup>p</sup> -- (shadscale saltbush)</b>									
2015	280	-	43	57	0	7	0	0	25/34
2018	180	-	0	100	0	0	0	0	39/67
2022	180	-	0	100	0	11	0	11	- / -
<b>Bassia prostrata<sup>pi</sup> -- (forage kochia)</b>									
2015	260	620	15	77	8	0	8	8	25/41
2018	320	-	6	94	0	13	0	0	30/46
2022	460	2720	4	96	0	9	0	4	- / -
<b>Gutierrezia sarothrae -- (broom snakeweed)</b>									
2015	3160	560	23	77	0	0	0	0	20/27
2018	5200	40	20	73	7	0	0	37	23/33
2022	8520	-	0	96	4	0	0	61	- / -
<b>Sarcobatus vermiculatus -- (greasewood)</b>									
2015	-	-	-	-	-	-	-	-	63/110
2018	-	-	-	-	-	-	-	-	91/153

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

**Table 10R-56.15 - Deer Desirable Components Index: Semidesert 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	0.7	0.0	0.0	10.2	-20.0	1.9	0.0	-7.3	Very Poor
2018	2.0	0.0	0.0	11.0	-9.1	0.3	0.0	4.2	Very Poor
2022	3.9	0.0	0.0	2.1	-4.8	1.2	0.0	2.3	Very Poor

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



### Location Information

USGS 7.5 min Map Info  
GPS (0' Stake)

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

### Transect Information

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

593  
5° magnetic  
500ft  
Line 1 (11ft), Line 2 (34ft), Line 3 (59ft), Line 4 (71ft), Line 5 (95ft)  
Standard

### Directions to Site

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

**Site Information**

Land Ownership	Federal
Land Administrator	BLM
Allotment	Park Canyon
Elevation	6,500ft (1,981m)
Aspect	North
Slope	5%
Sample Dates	06/02/2015, 08/28/2018, 08/03/2022

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

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

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

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

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

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

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

Year	Vegetation Type	Woodland Succession
2015	Perennial Forb	No Encroachment
2018	Perennial Forb	No Encroachment
2022	Perennial Forb	No Encroachment

**Site Notes**

No Notes

**Site Potential**

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

Since study establishment in 2015, the plant community on this site has been dominated by perennial forbs, particularly scarlet globemallow (*Sphaeralcea coccinea*). Annual forbs such as prickly Russian thistle (*Salsola tragus*) were also abundant in 2015 and 2022, but decreased significantly in 2018. The seeded species (Table 10R-57.2) thickspike wheatgrass (*Elymus lanceolatus*) was the most abundant perennial grass in all sample years, yet cover of perennial grasses in general has remained low to moderate. Although cheatgrass has been present with only moderate abundance, there remains a risk of diminished ecological resilience of the plant community (Table 10R-57.7, Table 10R-57.10, Table 10R-57.11). Shrubs have remained rare, with broom snakeweed (*Gutierrezia sarothrae*) as the most abundant species (Table 10R-57.12, Table 10R-57.13).

**Trend Summary Tables**

**Table 10R-57.6 - Shrub/Tree Summary.** Average modified Daubenmire quadrat and line intercept cover by year for shrubs/trees

Year	Quadrat Cover (%)			Line-intercept Cover (%)		
	Preferred Shrub	Other Shrub	Tree	Preferred Shrub	Other Shrub	Tree
2015	0.0	-	-	-	-	-
2018	-	0.0	-	-	-	-
2022	-	0.0	-	-	0.2	-

**Table 10R-57.7 - Herbaceous Summary.** Nested frequency and average modified Daubenmire quadrat cover by year for herbaceous functional groups

Year	Nested Frequency				Quadrat Cover (%)			
	Annual Grass	Perennial Grass	Annual/Biennial Forb	Perennial Forb	Annual Grass	Perennial Grass	Annual/Biennial Forb	Perennial Forb
2015	113	138	447	428	2.9	9.2	20.1	32.3
2018	331	187	26	388	7.3	5.0	0.1	16.9
2022	283	119	354	355	7.6	6.1	11.7	19.9

**Table 10R-57.8 - Basic Ground Cover.** Average modified Daubenmire quadrat cover by year for basic ground cover types.

Year	Cover Type (%)					
	Bare Ground	Cryptogams	Litter	Pavement	Rock	Vegetation
2015	29.5	-	9.4	19.7	0.0	59.9
2018	25.0	0.0	33.7	27.9	0.0	29.8
2022	35.5	0.0	15.5	40.0	0.6	40.9

**Table 10R-57.9 - Pellet Group Data.** Quadrat frequency and pellet group transect data for animal pellets. Rabbit pellet groups are not sampled in the pellet group transect.

Year	Cattle	Mule Deer	Rocky Mountain Elk	Horse	Rabbit
	Quadrat Frequency				
2015	-	1	2	-	1
2018	1	10	26	-	2
2022	4	4	10	1	-
Year	Days Use Per Acre (ha)				
2015	-	6.0 (14.9)	8.1 (19.9)	-	-
2018	5.1 (12.6)	0.7 (1.7)	14.7 (36.4)	-	-
2022	10.2 (25.1)	15.4 (38.1)	11.4 (28.1)	-	-

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

GRASS SPECIES	Achnatherum hymenoides (Indian ricegrass)	Agropyron cristatum <sup>i</sup> (crested wheatgrass)	Bromus tectorum <sup>ai</sup> (cheatgrass)	Elymus elymoides (squirreltail)	Elymus lanceolatus (thickspike wheatgrass)	Poa secunda (Sandberg bluegrass)	Psathyrostachys juncea <sup>i</sup> (Russian wildrye)	Pseudoroegneria spicata (bluebunch wheatgrass)	Sporobolus cryptandrus (sand dropseed)
year	Nested Frequency								
2015	3	34	113	12	99	1	-	1	4
2018	-	32	331	1	114	5	10	12	50
2022	1	61	283	2	70	5	-	6	-
year	Average Cover (%)								
2015	0.0	1.8	2.9	0.8	6.4	0.0	-	0.0	0.0
2018	-	1.0	7.3	0.0	2.9	0.1	0.2	0.2	0.6
2022	0.0	2.3	7.6	0.0	3.4	0.0	-	0.2	-

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

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

FORB SPECIES	Alyssum desertorum <sup>ai</sup> (desert madwort)	Astragalus chamaeleuce var. chamaeleuce (cicada milkvetch)	Chaetopappa ericoides (rose heath)	Chenopodium leptophyllum <sup>a</sup> (narrowleaf goosefoot)	Descurainia pinnata <sup>a</sup> (western tansymustard)	Draba <sup>a</sup> (draba)	Epilobium brachycarpum <sup>a</sup> (tall annual willowherb)	Erigeron pumilus (shaggy fleabane)	Ipomopsis aggregata (scarlet gilia)	Lappula occidentalis <sup>a</sup> (flatspine stickseed)	Linum lewisii (Lewis flax)	Medicago sativa <sup>i</sup> (alfalfa)	Salsola tragus <sup>ai</sup> (prickly Russian thistle)	Sanguisorba minor <sup>i</sup> (small burnet)	Schoenocrambe limifolia (flaxleaf plainsmustard)	Sisymbrium altissimum <sup>ai</sup> (tall tumblemustard)	Sphaeralcea coccinea (scarlet globemallow)
year	Nested Frequency																
2015	-	0	2	2	93	12	2	2	4	5	12	3	426	1	26	133	425
2018	3	-	3	-	-	-	-	1	6	4	-	1	17	-	1	2	388
2022	-	-	2	11	14	-	-	-	4	13	-	-	345	-	-	11	355
year	Average Cover (%)																
2015	-	0.0	0.1	0.0	1.2	0.0	0.0	0.0	0.0	0.2	0.1	0.0	13.7	0.0	0.9	5.0	31.1
2018	0.0	-	0.0	-	-	-	-	0.0	0.1	0.0	-	0.0	0.1	-	0.0	0.0	16.8
2022	-	-	0.0	0.1	0.3	-	-	-	0.0	0.1	-	-	11.2	-	-	0.1	19.9

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



FORB SPECIES		
	Townsendia (Townsend daisy)	Tragopogon dubius <sup>ai</sup> (yellow salsify)
year	Nested	
2015	2	1
2018	-	-
2022	-	-
year	Average Cover (%)	
2015	0.0	0.0
2018	-	-
2022	-	-

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

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

SHRUB SPECIES		
	Atriplex canescens <sup>p</sup> (fourwing saltbush)	Gutierrezia sarothrae (broom snakeweed)
year	Line Intercept	
2015	-	-
2018	-	-
2022	-	0.2
year	Quadrat Cover (%)	
2015	0.0	-
2018	-	0.0
2022	-	0.0

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

**Table 10R-57.13 - Shrub/Tree Characteristics.** Population characteristics of shrub/tree species populations including density reproduction (seedlings), age distribution, utilization, vigor and average size (height/crown) of plants.

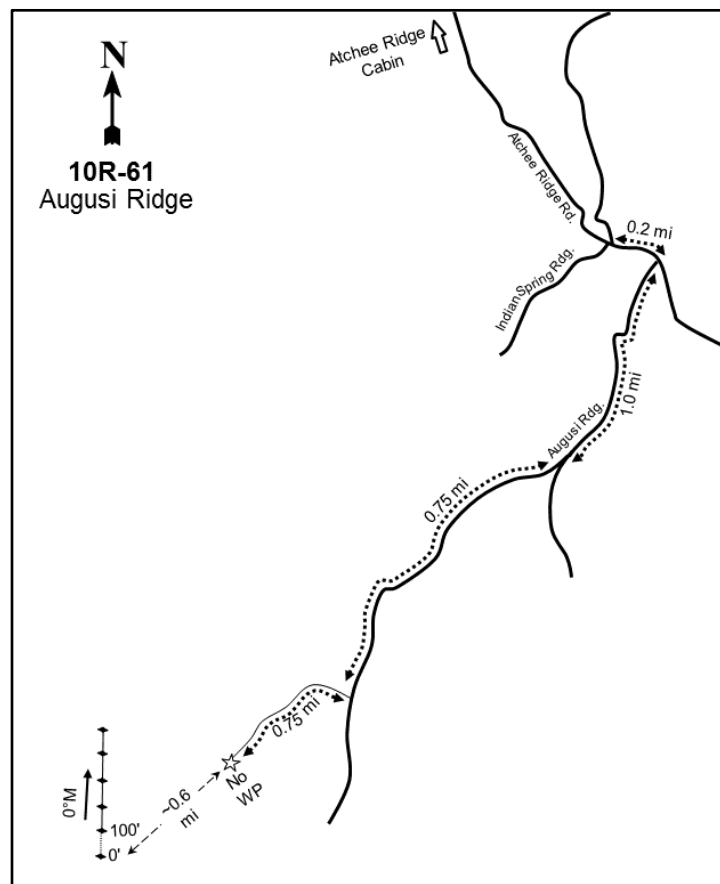
Year	Density		Age Class Distribution			Utilization		Poor Vigor (%)	Average Height Crown (cm)
	Plants Per Acre		Excluding Seedlings			Moderate (%)	Heavy (%)		
	Excluding Seedlings	Seedling	Young (%)	Mature (%)	Decadent (%)				
<b>Artemisia tridentata ssp. vaseyana<sup>p</sup> -- (mountain big sagebrush)</b>									
2015	-	-	-	-	-	-	-	-	-/-
2018	-	-	-	-	-	-	-	-	13/14
2022	-	-	-	-	-	-	-	-	-/-
<b>Atriplex canescens<sup>p</sup> -- (fourwing saltbush)</b>									
2015	-	60	0	0	0	0	0	0	- / -
2018	-	-	-	-	-	-	-	-	53/50
2022	20	-	0	100	0	0	0	0	- / -
<b>Atriplex confertifolia<sup>p</sup> -- (shadscale saltbush)</b>									
2015	-	-	-	-	-	-	-	-	-/-
2018	-	-	-	-	-	-	-	-	15/21
2022	-	-	-	-	-	-	-	-	-/-
<b>Gutierrezia sarothrae -- (broom snakeweed)</b>									
2015	-	-	-	-	-	-	-	-	-/-
2018	220	20	18	82	0	0	0	0	12/16
2022	280	-	0	93	7	0	0	7	- / -
<b>Sarcobatus vermiculatus -- (greasewood)</b>									
2015	-	-	-	-	-	-	-	-	73/73
2018	-	-	-	-	-	-	-	-	55/92

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

**Table 10R-57.15 - Deer Desirable Components Index: Upland 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	0.0	0.0	0.0	18.4	-2.2	10.0	0.0	26.2	Very Poor
2018	0.0	0.0	0.0	10.1	-5.5	10.0	0.0	14.6	Very Poor
2022	0.0	0.0	0.0	12.1	-5.7	10.0	0.0	16.4	Very Poor

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



### Location Information

USGS 7.5 min Map Info  
GPS (0' Stake)

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

### Transect Information

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

576  
0° magnetic  
500ft  
Line 1 (11ft), Line 2 (34ft), Line 3 (59ft), Line 4 (71ft), Line 5 (95ft)  
No Rebar

### Directions to Site

From the Atchee Ridge cabin, travel east on Big Park Road and take a slight right onto Atchee Ridge Road. Drive 0.9 miles to another junction, then stay right and travel for 0.4 miles to another fork and a treatment sign. From there, stay left and continue for 2.2 miles to a junction with a sign reading "Indian Springs Ridge Road." Stay left and continue for 0.2 miles to another fork. Bear right onto Augusi Ridge Road and continue 1 mile to a fork. Bear right again, go 0.75 miles to a fork, and proceed to the left. Continue another 0.75 miles to an opening and bear right, following the road to the south edge of a clearing; park here. A GPS is recommended to navigate to the site from here. An old ATV road may be followed for roughly 0.6 miles south to the general area of the site, which is located in a basin near a small sagebrush flat.

**Site Information**

Land Ownership	Federal
Land Administrator	BLM
Allotment	ATCHEE RIDGE AMP
Elevation	7,590ft (2,313m)
Aspect	West
Slope	5-10%
Sample Dates	08/29/2018, 08/02/2022

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

Treatment/Disturbance	Name	WRI DB#	Date	Size (acres)
Mechanical - Bullhog	Augusi Bullhog	4471	September-December 2019	692

**Wildlife Habitat and Vegetation History****Table 10R-61.3 - Wildlife Seasonal Habitat.** DWR wildlife habitat and seasonality.

Species	Habitat	Season
American Bison	potential	year-long
Mule Deer	substantial	summer
Rocky Mountain Elk	crucial	summer

**Table 10R-61.4 - Vegetation History.** The dominant vegetation type(s) and phase of woodland succession (Tausch, Miller, Roundy, & Chambers, 2009).

Year	Vegetation Type	Woodland Succession
2018	Pinyon-Juniper	Phase III
2022	Pinyon/Perennial Grass	Phase I

**Site Notes**

No Notes

**Site Potential**

1981 - 2010 Average Annual Precipitation	18 inches
NRCS Ecological Site	Mountain Shallow Loam (Black Sagebrush)
NRCS Ecological Site #	R048AY433UT
States and Transitions	No state and transition model is available for this ecological site.

At the time of study establishment in 2018, this site was a mixed conifer-encroached plant community with a sparse understory and remnant shrub layer. The preferred browse component was dominated by Utah serviceberry (*Amelanchier utahensis*); small amounts of black sagebrush (*Artemisia nova*), longflower rabbitbrush (*Chrysothamnus depressus*) and mountain snowberry (*Symphoricarpos oreophilus*) were also sampled. All grass species were native perennials with muttongrass (*Poa fendleriana*) being the dominant species (Table 10R-61.10). All forbs observed were also native species. Overall forb diversity and cover was low, with the dominant species being mountain phlox (*Phlox austromontana*) (Table 10R-61.11). Tree cover was primarily contributed by twoneedle pinyon (*Pinus edulis*) with lesser amounts offered by Utah juniper (*Juniperus osteosperma*), Rocky Mountain juniper (*J. scopulorum*) and Douglas fir (*Pseudotsuga menziesii*) (Table 10R-61.12, Table 10R-61.13, Table 10R-61.14). Following treatment in 2019 (Table 10R-61.1), most of the trees were removed, although several large pinyon trees were left scattered across the site that provided moderate cover (Table 10R-61.12). Perennial grass cover increased substantially, and they became a dominant lifeform in 2022; cheatgrass (*Bromus tectorum*) was sampled in very low amounts (Table 10R-61.7, Table 10R-61.10).

**Trend Summary Tables**

**Table 10R-61.6 - Shrub/Tree Summary.** Average modified Daubenmire quadrat and line intercept cover by year for shrubs/trees

Year	Quadrat Cover (%)			Line-intercept Cover (%)		
	Preferred Shrub	Other Shrub	Tree	Preferred Shrub	Other Shrub	Tree
2018	2.1	0.0	12.0	3.9	-	83.0
2022	2.3	1.0	1.2	3.6	0.9	13.3

**Table 10R-61.7 - Herbaceous Summary.** Nested frequency and average modified Daubenmire quadrat cover by year for herbaceous functional groups

Year	Nested Frequency				Quadrat Cover (%)			
	Annual Grass	Perennial Grass	Annual/Biennial Forb	Perennial Forb	Annual Grass	Perennial Grass	Annual/Biennial Forb	Perennial Forb
2018	-	141	3	103	-	4.1	0.0	3.0
2022	3	269	8	99	0.3	22.3	0.1	4.5

**Table 10R-61.8 - Basic Ground Cover.** Average modified Daubenmire quadrat cover by year for basic ground cover types.

Year	Cover Type (%)					
	Bare Ground	Cryptogams	Litter	Pavement	Rock	Vegetation
2018	7.9	0.7	89.5	0.0	0.1	19.6
2022	3.0	0.0	85.4	0.1	0.0	29.5

**Table 10R-61.9 - Pellet Group Data.** Quadrat frequency and pellet group transect data for animal pellets. Rabbit pellet groups are not sampled in the pellet group transect.

Year	Coyote	Mule Deer	Rocky Mountain Elk	Rabbit
	Quadrat Frequency			
2018	1	3	2	8
2022	-	10	16	3
Year	Days Use Per Acre (ha)			
2018	-	10.7 (26.5)	10.7 (26.5)	-
2022	-	7.4 (18.2)	13.4 (33.1)	-

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

GRASS SPECIES	Achnatherum hymenoides (Indian ricegrass)	Bouteloua gracilis (blue grama)	Bromus tectorum <sup>a</sup> (cheatgrass)	Carex rossii (Ross' sedge)	Elymus elymoides (squirreltail)	Elymus lanceolatus (thickspike wheatgrass)	Hesperostipa comata (needle and thread)	Poa fendleriana (muttongrass)	Poa secunda (Sandberg bluegrass)
year	Nested Frequency								
2018	-	4	-	4	3	15	-	132	-
2022	5	16	3	6	103	92	22	91	18
year	Average Cover (%)								
2018	-	0.1	-	0.0	0.0	0.1	-	3.9	-
2022	0.0	1.2	0.3	0.1	6.9	7.7	0.3	5.5	0.6

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

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

FORB SPECIES	Agoseris glauca (pale agoseris)	Antennaria parvifolia (small-leaf pussytoes)	Arabis (rockcress)	Astragalus convallarius (lesser rushy milkvetch)	Calochortus nuttallii (sego lily)	Cryptantha humilis (roundspike cryptantha)	Erigeron eatonii (Eaton's fleabane)	Gayophytum racemosum <sup>a</sup> (blackfoot groundsmoke)	Packera multilobata (lobeleaf groundsel)	Penstemon watsonii (Watson's penstemon)	Phlox austromontana (mountain phlox)	Phlox longifolia (longleaf phlox)	Polygonum douglasii <sup>a</sup> (Douglas' knotweed)	Sphaeralcea coccinea (scarlet globemallow)	Symphoricarpos ascendens (western aster)
year	Nested Frequency														
2018	-	10	3	-	-	-	18	-	-	3	83	-	3	3	3
2022	6	21	6	1	1	7	10	5	3	13	47	5	3	13	1
year	Average Cover (%)														
2018	-	0.1	0.0	-	-	-	0.1	-	-	0.0	2.8	-	0.0	0.0	0.0
2022	0.0	0.9	0.2	0.0	0.0	0.8	0.2	0.1	0.2	0.3	1.6	0.0	0.0	0.3	0.0

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

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

SHRUB SPECIES	Amelanchier utahensis <sup>p</sup> (Utah serviceberry)	Artemisia frigida <sup>p</sup> (prairie sagewort)	Artemisia nova <sup>p</sup> (black sagebrush)	Chrysothamnus depressus <sup>p</sup> (longflower rabbitbrush)	Chrysothamnus viscidiflorus ssp. viscidiflorus var. viscidiflorus (yellow rabbitbrush)	Juniperus osteosperma <sup>t</sup> (Utah juniper)	Juniperus scopulorum <sup>t</sup> (Rocky Mountain juniper)	Pinus edulis <sup>t</sup> (twonneedle pinyon)	Pseudotsuga menziesii <sup>t</sup> (Douglas-fir)	Symphoricarpos oreophilus <sup>p</sup> (mountain snowberry)
year	Line Intercept Cover (%)									
2018	3.6	-	0.2	0.1	-	7.9	3.4	67.3	4.4	0
2022	2	0.1	0.4	0.4	0.9	0.3	-	13	-	0.7
year	Quadrat Cover (%)									
2018	1.7	-	0.3	0.1	0.0	1.9	0.8	9.3	0.0	0.0
2022	0.7	0.0	0.3	0.9	1.0	0.2	-	1.0	-	0.4

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

**Table 10R-61.13 - Shrub/Tree Characteristics.** Population characteristics of shrub/tree species populations including density reproduction (seedlings), age distribution, utilization, vigor and average size (height/crown) of plants.

Year	Density		Age Class Distribution			Utilization		Poor Vigor (%)	Average Height Crown (cm)
	Plants Per Acre		Excluding Seedlings			Moderate (%)	Heavy (%)		
	Excluding Seedlings	Seedling	Young (%)	Mature (%)	Decadent (%)				
Amelanchier utahensis <sup>p</sup> -- (Utah serviceberry)									
2018	540	-	15	74	11	7	0	33	135/105
2022	740	-	16	68	16	35	57	19	- / -
Artemisia frigida <sup>p</sup> -- (prairie sagewort)									
2018	-	-	-	-	-	-	-	-	- / -
2022	20	-	0	100	0	0	0	0	- / -
Artemisia nova <sup>p</sup> -- (black sagebrush)									
2018	320	-	13	75	13	0	0	6	23/35
2022	480	-	21	79	0	46	29	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>Artemisia tridentata ssp. vaseyana<sup>p</sup> -- (mountain big sagebrush)</b>									
2018	40	-	0	0	100	0	0	0	30/53
2022	20	-	0	100	0	100	0	0	- / -
<b>Chrysothamnus depressus<sup>p</sup> -- (longflower rabbitbrush)</b>									
2018	140	-	0	100	0	0	0	0	10/17
2022	680	20	3	97	0	9	0	15	- / -
<b>Chrysothamnus viscidiflorus ssp. viscidiflorus -- (yellow rabbitbrush)</b>									
2018	40	-	0	50	50	0	0	50	12/7
2022	-	-	-	-	-	-	-	-	- / -
<b>Chrysothamnus viscidiflorus ssp. viscidiflorus var. viscidiflorus -- (yellow rabbitbrush)</b>									
2018	20	-	100	0	0	0	0	100	- / -
2022	240	-	0	100	0	0	0	0	- / -
<b>Juniperus osteosperma<sup>i</sup> -- (Utah juniper)</b>									
2018	280	-	29	71	0	0	0	14	- / -
2022	120	-	100	0	0	0	0	0	- / -
<b>Juniperus scopulorum<sup>i</sup> -- (Rocky Mountain juniper)</b>									
2018	40	-	0	100	0	0	0	0	- / -
2022	-	-	-	-	-	-	-	-	- / -
<b>Pinus edulis<sup>i</sup> -- (twoneedle pinyon)</b>									
2018	1060	320	28	70	2	0	0	2	- / -
2022	40	20	50	50	0	0	0	0	- / -
<b>Pseudotsuga menziesii<sup>i</sup> -- (Douglas-fir)</b>									
2018	20	-	100	0	0	0	0	0	- / -
2022	-	-	-	-	-	-	-	-	- / -
<b>Symphoricarpos oreophilus<sup>p</sup> -- (mountain snowberry)</b>									
2018	120	-	100	0	0	0	0	0	27/51
2022	500	-	0	100	0	80	16	0	- / -

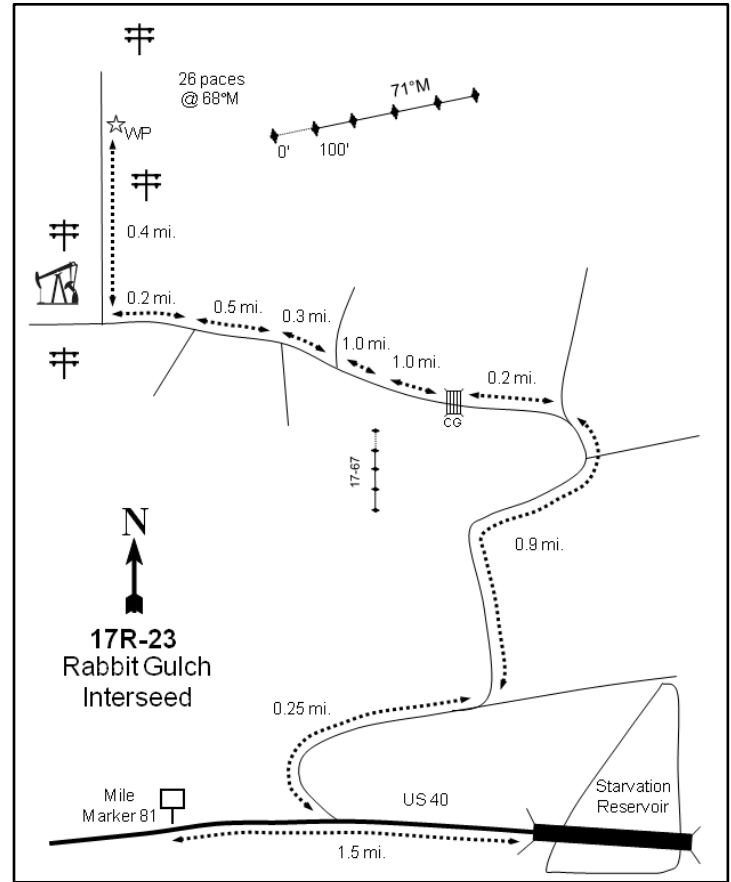
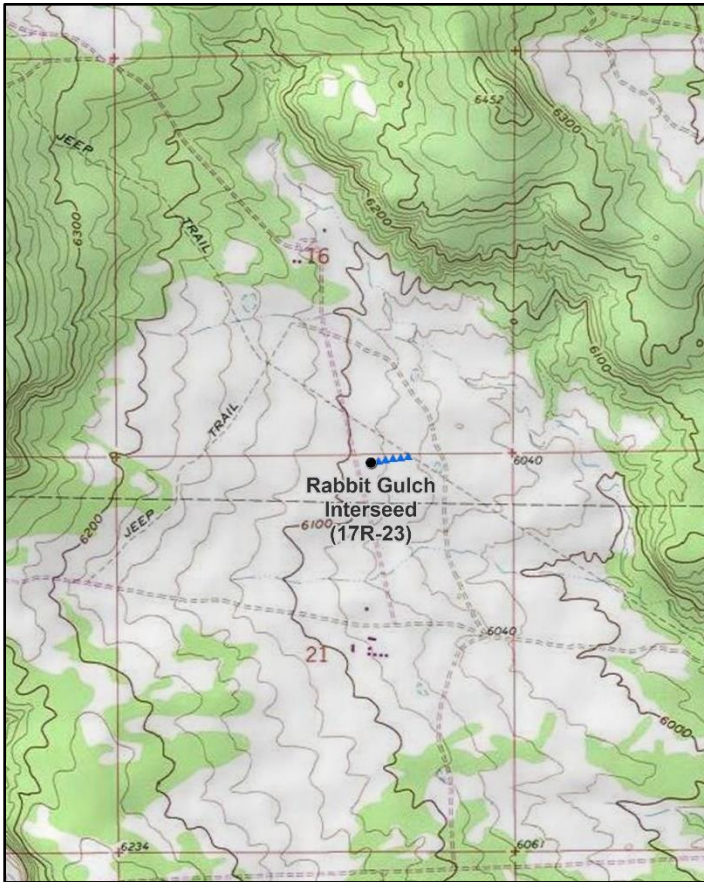
t - Tree Species; p - Preferred Browse; i - Introduced Species

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

Year	Density	Size Class Distribution					Average Diameter (cm)
	Trees per Acre	Seedling (%)	1-4' (%)	4-8' (%)	8-12' (%)	>12' (%)	
<b>Juniperus osteosperma (Utah juniper)</b>							
2018	97	21	26	16	16	21	6.9
2022	48	36	64	-	-	-	2.0
<b>Juniperus scopulorum (Rocky Mountain juniper)</b>							
2018	15	14	43	-	43	-	5.0
<b>Pinus edulis (twoneedle pinyon)</b>							
2018	683	5	15	5	15	60	12.3
2022	26	18	27	-	-	55	21.2
<b>Pseudotsuga menziesii (Douglas-fir)</b>							
2018	28	-	-	33	33	33	10.3



## RABBIT GULCH INTERSEED - STUDY NO. 17R-23

**Location Information**

USGS 7.5 min Map Info  
GPS (0' Stake)

Rabbit Gulch NW; Township 3S, Range 6W, Section 21  
NAD 83 UTM ZONE 12, 536968 East 4451389 North

**Transect Information**

Browse Tag # (0' Stake)	145
Transect Bearing	71° magnetic
Length	500ft
Belt Placement	Line 1 (11ft), Line 2 (34ft), Line 3 (59ft), Line 4 (71ft), Line 5 (95ft)
Belt Marker Placement	No Rebar

**Directions to Site**

From Starvation Bridge on US-40, travel west for 1.5 miles to a turnoff on the north side of the road (28000 West). Follow this road for 0.25 miles to a fork. Stay left, drive for 0.9 miles, and continue to stay left. Proceed for 0.2 miles to a cattle guard and fence. After the cattle guard, drive for 1.0 mile to a witness post on the left side of the road. From the witness post, drive 0.1 miles to a fork. Stay left and travel for 0.4 miles to another intersection, again staying left. Continue 0.3 miles to an intersection. Stay right and continue for 0.5 miles to a fork. Proceed to the right and go for 0.2 miles to another intersection. From here, turn right (north) and drive 0.4 miles to a witness post on the right (east) side of the road. From the witness post, walk 26 paces at 68 degrees magnetic to the 0-foot stake that is marked with browse tag #145.

**Site Information**

Land Ownership	Private
Land Administrator	Private
Allotment	No data
Elevation	6,090ft (1,856m)
Aspect	East
Slope	2-3%
Sample Dates	07/06/2006, 06/30/2010, 06/26/2013, 08/02/2017, 08/01/2022

**Table 17R-23.1 Disturbance History.** Recorded history of major disturbances.

Treatment/Disturbance	Name	WRI DB#	Date	Size (acres)
Seeding - Rangeland Drill	Rabbit Gulch Interseeding	420	February-March 2007	129
Herbicide - Plateau	Rabbit Gulch Winter Range Improvement Phase II	4799	September 2019	362

**Table 17R-23.2 Seed Mix.** List of known seeded plant species and rates (if available).

Mix Name			Application Type	Application Date	Acres
Rabbit Gulch Interseeding			Drill	Feb 2007	250
Type	Species	Common Name	Cultivar/Source ID	Bulk lbs/acre	PLS
G	Agropyron cristatum	Crested Wheatgrass	Douglas	0.24	0.21
G	Bouteloua gracilis	Blue Grama		0.08	0.03
G	Elymus wawawaiensis	Snake River Wheatgrass	Secar	0.24	0.18
G	Pascopyrum smithii	Western Wheatgrass	Arriba	0.24	0.20
G	Poa secunda	Sandberg Bluegrass	Toole MT	0.24	0.20
G	Psathyrostachys juncea	Russian Wildrye	Bozoisky	0.24	0.22
F	Linum perenne	Blue Flax	Appar	0.24	0.22
F	Medicago sativa	Alfalfa	Ranger	1.00	0.88
F	Onobrychis viciifolia	Sainfoin	Eski	2.00	1.84
F	Sanguisorba minor	Small Burnet	Delar	2.00	1.86

Mix Name			Application Type	Application Date	Acres
Rabbit Gulch Interseeding Shrubs			Drill	Feb 2007	250
Type	Species	Common Name	Cultivar/Source ID	Bulk lbs/acre	PLS
S	Artemisia tridentata ssp. wyomingensis	Wyoming Big Sagebrush	Sanpete UT	1.00	0.19
S	Atriplex canescens	Fourwing Saltbush	Emery UT	0.55	0.24
S	Atriplex canescens	Fourwing Saltbush	Carbon UT	0.45	0.21
S	Bassia prostrata	Forage Kochia	Immigrant	1.00	0.57
S	Krascheninnikovia lanata	Winterfat	Iron UT	0.50	0.21

**Wildlife Habitat and Vegetation History****Table 17R-23.3 - Wildlife Seasonal Habitat.** DWR wildlife habitat and seasonality.

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

**Table 17R-23.4 - Vegetation History.** The dominant vegetation type(s) and phase of woodland succession (Tausch, Miller, Roundy, & Chambers, 2009).

Year	Vegetation Type	Woodland Succession
2006	Perennial Grass	No Encroachment
2010	Perennial Grass	No Encroachment
2013	Perennial Grass	No Encroachment
2017	Perennial Grass	No Encroachment
2022	Perennial Grass	No Encroachment

**Site Notes**

Rabbit Gulch suffered sagebrush mortality during the summer of 2002.

**Soils****Table 17R-23.5 - Soil Analysis Data.** List of chemical and textural soil characteristics determined by laboratory analysis.

Texture	pH	%sand	%silt	%clay	%OM	PPM P	PPM K	ds/m	Sample Date
Sandy Loam	7.7	64.7	16.5	18.8	0.7	7.4	176.0	0.4	07/06/2006

**Site Potential**

1981 - 2010 Average Annual Precipitation	10 inches
NRCS Ecological Site	Semidesert Loam (Wyoming Big Sagebrush)
NRCS Ecological Site #	R034BY212UT
States and Transitions	No state and transition model is available for this ecological site.

Perennial grasses, mainly Indian ricegrass (*Achnatherum hymenoides*) and needle and thread (*Hesperostipa comata*), have dominated this site since study establishment in 2006; cover has fluctuated, but has exhibited an overall increase. Annual grasses are present, but not in large amounts, and perennial and annual forbs have remained rare (Table 17R-23.7, Table 17R-23.10, Table 17R-23.11). Wyoming big sagebrush (*Artemisia tridentata* ssp. *wyomingensis*) and shadscale saltbush (*Atriplex confertifolia*) have been the dominant browse species in all study years. These shrubs have not been particularly abundant until 2022, when the sagebrush population more than doubled in density. However, cover remained similar in 2022 due to much of the density increase being attributed to young, small sagebrush plants (Table 17R-23.12, Table 17R-23.13).

**Trend Summary Tables****Table 17R-23.6 - Shrub/Tree Summary.** Average modified Daubenmire quadrat and line intercept cover by year for shrubs/trees

Year	Quadrat Cover (%)			Line-intercept Cover (%)		
	Preferred Shrub	Other Shrub	Tree	Preferred Shrub	Other Shrub	Tree
2006	1.7	1.9	-	2.4	1.6	-
2010	1.5	2.1	-	2.7	2.5	-
2013	2.7	1.6	-	4.4	0.8	-
2017	2.2	2.7	-	2.0	1.6	-
2022	2.1	2.5	-	3.7	1.7	-

**Table 17R-23.7 - Herbaceous Summary.** Nested frequency and average modified Daubenmire quadrat cover by year for herbaceous functional groups

Year	Nested Frequency				Quadrat Cover (%)			
	Annual Grass	Perennial Grass	Annual/Biennial Forb	Perennial Forb	Annual Grass	Perennial Grass	Annual/Biennial Forb	Perennial Forb
2006	37	313	111	48	0.2	13.3	0.8	0.3
2010	19	344	85	63	0.2	17.8	1.7	1.3
2013	31	330	46	67	0.1	15.2	0.8	0.7
2017	281	362	166	53	6.1	22.9	1.3	0.5
2022	33	278	127	48	0.3	15.8	1.0	0.7

**Table 17R-23.8 - Basic Ground Cover.** Average modified Daubenmire quadrat cover by year for basic ground cover types.

Year	Cover Type (%)					
	Bare Ground	Cryptogams	Litter	Pavement	Rock	Vegetation
2006	53.3	8.3	32.8	0.0	-	19.6
2010	51.1	1.9	29.5	-	-	26.4
2013	46.6	2.5	30.7	-	-	25.8
2017	47.2	0.6	26.7	0.0	-	36.8
2022	68.5	1.4	23.9	0.1	-	19.9

**Table 17R-23.9 - Pellet Group Data.** Quadrat frequency and pellet group transect data for animal pellets. Rabbit pellet groups are not sampled in the pellet group transect.

Year	Cattle	Mule Deer	Rocky Mountain Elk	Greater Sage-Grouse	Rabbit
	Quadrat Frequency				
2006	3	26	13	-	58
2010	6	16	13	-	7
2013	-	14	2	-	11
2017	1	7	6	-	52
2022	6	31	4	-	14
Year	Days Use Per Acre (ha)				
2006	12.3 (30.5)	22.1 (54.6)	21.5 (53.0)	-	-
2010	11.6 (28.7)	10.0 (24.8)	17.4 (43.0)	-	-
2013	2.2 (5.4)	16.1 (39.7)	4.0 (9.9)	8.7 (21.5)*	-
2017	19.6 (48.4)	14.1 (34.8)	0.7 (1.7)	-	-
2022	10.2 (25.1)	57.0 (140.7)	5.3 (13.2)	-	-

\*Pellets per acre (ha)

**Table 17R-23.10 - Grass Species.** Nested frequency and modified Daubenmire average cover by year.

GRASS SPECIES	Achmatherum 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)	Pleuraphis jamesii (James' galleta)	Poa fendleriana (muttongrass)	Poa secunda (Sandberg bluegrass)	Psathyrostachys juncea <sup>i</sup> (Russian wildrye)	Pseudoroegneria spicata (bluebunch wheatgrass)	Sporobolus cryptandrus (sand dropseed)	Vulpia octoflora <sup>a</sup> (sixweeks fescue)
year	Nested Frequency												
2006	244	-	2	4	124	-	-	1	5	-	-	-	35
2010	104	1	9	16	309	-	3	8	9	2	2	-	10
2013	94	-	10	27	289	-	7	-	17	-	-	-	21
2017	60	6	133	8	320	2	12	-	41	4	3	-	201
2022	58	3	10	-	221	16	5	2	20	10	2	39	23
year	Average Cover (%)												
2006	9.1	-	0.0	0.0	4.1	-	-	0.0	0.0	-	-	-	0.2
2010	2.7	0.1	0.1	0.8	13.9	-	0.1	0.1	0.1	0.0	0.0	-	0.1
2013	2.8	-	0.1	0.4	11.8	-	0.1	-	0.2	-	-	-	0.1
2017	1.7	0.2	3.5	0.2	19.8	0.0	0.2	-	0.7	0.0	0.0	-	2.6
2022	2.3	0.1	0.2	-	11.4	0.5	0.2	0.0	0.4	0.0	0.0	0.8	0.1

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

**Table 17R-23.11 - Forb Species.** Nested frequency and modified Daubenmire average cover by year.

FORB SPECIES	Alyssum desertorum <sup>ai</sup> (desert madwort)	Androstaphyllum breviflorum (pink funnel lily)	Calochortus nuttallii (sego lily)	Chaetopappa ericoides (rose heath)	Chenopodium leptophyllum <sup>a</sup> (narrowleaf goosefoot)	Collinsia parviflora <sup>a</sup> (maiden blue eyed Mary)	Cymopterus (springparsley)	Descurainia pinnata <sup>a</sup> (western tansymustard)	Draba <sup>a</sup> (draba)	Eriogonum cernuum <sup>a</sup> (nodding buckwheat)	Halogeton glomeratus <sup>ai</sup> (saltlover)	Lappula occidentalis <sup>a</sup> (flatspine stickseed)	Lepidium <sup>a</sup> (pepperweed)	Machaeranthera canescens (hoary tansyaster)	Mentzelia albicaulis <sup>a</sup> (whitestem blazingstar)	Oenothera (evening primrose)	Phacelia ivesiana <sup>a</sup> (Ives' phacelia)
year	Nested Frequency																
2006	-	-	-	6	-	-	-	14	2	15	56	31	-	4	-	-	-
2010	2	-	5	9	3	-	-	5	10	-	22	41	-	-	-	1	-
2013	2	13	-	11	7	5	4	3	-	-	14	-	4	-	1	-	16
2017	13	-	-	10	-	1	-	7	8	-	-	20	3	-	-	-	1
2022	5	-	-	13	-	-	-	-	-	-	-	13	-	-	-	-	-
year	Average Cover (%)																
2006	-	-	-	0.1	-	-	-	0.1	0.0	0.1	0.5	0.1	-	0.0	-	-	-
2010	0.0	-	0.0	0.2	0.0	-	-	0.0	0.0	-	0.5	0.5	-	-	-	0.0	-
2013	0.0	0.0	-	0.2	0.2	0.0	0.0	0.0	-	-	0.3	-	0.0	-	0.0	-	0.1
2017	0.0	-	-	0.2	-	0.0	-	0.0	0.1	-	-	0.2	0.0	-	-	-	0.0
2022	0.0	-	-	0.2	-	-	-	-	-	-	-	0.1	-	-	-	-	-

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

FORB SPECIES					
<i>Plantago patagonica</i> <sup>a</sup> (woolly plantain)					
<i>Salsola tragus</i> <sup>ai</sup> (prickly Russian thistle)					
<i>Schoenocrambe limifolia</i> (flaxleaf plainsmustard)					
<i>Sphaeralcea grossulariifolia</i> (gooseberryleaf globemallow)					
<i>Townsendia</i> (Townsend daisy)					
year	Nested Frequency				
2006	6	1	4	35	-
2010	30	-	8	38	4
2013	5	2	12	29	5
2017	138	-	9	33	1
2022	110	12	-	28	9
year	Average Cover (%)				
2006	0.0	0.0	0.0	0.2	-
2010	0.7	-	0.1	1.0	0.0
2013	0.0	0.1	0.0	0.4	0.0
2017	1.0	-	0.0	0.3	0.0
2022	0.8	0.1	-	0.5	0.0

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

**Table 17R-23.12 - Shrub and Tree Species.** Average modified Daubenmire quadrat and line intercept cover by year.

SHRUB SPECIES						
<i>Artemisia tridentata</i> ssp. <i>wyomingensis</i> <sup>p</sup> (Wyoming big sagebrush)						
<i>Atriplex confertifolia</i> <sup>p</sup> (shadscale saltbush)						
<i>Bassia prostrata</i> <sup>pi</sup> (forage kochia)						
<i>Gutierrezia sarothrae</i> (broom snakeweed)						
<i>Krascheninnikovia lanata</i> <sup>p</sup> (winterfat)						
<i>Opuntia</i> (pricklypear)						
year	Line Intercept Cover (%)					
2006	0.8	1.5	-	0.1	0.1	1.5
2010	0.4	2.1	-	-	0.2	2.5
2013	1.9	2.2	0.2	-	0.1	0.8
2017	1	0.7	-	1	0.3	0.6
2022	1.4	1.6	-	-	0.7	1.7
year	Quadrat Cover (%)					
2006	1.0	0.6	-	0.6	0.2	1.3
2010	0.4	0.8	-	0.1	0.3	2.0
2013	2.1	0.3	0.0	0.2	0.3	1.4
2017	1.4	0.4	0.1	1.4	0.4	1.3
2022	1.4	0.2	-	0.5	0.5	2.0

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

**Table 17R-23.13 - Shrub/Tree Characteristics.** Population characteristics of shrub/tree species populations including density reproduction (seedlings), age distribution, utilization, vigor and average size (height/crown) of plants.

Year	Density		Age Class Distribution			Utilization		Poor Vigor (%)	Average Height Crown (cm)
	Plants Per Acre		Excluding Seedlings			Moderate (%)	Heavy (%)		
	Excluding Seedlings	Seedling	Young (%)	Mature (%)	Decadent (%)				
<b>Artemisia tridentata ssp. wyomingensis<sup>p</sup> -- (Wyoming big sagebrush)</b>									
2006	220	1120	0	9	91	27	9	82	41/62
2010	840	-	50	36	14	14	17	12	41/69
2013	620	-	52	32	16	10	32	13	37/61
2017	500	-	20	60	20	24	16	20	35/52
2022	1220	20	61	25	15	8	23	16	- / -
<b>Atriplex confertifolia<sup>p</sup> -- (shadscale saltbush)</b>									
2006	420	740	19	62	19	0	0	10	30/64
2010	440	-	14	86	0	5	0	0	33/72
2013	480	-	25	71	4	4	4	13	37/73
2017	400	-	0	90	10	0	0	10	26/47
2022	500	-	24	56	20	0	40	20	- / -
<b>Bassia prostrata<sup>pi</sup> -- (forage kochia)</b>									
2006	-	-	-	-	-	-	-	-	- / -
2010	20	-	0	100	0	0	0	0	23/34
2013	260	-	54	46	0	0	8	0	11/27
2017	260	-	0	100	0	8	0	0	9/24
2022	80	-	0	100	0	0	25	0	- / -
<b>Gutierrezia sarothrae -- (broom snakeweed)</b>									
2006	520	20	8	85	8	19	4	96	13/23
2010	220	-	9	91	0	0	0	0	19/28
2013	460	-	4	91	4	0	0	0	17/22
2017	1180	-	5	95	0	0	0	0	18/27
2022	420	220	19	81	0	0	0	0	- / -
<b>Krascheninnikovia lanata<sup>p</sup> -- (winterfat)</b>									
2006	260	160	62	39	0	8	8	23	12/24
2010	400	20	0	100	0	60	25	10	19/23
2013	680	20	15	85	0	59	24	18	16/22
2017	680	20	3	97	0	9	15	0	15/24
2022	580	-	14	79	7	7	76	7	- / -
<b>Opuntia -- (pricklypear)</b>									
2006	1220	-	2	85	13	0	0	7	12/44
2010	1520	-	0	99	1	0	0	1	13/53
2013	1780	40	0	97	3	0	1	53	12/34
2017	2500	-	4	94	2	0	0	21	13/31
2022	2440	-	3	95	2	0	0	2	- / -

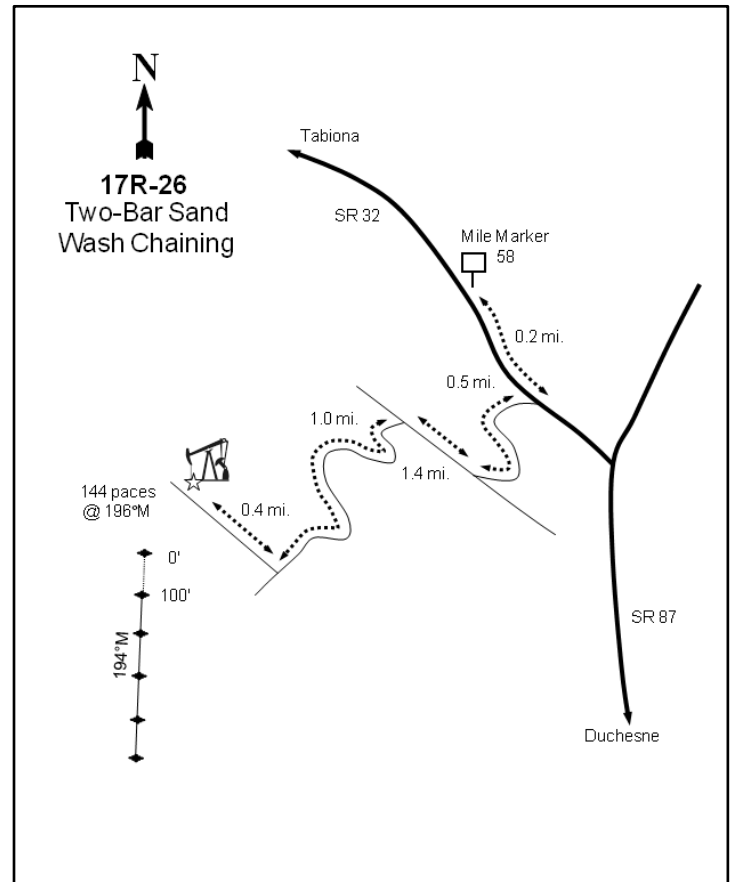
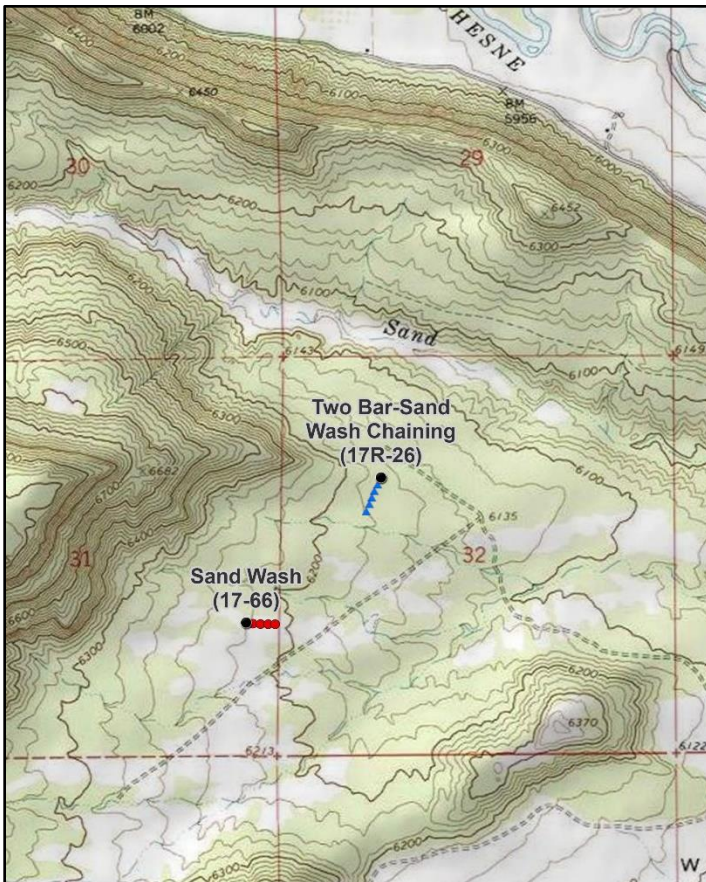
t - Tree Species; p - Preferred Browse; i - Introduced Species

**Table 17R-23.15 - Deer Desirable Components Index: Semidesert 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	2.6	0.0	0.0	26.5	-0.2	0.7	0.0	29.7	Fair
2010	2.9	0.0	0.0	30.0	-0.1	2.6	0.0	35.3	Fair
2013	5.0	0.0	0.0	30.0	-0.1	1.3	0.0	36.3	Fair
2017	2.3	0.0	0.0	30.0	-4.6	1.0	0.0	28.7	Fair
2022	4.2	0.0	0.0	30.0	-0.3	1.4	0.0	35.4	Fair



## TWO BAR-SAND WASH CHAINING - STUDY NO. 17R-26

**Location Information**

USGS 7.5 min Map Info  
GPS (0' Stake)

Talmage SW; Township 2S, Range 5W, Section 32  
NAD 83 UTM ZONE 12, 544307 East 4457436 North

**Transect Information**

Browse Tag # (0' Stake)	195
Transect Bearing	194° magnetic
Length	500ft
Belt Placement	Line 1 (11ft), Line 2 (34ft), Line 3 (59ft), Line 4 (71ft), Line 5 (95ft)
Belt Marker Placement	Belt 3: 4ft; Line 3: 92ft Long

**Directions to Site**

From Tabiona, travel southeast on State Road 32 to mile marker 58. From mile marker 58, continue on for 0.2 miles to a road coming in from the right (west). Turn right here and go 0.5 miles to a fork: stay right and go 1.4 miles to another fork. Proceed to the left and travel 1 mile to a fork. Stay to the right and continue for 0.4 miles to a natural gas pump pad on the right (northeast) side of the road. The 0-foot stake is 114 paces from the oil derrick at 196 degrees magnetic and is marked with browse tag #195.



**Site Information**

Land Ownership	State
Land Administrator	DWR
Allotment	No data
Elevation	6,200ft (1,890m)
Aspect	Northeast
Slope	5%
Sample Dates	07/06/2007, 06/29/2010, 06/27/2013, 08/02/2017, 08/01/2022

**Table 17R-26.1 Disturbance History.** Recorded history of major disturbances.

Treatment/Disturbance	Name	WRI DB#	Date	Size (acres)
Chaining - Two-Way Ely	2-bar Pinyon and Juniper Thinning	368	September-October 2007	978
Seeding - Dribbler	2-bar Pinyon and Juniper Thinning	368	September-October 2007	978
Seeding - Aerial After	2-bar Pinyon and Juniper Thinning	368	October 2007	978
Seeding - Aerial After	2-bar Pinyon and Juniper Thinning	368	January 2008	978
Hand Crew - Lop and Scatter	Tabby Mountain chaining maintenance	2570	October 2013	1915

**Table 17R-26.2 Seed Mix.** List of known seeded plant species and rates (if available).

Mix Name			Application Type	Application Date	Acres
2-Bar PJ thinning- Sand Wash			Aerial	Oct 2007	400
Type	Species	Common Name	Cultivar/Source ID	Bulk lbs/acre	PLS
G	<i>Achnatherum hymenoides</i>	Indian Ricegrass	Rimrock	1.00	0.87
G	<i>Agropyron cristatum</i>	Crested Wheatgrass	Douglas	0.50	0.42
G	<i>Agropyron cristatum</i>	Crested Wheatgrass	Hycrest	0.50	0.46
G	<i>Elymus lanceolatus</i>	Thickspike Wheatgrass	Critana	1.00	0.92
G	<i>Elymus wawawaiensis</i>	Snake River Wheatgrass	Secar	0.50	0.40
G	<i>Poa secunda</i>	Canby Bluegrass	Canbar	0.25	0.22
G	<i>Psathyrostachys juncea</i>	Russian Wildrye		0.32	0.26
G	<i>Psathyrostachys juncea</i>	Russian Wildrye		0.43	0.36
G	<i>Sporobolus cryptandrus</i>	Sand Dropseed		0.05	0.05
G	<i>Thinopyrum intermedium</i>	Pubescent Wheatgrass		0.50	0.42
F	<i>Linum perenne</i>	Blue Flax	Appar	0.25	0.23
F	<i>Medicago sativa</i>	Alfalfa	Ladak	0.50	0.46
F	<i>Medicago sativa</i>	Alfalfa	Ranger	0.50	0.44
F	<i>Sanguisorba minor</i>	Small Burnet	Delar	2.00	1.86

Mix Name			Application Type	Application Date	Acres
2-Bar PJ thinning- Dribbler			Dribbler	Sep 2007	1000
Type	Species	Common Name	Cultivar/Source ID	Bulk lbs/acre	PLS
S	<i>Atriplex canescens</i>	Fourwing Saltbush	Carbon UT	0.01	0.01
S	<i>Atriplex canescens</i>	Fourwing Saltbush	Lincoln NV	0.19	0.07
S	<i>Cercocarpus montanus</i>	True Mountain Mahogany	Sevier UT	0.05	0.04
S	<i>Purshia tridentata</i>	Bitterbrush	Elko NV	0.15	0.14

Mix Name			Application Type	Application Date	Acres
Two Bar PJ Thinning Sagebrush			Aerial	Jan 2008	925
Type	Species	Common Name	Cultivar/Source ID	Bulk lbs/acre	PLS
S	<i>Artemisia tridentata</i> ssp. <i>wyomingensis</i>	Wyoming Big Sagebrush	Iron UT	1.04	0.22

**Wildlife Habitat and Vegetation History****Table 17R-26.3 - Wildlife Seasonal Habitat.** DWR wildlife habitat and seasonality.

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

**Table 17R-26.4 - Vegetation History.** The dominant vegetation type(s) and phase of woodland succession (Tausch, Miller, Roundy, & Chambers, 2009).

Year	Vegetation Type	Woodland Succession
2007	Pinyon-Juniper	Phase III
2010	Perennial Grass/Pinyon-Juniper	Phase I
2013	Perennial Grass/Black Sagebrush/Pinyon-Juniper	Phase I
2017	Perennial Grass/Black Sagebrush/Pinyon-Juniper	Phase I
2022	Perennial Grass/Black Sagebrush/Pinyon-Juniper	Phase I

**Site Notes**

The study was established in 2007 to monitor a twoneedle pinyon (*Pinus edulis*) and Utah juniper (*Juniperus osteosperma*) thinning project on the Tabby Mountain Wildlife Management Area (WMA). The area serves as deer and elk wintering habitat, but pinyon and juniper encroachment has eliminated much of the sagebrush habitat. The objectives of the project were to restore the sagebrush steppe and improve mule deer and elk winter habitat (WRI Database 2022).

**Soils****Table 17R-26.5 - Soil Analysis Data.** List of chemical and textural soil characteristics determined by laboratory analysis.

Texture	pH	%sand	%silt	%clay	%OM	PPM P	PPM K	ds/m	Sample Date
Sandy Clay Loam	7.0	57.4	19.0	23.6	1.6	9.5	115.2	0.8	07/06/2007

**Site Potential**

1981 - 2010 Average Annual Precipitation            10 inches  
 NRCS Ecological Site                                    Upland Shallow Loam (Black Sagebrush)  
 NRCS Ecological Site #                                R034BY320UT  
 States and Transitions                                No state and transition model is available for the above ecological site.

When established in 2007, this study site was dominated by encroaching twoneedle pinyon (*Pinus edulis*) and Utah juniper (*Juniperus osteosperma*) with scattered stretches of black sagebrush (*Artemisia nova*). The herbaceous understory was sparse and not very diverse; following the chaining (Table 17R-26.1), there was an initial release of forbs that declined thereafter (Table 17R-26.11). Perennial native grasses increased following treatment, with Indian ricegrass (*Achnatherum hymenoides*) as the dominant species (Table 17R-26.10). Black sagebrush became the dominant browse species after the chaining treatment (Table 17R-26.13). There is a fair amount of mature twoneedle pinyon remaining on the site as of 2022, increasing the vulnerability of this site to further woodland encroachment (Table 17R-26.14). It is likely that this site will remain in a perennial grass and sagebrush dominated ecosystem with a continued, gradual increase of conifer cover and density over time.

**Trend Summary Tables****Table 17R-26.6 - Shrub/Tree Summary.** Average modified Daubenmire quadrat and line intercept cover by year for shrubs/trees

Year	Quadrat Cover (%)			Line-intercept Cover (%)		
	Preferred Shrub	Other Shrub	Tree	Preferred Shrub	Other Shrub	Tree
2007	3.8	2.3	6.4	3.4	1.6	22.1
2010	2.6	3.2	1.8	3.9	2.0	5.1
2013	2.3	1.3	1.5	6.9	0.8	8.3
2017	5.1	2.5	2.5	6.6	2.4	4.0
2022	4.4	2.6	5.1	7.7	2.2	6.6

**Table 17R-26.7 - Herbaceous Summary.** Nested frequency and average modified Daubenmire quadrat cover by year for herbaceous functional groups

Year	Nested Frequency				Quadrat Cover (%)			
	Annual Grass	Perennial Grass	Annual/Biennial Forb	Perennial Forb	Annual Grass	Perennial Grass	Annual/Biennial Forb	Perennial Forb
2007	-	28	26	16	-	0.2	0.1	0.0
2010	15	89	270	86	0.2	4.9	9.1	4.5
2013	55	182	62	46	0.2	10.0	1.1	1.0
2017	70	208	15	39	2.1	14.3	0.1	0.7
2022	20	174	3	15	0.1	11.1	0.0	0.2

**Table 17R-26.8 - Basic Ground Cover.** Average modified Daubenmire quadrat cover by year for basic ground cover types.

Year	Cover Type (%)					
	Bare Ground	Cryptogams	Litter	Pavement	Rock	Vegetation
2007	54.8	5.4	34.5	0.0	1.3	13.7
2010	45.0	0.5	42.3	0.2	1.6	24.8
2013	37.8	0.2	45.4	0.6	1.3	20.7
2017	46.5	0.2	41.9	0.8	1.5	24.3
2022	53.5	1.0	34.8	0.7	2.0	20.9

**Table 17R-26.9 - Pellet Group Data.** Quadrat frequency and pellet group transect data for animal pellets. Rabbit pellet groups are not sampled in the pellet group transect.

Year	Cattle	Coyote	Mule Deer	Rocky Mountain Elk	Rabbit
	Quadrat Frequency				
2007	-	-	18	11	51
2010	-	-	16	1	16
2013	-	-	13	8	23
2017	-	-	19	14	50
2022	2	-	51	20	24
Year	Days Use Per Acre (ha)				
2007	0.7 (1.8)	17.4 (43.0)*	36.2 (89.4)	5.3 (13.2)	-
2010	0.7 (1.8)	-	32.2 (79.5)	-	-
2013	-	-	19.4 (48.0)	3.4 (8.3)	-
2017	-	-	68.3 (168.8)	28.1 (69.5)	-
2022	5.1 (12.6)	-	103.9 (256.6)	17.4 (43.0)	-

Pellets per acre (ha)

**Table 17R-26.10 - Grass Species.** Nested frequency and modified Daubenmire average cover by year.

GRASS SPECIES	Achnatherum hymenoides (Indian ricegrass)	Agropyron cristatum <sup>i</sup> (crested wheatgrass)	Bromus tectorum <sup>ai</sup> (cheatgrass)	Elymus elymoides (squirreltail)	Elymus lanceolatus (thickspike wheatgrass)	Hesperostipa comata (needle and thread)	Pascopyrum smithii (western wheatgrass)	Pleuraphis jamesii (James' galleta)	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												
2007	11	-	-	2	-	-	-	4	-	15	-	-	-
2010	44	20	15	14	12	3	-	-	-	1	-	6	-
2013	83	21	54	58	37	19	-	-	0	1	-	1	1
2017	83	25	64	47	71	31	-	-	-	3	-	-	7
2022	68	32	11	4	28	36	30	-	-	6	0	-	9
year	Average Cover (%)												
2007	0.1	-	-	0.0	-	-	-	0.0	-	0.1	-	-	-
2010	3.5	0.4	0.2	0.5	0.1	0.1	-	-	-	0.0	-	0.2	-
2013	6.5	0.4	0.2	1.6	0.7	0.5	-	-	0.0	0.1	-	0.0	0.0
2017	9.1	0.9	2.0	1.1	2.0	1.3	-	-	-	0.0	-	-	0.1
2022	5.2	1.3	0.1	0.0	1.1	1.5	1.1	-	-	0.8	0.0	-	0.1

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

**Table 17R-26.11 - Forb Species.** Nested frequency and modified Daubenmire average cover by year.

FORB SPECIES	Arabis (rockcress)	Arenaria (sandwort)	Astragalus convallarius (lesser rushy milkvetch)	Astragalus spatulatus (tufted milkvetch)	Astragalus utahensis (Utah milkvetch)	Castilleja linariifolia (Wyoming Indian paintbrush)	Caulanthus crassicaulis <sup>a</sup> (thickstem wild cabbage)	Chenopodium album <sup>a</sup> (lambsquarters)	Chenopodium fremonti <sup>a</sup> (Fremont's goosefoot)	Chenopodium leptophyllum <sup>a</sup> (narrowleaf goosefoot)	Collinsia parviflora <sup>a</sup> (maiden blue eyed Mary)	Comandra umbellata (bastard toadflax)	Cryptantha (cryptantha)	Cymopterus (springparsley)	Descurainia pinnata <sup>a</sup> (western tansymustard)	Eriogonum cernuum <sup>a</sup> (nodding buckwheat)	Eriogonum ephedroides (ephedra buckwheat)	
year	Nested Frequency																	
2007	6	-	-	-	-	-	3	-	-	-	-	-	3	3	15	8	-	
2010	47	3	1	1	1	0	-	6	10	6	1	3	3	10	2	263	-	
2013	3	-	3	3	-	-	-	-	2	1	7	1	9	-	-	41	4	
2017	-	-	-	-	-	-	-	-	-	-	2	-	16	3	3	5	16	
2022	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	7	
year	Average Cover (%)																	
2007	0.0	-	-	-	-	-	0.0	-	-	-	-	-	0.0	0.0	0.0	0.0	-	
2010	2.4	0.0	0.0	0.0	0.0	0.0	-	0.2	0.2	0.0	0.0	0.0	0.7	0.1	0.0	8.0	-	
2013	0.0	-	0.0	0.0	-	-	-	-	0.0	0.0	0.0	0.0	0.3	-	-	0.1	0.2	
2017	-	-	-	-	-	-	-	-	-	-	0.0	-	0.3	0.0	0.0	0.0	0.2	
2022	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.2	

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

FORB SPECIES	Gilia inconspicua <sup>a</sup> (shy gilia)	Halogeton glomeratus <sup>ai</sup> (saltlover)	Hedysarum boreale (Utah sweetvetch)	Ipomopsis congesta (ballhead ipomopsis)	Lactuca scariola <sup>ai</sup> (prickly lettuce)	Lappula occidentalis <sup>a</sup> (flatspine stickseed)	Linum perenne <sup>i</sup> (blue flax)	Machaeranthera grindeloides (rayless tansyaster)	Medicago sativa <sup>i</sup> (alfalfa)	Navarretia intertexta <sup>a</sup> (needleleaf navarretia)	Penstemon pachyphyllus (thickleaf beardtongue)	Phlox longifolia (longleaf phlox)	Salsola tragus <sup>ai</sup> (prickly Russian thistle)	Sanguisorba minor <sup>i</sup> (small burnet)	Schoenocrambe limifolia (flaxleaf plainsmustard)	Sisymbrium altissimum <sup>ai</sup> (tall tumbledustard)	Streptanthus cordatus (heartleaf twistflower)	
year	Nested Frequency																	
2007	-	-	-	3	-	-	-	-	-	-	-	-	-	-	-	-	1	
2010	3	6	6	2	2	3	8	-	0	14	4	1	11	0	-	-	-	
2013	3	2	2	-	-	-	-	3	3	-	13	-	27	-	-	-	-	
2017	-	-	3	-	-	-	-	1	-	-	4	-	3	-	-	2	-	
2022	-	-	-	-	-	-	-	-	-	-	2	-	2	-	2	1	-	
year	Average Cover (%)																	
2007	-	-	-	0.0	-	-	-	-	-	-	-	-	-	-	-	-	0.0	
2010	0.0	0.0	0.0	0.0	0.0	0.0	0.5	-	0.0	0.2	0.3	0.0	0.4	0.0	-	-	-	
2013	0.0	0.0	0.0	-	-	-	-	0.0	0.1	-	0.3	-	0.9	-	-	-	-	
2017	-	-	0.0	-	-	-	-	0.0	-	-	0.2	-	0.0	-	-	0.0	-	
2022	-	-	-	-	-	-	-	-	-	-	0.0	-	0.0	-	0.0	0.0	-	

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

FORB SPECIES	
	Townsendia (Townsend daisy)
year	Nested
2007	-
2010	3
2013	8
2017	3
2022	4
year	Average Cover (%)
2007	-
2010	0.1
2013	0.0
2017	0.0
2022	0.0

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

**Table 17R-26.12 - Shrub and Tree Species.** Average modified Daubenmire quadrat and line intercept cover by year.

SHRUB SPECIES	Artemisia nova <sup>p</sup> (black sagebrush)	Artemisia tridentata ssp. vaseyana <sup>p</sup> (mountain big sagebrush)	Atriplex canescens <sup>p</sup> (fourwing saltbush)	Cercocarpus montanus <sup>p</sup> (alderleaf mountain mahogany)	Gutierrezia sarothrae (broom snakeweed)	Juniperus osteosperma <sup>t</sup> (Utah juniper)	Linanthus pungens (granite prickly phlox)	Opuntia (pricklypear)	Pinus edulis <sup>t</sup> (twoneedle pinyon)	Purshia tridentata <sup>p</sup> (antelope bitterbrush)
year	Line Intercept Cover (%)									
2007	2.7	-	-	0.7	-	10.2	-	1.6	11.9	-
2010	3.9	-	-	-	-	1.9	0.1	1.9	3.2	-
2013	6.9	-	-	-	-	1.4	0.3	0.5	6.9	-
2017	6.2	0.3	0.1	-	0	1.2	0.1	2.3	2.8	-
2022	6.2	0.7	0.8	-	-	3	-	2.2	3.6	-
year	Quadrat Cover (%)									
2007	3.4	-	-	0.4	-	3.6	0.0	2.3	2.8	-
2010	2.6	-	-	-	0.1	0.8	0.2	2.9	0.9	-
2013	2.3	-	-	-	0.0	1.5	0.3	1.0	0.0	0.0
2017	4.0	1.0	0.0	-	0.3	1.1	0.2	2.0	1.4	-
2022	4.1	0.2	0.1	-	-	2.0	-	2.6	3.1	-

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

**Table 17R-26.13 - Shrub/Tree Characteristics.** Population characteristics of shrub/tree species populations including density reproduction (seedlings), age distribution, utilization, vigor and average size (height/crown) of plants.

Year	Density		Age Class Distribution			Utilization		Poor Vigor (%)	Average Height Crown (cm)
	Plants Per Acre		Excluding Seedlings			Moderate (%)	Heavy (%)		
	Excluding Seedlings	Seedling	Young (%)	Mature (%)	Decadent (%)				
<b>Artemisia nova<sup>P</sup> -- (black sagebrush)</b>									
2007	2420	60	2	36	62	26	38	48	16/44
2010	1700	100	22	73	5	2	2	7	25/50
2013	3940	2760	54	45	1	11	19	21	22/49
2017	5160	40	43	56	2	11	2	0	19/52
2022	5000	20	47	50	3	17	46	4	- / -
<b>Artemisia tridentata ssp. vaseyana<sup>P</sup> -- (mountain big sagebrush)</b>									
2007	-	-	-	-	-	-	-	-	-/-
2010	-	-	-	-	-	-	-	-	-/-
2013	60	-	33	67	0	33	0	0	40/59
2017	960	-	29	69	2	6	6	0	25/42
2022	280	40	50	43	7	0	57	7	- / -
<b>Atriplex canescens<sup>P</sup> -- (fourwing saltbush)</b>									
2007	-	-	-	-	-	-	-	-	-/-
2010	20	-	0	100	0	0	0	0	57/68
2013	-	-	-	-	-	-	-	-	98/101
2017	80	-	25	75	0	0	50	0	78/82
2022	60	-	33	67	0	0	100	0	- / -
<b>Cercocarpus montanus<sup>P</sup> -- (alderleaf mountain mahogany)</b>									
2007	40	20	50	50	0	0	0	50	121/139
2010	20	-	100	0	0	0	0	0	97/127
2013	20	-	100	0	0	100	0	0	133/185
2017	20	-	0	100	0	100	0	0	92/106
2022	-	-	-	-	-	-	-	-	-/-
<b>Ephedra viridis<sup>P</sup> -- (mormon tea)</b>									
2007	-	-	-	-	-	-	-	-	70/90
2010	-	-	-	-	-	-	-	-	78/116
2013	-	-	-	-	-	-	-	-	29/54
2017	-	-	-	-	-	-	-	-	60/91
2022	-	-	-	-	-	-	-	-	-/-
<b>Ericameria nauseosa -- (rubber rabbitbrush)</b>									
2007	-	-	-	-	-	-	-	-	-/-
2010	20	-	100	0	0	0	0	0	40/36
2013	40	-	0	100	0	0	0	0	56/54
2017	-	-	-	-	-	-	-	-	73/101
2022	-	-	-	-	-	-	-	-	-/-
<b>Gutierrezia sarothrae -- (broom snakeweed)</b>									
2007	20	-	100	0	0	0	0	0	9/6
2010	60	-	100	0	0	0	0	0	31/47
2013	60	-	0	100	0	0	0	0	20/33
2017	180	-	0	100	0	0	0	0	12/17
2022	40	-	0	100	0	0	0	0	- / -
<b>Juniperus osteosperma<sup>1</sup> -- (Utah juniper)</b>									
2007	120	-	0	83	17	0	0	0	- / -
2010	140	200	43	57	0	0	0	0	- / -
2013	280	240	93	7	0	0	0	0	- / -
2017	360	40	89	6	6	0	0	6	- / -
2022	400	40	80	20	0	0	0	0	- / -

Year	Density		Age Class Distribution			Utilization		Poor Vigor (%)	Average Height Crown (cm)
	Plants Per Acre		Excluding Seedlings			Moderate (%)	Heavy (%)		
	Excluding Seedlings	Seedling	Young (%)	Mature (%)	Decadent (%)				
<b>Linanthus pungens -- (granite prickly phlox)</b>									
2007	140	-	0	43	57	0	0	0	5/10
2010	240	-	17	83	0	0	0	0	13/22
2013	380	40	0	100	0	0	0	11	10/21
2017	200	-	0	100	0	70	0	70	15/24
2022	20	-	0	100	0	0	0	0	- / -
<b>Opuntia -- (pricklypear)</b>									
2007	3080	-	0	94	7	23	0	7	9/32
2010	2760	40	9	91	0	0	0	4	10/31
2013	1560	-	3	86	12	0	0	15	8/32
2017	2520	-	2	96	2	6	0	0	9/39
2022	2360	-	2	95	3	1	0	3	- / -
<b>Pinus edulis<sup>t</sup> -- (twoneedle pinyon)</b>									
2007	220	-	64	36	0	0	0	0	- / -
2010	20	80	100	0	0	0	0	0	- / -
2013	80	-	75	25	0	0	0	25	- / -
2017	80	-	75	25	0	0	0	0	- / -
2022	80	-	75	25	0	25	0	0	- / -
<b>Purshia tridentata<sup>p</sup> -- (antelope bitterbrush)</b>									
2007	-	-	-	-	-	-	-	-	- / -
2010	-	-	-	-	-	-	-	-	- / -
2013	-	20	0	0	0	0	0	0	- / -
2017	-	-	-	-	-	-	-	-	41/109

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

**Table 17R-26.14 - Tree Characteristics.** Point-quarter tree density, size class distribution, and average diameter.

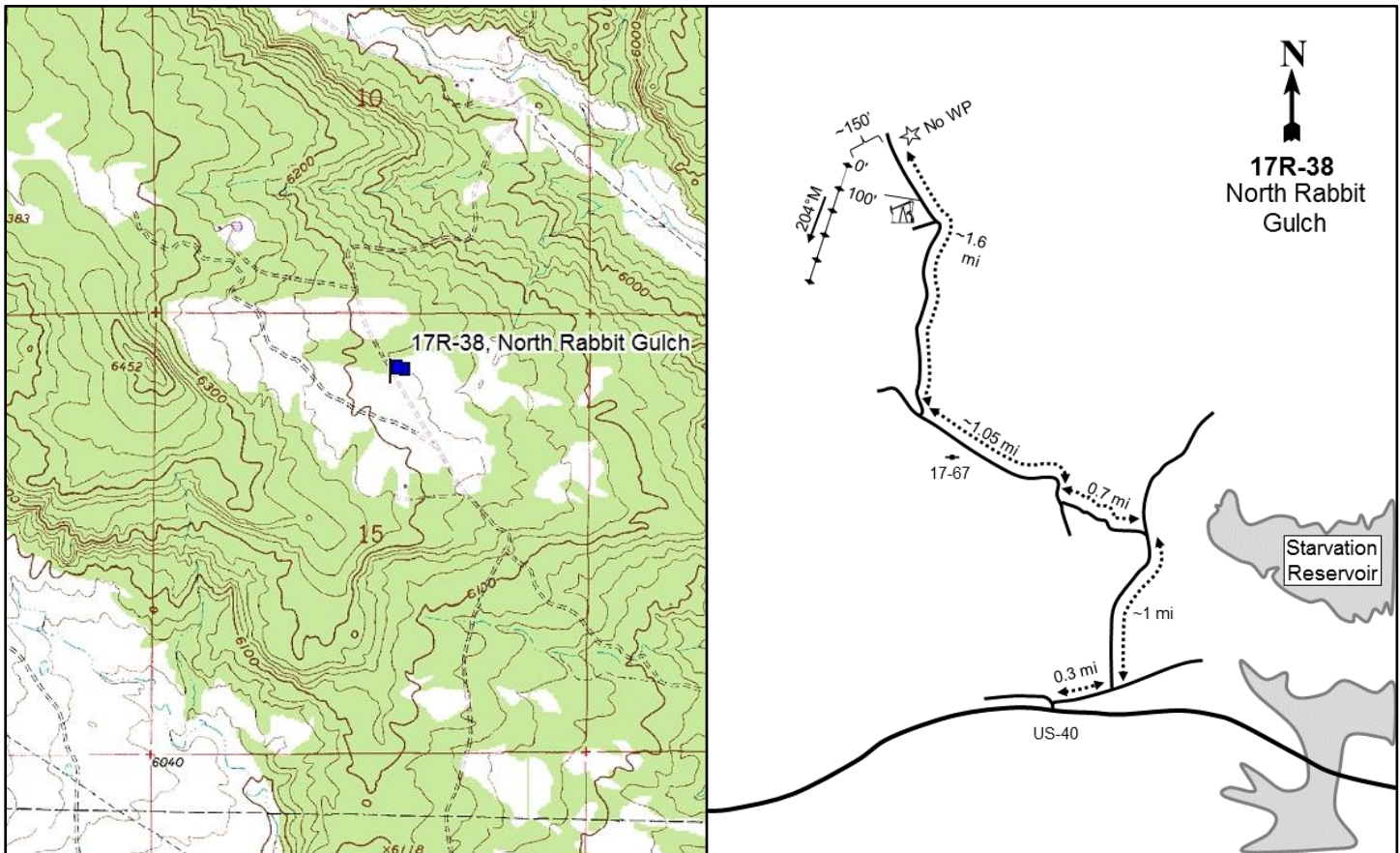
Year	Density	Size Class Distribution					Average Diameter (cm)
	Trees per Acre	Seedling (%)	1-4' (%)	4-8' (%)	8-12' (%)	>12' (%)	
<b>Juniperus osteosperma (Utah juniper)</b>							
2007	160	-	20	50	30	-	38.4
2010	86	-	83	11	6	-	8.4
2013	129	18	71	12	-	-	5.4
2017	122	37	42	16	-	5	13.5
2022	178	53	21	26	-	-	4.6
<b>Pinus edulis (twoneedle pinyon)</b>							
2007	137	15	25	15	25	20	16.5
2010	43	13	63	25	-	-	3.9
2013	76	-	71	29	-	-	6.2
2017	49	-	87	13	-	-	6.7
2022	31	14	71	-	7	7	4.7

**Table 17R-26.15 - Deer Desirable Components Index: Upland 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	4.4	0.0	0.0	0.4	0.0	0.1	0.0	4.8	Very Poor
2010	4.9	0.0	0.0	9.7	-0.2	9.0	0.0	23.4	Very Poor
2013	8.6	14.7	15.0	20.0	-0.2	2.0	0.0	60.1	Fair
2017	8.3	14.5	15.0	28.5	-1.6	1.5	0.0	66.2	Fair-Good
2022	9.6	14.0	15.0	22.2	-0.1	0.4	0.0	61.2	Fair



## NORTH RABBIT GULCH - STUDY NO. 17R-38

**Location Information**

USGS 7.5 min Map Info  
GPS (0' Stake)

Rabbit Gulch NE; Township 3S, Range 6W, Section 15  
NAD 83 UTM ZONE 12, 538434 East 4452757 North

**Transect Information**

Browse Tag # (0' Stake)

74

Transect Bearing

182° 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 Starvation Bridge on US-40, travel west for 1.5 miles to a turnoff (28000 West) on the north side of the road: turn here. Follow this road for 0.3 miles to a fork. Bear left and continue for approximately 1 mile to another fork. Proceed to the left again and continue for 0.7 miles to another fork. Bear right this time and drive for 1.05 miles, passing study 17-67 (Rabbit Gulch), then turn right. Drive for 1.6 miles, passing a gas pad, and park; there is no witness post. The study site is about 150 feet west of the road.

**Site Information**

Land Ownership	State
Land Administrator	DWR
Allotment	No data
Elevation	No data
Aspect	Northeast
Slope	3%
Sample Dates	07/31/2018, 08/01/2022

**Table 17R-38.1 Disturbance History.** Recorded history of major disturbances.

Treatment/Disturbance	Name	WRI DB#	Date	Size (acres)
Herbicide - Plateau	Rabbit Gulch Winter Range Improvement Phase I	4447	October 2018	224

**Wildlife Habitat and Vegetation History****Table 17R-38.3 - Wildlife Seasonal Habitat.** DWR wildlife habitat and seasonality.

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

**Table 17R-38.4 - Vegetation History.** The dominant vegetation type(s) and phase of woodland succession (Tausch, Miller, Roundy, & Chambers, 2009).

Year	Vegetation Type	Woodland Succession
2018	Perennial-Annual Grass	Phase I
2022	Perennial Grass	Phase I

**Site Notes**

No Notes

**Site Potential**

1981 - 2010 Average Annual Precipitation	10 inches
NRCS Ecological Site	Semidesert Loam (Wyoming Big Sagebrush)
NRCS Ecological Site #	R034BY212UT
States and Transitions	No state and transition model is available for this ecological site.

At the time of study establishment in 2018, this site was a degraded sagebrush and perennial grass plant community. In addition, the introduced annual species cheatgrass (*Bromus tectorum*) was co-dominant in the understory. Following a 2018 herbicide treatment (17R-38.1), annual grasses were reduced significantly in frequency and cover, and perennial grass species were found to have increased in 2022. Needle and thread (*Hesperostipa comata*) was the co-dominant grass species and retained similar cover between 2018 and 2022, but Indian ricegrass (*Achnatherum hymenoides*) and crested wheatgrass (*Agropyron cristatum*) increased in both nested frequency and cover over the same time period (Table 17R-38.7, Table 17R-38.10). Forbs have remained depauperate and have provided little cover. The most abundant forb in 2018 was the ruderal annual species western tansymustard (*Descurainia pinnata*), but prickly Russian thistle (*Salsola tragus*) became the most frequent forb found in 2022 (Table 17R-38.7, Table 17R-38.11). The shrub layer has in general remained in poor condition with mountain big sagebrush (*Artemisia tridentata* ssp. *vaseyana*) as the dominant species (Table 17R-38.6, Table 17R-38.12). Decadence among sagebrush was high in 2018 with nearly half of the plants classified as having poor vigor. However, the population shifted to have the age classes more evenly distributed, as the proportion of young sagebrush plants increased in 2022 (Table 17R-38.13). Utah juniper (*Juniperus osteosperma*) is present on the site, and it is likely that trees will continue to encroach in the future provided there is not a tree-removing disturbance (Table 17R-38.14).

**Trend Summary Tables**

**Table 17R-38.6 - Shrub/Tree Summary.** Average modified Daubenmire quadrat and line intercept cover by year for shrubs/trees

Year	Quadrat Cover (%)			Line-intercept Cover (%)		
	Preferred Shrub	Other Shrub	Tree	Preferred Shrub	Other Shrub	Tree
2018	2.4	1.1	-	2.7	0.7	-
2022	2.9	2.0	-	4.3	1.6	-

**Table 17R-38.7 - Herbaceous Summary.** Nested frequency and average modified Daubenmire quadrat cover by year for herbaceous functional groups

Year	Nested Frequency				Quadrat Cover (%)			
	Annual Grass	Perennial Grass	Annual/Biennial Forb	Perennial Forb	Annual Grass	Perennial Grass	Annual/Biennial Forb	Perennial Forb
2018	355	295	70	21	6.9	17.5	0.4	0.1
2022	9	297	146	11	0.0	16.2	0.9	0.1

**Table 17R-38.8 - Basic Ground Cover.** Average modified Daubenmire quadrat cover by year for basic ground cover types.

Year	Cover Type (%)					
	Bare Ground	Cryptogams	Litter	Pavement	Rock	Vegetation
2018	41.3	0.2	54.6	1.2	0.2	28.3
2022	57.8	1.0	34.6	0.3	0.4	21.4

**Table 17R-38.9 - Pellet Group Data.** Quadrat frequency and pellet group transect data for animal pellets. Rabbit pellet groups are not sampled in the pellet group transect.

Year	Cattle	Mule Deer	Rocky Mountain Elk	Rabbit
	Quadrat Frequency			
2018	-	14	-	55
2022	2	65	21	15
Year	Days Use Per Acre (ha)			
2018	-	6.7 (16.6)	2.0 (5.0)	-
2022	3.6 (9.0)	147.4 (364.2)	16.8 (41.4)	-

**Table 17R-38.10 - Grass Species.** Nested frequency and modified Daubenmire average cover by year.

GRASS SPECIES	Achnatherum hymenoides (Indian ricegrass)	Agropyron cristatum <sup>i</sup> (crested wheatgrass)	Bouteloua gracilis (blue grama)	Bromus tectorum <sup>ai</sup> (cheatgrass)	Elymus lanceolatus (thickspike wheatgrass)	Festuca idahoensis (Idaho fescue)	Hesperostipa comata (needle and thread)	Poa fendleriana (muttongrass)	Poa secunda (Sandberg bluegrass)	Psathyrostachys juncea <sup>i</sup> (Russian wildrye)	Sporobolus cryptandrus (sand dropseed)	Vulpia octoflora <sup>a</sup> (sixweeks fescue)
year	Nested Frequency											
2018	53	52	36	342	6	21	154	6	12	12	61	105
2022	74	110	11	3	4	4	115	-	2	-	56	6
year	Average Cover (%)											
2018	1.6	3.1	1.4	6.4	0.2	0.2	8.7	0.2	0.0	0.9	1.3	0.5
2022	3.0	4.6	0.7	0.0	0.1	0.1	6.0	-	0.0	-	1.7	0.0

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

**Table 17R-38.11 - Forb Species.** Nested frequency and modified Daubenmire average cover by year.

FORB SPECIES									
<i>Alyssum desertorum</i> <sup>ai</sup> (desert madwort)									
<i>Arabis</i> (rockcress)									
<i>Descurainia pinnata</i> <sup>a</sup> (western tansymustard)									
<i>Lappula occidentalis</i> <sup>a</sup> (flatspine stickseed)									
<i>Plantago patagonica</i> <sup>ai</sup> (woolly plantain)									
<i>Salsola tragus</i> <sup>ai</sup> (prickly Russian thistle)									
<i>Schoenocrambe linifolia</i> (flaxleaf plainsmustard)									
<i>Sisymbrium altissimum</i> <sup>ai</sup> (tall tumblemustard)									
<i>Sphaeralcea coccinea</i> (scarlet globemallow)									
year	Nested Frequency								
2018	4	3	25	21	29	-	13	2	8
2022	-	-	-	1	-	145	-	-	11
year	Average Cover (%)								
2018	0.0	0.0	0.3	0.1	0.1	-	0.1	0.0	0.0
2022	-	-	-	0.0	-	0.9	-	-	0.1

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

**Table 17R-38.12 - Shrub and Tree Species.** Average modified Daubenmire quadrat and line intercept cover by year.

SHRUB SPECIES						
<i>Artemisia tridentata</i> ssp. <i>vaseyana</i> <sup>p</sup> (mountain big sagebrush)						
<i>Atriplex canescens</i> <sup>p</sup> (fourwing saltbush)						
<i>Krascheninnikovia lanata</i> <sup>p</sup> (winterfat)						
<i>Opuntia</i> (pricklypear)						
<i>Opuntia fragilis</i> (brittle pricklypear)						
<i>Sarcobatus vermiculatus</i> (greasewood)						
year	Line Intercept Cover (%)					
2018	2.3	-	0.4	0.7	-	-
2022	3.8	0	0.5	1	0.4	0.2
year	Quadrat Cover (%)					
2018	2.1	-	0.3	1.1	-	0.0
2022	2.2	0.0	0.7	1.6	0.4	0.0

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

**Table 17R-38.13 - Shrub/Tree Characteristics.** Population characteristics of shrub/tree species populations including density reproduction (seedlings), age distribution, utilization, vigor and average size (height/crown) of plants.

Year	Density		Age Class Distribution			Utilization		Poor Vigor (%)	Average Height Crown (cm)
	Plants Per Acre		Excluding Seedlings			Moderate (%)	Heavy (%)		
	Excluding Seedlings	Seedling	Young (%)	Mature (%)	Decadent (%)				
<i>Artemisia tridentata</i> ssp. <i>vaseyana</i> <sup>p</sup> -- (mountain big sagebrush)									
2018	920	-	7	37	56	9	26	48	47/64
2022	1440	960	33	31	36	14	64	39	- / -
<i>Atriplex canescens</i> <sup>p</sup> -- (fourwing saltbush)									
2018	-	-	-	-	-	-	-	-	49/119
2022	40	-	50	50	0	0	100	0	- / -
<i>Atriplex confertifolia</i> <sup>p</sup> -- (shadscale saltbush)									
2018	-	-	-	-	-	-	-	-	15/50
2022	-	-	-	-	-	-	-	-	- / -

Year	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>									
2018	-	-	-	-	-	-	-	-	15/21
2022	-	-	-	-	-	-	-	-	-/-
<b>Juniperus osteosperma<sup>1</sup> -- (Utah juniper)</b>									
2018	20	-	0	100	0	0	0	0	-/-
2022	-	-	-	-	-	-	-	-	-/-
<b>Krascheninnikovia lanata<sup>p</sup> -- (winterfat)</b>									
2018	1360	-	0	100	0	31	0	0	17/19
2022	1240	-	3	92	5	0	100	5	-/-
<b>Opuntia fragilis -- (brittle pricklypear)</b>									
2018	-	-	-	-	-	-	-	-	3/40
2022	-	-	-	-	-	-	-	-	-/-
<b>Opuntia -- (pricklypear)</b>									
2018	2620	-	1	95	4	0	0	3	9/24
2022	2660	20	3	88	9	0	0	9	-/-
<b>Sarcobatus vermiculatus -- (greasewood)</b>									
2018	40	-	50	0	50	0	0	50	60/68

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

**Table 17R-38.14 - Tree Characteristics.** Point-quarter tree density, size class distribution, and average diameter.

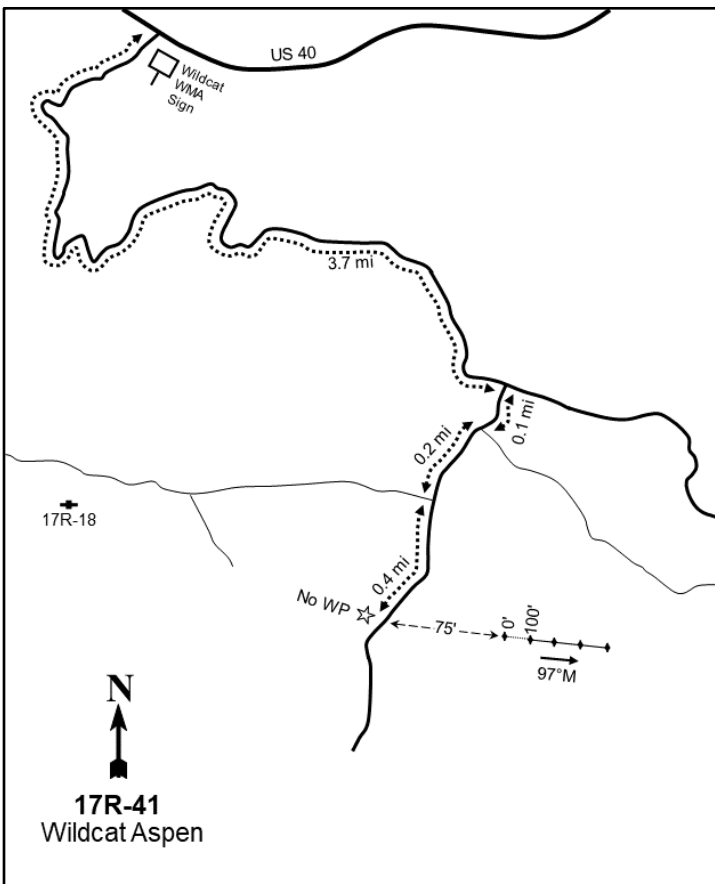
Year	Density	Size Class Distribution					Average Diameter (cm)
	Trees per Acre	Seedling (%)	1-4' (%)	4-8' (%)	8-12' (%)	>12' (%)	
<b>Juniperus osteosperma (Utah juniper)</b>							
2018	18	-	25	50	25	-	10.0
2022	7	-	50	50	-	-	8.0

**Table 17R-38.15 - Deer Desirable Components Index: Semidesert Potential Scale.**

Year	Preferred Browse Cover	Preferred Browse Decadence	Preferred Browse Young	Perennial Grass Cover	Annual Grass Cover	Perennial Forb Cover	Noxious Weeds	Total Score	Ranking
2018	3.4	0.0	0.0	30.0	-5.2	0.1	0.0	28.3	Fair
2022	5.4	0.0	0.0	30.0	0.0	0.1	0.0	35.5	Fair



## 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	DWR
Allotment	No data
Elevation	8,020ft (2,444m)
Aspect	Northwest
Slope	5-10%
Sample Dates	07/21/2019, 08/03/2022

**Table 17R-41.1 Disturbance History.** Recorded history of major disturbances.

Treatment/Disturbance	Name	WRI DB#	Date	Size (acres)
Fire - Wildfire	Dollar Ridge	-	2018	70003

**Wildlife Habitat and Vegetation History****Table 17R-41.3 - Wildlife Seasonal Habitat.** DWR 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
2022	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	No state and transition model is available for this ecological site.

Since study establishment in 2019, the plant community on this site has remained dominated by quaking aspen (*Populus tremuloides*) with a robust and diverse understory. Perennial grasses and/or forbs have contributed a majority of the cover in the herbaceous understory. Kentucky bluegrass (*Poa pratensis*) has been the dominant perennial grass species in both sample years (Table 17R-41.10). Forbs are mostly native, with western aster (*Symphotrichum ascendens*) and silvery lupine (*Lupinus argenteus*) contributing the most cover in 2022 (Table 17R-41.11). Shrubs have remained 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 seedling and small size classes comprised the population of aspen in 2019, but in 2022 the size class shifted to more moderately sized trees with few receiving any herbivory. Without biotic or abiotic disturbances, the aspen population is expected to mature while the understory continues to diversify and becomes more productive habitat for wildlife (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
2022	1.3	8.0	15.3	1.9	11.5	39.1

**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
2022	-	380	271	170	-	24.0	5.2	5.8

**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
2022	24.7	0.2	50.2	0.2	0.6	48.1

**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	Rabbit
	Quadrat Frequency			
2019	-	4	3	-
2022	-	8	2	3
Year	Days Use Per Acre (ha)			
2019	2.2 (5.4)	4.7 (11.6)	2.7 (6.6)	-
2022	-	10.7 (26.5)	8.7 (21.5)	-

**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' (Kentucky bluegrass)	Poa secunda (Sandberg bluegrass)
year	Nested Frequency												
2019	12	1	9	110	2	18	3	3	2	41	5	333	1
2022	13	4	9	92	6	56	-	-	-	33	2	298	6
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
2022	0.2	0.3	0.1	4.6	0.3	1.5	-	-	-	0.8	0.0	15.7	0.4

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>a</sup> (shepherd's purse)	Carduus nutans <sup>mi</sup> (nodding plumeless thistle)	Chaenactis fremontii <sup>a</sup> (pincushion flower)	Chenopodium fremontii <sup>a</sup> (Fremont's goosefoot)	Collinsia parviflora <sup>a</sup> (maiden blue eyed Mary)	Collomia linearis <sup>a</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 ephedroides (ephedra buckwheat)	Eriogonum heracleoides (parsnipflower buckwheat)	Galium <sup>a</sup> (bedstraw)	Gayophytum racemosum <sup>a</sup> (blackfoot groundsmoke)
year	Nested Frequency																
2019	27	4	5	21	-	24	163	67	3	10	6	2	13	-	4	61	-
2022	18	5	-	12	4	10	119	45	-	-	37	6	30	0	8	49	10
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	-
2022	0.1	0.2	-	0.1	0.0	0.0	0.5	0.6	-	-	0.2	0.1	0.6	0.0	0.4	0.4	0.1

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

FORB SPECIES	Gayophytum ramosissimum <sup>a</sup> (pinyon groundsmoke)	Geranium richardsonii (Richardson's geranium)	Hydrophyllum capitatum (ballhead waterleaf)	Lactuca serriola <sup>a</sup> (prickly lettuce)	Lepidium montanum <sup>a</sup> (mountain pepperweed)	Lithophragma tenellum (slender woodland-star)	Lupinus argenteus (silvery lupine)	Nemophila breviflora <sup>a</sup> (basin nemophila)	Penstemon watsonii (Watson's penstemon)	Perideridia gairdneri ssp. borealis (common yampah)	Phlox longifolia (longleaf phlox)	Polygonum douglasii <sup>a</sup> (Douglas' knotweed)	Potentilla gracilis (slender cinquefoil)	Pseudostellaria jamesiana (tuber starwort)	Symphyotrichum (aster)	Symphyotrichum ascendens (western aster)	Taraxacum officinale (common dandelion)
year	Nested Frequency																
2019	8	1	5	8	1	1	53	34	1	27	20	64	5	126	4	95	59
2022	40	9	-	50	16	-	54	-	-	13	16	31	-	-	-	73	11
year	Average Cover (%)																
2019	0.2	0.1	0.1	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
2022	0.7	0.2	-	0.4	0.2	-	1.3	-	-	0.1	0.2	0.3	-	-	-	3.4	0.1

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

FORB SPECIES			
	Tragopogon dubius <sup>ai</sup> (yellow salsify)		
	Trifolium douglasii (Douglas' clover)		
	Verbascum thapsus <sup>ai</sup> (common mullein)		
year	Nested Frequency		
2019	11	19	-
2022	49	-	5
year	Average Cover (%)		
2019	0.4	0.5	-
2022	0.8	-	0.0

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										
	Artemisia tridentata ssp. vaseyana <sup>p</sup> (mountain big sagebrush)	Chrysothamnus viscidiflorus ssp. viscidiflorus var. viscidiflorus (yellow rabbitbrush)	Ericameria nauseosa (rubber rabbitbrush)	Mahonia repens (creeping barberry)	Populus tremuloides <sup>t</sup> (quaking aspen)	Prunus virginiana <sup>p</sup> (chokecherry)	Ribes hudsonianum <sup>p</sup> (northern black currant)	Rosa woodsii <sup>p</sup> (Woods' rose)	Symphoricarpos oreophilus <sup>p</sup> (mountain snowberry)	
year	Line Intercept Cover (%)									
2019	0.7	3.9	-	0.9	31.5	-	-	-	0.7	
2022	-	9.6	-	1.9	39.1	0.2	0.2	0.2	1.3	
year	Quadrat Cover (%)									
2019	0.6	3.1	-	1.1	7.5	-	0.0	0.0	0.2	
2022	0.0	6.8	0.1	1.0	15.3	0.0	0.0	0.0	1.2	

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 (%)				
<b>Artemisia cana<sup>p</sup> -- (silver sagebrush)</b>									
2019	-	-	-	-	-	-	-	-	44/56
2022	-	-	-	-	-	-	-	-	-/-
<b>Artemisia tridentata ssp. vaseyana<sup>p</sup> -- (mountain big sagebrush)</b>									
2019	20	-	0	100	0	0	0	0	79/159
2022	20	20	0	0	100	0	100	0	-/-
<b>Chrysothamnus viscidiflorus ssp. viscidiflorus var. viscidiflorus -- (yellow rabbitbrush)</b>									
2019	1880	-	9	92	0	0	0	0	35/46
2022	4620	-	35	63	2	0	0	3	-/-
<b>Mahonia repens -- (creeping barberry)</b>									
2019	5240	-	0	100	0	0	0	0	11/12
2022	6180	20	4	96	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>Prunus virginiana<sup>p</sup> -- (chokecherry)</b>									
2019	-	-	-	-	-	-	-	-	-/-
2022	40	-	0	100	0	0	100	0	- / -
<b>Ribes hudsonianum<sup>p</sup> -- (northern black currant)</b>									
2019	-	-	-	-	-	-	-	-	-/-
2022	160	-	0	100	0	38	25	0	- / -
<b>Rosa woodsii<sup>p</sup> -- (Woods' rose)</b>									
2019	40	-	100	0	0	0	0	0	25/53
2022	100	-	0	100	0	0	0	0	- / -
<b>Symphoricarpos oreophilus<sup>p</sup> -- (mountain snowberry)</b>									
2019	200	-	20	80	0	0	0	0	45/67
2022	420	-	5	95	0	5	0	0	- / -

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 (%)	
<b>Populus tremuloides (quaking aspen)</b>								
2019	6480	31	66	-	2	0	1	1
2022	5620	4	59	32	4	0	0	0

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

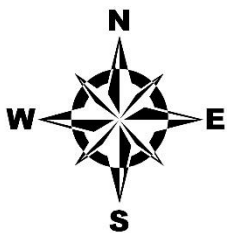
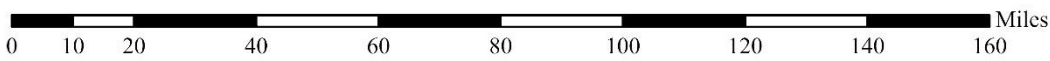
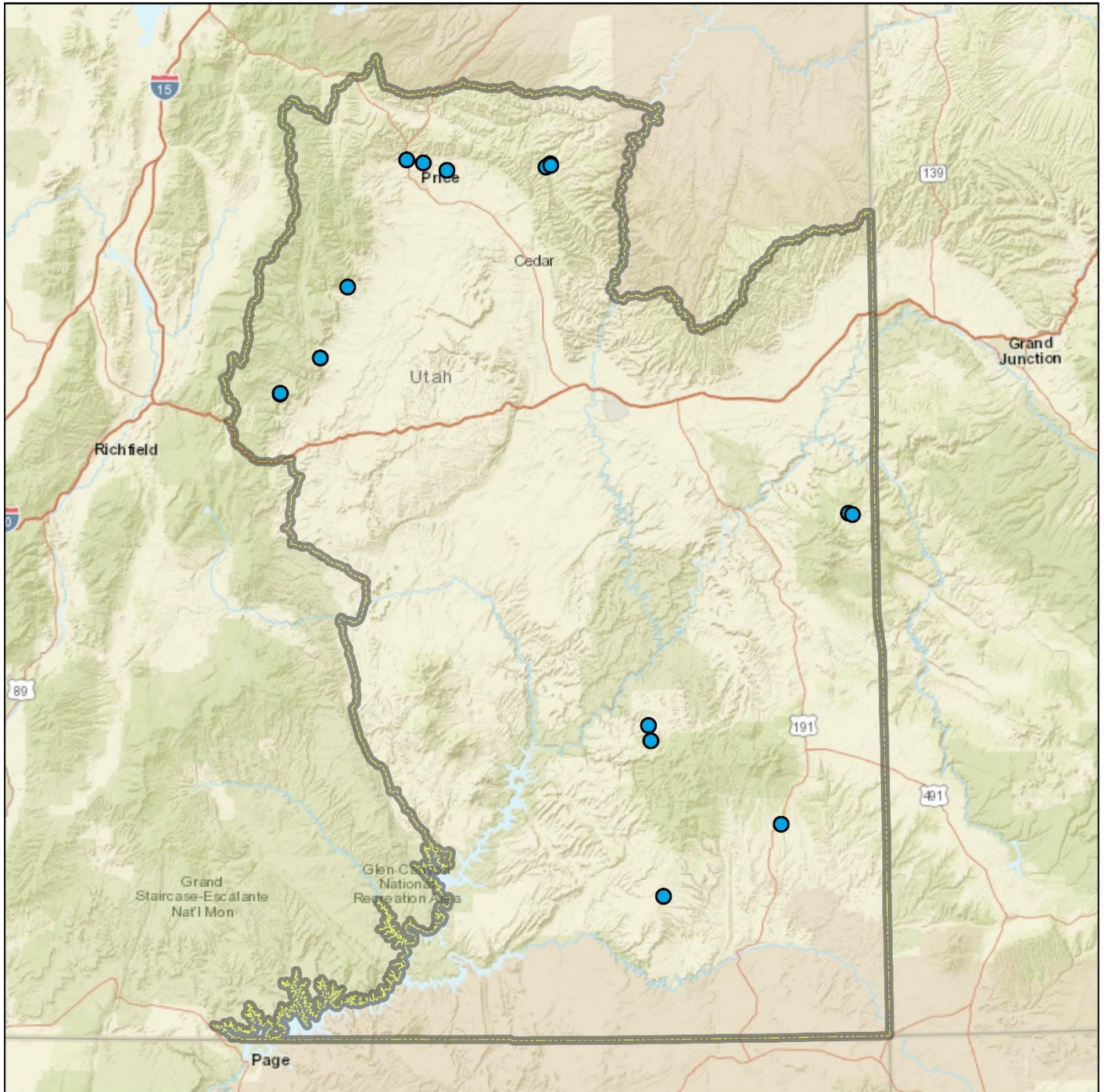
**Table 17R-41.14 - Tree Characteristics.** Point-quarter tree density, size class distribution, and average diameter.

Year	Density	Size Class Distribution					Average Diameter (cm)
	Trees per Acre	Seedling (%)	1-4' (%)	4-8' (%)	8-12' (%)	>12' (%)	
<b>Populus tremuloides (quaking aspen)</b>							
2019	4007	25	70	-	-	5	2.4
2022	1965	5	75	20	-	-	1.7

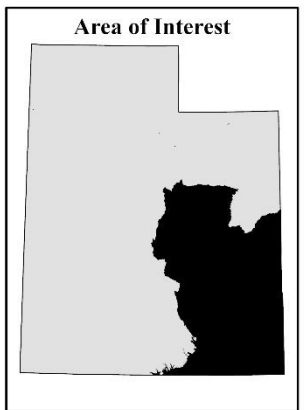
**Table 17R-41.15 - Deer Desirable Components Index: Mountain Potential Scale.**

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
2022	2.1	0.0	0.0	30.0	0.0	10.0	-2.0	40.1	Very Poor-Poor

### SOUTHEASTERN REGION



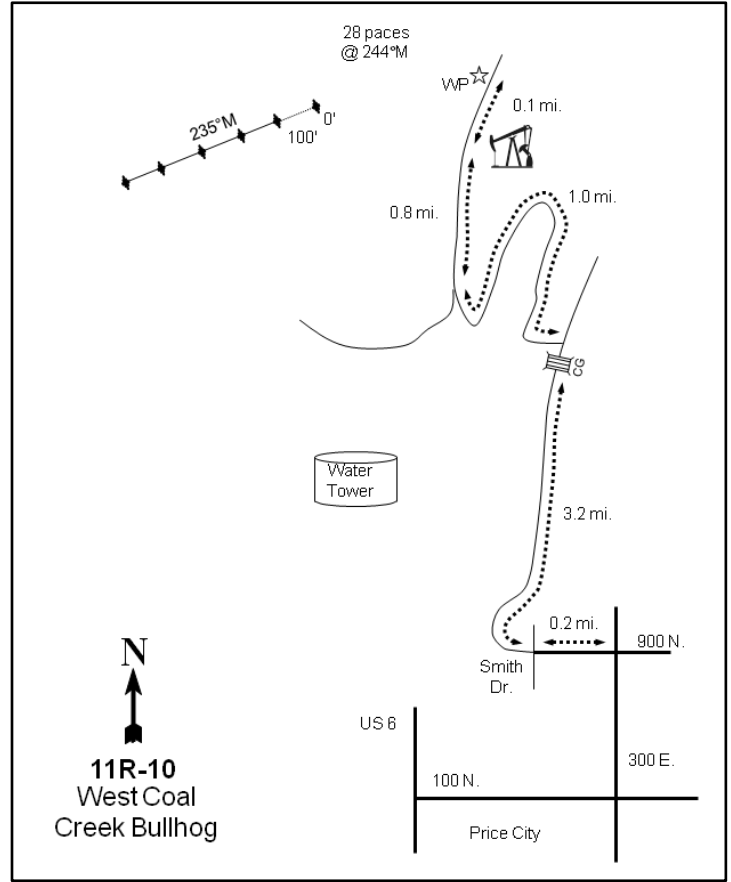
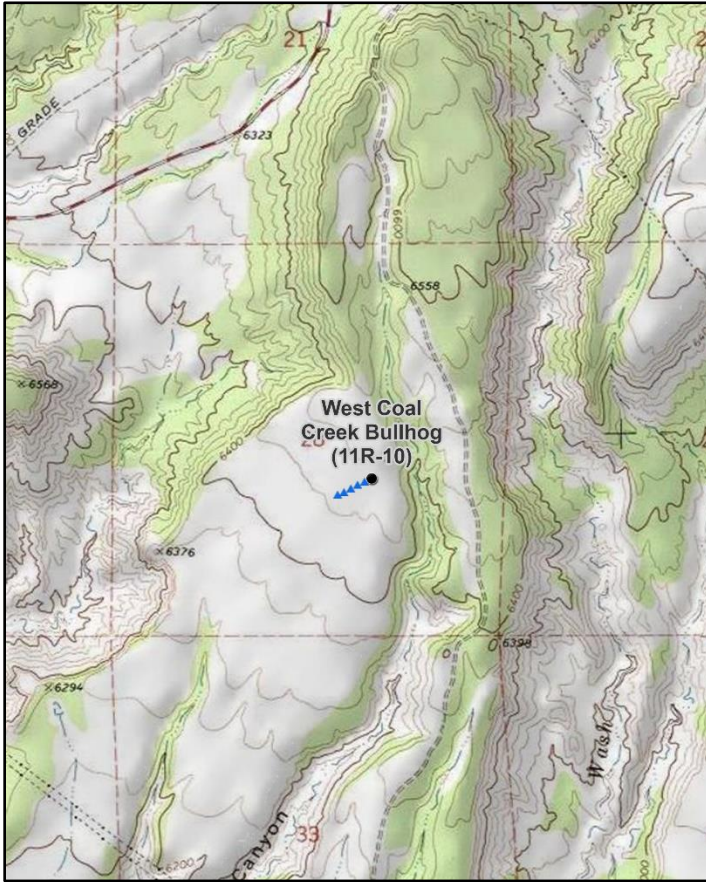
**Region Boundaries**  
Southeastern Region  
**Study Location**  
2022 WRI Study Sites



Credits: Esri, HERE, Garmin, NGA, USGS, NPS



## WEST COAL CREEK BULLHOG - STUDY NO. 11R-10



### Location Information

USGS 7.5 min Map Info  
GPS (0' Stake)

Helper SE; Township 13S, Range 10E, Section 28  
NAD 83 UTM ZONE 12, 516812 East 4390586 North

### Transect Information

Browse Tag # (0' Stake)	189
Transect Bearing	235° magnetic
Length	500ft
Belt Placement	Line 1 (11ft), Line 2 (34ft), Line 3 (59ft), Line 4 (71ft), Line 5 (95ft)
Belt Marker Placement	Standard

### Directions to Site

From 300 East in Price, turn left (west) on 900 North and proceed for 0.2 miles to Smith Drive. Continue west on 900 North (eventually traveling north) past a water tower and out of town for 3.2 miles, just past a cattle guard to a fork. Proceed left and continue for 1.0 mile to an intersection. Turn right (north) and drive for 0.8 miles to an oil/gas pump on the right (east) side of the road. From there, travel north for 0.1 mile to a witness post on the left (west) side of the road. The 0-foot stake is 28 paces away from the witness post at 244 degrees magnetic.

**Site Information**

Land Ownership	Federal
Land Administrator	BLM
Allotment	WOODHILL
Elevation	6,400ft (1,951m)
Aspect	South
Slope	3-5%
Sample Dates	07/02/2007, 06/30/2009, 07/02/2013, 08/16/2017, 07/18/2022

**Table 11R-10.1 Disturbance History.** Recorded history of major disturbances.

Treatment/Disturbance	Name	WRI DB#	Date	Size (acres)
Mechanical - Bullhog	West Coal Creek	847	Fall 2007 and Spring 2008	1868
Seeding - Aerial Before	West Coal Creek	847	August and December 2007	1868
Hand Crew - Lop and Scatter	Miller Creek Restoration 4.0 (Proposed)	5635	Summer 2021-July 2022	1751
Chaining - Two-Way Chain Unknown	Woodhill PJ Control and Seeding	-	1966-1967	-
Seeding - Seed Unknown	Woodhill PJ Control and Seeding	-	1966-1967	-

**Table 11R-10.2 Seed Mix.** List of known seeded plant species and rates (if available).

Mix Name			Application Type	Application Date	Acres
West Coal Creek			Aerial	Aug 2007	1912
Type	Species	Common Name	Cultivar/Source ID	Bulk lbs/acre	PLS
G	Achnatherum hymenoides	Indian Ricegrass	Rimrock	0.72	0.62
G	Achnatherum hymenoides	Indian Ricegrass	Rimrock	1.17	1.14
G	Agropyron fragile	Siberian Wheatgrass	Vavilov	1.35	1.16
G	Bouteloua gracilis	Blue Grama		0.07	0.02
G	Bouteloua gracilis	Blue Grama		0.26	0.25
G	Elymus wawawaiensis	Snake River Wheatgrass	Secar	1.35	1.09
G	Poa secunda	Big Bluegrass	Sherman	0.05	0.04
G	Psathyrostachys juncea	Russian Wildrye		0.80	0.64
G	Psathyrostachys juncea	Russian Wildrye		0.70	0.62
G	Sporobolus cryptandrus	Sand Dropseed		0.05	0.05
G	Thinopyrum intermedium	Intermediate Wheatgrass		1.35	1.29
F	Linum perenne	Blue Flax	Appar	0.26	0.24
F	Medicago sativa	Alfalfa	Ladak	0.13	0.12
F	Medicago sativa	Alfalfa	Ladak	0.18	0.17
F	Medicago sativa	Alfalfa	Ranger	0.31	0.28
F	Medicago sativa	Alfalfa	Spredor 4	0.16	0.15
F	Medicago sativa	Alfalfa	Spredor 4	0.16	0.14
F	Penstemon palmeri	Palmer Penstemon	Sanpete UT	0.03	0.02
F	Penstemon palmeri	Palmer Penstemon	Sanpete UT	0.05	0.04
S	Atriplex canescens	Fourwing Saltbush	Lincoln NV	1.00	0.36
S	Atriplex canescens	Fourwing Saltbush	Carbon UT	0.21	0.08
S	Bassia prostrata	Forage Kochia	Immigrant	0.47	0.42
S	Krascheninnikovia lanata	Winterfat	Iron UT	0.07	0.03

**Wildlife Habitat and Vegetation History****Table 11R-10.3 - Wildlife Seasonal Habitat.** DWR wildlife habitat and seasonality.

Species	Habitat	Season
Mule Deer	crucial	winter

**Table 11R-10.4 - Vegetation History.** The dominant vegetation type(s) and phase of woodland succession (Tausch, Miller, Roundy, & Chambers, 2009).

Year	Vegetation Type	Woodland Succession
2007	Black Sagebrush/Pinyon-Juniper	Phase II
2009	Black Sagebrush	Phase I
2013	Black Sagebrush	Phase I
2017	Black Sagebrush/Perennial Grass	Phase I
2022	Black Sagebrush/Perennial Grass	Phase I



**Site Notes**

There are many oil and gas pads in the general vicinity.

**Soils**

**Table 11R-10.5 - Soil Analysis Data.** List of chemical and textural soil characteristics determined by laboratory analysis.

Texture	pH	%sand	%silt	%clay	%OM	PPM P	PPM K	ds/m	Sample Date
Loam	7.2	48.1	28.4	23.5	2.7	10.8	64.0	0.6	07/02/2007

**Site Potential**

1981 - 2010 Average Annual Precipitation 12 inches  
 NRCS Ecological Site Upland Shallow Loam (Black Sagebrush)  
 NRCS Ecological Site # R034BY320UT  
 States and Transitions No state and transition model is available for this ecological site.

When the study was established in 2007, the plant community on this site was a stand of black sagebrush (*Artemisia nova*) with encroaching twoneedle pinyon (*Pinus edulis*) and Utah juniper (*Juniperus osteosperma*). Black sagebrush cover increased following a bullhog treatment that eliminated most of the tree cover (Table 11R-10.1, Table 11R-10.12). The herbaceous understory was depleted and sparse prior to the treatment, but some diversity has returned to the forb community in the years following the treatment. Crested wheatgrass (*Agropyron cristatum*) has been the dominant understory species since 2013 (Table 11R-10.7, Table 11R-10.10, Table 11R-10.11). Point-quarter density data indicates that a remnant tree component remains following treatment, which puts the study area at risk of infilling in future years (Table 11R-10.14). Overall, this site is in good condition with no annual grasses present and tree cover reduced to lower levels.

**Trend Summary Tables**

**Table 11R-10.6 - Shrub/Tree Summary.** Average modified Daubenmire quadrat and line intercept cover by year for shrubs/trees

Year	Quadrat Cover (%)			Line-intercept Cover (%)		
	Preferred Shrub	Other Shrub	Tree	Preferred Shrub	Other Shrub	Tree
2007	8.5	0.0	6.6	10.4	0.1	10.1
2009	9.5	0.0	0.1	10.8	-	-
2013	11.4	-	0.2	14.9	0.4	0.2
2017	16.1	0.1	0.6	18.2	0.3	0.6
2022	16.4	0.0	0.9	17.1	-	0.3

**Table 11R-10.7 - Herbaceous Summary.** Nested frequency and average modified Daubenmire quadrat cover by year for herbaceous functional groups

Year	Nested Frequency				Quadrat Cover (%)			
	Annual Grass	Perennial Grass	Annual/Biennial Forb	Perennial Forb	Annual Grass	Perennial Grass	Annual/Biennial Forb	Perennial Forb
2007	-	123	9	44	-	1.1	0.1	0.3
2009	-	147	11	117	-	4.7	0.8	3.6
2013	-	191	25	68	-	2.8	0.2	0.8
2017	-	250	59	110	-	11.5	0.4	0.8
2022	-	279	6	69	-	13.5	0.2	0.7

**Table 11R-10.8 - Basic Ground Cover.** Average modified Daubenmire quadrat cover by year for basic ground cover types.

Year	Cover Type (%)					
	Bare Ground	Cryptogams	Litter	Pavement	Rock	Vegetation
2007	35.2	4.6	38.8	13.0	3.9	15.8
2009	26.5	0.1	47.4	8.2	2.4	18.9
2013	29.9	0.1	37.8	7.9	5.2	16.2
2017	26.4	0.2	39.6	15.7	3.4	27.3
2022	37.7	0.5	45.0	8.4	4.6	28.1

**Table 11R-10.9 - Pellet Group Data.** Quadrat frequency and pellet group transect data for animal pellets. Rabbit pellet groups are not sampled in the pellet group transect.

Year	Cattle	Mule Deer	Rocky Mountain Elk	Rabbit
	Quadrat Frequency			
2007	1	1	1	81
2009	5	5	-	29
2013	3	12	-	9
2017	2	20	-	66
2022	2	22	1	18
Year	Days Use Per Acre (ha)			
2007	1.5 (3.6)	3.4 (8.3)	2.7 (6.6)	-
2009	7.2 (17.9)	16.1 (39.7)	2.7 (6.6)	-
2013	16.7 (41.2)	20.1 (49.7)	-	-
2017	17.4 (43.0)	30.8 (76.1)	0.7 (1.7)	-
2022	-	44.2 (109.2)	-	-

**Table 11R-10.10 - Grass Species.** Nested frequency and modified Daubenmire average cover by year.

GRASS SPECIES	Achnatherum hymenoides (Indian ricegrass)	Agropyron cristatum <sup>i</sup> (crested wheatgrass)	Bouteloua gracilis (blue grama)	Elymus elymoides (squirreltail)	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							
2007	-	120	1	1	2	-	-	-
2009	4	137	-	-	-	13	-	3
2013	3	182	-	3	3	-	3	-
2017	8	238	8	2	-	-	-	-
2022	5	273	9	3	-	-	-	-
year	Average Cover (%)							
2007	-	1.1	0.0	0.0	0.0	-	-	-
2009	0.2	4.2	-	-	-	0.3	-	0.0
2013	0.0	2.8	-	0.0	0.0	-	0.0	-
2017	0.3	11.1	0.2	0.0	-	-	-	-
2022	0.2	13.1	0.2	0.0	-	-	-	-

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

**Table 11R-10.11 - Forb Species.** Nested frequency and modified Daubenmire average cover by year.

FORB SPECIES	Astragalus (milkvetch)	Astragalus convallarius (lesser rushy milkvetch)	Chamaesyce (sandmat)	Chenopodium fremontii <sup>a</sup> (Fremont's goosefoot)	Chenopodium leptophyllum <sup>a</sup> (narrowleaf goosefoot)	Descurainia pinnata <sup>a</sup> (western tansymustard)	Eriogonum batemanii (Bateman's buckwheat)	Eriogonum cernuum <sup>a</sup> (nodding buckwheat)	Ipomopsis aggregata (scarlet gilia)	Lactuca serriola <sup>ai</sup> (prickly lettuce)	Lappula occidentalis <sup>a</sup> (flatspine stickseed)	Lesquerella (bladderpod)	Linum lewisii (Lewis flax)	Medicago sativa <sup>i</sup> (alfalfa)	Penstemon humilis (low beardtongue)	Physaria (twinpod)	Salsola tragus <sup>ai</sup> (prickly Russian thistle)
year	Nested Frequency																
2007	-	1	12	-	-	2	-	7	-	-	-	-	-	-	30	-	-
2009	1	16	27	0	3	6	11	-	1	1	-	8	5	1	62	-	2
2013	2	22	32	-	7	1	10	7	1	-	-	1	-	2	13	-	14
2017	3	8	51	4	-	23	8	-	1	-	3	51	-	-	12	-	35
2022	2	10	24	-	-	3	18	0	-	2	-	11	-	-	1	15	1
year	Average Cover (%)																
2007	-	0.0	0.2	-	-	0.0	-	0.1	-	-	-	-	-	-	0.1	-	-
2009	0.1	0.2	0.8	0.1	0.0	0.4	0.5	-	0.1	0.2	-	0.5	0.0	0.0	1.4	-	0.0
2013	0.0	0.1	0.2	-	0.0	0.0	0.3	0.0	0.0	-	-	0.0	-	0.0	0.1	-	0.1
2017	0.0	0.2	0.2	0.0	-	0.3	0.1	-	0.0	-	0.0	0.2	-	-	0.0	-	0.1
2022	0.1	0.1	0.1	-	-	0.1	0.1	0.0	-	0.0	-	0.2	-	-	0.0	0.0	0.0

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

FORB SPECIES	Symphyotrichum (aster)	Townsendia (Townsend daisy)
year	Nested	
2007	1	1
2009	-	-
2013	-	-
2017	-	-
2022	-	-
year	Average Cover (%)	
2007	0.0	0.0
2009	-	-
2013	-	-
2017	-	-
2022	-	-

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

**Table 11R-10.12 - Shrub and Tree Species.** Average modified Daubenmire quadrat and line intercept cover by year.

SHRUB SPECIES	Line Intercept Cover (%)						
	Artemisia nova <sup>p</sup> (black sagebrush)	Artemisia tridentata ssp. wyomingensis <sup>p</sup> (Wyoming big sagebrush)	Gutierrezia sarothrae (broom snakeweed)	Juniperus osteosperma <sup>i</sup> (Utah juniper)	Opuntia polyacantha (plains pricklypear)	Pinus edulis <sup>i</sup> (twoneedle pinyon)	Purshia tridentata <sup>p</sup> (antelope bitterbrush)
year	Line Intercept Cover (%)						
2007	10.4	-	-	2.7	0.1	7.4	-
2009	10.8	-	-	0	-	-	-
2013	14.9	-	-	0.2	0.4	-	-
2017	18.2	-	0.2	0.6	0.1	-	-
2022	17.1	-	-	0.3	-	0	-
year	Quadrat Cover (%)						
2007	8.4	-	-	1.6	0.0	5.0	0.0
2009	9.3	0.2	-	0.0	0.0	0.1	-
2013	11.4	-	-	0.2	0.0	-	-
2017	16.1	-	0.0	0.2	0.0	0.4	-
2022	16.3	0.1	0.0	0.1	-	0.8	-

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

**Table 11R-10.13 - Shrub/Tree Characteristics.** Population characteristics of shrub/tree species populations including density reproduction (seedlings), age distribution, utilization, vigor and average size (height/crown) of plants.

Year	Density		Age Class Distribution			Utilization		Poor Vigor (%)	Average Height Crown (cm)
	Plants Per Acre		Excluding Seedlings			Moderate (%)	Heavy (%)		
	Excluding Seedlings	Seedling	Young (%)	Mature (%)	Decadent (%)				
<b>Artemisia nova<sup>p</sup> -- (black sagebrush)</b>									
2007	7220	4160	2	68	30	58	8	13	33/55
2009	-	-	-	-	-	-	-	-	25/48
2013	11760	900	32	67	2	29	23	14	21/46
2017	11760	60	7	86	7	23	5	5	23/52
2022	8880	20	29	63	9	25	22	13	- / -
<b>Artemisia tridentata ssp. wyomingensis<sup>p</sup> -- (Wyoming big sagebrush)</b>									
2007	-	-	-	-	-	-	-	-	- / -
2009	-	-	-	-	-	-	-	-	27/35
2013	-	-	-	-	-	-	-	-	- / -
2017	20	-	100	0	0	0	0	100	- / -
2022	20	-	100	0	0	0	100	0	- / -
<b>Atriplex canescens<sup>p</sup> -- (fourwing saltbush)</b>									
2007	-	-	-	-	-	-	-	-	122/125
2009	-	-	-	-	-	-	-	-	29/26
2013	60	-	67	33	0	33	0	33	53/54
2017	80	-	25	50	25	0	75	25	56/71
2022	20	-	0	100	0	0	100	0	- / -
<b>Cercocarpus montanus<sup>p</sup> -- (alderleaf mountain mahogany)</b>									
2007	-	-	-	-	-	-	-	-	- / -
2009	-	-	-	-	-	-	-	-	95/120
2013	-	-	-	-	-	-	-	-	- / -
2017	-	-	-	-	-	-	-	-	118/136
2022	-	-	-	-	-	-	-	-	- / -

Year	Density		Age Class Distribution			Utilization		Poor Vigor (%)	Average Height Crown (cm)
	Plants Per Acre		Excluding Seedlings			Moderate (%)	Heavy (%)		
	Excluding Seedlings	Seedling	Young (%)	Mature (%)	Decadent (%)				
<b>Ephedra viridis<sup>p</sup> -- (mormon tea)</b>									
2007	-	-	-	-	-	-	-	-	-/-
2009	-	-	-	-	-	-	-	-	-/-
2013	-	-	-	-	-	-	-	-	-/-
2017	80	-	75	25	0	0	0	0	18/19
2022	20	-	0	100	0	0	0	0	-/-
<b>Gutierrezia sarothrae -- (broom snakeweed)</b>									
2007	-	-	-	-	-	-	-	-	-/-
2009	-	-	-	-	-	-	-	-	21/23
2013	-	-	-	-	-	-	-	-	23/34
2017	40	60	0	100	0	0	0	0	19/28
2022	20	20	0	100	0	0	0	0	-/-
<b>Juniperus osteosperma<sup>i</sup> -- (Utah juniper)</b>									
2007	120	-	67	33	0	0	0	0	-/-
2009	-	-	-	-	-	-	-	-	-/-
2013	80	-	100	0	0	0	0	25	-/-
2017	80	-	75	25	0	0	0	0	-/-
2022	60	20	67	0	33	0	0	33	-/-
<b>Opuntia polyacantha -- (plains pricklypear)</b>									
2007	140	-	14	86	0	0	0	0	8/19
2009	-	-	-	-	-	-	-	-	8/29
2013	140	60	0	100	0	0	0	86	4/24
2017	300	-	0	100	0	0	0	0	7/23
2022	20	-	0	100	0	0	0	0	-/-
<b>Pinus edulis<sup>t</sup> -- (twoneedle pinyon)</b>									
2007	160	-	25	75	0	0	0	0	-/-
2009	-	-	-	-	-	-	-	-	-/-
2013	-	-	-	-	-	-	-	-	-/-
2017	80	-	50	50	0	0	0	0	-/-
2022	60	-	100	0	0	0	0	0	-/-
<b>Purshia stansburiana<sup>p</sup> -- (Stansbury cliffrose)</b>									
2007	-	-	-	-	-	-	-	-	110/78
2009	-	-	-	-	-	-	-	-	81/24
2013	-	-	-	-	-	-	-	-	54/85
2017	-	-	-	-	-	-	-	-	104/121
2022	20	-	0	100	0	100	0	0	-/-
<b>Purshia tridentata<sup>p</sup> -- (antelope bitterbrush)</b>									
2007	-	-	-	-	-	-	-	-	102/177
2009	-	-	-	-	-	-	-	-	92/137
2013	20	-	0	100	0	0	100	100	130/163
2017	20	-	0	100	0	0	0	0	48/95
2022	20	-	0	100	0	0	100	0	-/-
<b>Sclerocactus -- (fishhook cactus)</b>									
2007	-	-	-	-	-	-	-	-	-/-
2009	-	-	-	-	-	-	-	-	-/-
2013	-	-	-	-	-	-	-	-	-/-
2017	-	-	-	-	-	-	-	-	7/9

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

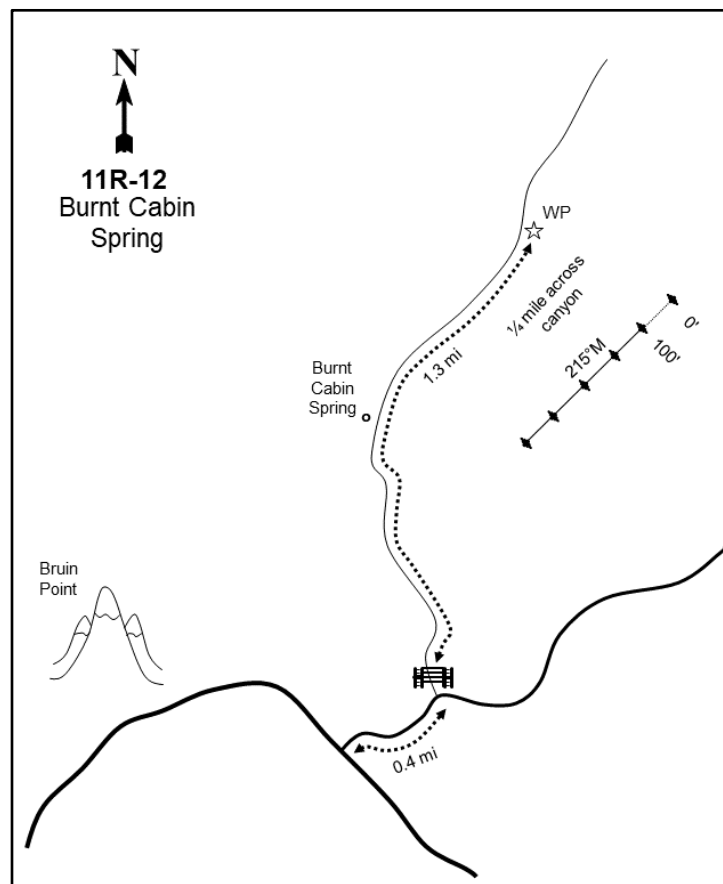
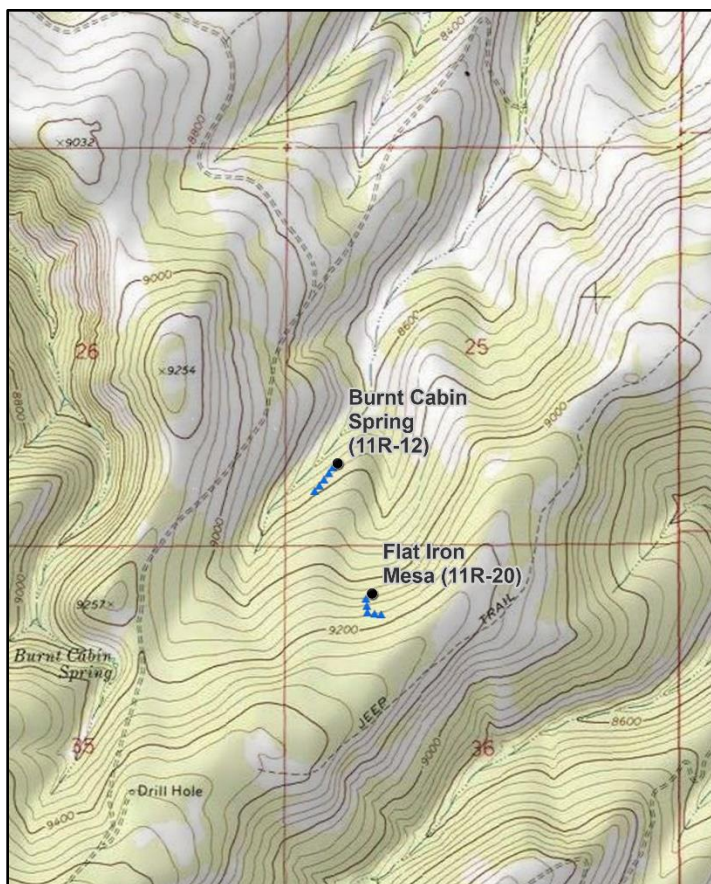
**Table 11R-10.14 - Tree Characteristics.** Point-quarter tree density, size class distribution, and average diameter.

Year	Density	Size Class Distribution					Average Diameter (cm)
	Trees per Acre	Seedling (%)	1-4' (%)	4-8' (%)	8-12' (%)	>12' (%)	
<b>Juniperus osteosperma (Utah juniper)</b>							
2007	178	-	45	45	10	-	9.8
2009	17	-	67	33	-	-	3.7
2013	69	17	83	-	-	-	4.6
2017	56	6	82	12	-	-	6.1
2022	1	100	-	-	-	-	0.1
<b>Pinus edulis (twoneedle pinyon)</b>							
2007	121	-	25	70	5	-	9.9
2009	10	20	20	60	-	-	4.6
2013	21	22	44	33	-	-	4.7
2017	12	-	75	25	-	-	4.8
2022	20	-	63	38	-	-	5.1

**Table 11R-10.15 - Deer Desirable Components Index: Upland 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	13.0	6.1	1.1	2.2	0.0	0.6	0.0	23.0	Very Poor
2009	13.5	0.0	0.0	9.4	0.0	7.3	0.0	30.1	Very Poor
2013	18.6	14.5	15.0	5.6	0.0	1.7	0.0	55.4	Fair
2017	22.8	13.0	3.7	23.1	0.0	1.6	0.0	64.0	Fair-Good
2022	21.4	12.4	14.3	27.0	0.0	1.3	0.0	76.3	Good

## BURNT CABIN SPRING - STUDY NO. 11R-12



### Location Information

USGS 7.5 min Map Info  
GPS (0' Stake)

Bruin Point SE; Township 13S, Range 14E, Section 25  
NAD 83 UTM ZONE 12, 559658 East 4390313 North

### Transect Information

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

Not Available  
215° magnetic (Line 5: 265° magnetic)  
500ft  
Line 1 (11ft), Line 2 (34ft), Line 3 (59ft), Line 4 (71ft), Line 5 (95ft)  
No Rebar

### Directions to Site

From Bruin Point, travel east to the entrance of Range Creek WMA and turn left. Drive 0.4 miles to a locked gate on the left. Proceed through the gate and continue 1.3 miles to a witness post on the right (east) side of the road. The study site is across the canyon to the southeast and on the lower portion of the hill slope. The 0-foot stake is a metal half-high fencepost, while the rest of the stakes are rock cairns with wooden posts; metal stakes should be placed during the next sampling.



**Site Information**

Land Ownership	State
Land Administrator	DWR
Allotment	GREEN RIVER
Elevation	8,777ft (2,675m)
Aspect	Northwest
Slope	25%
Sample Dates	08/21/2012, 08/17/2016, 07/19/2022

**Table 11R-12.1 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	4840	October 2019-July 2020	129
Fire - Prescribed	Cold Spring Aspen Enhancement Phase 2: Tavaputs Ranch	1932	June 2015	191

**Wildlife Habitat and Vegetation History****Table 11R-12.3 - Wildlife Seasonal Habitat.** DWR 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 11R-12.4 - Vegetation History.** The dominant vegetation type(s) and phase of woodland succession (Tausch, Miller, Roundy, & Chambers, 2009).

Year	Vegetation Type	Woodland Succession
2012	Quaking Aspen-Conifer Encroached	NA
2016	Quaking Aspen	NA
2022	Annual-Perennial Forb/Quaking Aspen	NA

**Site Notes**

This study is located two and a half miles northeast of Bruin Point within the Range Creek Wildlife Management Area.

**Site Potential**

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

At the outset of the study in 2012, this site was a Douglas Fir (*Pseudotsuga menziesii*) and subalpine fir (*Abies lasiocarpa*) dominated forest. Many fallen and dead quaking aspen (*Populus tremuloides*) trees were present, but few live trees were sampled (Photos, Table 11R-12.13a, Table 11R-12.14). The shrub understory consisted of dense patches of creeping barberry (*Mahonia repens*) (Table 11R-12.12, Table 11R-12.13). The herbaceous understory was very low in abundance and lacked diversity (Table 11R-12.10, Table 11R-12.11). Following the controlled burn in 2015, many of the conifer species were removed with aspen becoming the dominant species in the community (Table 11R-12.12, Table 11R-12.13). Species diversity increased significantly among the herbaceous understory. However, the noxious annual weed species gypsyflower (*Cynoglossum officinale*) was observed with low abundance in both 2016 and 2022 (Table 11R-12.11). An additional treatment removed the standing dead timber in 2019 (Table 11R-12.1). Aspen increased in cover and remained the dominant woody species along with Wood's rose (*Rosa woodsii*) and mountain snowberry (*Symphoricarpos oreophilus*) (Table 11R-12.12, Table 11R-12.13). Native annual and perennial forbs remained the dominant herbaceous component (Table 11R-12.7).

**Trend Summary Tables**

**Table 11R-12.6 - Shrub/Tree Summary.** Average modified Daubenmire quadrat and line intercept cover by year for shrubs/trees

Year	Quadrat Cover (%)			Line-intercept Cover (%)		
	Preferred Shrub	Other Shrub	Tree	Preferred Shrub	Other Shrub	Tree
2012	2.8	2.7	62.9	4.6	3.3	101.3
2016	4.1	1.7	6.7	4.7	2.6	12.3
2022	11.8	1.5	10.2	16.1	1.3	13.9

**Table 11R-12.7 - Herbaceous Summary.** Nested frequency and average modified Daubenmire quadrat cover by year for herbaceous functional groups

Year	Nested Frequency				Quadrat Cover (%)			
	Annual Grass	Perennial Grass	Annual/Biennial Forb	Perennial Forb	Annual Grass	Perennial Grass	Annual/Biennial Forb	Perennial Forb
2012	-	47	1	152	-	0.6	0.0	5.7
2016	-	68	150	157	-	0.9	17.6	5.2
2022	14	110	210	224	0.4	5.7	16.1	11.8

**Table 11R-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
2012	0.6	1.1	85.3	-	-	65.9
2016	4.6	-	69.1	1.2	0.3	31.2
2022	33.3	0.2	48.4	4.2	2.9	43.5

**Table 11R-12.9 - Pellet Group Data.** Quadrat frequency and pellet group transect data for animal pellets. Rabbit pellet groups are not sampled in the pellet group transect.

Year	Cattle	Coyote	Mule Deer	Rocky Mountain Elk	Horse	Rabbit
	Quadrat Frequency					
2012	-	-	1	-	-	-
2016	-	-	4	6	-	1
2022	-	-	3	9	2	-
Year	Days Use Per Acre (ha)					
2012	-	8.7 (21.5)*	8.7 (21.5)	5.3 (13.2)	-	-
2016	5.8 (14.3)	-	12.8 (31.5)	30.8 (76.1)	0.6 (1.4)	-
2022	-	-	8.1 (19.9)	5.3 (13.2)	-	-

\*Pellets per acre (ha)

**Table 11R-12.10 - Grass Species.** Nested frequency and modified Daubenmire average cover by year.

GRASS SPECIES	Achnatherum nelsonii (Columbia needlegrass)	Bromus porteri (Porter brome)	Bromus tectorum <sup>ai</sup> (cheatgrass)	Carex rossii (Ross' sedge)	Poa fendleriana (muttongrass)	Poa palustris (fowl bluegrass)	Poa pratensis <sup>i</sup> (Kentucky bluegrass)
year	Nested Frequency						
2012	-	20	-	24	-	-	11
2016	8	4	-	56	-	-	2
2022	15	31	14	73	6	0	3
year	Average Cover (%)						
2012	-	0.2	-	0.2	-	-	0.2
2016	0.1	0.0	-	0.8	-	-	0.0
2022	0.9	1.1	0.4	3.3	0.2	0.0	0.1

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

**Table 11R-12.11 - Forb Species.** Nested frequency and modified Daubenmire average cover by year.

FORB SPECIES	Achillea millefolium (Common yarrow)	Alyssum desertorum <sup>ai</sup> (desert madwort)	Androsace septentrionalis <sup>ai</sup> (pygmyflower rockjasmine)	Aquilegia coerulea (Colorado blue columbine)	Arnica cordifolia (heartleaf arnica)	Astragalus miser var. oblongifolius (timber milkvetch)	Calochortus gunnisonii (Gunnison's mariposa lily)	Chenopodium atrovirens <sup>a</sup> (pinyon goosefoot)	Cirsium (thistle)	Collomia linearis <sup>a</sup> (tiny trumpet)	Corydalis <sup>a</sup> (fumewort)	Cynoglossum officinale <sup>eni</sup> (gypsflower)	Descurainia californica <sup>a</sup> (Sierra tansymustard)	Dracocephalum parviflorum (American dragonhead)	Epilobium (willowherb)	Eucephalus engelmannii (Engelmann's aster)	Fragaria virginiana (Virginia strawberry)
year	Nested Frequency																
2012	8	-	-	-	-	10	-	-	-	-	-	-	1	-	-	12	13
2016	8	13	1	11	-	5	-	64	3	-	76	3	21	3	1	6	7
2022	31	-	2	4	16	6	13	51	7	5	4	1	136	58	1	2	21
year	Average Cover (%)																
2012	0.1	-	-	-	-	0.2	-	-	-	-	-	-	0.0	-	-	0.1	0.3
2016	0.5	0.2	0.0	0.4	-	0.1	-	2.4	0.0	-	10.1	0.1	4.2	0.0	0.0	0.1	0.2
2022	1.1	-	0.1	0.3	0.6	0.0	1.0	2.3	0.4	0.0	0.1	0.1	10.9	1.8	0.0	0.1	0.9

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

FORB SPECIES	Hackelia patens (spotted stickseed)	Heliomeris multiflora (showy goldeneye)	Iliamna rivularis (streambank wild hollyhock)	Ipomopsis aggregata (scarlet gilia)	Ligusticum (licorice-root)	Maianthemum racemosum ssp. amplexicaule (feathery false lily of the valley)	Maianthemum stellatum (starry false lily of the valley)	Osmorhiza berteroi (sweet cicely)	Phacelia sericea <sup>a</sup> (silky phacelia)	Polygonum douglasii <sup>a</sup> (Douglas' knotweed)	Ranunculus inamoenus (graceful buttercup)	Silene menziesii (Menzies' campion)	Symphotrichum ascendens (western aster)	Taraxacum officinale (common dandelion)	Thalictrum fendleri (Fendler's meadow-rue)	Viola adunca (hookedspur violet)
year	Nested Frequency															
2012	-	-	-	-	-	9	39	47	-	-	-	-	-	-	38	80
2016	-	-	2	3	1	2	13	15	16	-	10	10	3	1	38	106
2022	34	4	-	-	-	-	14	25	15	51	6	-	27	44	5	54
year	Average Cover (%)															
2012	-	-	-	-	-	0.6	1.7	0.4	-	-	-	-	-	-	1.2	1.2
2016	-	-	0.1	0.0	0.0	0.1	0.1	0.3	0.6	-	0.1	0.3	0.0	0.0	0.9	2.0
2022	1.5	0.3	-	-	-	-	0.4	0.8	0.9	1.7	0.0	-	0.6	0.6	0.3	1.0

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

**Table 11R-12.12 - Shrub and Tree Species.** Average modified Daubenmire quadrat and line intercept cover by year.

SHRUB SPECIES	Abies lasiocarpa <sup>t</sup> (subalpine fir)	Acer negundo var. negundo <sup>t</sup> (boxelder)	Amelanchier utahensis <sup>p</sup> (Utah serviceberry)	Arctostaphylos patula (greenleaf manzanita)	Artemisia tridentata ssp. vaseyana <sup>p</sup> (mountain big sagebrush)	Mahonia repens (creeping barberry)	Paxistima myrsinites (Oregon boxleaf)	Populus tremuloides <sup>t</sup> (quaking aspen)	Pseudotsuga menziesii <sup>t</sup> (Douglas-fir)	Ribes <sup>p</sup> (currant)	Ribes cereum var. cereum <sup>p</sup> (wax currant)	Rosa woodsii <sup>p</sup> (Woods' rose)	Rubus (blackberry)	Sambucus nigra ssp. cerulea <sup>p</sup> (blue elderberry)	Symphoricarpos oreophilus <sup>p</sup> (mountain snowberry)
year	Line Intercept Cover (%)														
2012	73.8	-	-	-	-	0.3	3	21.4	6.1	0.1	-	1.1	-	-	3.4
2016	2.9	-	-	-	-	2.2	0.4	9.4	-	-	0	2.9	-	0	1.8
2022	-	-	-	-	-	1.3	-	13.9	-	-	-	7.9	-	1	7.2
year	Quadrat Cover (%)														
2012	49.3	0.0	-	-	-	0.7	2.0	2.7	10.9	0.0	0.0	0.8	-	-	1.9
2016	2.4	-	0.0	0.3	0.0	1.0	0.3	4.3	-	-	0.0	2.2	0.0	0.1	1.7
2022	-	-	-	0.1	-	1.0	0.3	10.2	-	0.1	-	5.8	-	0.0	5.9

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

**Table 11R-12.13 - Shrub/Tree Characteristics.** Population characteristics of shrub/tree species populations including density reproduction (seedlings), age distribution, utilization, vigor and average size (height/crown) of plants.

Year	Density		Age Class Distribution			Utilization		Poor Vigor (%)	Average Height Crown (cm)
	Plants Per Acre		Excluding Seedlings			Moderate (%)	Heavy (%)		
	Excluding Seedlings	Seedling	Young (%)	Mature (%)	Decadent (%)				
<b>Abies lasiocarpa<sup>t</sup> -- (subalpine fir)</b>									
2012	3500	920	78	15	6	0	0	9	- / -
2016	20	80	100	0	0	0	0	0	- / -
2022	-	-	-	-	-	-	-	-	- / -
<b>Amelanchier utahensis<sup>p</sup> -- (Utah serviceberry)</b>									
2012	-	-	-	-	-	-	-	-	- / -
2016	-	20	0	0	0	0	0	0	24/20
2022	-	-	-	-	-	-	-	-	- / -
<b>Artemisia tridentata ssp. vaseyana<sup>p</sup> -- (mountain big sagebrush)</b>									
2012	-	-	-	-	-	-	-	-	- / -
2016	40	-	100	0	0	0	0	0	- / -
2022	20	-	0	100	0	0	0	0	- / -
<b>Mahonia repens -- (creeping barberry)</b>									
2012	1540	-	0	100	0	0	0	0	14/13
2016	1820	-	0	100	0	0	0	0	15/21
2022	5740	360	0	100	0	0	0	0	- / -
<b>Paxistima myrsinites -- (Oregon boxleaf)</b>									
2012	6860	-	11	88	1	0	0	0	12/14
2016	3320	320	40	60	0	0	0	0	9/9
2022	280	340	50	50	0	0	0	0	- / -
<b>Pseudotsuga menziesii<sup>t</sup> -- (Douglas-fir)</b>									
2012	180	-	22	56	22	0	44	11	- / -
2016	-	-	-	-	-	-	-	-	- / -
2022	-	-	-	-	-	-	-	-	- / -
<b>Ribes<sup>p</sup> -- (currant)</b>									
2012	-	-	-	-	-	-	-	-	- / -
2016	-	-	-	-	-	-	-	-	- / -
2022	80	-	0	100	0	0	0	0	- / -

Year	Density		Age Class Distribution			Utilization		Poor Vigor (%)	Average Height Crown (cm)
	Plants Per Acre		Excluding Seedlings			Moderate (%)	Heavy (%)		
	Excluding Seedlings	Seedling	Young (%)	Mature (%)	Decadent (%)				
<b>Ribes cereum var. cereum<sup>p</sup> -- (wax currant)</b>									
2012	60	-	67	33	0	0	0	0	63/50
2016	20	180	100	0	0	0	0	0	11/13
2022	-	-	-	-	-	-	-	-	-/-
<b>Rosa woodsii<sup>p</sup> -- (Woods' rose)</b>									
2012	2780	-	9	91	0	0	0	0	25/22
2016	4320	100	27	73	0	1	0	2	24/28
2022	4120	20	15	85	0	1	0	0	-/-
<b>Rubus -- (blackberry)</b>									
2012	-	-	-	-	-	-	-	-	-/-
2016	80	-	25	75	0	0	0	0	7/11
2022	-	-	-	-	-	-	-	-	-/-
<b>Sambucus nigra ssp. cerulea<sup>p</sup> -- (blue elderberry)</b>									
2012	-	-	-	-	-	-	-	-	-/-
2016	20	200	100	0	0	0	0	0	26/24
2022	20	-	0	100	0	0	0	0	-/-
<b>Symphoricarpos oreophilus<sup>p</sup> -- (mountain snowberry)</b>									
2012	3560	-	4	96	0	0	0	1	48/37
2016	2200	60	36	65	0	32	12	0	25/38
2022	2080	380	12	89	0	5	1	0	-/-

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

**Table 11R-12.13a - Aspen Characteristics.** Characteristics of aspen populations including density, size class distribution, and vigor of plants.

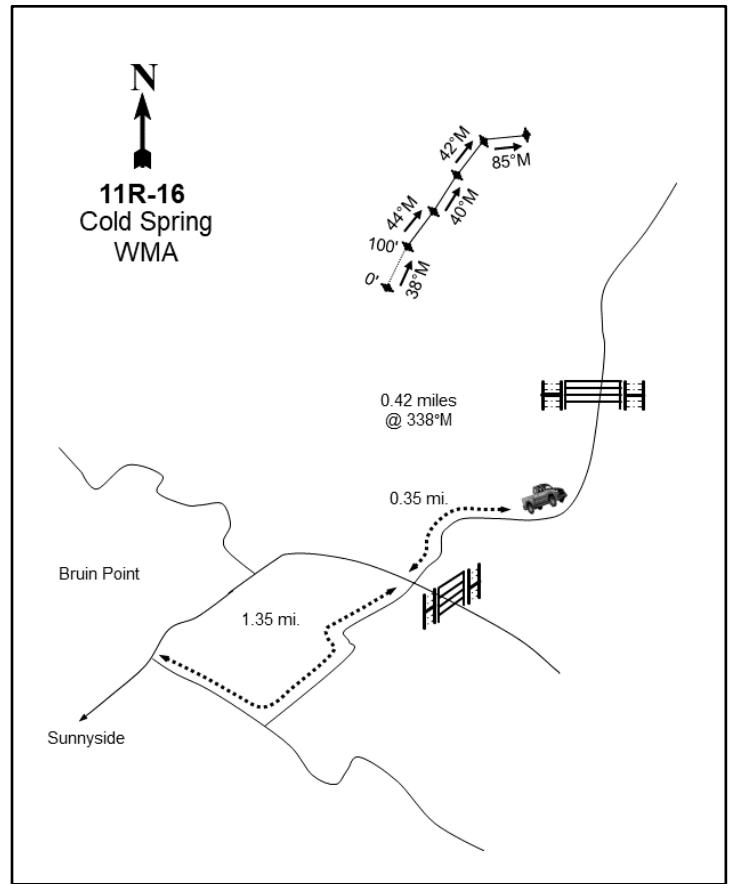
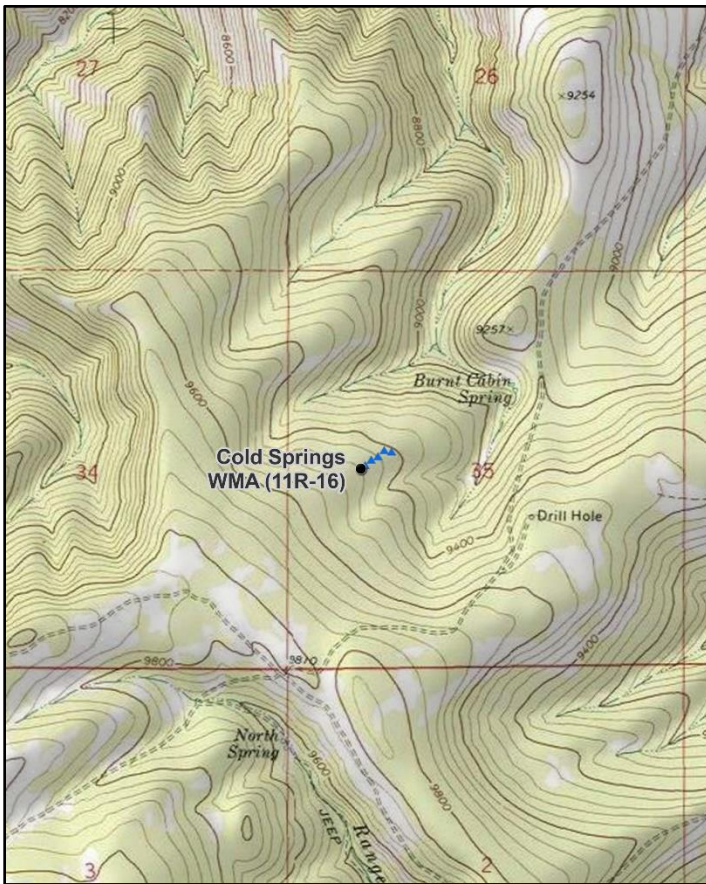
Year	Density	Size Class Distribution				Utilization		Poor Vigor (%)
	Plants per Acre	Class I (%)	Class II (%)	Class III (%)	Class IV (%)	Moderate (%)	Heavy (%)	
<b>Populus tremuloides (quaking aspen)</b>								
2012	960	46	10	44	-	0	0	0
2016	4580	23	70	7	1	20	49	5
2022	2280	4	59	37	-	2	0	0

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

**Table 11R-12.14 - Tree Characteristics.** Point-quarter tree density, size class distribution, and average diameter.

Year	Density	Size Class Distribution					Average Diameter (cm)
	Trees per Acre	Seedling (%)	1-4' (%)	4-8' (%)	8-12' (%)	>12' (%)	
<b>Abies lasiocarpa (subalpine fir)</b>							
2012	2569	60	15	10	5	10	2.6
2016	9	-	50	50	-	-	2.3
<b>Populus tremuloides (quaking aspen)</b>							
2012	287	6	28	6	-	61	8.6
2016	1097	30	60	-	-	10	3.3
2022	455	-	75	25	-	-	2.2

## COLD SPRINGS WMA - STUDY NO. 11R-16



### Location Information

USGS 7.5 min Map Info  
GPS (0' Stake)

Bruin Point SW; Township 13S, Range 14E, Section 35  
NAD 83 UTM ZONE 12, 558133 East 4389177 North

### Transect Information

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

Not Available  
38° magnetic (Line 2: 44° magnetic, Line 3: 40° magnetic, Line 4: 42° magnetic, Line 5: 85°  
500ft  
Line 1 (11ft), Line 2 (34ft), Line 3 (59ft), Line 4 (71ft), Line 5 (95ft)  
No Stakes or Rebar

### Directions to Site

From Bruin Point, travel east to the entrance to Range Creek WMA and turn left. Drive 0.4 miles to a locked gate on the left. The study site is across the canyon to the northwest on the ridge approximately one half mile away. Rock cairns take the place of metal stakes -- half-high fenceposts and rebar should be placed during the next reading.

**Site Information**

Land Ownership	State
Land Administrator	DWR
Allotment	GREEN RIVER
Elevation	9,305ft (2,836m)
Aspect	Northeast
Slope	8-10%
Sample Dates	07/02/2013, 08/17/2016, 07/19/2022

**Table 11R-16.1 Disturbance History.** Recorded history of major disturbances.

Treatment/Disturbance	Name	WRI DB#	Date	Size (acres)
Mechanical - Push	Cold Springs Conifer Removal/Aspen Regeneration Phase II	2637	July 2013-June 2014	45

**Wildlife Habitat and Vegetation History****Table 11R-16.3 - Wildlife Seasonal Habitat.** DWR 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-16.4 - Vegetation History.** The dominant vegetation type(s) and phase of woodland succession (Tausch, Miller, Roundy, & Chambers, 2009).

Year	Vegetation Type	Woodland Succession
2013	Subalpine Fir	NA
2016	Quaking Aspen	NA
2022	Quaking Aspen/Perennial Grass-Forb	NA

**Site Notes**

The lines of this transect were shifted in 2016 to avoid large piles of litter from the push treatment. However, the site was shifted back to an orientation closer to that of the original transect in 2022. There was also a doe carcass found near the site in 2016.

**Site Potential**

1981 - 2010 Average Annual Precipitation	23 inches
NRCS Ecological Site	High Mountain Loam (Aspen)
NRCS Ecological Site #	R048AY506UT
States and Transitions	No state and transition model is available for this ecological site.

Upon study establishment in 2012, this site was a subalpine fir (*Abies lasiocarpa*) dominated forest. Many fallen and dead quaking aspen (*Populus tremuloides*) trees were present, but few live trees were sampled (Photos, Table 11R-16.12, Table 11R-16.13). The herbaceous understory had moderate abundance, but lacked diversity (Table 11R-16.7, Table 11R-16.10, Table 11R-16.11). Following the push treatment in 2015, the conifer species were removed and young aspen became the dominant species in the community. Shrubs have also increased after treatment, with Woods' rose (*Rosa woodsii*) contributing the most shrub cover (Table 11R-16.12, Table 11R-16.13, Table 11R-16.13a, Table 11R-16.14). In addition, species diversity increased substantially among the herbaceous understory in the post-treatment sample years (Table 11R-16.10, Table 11R-16.11).



**Trend Summary Tables**

**Table 11R-16.6 - Shrub/Tree Summary.** Average modified Daubenmire quadrat and line intercept cover by year for shrubs/trees

Year	Quadrat Cover (%)			Line-intercept Cover (%)		
	Preferred Shrub	Other Shrub	Tree	Preferred Shrub	Other Shrub	Tree
2013	1.5	0.2	29.3	1.5	0.2	75.1
2016	1.1	-	8.0	1.9	-	10.7
2022	11.6	0.6	21.2	12.0	0.9	33.8

**Table 11R-16.7 - Herbaceous Summary.** Nested frequency and average modified Daubenmire quadrat cover by year for herbaceous functional groups

Year	Nested Frequency				Quadrat Cover (%)			
	Annual Grass	Perennial Grass	Annual/Biennial Forb	Perennial Forb	Annual Grass	Perennial Grass	Annual/Biennial Forb	Perennial Forb
2013	-	42	7	149	-	0.5	0.1	7.5
2016	-	205	318	257	-	8.1	10.0	13.4
2022	-	339	196	348	-	24.2	3.7	18.7

**Table 11R-16.8 - Basic Ground Cover.** Average modified Daubenmire quadrat cover by year for basic ground cover types.

Year	Cover Type (%)					
	Bare Ground	Cryptogams	Litter	Pavement	Rock	Vegetation
2013	0.5	0.1	86.0	0.2	0.1	40.6
2016	17.8	0.4	46.6	2.3	0.4	35.0
2022	19.0	0.1	48.9	2.6	1.1	55.7

**Table 11R-16.9 - Pellet Group Data.** Quadrat frequency and pellet group transect data for animal pellets. Rabbit pellet groups are not sampled in the pellet group transect.

Year	Black Bear	Cattle	Mule Deer	Rocky Mountain Elk	Horse
	Quadrat Frequency				
2013	-	-	-	1	-
2016	-	2	6	2	-
2022	-	-	3	5	1
Year	Days Use Per Acre (ha)				
2013	8.7 (21.5)*	1.5 (3.6)	0.7 (1.7)	3.4 (8.3)	-
2016	-	3.6 (9.0)	6.0 (14.9)	2.0 (5.0)	-
2022	8.7 (21.5)*	2.9 (7.2)	18.1 (44.7)	1.3 (3.3)	-

\*Pellets per acre (ha)

**Table 11R-16.10 - Grass Species.** Nested frequency and modified Daubenmire average cover by year.

GRASS SPECIES	Achnatherum lettermanii (Letterman's needlegrass)	Achnatherum nelsonii (Columbia needlegrass)	Bromus marginatus (mountain brome)	Bromus porteri (Porter brome)	Carex rossii (Ross' sedge)	Elymus elymoides (squirreltail)	Elymus trachycaulus (slender wheatgrass)	Poa pratensis' (Kentucky bluegrass)	Poa secunda (Sandberg bluegrass)
year	Nested Frequency								
2013	-	9	4	-	31	-	-	-	-
2016	4	10	5	-	200	2	1	2	0
2022	4	30	4	25	311	-	5	7	-
year	Average Cover (%)								
2013	-	0.0	0.0	-	0.4	-	-	-	-
2016	0.1	0.3	0.1	-	7.4	0.0	0.0	0.1	0.0
2022	0.1	1.8	0.0	1.9	19.6	-	0.2	0.4	-

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

**Table 11R-16.11 - Forb Species.** Nested frequency and modified Daubenmire average cover by year.

FORB SPECIES	Nested Frequency																	
Achillea millefolium (Common yarrow)	13	6	-	6	-	-	4	59	14	-	-	-	-	-	-	58	8	
Agoseris glauca (pale agoseris)	41	-	1	32	5	2	20	57	61	-	179	-	61	0	1	3	32	
Alyssum desertorum <sup>ni</sup> (desert madwort)	47	8	-	2	3	4	36	62	13	8	8	4	124	15	5	-	57	
Androsace septentrionalis <sup>a</sup> (pygmyflower rockjasmine)	Average Cover (%)																	
Antennaria microphylla (littleleaf pussytoes)	2013	0.1	0.0	-	0.0	-	-	0.0	1.6	0.5	-	-	-	-	-	1.8	0.2	
Aquilegia coerulea (Colorado blue columbine)	2016	2.3	-	0.0	0.3	0.2	0.0	0.2	0.9	1.1	-	3.1	-	0.9	0.0	0.1	0.0	
Arabis drummondii (Drummond's rockcress)	2022	1.5	0.2	-	0.0	0.4	0.2	0.2	1.4	0.2	0.5	0.0	0.0	1.9	0.1	0.0	1.7	
Arnica cordifolia (heartleaf arnica)																		
Astragalus miser var. oblongifolius (timber milkvetch)																		
Carduus nutans <sup>ni</sup> (nodding plumeless thistle)																		
Chenopodium atrovirens <sup>a</sup> (pinyon goosefoot)																		
Cirsium (thistle)																		
Collomia linearis <sup>a</sup> (tiny trumpet)																		
Descurainia californica <sup>a</sup> (Sierra tansymustard)																		
Dracocephalum parviflorum (American dragonhead)																		
Eucephalus engelmannii (Engelmann's aster)																		
Fragaria virginiana (Virginia strawberry)																		

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

FORB SPECIES	Nested Frequency																	
Gayophytum ramosissimum <sup>a</sup> (pinyon groundsmoke)	2013	-	-	-	-	38	-	1	-	-	-	-	17	-	-	11	16	
Gentiana amarella ssp. heterosepala <sup>a</sup> (autumn dwarf gentian)	2016	61	15	1	7	75	2	48	207	-	-	34	2	1	17	144	38	
Heliomeris multiflora var. multiflora (showy goldeneye)	2022	86	3	13	-	139	2	6	86	5	14	4	10	33	42	151	80	
Ligusticum (licorice-root)	Average Cover (%)																	
Lupinus argenteus (silvery lupine)	2013	-	-	-	-	2.4	-	0.0	-	-	-	-	0.0	-	-	0.3	0.6	
Osmorhiza berteroi (sweetcicely)	2016	1.0	0.3	0.0	0.0	3.0	0.0	0.9	3.5	-	-	0.9	0.0	0.0	0.5	2.8	0.6	
Phacelia sericea <sup>a</sup> (silky phacelia)	2022	0.6	0.0	0.7	-	4.5	0.0	0.0	0.5	0.1	0.3	0.0	0.1	0.8	1.0	4.3	1.1	
Polygonum douglasii <sup>a</sup> (Douglas' knotweed)																		
Potentilla gracilis (slender cinquefoil)																		
Pseudostellaria jamesiana (tuber starwort)																		
Ranunculus inamoenus (graceful buttercup)																		
Silene menziesii (Menzies' campion)																		
Stenotus acaulis (stemless mock goldenweed)																		
Symphyotrichum ascendens (western aster)																		
Taraxacum officinale (common dandelion)																		
Viola adunca (hookedspur violet)																		

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

**Table 11R-16.12 - Shrub and Tree Species.** Average modified Daubenmire quadrat and line intercept cover by year.

SHRUB SPECIES	Abies lasiocarpa <sup>t</sup> (subalpine fir)	Paxistima myrsinites (Oregon boxleaf)	Picea engelmannii <sup>t</sup> (Engelmann spruce)	Populus tremuloides <sup>t</sup> (quaking aspen)	Ribes cereum <sup>p</sup> (wax currant)	Ribes montigenum <sup>p</sup> (gooseberry currant)	Rosa woodsii <sup>p</sup> (Woods' rose)	Rubus idaeus (American red raspberry)	Sambucus nigra ssp. cerulea <sup>p</sup> (blue elderberry)	Symphoricarpos oreophilus <sup>p</sup> (mountain snowberry)
year	Line Intercept Cover (%)									
2013	63.4	0.2	1.6	10.1	-	-	0.9	-	-	0.6
2016	-	-	-	10.7	0.1	-	1.6	-	-	0.2
2022	0.8	-	-	33	1.7	0.9	7.3	0.9	0.7	1.4
year	Quadrat Cover (%)									
2013	28.5	0.2	0.2	0.6	-	-	1.1	-	-	0.4
2016	-	-	-	8.0	0.0	-	0.9	-	-	0.2
2022	0.9	0.1	-	20.3	1.4	1.0	7.9	0.5	0.1	1.2

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

**Table 11R-16.13 - Shrub/Tree Characteristics.** Population characteristics of shrub/tree species populations including density reproduction (seedlings), age distribution, utilization, vigor and average size (height/crown) of plants.

Year	Density		Age Class Distribution			Utilization		Poor Vigor (%)	Average Height Crown (cm)
	Plants Per Acre		Excluding Seedlings			Moderate (%)	Heavy (%)		
	Excluding Seedlings	Seedling	Young (%)	Mature (%)	Decadent (%)				
<b>Abies lasiocarpa<sup>t</sup> -- (subalpine fir)</b>									
2013	3900	1740	70	25	6	6	7	10	- / -
2016	20	-	100	0	0	0	0	0	- / -
2022	120	-	100	0	0	0	0	0	- / -
<b>Artemisia tridentata ssp. vaseyana<sup>p</sup> -- (mountain big sagebrush)</b>									
2013	-	-	-	-	-	-	-	-	- / -
2016	-	-	-	-	-	-	-	-	42/37
2022	-	-	-	-	-	-	-	-	- / -
<b>Paxistima myrsinites -- (Oregon boxleaf)</b>									
2013	520	-	0	100	0	0	0	0	11/28
2016	-	-	-	-	-	-	-	-	12/11
2022	20	-	0	100	0	0	0	0	- / -
<b>Picea engelmannii<sup>t</sup> -- (Engelmann spruce)</b>									
2013	60	-	33	33	33	0	0	0	- / -
2016	-	-	-	-	-	-	-	-	- / -
2022	20	-	100	0	0	0	0	0	- / -
<b>Ribes cereum<sup>p</sup> -- (wax currant)</b>									
2013	-	-	-	-	-	-	-	-	64/28
2016	40	20	100	0	0	0	0	0	41/26
2022	160	-	38	63	0	0	13	0	- / -
<b>Ribes montigenum<sup>p</sup> -- (gooseberry currant)</b>									
2013	-	-	-	-	-	-	-	-	- / -
2016	-	-	-	-	-	-	-	-	- / -
2022	100	-	40	60	0	60	0	0	- / -
<b>Rosa woodsii<sup>p</sup> -- (Woods' rose)</b>									
2013	1340	20	33	67	0	3	0	0	29/29
2016	1300	-	5	95	0	25	0	0	32/36
2022	2560	160	9	89	2	6	10	2	- / -

Year	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>Rubus idaeus -- (American red raspberry)</b>									
2013	-	-	-	-	-	-	-	-	-/-
2016	-	-	-	-	-	-	-	-	-/-
2022	2620	-	11	89	0	0	5	0	-/-
<b>Sambucus nigra ssp. cerulea<sup>p</sup> -- (blue elderberry)</b>									
2013	-	-	-	-	-	-	-	-	-/-
2016	-	-	-	-	-	-	-	-	44/39
2022	40	-	0	100	0	0	50	0	-/-
<b>Symphoricarpos oreophilus<sup>p</sup> -- (mountain snowberry)</b>									
2013	540	-	41	59	0	4	0	0	52/52
2016	440	-	23	77	0	91	0	0	47/79
2022	140	-	14	86	0	0	57	0	-/-

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

**Table 11R-16.13a - Aspen Characteristics.** Characteristics of aspen populations including density, size class distribution, and vigor of plants.

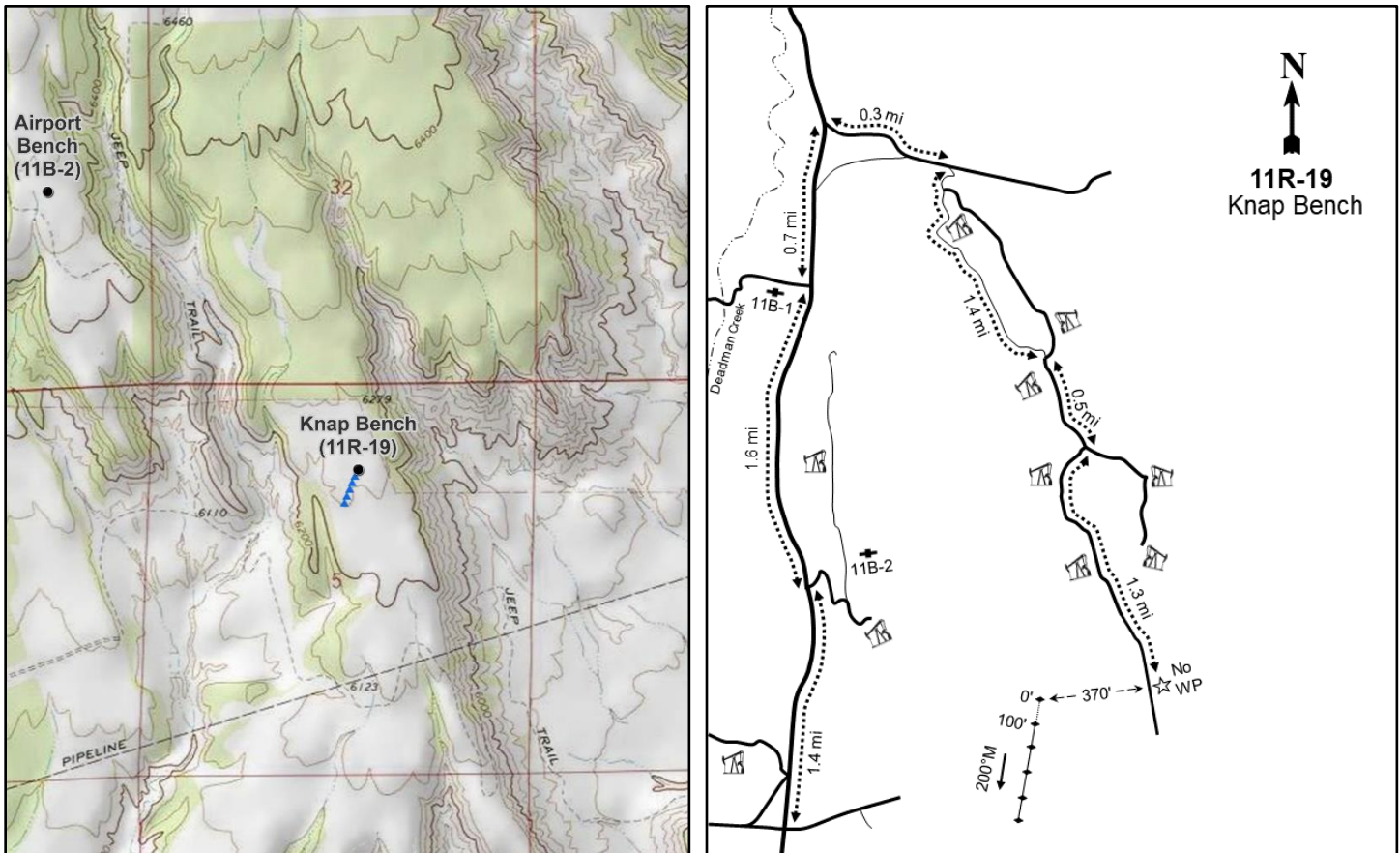
Year	Density	Size Class Distribution				Utilization		Poor Vigor (%)
	Plants per Acre	Class I (%)	Class II (%)	Class III (%)	Class IV (%)	Moderate (%)	Heavy (%)	
<b>Populus tremuloides (quaking aspen)</b>								
2013	500	4	20	36	40	8	0	4
2016	5400	12	86	1	-	38	10	0
2022	6660	3	32	63	2	1	3	1

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 11R-16.14 - Tree Characteristics.** Point-quarter tree density, size class distribution, and average diameter.

Year	Density	Size Class Distribution					Average Diameter (cm)
	Trees per Acre	Seedling (%)	1-4' (%)	4-8' (%)	8-12' (%)	>12' (%)	
<b>Abies lasiocarpa (subalpine fir)</b>							
2013	1451	30	20	35	5	10	5.2
2022	49	57	29	14	-	-	1.7
<b>Picea engelmannii (Engelmann spruce)</b>							
2013	28	-	31	15	-	54	17.3
2022	11	25	25	25	-	25	4.0
<b>Populus tremuloides (quaking aspen)</b>							
2013	357	-	-	-	-	-	11.8
2016	7291	5	95	-	-	-	1.1
2022	491	-	40	50	10	-	3.0

## 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)  
Standard

### 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.

**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, 07/18/2022

**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 4.0	5635	November 2021-February 2022	1751

**Wildlife Habitat and Vegetation History****Table 11R-19.3 - Wildlife Seasonal Habitat.** DWR 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
2022	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). The site remained similar following the removal of the few trees in the area (Table 11R-19.1). Herbaceous species decreased in cover and nested frequency (Table 11R-19.7), but this is likely due to drought conditions that occurred between the 2019-2022 readings.

## 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
2022	6.3	8.1	-	9.1	11.1	-

**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	307	152	0.5	8.4	13.5	5.4
2022	17	164	197	70	0.3	6.0	2.1	1.3

**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
2022	50.8	0.2	25.5	20.6	5.6	20.1

**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
2022	-	-	20	24
Year	Days Use Per Acre (ha)			
2019	4.4 (10.8)	-	4.0 (9.9)	-
2022	9.4 (23.3)	-	44.2 (109.2)	-

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

GRASS SPECIES	Nested Frequency		
	Achnatherum hymenoides (Indian ricegrass)	Agropyron cristatum <sup>i</sup> (crested wheatgrass)	Bromus tectorum <sup>ai</sup> (cheatgrass)
year	Nested Frequency		
2019	10	191	25
2022	28	140	17
year	Average Cover (%)		
2019	0.6	7.8	0.5
2022	1.1	5.0	0.3

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	Camelina microcarpa <sup>ai</sup> (littlerpod false flax)	Chamaesyce (sandmat)	Chenopodium album <sup>a</sup> (lambsquarters)	Cryptantha (cryptantha)	Descurainia pinnata <sup>a</sup> (western tansymustard)	Eriogonum (buckwheat)	Eriogonum batemanii (Bateman's 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 tumbledustard)
year	Nested Frequency																
2019	41	26	2	12	262	55	53	32	3	5	5	62	6	6	22	88	3
2022	5	6	-	4	3	2	41	15	-	-	-	32	-	-	19	185	-
year	Average Cover (%)																
2019	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
2022	0.0	0.0	-	0.2	0.0	0.0	0.6	0.2	-	-	-	0.5	-	-	0.2	1.6	-

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

FORB SPECIES	Townsendia incana (hoary Townsend daisy)	Tragopogon dubius <sup>ai</sup> (yellow salsify)
year	Nested	
2019	7	1
2022	-	-
year	Average Cover (%)	
2019	0.1	0.0
2022	-	-

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	Cercocarpus montanus <sup>p</sup> (alderleaf mountain mahogany)	Ephedra viridis <sup>p</sup> (mormon tea)	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)	Juniperus scopulorum <sup>i</sup> (Rocky Mountain juniper)	Quercus gambelii <sup>p</sup> (Gambel oak)
year	Line Intercept Cover (%)							
2019	4.6	4.9	-	1.8	9.2	-	0.6	-
2022	3.1	4.5	-	1.5	11.1	-	-	-
year	Quadrat Cover (%)							
2019	2.9	3.8	0.0	1.0	10.5	0.1	1.0	-
2022	1.9	3.5	-	0.8	8.1	-	-	0.1

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
2022	-	-	-	-	-	-	-	-	-/-
<b>Cercocarpus montanus<sup>p</sup> -- (alderleaf mountain mahogany)</b>									
2019	120	-	17	50	33	67	17	33	139/162
2022	60	-	0	67	33	33	67	33	-/-
<b>Echinocereus coccineus -- (scarlet hedgehog cactus)</b>									
2019	-	-	-	-	-	-	-	-	22/41
2022	-	-	-	-	-	-	-	-	-/-
<b>Ephedra viridis<sup>p</sup> -- (mormon tea)</b>									
2019	540	20	22	74	4	11	26	0	91/146
2022	280	20	14	86	0	21	0	0	-/-
<b>Ericameria nauseosa -- (rubber rabbitbrush)</b>									
2019	20	-	0	100	0	100	0	0	89/148
2022	-	-	-	-	-	-	-	-	-/-
<b>Ericameria nauseosa ssp. nauseosa var. hololeuca<sup>p</sup> -- (rubber rabbitbrush)</b>									
2019	180	280	11	78	11	11	0	0	73/114
2022	220	-	46	55	0	0	0	0	-/-
<b>Gutierrezia sarothrae -- (broom snakeweed)</b>									
2019	28680	5280	71	29	0	0	0	0	24/37
2022	17640	440	9	91	1	0	0	0	-/-
<b>Juniperus osteosperma<sup>i</sup> -- (Utah juniper)</b>									
2019	20	-	100	0	0	0	0	0	-/-
2022	-	-	-	-	-	-	-	-	-/-
<b>Juniperus scopulorum<sup>i</sup> -- (Rocky Mountain juniper)</b>									
2019	20	-	0	100	0	0	0	0	-/-
2022	-	-	-	-	-	-	-	-	-/-
<b>Opuntia polyacantha -- (plains pricklypear)</b>									
2019	20	-	100	0	0	0	0	0	9/37
2022	-	-	-	-	-	-	-	-	-/-

Year	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>									
2019	-	-	-	-	-	-	-	-	98/54
2022	340	-	0	100	0	0	0	0	- / -
<b>Yucca -- (yucca)</b>									
2019	-	-	-	-	-	-	-	-	30/31

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

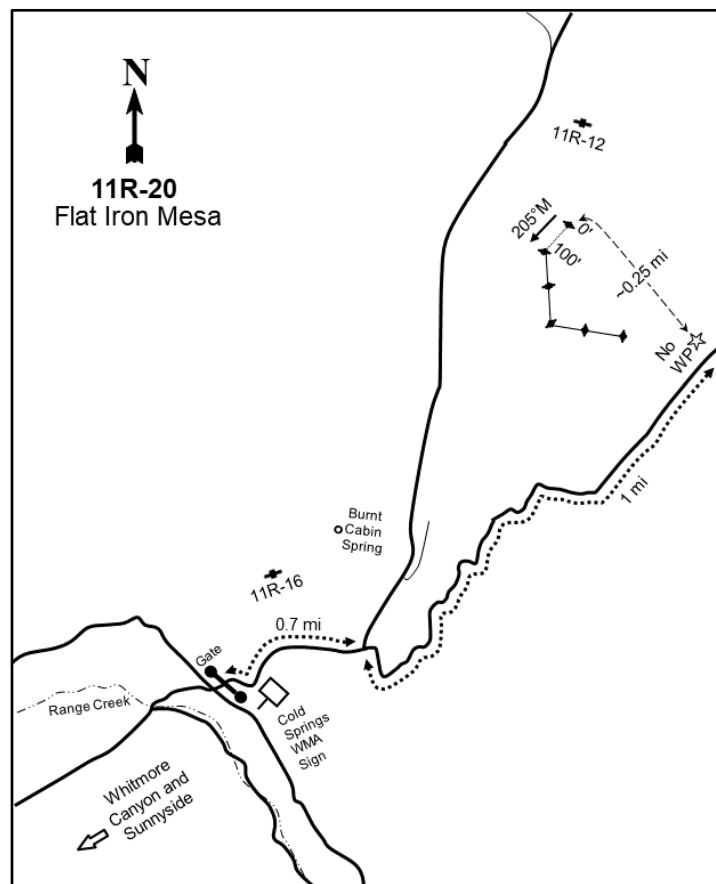
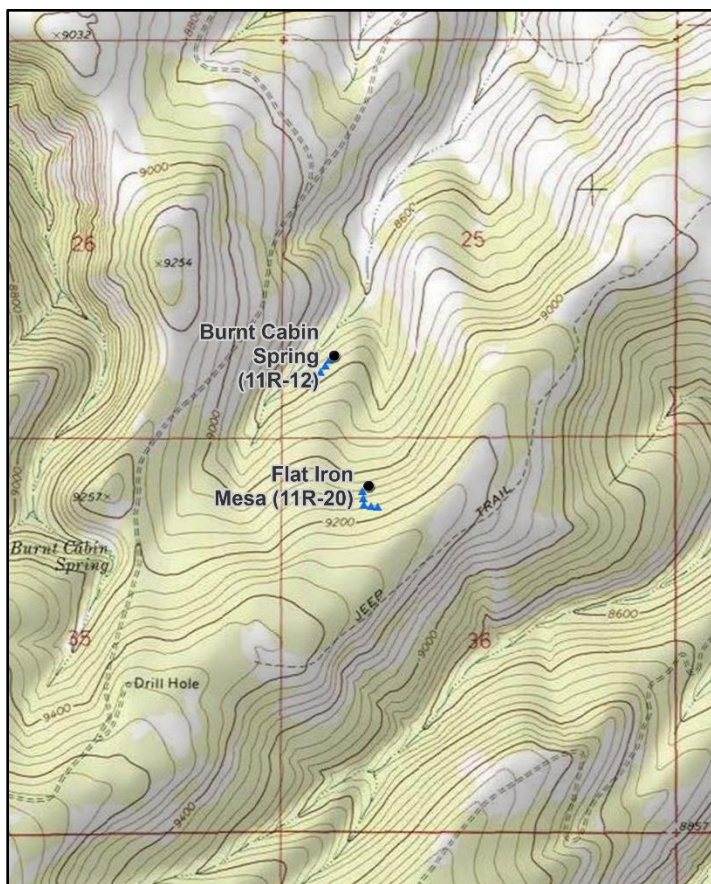
**Table 11R-19.14 - Tree Characteristics.** Point-quarter tree density, size class distribution, and average diameter.

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
2022	4	100	-	-	-	-	2.5
<b>Pinus edulis (twoneedle pinyon)</b>							
2019	14	-	50	50	-	-	5.5

**Table 11R-19.15 - Deer Desirable Components Index: Upland 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	10.0	0.0	60.7	Fair
2022	12.2	11.6	7.3	12.1	-0.3	2.6	0.0	45.4	Poor

## 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

69  
205° magnetic (Lines 2-5: ?° magnetic)  
500ft  
Line 1 (11ft), Line 2 (34ft), Line 3 (59ft), Line 4 (71ft), Line 5 (95ft)  
Standard

### 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. All stake markers are rebar and will likely be hard to find.

**Site Information**

Land Ownership	State
Land Administrator	DWR
Allotment	GREEN RIVER
Elevation	9,150ft (2,789m)
Aspect	Northwest
Slope	20%
Sample Dates	08/20/2019, 07/20/2022

**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	4840	October 2019-July 2020	129

**Wildlife Habitat and Vegetation History****Table 11R-20.3 - Wildlife Seasonal Habitat.** DWR 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
2022	Quaking Aspen/Annual-Perennial Forb	NA

**Site Notes**

In 2022, the 200, 300, 400, and 500-foot stakes were shifted to fit within the treatment area and the lines were taken down before a bearing could be taken for lines 2-5. As such, a bearing should be taken for these lines during the next sampling.

**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.

The 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 (Photos, Table 11R-20.12, Table 11R-20.13, Table 11R-20.14). 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). Following the treatment that removed all of the mature trees from the site (Table 11R-20.1), young aspen became the dominant plant species (Table 11R-20.12, Table 11R-20.13, Table 11R-20.14). Annual and perennial forbs increased provided the majority of the herbaceous cover (Table 11R-20.7). Conifer trees were almost completely removed from the site, with only a few young trees remaining (Table 11R-20.13, Table 11R-20.14).

**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
2022	10.5	1.1	20.9	11.7	0.9	35.3

**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	25.1
2022	-	87	246	210	-	2.6	18.7	12.7

**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
2022	37.1	0.4	39.0	0.4	0.9	50.8

**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
2022	9	6	-
Year	Days Use Per Acre (ha)		
2019	5.3 (13.2)	2.7 (6.6)	-
2022	7.4 (18.2)	8.1 (19.9)	-

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

GRASS SPECIES	Bromus marginatus (mountain brome)	Bromus porteri (Porter brome)	Carex rossii (Ross' sedge)	Poa pratensis <sup>1</sup> (Kentucky bluegrass)	Trisetum canescens (tall trisetum)
year	Nested Frequency				
2019	-	60	30	-	-
2022	0	25	63	1	1
year	Average Cover (%)				
2019	-	0.9	0.8	-	-
2022	0.0	0.9	1.5	0.0	0.1

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	Achillea millefolium (Common yarrow)	Androsace septentrionalis <sup>a</sup> (pygmyflower rockjasmine)	Aquilegia coerulea (Colorado blue columbine)	Arabis (rockcress)	Arabis drummondii (Drummond's rockcress)	Arnica cordifolia (heartleaf arnica)	Astragalus miser (timber milkvetch)	Astragalus miser var. oblongifolius (timber milkvetch)	Chamertion angustifolium (fireweed)	Chenopodium atrovirens <sup>a</sup> (pinyon goosefoot)	Chenopodium fremonti <sup>a</sup> (Fremont's goosefoot)	Corydalis <sup>a</sup> (fumewort)	Corydalis aurea <sup>a</sup> (scrambled eggs)	Cynoglossum officinale <sup>mi</sup> (gypsyflower)	Descurainia californica <sup>a</sup> (Sierra tansymustard)	Dracocephalum parviflorum (American dragonhead)	Epilobium (willowherb)
year	Nested Frequency																
2019	40	-	3	-	7	199	96	-	-	-	-	-	-	-	-	-	-
2022	16	4	-	5	1	39	-	45	11	17	110	35	8	8	122	22	2
year	Average Cover (%)																
2019	1.1	-	0.2	-	0.0	6.7	6.0	-	-	-	-	-	-	-	-	-	-
2022	0.4	0.0	-	0.0	0.1	0.8	-	1.6	0.1	0.3	3.0	1.5	0.5	0.0	11.9	1.7	0.0

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

FORB SPECIES	Epilobium brachycarpum <sup>a</sup> (tall annual willowherb)	Erigeron (fleabane)	Eucephalus engelmannii (Engelmann's aster)	Fragaria virginiana (Virginia strawberry)	Gentiana amarella ssp. heterosepala <sup>a</sup> (autumn dwarf gentian)	Lactuca serriola <sup>a</sup> (prickly lettuce)	Lupinus argenteus (silvery lupine)	Maianthemum racemosum (feathery false lily of the valley)	Orthilia secunda (sidebells wintergreen)	Osmorhiza berteroi (sweetcicely)	Phacelia sericea <sup>a</sup> (silky phacelia)	Polygonum douglasii <sup>a</sup> (Douglas' knotweed)	Saxifraga (saxifrage)	Senecio integerrimus <sup>a</sup> (lambstongue ragwort)	Silene menziesii (Menzies' campion)	Stenotus acaulis (stemless mock goldenweed)	Symphotrichum ascendens (western aster)
year	Nested Frequency																
2019	1	116	-	2	-	-	33	1	1	21	-	-	43	16	27	-	-
2022	-	-	44	16	1	0	10	-	-	9	23	24	-	-	25	5	16
year	Average Cover (%)																
2019	0.0	5.7	-	0.2	-	-	2.1	0.0	0.0	0.3	-	-	1.3	0.5	0.1	-	-
2022	-	-	2.0	0.2	0.0	0.0	0.6	-	-	0.3	1.1	0.3	-	-	0.3	0.3	0.3

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



FORB SPECIES	Taraxacum officinale (common dandelion)	Thalictrum fendleri (Fendler's meadow-rue)	Viola adunca (hookedspur violet)
year	Nested Frequency		
2019	12	4	61
2022	38	13	67
year	Average Cover (%)		
2019	0.2	0.2	1.1
2022	1.4	0.8	1.6

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	Abies lasiocarpa <sup>a</sup> (subalpine fir)	Juniperus communis (common juniper)	Mahonia repens (creeping barberry)	Paxistima myrsinites (Oregon boxleaf)	Physocarpus monogynus (mountain ninebark)	Populus tremuloides <sup>i</sup> (quaking aspen)	Pseudotsuga menziesii <sup>i</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)
year	Line Intercept Cover (%)										
2019	43.1	-	0.2	0.4	-	22.7	3.4	0.5	11.1	2.5	6.3
2022	0.1	-	0.1	-	0.6	35.2	-	0.1	8.4	0.2	3.2
year	Quadrat Cover (%)										
2019	20.9	-	0.3	1.2	-	0.9	0.0	1.2	9.1	1.0	4.2
2022	0.0	0.4	0.0	0.2	0.5	20.9	-	0.2	8.3	0.0	2.1

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>a</sup> -- (subalpine fir)</b>									
2019	1260	660	67	32	2	0	0	2	- / -
2022	60	-	67	0	33	0	0	33	- / -
<b>Acer glabrum -- (Rocky Mountain maple)</b>									
2019	-	-	-	-	-	-	-	-	78/55
2022	-	-	-	-	-	-	-	-	- / -
<b>Acer negundo<sup>i</sup> -- (boxelder)</b>									
2019	20	-	100	0	0	100	0	0	- / -
2022	-	-	-	-	-	-	-	-	- / -
<b>Juniperus communis -- (common juniper)</b>									
2019	-	-	-	-	-	-	-	-	- / -
2022	20	-	0	100	0	0	0	0	- / -

Year	Density		Age Class Distribution			Utilization		Poor Vigor (%)	Average Height Crown (cm)
	Plants Per Acre		Excluding Seedlings			Moderate (%)	Heavy (%)		
	Excluding Seedlings	Seedling	Young (%)	Mature (%)	Decadent (%)				
<b>Mahonia repens -- (creeping barberry)</b>									
2019	900	-	0	100	0	0	0	0	18/14
2022	60	-	0	100	0	0	0	0	- / -
<b>Paxistima myrsinites -- (Oregon boxleaf)</b>									
2019	2580	20	6	94	0	0	0	0	11/16
2022	80	-	100	0	0	0	0	0	- / -
<b>Physocarpus monogynus -- (mountain ninebark)</b>									
2019	-	-	-	-	-	-	-	-	- / -
2022	740	-	73	27	0	41	27	0	- / -
<b>Pseudotsuga menziesii<sup>i</sup> -- (Douglas-fir)</b>									
2019	240	20	8	92	0	0	0	0	- / -
2022	-	-	-	-	-	-	-	-	- / -
<b>Ribes<sup>p</sup> -- (currant)</b>									
2019	240	-	0	100	0	0	0	0	48/36
2022	60	-	67	33	0	0	0	0	- / -
<b>Rosa woodsii<sup>p</sup> -- (Woods' rose)</b>									
2019	13280	120	9	91	0	1	0	1	23/25
2022	5680	40	35	65	0	0	0	2	- / -
<b>Shepherdia canadensis -- (russet buffaloberry)</b>									
2019	420	-	19	76	5	0	0	5	45/48
2022	20	-	0	100	0	0	0	0	- / -
<b>Symphoricarpos oreophilus<sup>p</sup> -- (mountain snowberry)</b>									
2019	3280	60	4	95	1	1	0	1	44/45
2022	680	-	6	94	0	0	0	0	- / -

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.

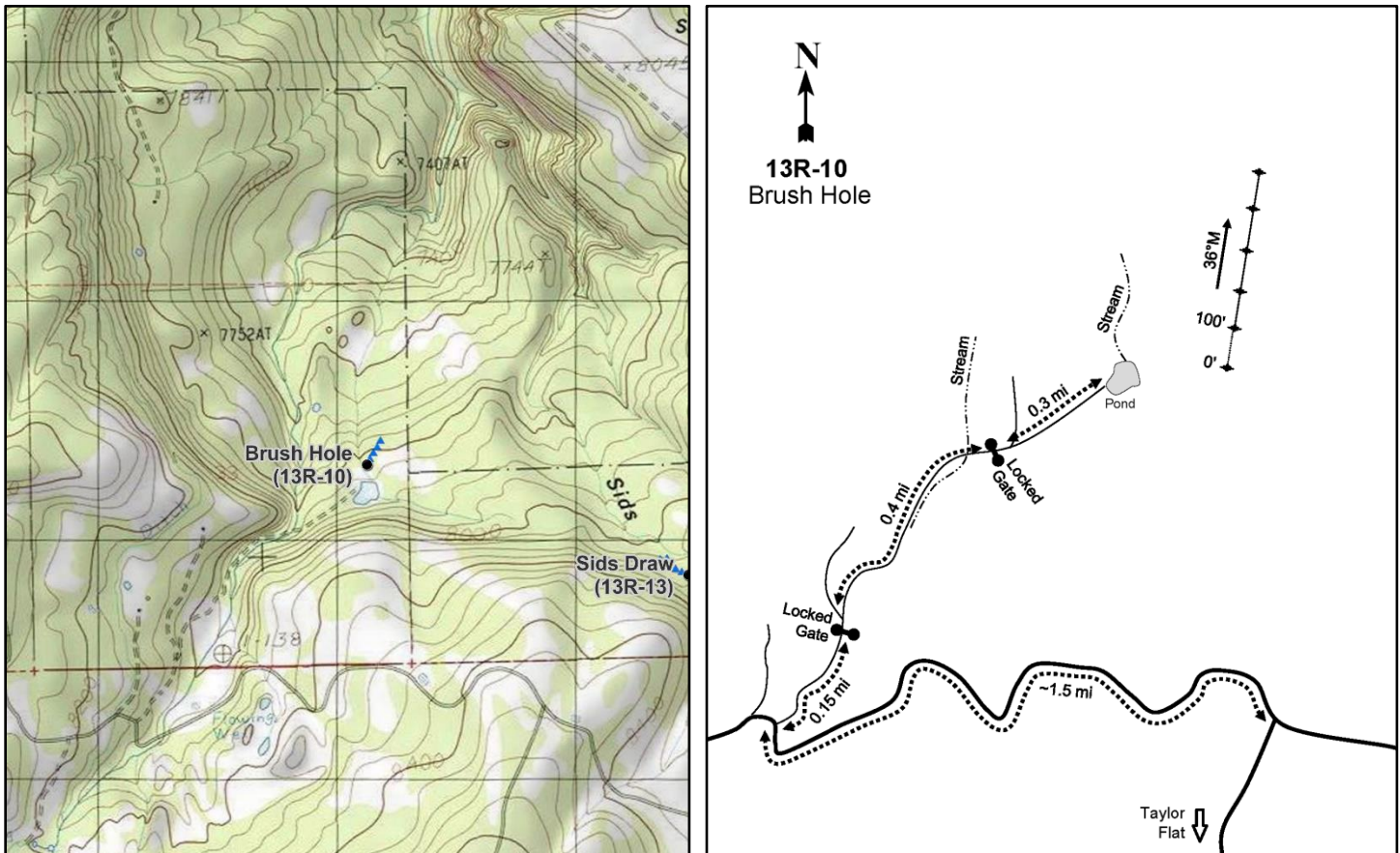
Year	Density	Size Class Distribution				Utilization		Poor Vigor (%)
	Plants per Acre	Class I (%)	Class II (%)	Class III (%)	Class IV (%)	Moderate (%)	Heavy (%)	
<b>Populus tremuloides (quaking aspen)</b>								
2019	520	27	42	4	27	5	0	5
2022	8540	9	91	0	-	1	0	1

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

**Table 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>Abies lasiocarpa (subalpine fir)</b>							
2022	9	-	60	40	-	-	4.2
<b>Populus tremuloides (quaking aspen)</b>							
2019	196	-	13	-	-	88	16.4
2022	2021	-	90	10	-	-	1.9

## BRUSH HOLE - STUDY NO. 13R-10

**Location Information**

USGS 7.5 min Map Info  
GPS (0' Stake)

Mount Waas NE; Township 25S, Range 25E, Section 33  
NAD 83 UTM ZONE 12, 660055 East 4272513 North

**Transect Information**

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

64  
36° magnetic  
400ft  
Line 1 (11ft & 95ft), Line 2 (34ft), Line 3 (59ft), Line 4 (71ft)  
Standard

**Directions to Site**

From Taylor Flat Road, turn left (west) onto North End Road and drive for about 1.5 miles to a road on the right (north). Turn onto this road and travel 0.15 miles to a locked gate. Continue through the gate and proceed for 0.4 miles (past a stream) to another locked gate. Proceed through the gate and drive for another 0.3 miles to a pond. The transect is east of the pond.

**Site Information**

Land Ownership	Private
Land Administrator	Private
Allotment	No data
Elevation	7,822ft (2,384m)
Aspect	North
Slope	10-25%
Sample Dates	08/03/2016, 08/17/2022

**Table 13R-10.1 Disturbance History.** Recorded history of major disturbances.

Treatment/Disturbance	Name	WRI DB#	Date	Size (acres)
Mechanical - Bullhog	Brush Hole Shrub Treatment	3630	April-May 2017	359

**Wildlife Habitat and Vegetation History****Table 13R-10.3 - Wildlife Seasonal Habitat.** DWR wildlife habitat and seasonality.

Species	Habitat	Season
Mule Deer	crucial	summer
Rocky Mountain Elk	crucial	spring/fall

**Table 13R-10.4 - Vegetation History.** The dominant vegetation type(s) and phase of woodland succession (Tausch, Miller, Roundy, & Chambers, 2009).

Year	Vegetation Type	Woodland Succession
2016	Gambel Oak	Phase I
2022	Gambel Oak	Phase I

**Site Notes**

No Notes

**Site Potential**

1981 - 2010 Average Annual Precipitation	24 inches
NRCS Ecological Site	Mountain Loam (Oak)
NRCS Ecological Site #	R048AY415UT
States and Transitions	No state and transition model is available for this ecological site.

At the outset of the study in 2016, this site was dominated by Gambel oak (*Quercus gambelii*) and Rocky Mountain juniper (*Juniperus scopulorum*). There were a number of other browse species found in the community, but they were sparse and provided limited cover as a whole (Table 13R-10.12, Table 13R-10.13). The herbaceous understory provided high cover, although much of the cover was contributed by two grass species: Kentucky bluegrass (*Poa pratensis*) and sedge (*Carex sp.*). Herbaceous species diversity was moderate (Table 13R-10.10, Table 13R-10.11). Following the treatment (Table 13R-10.1), Gambel oak cover was reduced substantially, but it continues to be the dominant shrub on the site as of 2022 (Table 13R-10.12). Perennial grass and forb cover increased with Kentucky bluegrass and sedges maintaining dominance (Table 13R-13.7, Table 13R-13.10). With the removal of juniper trees and revitalization of oak, it is predicted that the herbaceous plant community will increase in species diversity while the age class structure of oak and shrub populations in the community will continue to broaden.

## Trend Summary Tables

**Table 13R-10.6 - Shrub/Tree Summary.** Average modified Daubenmire quadrat and line intercept cover by year for shrubs/trees

Year	Quadrat Cover (%)			Line-intercept Cover (%)		
	Preferred Shrub	Other Shrub	Tree	Preferred Shrub	Other Shrub	Tree
2016	44.7	3.5	4.2	89.4	3.6	7.9
2022	32.8	3.5	0.3	50.3	2.1	4.6

**Table 13R-10.7 - Herbaceous Summary.** Nested frequency and average modified Daubenmire quadrat cover by year for herbaceous functional groups

Year	Nested Frequency				Quadrat Cover (%)			
	Annual Grass	Perennial Grass	Annual/Biennial Forb	Perennial Forb	Annual Grass	Perennial Grass	Annual/Biennial Forb	Perennial Forb
2016	-	415	81	163	-	13.5	0.3	3.4
2022	-	339	100	215	-	20.1	1.5	7.0

**Table 13R-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	4.3	0.2	79.2	0.4	0.6	57.6
2022	16.3	0.3	64.2	0.5	1.2	47.8

**Table 13R-10.9 - Pellet Group Data.** Quadrat frequency and pellet group transect data for animal pellets. Rabbit pellet groups are not sampled in the pellet group transect.

Year	Cattle	Mule Deer	Rocky Mountain Elk	Rabbit
	Quadrat Frequency			
2016	-	-	-	2
2022	2	22	-	4
Year	Days Use Per Acre (ha)			
	2016	15.3 (37.7)	1.3 (3.3)	2.0 (5.0)
2022	10.2 (25.1)	43.6 (107.6)	8.7 (21.5)	-

**Table 13R-10.10 - Grass Species.** Nested frequency and modified Daubenmire average cover by year.

GRASS SPECIES	Achnatherum lettermanii (Letterman's needlegrass)	Carex (sedge)	Carex geyeri (Geyer's sedge)	Elymus elymoides (squirreltail)	Poa fendleriana (muttongrass)	Poa pratensis <sup>1</sup> (Kentucky bluegrass)
year	Nested Frequency					
2016	1	304	-	2	3	265
2022	15	40	78	5	27	283
year	Average Cover (%)					
2016	0.0	6.1	-	0.4	0.1	6.9
2022	0.8	1.1	1.4	0.1	0.8	15.8

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

**Table 13R-10.11 - Forb Species.** Nested frequency and modified Daubenmire average cover by year.

FORB SPECIES	Nested Frequency																	
Achillea millefolium (Common yarrow)	8	4	8	11	3	32	3	1	-	-	-	2	29	1	10	5	47	
Allium (onion)	20	-	11	1	-	22	-	2	1	1	3	7	6	5	1	15	45	
Androsace septentrionalis <sup>a</sup> (pygmyflower rockjasmine)	Average Cover (%)																	
Antennaria parvifolia (small-leaf pussytoes)	0.0	0.0	0.0	0.5	0.0	0.6	0.0	0.0	-	-	-	0.2	0.1	0.0	0.2	0.0	0.2	
Arabis (rockcress)	0.9	-	0.4	0.0	-	0.3	-	0.0	0.0	0.0	0.0	0.2	0.0	0.1	0.0	0.1	0.5	
Arenaria (sandwort)	Average Cover (%)																	
Astragalus scopulorum (Rocky Mountain milkvetch)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Calochortus nuttallii (sego lily)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Castilleja linarifolia (Wyoming Indian paintbrush)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Cerastium beeringianum (Bering chickweed)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Chenopodium atrovirens <sup>a</sup> (pinyon goosefoot)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Clematis hirsutissima (hairy clematis)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Collinsia parviflora <sup>a</sup> (maiden blue eyed Mary)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Cymopterus (springparsley)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Erigeron flagellaris (trailing fleabane)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Eriogonum racemosum (redroot buckwheat)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Galium <sup>a</sup> (bedstraw)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	

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

FORB SPECIES	Nested Frequency															
Gayophytum ramosissimum <sup>a</sup> (pinyon groundsmoke)	-	5	1	2	-	100	3	2	3	13	2	11	1	12	-	-
Hackelia patens (spotted stickseed)	3	8	3	7	23	82	7	18	5	20	30	30	5	63	8	-
Heterotheca villosa (hairy false goldenaster)	Average Cover (%)															
Iris missouriensis (Rocky Mountain iris)	-	0.0	0.0	0.0	-	1.4	0.0	0.0	0.1	0.0	0.0	0.1	0.0	0.0	-	-
Lactuca serriola <sup>a</sup> (prickly lettuce)	0.0	0.2	0.0	0.2	0.3	1.1	0.3	0.8	0.0	0.1	0.3	0.2	0.0	2.1	0.2	-
Lathyrus brachycalyx (Bonneville pea)	Average Cover (%)															
Lupinus argenteus (silvery lupine)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Packera multilobata (lobeleaf groundsel)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Petroradia pumila (rock goldenrod)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Phlox longifolia (longleaf phlox)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Polygonum douglasii <sup>a</sup> (Douglas' knotweed)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Pseudostellaria jamesiana (tuber starwort)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Symphotrichum ascendens (western aster)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Taraxacum officinale (common dandelion)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Vicia americana (American vetch)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

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

**Table 13R-10.12 - Shrub and Tree Species.** Average modified Daubenmire quadrat and line intercept cover by year.

SHRUB SPECIES	Line Intercept Cover (%)									
	year	Line Intercept Cover (%)								
Amelanchier utahensis <sup>p</sup> (Utah serviceberry)	2016	1.5	-	6.5	3.6	1.4	0	83.2	0.4	4.3
Artemisia tridentata ssp. vaseyana <sup>p</sup> (mountain big sagebrush)	2022	2.2	0.8	4.6	2.1	-	-	42.3	-	5
Juniperus scopulorum <sup>t</sup> (Rocky Mountain juniper)	year	Quadrat Cover (%)								
Mahonia repens (creeping barberry)	2016	0.8	-	3.8	3.5	0.4	0.7	39.2	0.1	3.9
Pinus edulis <sup>t</sup> (twoneedle pinyon)	2022	0.7	1.2	0.3	3.5	-	-	27.9	0.1	2.9
Prunus virginiana <sup>p</sup> (chokecherry)	year	Quadrat Cover (%)								
Quercus gambelii <sup>p</sup> (Gambel oak)	2016	0.8	-	3.8	3.5	0.4	0.7	39.2	0.1	3.9
Rosa woodsii <sup>p</sup> (Woods' rose)	2022	0.7	1.2	0.3	3.5	-	-	27.9	0.1	2.9
Symphoricarpos oreophilus <sup>p</sup> (mountain snowberry)	year	Quadrat Cover (%)								

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

**Table 13R-10.13 - Shrub/Tree Characteristics.** Population characteristics of shrub/tree species populations including density reproduction (seedlings), age distribution, utilization, vigor and average size (height/crown) of plants.

Year	Density		Age Class Distribution			Utilization		Poor Vigor (%)	Average Height Crown (cm)
	Plants Per Acre		Excluding Seedlings			Moderate (%)	Heavy (%)		
	Excluding Seedlings	Seedling	Young (%)	Mature (%)	Decadent (%)				
<b>Amelanchier utahensis<sup>p</sup> -- (Utah serviceberry)</b>									
2016	420	-	14	81	5	10	0	5	72/54
2022	580	-	59	41	0	79	3	0	- / -
<b>Artemisia tridentata ssp. vaseyana<sup>p</sup> -- (mountain big sagebrush)</b>									
2016	-	-	-	-	-	-	-	-	- / -
2022	380	120	11	90	0	0	0	0	- / -
<b>Artemisia tridentata ssp. wyomingensis<sup>p</sup> -- (Wyoming big sagebrush)</b>									
2016	180	-	44	56	0	44	0	0	41/53
2022	-	-	-	-	-	-	-	-	- / -
<b>Juniperus scopulorum<sup>t</sup> -- (Rocky Mountain juniper)</b>									
2016	40	20	50	50	0	0	0	0	- / -
2022	-	-	-	-	-	-	-	-	- / -
<b>Mahonia repens -- (creeping barberry)</b>									
2016	13540	200	5	95	0	0	0	0	12/14
2022	14380	-	3	97	0	0	0	0	- / -
<b>Pinus edulis<sup>t</sup> -- (twoneedle pinyon)</b>									
2016	20	-	0	100	0	0	0	0	- / -
2022	-	-	-	-	-	-	-	-	- / -
<b>Prunus virginiana<sup>p</sup> -- (chokecherry)</b>									
2016	300	40	100	0	0	0	0	0	49/52
2022	80	-	0	100	0	0	0	0	- / -
<b>Quercus gambelii<sup>p</sup> -- (Gambel oak)</b>									
2016	11860	1180	53	46	2	0	0	2	157/94
2022	25080	-	65	35	1	50	18	1	- / -
<b>Rosa woodsii<sup>p</sup> -- (Woods' rose)</b>									
2016	280	-	7	93	0	0	0	0	38/34
2022	120	-	33	67	0	0	0	0	- / -
<b>Symphoricarpos oreophilus<sup>p</sup> -- (mountain snowberry)</b>									
2016	1820	40	8	92	0	3	1	0	43/67
2022	3200	460	5	91	4	23	16	3	- / -

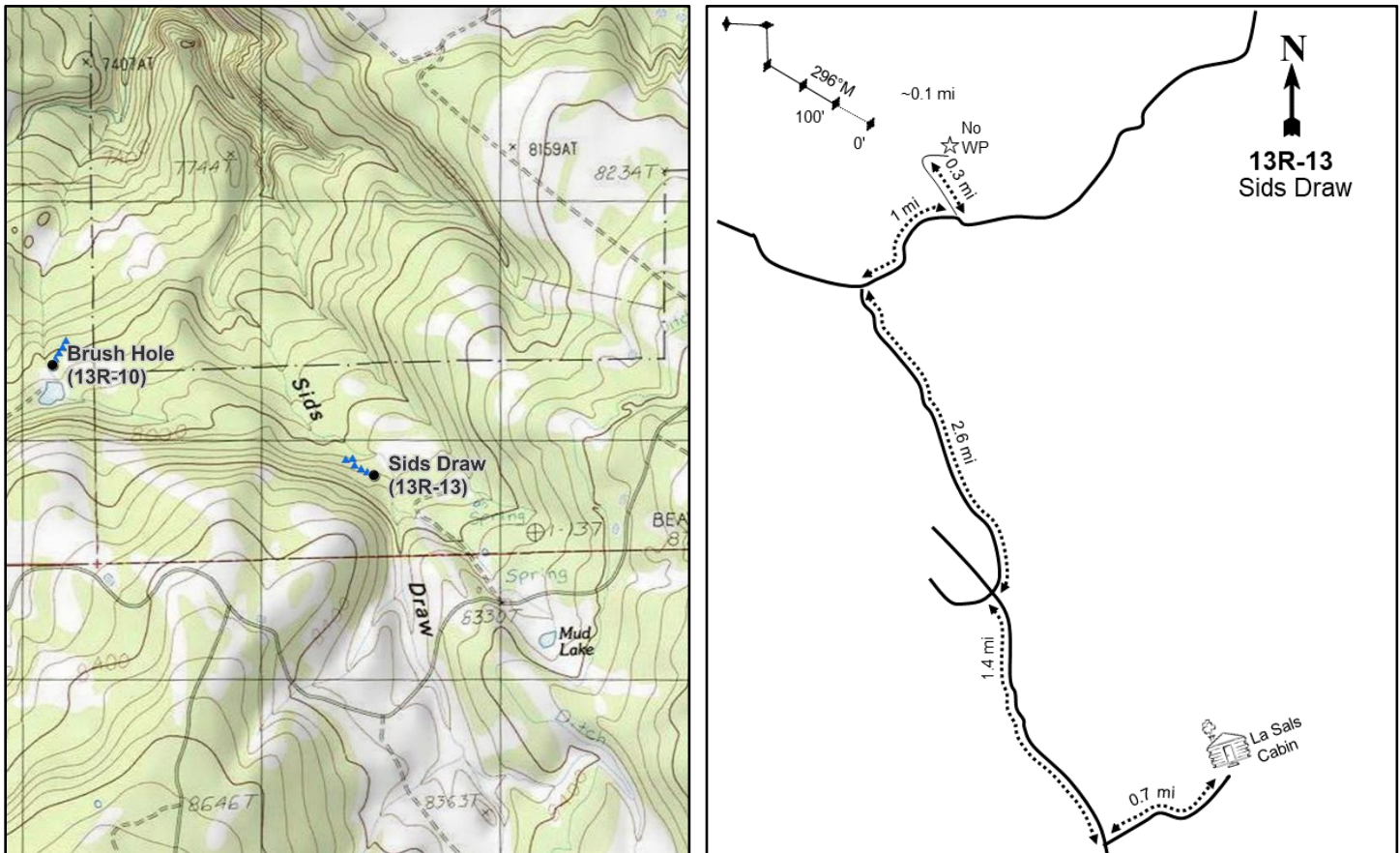
t - Tree Species; p - Preferred Browse; i - Introduced Species



**Table 13R-10.14 - Tree Characteristics.** Point-quarter tree density, size class distribution, and average diameter.

Year	Density	Size Class Distribution					Average Diameter (cm)
	Trees per Acre	Seedling (%)	1-4' (%)	4-8' (%)	8-12' (%)	>12' (%)	
<b>Juniperus scopulorum (Rocky Mountain juniper)</b>							
2016	22	17	-	-	17	67	43.0
2022	23	20	30	10	-	40	16.5
<b>Pinus edulis (twoneedle pinyon)</b>							
2016	23	-	-	-	-	100	26.8
2022	4	-	-	-	-	100	44.0
<b>Quercus gambelii (Gambel oak)</b>							
2016	5052	15	45	20	15	5	12.4

## 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)	67
Transect Bearing	296° magnetic
Length	500ft
Belt Placement	Line 1 (11ft), Line 2 (34ft), Line 3 (59ft), Line 4 (71ft), Line 5 (95ft)
Belt Marker Placement	Standard; Line 4: 95ft Long

### 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 for 5.4 miles, passing by the Taylor Flat Road. 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, 08/15/2022

**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	August-October 2019	1247

**Wildlife Habitat and Vegetation History****Table 13R-13.3 - Wildlife Seasonal Habitat.** DWR 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
2022	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.

At the time of study establishment in 2019, the study was a Gambel oak (*Quercus gambelii*) ecological site with an abundant understory composed of perennial grasses and forbs. Perennial grasses were primarily native species with the exception of Kentucky bluegrass (*Poa pratensis*), which has been the dominant species. Sedges (*Carex sp.*) have been sub-dominant in the understory (Table 13R-13.10). Perennial forbs were diverse and abundant with western sweetroot (*Osmorhiza occidentalis*) and tuber starwort (*Pseudostellaria jamesiana*) contributing the most forb cover (Table 13R-13.11). Browse species were abundant and contributed large amounts of cover: total preferred shrub cover was over one hundred percent in 2019 due to the layering effect in the canopy. Gambel oak (*Quercus gambelii*) and mountain snowberry (*Symphoricarpos oreophilus*) were the dominant browse species and provided significant cover, although small amounts of chokecherry (*Prunus virginiana*), Utah serviceberry (*Amelanchier utahensis*), and Wood's rose (*Rosa woodsii*) were 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 (Table 13R-13.13a, Table 13R-13.14). Following the treatment, Gambel oak cover was reduced substantially, but it remains the dominant shrub as of 2022 (Table 13R-13.12). Perennial grass and forb cover decreased slightly with Kentucky bluegrass and sedges remaining the dominant herbaceous species (Table 13R-13.7, Table 13R-13.10). With the removal of juniper trees and revitalization of oak, it is predicted that the herbaceous plant community will increase in species diversity while the age class structure of oak and shrub populations in the community will continue to broaden.

**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
2022	37.2	0.1	0.5	52.3	-	1.1

**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
2022	-	365	86	323	-	21.3	2.0	21.5

**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
2022	6.9	0.1	67.5	0.0	0.6	61.7

**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	Rabbit
	Quadrat Frequency				
2019	-	3	-	-	-
2022	-	3	4	4	1
Year	Days Use Per Acre (ha)				
2019	8.7 (21.5)*	3.6 (9.0)	2.7 (6.6)	2.7 (6.6)	-
2022	-	8.0 (19.7)	4.7 (11.6)	0.7 (1.7)	-

\*Pellets per acre (ha)

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

GRASS SPECIES	Achnatherum nelsonii (Columbia needlegrass)	Bromus porteri (Porter brome)	Carex (sedge)	Carex obtusata (obtuse sedge)	Elymus elymoides (squirreltail)	Elymus trachycaulus (slender wheatgrass)	Festuca thurberi (Thurber's fescue)	Koeleria macrantha (prairie Junegrass)	Muhlenbergia richardsonis (mat muhly)	Poa fendleriana (muttongrass)	Poa pratensis <sup>i</sup> (Kentucky bluegrass)
year	Nested Frequency										
2019	17	50	198	4	4	5	0	-	5	-	345
2022	5	47	162	15	7	14	2	11	-	5	274
year	Average Cover (%)										
2019	0.8	1.1	7.0	0.0	0.2	0.0	0.0	-	0.2	-	20.3
2022	0.2	1.5	5.2	0.3	0.2	0.5	0.1	0.7	-	0.2	12.4

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
Arabis (rockcress)	49	1	-	8	-	16	12	4	4	-	-	10	46	19	4	21	2
Arenaria (sandwort)	Average Cover (%)																
Artemisia ludoviciana (white sagebrush)	0.9	-	0.7	-	0.0	0.2	-	0.2	-	0.1	0.0	-	-	1.1	-	-	0.1
Calochortus nuttallii (sego lily)	1.2	0.0	-	0.3	-	0.5	0.1	0.0	0.2	-	-	0.6	1.0	0.4	0.2	0.8	0.0
Cerastium beeringianum (Bering chickweed)	Nested Frequency																
Chenopodium atrovirens <sup>a</sup> (pinyon goosefoot)	23	-	9	-	0	10	-	7	-	3	4	-	-	25	-	-	1
Chenopodium fremontii <sup>a</sup> (Fremont's goosefoot)	49	1	-	8	-	16	12	4	4	-	-	10	46	19	4	21	2
Cirsium wheeleri (Wheeler's thistle)	Average Cover (%)																
Clematis hirsutissima (hairy clematis)	0.9	-	0.7	-	0.0	0.2	-	0.2	-	0.1	0.0	-	-	1.1	-	-	0.1
Collinsia parviflora <sup>a</sup> (maiden blue eyed Mary)	1.2	0.0	-	0.3	-	0.5	0.1	0.0	0.2	-	-	0.6	1.0	0.4	0.2	0.8	0.0
Descurainia californica <sup>a</sup> (Sierra tansymustard)	Nested Frequency																
Dracocephalum parviflorum (American dragonhead)	23	-	9	-	0	10	-	7	-	3	4	-	-	25	-	-	1
Erigeron (fleabane)	49	1	-	8	-	16	12	4	4	-	-	10	46	19	4	21	2
Erigeron flagellaris (trailing fleabane)	Average Cover (%)																
Erigeron speciosus (aspen fleabane)	0.9	-	0.7	-	0.0	0.2	-	0.2	-	0.1	0.0	-	-	1.1	-	-	0.1
Eriogonum racemosum (redroot buckwheat)	1.2	0.0	-	0.3	-	0.5	0.1	0.0	0.2	-	-	0.6	1.0	0.4	0.2	0.8	0.0

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

FORB SPECIES	Nested Frequency																
Frasera speciosa (elkweed)	5	116	-	-	1	26	45	12	-	10	54	-	3	11	-	147	3
Galium <sup>a</sup> (bedstraw)	3	48	7	2	14	11	91	84	6	17	6	3	-	15	2	143	-
Geranium richardsonii (Richardson's geranium)	Average Cover (%)																
Helianthella microcephala (purpledisk helianthella)	0.4	2.7	-	-	0.3	1.5	2.1	1.4	-	2.0	5.0	-	0.0	0.1	-	4.6	0.0
Hymenoxys hoopesii (owl's-claws)	0.2	0.9	0.5	0.1	1.2	0.5	2.3	2.7	0.6	1.0	0.2	0.0	-	0.2	0.0	2.1	-
Iris missouriensis (Rocky Mountain iris)	Nested Frequency																
Lathyrus lanszwertii (Nevada pea)	5	116	-	-	1	26	45	12	-	10	54	-	3	11	-	147	3
Ligusticum porteri (Porter's licorice-root)	3	48	7	2	14	11	91	84	6	17	6	3	-	15	2	143	-
Lomatium (desertparsley)	Average Cover (%)																
Lupinus argenteus (silvery lupine)	0.4	2.7	-	-	0.3	1.5	2.1	1.4	-	2.0	5.0	-	0.0	0.1	-	4.6	0.0
Osmorhiza occidentalis (western sweetroot)	0.2	0.9	0.5	0.1	1.2	0.5	2.3	2.7	0.6	1.0	0.2	0.0	-	0.2	0.0	2.1	-
Phacelia sericea <sup>a</sup> (silky phacelia)	Nested Frequency																
Phlox longifolia (longleaf phlox)	5	116	-	-	1	26	45	12	-	10	54	-	3	11	-	147	3
Polygonum douglasii <sup>a</sup> (Douglas' knotweed)	3	48	7	2	14	11	91	84	6	17	6	3	-	15	2	143	-
Pseudocymopterus montanus (alpine false springparsley)	Average Cover (%)																
Pseudostellaria jamesiana (tuber starwort)	0.4	2.7	-	-	0.3	1.5	2.1	1.4	-	2.0	5.0	-	0.0	0.1	-	4.6	0.0
Silene drummondii (Drummond's campion)	0.2	0.9	0.5	0.1	1.2	0.5	2.3	2.7	0.6	1.0	0.2	0.0	-	0.2	0.0	2.1	-

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

FORB SPECIES	Nest Frequency						
<i>Symphyotrichum ascendens</i> (western aster)	18	29	3	-	-	67	51
<i>Taraxacum officinale</i> (common dandelion)	62	17	3	5	1	58	60
<i>Thalictrum fendleri</i> (Fendler's meadow-rue)	Average Cover (%)						
<i>Tragopogon dubius</i> <sup>ai</sup> (yellow salsify)	0.6	0.7	0.0	-	-	2.5	0.9
<i>Trifolium</i> (clover)	2.2	0.3	0.0	0.1	0.0	1.9	0.8
<i>Vicia americana</i> (American vetch)	Line Intercept Cover (%)						
<i>Viola</i> (violet)	0.8	-	5.6	0.5	0.3	9.9	75.9
	2019	2022	2019	2022	2019	2022	2019
	0.2	0.9	-	0.2	3.2	29.6	0.7
	Quadrat Cover (%)						
	0.5	-	2.3	0.0	0.1	3.1	13.1
	2019	2022	2019	2022	2019	2022	2019
	0.2	0.1	0.4	-	0.1	1.7	21.2
	1.9	0.6	27.4	13.5	13.1	1.9	27.4
	2019	2022	2019	2022	2019	2022	2019
	0.6	0.3	0.0	0.1	0.0	0.0	0.8

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 (%)									
<i>Amelanchier utahensis</i> <sup>p</sup> (Utah serviceberry)	0.8	-	5.6	0.5	0.3	9.9	75.9	2.9	31.2	
<i>Chrysothamnus viscidiflorus</i> ssp. <i>viscidiflorus</i> (yellow rabbitbrush)	0.2	-	0.9	-	0.2	3.2	29.6	0.7	18.6	
<i>Juniperus scopulorum</i> <sup>t</sup> (Rocky Mountain juniper)	Quadrat Cover (%)									
<i>Mahonia repens</i> (creeping barberry)	0.5	-	2.3	0.0	0.1	3.1	13.1	1.9	27.4	
<i>Populus tremuloides</i> <sup>t</sup> (quaking aspen)	2019	2022	2019	2022	2019	2022	2019	2022	2019	2022
<i>Prunus virginiana</i> <sup>p</sup> (chokecherry)	0.2	0.1	0.4	-	0.1	1.7	21.2	0.6	13.5	
<i>Quercus gambelii</i> <sup>p</sup> (Gambel oak)	0.2	0.1	0.4	-	0.1	1.7	21.2	0.6	13.5	
<i>Rosa woodsii</i> <sup>p</sup> (Woods' rose)	0.2	0.1	0.4	-	0.1	1.7	21.2	0.6	13.5	
<i>Symphoricarpos oreophilus</i> <sup>p</sup> (mountain snowberry)	0.2	0.1	0.4	-	0.1	1.7	21.2	0.6	13.5	

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 (%)				
<b>Amelanchier utahensis</b> <sup>p</sup> -- (Utah serviceberry)									
2019	240	-	42	58	0	0	0	0	135/92
2022	160	-	0	100	0	0	50	0	-/-
<b>Chrysothamnus viscidiflorus</b> ssp. <i>viscidiflorus</i> -- (yellow rabbitbrush)									
2019	-	-	-	-	-	-	-	-	75/93
2022	60	-	0	100	0	0	0	0	-/-
<b>Juniperus scopulorum</b> <sup>t</sup> -- (Rocky Mountain juniper)									
2019	40	-	0	100	0	0	0	0	-/-
2022	-	-	-	-	-	-	-	-	-/-
<b>Mahonia repens</b> -- (creeping barberry)									
2019	340	-	0	100	0	0	0	0	15/16
2022	-	-	-	-	-	-	-	-	-/-

Year	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>Prunus virginiana<sup>p</sup> -- (chokecherry)</b>									
2019	2020	-	26	74	0	0	0	0	157/98
2022	1860	-	56	44	0	0	0	0	- / -
<b>Quercus gambelii<sup>p</sup> -- (Gambel oak)</b>									
2019	9040	-	59	39	2	9	0	1	157/92
2022	27860	20	51	49	0	38	4	55	- / -
<b>Rosa woodsii<sup>p</sup> -- (Woods' rose)</b>									
2019	1500	-	19	77	4	1	0	4	78/52
2022	1000	20	16	84	0	0	0	0	- / -
<b>Symphoricarpos oreophilus<sup>p</sup> -- (mountain snowberry)</b>									
2019	8520	-	12	86	1	1	0	1	59/67
2022	14520	-	6	94	0	6	1	0	- / -

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 (%)	
<b>Populus tremuloides (quaking aspen)</b>								
2019	100	-	100	-	-	100	0	0
2022	60	-	100	-	-	100	0	0

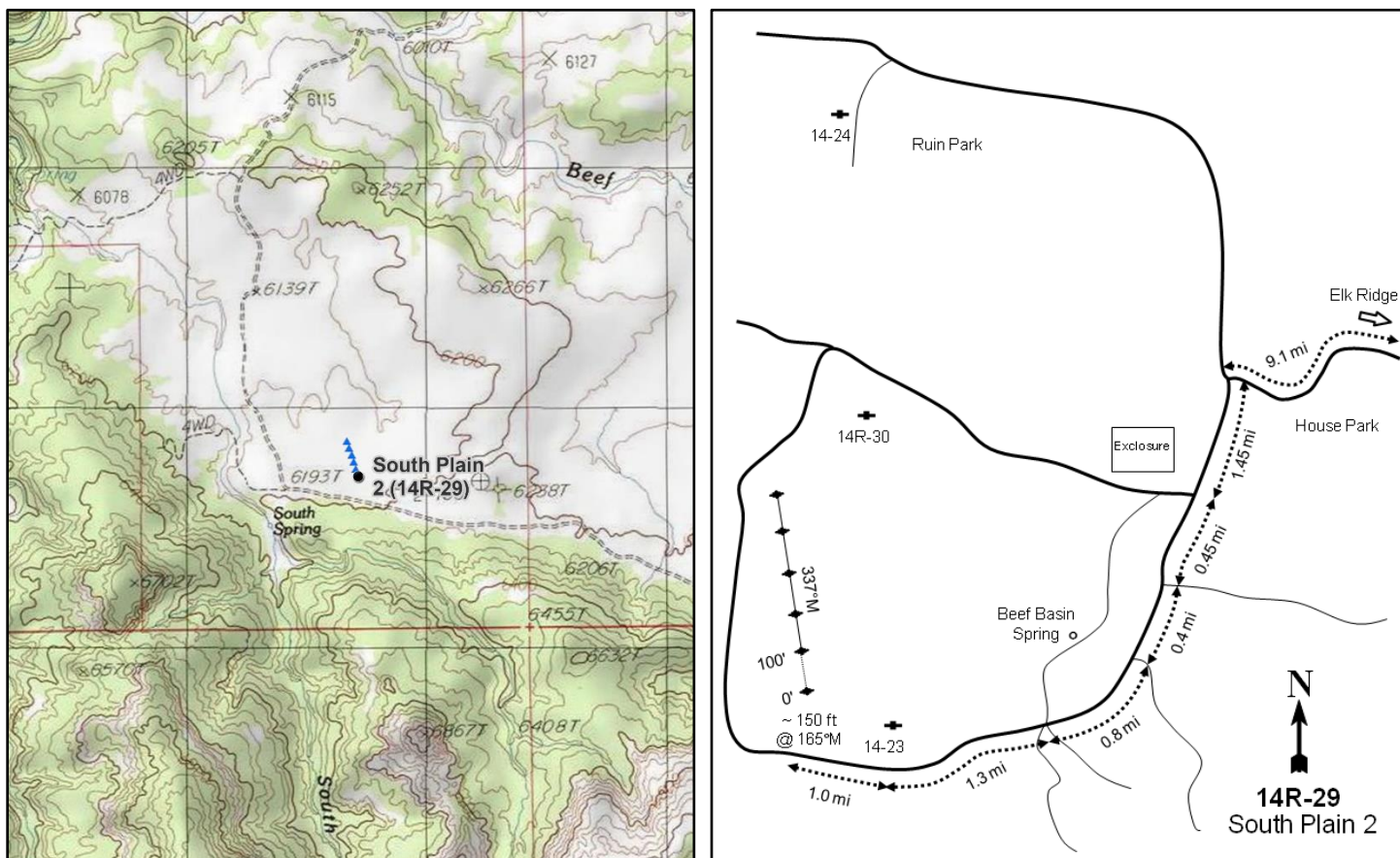
Class I - <= 1.5 feet; Class II - > 1.5 feet to 5 feet; Class III - > 5 feet and up to 1 inch diameter at breast height (dbh); Class IV - > 1 in diameter at breast height (dbh)

**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' (%)	
<b>Juniperus scopulorum (Rocky Mountain juniper)</b>							
2019	13	-	-	20	20	60	23.0
2022	3	-	-	-	-	100	61.5
<b>Populus tremuloides (quaking aspen)</b>							
2022	4	-	-	-	-	100	17.5



## SOUTH PLAIN 2 - STUDY NO. 14R-29

**Location Information**

USGS 7.5 min Map Info  
GPS (0' Stake)

Fable Valley NW; Township 32S, Range 18E, Section 63  
NAD 83 UTM ZONE 12, 592659 East 4200914 North

**Transect Information**

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

682  
332° magnetic  
500ft  
Line 1 (11ft), Line 2 (34ft), Line 3 (59ft), Line 4 (71ft), Line 5 (95ft)  
Standard

**Directions to Site**

At the junction of the Rocky Mountain Elk Ridge-Salt Creek Mesa-Beef Basin Roads, proceed north down into the Beef Basin area. Follow the main road for 9.1 miles, passing the FS/BLM boundary down to an intersection where there is a BLM register box. Stay left on County Road #104 and proceed 1.45 miles to the turnoff to an exclusion. Stay left for 0.45 miles to a fork. Stay right and go 0.4 miles to another fork. Go right at the intersection with the Beef Basin Canyon Road and continue 0.8 miles to a five-way intersection. Take the west fork straight through the intersection (left fork goes to Native American ruins) and continue 1.3 miles to a large pinyon pine on the right. Travel 1.0 mile and stop. The study site is approximately 150 feet to the north at 165 degrees magnetic.

**Site Information**

Land Ownership	Federal
Land Administrator	BLM
Allotment	INDIAN CREEK
Elevation	6,198ft (1,889m)
Aspect	North
Slope	2-3%
Sample Dates	08/29/2012, 08/21/2017, 08/17/2022

**Table 14R-29.1 Disturbance History.** Recorded history of major disturbances.

Treatment/Disturbance	Name	WRI DB#	Date	Size (acres)
Seeding - Aerial	Beef Basin Phase I	2939	January 2015	272
Seeding - Drill	Beef Basin Phase I	2939	October-November 2014	254
Herbicide - Plateau	Beef Basin Phase I	2939	November 2014	272

**Table 14R-29.2 Seed Mix.** List of known seeded plant species and rates (if available).

Mix Name			Application Type	Application Date	Acres
Beef Basin			Drill	Oct 2014	875
Type	Species	Common Name	Cultivar/Source ID	Bulk lbs/acre	PLS
G	Achnatherum hymenoides	Indian Ricegrass	Nezpar	0.80	0.73
G	Hesperostipa comata	Needle and Threadgrass	Iron UT	0.97	0.72
G	Poa secunda	Sandberg Bluegrass	UP Colorado Plateau	0.51	0.42
G	Sporobolus cryptandrus	Sand Dropseed	Washington CO	0.10	0.09
F	Onobrychis viciifolia	Sainfoin	Eski	0.29	0.28
F	Penstemon palmeri	Palmer Penstemon	Sevier UT	0.29	0.22
F	Sphaeralcea coccinea	Scarlet Globemallow	Sanpete UT	0.03	0.01
F	Sphaeralcea grossulariifolia	Gooseberryleaf Globemallow	Iron/Millard UT	0.11	0.08
S	Artemisia tridentata ssp. wyomingensis	Wyoming Big Sagebrush	Paiute UT	1.06	0.20

Mix Name			Application Type	Application Date	Acres
Beef Basin - Fluffy			Drill	Nov 2014	875
Type	Species	Common Name	Cultivar/Source ID	Bulk lbs/acre	PLS
S	Atriplex canescens	Fourwing Saltbush	Kane UT	0.46	0.18
S	Atriplex canescens	Fourwing Saltbush	Kane UT	0.56	0.25
S	Krascheninnikovia lanata	Winterfat	Torrance NM	0.29	0.04

Mix Name			Application Type	Application Date	Acres
Beef Basin Sagebrush			Aerial	Jan 2015	875
Type	Species	Common Name	Cultivar/Source ID	Bulk lbs/acre	PLS
		Rice Hulls		0.57	0.00

**Wildlife Habitat and Vegetation History****Table 14R-29.3 - Wildlife Seasonal Habitat.** DWR wildlife habitat and seasonality.

Species	Habitat	Season
Mule Deer	crucial	winter

**Table 14R-29.4 - Vegetation History.** The dominant vegetation type(s) and phase of woodland succession (Tausch, Miller, Roundy, & Chambers, 2009).

Year	Vegetation Type	Woodland Succession
2012	Perennial Grass	No Encroachment
2017	Perennial Grass	No Encroachment
2022	Perennial Grass/Mixed Salt Desert Shrub	No Encroachment

**Site Notes**

No Notes

**Site Potential**

1981 - 2010 Average Annual Precipitation	12 inches
NRCS Ecological Site	Upland Sand (Mountain Big Sagebrush)
NRCS Ecological Site #	R035XY307UT
States and Transitions	No state and transition model is available for this ecological site.

This site has existed as a perennial grass -- namely blue grama (*Bouteloua gracilis*) and needle and thread (*Hesperostipa comata*) -- plant community type since 2012 (Table 14R-29.7, Table 14R-29.10). Browse species are scattered throughout the area, with winterfat (*Krascheninnikovia lanata*) as the most abundant preferred species in both pre- and the initial post-treatment sample year. In 2022, fourwing saltbush (*Atriplex canescens*) became co-dominant with winterfat (Table 14R-29.12, Table 14R-29.13). Annual and perennial forbs were rare, but both have increased in abundance since treatment and provide low amounts of cover as of 2022 (Table 14R-29.11).

**Trend Summary Tables****Table 14R-29.6 - Shrub/Tree Summary.** Average modified Daubenmire quadrat and line intercept cover by year for shrubs/trees

Year	Quadrat Cover (%)			Line-intercept Cover (%)		
	Preferred Shrub	Other Shrub	Tree	Preferred Shrub	Other Shrub	Tree
2012	1.7	0.5	-	1.5	0.2	-
2017	1.8	0.6	-	1.8	0.1	-
2022	3.5	1.5	-	5.3	1.8	-

**Table 14R-29.7 - Herbaceous Summary.** Nested frequency and average modified Daubenmire quadrat cover by year for herbaceous functional groups

Year	Nested Frequency				Quadrat Cover (%)			
	Annual Grass	Perennial Grass	Annual/Biennial Forb	Perennial Forb	Annual Grass	Perennial Grass	Annual/Biennial Forb	Perennial Forb
2012	64	406	92	15	0.3	29.1	0.7	0.3
2017	138	370	268	50	3.2	22.9	3.8	0.2
2022	165	309	243	218	1.9	13.4	2.4	3.8

**Table 14R-29.8 - Basic Ground Cover.** Average modified Daubenmire quadrat cover by year for basic ground cover types.

Year	Cover Type (%)					
	Bare Ground	Cryptogams	Litter	Pavement	Rock	Vegetation
2012	41.6	1.2	38.8	0.2	-	32.8
2017	35.3	-	38.9	0.0	-	34.9
2022	64.3	-	27.2	0.0	0.0	25.0

**Table 14R-29.9 - Pellet Group Data.** Quadrat frequency and pellet group transect data for animal pellets. Rabbit pellet groups are not sampled in the pellet group transect.

Year	Cattle	Mule Deer	Rocky Mountain Elk	Rabbit
	Quadrat Frequency			
2012	9	8	1	8
2017	8	6	-	37
2022	6	14	2	12
Year	Days Use Per Acre (ha)			
2012	10.9 (26.9)	8.1 (19.9)	0.7 (1.7)	-
2017	12.3 (30.5)	1.3 (3.3)	8.7 (21.5)	-
2022	45.0 (111.2)	16.8 (41.4)	11.4 (28.1)	-

**Table 14R-29.10 - Grass Species.** Nested frequency and modified Daubenmire average cover by year.

GRASS SPECIES								
Achnatherum hymenoides (Indian ricegrass)								
Bouteloua gracilis (blue grama)								
Bromus tectorum <sup>ai</sup> (cheatgrass)								
Elymus elymoides (squirreltail)								
Hesperostipa comata (needle and thread)								
Poa secunda (Sandberg bluegrass)								
Sporobolus cryptandrus (sand dropseed)								
Vulpia octoflora <sup>ai</sup> (sixweeks fescue)								
year	Nested Frequency							
2012	4	320	64	9	172	-	56	-
2017	2	264	131	4	209	8	54	10
2022	8	164	162	-	70	18	117	25
year	Average Cover (%)							
2012	0.0	19.3	0.3	0.1	7.2	-	2.4	-
2017	0.1	14.6	3.1	0.0	6.8	0.0	1.3	0.1
2022	0.0	9.0	1.8	-	2.0	0.1	2.3	0.2

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

**Table 14R-29.11 - Forb Species.** Nested frequency and modified Daubenmire average cover by year.

FORB SPECIES																
Astragalus (milkvetch)																
Chenopodium leptophyllum <sup>a</sup> (narrowleaf goosefoot)																
Cordylanthus <sup>a</sup> (bird's-beak)																
Cryptantha (cryptantha)																
Cryptantha <sup>a</sup> (annual cryptantha)																
Descurainia pinnata <sup>a</sup> (western tansymustard)																
Erigeron pumilus (shaggy fleabane)																
Erodium cicutarium <sup>ai</sup> (redstem stork's bill)																
Gilia inconspicua <sup>a</sup> (shy gilia)																
Lappula occidentalis <sup>a</sup> (flat-spine stickseed)																
Machaeranthera canescens (hoary tansyaster)																
Plantago patagonica <sup>a</sup> (woolly plantain)																
Portulaca oleracea <sup>ai</sup> (little hogweed)																
Salsola tragus <sup>ai</sup> (prickly Russian thistle)																
Sphaeralcea parvifolia (smallflower globemallow)																
Tragopogon dubius <sup>ai</sup> (yellow salsify)																
year	Nested Frequency															
2012	1	23	4	-	7	1	2	-	-	-	12	-	58	9	-	-
2017	3	15	-	6	21	38	1	76	134	11	42	164	7	5	-	3
2022	-	-	2	7	26	12	-	19	-	67	207	181	-	16	35	-
year	Average Cover (%)															
2012	0.0	0.3	0.0	-	0.0	0.0	0.0	-	-	-	0.3	-	0.1	0.2	-	-
2017	0.0	0.1	-	0.0	0.1	0.2	0.0	1.1	1.2	0.0	0.1	0.9	0.0	0.0	-	0.0
2022	-	-	0.0	0.0	0.1	0.0	-	0.1	-	0.6	3.7	1.3	-	0.1	0.1	-

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

**Table 14R-29.12 - Shrub and Tree Species.** Average modified Daubenmire quadrat and line intercept cover by year.

SHRUB SPECIES	Artemisia tridentata ssp. vaseyana <sup>p</sup> (mountain big sagebrush)	Atriplex canescens <sup>p</sup> (fourwing saltbush)	Gutierrezia sarothrae (broom snakeweed)	Krascheninnikovia lanata <sup>p</sup> (winterfat)	Opuntia fragilis (brittle pricklypear)	Opuntia polyacantha (plains pricklypear)	Pediocactus simpsonii (mountain ball cactus)	Sclerocactus whipplei (Whipple's fishhook cactus)
year	Line Intercept Cover (%)							
2012	0.6	-	-	0.9	-	0.2	-	-
2017	0.4	0.3	-	1.1	-	0.1	-	-
2022	0.5	2.6	0.2	2.2	-	1.6	0	-
year	Quadrat Cover (%)							
2012	0.5	-	-	1.2	-	0.5	-	0.0
2017	0.8	0.2	-	0.8	-	0.6	0.0	-
2022	0.6	1.4	0.3	1.5	0.0	1.1	0.0	-

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

**Table 14R-29.13 - Shrub/Tree Characteristics.** Population characteristics of shrub/tree species populations including density reproduction (seedlings), age distribution, utilization, vigor and average size (height/crown) of plants.

Year	Density		Age Class Distribution			Utilization		Poor Vigor (%)	Average Height Crown (cm)
	Plants Per Acre		Excluding Seedlings			Moderate (%)	Heavy (%)		
	Excluding Seedlings	Seedling	Young (%)	Mature (%)	Decadent (%)				
<b>Artemisia tridentata ssp. vaseyana<sup>p</sup> -- (mountain big sagebrush)</b>									
2012	260	-	0	39	62	0	62	62	29/57
2017	280	-	7	64	29	50	50	21	27/59
2022	220	-	0	100	0	36	55	0	- / -
<b>Atriplex canescens<sup>p</sup> -- (fourwing saltbush)</b>									
2012	-	-	-	-	-	-	-	-	105/188
2017	1320	-	80	20	0	29	0	0	62/90
2022	3660	4280	82	18	1	10	0	1	- / -
<b>Chrysothamnus viscidiflorus ssp. viscidiflorus var. stenophyllus -- (yellow rabbitbrush)</b>									
2012	-	-	-	-	-	-	-	-	28/70
2017	-	-	-	-	-	-	-	-	28/52
2022	-	-	-	-	-	-	-	-	- / -
<b>Gutierrezia sarothrae -- (broom snakeweed)</b>									
2012	-	-	-	-	-	-	-	-	- / -
2017	120	-	33	67	0	0	0	0	22/41
2022	440	-	5	96	0	0	0	0	- / -
<b>Krascheninnikovia lanata<sup>p</sup> -- (winterfat)</b>									
2012	1280	160	33	67	0	17	45	3	27/33
2017	1760	-	0	100	0	30	35	0	28/32
2022	1620	40	11	89	0	21	53	9	- / -
<b>Opuntia fragilis -- (brittle pricklypear)</b>									
2012	-	-	-	-	-	-	-	-	- / -
2017	-	-	-	-	-	-	-	-	- / -
2022	80	20	100	0	0	0	0	0	- / -
<b>Opuntia polyacantha -- (plains pricklypear)</b>									
2012	280	-	29	57	14	0	0	21	14/54
2017	320	-	6	94	0	0	0	6	11/28
2022	340	20	0	100	0	0	0	0	- / -

Year	Density		Age Class Distribution			Utilization		Poor Vigor (%)	Average Height Crown (cm)
	Plants Per Acre		Excluding Seedlings			Moderate (%)	Heavy (%)		
	Excluding Seedlings	Seedling	Young (%)	Mature (%)	Decadent (%)				
<b>Pediocactus simpsonii -- (mountain ball cactus)</b>									
2012	40	-	0	100	0	0	0	0	6/11
2017	80	-	0	100	0	0	0	0	4/6
2022	280	-	7	93	0	0	0	0	- / -
<b>Sclerocactus whipplei -- (Whipple's fishhook cactus)</b>									
2012	20	20	0	100	0	0	0	0	11/13
2017	20	-	0	100	0	0	0	0	8/8
2022	-	20	0	0	0	0	0	0	- / -

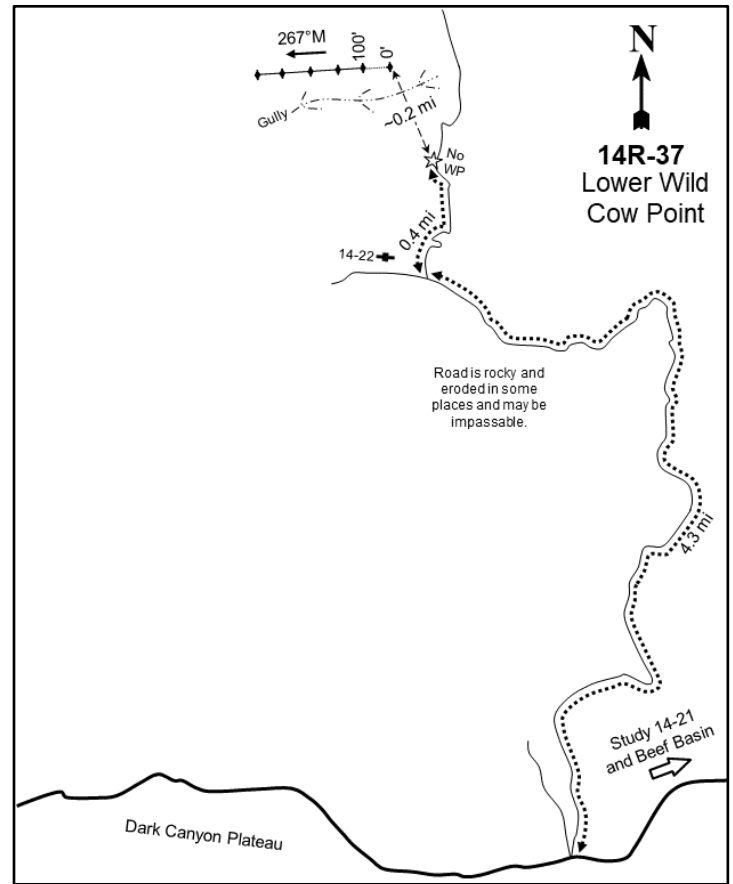
t - Tree Species; p - Preferred Browse; i - Introduced Species

**Table 14R-29.15 - Deer Desirable Components Index: Upland 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	1.9	0.0	0.0	30.0	-0.2	0.5	0.0	32.2	Very Poor
2017	2.3	0.0	0.0	30.0	-2.4	0.4	0.0	30.2	Very Poor
2022	6.6	14.9	15.0	26.8	-1.4	7.6	0.0	69.5	Good



## LOWER WILD COW POINT - STUDY NO. 14R-37



### Location Information

USGS 7.5 min Map Info  
GPS (0' Stake)

Fable Valley SE; Township 33S, Range 18E, Section 50  
NAD 83 UTM ZONE 12, 593513 East 4195753 North

### Transect Information

Browse Tag # (0' Stake)	109
Transect Bearing	267° magnetic
Length	500ft
Belt Placement	Line 1 (11ft), Line 2 (34ft), Line 3 (59ft), Line 4 (71ft), Line 5 (95ft)
Belt Marker Placement	Belts 3, 4: 3ft

### Directions to Site

Drive to the North Long Point study (14-21). From the west rim of North Long Point, proceed west down the dugway on the Dark Canyon Plateau Road for 5.4 miles. Turn north on the Wild Cow Point Road and go 4.3 miles to a chaining and a faint road on the left (west): this is the Wild Cow Point study (14-22). Continue down the road for another 0.4 miles, park on the road and hike down to the study, crossing a gully.



**Site Information**

Land Ownership	Federal
Land Administrator	BLM
Allotment	INDIAN CREEK
Elevation	7,349ft (2,240m)
Aspect	South
Slope	3-6%
Sample Dates	08/27/2014, 08/22/2017, 08/17/2022

**Table 14R-37.1 Disturbance History.** Recorded history of major disturbances.

Treatment/Disturbance	Name	WRI DB#	Date	Size (acres)
Mechanical - Bullhog	Dark Canyon Plateau Phase II	2938	May 2015	238

**Wildlife Habitat and Vegetation History****Table 14R-37.3 - Wildlife Seasonal Habitat.** DWR wildlife habitat and seasonality.

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

**Table 14R-37.4 - Vegetation History.** The dominant vegetation type(s) and phase of woodland succession (Tausch, Miller, Roundy, & Chambers, 2009).

Year	Vegetation Type	Woodland Succession
2014	Pinyon-Juniper	Phase III
2017	Mixed Mountain Brush/Pinyon-Juniper	Phase II
2022	Mixed Mountain Brush/Pinyon-Juniper	Phase II

**Site Notes**

No Notes

**Site Potential**

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

This study site was encroached by pinyon pine (*Pinus edulis*) and Utah juniper (*Juniperus osteosperma*) and considered to be in Phase III of woodland succession upon establishment in 2014; mountain big sagebrush (*Artemisia tridentata* ssp. *vaseyana*) and other browse species provided limited cover. A bullhog treatment in 2015 (Table 14R-37.1) removed some of the trees, causing the site to transition into one co-dominated by Phase II pinyon-juniper and mountain big sagebrush (Table 14R-37.4, Table 14R-37.12, Table 14R-37.13, Table 14R-37.14). Perennial grasses and forbs provided moderate cover in 2014, but cover increased following treatment with the native perennial grasses muttongrass (*Poa fendleriana*), needle and thread (*Hesperostipa comata*), and blue grama (*Bouteloua gracilis*) as the dominant herbaceous species in 2017 and 2022 (Table 14R-37.7, Table 14R-37.10, Table 14R-37.11).

**Trend Summary Tables**

**Table 14R-37.6 - Shrub/Tree Summary.** Average modified Daubenmire quadrat and line intercept cover by year for shrubs/trees

Year	Quadrat Cover (%)			Line-intercept Cover (%)		
	Preferred Shrub	Other Shrub	Tree	Preferred Shrub	Other Shrub	Tree
2014	2.9	0.6	8.8	6.3	0.4	47.4
2017	3.2	1.2	3.1	7.5	0.2	27.4
2022	3.1	0.6	6.3	8.8	0.6	23.7

**Table 14R-37.7 - Herbaceous Summary.** Nested frequency and average modified Daubenmire quadrat cover by year for herbaceous functional groups

Year	Nested Frequency				Quadrat Cover (%)			
	Annual Grass	Perennial Grass	Annual/Biennial Forb	Perennial Forb	Annual Grass	Perennial Grass	Annual/Biennial Forb	Perennial Forb
2014	36	230	38	137	0.1	9.3	0.2	2.1
2017	14	277	27	162	0.1	15.3	0.1	5.9
2022	90	251	18	78	1.8	16.6	0.1	1.8

**Table 14R-37.8 - Basic Ground Cover.** Average modified Daubenmire quadrat cover by year for basic ground cover types.

Year	Cover Type (%)					
	Bare Ground	Cryptogams	Litter	Pavement	Rock	Vegetation
2014	26.4	15.0	50.9	0.5	2.9	22.1
2017	34.1	2.0	57.4	0.5	3.1	23.8
2022	31.2	0.7	51.4	0.3	3.6	31.1

**Table 14R-37.9 - Pellet Group Data.** Quadrat frequency and pellet group transect data for animal pellets. Rabbit pellet groups are not sampled in the pellet group transect.

Year	Cattle	Mule Deer	Rocky Mountain Elk	Rabbit
	Quadrat Frequency			
2014	3	11	1	36
2017	-	6	4	5
2022	1	15	3	5
Year	Days Use Per Acre (ha)			
2014	-	5.3 (13.2)	6.0 (14.9)	-
2017	2.9 (7.2)	15.4 (38.1)	8.7 (21.5)	-
2022	-	22.8 (56.3)	11.4 (28.1)	-

**Table 14R-37.10 - Grass Species.** Nested frequency and modified Daubenmire average cover by year.

GRASS SPECIES	Achnatherum hymenoides (Indian ricegrass)	Agropyron cristatum <sup>i</sup> (crested wheatgrass)	Bouteloua gracilis (blue grama)	Bromus tectorum <sup>ai</sup> (cheatgrass)	Elymus elymoides (squirreltail)	Hesperostipa comata (needle and thread)	Poa fendleriana (muttongrass)	Pseudopogon spicata (bluebunch wheatgrass)	Vulpia octoflora <sup>a</sup> (sixweeks fescue)
year	Nested Frequency								
2014	13	-	68	9	49	31	108	3	29
2017	14	3	68	9	18	100	125	-	5
2022	29	3	78	38	15	90	96	-	69
year	Average Cover (%)								
2014	0.1	-	4.0	0.0	0.6	1.6	3.0	0.0	0.1
2017	0.7	0.1	4.6	0.1	0.6	2.9	6.3	-	0.0
2022	3.4	0.1	2.6	0.8	0.7	5.5	4.3	-	1.0

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

**Table 14R-37.11 - Forb Species.** Nested frequency and modified Daubenmire average cover by year.

FORB SPECIES	Arabis (rockress)	Astragalus convallarius (lesser rushy milkvetch)	Astragalus mollissimus (woolly locoweed)	Camelina microcarpa <sup>a</sup> (littlupod false flax)	Chaenactis douglasii (Douglas' dusty maiden)	Chenopodium atrovirens <sup>a</sup> (pinyon goosefoot)	Cordylanthus <sup>a</sup> (bird's-beak)	Cryptantha (cryptantha)	Descurainia pinnata <sup>a</sup> (western tansymustard)	Erigeron pumilus (shaggy fleabane)	Eriogonum racemosum (redroot buckwheat)	Eriogonum umbellatum (sulphur-flower buckwheat)	Gilia inconspicua <sup>a</sup> (shy gilia)	Hymenopappus filifolius (fineleaf hymenopappus)	Ipomopsis aggregata (scarlet gilia)	Lappula occidentalis <sup>a</sup> (flatspine stickseed)	Lesquerella (bladderpod)
year	Nested Frequency																
2014	22	4	12	-	8	-	2	3	12	1	11	5	19	-	6	7	18
2017	-	35	15	-	-	8	4	-	2	5	9	9	13	8	1	-	31
2022	-	8	4	2	2	-	3	9	1	6	8	8	-	-	-	6	3
year	Average Cover (%)																
2014	0.1	0.0	0.1	-	0.1	-	0.0	0.2	0.1	0.0	0.2	0.1	0.0	-	0.0	0.0	0.1
2017	-	0.8	0.3	-	-	0.0	0.0	-	0.0	0.1	0.5	0.4	0.0	0.3	0.0	-	0.9
2022	-	0.0	0.0	0.0	0.0	-	0.0	0.1	0.0	0.1	0.2	0.1	-	-	-	0.1	0.0

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

FORB SPECIES	Machaeranthera canescens (hoary tansyaster)	Machaeranthera grindeloides (rayless tansyaster)	Packera multilobata (lobeleaf groundsel)	Penstemon (beardtongue)	Petroragia pumila (rock goldenrod)	Phlox hoodii (spiny phlox)	Polygonum douglasii <sup>a</sup> (Douglas' knotweed)	Stenotus acaulis (stemless mock goldenweed)	Streptanthus cordatus (heartleaf twistflower)
year	Nested Frequency								
2014	45	3	35	-	12	4	5	3	-
2017	35	2	38	1	10	6	2	10	1
2022	19	2	7	-	6	9	6	-	-
year	Average Cover (%)								
2014	0.6	0.0	0.2	-	0.4	0.1	0.0	0.0	-
2017	0.9	0.0	1.0	0.0	0.5	0.2	0.0	0.1	0.0
2022	0.4	0.0	0.0	-	0.2	0.6	0.0	-	-

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

**Table 14R-37.12 - Shrub and Tree Species.** Average modified Daubenmire quadrat and line intercept cover by year.

SHRUB SPECIES	Amelanchier utahensis <sup>p</sup> (Utah serviceberry)	Artemisia nova <sup>p</sup> (black sagebrush)	Artemisia tridentata ssp. vaseyana <sup>p</sup> (mountain big sagebrush)	Cercocarpus intricatus <sup>p</sup> (litleleaf mountain mahogany)	Cercocarpus montanus <sup>p</sup> (alderleaf mountain mahogany)	Chrysothamnus viscidiflorus ssp. viscidiflorus var. viscidiflorus (yellow rabbitbrush)	Gutierrezia sarothrae (broom snakeweed)	Juniperus osteosperma <sup>t</sup> (Utah juniper)	Linanthus pungens (granite prickly phlox)	Opuntia fragilis (brittle pricklypear)	Pinus edulis <sup>t</sup> (twoneedle pinyon)	Purshia stansburiana <sup>p</sup> (Stansbury cliffrose)	Purshia tridentata <sup>p</sup> (antelope bitterbrush)	Sclerocactus parviflorus (smallflower fishhook cactus)
year	Line Intercept Cover (%)													
2014	-	0.4	3.9	0.8	-	-	0.2	13.1	0.2	0	34.3	-	1.2	-
2017	-	0.2	3.4	1.5	-	-	0.1	10.5	0.1	-	16.9	0.4	2	0
2022	0.5	2.1	2.9	1.4	-	-	0.3	9.9	0.2	-	13.8	-	1.9	0.1
year	Quadrat Cover (%)													
2014	0.0	0.4	1.3	0.6	-	-	0.2	1.9	0.2	0.2	7.0	-	0.6	0.0
2017	0.1	0.2	1.7	0.8	-	0.0	0.3	1.7	0.8	-	1.5	0.0	0.4	0.1
2022	0.2	0.4	1.3	0.9	0.1	0.0	0.1	1.1	0.3	-	5.3	-	0.3	0.1

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

**Table 14R-37.13 - Shrub/Tree Characteristics.** Population characteristics of shrub/tree species populations including density reproduction (seedlings), age distribution, utilization, vigor and average size (height/crown) of plants.

Year	Density		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>									
2014	-	20	0	0	0	0	0	0	139/136
2017	20	20	0	100	0	0	0	100	107/116
2022	60	-	0	100	0	100	0	0	- / -
<b>Artemisia nova<sup>p</sup> -- (black sagebrush)</b>									
2014	260	-	46	54	0	8	0	0	19/57
2017	180	-	0	100	0	0	0	0	18/38
2022	560	20	18	79	4	21	0	4	- / -
<b>Artemisia tridentata ssp. vaseyana<sup>p</sup> -- (mountain big sagebrush)</b>									
2014	400	-	15	65	20	5	0	20	47/88
2017	420	-	10	67	24	38	19	14	48/82
2022	400	-	0	70	30	25	0	30	- / -
<b>Cercocarpus intricatus<sup>p</sup> -- (litleleaf mountain mahogany)</b>									
2014	160	-	0	100	0	100	0	0	61/70
2017	120	-	0	67	33	0	0	0	47/83
2022	140	-	0	100	0	100	0	0	- / -
<b>Cercocarpus montanus<sup>p</sup> -- (alderleaf mountain mahogany)</b>									
2014	-	-	-	-	-	-	-	-	142/154
2017	-	-	-	-	-	-	-	-	- / -
2022	20	-	0	100	0	100	0	0	- / -
<b>Chrysothamnus viscidiflorus ssp. viscidiflorus var. stenophyllus -- (yellow rabbitbrush)</b>									
2014	-	-	-	-	-	-	-	-	- / -
2017	-	-	-	-	-	-	-	-	34/31
2022	20	-	0	0	100	0	0	100	- / -
<b>Chrysothamnus viscidiflorus ssp. viscidiflorus var. viscidiflorus -- (yellow rabbitbrush)</b>									
2014	-	-	-	-	-	-	-	-	31/34
2017	20	-	100	0	0	0	0	0	46/85
2022	40	-	50	50	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>Ephedra viridis<sup>p</sup> -- (mormon tea)</b>									
2014	-	-	-	-	-	-	-	-	-/-
2017	-	-	-	-	-	-	-	-	49/52
2022	-	-	-	-	-	-	-	-	-/-
<b>Ericameria nauseosa -- (rubber rabbitbrush)</b>									
2014	-	-	-	-	-	-	-	-	41/57
2017	-	-	-	-	-	-	-	-	-/-
2022	-	-	-	-	-	-	-	-	-/-
<b>Gutierrezia sarothrae -- (broom snakeweed)</b>									
2014	400	20	60	35	5	0	0	0	15/23
2017	800	-	0	100	0	0	0	0	20/35
2022	120	-	0	100	0	0	0	0	- / -
<b>Juniperus osteosperma<sup>i</sup> -- (Utah juniper)</b>									
2014	-	-	-	-	-	-	-	-	-/-
2017	-	20	0	0	0	0	0	0	- / -
2022	20	-	100	0	0	0	0	0	- / -
<b>Linanthus pungens -- (granite prickly phlox)</b>									
2014	680	-	0	65	35	6	0	3	10/20
2017	640	-	3	78	19	0	0	19	15/24
2022	420	-	0	81	19	0	0	29	- / -
<b>Mahonia fremontii -- (Fremont's mahonia)</b>									
2014	-	-	-	-	-	-	-	-	-/-
2017	-	-	-	-	-	-	-	-	40/55
2022	-	-	-	-	-	-	-	-	-/-
<b>Opuntia fragilis -- (brittle pricklypear)</b>									
2014	300	-	60	40	0	0	0	27	6/15
2017	100	-	0	100	0	0	0	0	4/15
2022	40	-	50	50	0	0	0	0	- / -
<b>Peraphyllum ramosissimum<sup>p</sup> -- (wild crab apple)</b>									
2014	-	-	-	-	-	-	-	-	87/113
2017	-	-	-	-	-	-	-	-	84/145
2022	-	-	-	-	-	-	-	-	-/-
<b>Pinus edulis<sup>i</sup> -- (twoneedle pinyon)</b>									
2014	160	20	13	88	0	0	0	0	- / -
2017	40	100	100	0	0	0	0	50	- / -
2022	20	-	0	100	0	0	0	0	- / -
<b>Purshia stansburiana<sup>p</sup> -- (Stansbury cliffrose)</b>									
2014	-	-	-	-	-	-	-	-	-/-
2017	-	-	-	-	-	-	-	-	103/133
2022	-	-	-	-	-	-	-	-	-/-
<b>Purshia tridentata<sup>p</sup> -- (antelope bitterbrush)</b>									
2014	300	-	0	80	20	80	7	40	25/51
2017	220	-	0	100	0	0	0	9	47/92
2022	80	-	0	100	0	100	0	25	- / -
<b>Sclerocactus parviflorus -- (smallflower fishhook cactus)</b>									
2014	220	-	0	100	0	0	0	0	14/12
2017	180	-	11	89	0	0	0	0	12/10
2022	100	-	0	100	0	0	0	0	- / -
<b>Yucca -- (yucca)</b>									
2014	-	-	-	-	-	-	-	-	27/37

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

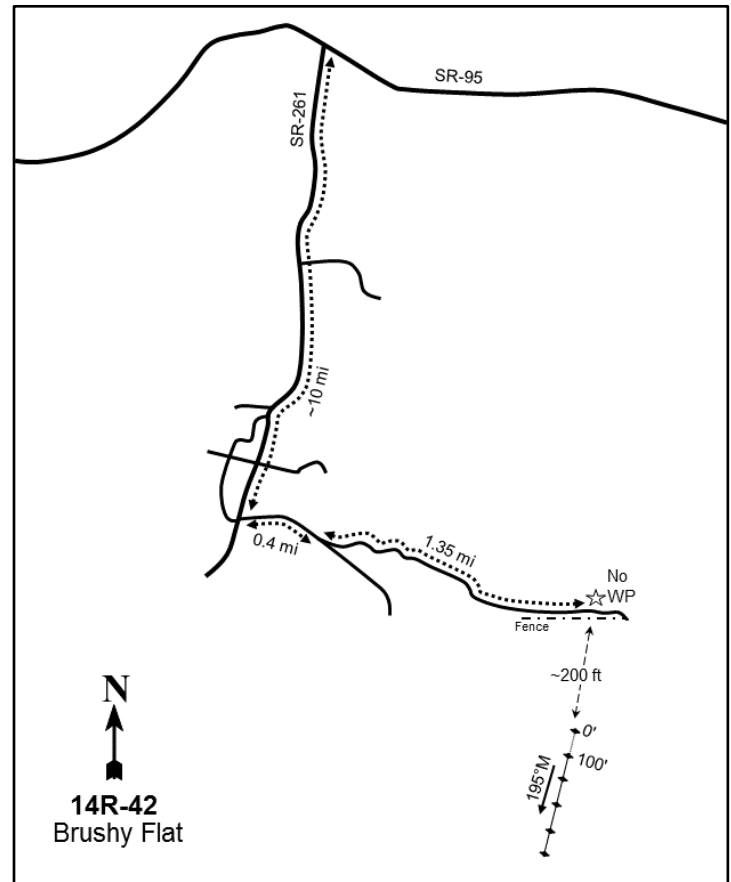
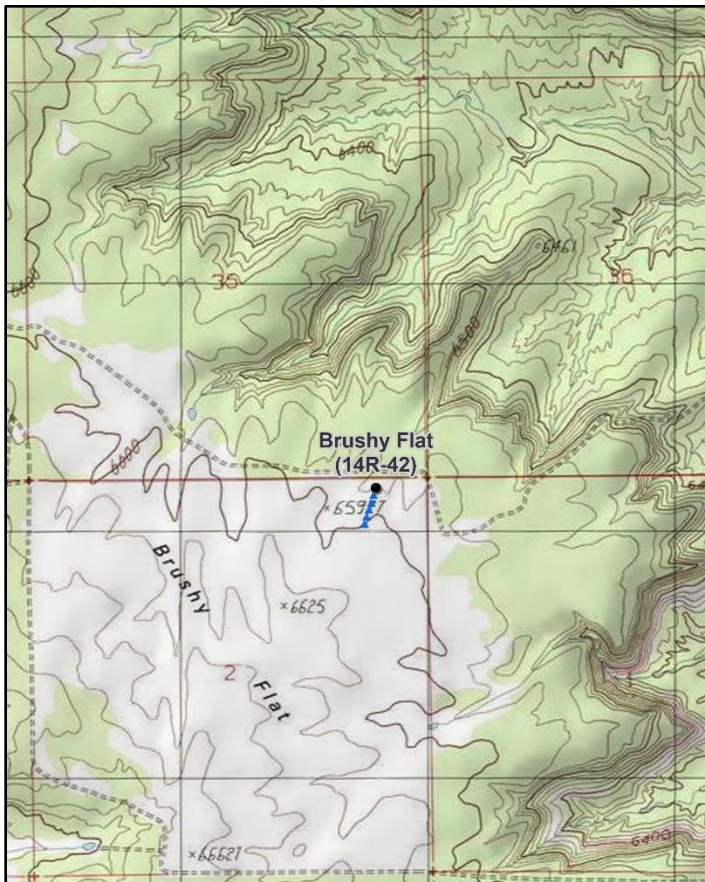
**Table 14R-37.14 - Tree Characteristics.** Point-quarter tree density, size class distribution, and average diameter.

Year	Density	Size Class Distribution					Average Diameter (cm)
	Trees per Acre	Seedling (%)	1-4' (%)	4-8' (%)	8-12' (%)	>12' (%)	
<b>Juniperus osteosperma (Utah juniper)</b>							
2014	42	-	-	20	50	30	33.4
2017	14	-	22	-	-	78	61.2
2022	18	-	17	-	17	67	38.3
<b>Pinus edulis (twoneedle pinyon)</b>							
2014	254	5	20	15	25	35	25.1
2017	65	47	7	13	-	33	27.1
2022	57	27	40	7	-	27	15.0

**Table 14R-37.15 - Deer Desirable Components Index: Upland 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
2014	8.4	10.1	6.1	18.6	-0.1	4.2	0.0	47.4	Poor
2017	10.4	9.0	2.2	30.0	0.0	10.0	0.0	61.4	Fair
2022	12.0	11.8	2.1	30.0	-1.4	3.5	0.0	58.0	Fair

## BRUSHY FLAT - STUDY NO. 14R-42



### Location Information

USGS 7.5 min Map Info  
GPS (0' Stake)

Cedar Mesa North SE; Township 39S, Range 18E, Section 02  
NAD 83 UTM ZONE 12, 597735 East 4143373 North

### Transect Information

Browse Tag # (0' Stake)	65
Transect Bearing	195° 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 west on SR-95, turn left (south) onto SR-261 and drive for approximately 10 miles. Turn left (east) onto Snow Flat Road and continue for 0.4 miles to a fork. Bear left, proceed for 1.35 miles, and park; there is no witness post. The study is approximately 200 feet south of the road (you will cross a fence).



**Site Information**

Land Ownership	Private
Land Administrator	Private
Allotment	SLICKHORN
Elevation	No data
Aspect	North
Slope	3%
Sample Dates	08/20/2018, 08/16/2022

**Table 14R-42.1 Disturbance History.** Recorded history of major disturbances.

Treatment/Disturbance	Name	WRI DB#	Date	Size (acres)
Seeding - Rangeland Drill	Cedar Mesa "Buck Pasture" Seeding	4423	November-December 2018	546
Agriculture - Dry Farm	-	-	Historic	-

**Table 14R-42.2 Seed Mix.** List of known seeded plant species and rates (if available).

Mix Name			Application Type	Application Date	Acres
Cedar Mesa			Drill	Nov 2018	560
Type	Species	Common Name	Cultivar/Source ID	Bulk lbs/acre	PLS
G	Achnatherum hymenoides	Indian Ricegrass	Emery, UT	1.25	1.16
G	Achnatherum hymenoides	Indian Ricegrass	Emery, UT	0.27	0.26
G	Agropyron cristatum	Crested Wheatgrass	Hycrest II	0.89	0.84
G	Elymus trachycaulus	Thickspike Wheatgrass	Bannock II	0.98	0.90
G	Pascopyrum smithii	Western Wheatgrass	Recovery	0.98	0.89
G	Pleuraphis jamesii	Galleta		0.02	0.01
G	Pleuraphis jamesii	Galleta		0.73	0.43
F	Cleome serrulata	Rocky Mountain Beeplant		0.45	0.41
F	Helianthus annuus	Annual Sunflower		0.98	0.95
F	Linum perenne	Blue Flax		0.45	0.36
F	Medicago sativa	Alfalfa	Ladak DL	0.54	0.49
F	Melilotus officinalis	Yellow Sweetclover		0.10	0.08
F	Melilotus officinalis	Yellow Sweetclover		0.30	0.30
F	Onobrychis viciifolia	Sainfoin	Shoshone	1.07	0.94
F	Penstemon palmeri	Palmer Penstemon		0.03	0.01
F	Penstemon palmeri	Palmer Penstemon		0.02	0.02
F	Penstemon palmeri	Palmer Penstemon	Lincoln NV	0.19	0.13
F	Penstemon palmeri	Palmer Penstemon	Cedar	0.25	0.22
F	Sanguisorba minor	Small Burnet	Delar	0.98	0.86
F	Sphaeralcea grossulariifolia	Gooseberryleaf Globemallow	White Pine NV	0.22	0.20
S	Atriplex canescens	Fourwing Saltbush		0.31	0.19
S	Atriplex canescens	Fourwing Saltbush		0.67	0.25

Mix Name			Application Type	Application Date	Acres
Cedar Mesa Fluffly			Drill	Nov 2018	560
Type	Species	Common Name	Cultivar/Source ID	Bulk lbs/acre	PLS
		Cracked Corn		0.18	0.00
G	Bouteloua gracilis	Blue Grama	Alma	0.18	0.14
G	Poa secunda	Sandberg Bluegrass	UP Colorado Plateau	0.19	0.16
G	Poa secunda	Sandberg Bluegrass	Mountain Home	0.04	0.04
G	Sporobolus cryptandrus	Sand Dropseed		0.04	0.03
S	Artemisia tridentata ssp. wyomingensis	Wyoming Big Sagebrush	Carbon UT	0.50	0.19
S	Bassia prostrata	Forage Kochia	Snowstorm	0.54	0.31

**Wildlife Habitat and Vegetation History****Table 14R-42.3 - Wildlife Seasonal Habitat.** DWR wildlife habitat and seasonality.

Species	Habitat	Season
Mule Deer	crucial	winter

**Table 14R-42.4 - Vegetation History.** The dominant vegetation type(s) and phase of woodland succession (Tausch, Miller, Roundy, & Chambers, 2009).

Year	Vegetation Type	Woodland Succession
2018	Annual Forb	No Encroachment
2022	Annual Forb/Mixed Shrub	No Encroachment

**Site Notes**

No Notes

**Site Potential**

1981 - 2010 Average Annual Precipitation	12 inches
NRCS Ecological Site	Upland Loam (Mountain Big Sagebrush)
NRCS Ecological Site #	R035XY308UT
States and Transitions	No state and transition model is available for this ecological site.

Upon study establishment in 2018, this site was dominated by weedy annual forbs, mainly prickly Russian thistle (*Salsola tragus*). Perennial forbs were also present with a moderate amount of cover being contributed by sandmat (*Chamaesyce sp.*). The only grasses observed on site were the introduced annual species cheatgrass (*Bromus tectorum*) and cereal rye (*Secale cereale*), and both offered little cover (Table 14R-42.7, Table 14R-42.10, Table 14R-42.11). The shrub component was also sparse with mountain big sagebrush (*Artemisia tridentata* ssp. *vaseyana*) offering what little browse cover was observed (Table 14R-42.12, Table 14R-42.13). Following treatment, cheatgrass remained the dominant grass species. Russian thistle decreased in cover but remained prominent (Table 14R-42.10, Table 14R-42.11). Shrub cover increased following the treatment with forage kochia (*Bassia prostrata*) and rubber rabbitbrush (*Ericmeria nauseosa*) being sampled with low to moderate cover; sagebrush cover remain similar (Table 14R-42.12, Table 14R-42.13).

**Trend Summary Tables****Table 14R-42.6 - Shrub/Tree Summary.** Average modified Daubenmire quadrat and line intercept cover by year for shrubs/trees

Year	Quadrat Cover (%)			Line-intercept Cover (%)		
	Preferred Shrub	Other Shrub	Tree	Preferred Shrub	Other Shrub	Tree
2018	0.9	-	-	3.3	-	-
2022	4.3	3.1	-	6.2	6.6	-

**Table 14R-42.7 - Herbaceous Summary.** Nested frequency and average modified Daubenmire quadrat cover by year for herbaceous functional groups

Year	Nested Frequency				Quadrat Cover (%)			
	Annual Grass	Perennial Grass	Annual/Biennial Forb	Perennial Forb	Annual Grass	Perennial Grass	Annual/Biennial Forb	Perennial Forb
2018	68	-	280	298	0.5	-	19.2	10.3
2022	372	65	182	325	11.1	2.7	2.9	8.6

**Table 14R-42.8 - Basic Ground Cover.** Average modified Daubenmire quadrat cover by year for basic ground cover types.

Year	Cover Type (%)					
	Bare Ground	Cryptogams	Litter	Pavement	Rock	Vegetation
2018	40.8	-	51.6	-	0.0	28.3
2022	33.7	0.0	56.9	0.0	-	28.9

**Table 14R-42.9 - Pellet Group Data.** Quadrat frequency and pellet group transect data for animal pellets. Rabbit pellet groups are not sampled in the pellet group transect.

Year	Cattle	Coyote	Mule Deer	Rocky Mountain Elk	Rabbit
	Quadrat Frequency				
2018	1	-	4	3	5
2022	-	-	14	2	7
Year	Days Use Per Acre (ha)				
2018	19.6 (48.4)	17.4 (43.0)*	6.7 (16.6)	4.7 (11.6)	-
2022	3.6 (9.0)	-	13.4 (33.1)	5.3 (13.2)	-

\*Pellets per acre (ha)

**Table 14R-42.10 - Grass Species.** Nested frequency and modified Daubenmire average cover by year.

GRASS SPECIES							
<i>Aegilops cylindrica</i> <sup>ai</sup> (jointed goatgrass)							
<i>Agropyron cristatum</i> <sup>i</sup> (crested wheatgrass)							
<i>Bromus tectorum</i> <sup>ai</sup> (cheatgrass)							
<i>Pascopyrum smithii</i> (western wheatgrass)							
<i>Poa secunda</i> (Sandberg bluegrass)							
<i>Secale cereale</i> <sup>ai</sup> (cereal rye)							
<i>Sporobolus cryptandrus</i> (sand dropseed)							
year	Nested Frequency						
2018	-	-	64	-	-	6	-
2022	49	62	363	3	1	50	1
year	Average Cover (%)						
2018	-	-	0.4	-	-	0.0	-
2022	0.4	2.5	10.2	0.1	0.0	0.5	0.0

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

**Table 14R-42.11 - Forb Species.** Nested frequency and modified Daubenmire average cover by year.

FORB SPECIES															
<i>Amaranthus</i> <sup>ai</sup> (pigweed)															
<i>Bassia scoparia</i> <sup>ai</sup> (burningbush)															
<i>Chamaesyce</i> (sandmat)															
<i>Chenopodium leptophyllum</i> <sup>a</sup> (narrowleaf goosefoot)															
<i>Cirsium arizonicum</i> <sup>a</sup> (Arizona thistle)															
<i>Machaeranthera canescens</i> (hoary tansyaster)															
<i>Packera multilobata</i> (lobeleaf groundsel)															
<i>Portulaca oleracea</i> <sup>ai</sup> (little hogweed)															
<i>Salsola tragus</i> <sup>ai</sup> (prickly Russian thistle)															
<i>Senecio spartioides</i> (broom-like ragwort)															
<i>Sisymbrium altissimum</i> <sup>ai</sup> (tall tumbled mustard)															
<i>Sphaeralcea coccinea</i> (scarlet globemallow)															
<i>Sphaeralcea parvifolia</i> (smallflower globemallow)															
<i>Tragopogon dubius</i> <sup>ai</sup> (yellow salsify)															
year	Nested Frequency														
2018	161	7	290	1	-	-	-	69	92	-	7	-	8	5	
2022	32	-	306	22	1	22	2	76	123	0	3	3	41	5	
year	Average Cover (%)														
2018	4.5	1.0	9.2	0.0	-	-	-	0.2	13.3	-	0.2	-	1.1	0.0	
2022	0.1	-	7.5	0.1	0.0	0.1	0.0	1.4	1.2	0.0	0.0	0.0	0.9	0.0	

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

**Table 14R-42.12 - Shrub and Tree Species.** Average modified Daubenmire quadrat and line intercept cover by year.

SHRUB SPECIES	Artemisia tridentata ssp. vaseyana <sup>p</sup> (mountain big sagebrush)	Bassia prostrata <sup>pi</sup> (forage kochia)	Ericameria nauseosa (rubber rabbitbrush)	Opuntia (pricklypear)
year	Line Intercept Cover (%)			
2018	3.3	-	-	-
2022	3	3.2	6.6	-
year	Quadrat Cover (%)			
2018	0.9	-	-	-
2022	3.2	1.1	3.1	0.0

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

**Table 14R-42.13 - Shrub/Tree Characteristics.** Population characteristics of shrub/tree species populations including density reproduction (seedlings), age distribution, utilization, vigor and average size (height/crown) of plants.

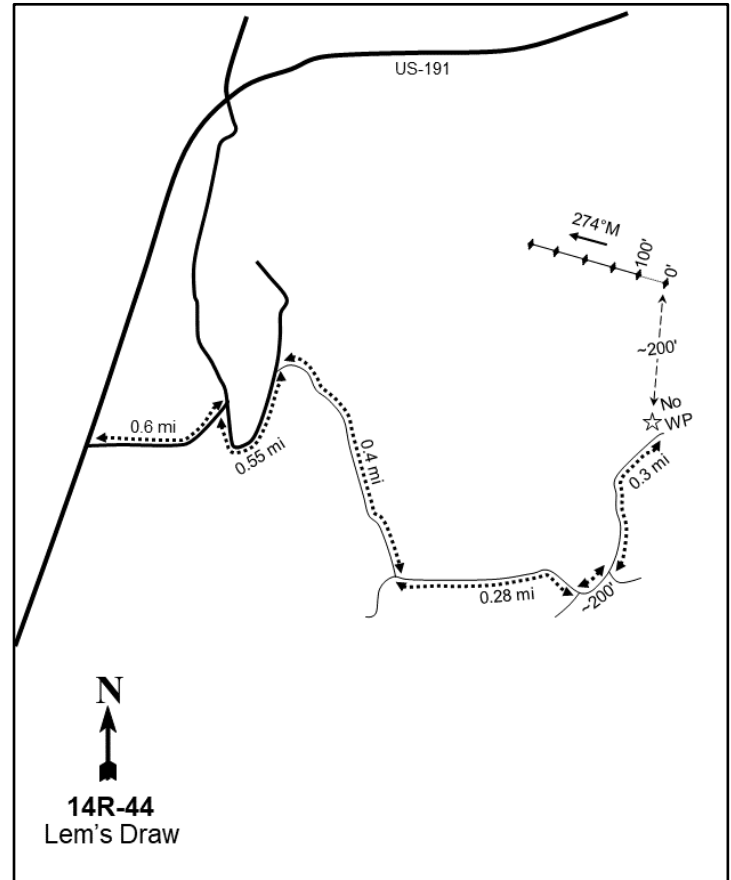
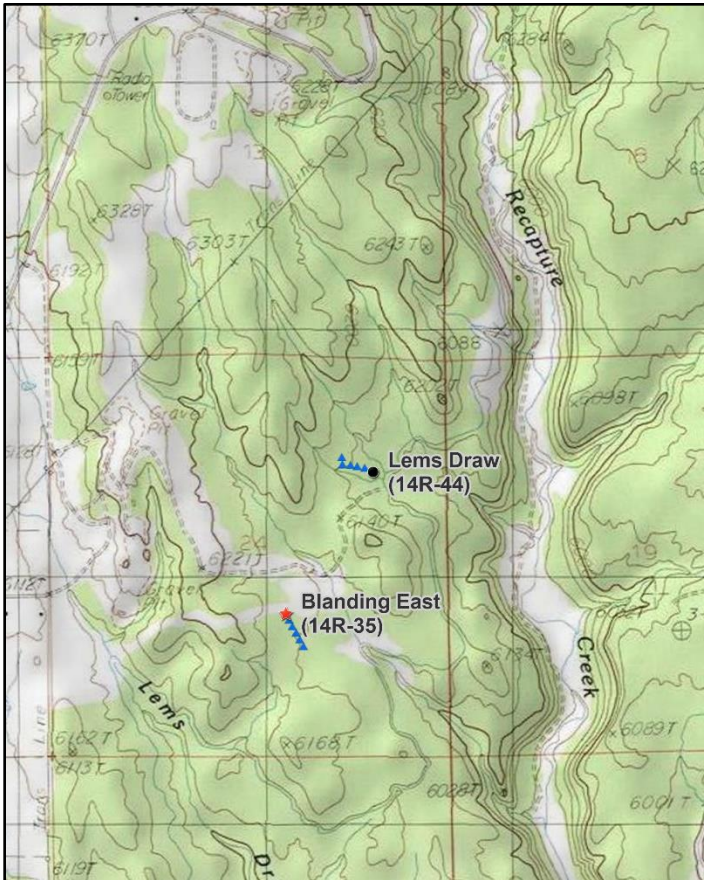
Year	Density		Age Class Distribution			Utilization		Poor Vigor (%)	Average Height Crown (cm)
	Plants Per Acre		Excluding Seedlings			Moderate (%)	Heavy (%)		
	Excluding Seedlings	Seedling	Young (%)	Mature (%)	Decadent (%)				
<b>Artemisia tridentata ssp. vaseyana<sup>p</sup> -- (mountain big sagebrush)</b>									
2018	40	-	0	100	0	0	0	0	63/133
2022	4460	-	71	28	0	0	0	0	- / -
<b>Bassia prostrata<sup>pi</sup> -- (forage kochia)</b>									
2018	-	-	-	-	-	-	-	-	- / -
2022	1380	840	26	74	0	6	6	0	- / -
<b>Ericameria nauseosa -- (rubber rabbitbrush)</b>									
2018	-	-	-	-	-	-	-	-	105/174
2022	4040	-	5	95	1	0	0	1	- / -
<b>Opuntia -- (pricklypear)</b>									
2018	-	-	-	-	-	-	-	-	21/73
2022	80	20	25	75	0	0	0	0	- / -

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

**Table 14R-42.15 - Deer Desirable Components Index: Upland Potential Scale.**

Year	Preferred Browse Cover	Preferred Browse Decadence	Preferred Browse Young	Perennial Grass Cover	Annual Grass Cover	Perennial Forb Cover	Noxious Weeds	Total Score	Ranking
2018	4.1	0.0	0.0	0.0	-0.3	10.0	0.0	13.8	Very Poor
2022	8.6	14.9	15.0	5.4	-8.0	10.0	-2.0	43.8	Poor

## LEMS DRAW - STUDY NO. 14R-44

**Location Information**

USGS 7.5 min Map Info  
GPS (0' Stake)

Blanding North SW; Township 36S, Range 22E, Section 24  
NAD 83 UTM ZONE 12, 637373 East 4167615 North

**Transect Information**

Browse Tag # (0' Stake)	66
Transect Bearing	274° magnetic
Length	500ft
Belt Placement	Line 1 (11ft), Line 2 (34ft), Line 3 (59ft), Line 4 (71ft), Line 5 (95ft)
Belt Marker Placement	Standard

**Directions to Site**

Traveling north from Blanding, turn right (east) onto East Kiva Drive. Continue for 0.6 miles to a "T"-junction with North Beeson Road and North Lems Draw Road. Turn right (south) onto North Lems Draw Road and follow this road for approximately 0.55 miles. Turn right (east) and drive for 0.4 miles, then turn left (east). Continue for about 0.28 miles, passing a number of other roads, to a fork. Bear left and drive for 100 feet to another fork. Proceed to the left (north), continue for roughly 0.3 miles, and park; there is no witness post. The study site is about 200 feet northeast of the road.

**Site Information**

Land Ownership	Federal
Land Administrator	BLM
Allotment	BULLDOG
Elevation	No data
Aspect	West
Slope	5%
Sample Dates	08/21/2018, 08/16/2022

**Table 14R-44.1 Disturbance History.** Recorded history of major disturbances.

Treatment/Disturbance	Name	WRI DB#	Date	Size (acres)
Hand Crew - Lop and Scatter	Blanding East Phase III	4323	November 2018	233

**Wildlife Habitat and Vegetation History****Table 14R-44.3 - Wildlife Seasonal Habitat.** DWR wildlife habitat and seasonality.

Species	Habitat	Season
Mule Deer	crucial	spring/fall
Rocky Mountain Elk	crucial	winter

**Table 14R-44.4 - Vegetation History.** The dominant vegetation type(s) and phase of woodland succession (Tausch, Miller, Roundy, & Chambers, 2009).

Year	Vegetation Type	Woodland Succession
2018	Pinyon-Juniper	Phase III
2022	Pinyon-Juniper/Broom Snakeweed	Phase II

**Site Notes**

No Notes

**Site Potential**

1981 - 2010 Average Annual Precipitation	14 inches
NRCS Ecological Site	Upland Shallow Loam (Black Sagebrush)
NRCS Ecological Site #	R035XY312UT
States and Transitions	No state and transition model is available for this ecological site.

This site was dominated by Utah juniper (*Juniperus osteosperma*) and twoneedle pinyon (*Pinus edulis*) upon establishment in 2018, and was considered to be within Phase III of woodland succession (Table 14R-44.4). Other browse species were present, but offered much less cover (Table 14R-44.12, Table 14R-44.13, Table 14R-44.14). The understory was extremely limited, with all of the herbaceous cover being provided by annual and perennial forbs (Table 14R-44.7, Table 14R-44.10, Table 14R-44.11). Following a lop and scatter treatment (Table 14R-44.1), the herbaceous understory remained limited (Table 14R-7). Pinyon and juniper trees were thinned, but remained a major component of the the community (Table 14R-44.6). Other shrubs, namely broom snakeweed (*Gutierrezia sarothrae*), increased following treatment (Table 14R-44.12, Table 14R-44.13).

## Trend Summary Tables

**Table 14R-44.6 - Shrub/Tree Summary.** Average modified Daubenmire quadrat and line intercept cover by year for shrubs/trees

Year	Quadrat Cover (%)			Line-intercept Cover (%)		
	Preferred Shrub	Other Shrub	Tree	Preferred Shrub	Other Shrub	Tree
2018	0.5	0.3	10.2	3.2	0.4	28.6
2022	1.6	6.6	1.6	2.5	8.7	10.4

**Table 14R-44.7 - Herbaceous Summary.** Nested frequency and average modified Daubenmire quadrat cover by year for herbaceous functional groups

Year	Nested Frequency				Quadrat Cover (%)			
	Annual Grass	Perennial Grass	Annual/Biennial Forb	Perennial Forb	Annual Grass	Perennial Grass	Annual/Biennial Forb	Perennial Forb
2018	-	-	3	1	-	-	0.0	0.0
2022	17	16	10	39	0.1	0.4	0.0	0.5

**Table 14R-44.8 - Basic Ground Cover.** Average modified Daubenmire quadrat cover by year for basic ground cover types.

Year	Cover Type (%)					
	Bare Ground	Cryptogams	Litter	Pavement	Rock	Vegetation
2018	48.6	1.6	40.0	7.9	6.6	11.8
2022	40.6	0.6	48.3	5.7	4.4	11.4

**Table 14R-44.9 - Pellet Group Data.** Quadrat frequency and pellet group transect data for animal pellets. Rabbit pellet groups are not sampled in the pellet group transect.

Year	Cattle	Mule Deer	Rabbit
	Quadrat Frequency		
2018	-	6	6
2022	1	12	1
Year	Days Use Per Acre (ha)		
2018	-	12.8 (31.5)	-
2022	-	4.7 (11.6)	-

**Table 14R-44.10 - Grass Species.** Nested frequency and modified Daubenmire average cover by year.

GRASS SPECIES	Bromus tectorum <sup>ai</sup> (cheatgrass)	Elymus elymoides (squirreltail)	Poa pratensis <sup>i</sup> (Kentucky bluegrass)	Sporobolus cryptandrus (sand dropseed)	Vulpia octoflora <sup>a</sup> (six weeks fescue)
year	Nested Frequency				
2018	-	-	-	-	-
2022	12	11	4	1	8
year	Average Cover (%)				
2018	-	-	-	-	-
2022	0.1	0.3	0.1	0.0	0.0

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



**Table 14R-44.11 - Forb Species.** Nested frequency and modified Daubenmire average cover by year.

FORB SPECIES	Arabid (rockress)	Chamaesyce (sandmat)	Cryptantha (cryptantha)	Heterotheca villosa (hairy false goldenaster)	Lactuca serriola <sup>ai</sup> (prickly lettuce)	Lappula occidentalis <sup>a</sup> (flatspine stickseed)	Lepidium montanum <sup>a</sup> (mountain pepperweed)	Machaeranthera canescens (hoary tansyaster)	Penstemon eatonii (firecracker penstemon)	Penstemon pachyphyllus (thickleaf beardtongue)	Phlox longifolia (longleaf phlox)	Physaria (twinpod)	Portulaca oleracea <sup>ai</sup> (litttle hogweed)	Tetranneuris acaulis (stemless four-nerve daisy)
year	Nested Frequency													
2018	-	-	-	-	3	-	-	-	-	-	-	1	-	-
2022	2	6	2	7	-	2	5	6	5	5	2	-	3	12
year	Average Cover (%)													
2018	-	-	-	-	0.0	-	-	-	-	-	-	0.0	-	-
2022	0.0	0.0	0.0	0.1	-	0.0	0.0	0.2	0.1	0.1	0.0	-	0.0	0.1

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

**Table 14R-44.12 - Shrub and Tree Species.** Average modified Daubenmire quadrat and line intercept cover by year.

SHRUB SPECIES	Amelanchier utahensis <sup>p</sup> (Utah serviceberry)	Artemisia nova <sup>p</sup> (black sagebrush)	Chrysothamnus viscidiflorus ssp. viscidiflorus var. stenophyllus (yellow rabbitbrush)	Ephedra viridis <sup>p</sup> (mormon tea)	Ericameria nauseosa (rubber rabbitbrush)	Gutierrezia sarothrae (broom snakeweed)	Juniperus osteosperma <sup>i</sup> (Utah juniper)	Opuntia polyacantha (plains pricklypear)	Pinus edulis <sup>s</sup> (twonneedle pinyon)	Purshia tridentata <sup>p</sup> (antelope bitterbrush)	Quercus gambelii <sup>p</sup> (Gambel oak)
year	Line Intercept Cover (%)										
2018	-	0.6	0.2	2	-	0.2	16	-	12.6	0.6	0
2022	0.3	0.4	0.1	0.4	0.3	8.2	9.2	0.1	1.2	0.7	0.7
year	Quadrat Cover (%)										
2018	-	0.1	0.0	0.3	-	0.2	5.3	-	5.0	0.1	0.0
2022	0.0	1.1	0.2	0.1	0.2	5.9	1.2	0.3	0.4	0.1	0.2

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

**Table 14R-44.13 - Shrub/Tree Characteristics.** Population characteristics of shrub/tree species populations including density reproduction (seedlings), age distribution, utilization, vigor and average size (height/crown) of plants.

Year	Density		Age Class Distribution			Utilization		Poor Vigor (%)	Average Height Crown (cm)
	Plants Per Acre		Excluding Seedlings			Moderate (%)	Heavy (%)		
	Excluding Seedlings	Seedling	Young (%)	Mature (%)	Decadent (%)				
<b>Amelanchier utahensis<sup>p</sup> -- (Utah serviceberry)</b>									
2018	20	-	0	0	100	0	100	100	202/212
2022	60	-	0	0	100	100	0	100	- / -
<b>Artemisia nova<sup>p</sup> -- (black sagebrush)</b>									
2018	280	-	0	7	93	14	0	93	25/45
2022	180	-	0	56	44	0	0	44	- / -
<b>Cercocarpus montanus<sup>p</sup> -- (alderleaf mountain mahogany)</b>									
2018	-	-	-	-	-	-	-	-	- / -
2022	20	-	0	0	100	0	100	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>Chrysothamnus viscidiflorus ssp. viscidiflorus var. stenophyllus -- (yellow rabbitbrush)</b>									
2018	20	-	0	0	100	0	0	100	44/72
2022	440	-	5	91	5	14	0	18	- / -
<b>Ephedra viridis<sup>p</sup> -- (mormon tea)</b>									
2018	100	-	0	20	80	80	0	80	52/80
2022	160	-	13	88	0	0	0	0	- / -
<b>Ericameria nauseosa -- (rubber rabbitbrush)</b>									
2018	-	-	-	-	-	-	-	-	- / -
2022	280	-	100	0	0	14	0	50	- / -
<b>Gutierrezia sarothrae -- (broom snakeweed)</b>									
2018	360	-	0	28	72	0	0	78	11/20
2022	8380	-	1	93	7	0	0	28	- / -
<b>Juniperus osteosperma<sup>i</sup> -- (Utah juniper)</b>									
2018	160	-	25	38	38	0	0	63	- / -
2022	140	20	86	14	0	14	0	43	- / -
<b>Opuntia polyacantha -- (plains pricklypear)</b>									
2018	20	-	0	100	0	0	0	100	10/21
2022	120	-	33	67	0	0	0	0	- / -
<b>Pinus edulis<sup>i</sup> -- (twoneedle pinyon)</b>									
2018	160	-	25	63	13	0	0	0	- / -
2022	40	-	0	100	0	0	0	0	- / -
<b>Purshia tridentata<sup>p</sup> -- (antelope bitterbrush)</b>									
2018	120	-	0	0	100	33	0	100	23/59
2022	100	-	0	0	100	80	0	100	- / -
<b>Quercus gambelii<sup>p</sup> -- (Gambel oak)</b>									
2018	80	-	0	0	100	0	0	100	73/20
2022	700	-	100	0	0	0	0	97	- / -

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

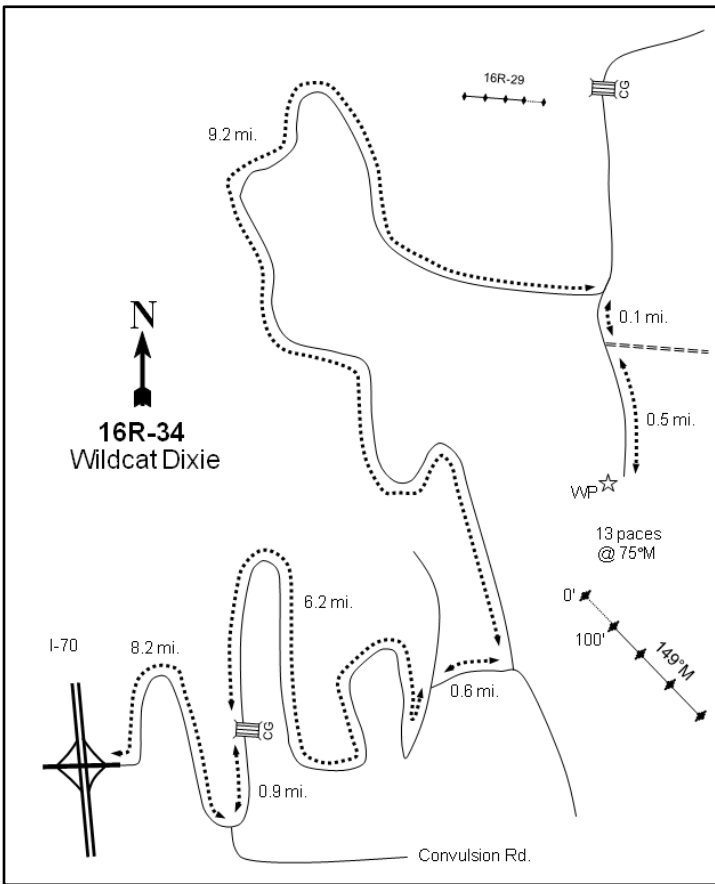
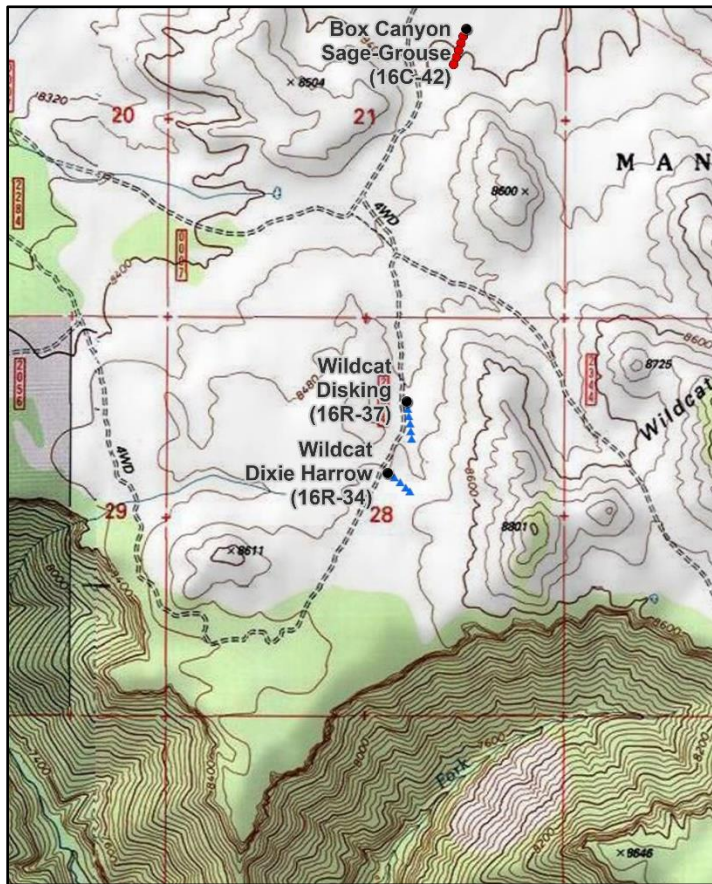
**Table 14R-44.14 - Tree Characteristics.** Point-quarter tree density, size class distribution, and average diameter.

Year	Density	Size Class Distribution					Average Diameter (cm)
	Trees per Acre	Seedling (%)	1-4' (%)	4-8' (%)	8-12' (%)	>12' (%)	
<b>Juniperus osteosperma (Utah juniper)</b>							
2018	194	5	15	15	20	45	27.5
2022	59	-	-	-	33	67	46.1
<b>Pinus edulis (twoneedle pinyon)</b>							
2018	119	-	33	33	33	-	12.1
2022	1	-	-	-	-	100	27.0

**Table 14R-44.15 - Deer Desirable Components Index: Upland Potential Scale.**

Year	Preferred Browse Cover	Preferred Browse Decadence	Preferred Browse Young	Perennial Grass Cover	Annual Grass Cover	Perennial Forb Cover	Noxious Weeds	Total Score	Ranking
2018	4.2	0.0	0.0	0.0	0.0	0.0	0.0	4.2	Very Poor
2022	3.2	0.0	0.0	0.7	-0.1	1.0	0.0	4.9	Very Poor

## WILDCAT DIXIE HARROW - STUDY NO. 16R-34



### Location Information

USGS 7.5 min Map Info  
GPS (0' Stake)

Emery West NW; Township 21S, Range 5E, Section 28  
NAD 83 UTM ZONE 12, 468630 East 4312670 North

### Transect Information

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

235  
120° magnetic  
400ft  
Line 1 (11ft & 95ft), Line 2 (34ft), Line 3 (59ft), Line 4 (71ft)  
Standard; Line 4: 75ft Long

### Directions to Site

From Exit 73 on I-70, drive for 8.2 miles, then turn onto a road on the left. Continue for 0.9 miles, following signs for Duncan Mountain. On Convulsion Road, drive for 6.2 miles to a fork. Go right, then proceed for 0.6 miles to another fork. Go left and continue for 9.2 miles to a two-track road on the right. Drive for 0.1 miles on the two-track to another fork and proceed to the right. Continue for 0.5 miles to the witness post on the right (west) side of the road. The 0-foot stake is 19 paces from the witness post at 60 degrees magnetic and is marked with browse tag #235.

**Site Information**

Land Ownership	Federal
Land Administrator	USFS
Allotment	EMERY
Elevation	8,457ft (2,578m)
Aspect	North
Slope	4%
Sample Dates	08/06/2008, 08/12/2009, 06/23/2010, 07/01/2013, 08/14/2017, 07/05/2022

**Table 16R-34.1 Disturbance History.** Recorded history of major disturbances.

Treatment/Disturbance	Name	WRI DB#	Date	Size (acres)
Harrow - One-Way Dixie	Wildcat Knolls Habitat Improvement	1161	September-November 2008	435
Seeding - Broadcast	Wildcat Knolls Habitat Improvement	1161	September-November 2008	810
Discing - Two-Way	Wildcat Sagebrush Restoration Project Phase II	1392	August-September 2009	90
Seeding - Rangeland Drill	Wildcat Sagebrush Restoration Project Phase II	1392	August-September 2009	90

**Table 16R-34.2 Seed Mix.** List of known seeded plant species and rates (if available).

Mix Name			Application Type	Application Date	Acres
Wildcat Knolls Habitat Improvement			Broadcast	Oct 2008	1000
Type	Species	Common Name	Cultivar/Source ID	Bulk lbs/acre	PLS
G	<i>Elymus elymoides</i>	Bottlebrush Squirreltail	Toe Jam	0.50	0.42
G	<i>Elymus trachycaulus</i>	Slender Wheatgrass	San Luis	1.05	0.89
G	<i>Elymus trachycaulus</i>	Slender Wheatgrass	San Luis	0.98	0.88
G	<i>Leymus cinereus</i>	Great Basin Wildrye	Trailhead	1.00	0.91
G	<i>Pascopyrum smithii</i>	Western Wheatgrass	Arriba	1.00	0.94
G	<i>Poa secunda</i>	Sandberg Bluegrass	Toole MT	1.00	0.84
F	<i>Achillea millefolium</i>	Western Yarrow		0.10	0.10
F	<i>Astragalus cicer</i>	Cicer Milkvetch	Lutana	1.00	0.76
F	<i>Hedysarum boreale</i>	Utah Sweetvetch		0.25	0.22
F	<i>Hedysarum boreale</i> ssp. <i>boreale</i> var. <i>boreale</i>	Utah Sweetvetch		0.25	0.22
F	<i>Heliomeris multiflora</i>	Showy Goldeneye	Sanpete UT	0.03	0.02
F	<i>Lactuca serriola</i>	Prickly Lettuce		0.14	0.11
F	<i>Linum perenne</i>	Blue Flax	Appar	0.27	0.22
F	<i>Linum perenne</i>	Blue Flax	Appar	0.20	0.18
F	<i>Linum perenne</i>	Blue Flax	Appar	0.54	0.48
F	<i>Penstemon strictus</i>	Rocky Mountain Penstemon	Bandera	0.02	0.01
F	<i>Penstemon strictus</i>	Rocky Mountain Penstemon	Bandera	0.05	0.05
F	<i>Sanguisorba minor</i>	Small Burnet	Delar	1.50	1.39
S	<i>Artemisia tridentata</i> ssp. <i>vaseyana</i>	Mountain Big Sagebrush	Sanpete UT	0.22	0.04
S	<i>Artemisia tridentata</i> ssp. <i>vaseyana</i>	Mountain Big Sagebrush	Sevier/Wayne UT	0.28	0.08

**Wildlife Habitat and Vegetation History****Table 16R-34.3 - Wildlife Seasonal Habitat.** DWR 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

**Table 16R-34.4 - Vegetation History.** The dominant vegetation type(s) and phase of woodland succession (Tausch, Miller, Roundy, & Chambers, 2009).

Year	Vegetation Type	Woodland Succession
2008	Mountain Big Sagebrush/Perennial grass/Perennial Forb	No Encroachment
2009	Mountain Big Sagebrush/Perennial Grass	No Encroachment
2010	Mountain Big Sagebrush/Perennial Grass	No Encroachment
2013	Mountain Big Sagebrush/Perennial Grass	No Encroachment
2017	Mountain Big Sagebrush/Perennial Grass	No Encroachment
2022	Mountain Big Sagebrush/Perennial Grass	No Encroachment

**Site Notes**

Sage-grouse were observed in the area in 2017.

**Site Potential**

1981 - 2010 Average Annual Precipitation	16 inches
NRCS Ecological Site	Mountain Loam (Mountain Big Sagebrush)
NRCS Ecological Site #	R047XA430UT
States and Transitions	No state and transition model is available for this ecological site.

At the time of study establishment in 2008, this was a mountain big sagebrush (*Artemisia tridentata* ssp. *vaseyana*) site with a co-dominant component of a variety of perennial grasses and forbs. In the fall of 2008, it was treated with a one-way dixie harrow to reduce sagebrush decadence and invigorate the understory (Table 16R-34.1). Following treatment, the cover of sagebrush decreased significantly, but decadence was reduced (Table 16R-34.13). As time since treatment has passed, the cover of sagebrush has steadily increased. The understory is robust and diverse, with the dominant grass being muttongrass (*Poa fendleriana*) (Table 16R-34.10); the dominant perennial forb on the site is redroot buckwheat (*Eriogonum racemosum*) (Table 16R-34.11). Overall, the site is in good ecological condition with little presence of undesirable introduced species.

**Trend Summary Tables****Table 16R-34.6 - Shrub/Tree Summary.** Average modified Daubenmire quadrat and line intercept cover by year for shrubs/trees

Year	Quadrat Cover (%)			Line-intercept Cover (%)		
	Preferred Shrub	Other Shrub	Tree	Preferred Shrub	Other Shrub	Tree
2008	24.5	4.0	-	32.1	5.5	-
2009	5.2	4.5	-	4.0	3.3	-
2010	6.6	6.8	-	6.0	6.3	-
2013	7.8	6.7	-	11.2	7.1	-
2017	15.9	8.6	-	17.7	7.9	-
2022	16.6	7.8	-	25.5	6.4	-

**Table 16R-34.7 - Herbaceous Summary.** Nested frequency and average modified Daubenmire quadrat cover by year for herbaceous functional groups

Year	Nested Frequency				Quadrat Cover (%)			
	Annual Grass	Perennial Grass	Annual/Biennial Forb	Perennial Forb	Annual Grass	Perennial Grass	Annual/Biennial Forb	Perennial Forb
2008	-	388	63	289	-	16.5	0.1	13.1
2009	-	315	36	209	-	11.8	0.2	6.6
2010	-	313	218	243	-	10.4	3.0	8.2
2013	-	403	119	263	-	12.5	0.3	5.9
2017	-	452	43	253	-	25.3	0.1	9.6
2022	-	403	8	223	-	17.4	0.0	6.4

**Table 16R-34.8 - Basic Ground Cover.** Average modified Daubenmire quadrat cover by year for basic ground cover types.

Year	Cover Type (%)					
	Bare Ground	Cryptogams	Litter	Pavement	Rock	Vegetation
2008	23.3	0.3	45.3	0.0	-	55.1
2009	40.4	-	44.0	0.1	0.0	25.8
2010	40.1	-	43.2	0.0	0.0	33.3
2013	27.5	-	42.2	0.0	0.0	40.4
2017	23.6	-	41.0	0.3	0.0	53.9
2022	33.7	0.1	41.9	0.3	0.0	43.0

**Table 16R-34.9 - Pellet Group Data.** Quadrat frequency and pellet group transect data for animal pellets. Rabbit pellet groups are not sampled in the pellet group transect.

Year	Cattle	Mule Deer	Rocky Mountain Elk	Greater Sage-Grouse	Rabbit
	Quadrat Frequency				
2008	2	4	59	1	10
2009	10	23	22	-	3
2010	1	24	17	2	4
2013	2	6	24	6	3
2017	8	9	28	1	14
2022	10	21	6	-	7
Year	Days Use Per Acre (ha)				
2008	25.4 (62.8)	-	63.0 (155.6)	17.4 (43.0)*	-
2009	18.1 (44.8)	0.7 (1.7)	38.2 (94.4)	-	-
2010	2.2 (5.4)	19.4 (48.0)	15.4 (38.1)	8.7 (21.5)*	-
2013	12.3 (30.5)	6.0 (14.9)	65.0 (160.6)	34.9 (86.1)*	-
2017	20.3 (50.2)	0.7 (1.7)	46.9 (115.9)	34.9 (86.1)*	-
2022	13.8 (34.1)	12.1 (29.8)	13.4 (33.1)	43.6 (107.6)*	-

\*Pellets per acre (ha)

**Table 16R-34.10 - Grass Species.** Nested frequency and modified Daubenmire average cover by year.

GRASS SPECIES										
	Achnatherum lettermanii (Letterman's needlegrass)	Bromus inermis <sup>i</sup> (smooth brome)	Carex (sedge)	Elymus elymoides (squirreltail)	Hesperostipa comata (needle and thread)	Koeleria macrantha (prairie Junegrass)	Pascopyrum smithii (western wheatgrass)	Poa fendleriana (muttongrass)	Poa secunda (Sandberg bluegrass)	Pseudoroegneria spicata (bluebunch wheatgrass)
year	Nested Frequency									
2008	92	7	66	58	30	55	138	250	16	2
2009	14	-	106	3	-	-	128	191	8	8
2010	37	0	-	5	-	-	190	156	39	-
2013	56	2	146	16	69	14	197	173	23	1
2017	63	-	135	57	85	2	238	208	92	4
2022	116	-	158	38	31	-	194	137	79	20
year	Average Cover (%)									
2008	2.0	0.0	0.5	0.7	0.6	1.3	1.3	9.8	0.3	0.0
2009	0.2	-	2.1	0.1	-	-	2.5	6.3	0.2	0.5
2010	1.4	0.0	-	0.0	-	-	3.5	4.5	0.9	-
2013	1.9	0.0	1.0	0.1	1.9	0.4	2.2	4.4	0.4	0.0
2017	2.1	-	3.1	1.6	2.9	0.0	4.2	9.3	2.1	0.1
2022	3.2	-	3.2	1.3	0.8	-	3.3	2.9	2.2	0.4

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

**Table 16R-34.11 - Forb Species.** Nested frequency and modified Daubenmire average cover by year.

FORB SPECIES	Agoseris glauca (pale agoseris)	Androsace septentrionalis <sup>a</sup> (pygmyflower rockjasmine)	Antennaria (pussytoes)	Arabis (rockcress)	Astragalus (milkvetch)	Astragalus convallarius (lesser rushy milkvetch)	Astragalus utahensis (Utah milkvetch)	Calochortus nuttallii (sego lily)	Castilleja angustifolia (northwestern Indian paintbrush)	Castilleja linariifolia (Wyoming Indian paintbrush)	Chaenactis douglasii (Douglas' dustymaiden)	Chenopodium album <sup>a</sup> (lambsquarters)	Chenopodium leptophyllum <sup>a</sup> (narrowleaf goosefoot)	Collinsia parviflora <sup>a</sup> (maiden blue eyed Mary)	Comandra umbellata (bastard toadflax)	Crepis acuminata (tapertip hawkbeard)	Erigeron (fleabane)
year	Nested Frequency																
2008	-	-	7	5	-	47	-	-	-	53	4	-	-	28	72	5	139
2009	-	-	1	-	-	44	-	-	-	36	4	4	27	-	34	3	64
2010	10	-	2	4	-	41	-	-	5	28	2	9	61	1	29	9	64
2013	19	8	4	7	-	47	-	1	1	34	7	-	5	21	51	7	43
2017	1	1	5	9	2	17	-	-	-	19	-	-	4	3	68	6	51
2022	-	-	3	-	-	27	1	-	1	6	-	-	-	-	48	17	7
year	Average Cover (%)																
2008	-	-	0.0	0.0	-	1.6	-	-	-	1.9	0.1	-	-	0.0	0.5	0.1	1.9
2009	-	-	0.0	-	-	0.7	-	-	-	1.5	0.0	0.0	0.1	-	0.5	0.0	1.4
2010	0.4	-	0.0	0.1	-	0.8	-	-	0.1	0.9	0.0	0.0	0.2	0.0	0.2	0.3	1.5
2013	0.1	0.1	0.1	0.1	-	0.2	-	0.0	0.0	0.6	0.0	-	0.0	0.0	0.9	0.2	0.7
2017	0.0	0.0	0.2	0.2	0.0	0.2	-	-	-	0.4	-	-	0.0	0.0	1.1	0.1	0.6
2022	-	-	0.1	-	-	0.5	0.0	-	0.0	0.2	-	-	-	-	0.5	0.4	0.0

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

FORB SPECIES	Erigeron eatonii (Eaton's fleabane)	Erigeron pumilus (shaggy fleabane)	Eriogonum alatum (winged buckwheat)	Eriogonum racemosum (redroot buckwheat)	Eriogonum umbellatum (sulphur-flower buckwheat)	Gayophytum ramosissimum <sup>a</sup> (pinyon groundsmoke)	Heliomeris multiflora var. multiflora (showy goldeneye)	Ipomopsis aggregata (scarlet gilia)	Lappula occidentalis <sup>a</sup> (flatspine stickseed)	Lesquerella (bladderpod)	Linum perenne <sup>i</sup> (blue flax)	Lithospermum ruderale (western stone seed)	Lupinus (lupine)	Lupinus argenteus (silvery lupine)	Machaeranthera canescens (hoary tansyaster)	Microsteris gracilis <sup>a</sup> (slender phlox)	Orobanche (broomrape)
year	Nested Frequency																
2008	-	-	3	134	25	-	-	18	-	-	-	1	3	32	5	-	1
2009	-	-	-	57	43	7	1	3	-	5	12	-	-	8	0	-	-
2010	-	-	4	123	13	195	-	28	3	-	0	-	12	3	3	1	-
2013	-	-	-	139	27	68	-	9	-	-	1	1	-	27	8	22	-
2017	-	-	5	116	30	-	23	23	-	-	11	-	1	9	14	-	-
2022	65	5	-	122	22	-	-	15	-	-	1	-	-	8	-	-	-
year	Average Cover (%)																
2008	-	-	0.0	3.1	0.7	-	-	0.1	-	-	-	0.0	0.0	2.0	0.1	-	0.0
2009	-	-	-	0.6	0.8	0.0	0.1	0.1	-	0.0	0.0	-	-	0.5	0.0	-	-
2010	-	-	0.0	1.7	0.0	2.7	-	0.6	0.0	-	0.0	-	0.6	0.0	0.0	0.0	-
2013	-	-	-	1.3	0.1	0.1	-	0.1	-	-	0.0	0.0	-	0.8	0.0	0.1	-
2017	-	-	0.0	2.5	0.5	-	0.2	0.3	-	-	0.1	-	0.4	1.0	0.3	-	-
2022	0.9	0.0	-	2.3	0.2	-	-	0.4	-	-	0.0	-	-	0.0	-	-	-

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



FORB SPECIES	Packera multilobata (lobeleaf groundsel)	Penstemon comarrhenus (dusty beardtongue)	Penstemon watsonii (Watson's penstemon)	Petradoria pumila (rock goldenrod)	Polygonum douglasii <sup>a</sup> (Douglas' knotweed)	Sanguisorba minor <sup>i</sup> (small burnet)	Silene drummondii (Drummond's campion)	Symphyotrichum (aster)	Taraxacum officinale (common dandelion)	Trifolium (clover)	Zigadenus paniculatus (foothill deathcamas)
year	Nested Frequency										
2008	-	46	30	-	49	3	-	2	-	-	5
2009	3	-	25	-	2	-	-	-	-	-	-
2010	1	1	19	-	4	-	-	-	-	2	2
2013	4	18	13	-	17	-	-	2	-	2	1
2017	41	32	15	-	35	-	3	2	2	-	-
2022	2	21	15	13	8	-	-	-	-	-	-
year	Average Cover (%)										
2008	-	0.3	0.7	-	0.1	0.0	-	0.0	-	-	0.1
2009	0.0	-	0.3	-	0.0	-	-	-	-	-	-
2010	0.0	0.0	0.7	-	0.0	-	-	-	-	0.0	0.0
2013	0.0	0.1	0.4	-	0.0	-	-	0.0	-	0.0	0.0
2017	0.8	0.5	0.1	-	0.1	-	0.0	0.0	0.0	-	-
2022	0.0	0.4	0.4	0.1	0.0	-	-	-	-	-	-

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

**Table 16R-34.12 - Shrub and Tree Species.** Average modified Daubenmire quadrat and line intercept cover by year.

SHRUB SPECIES	Artemisia nova <sup>p</sup> (black sagebrush)	Artemisia tridentata ssp. vaseyana <sup>p</sup> (mountain big sagebrush)	Chrysothamnus depressus <sup>p</sup> (longflower rabbitbrush)	Chrysothamnus viscidiflorus (yellow rabbitbrush)	Chrysothamnus viscidiflorus ssp. viscidiflorus var. viscidiflorus (yellow rabbitbrush)	Ericameria nauseosa (rubber rabbitbrush)	Ericameria parryi (Parry's rabbitbrush)	Symphoricarpos oreophilus <sup>p</sup> (mountain snowberry)	Tetradymia canescens (spineless horsebrush)
year	Line Intercept Cover (%)								
2008	-	32.1	-	1.8	3.7	-	-	-	-
2009	-	3.7	-	0.5	2.7	-	-	0.3	0.1
2010	-	5.6	-	0.4	5.8	-	-	0.4	0.1
2013	-	10.6	-	0.7	6.2	-	-	0.6	0.2
2017	0.2	16.8	-	0.6	7.2	-	-	0.7	0.1
2022	3.6	21.8	-	2	4.3	-	-	0.1	0.1
year	Quadrat Cover (%)								
2008	-	24.5	-	1.5	2.5	-	-	0.0	-
2009	-	5.1	-	1.1	3.1	0.0	-	0.1	0.3
2010	-	6.2	-	2.3	4.1	-	-	0.4	0.3
2013	-	7.4	-	1.0	5.4	0.0	-	0.4	0.3
2017	0.4	14.9	-	2.1	5.9	-	0.0	0.5	0.5
2022	2.8	13.5	0.0	2.3	5.0	-	-	0.4	0.5

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

**Table 16R-34.13 - Shrub/Tree Characteristics.** Population characteristics of shrub/tree species populations including density reproduction (seedlings), age distribution, utilization, vigor and average size (height/crown) of plants.

Year	Density		Age Class Distribution			Utilization		Poor Vigor (%)	Average Height Crown (cm)
	Plants Per Acre		Excluding Seedlings			Moderate (%)	Heavy (%)		
	Excluding Seedlings	Seedling	Young (%)	Mature (%)	Decadent (%)				
<b>Amelanchier utahensis<sup>P</sup> -- (Utah serviceberry)</b>									
2008	-	-	-	-	-	-	-	-	-/-
2009	-	-	-	-	-	-	-	-	-/-
2010	-	-	-	-	-	-	-	-	-/-
2013	-	-	-	-	-	-	-	-	-/-
2017	-	-	-	-	-	-	-	-	43/48
2022	100	-	20	80	0	0	20	0	-/-
<b>Artemisia nova<sup>P</sup> -- (black sagebrush)</b>									
2008	-	-	-	-	-	-	-	-	-/-
2009	-	-	-	-	-	-	-	-	23/17
2010	-	-	-	-	-	-	-	-	-/-
2013	-	-	-	-	-	-	-	-	-/-
2017	220	-	0	100	0	0	0	0	18/37
2022	1720	-	42	54	5	5	12	17	-/-
<b>Artemisia tridentata ssp. vaseyana<sup>P</sup> -- (mountain big sagebrush)</b>									
2008	8420	180	6	53	41	16	1	8	46/76
2009	-	-	-	-	-	-	-	-	31/38
2010	5200	60	17	75	9	8	0	7	34/47
2013	5340	960	20	72	8	27	5	21	33/45
2017	9980	1240	40	57	3	10	0	3	31/53
2022	7320	40	9	79	12	42	5	17	-/-
<b>Chrysothamnus depressus<sup>P</sup> -- (longflower rabbitbrush)</b>									
2008	-	-	-	-	-	-	-	-	-/-
2009	-	-	-	-	-	-	-	-	-/-
2010	-	-	-	-	-	-	-	-	-/-
2013	-	-	-	-	-	-	-	-	-/-
2017	-	-	-	-	-	-	-	-	-/-
2022	40	-	0	100	0	0	0	0	-/-
<b>Chrysothamnus viscidiflorus -- (yellow rabbitbrush)</b>									
2008	3060	-	1	95	4	0	1	0	12/26
2009	-	-	-	-	-	-	-	-	18/27
2010	980	20	8	92	0	0	0	0	18/33
2013	500	-	0	100	0	0	0	0	11/28
2017	1380	-	7	93	0	0	0	4	17/33
2022	2540	80	9	89	2	20	2	7	-/-
<b>Chrysothamnus viscidiflorus ssp. viscidiflorus var. viscidiflorus -- (yellow rabbitbrush)</b>									
2008	5520	-	25	71	4	0	0	1	23/31
2009	-	-	-	-	-	-	-	-	20/27
2010	5680	80	13	87	0	0	0	0	22/33
2013	5420	100	9	90	2	7	2	6	26/35
2017	5640	-	7	91	2	0	0	3	29/39
2022	5260	-	6	83	11	0	0	12	-/-
<b>Ericameria nauseosa -- (rubber rabbitbrush)</b>									
2008	-	-	-	-	-	-	-	-	-/-
2009	-	-	-	-	-	-	-	-	24/35
2010	-	-	-	-	-	-	-	-	-/-
2013	60	-	0	100	0	33	0	0	17/34
2017	-	-	-	-	-	-	-	-	35/47
2022	-	-	-	-	-	-	-	-	-/-

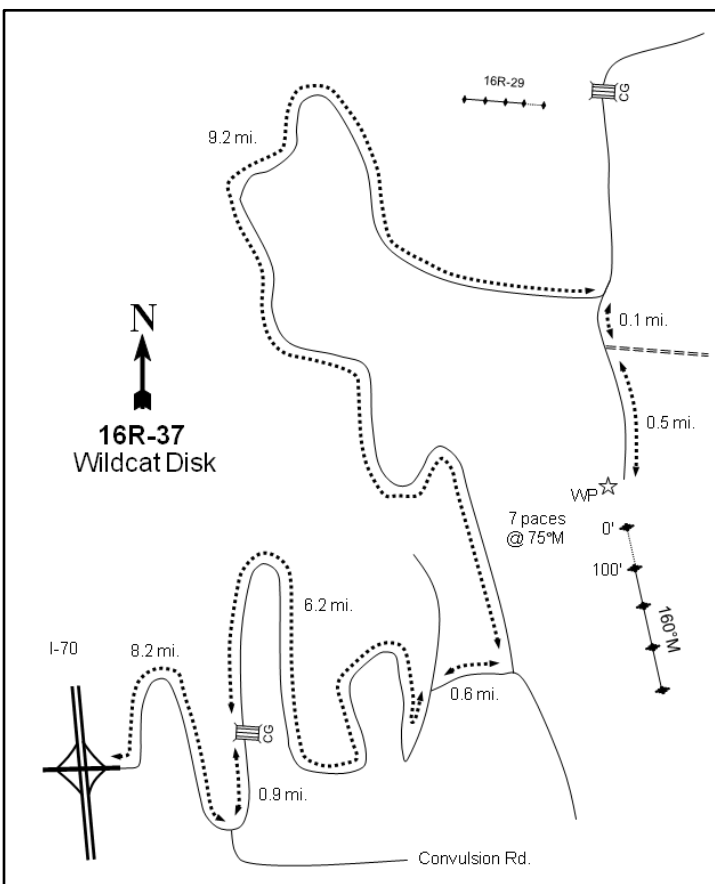
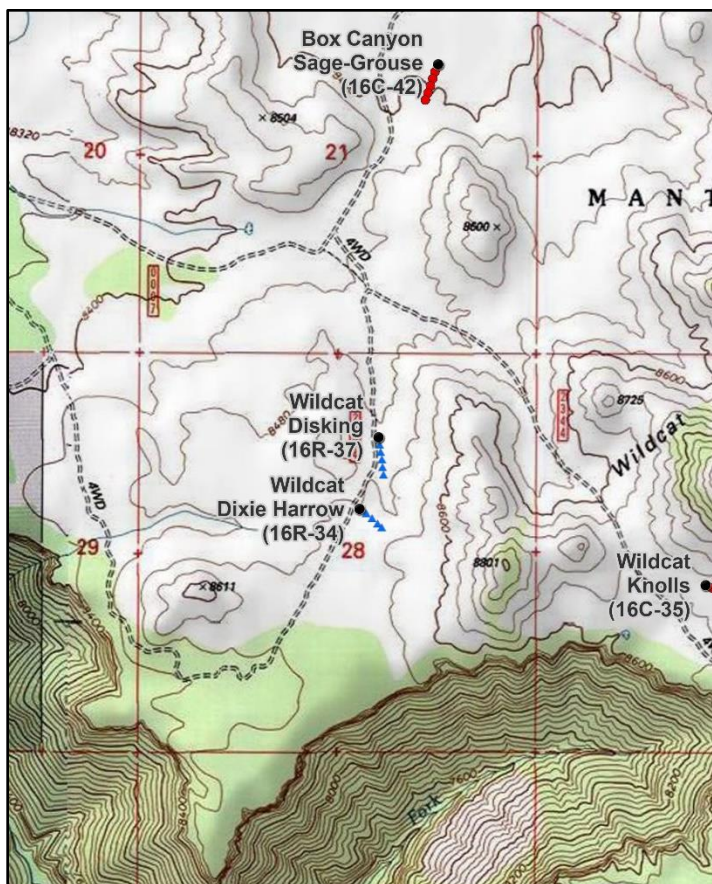
Year	Density		Age Class Distribution			Utilization		Poor Vigor (%)	Average Height Crown (cm)
	Plants Per Acre		Excluding Seedlings			Moderate (%)	Heavy (%)		
	Excluding Seedlings	Seedling	Young (%)	Mature (%)	Decadent (%)				
<b>Ericameria parryi -- (Parry's rabbitbrush)</b>									
2008	-	-	-	-	-	-	-	-	-/-
2009	-	-	-	-	-	-	-	-	-/-
2010	-	-	-	-	-	-	-	-	-/-
2013	-	-	-	-	-	-	-	-	-/-
2017	20	-	0	100	0	0	0	0	25/47
2022	120	-	0	100	0	0	0	0	- / -
<b>Gutierrezia sarothrae -- (broom snakeweed)</b>									
2008	-	-	-	-	-	-	-	-	-/-
2009	-	-	-	-	-	-	-	-	-/-
2010	-	-	-	-	-	-	-	-	28/34
2013	-	-	-	-	-	-	-	-	-/-
2017	-	-	-	-	-	-	-	-	-/-
2022	-	-	-	-	-	-	-	-	-/-
<b>Rosa woodsii<sup>p</sup> -- (Woods' rose)</b>									
2008	-	-	-	-	-	-	-	-	-/-
2009	-	-	-	-	-	-	-	-	13/14
2010	-	-	-	-	-	-	-	-	-/-
2013	-	-	-	-	-	-	-	-	-/-
2017	-	-	-	-	-	-	-	-	23/13
2022	-	-	-	-	-	-	-	-	-/-
<b>Symphoricarpos oreophilus<sup>p</sup> -- (mountain snowberry)</b>									
2008	60	20	67	33	0	0	0	0	30/55
2009	-	-	-	-	-	-	-	-	24/25
2010	620	20	19	81	0	0	0	0	23/40
2013	560	-	0	100	0	21	0	0	36/45
2017	420	-	14	86	0	10	0	0	44/75
2022	620	-	16	52	32	0	7	39	- / -
<b>Tetradymia canescens -- (spineless horsebrush)</b>									
2008	-	-	-	-	-	-	-	-	24/36
2009	-	-	-	-	-	-	-	-	14/15
2010	440	180	27	73	0	0	0	0	19/28
2013	480	-	21	79	0	38	0	0	13/27
2017	500	-	28	68	4	8	0	8	17/23
2022	440	-	9	73	18	0	0	18	- / -

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

**Table 16R-34.15 - Deer Desirable Components Index: Mountain 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	2.7	2.9	30.0	0.0	10.0	0.0	75.6	Good
2009	4.9	0.0	0.0	23.6	0.0	10.0	0.0	38.5	Very Poor-Poor
2010	7.4	12.6	8.5	20.7	0.0	10.0	0.0	59.3	Fair
2013	13.9	12.7	9.4	24.9	0.0	10.0	0.0	70.8	Fair-Good
2017	22.0	14.0	15.0	30.0	0.0	10.0	0.0	91.0	Good-Excellent
2022	30.0	11.7	7.0	30.0	0.0	10.0	0.0	88.7	Good-Excellent

## WILDCAT DISKING - STUDY NO. 16R-37



### Location Information

USGS 7.5 min Map Info  
GPS (0' Stake)

Emery West NW; Township 21S, Range 5E, Section 28  
NAD 83 UTM ZONE 12, 468707 East 4312960 North

### Transect Information

Browse Tag # (0' Stake)	672
Transect Bearing	160° magnetic
Length	500ft
Belt Placement	Read baseline, No belts
Belt Marker Placement	No Rebar

### Directions to Site

From Exit 73 on I-70, drive for 8.2 miles, then turn onto a road on the left. Continue for 0.9 miles, following signs to Duncan Mountain. On Convulsion Road, drive for 6.2 miles to a fork. Go right and proceed for 0.6 miles to another fork. Proceed to the left, then continue for 9.2 miles to a two-track road on the right. Drive for 0.1 miles on the two-track to a fork and go right. Continue for 0.3 miles to the witness post on the right (west) side of the road. Walk for 7 paces at 75 degrees magnetic to the 0-foot stake.

**Site Information**

Land Ownership	Federal
Land Administrator	USFS
Allotment	EMERY
Elevation	8,425ft (2,568m)
Aspect	North
Slope	3%
Sample Dates	08/12/2009, 06/23/2010, 07/01/2013, 08/14/2017, 07/06/2022

**Table 16R-37.1 Disturbance History.** Recorded history of major disturbances.

Treatment/Disturbance	Name	WRI DB#	Date	Size (acres)
Disk - Two-Way	Wildcat Knolls Habitat Improvement	1161	September-November 2008	375
Seeding - Broadcast Before	Wildcat Knolls Habitat Improvement	1161	September-November 2008	810
Seeding - Rangeland Drill	Wildcat Sagebrush Restoration Project Phase II	1392	September 2009	466

**Table 16R-37.2 Seed Mix.** List of known seeded plant species and rates (if available).

Mix Name			Application Type	Application Date	Acres
Wildcat Knolls Habitat Improvement			Broadcast	Oct 2008	1000
Type	Species	Common Name	Cultivar/Source ID	Bulk lbs/acre	PLS
G	<i>Elymus elymoides</i>	Bottlebrush Squirreltail	Toe Jam	0.50	0.42
G	<i>Elymus trachycaulus</i>	Slender Wheatgrass	San Luis	1.05	0.89
G	<i>Elymus trachycaulus</i>	Slender Wheatgrass	San Luis	0.98	0.88
G	<i>Leymus cinereus</i>	Great Basin Wildrye	Trailhead	1.00	0.91
G	<i>Pascopyrum smithii</i>	Western Wheatgrass	Arriba	1.00	0.94
G	<i>Poa secunda</i>	Sandberg Bluegrass	Toole MT	1.00	0.84
F	<i>Achillea millefolium</i>	Western Yarrow		0.10	0.10
F	<i>Astragalus cicer</i>	Cicer Milkvetch	Lutana	1.00	0.76
F	<i>Hedysarum boreale</i>	Utah Sweetvetch		0.25	0.22
F	<i>Hedysarum boreale</i> ssp. <i>boreale</i> var. <i>boreale</i>	Utah Sweetvetch		0.25	0.22
F	<i>Heliomeris multiflora</i>	Showy Goldeneye	Sanpete UT	0.03	0.02
F	<i>Lactuca serriola</i>	Prickly Lettuce		0.14	0.11
F	<i>Linum perenne</i>	Blue Flax	Appar	0.20	0.18
F	<i>Linum perenne</i>	Blue Flax	Appar	0.27	0.22
F	<i>Linum perenne</i>	Blue Flax	Appar	0.54	0.48
F	<i>Penstemon strictus</i>	Rocky Mountain Penstemon	Bandera	0.02	0.01
F	<i>Penstemon strictus</i>	Rocky Mountain Penstemon	Bandera	0.05	0.05
F	<i>Sanguisorba minor</i>	Small Burnet	Delar	1.50	1.39
S	<i>Artemisia tridentata</i> ssp. <i>vaseyana</i>	Mountain Big Sagebrush	Sanpete UT	0.22	0.04
S	<i>Artemisia tridentata</i> ssp. <i>vaseyana</i>	Mountain Big Sagebrush	Sevier/Wayne UT	0.28	0.08

Mix Name			Application Type	Application Date	Acres
Wildcat Sagebrush Restoration Project Phase 2			Drill	Sep 2009	500
Type	Species	Common Name	Cultivar/Source ID	Bulk lbs/acre	PLS
G	<i>Elymus elymoides</i>	Bottlebrush Squirreltail	Toe Jam	0.50	0.43
G	<i>Elymus trachycaulus</i>	Slender Wheatgrass	San Luis	2.00	1.93
G	<i>Leymus cinereus</i>	Great Basin Wildrye	Trailhead	1.00	0.85
G	<i>Pascopyrum smithii</i>	Western Wheatgrass	Arriba	1.00	0.87
G	<i>Poa secunda</i>	Sandberg Bluegrass	Toole MT	0.75	0.63
F	<i>Achillea millefolium</i>	Western Yarrow		0.10	0.09
F	<i>Astragalus cicer</i>	Cicer Milkvetch	Lutana	1.00	0.97
F	<i>Hedysarum boreale</i>	Utah Sweetvetch	Timp	0.25	0.19
F	<i>Hedysarum boreale</i> ssp. <i>boreale</i> var. <i>boreale</i>	Utah Sweetvetch	Timp	0.25	0.19
F	<i>Heliomeris multiflora</i>	Showy Goldeneye		0.03	0.02
F	<i>Lactuca serriola</i>	Prickly Lettuce		0.10	0.09
F	<i>Linum perenne</i>	Blue Flax	Appar	1.00	0.87
F	<i>Penstemon strictus</i>	Rocky Mountain Penstemon	Bandera	0.10	0.08
F	<i>Sanguisorba minor</i>	Small Burnet	Delar	1.50	1.39

Mix Name			Application Type	Application Date	Acres
Wildcat Sagebrush Restoration Project Phase 2 - Sagebrush			Drill	Sep 2009	500
Type	Species	Common Name	Cultivar/Source ID	Bulk lbs/acre	PLS
S	<i>Artemisia tridentata</i> ssp. <i>vaseyana</i>	Mountain Big Sagebrush	Sanpete UT	0.50	0.09

### Wildlife Habitat and Vegetation History

**Table 16R-37.3 - Wildlife Seasonal Habitat.** DWR 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

**Table 16R-37.4 - Vegetation History.** The dominant vegetation type(s) and phase of woodland succession (Tausch, Miller, Roundy, & Chambers, 2009).

Year	Vegetation Type	Woodland Succession
2009	Annual Forb	No Encroachment
2010	Annual Forb	No Encroachment
2013	Perennial Grass	No Encroachment
2017	Perennial Grass	No Encroachment
2022	Perennial Grass	No Encroachment

### Site Notes

Sage-grouse pellets were found on the site in 2010 and cattle use was high in 2013 (Table 16R-37.9).

### Site Potential

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

In 2009, this site was an annual forb plant community that was disked prior to study establishment in order to improve the plant community for sage-grouse (Table 16R-37.1). The dominant species in 2009 and 2010 was narrowleaf goosefoot (*Chenopodium leptophyllum*) (Table 16R-37.11). In 2013, the site was dominated by perennial grasses with squirreltail (*Elymus elymoides*) contributing the most cover. In 2017 and 2022, western wheatgrass (*Pascopyrum smithii*) and crested wheatgrass (*Agropyron cristatum*) were co-dominant (Table 16R-37.10). The forb community has remained diverse and abundant in the years following treatment (Table 16R-37.11). Mountain big sagebrush (*Artemisia tridentata* ssp. *vaseyana*) has been sparse, but is becoming more prevalent with much of the sagebrush population being represented by young plants; sagebrush seedlings were observed for the first time in 2022 (Table 16R-37.12, Table 16R-36.13). It is possible that heavy grazing will cause a shift in the plant community and allow crested wheatgrass to increase further due to the grazing tolerance of this plant.

## Trend Summary Tables

**Table 16R-37.6 - Shrub/Tree Summary.** Average modified Daubenmire quadrat and line intercept cover by year for shrubs/trees

Year	Quadrat Cover (%)			Line-intercept Cover (%)		
	Preferred Shrub	Other Shrub	Tree	Preferred Shrub	Other Shrub	Tree
2009	-	-	-	-	-	-
2010	-	-	-	-	-	-
2013	0.1	-	-	0.1	-	-
2017	1.0	-	-	0.3	-	-
2022	1.1	0.0	-	0.4	-	-

**Table 16R-37.7 - Herbaceous Summary.** Nested frequency and average modified Daubenmire quadrat cover by year for herbaceous functional groups

Year	Nested Frequency				Quadrat Cover (%)			
	Annual Grass	Perennial Grass	Annual/Biennial Forb	Perennial Forb	Annual Grass	Perennial Grass	Annual/Biennial Forb	Perennial Forb
2009	-	226	276	159	-	4.7	24.6	1.8
2010	3	168	411	124	0.0	1.2	30.4	0.6
2013	6	353	208	149	0.0	22.2	2.6	4.1
2017	-	428	112	215	-	33.5	2.4	6.8
2022	2	424	64	38	0.0	36.2	0.9	0.3

**Table 16R-37.8 - Basic Ground Cover.** Average modified Daubenmire quadrat cover by year for basic ground cover types.

Year	Cover Type (%)					
	Bare Ground	Cryptogams	Litter	Pavement	Rock	Vegetation
2009	59.7	-	23.9	0.0	0.1	27.7
2010	72.3	-	12.2	-	0.1	31.4
2013	46.0	-	27.1	-	0.0	36.3
2017	32.4	-	34.4	0.0	0.2	46.5
2022	51.3	-	20.4	0.8	0.1	38.9

**Table 16R-37.9 - Pellet Group Data.** Quadrat frequency and pellet group transect data for animal pellets. Rabbit pellet groups are not sampled in the pellet group transect.

Year	Cattle	Mule Deer	Rocky Mountain Elk	Greater Sage-Grouse	Rabbit
	Quadrat Frequency				
2009	4	6	8	-	3
2010	-	1	14	-	3
2013	8	1	17	-	19
2017	8	6	10	-	32
2022	37	11	5	-	13
Days Use Per Acre (ha)					
2009	8.7 (21.5)	-	6.0 (14.9)	-	-
2010	-	1.3 (3.3)	10.7 (26.5)	34.9 (86.1)*	-
2013	40.6 (100.4)	4.7 (11.6)	24.8 (61.2)	-	-
2017	31.2 (77.1)	2.0 (5.0)	14.1 (34.8)	-	-
2022	28.3 (69.9)	1.3 (3.3)	2.0 (5.0)	8.7 (21.5)*	-

\*Pellets per acre (ha)



**Table 16R-37.10 - Grass Species.** Nested frequency and modified Daubenmire average cover by year.

GRASS SPECIES	Nested Frequency												
Agropyron cristatum <sup>i</sup> (crested wheatgrass)	72	27	-	-	-	6	-	-	-	148	2	10	-
Bromus inermis <sup>i</sup> (smooth brome)	34	17	-	3	-	-	-	-	-	135	6	12	-
Bromus marginatus (mountain brome)	107	53	12	6	-	119	58	9	23	130	21	104	10
Bromus tectorum <sup>ai</sup> (cheatgrass)	208	79	-	-	-	4	44	-	3	269	47	117	-
Carex (sedge)	242	71	-	2	1	16	-	-	2	311	-	227	-
Elymus elymoides (squirreltail)													
Elymus trachycaulus (slender wheatgrass)													
Koeleria macrantha (prairie Junegrass)													
Leymus cinereus (basin wildrye)													
Pascopyrum smithii (western wheatgrass)													
Poa fendleriana (muttongrass)													
Poa secunda (Sandberg bluegrass)													
Pseudoroegneria spicata (bluebunch wheatgrass)													
year	Average Cover (%)												
2009	0.5	0.7	-	-	-	0.0	-	-	-	3.3	0.0	0.1	-
2010	0.1	0.2	-	0.0	-	-	-	-	-	0.8	0.0	0.0	-
2013	4.2	2.9	0.2	0.0	-	5.0	1.8	0.3	1.9	2.8	0.4	1.8	1.1
2017	12.7	4.2	-	-	-	0.1	0.7	-	0.2	11.2	1.3	3.2	-
2022	14.6	1.9	-	0.0	0.0	0.4	-	-	0.0	9.4	-	9.8	-

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

**Table 16R-37.11 - Forb Species.** Nested frequency and modified Daubenmire average cover by year.

FORB SPECIES	Nested Frequency																
Achillea millefolium (Common yarrow)	-	-	-	5	-	-	262	-	-	-	1	-	-	-	-	-	-
Agoseris glauca (pale agoseris)	3	2	-	1	-	1	398	-	2	36	-	-	-	-	4	38	-
Arabis (rockcress)	12	1	-	69	-	1	22	-	5	-	-	14	2	5	-	30	6
Astragalus agrestis (purple milkvetch)	21	4	1	45	-	-	-	122	-	-	1	56	8	-	3	-	12
Astragalus cibirius (browse milkvetch)	-	-	-	21	1	-	-	-	-	-	-	16	9	0	3	-	-
Calochortus nuttallii (sego lily)																	
Chenopodium leptophyllum <sup>a</sup> (narrowleaf goosefoot)																	
Cirsium (thistle)																	
Collinsia parviflora <sup>a</sup> (maiden blue eyed Mary)																	
Comandra umbellata (bastard toadflax)																	
Crepis acuminata (tapertip hawkbeard)																	
Descurainia pinnata <sup>a</sup> (western tansymustard)																	
Dracocephalum parviflorum (American dragonhead)																	
Eriogonum racemosum (redroot buckwheat)																	
Eriogonum umbellatum (sulphur-flower buckwheat)																	
Gayophytum ramosissimum <sup>a</sup> (pinyon groundsmoke)																	
Helioteris multiflora var. multiflora (showy goldeneye)																	
year	Average Cover (%)																
2009	-	-	-	0.0	-	-	24.0	-	-	-	0.0	-	-	-	-	-	-
2010	0.0	0.0	-	0.0	-	0.0	22.7	-	0.0	0.3	-	-	-	-	0.0	0.4	-
2013	0.0	0.0	-	1.4	-	0.0	0.2	-	0.0	-	-	0.0	0.2	0.0	-	0.1	0.1
2017	1.9	0.2	0.0	1.1	-	-	-	0.3	-	-	0.0	1.6	0.1	-	0.0	-	0.4
2022	-	-	-	0.1	0.0	-	-	-	-	-	-	0.3	0.2	0.0	0.0	-	-

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

FORB SPECIES	Nested Frequency															
year	Average Cover (%)															
Ipomopsis aggregata (scarlet gilia)	-	3	-	150	-	-	-	-	-	48	12	-	-	-	-	
Lactuca serriola <sup>ai</sup> (prickly lettuce)	-	38	74	6	9	-	147	-	-	33	-	-	-	81	12	
Lappula occidentalis <sup>a</sup> (flatspine stickseed)	3	5	176	86	-	-	15	2	31	5	-	-	17	-	6	
Linum perenne <sup>i</sup> (blue flax)	-	-	2	43	-	1	66	3	33	5	-	7	15	1	-	
Lithophragma (woodland-star)	-	-	38	2	-	-	22	-	-	-	-	2	3	-	-	
Machaeranthera canescens (hoary tansyaster)	Nest Frequency															
Monolepis nuttalliana <sup>a</sup> (Nuttall's povertyweed)	Average Cover (%)															
Penstemon pachyphylus (thickleaf beardtongue)	-	-	-	-	-	-	-	-	-	0.5	0.0	-	-	-	-	
Penstemon strictus (Rocky Mountain penstemon)	-	-	-	-	-	-	5.8	-	-	0.2	-	-	-	0.2	0.0	
Polygonum douglasii <sup>a</sup> (Douglas' knotweed)	0.0	0.0	1.7	1.7	-	-	0.2	0.0	0.6	0.0	-	-	0.3	-	0.0	
Sanguisorba minor <sup>i</sup> (small burnet)	-	-	0.0	0.6	-	0.0	0.4	0.0	2.1	0.0	-	0.1	0.4	0.0	-	
Taraxacum officinale (common dandelion)	-	-	0.2	0.0	-	-	0.3	-	-	-	-	0.0	0.1	-	-	
Tragopogon dubius <sup>ai</sup> (yellow salsify)	Nest Frequency															
Trifolium (clover)	Average Cover (%)															
Zigadenus paniculatus (foothill deathcamas)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	

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

**Table 16R-37.12 - Shrub and Tree Species.** Average modified Daubenmire quadrat and line intercept cover by year.

SHRUB SPECIES	Line Intercept	
Artemisia tridentata ssp. vaseyana <sup>p</sup> (mountain big sagebrush)	-	-
Ericameria nauseosa (rubber rabbitbrush)	-	-
year	Quadrat Cover (%)	
2009	0.1	-
2010	0.3	-
2013	0.4	-
2017	-	-
2022	-	-
year	Quadrat Cover (%)	
2009	0.1	-
2010	1.0	-
2013	1.1	0.0
2017	-	-
2022	-	-

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

**Table 16R-37.13 - Shrub/Tree Characteristics.** Population characteristics of shrub/tree species populations including density reproduction (seedlings), age distribution, utilization, vigor and average size (height/crown) of plants.

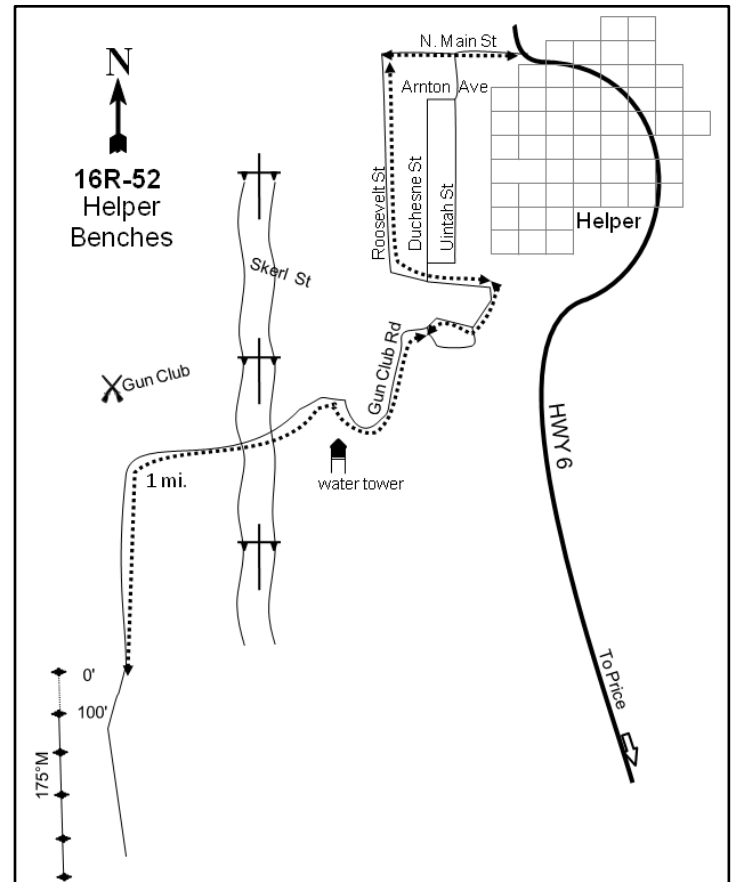
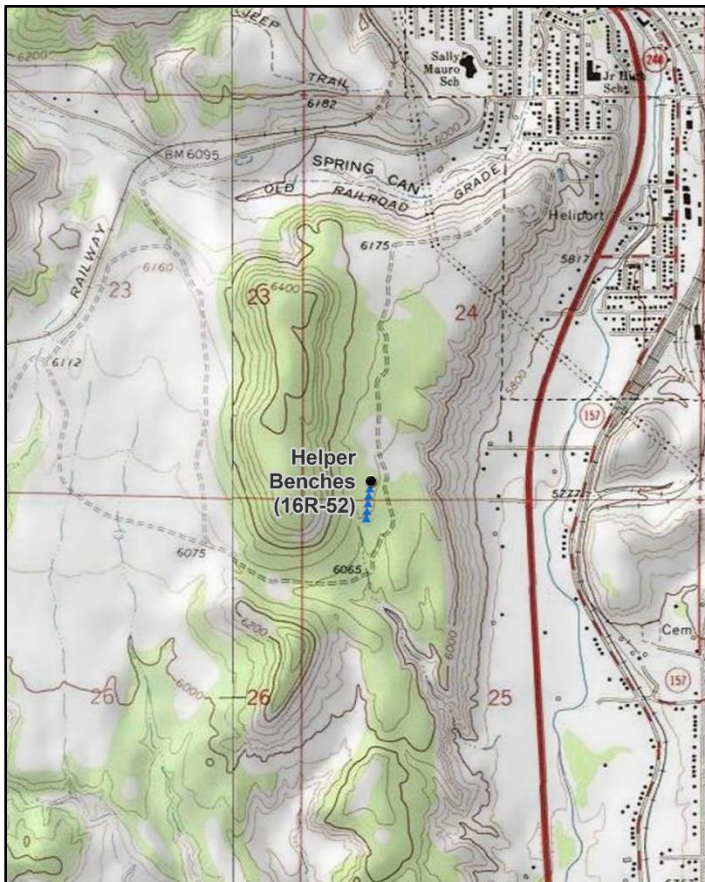
Year	Density		Age Class Distribution			Utilization		Poor Vigor (%)	Average Height Crown (cm)
	Plants Per Acre		Excluding Seedlings			Moderate (%)	Heavy (%)		
	Excluding Seedlings	Seedling	Young (%)	Mature (%)	Decadent (%)				
<b>Artemisia tridentata ssp. vaseyana<sup>p</sup> -- (mountain big sagebrush)</b>									
2009	-	-	-	-	-	-	-	-	-/-
2010	-	-	-	-	-	-	-	-	-/-
2013	320	-	88	13	0	25	0	0	24/26
2017	500	-	32	68	0	20	4	0	25/41
2022	1160	160	66	21	14	16	2	26	-/-
<b>Chrysothamnus viscidiflorus ssp. viscidiflorus var. viscidiflorus -- (yellow rabbitbrush)</b>									
2009	-	-	-	-	-	-	-	-	-/-
2010	-	-	-	-	-	-	-	-	12/15
2013	-	-	-	-	-	-	-	-	-/-
2017	20	-	0	100	0	0	0	0	22/33
2022	-	-	-	-	-	-	-	-	-/-
<b>Ericameria nauseosa -- (rubber rabbitbrush)</b>									
2009	-	-	-	-	-	-	-	-	41/31
2010	-	-	-	-	-	-	-	-	35/25
2013	-	-	-	-	-	-	-	-	60/114
2017	-	-	-	-	-	-	-	-	61/75
2022	20	-	0	0	100	0	0	100	-/-

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

**Table 16R-37.15 - Deer Desirable Components Index: Mountain 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
2009	0.0	0.0	0.0	9.4	0.0	3.5	0.0	12.9	Very Poor
2010	0.0	0.0	0.0	2.4	0.0	1.3	0.0	3.6	Very Poor
2013	0.1	0.0	0.0	30.0	0.0	8.2	0.0	38.3	Very Poor-Poor
2017	0.4	0.0	0.0	30.0	0.0	10.0	0.0	40.4	Very Poor-Poor
2022	0.5	0.0	0.0	30.0	0.0	0.7	0.0	31.1	Very Poor

## HELPER BENCHES - STUDY NO. 16R-52

**Location Information**

USGS 7.5 min Map Info  
GPS (0' Stake)

Helper SW; Township 13S, Range 9E, Section 24  
NAD 83 UTM ZONE 12, 511228 East 4391631 North

**Transect Information**

Browse Tag # (0' Stake)	670
Transect Bearing	173° magnetic
Length	500ft
Belt Placement	Line 1 (11ft), Line 2 (34ft), Line 3 (59ft), Line 4 (71ft), Line 5 (95ft)
Belt Marker Placement	Belt 3: 4 ft

**Directions to Site**

Traveling west out of Price on Highway 6, take exit 232 in Helper. Follow Main Street and turn left (south) onto Roosevelt Street, then take Roosevelt Street to Gun Club Road. Follow Gun Club Road for approximately 1 mile. The site will be on the right (west) side of the road.

**Site Information**

Land Ownership	State
Land Administrator	SITLA
Allotment	No data
Elevation	6,132ft (1,869m)
Aspect	Northeast
Slope	3-5%
Sample Dates	08/28/2014, 08/17/2017, 07/20/2022

**Table 16R-52.1 Disturbance History.** Recorded history of major disturbances.

Treatment/Disturbance	Name	WRI DB#	Date	Size (acres)
Chaining - Two-Way Ely	Helper Benches Pinyon/Juniper Removal	3006	October 2014	241
Seeding - Aerial Before	Helper Benches Pinyon/Juniper Removal	3006	October 2014	241

**Table 16R-52.2 Seed Mix.** List of known seeded plant species and rates (if available).

Mix Name			Application Type	Application Date	Acres
Helper Benches			Aerial	Oct 2014	308
Type	Species	Common Name	Cultivar/Source ID	Bulk lbs/acre	PLS
G	Achnatherum hymenoides	Indian Ricegrass	Nezpar	1.14	1.02
G	Agropyron fragile	Siberian Wheatgrass	Vavilov	0.49	0.43
G	Elymus lanceolatus	Thickspike Wheatgrass	Critana	0.65	0.56
G	Poa secunda	Canby Bluegrass	Canbar	0.65	0.50
F	Achillea millefolium	Western Yarrow	Lincoln WA	0.10	0.09
F	Cleome serrulata	Rocky Mountain Beeplant	Utah UT	0.49	0.43
F	Helianthus annuus	Annual Sunflower	Montezuma CO	0.32	0.30
F	Linum perenne	Blue Flax	Appar	0.97	0.82
F	Medicago sativa	Alfalfa	Ranger NC	1.30	1.16
F	Medicago sativa	Yellow Sweetclover		0.49	0.46
F	Penstemon palmeri	Palmer Penstemon	Carbon/Emery UT	0.29	0.23
F	Sanguisorba minor	Small Burnet		1.46	1.21
S	Atriplex canescens	Fourwing Saltbush	Carbon/Emery UT	1.14	0.50

Mix Name			Application Type	Application Date	Acres
Helper Benches Sagebrush			Aerial	Dec 2014	308
Type	Species	Common Name	Cultivar/Source ID	Bulk lbs/acre	PLS
F	Medicago sativa	Alfalfa	Ladak +	0.32	0.30
S	Artemisia tridentata ssp. wyomingensis	Wyoming Big Sagebrush	Sanpete UT	0.59	0.10
S	Bassia prostrata	Forage Kochia	Beaver UT	0.57	0.42

**Wildlife Habitat and Vegetation History****Table 16R-52.3 - Wildlife Seasonal Habitat.** DWR wildlife habitat and seasonality.

Species	Habitat	Season
Mule Deer	crucial	winter

**Table 16R-52.4 - Vegetation History.** The dominant vegetation type(s) and phase of woodland succession (Tausch, Miller, Roundy, & Chambers, 2009).

Year	Vegetation Type	Woodland Succession
2014	Pinyon-Juniper	Phase III
2017	Annual Forb/Perennial Grass	Phase I
2022	Perennial Grass	Phase I

**Site Notes**

No Notes

**Site Potential**

1981 - 2010 Average Annual Precipitation	11 inches
NRCS Ecological Site	Semidesert Stony Loam (Wyoming Big Sagebrush)
NRCS Ecological Site #	R034BY241UT
States and Transitions	No state and transition model is available for the above ecological site.

This site was established in 2014 and was dominated by twoneedle pinyon (*Pinus edulis*) and Utah juniper (*Juniperus osteosperma*) (Photos, Table 16R-52.6, Table 16R-20.12, Table 16R-52.13). Prior to treatment, there was little cover of grasses, forbs, or shrubs. Following the 2014 chaining and seeding treatment (Table 16R-52.1), the site was dominated primarily by annual forbs in 2017 (Table 16R-52.7). Forb cover is moderate as of 2022, but the diversity is fairly low; the most abundant forb of any single species has been the introduced species prickly Russian thistle (*Salsola tragus*) in both post-treatment sample years (Table 16R-52.11). There has been some establishment of perennial grasses, with Siberian wheatgrass (*Agropyron fragile*) being the dominant species (Table 16R-52.10). The browse species that have contributed the most cover following treatment include the seeded species fourwing saltbush (*Atriplex canescens*) and forage kochia (*Bassia prostrata*) (Table 16R-52.2, Table 16R-52.12). Tree cover decreased significantly post-treatment (Table 16R-52.14). However, trees that are still present on the site indicate that there may be potential for infilling in the future.

**Trend Summary Tables****Table 16R-52.6 - Shrub/Tree Summary.** Average modified Daubenmire quadrat and line intercept cover by year for shrubs/trees

Year	Quadrat Cover (%)			Line-intercept Cover (%)		
	Preferred Shrub	Other Shrub	Tree	Preferred Shrub	Other Shrub	Tree
2014	-	0.4	8.5	-	0.1	29.3
2017	0.8	-	1.8	0.5	-	2.3
2022	1.3	0.3	0.0	1.9	0.3	0.2

**Table 16R-52.7 - Herbaceous Summary.** Nested frequency and average modified Daubenmire quadrat cover by year for herbaceous functional groups

Year	Nested Frequency				Quadrat Cover (%)			
	Annual Grass	Perennial Grass	Annual/Biennial Forb	Perennial Forb	Annual Grass	Perennial Grass	Annual/Biennial Forb	Perennial Forb
2014	-	1	-	25	-	0.0	-	0.1
2017	13	149	382	132	0.3	6.6	16.4	4.9
2022	16	209	135	139	0.4	11.6	3.8	4.7

**Table 16R-52.8 - Basic Ground Cover.** Average modified Daubenmire quadrat cover by year for basic ground cover types.

Year	Cover Type (%)					
	Bare Ground	Cryptogams	Litter	Pavement	Rock	Vegetation
2014	23.0	0.4	43.4	21.6	11.3	9.4
2017	12.3	-	43.7	18.0	8.1	30.7
2022	29.4	0.3	49.9	12.3	11.9	17.9

**Table 16R-52.9 - Pellet Group Data.** Quadrat frequency and pellet group transect data for animal pellets. Rabbit pellet groups are not sampled in the pellet group transect.

Year	Cattle	Mule Deer	Rocky Mountain Elk	Rabbit
	Quadrat Frequency			
2014	-	58	-	7
2017	-	26	1	20
2022	-	26	20	1
Year	Days Use Per Acre (ha)			
2014	-	71.7 (177.1)	-	-
2017	0.7 (1.8)	66.4 (163.9)	14.7 (36.4)	-
2022	-	37.5 (92.7)	59.6 (147.3)	-

**Table 16R-52.10 - Grass Species.** Nested frequency and modified Daubenmire average cover by year.

GRASS SPECIES	Nested Frequency					
Achnatherum hymenoides (Indian ricegrass)	-	-	-	1	-	-
Agropyron fragile <sup>i</sup> (Siberian wheatgrass)	25	91	13	6	59	10
Bromus tectorum <sup>ai</sup> (cheatgrass)	35	138	16	8	47	5
Elymus elymoides (squirreltail)	Average Cover (%)					
Elymus lanceolatus (thickspike wheatgrass)	-	-	-	0.0	-	-
Poa secunda (Sandberg bluegrass)	1.5	3.1	0.3	0.1	1.9	0.1
	3.0	6.9	0.4	0.4	1.3	0.0

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

**Table 16R-52.11 - Forb Species.** Nested frequency and modified Daubenmire average cover by year.

FORB SPECIES	Nested Frequency																	
Arabis (rockcress)	1	21	6	-	3	-	-	-	-	-	-	-	-	-	-	-	-	-
Chamaesyce fendleri (Fendler's sandmat)	-	25	17	17	10	3	-	8	-	44	-	2	43	17	380	22	4	
Cryptantha (cryptantha)	6	56	53	-	18	-	8	-	3	1	3	-	29	9	135	6	2	
Descurainia pinnata <sup>a</sup> (western tansymustard)	Average Cover (%)																	
Eriogonum (buckwheat)	0.0	0.1	0.1	-	0.0	-	-	-	-	-	-	-	-	-	-	-	-	
Helianthus annuus <sup>a</sup> (common sunflower)	-	0.4	1.1	0.2	0.1	0.0	-	0.0	-	0.8	-	0.0	1.2	0.6	16.1	0.4	0.2	
Hymenoxys richardsonii (pingue rubberweed)	0.0	0.8	1.6	-	0.2	-	0.0	-	0.0	0.0	0.1	-	1.0	0.5	3.8	0.3	0.0	
Lactuca serriolata <sup>ai</sup> (prickly lettuce)																		
Lesquerella (bladderpod)																		
Linum perenne <sup>i</sup> (blue flax)																		
Lithospermum incisum (narrowleaf stone seed)																		
Machaeranthera canescens (hoary tansyaster)																		
Medicago sativa <sup>i</sup> (alfalfa)																		
Penstemon palmeri (Palmer's penstemon)																		
Salsola tragus <sup>ai</sup> (prickly Russian thistle)																		
Sanguisorba minor <sup>i</sup> (small burnet)																		
Tetradneuris acaulis (stemless four-nerve daisy)																		

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



FORB SPECIES	Townsendia incana (hoary Townsend daisy)
year	Nested
2014	-
2017	-
2022	2
year	Average Cover (%)
2014	-
2017	-
2022	0.0

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

**Table 16R-52.12 - Shrub and Tree Species.** Average modified Daubenmire quadrat and line intercept cover by year.

SHRUB SPECIES	Atriplex canescens <sup>p</sup> (fourwing saltbush)	Bassia prostrata <sup>pi</sup> (forage kochia)	Gutierrezia sarothrae (broom snakeweed)	Juniperus osteosperma <sup>i</sup> (Utah juniper)	Opuntia polyacantha (plains pricklypear)	Pinus edulis <sup>t</sup> (twoneedle pinyon)
year	Line Intercept Cover (%)					
2014	-	-	-	15.3	0.1	14
2017	0.4	0.1	-	2.2	-	0.1
2022	0.8	1.1	0.3	0.2	-	-
year	Quadrat Cover (%)					
2014	-	-	-	3.3	0.4	5.2
2017	0.4	0.4	-	1.8	-	0.0
2022	0.8	0.6	0.3	0.0	-	0.0

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

**Table 16R-52.13 - Shrub/Tree Characteristics.** Population characteristics of shrub/tree species populations including density reproduction (seedlings), age distribution, utilization, vigor and average size (height/crown) of plants.

Year	Density		Age Class Distribution			Utilization		Poor Vigor (%)	Average Height Crown (cm)
	Plants Per Acre		Excluding Seedlings			Moderate (%)	Heavy (%)		
	Excluding Seedlings	Seedling	Young (%)	Mature (%)	Decadent (%)				
<b>Atriplex canescens<sup>p</sup> -- (fourwing saltbush)</b>									
2014	-	-	-	-	-	-	-	-	-/-
2017	60	-	33	67	0	0	0	0	54/49
2022	60	-	67	33	0	0	33	0	-/-
<b>Bassia prostrata<sup>pi</sup> -- (forage kochia)</b>									
2014	-	-	-	-	-	-	-	-	-/-
2017	360	-	22	78	0	22	0	0	21/35
2022	180	-	11	89	0	0	0	0	-/-
<b>Ephedra viridis<sup>p</sup> -- (mormon tea)</b>									
2014	-	-	-	-	-	-	-	-	28/22
2017	-	-	-	-	-	-	-	-	-/-
2022	-	-	-	-	-	-	-	-	-/-
<b>Gutierrezia sarothrae -- (broom snakeweed)</b>									
2014	-	-	-	-	-	-	-	-	-/-
2017	20	-	0	100	0	0	0	0	24/35
2022	420	-	0	100	0	0	0	0	-/-
<b>Juniperus osteosperma<sup>i</sup> -- (Utah juniper)</b>									
2014	260	-	15	77	8	0	0	15	-/-
2017	40	-	100	0	0	0	0	0	-/-
2022	100	-	80	0	20	0	0	20	-/-
<b>Opuntia polyacantha -- (plains pricklypear)</b>									
2014	40	-	0	100	0	100	0	0	10/43
2017	20	-	0	100	0	0	0	0	8/22
2022	-	-	-	-	-	-	-	-	-/-
<b>Pinus edulis<sup>i</sup> -- (twoneedle pinyon)</b>									
2014	380	-	63	32	5	0	0	5	-/-
2017	40	-	50	50	0	0	0	0	-/-
2022	40	-	100	0	0	0	0	0	-/-

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

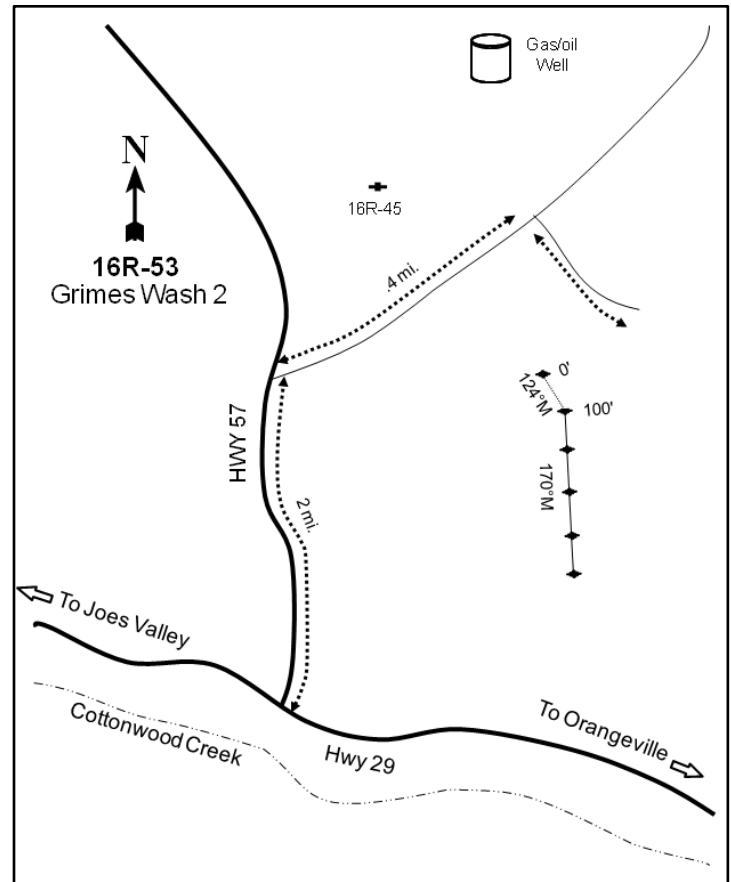
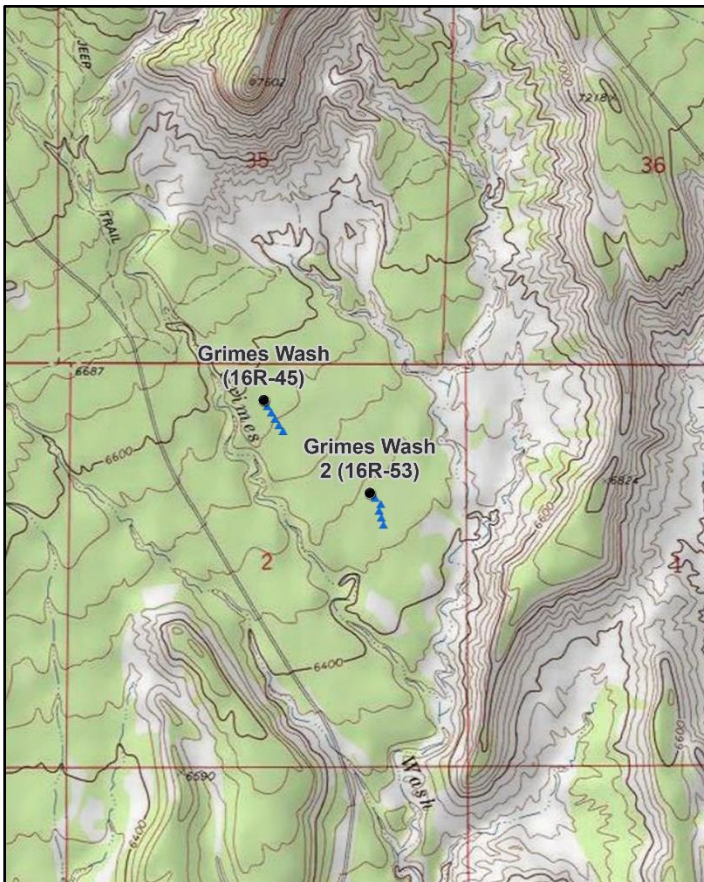
**Table 16R-52.14 - Tree Characteristics.** Point-quarter tree density, size class distribution, and average diameter.

Year	Density	Size Class Distribution					Average Diameter (cm)
	Trees per Acre	Seedling (%)	1-4' (%)	4-8' (%)	8-12' (%)	>12' (%)	
<b>Juniperus osteosperma (Utah juniper)</b>							
2014	366	-	-	10	75	15	20.0
2017	51	17	50	25	8	-	14.9
2022	40	21	71	7	-	-	7.4
<b>Pinus edulis (twoneedle pinyon)</b>							
2014	163	20	30	20	15	15	9.8
2017	23	18	82	-	-	-	5.4
2022	29	-	92	8	-	-	2.7

**Table 16R-52.15 - Deer Desirable Components Index: Semidesert 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
2014	0.0	0.0	0.0	0.0	0.0	0.3	0.0	0.3	Very Poor
2017	0.7	0.0	0.0	13.2	-0.2	9.8	0.0	23.4	Poor-Fair
2022	2.7	0.0	0.0	23.2	-0.3	9.3	0.0	34.9	Fair

## GRIMES WASH 2 - STUDY NO. 16R-53

**Location Information**

USGS 7.5 min Map Info  
GPS (0' Stake)

Red Point SW; Township 18S, Range 7E, Section 02  
NAD 83 UTM ZONE 12, 491361 East 4348787 North

**Transect Information**

Browse Tag # (0' Stake)	140
Transect Bearing	124° magnetic (Lines 2-5: 170° magnetic)
Length	500ft
Belt Placement	Line 1 (11ft), Line 2 (34ft), Line 3 (59ft), Line 4 (71ft), Line 5 (95ft)
Belt Marker Placement	Standard

**Directions to Site**

From the intersection of SR-29 and SR-57, drive 2 miles north on SR-57. Turn right, traveling northeast, and continue for 0.4 miles. Turn right, traveling southeast, and proceed for 0.1 miles. The site will be to the south.

**Site Information**

Land Ownership	State
Land Administrator	SITLA
Allotment	No data
Elevation	6,506ft (1,983m)
Aspect	Southeast
Slope	5%
Sample Dates	07/31/2014, 08/15/2017, 07/20/2022

**Table 16R-53.1 Disturbance History.** Recorded history of major disturbances.

Treatment/Disturbance	Name	WRI DB#	Date	Size (acres)
Seeding - Aerial Before	Grimes Wash PJ Removal	1946	October 2011	272
Chaining - Two-Way Ely	Grimes Wash PJ Removal	1946	October 2011	148
Seeding - Aerial After	Grimes Wash PJ Removal	1946	December 2011	272

**Table 16R-53.2 Seed Mix.** List of known seeded plant species and rates (if available).

Mix Name			Application Type	Application Date	Acres
Grimes Wash			Aerial	Oct 2011	272
Type	Species	Common Name	Cultivar/Source ID	Bulk lbs/acre	PLS
G	<i>Achnatherum hymenoides</i>	Indian Ricegrass	Emery UT	2.02	1.54
G	<i>Agropyron fragile</i>	Siberian Wheatgrass	Vavilov	1.47	1.14
G	<i>Elymus lanceolatus</i>	Thickspike Wheatgrass	Bannock	1.47	1.18
G	<i>Poa secunda</i>	Canby Bluegrass	Canbar	0.55	0.27
F	<i>Achillea millefolium</i>	Western Yarrow	Eagle Mountain	0.09	0.08
F	<i>Linum perenne</i>	Blue Flax	Appar	0.55	0.51
F	<i>Medicago sativa</i>	Alfalfa	Ladak +	0.37	0.35
F	<i>Melilotus officinalis</i>	Yellow Sweetclover		0.37	0.34
F	<i>Sphaeralcea grossulariifolia</i>	Gooseberryleaf Globemallow	Sanpete UT	0.18	0.17
S	<i>Atriplex canescens</i>	Fourwing Saltbush	Emery/Grand UT	0.55	0.17
S	<i>Krascheninnikovia lanata</i>	Winterfat	Millard/Sevier/Carbon	0.44	0.15

Mix Name			Application Type	Application Date	Acres
Grimes Wash - Browse			Aerial	Dec 2011	180
Type	Species	Common Name	Cultivar/Source ID	Bulk lbs/acre	PLS
F	<i>Medicago sativa</i>	Alfalfa	Nomad	0.56	0.50
S	<i>Artemisia tridentata</i> ssp. <i>wyomingensis</i>	Wyoming Big Sagebrush	Sevier UT	1.33	0.21

Mix Name			Application Type	Application Date	Acres
Grimes Wash Shrub			Aerial	Jan 2018	352
Type	Species	Common Name	Cultivar/Source ID	Bulk lbs/acre	PLS
F	<i>Medicago sativa</i>	Alfalfa	Ladak	0.43	0.40
S	<i>Artemisia tridentata</i> ssp. <i>wyomingensis</i>	Wyoming Big Sagebrush	Duchesne UT	0.42	0.08
S	<i>Artemisia tridentata</i> ssp. <i>wyomingensis</i>	Wyoming Big Sagebrush	Sevier UT	0.08	0.03

**Wildlife Habitat and Vegetation History****Table 16R-53.3 - Wildlife Seasonal Habitat.** DWR wildlife habitat and seasonality.

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

**Table 16R-53.4 - Vegetation History.** The dominant vegetation type(s) and phase of woodland succession (Tausch, Miller, Roundy, & Chambers, 2009).

Year	Vegetation Type	Woodland Succession
2014	Annual Forb	Phase I
2017	Annual Forb	Phase I
2022	Annual Forb	Phase I

**Site Notes**

The original Grimes Wash study (16R-45) was not included in the treatment, so it became a reference site for the Grimes Wash 2 study that was established in 2014 after treatment.

**Site Potential**

1981 - 2010 Average Annual Precipitation	11 inches
NRCS Ecological Site	Upland Stony Loam (Wyoming Big Sagebrush)
NRCS Ecological Site #	R034BY334UT
States and Transitions	No state and transition model is available for this ecological site.

Upon establishment in 2014 and during the subsequent readings, this study site was dominated by annual forbs, particularly the introduced species prickly Russian thistle (*Salsola tragus*) (Table 16R-53.11). Perennial grasses have remained sparse, with Indian ricegrass (*Achnatherum hymenoides*) and Siberian wheatgrass (*Agropyron fragile*) contributing the most cover in 2022 (Table 16R-53.10). Shrub cover has been low, with broom snakeweed (*Gutierrezia sarothrae*) and Wyoming big sagebrush (*Artemisia tridentata* ssp. *wyomingensis*) contributing the most cover in 2017 and 2022, respectively. Lesser amounts of black sagebrush (*A. nova*) and fourwing saltbush (*Atriplex canescens*) have also been present (Table 16R-53.12, Table 16R-53.13). Tree cover has remained low, with the study site being placed in Phase I of woodland succession in all sample years (Table 16R-53.4, Table 16R-53.12). Continued monitoring is recommended as the high annual forb cover as well as low cover of perennial grasses and forbs could be detrimental to the resilience of the site.

**Trend Summary Tables****Table 16R-53.6 - Shrub/Tree Summary.** Average modified Daubenmire quadrat and line intercept cover by year for shrubs/trees

Year	Quadrat Cover (%)			Line-intercept Cover (%)		
	Preferred Shrub	Other Shrub	Tree	Preferred Shrub	Other Shrub	Tree
2014	0.1	0.1	0.0	0.3	-	0.2
2017	1.5	2.1	0.2	1.5	3.0	0.4
2022	4.2	1.2	0.1	3.9	1.7	0.5

**Table 16R-53.7 - Herbaceous Summary.** Nested frequency and average modified Daubenmire quadrat cover by year for herbaceous functional groups

Year	Nested Frequency				Quadrat Cover (%)			
	Annual Grass	Perennial Grass	Annual/Biennial Forb	Perennial Forb	Annual Grass	Perennial Grass	Annual/Biennial Forb	Perennial Forb
2014	-	11	342	41	-	0.1	22.2	0.8
2017	-	25	345	56	-	0.6	30.6	1.8
2022	-	39	298	28	-	1.5	9.3	0.8

**Table 16R-53.8 - Basic Ground Cover.** Average modified Daubenmire quadrat cover by year for basic ground cover types.

Year	Cover Type (%)					
	Bare Ground	Cryptogams	Litter	Pavement	Rock	Vegetation
2014	32.6	0.0	33.9	10.0	6.1	24.3
2017	24.2	0.2	46.4	7.2	5.5	36.4
2022	45.1	0.7	45.1	7.1	6.5	15.8

**Table 16R-53.9 - Pellet Group Data.** Quadrat frequency and pellet group transect data for animal pellets. Rabbit pellet groups are not sampled in the pellet group transect.

Year	Mule Deer	Horse	Rabbit
	Quadrat Frequency		
2014	5	-	12
2017	7	-	38
2022	22	1	1
Year	Days Use Per Acre (ha)		
2014	0.7 (1.7)	-	-
2017	4.0 (9.9)	-	-
2022	41.5 (102.6)	-	-

**Table 16R-53.10 - Grass Species.** Nested frequency and modified Daubenmire average cover by year.

GRASS SPECIES	Achnatherum hymenoides (Indian ricegrass)	Agropyron fragile <sup>i</sup> (Siberian wheatgrass)	Elymus elymoides (squirreltail)	Elymus lanceolatus (thickspike wheatgrass)	Poa secunda (Sandberg bluegrass)
year	Nested Frequency				
2014	3	6	0	-	2
2017	2	10	9	-	4
2022	14	14	0	15	-
year	Average Cover (%)				
2014	0.0	0.0	0.0	-	0.0
2017	0.4	0.2	0.1	-	0.0
2022	0.6	0.8	0.0	0.1	-

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

**Table 16R-53.11 - Forb Species.** Nested frequency and modified Daubenmire average cover by year.

FORB SPECIES	Achillea millefolium (Common yarrow)	Arabis holboellii <sup>a</sup> (Holboell's rockcress)	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)	Eriogonum (buckwheat)	Eriogonum alatum (winged buckwheat)	Halogeton glomeratus <sup>ai</sup> (saltlover)	Lactuca scariola <sup>ai</sup> (prickly lettuce)	Lappula occidentalis <sup>ai</sup> (flatspine stickseed)	Lepidium <sup>a</sup> (pepperweed)	Lithospermum incisum (narrowleaf stoneseed)	Lomatium (desertparsley)	Melilotus officinalis <sup>i</sup> (sweetclover)	Penstemon (beardtongue)	Salsola tragus <sup>ai</sup> (prickly Russian thistle)
year	Nested Frequency																
2014	-	4	11	-	-	8	4	0	50	-	-	24	2	15	6	2	328
2017	12	9	18	7	2	111	4	23	7	6	2	11	1	-	5	2	318
2022	6	1	14	-	-	-	-	3	-	-	4	2	-	-	3	-	293
year	Average Cover (%)																
2014	-	0.2	0.3	-	-	0.2	0.0	0.0	0.5	-	-	0.5	0.0	0.4	0.0	0.0	20.9
2017	0.2	0.2	1.2	0.4	0.0	4.6	0.0	0.2	0.0	0.0	0.0	0.5	0.1	-	0.0	0.0	19.6
2022	0.2	0.0	0.1	-	-	-	-	0.2	-	-	0.0	0.0	-	-	0.2	-	9.3

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

FORB SPECIES	Nested Frequency		
<i>Sisymbrium altissimum</i> <sup>ai</sup> (tall tumblemustard)	6	0	1
<i>Stanleya viridiflora</i> (green princesplume)	65	-	5
<i>Tetraneris acaulis</i> (stemless four-nerve daisy)	8	-	2
year	Average Cover (%)		
2014	0.0	0.0	0.0
2017	5.3	-	0.1
2022	0.0	-	0.1

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

**Table 16R-53.12 - Shrub and Tree Species.** Average modified Daubenmire quadrat and line intercept cover by year.

SHRUB SPECIES	Line Intercept Cover (%)						
<i>Artemisia nova</i> <sup>p</sup> (black sagebrush)	-	0.2	-	0.1	0	0.2	-
<i>Artemisia tridentata</i> ssp. <i>wyomingensis</i> <sup>p</sup> (Wyoming big sagebrush)	0.4	1	-	0.1	3	0.4	-
<i>Atriplex canescens</i> <sup>p</sup> (fourwing saltbush)	0.5	2.7	0.6	0.1	1.7	0.5	-
<i>Eriogonum microthecum</i> <sup>p</sup> (slender buckwheat)	Quadrat Cover (%)						
<i>Gutierrezia sarothrae</i> (broom snakeweed)	0.1	0.0	0.0	0.0	0.0	0.0	0.1
<i>Juniperus osteosperma</i> <sup>t</sup> (Utah juniper)	0.4	1.1	0.0	0.1	2.1	0.2	0.0
<i>Opuntia polyacantha</i> (plains pricklypear)	1.1	2.5	0.5	0.0	1.0	0.1	0.1

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

**Table 16R-53.13 - Shrub/Tree Characteristics.** Population characteristics of shrub/tree species populations including density reproduction (seedlings), age distribution, utilization, vigor and average size (height/crown) of plants.

Year	Density		Age Class Distribution			Utilization		Poor Vigor (%)	Average Height Crown (cm)
	Plants Per Acre		Excluding Seedlings			Moderate (%)	Heavy (%)		
	Excluding Seedlings	Seedling	Young (%)	Mature (%)	Decadent (%)				
<b>Artemisia nova<sup>p</sup> -- (black sagebrush)</b>									
2014	120	140	33	67	0	0	0	0	16/35
2017	200	-	0	100	0	0	40	0	27/57
2022	300	-	13	87	0	13	33	0	- / -
<b>Artemisia tridentata</b> ssp. <i>wyomingensis</i> <sup>p</sup> -- (Wyoming big sagebrush)									
2014	220	-	18	82	0	18	0	0	21/34
2017	400	-	15	85	0	0	0	0	42/50
2022	440	-	46	55	0	14	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>Atriplex canescens<sup>p</sup> -- (fourwing saltbush)</b>									
2014	20	-	100	0	0	0	0	0	- / -
2017	20	-	100	0	0	0	0	0	51/46
2022	40	-	0	100	0	0	0	0	- / -
<b>Cercocarpus montanus<sup>p</sup> -- (alderleaf mountain mahogany)</b>									
2014	20	-	0	100	0	0	0	0	56/90
2017	-	-	-	-	-	-	-	-	- / -
2022	-	-	-	-	-	-	-	-	- / -
<b>Echinocereus -- (hedgehog cactus)</b>									
2014	-	-	-	-	-	-	-	-	- / -
2017	-	-	-	-	-	-	-	-	7/8
2022	-	-	-	-	-	-	-	-	- / -
<b>Ephedra viridis<sup>p</sup> -- (mormon tea)</b>									
2014	-	-	-	-	-	-	-	-	31/60
2017	-	-	-	-	-	-	-	-	26/35
2022	-	-	-	-	-	-	-	-	- / -
<b>Eriogonum microthecum<sup>p</sup> -- (slender buckwheat)</b>									
2014	80	-	0	100	0	0	0	0	8/14
2017	240	-	0	100	0	0	0	0	9/17
2022	220	-	9	82	9	0	0	9	- / -
<b>Ericameria nauseosa -- (rubber rabbitbrush)</b>									
2014	-	-	-	-	-	-	-	-	- / -
2017	-	-	-	-	-	-	-	-	59/59
2022	-	-	-	-	-	-	-	-	- / -
<b>Gutierrezia sarothrae -- (broom snakeweed)</b>									
2014	260	-	77	23	0	0	0	0	26/40
2017	4260	-	29	70	1	0	0	1	24/38
2022	1380	-	7	93	0	0	0	0	- / -
<b>Juniperus osteosperma<sup>i</sup> -- (Utah juniper)</b>									
2014	-	-	-	-	-	-	-	-	- / -
2017	40	-	50	50	0	0	0	0	- / -
2022	40	-	50	50	0	0	0	0	- / -
<b>Opuntia polyacantha -- (plains pricklypear)</b>									
2014	20	-	0	100	0	0	0	0	6/18
2017	20	-	0	100	0	0	0	0	7/24
2022	40	-	0	100	0	0	0	0	- / -

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

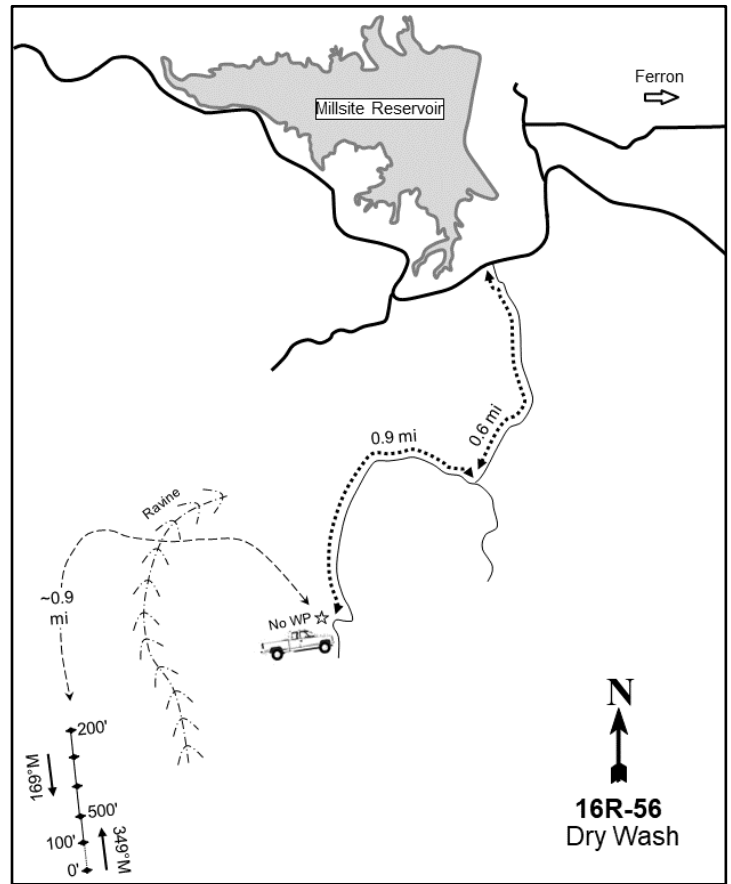
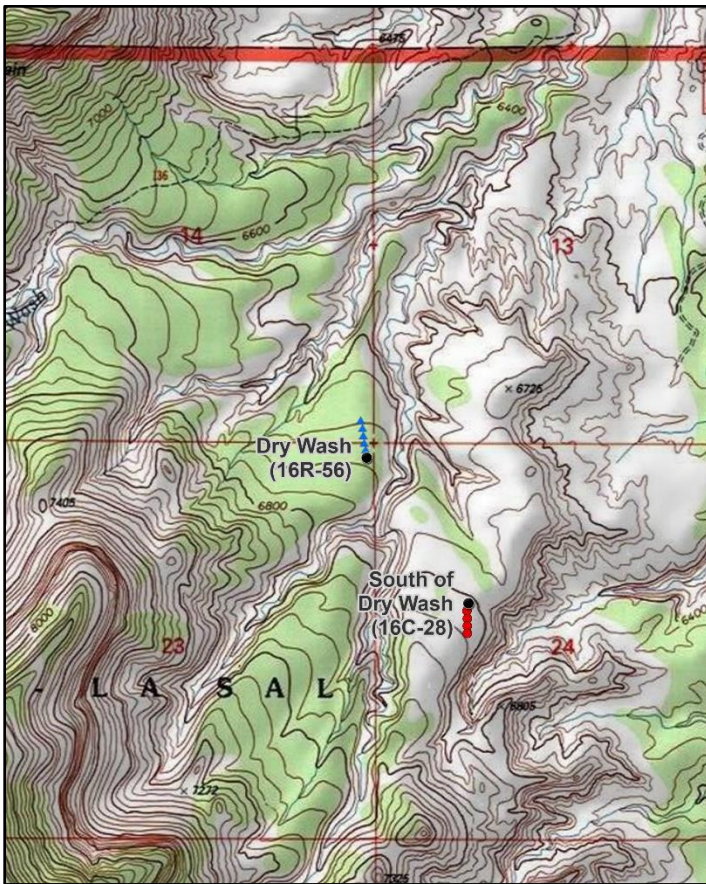
**Table 16R-53.14 - Tree Characteristics.** Point-quarter tree density, size class distribution, and average diameter.

Year	Density	Size Class Distribution					Average Diameter (cm)
	Trees per Acre	Seedling (%)	1-4' (%)	4-8' (%)	8-12' (%)	>12' (%)	
<b>Juniperus osteosperma (Utah juniper)</b>							
2014	27	44	33	22	-	-	5.0
2017	32	21	71	7	-	-	13.4
2022	42	13	47	40	-	-	9.6
<b>Pinus edulis (twoneedle pinyon)</b>							
2014	28	-	100	-	-	-	2.4
2017	26	25	75	-	-	-	3.9
2022	24	11	89	-	-	-	2.4

**Table 16R-53.15 - Deer Desirable Components Index: Upland 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
2014	0.4	0.0	0.0	0.2	0.0	1.5	0.0	2.0	Very Poor
2017	1.9	0.0	0.0	1.3	0.0	3.7	0.0	6.8	Very Poor
2022	4.9	0.0	0.0	3.1	0.0	1.6	0.0	9.5	Very Poor

## 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  
349° magnetic (Lines 3-5: 169° magnetic)  
500ft  
Line 1 (11ft), Line 2 (34ft), Line 3 (59ft), Line 4 (71ft), Line 5 (95 ft)  
No Rebar

### 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. The stakes are rebar.

**Site Information**

Land Ownership	Federal
Land Administrator	USFS
Allotment	FERRON
Elevation	6,600ft (2,012m)
Aspect	North
Slope	6%
Sample Dates	08/27/2019, 07/19/2022

**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	4907	October-November 2019	117
Seeding - Aerial Before	Dry Wash Units 4, 5, 9	4907	October 2019	117

**Table 16R-56.2 Seed Mix.** List of known seeded plant species and rates (if available).

Mix Name			Application Type	Application Date	Acres
Dry Wash			Aerial	Oct 2019	264
Type	Species	Common Name	Cultivar/Source ID	Bulk lbs/acre	PLS
G	Achnatherum hymenoides	Indian Ricegrass	Utah	1.52	1.47
G	Agropyron fragile	Siberian Wheatgrass	Vavilov II	0.95	0.78
G	Pascopyrum smithii	Western Wheatgrass	Arriba	1.14	0.99
G	Poa secunda	Canby Bluegrass	Canbar	0.95	0.73
F	Achillea millefolium	Western Yarrow	Eagle	0.11	0.10
F	Cleome serrulata	Rocky Mountain Beeplant		0.57	0.55
F	Helianthus annuus	Annual Sunflower		0.38	0.35
F	Linum perenne	Blue Flax	Appar	0.57	0.40
F	Medicago sativa	Alfalfa	Ladak DL	0.57	0.49
F	Medicago sativa ssp. falcata	Yellow Alfalfa	Don	0.38	0.37
F	Ratibida columnifera	Prairie Coneflower	Stillwater	0.33	0.30
F	Ratibida columnifera	Prairie Coneflower	Stillwater	0.43	0.38
S	Artemisia nova	Black Sagebrush	Cache, UT	0.76	0.15
S	Atriplex canescens	Fourwing Saltbush	Kane UT	0.95	0.25

**Wildlife Habitat and Vegetation History**

**Table 16R-56.3 - Wildlife Seasonal Habitat.** DWR 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
2022	Alderleaf Mountain Mayhogany	Phase I

**Site Notes**

In 2022, the 0 and 100-foot stakes were moved to be within the treatment area with line two running between the 100 and 500-foot stakes. As a result, the transect runs at 349° magnetic from the 0 to 100-foot stake and the 100 to 500-foot stake, while the lines between the 200 and 500-foot stakes run in the opposite direction (169° magnetic).

**Site Potential**

1981 - 2010 Average Annual Precipitation	11 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.

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. Following the lop and scatter treatment later that same year (Table 16R-56.1), density and cover of juniper and pinyon were significantly reduced and the study was considered to be in Phase I in 2022 (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. Following treatment, density and cover of mahogany and black sagebrush (*Artemisia nova*) decreased, but the proportions of young and mature plants increased in both populations in 2022 (Table 16R-56.12, Table 16R-56.13). The herbaceous understory has remained depauperate in both composition and biodiversity following treatment, with annual forbs providing most of the very limited herbaceous cover (Table 16R-56.7, Table 16R-56.10, Table 16R-56.11). This site could continue to remain in this state and might exhibit further degradation of the understory without a major disturbance.

**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
2022	7.3	0.0	0.2	10.3	-	2.7

**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
2022	-	4	11	101	-	0.2	0.0	2.7

**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
2022	31.9	0.3	58.4	5.6	8.6	9.4

**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
2022	24	2	3
Year	Days Use Per Acre (ha)		
	2019	67.7 (167.2)	22.1 (54.6)
2022	63.0 (155.6)	10.7 (26.5)	-

**Table 16R-56.10 - 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)
year	Nested Frequency			
2019	-	-	-	2
2022	1	1	2	-
year	Average Cover (%)			
2019	-	-	-	0.0
2022	0.0	0.0	0.1	-

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	Achillea millefolium (Common yarrow)	Arabis (rockcross)	Chenopodium fremontii <sup>a</sup> (Fremont's goosefoot)	Cleome lutea <sup>a</sup> (yellow spiderflower)	Cryptantha (cryptantha)	Descurainia pinnata <sup>a</sup> (western tansymustard)	Eriogonum (buckwheat)	Hymenopappus filifolius (fineleaf hymenopappus)	Medicago sativa <sup>i</sup> (alfalfa)	Penstemon (beardtongue)	Penstemon pachyphyllus (thickleaf beardtongue)	Schoenocrambe limifolia (flaxleaf plainsmustard)	Stanleya viridiflora (green princesplume)	Townsendia incana (hoary Townsend daisy)
year	Nested Frequency													
2019	-	34	58	-	15	49	16	4	-	18	-	3	1	2
2022	18	22	-	4	44	7	11	-	1	17	4	11	-	-
year	Average Cover (%)													
2019	-	0.2	0.5	-	0.1	0.5	0.0	0.0	-	0.2	-	0.0	0.2	0.0
2022	0.2	0.1	-	0.0	1.7	0.0	0.1	-	0.0	0.3	0.0	0.3	-	-

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	Artemisia nova <sup>p</sup> (black sagebrush)	Artemisia tridentata ssp. wyomingensis <sup>p</sup> (Wyoming big sagebrush)	Cercocarpus montanus <sup>p</sup> (alderleaf mountain mahogany)	Ephedra viridis <sup>p</sup> (mormon tea)	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 (%)							
2019	1.2	-	6.4	0.1	0.1	-	16.7	19.7
2022	0.9	0	6.9	2.2	0.3	-	0.3	2.4
year	Quadrat Cover (%)							
2019	1.6	-	2.8	0.8	0.1	-	11.7	7.8
2022	1.4	0.0	4.1	1.4	0.3	0.0	0.0	0.2

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 (%)				
<b>Artemisia nova<sup>p</sup> -- (black sagebrush)</b>									
2019	1360	-	21	49	31	22	2	38	23/35
2022	1060	140	32	57	11	9	11	9	- / -
<b>Artemisia tridentata ssp. wyomingensis<sup>p</sup> -- (Wyoming big sagebrush)</b>									
2019	-	-	-	-	-	-	-	-	- / -
2022	20	-	100	0	0	0	0	0	- / -
<b>Cercocarpus montanus<sup>p</sup> -- (alderleaf mountain mahogany)</b>									
2019	360	40	28	72	0	28	22	0	123/168
2022	180	40	33	67	0	11	67	0	- / -
<b>Ephedra viridis<sup>p</sup> -- (mormon tea)</b>									
2019	280	-	43	50	7	7	0	7	77/91
2022	400	-	40	55	5	0	0	5	- / -
<b>Eriogonum microthecum<sup>p</sup> -- (slender buckwheat)</b>									
2019	1960	-	11	89	0	7	0	0	12/14
2022	1540	440	53	47	0	0	0	0	- / -
<b>Gutierrezia sarothrae -- (broom snakeweed)</b>									
2019	-	-	-	-	-	-	-	-	- / -
2022	40	-	50	50	0	0	0	0	- / -
<b>Juniperus osteosperma<sup>t</sup> -- (Utah juniper)</b>									
2019	160	-	0	100	0	0	0	0	- / -
2022	60	-	33	0	67	0	0	67	- / -
<b>Opuntia polyacantha -- (plains pricklypear)</b>									
2019	40	-	0	100	0	0	0	0	10/31
2022	-	20	0	0	0	0	0	0	- / -
<b>Pinus edulis<sup>t</sup> -- (twoneedle pinyon)</b>									
2019	280	40	57	43	0	0	0	0	- / -
2022	140	20	86	14	0	0	0	0	- / -
<b>Sclerocactus -- (fishhook cactus)</b>									
2019	20	-	0	100	0	0	0	0	20/31

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



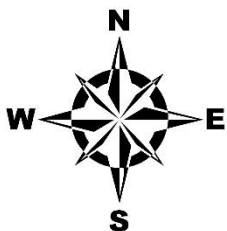
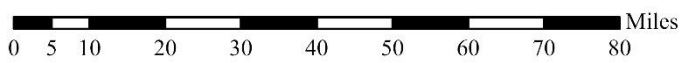
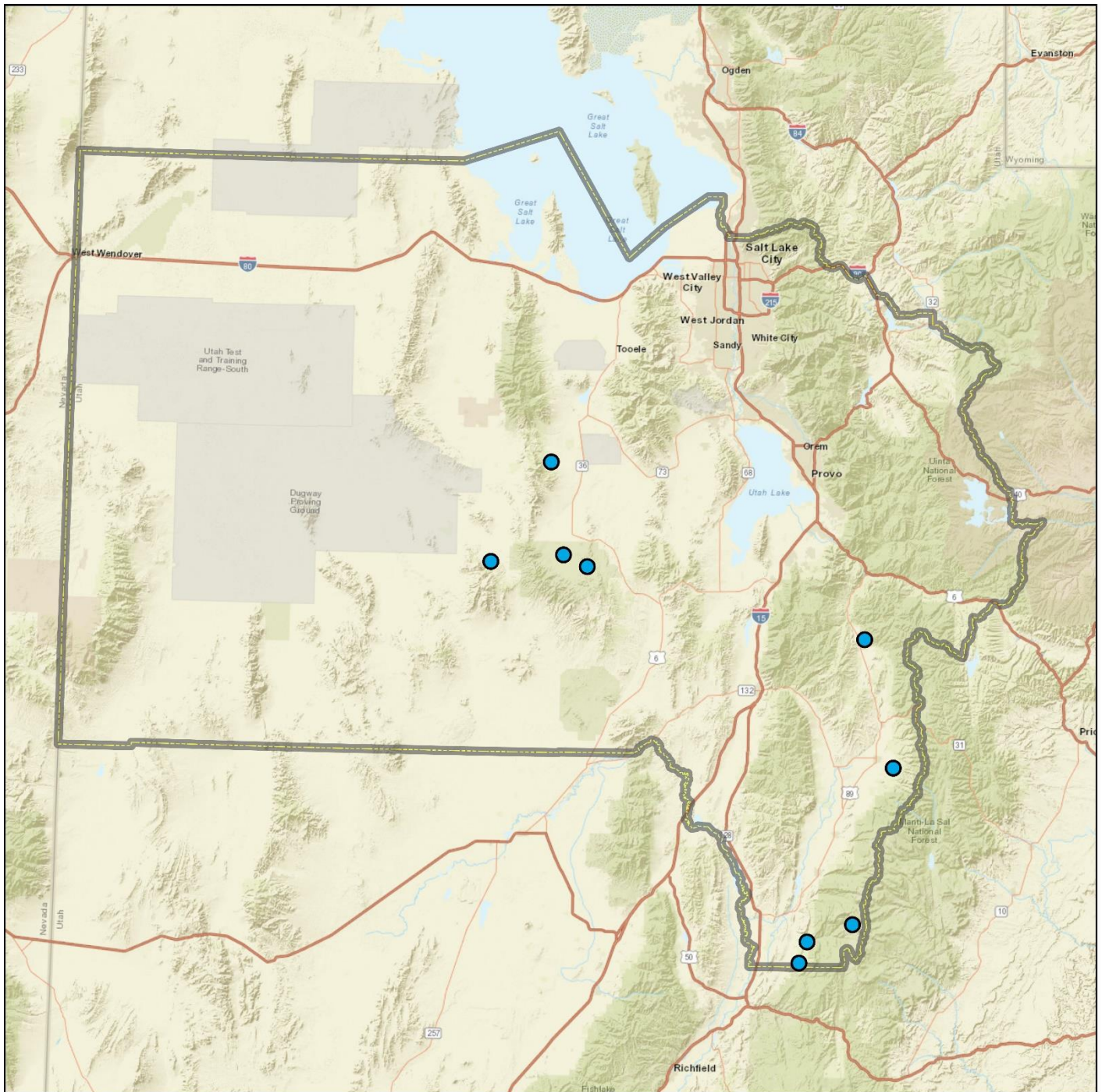
**Table 16R-56.14 - Tree Characteristics.** Point-quarter tree density, size class distribution, and average diameter.

Year	Density	Size Class Distribution					Average Diameter (cm)
	Trees per Acre	Seedling (%)	1-4' (%)	4-8' (%)	8-12' (%)	>12' (%)	
<b>Juniperus osteosperma (Utah juniper)</b>							
2019	139	-	-	50	45	5	34.0
2022	27	15	38	23	23	-	20.4
<b>Pinus edulis (twoneedle pinyon)</b>							
2019	386	5	20	55	10	10	13.7
2022	67	28	56	11	-	6	4.5

**Table 16R-56.15 - Deer Desirable Components Index: Upland 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
2022	14.6	14.4	15.0	0.4	0.0	5.3	0.0	49.7	Poor-Fair

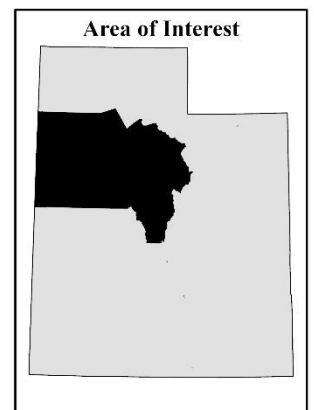
# CENTRAL REGION



**Region Boundaries**

- Central Region
- Study Location

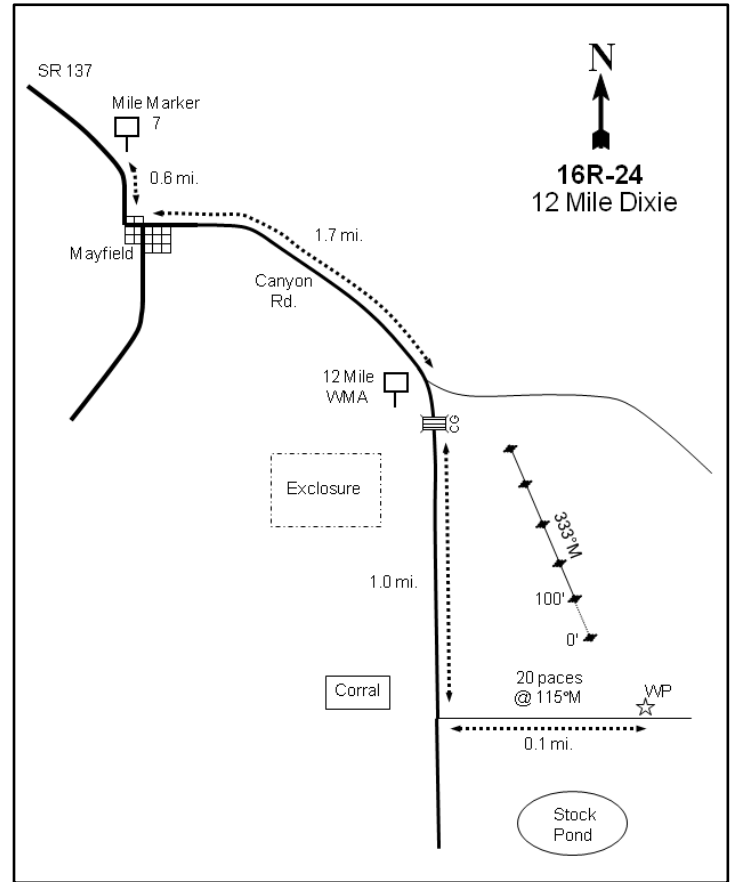
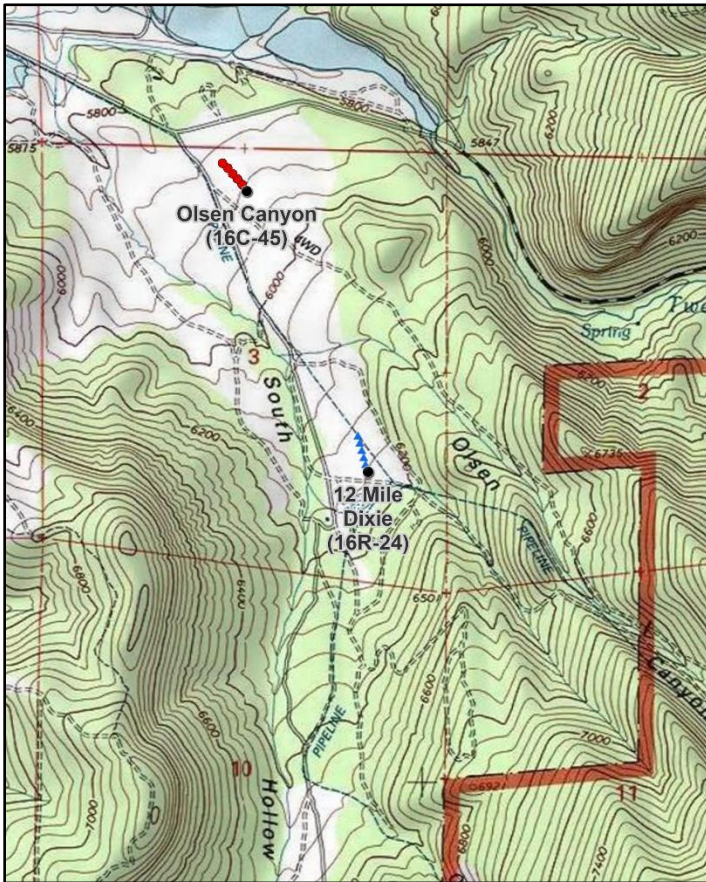
**2022 WRI Study Sites**



Credits: Esri, HERE, Garmin, NGA, USGS, NPS



## 12 MILE DIXIE - STUDY NO. 16R-24

**Location Information**

USGS 7.5 min Map Info  
GPS (0' Stake)

Mayfield NE; Township 20S, Range 2E, Section 03  
NAD 83 UTM ZONE 12, 442056 East 4327496 North

**Transect Information**

Browse Tag # (0' Stake)	591
Transect Bearing	333° magnetic
Length	500ft
Belt Placement	Line 1 (11ft), Line 2 (34ft), Line 3 (59ft), Line 4 (71ft), Line 5 (95ft)
Belt Marker Placement	Belt 1: No Rebar

**Directions to Site**

Drive south on SR-137 toward Mayfield. From mile marker #7, drive 0.6 miles and turn left (east) onto Canyon Road. Drive on this paved road for 1.7 miles to a fork and the end of the pavement and beginning of the dirt road with a sign showing "12 Mile WMA." From the dirt road, cross a cattle guard and drive 1.0 mile, passing a road on the right, to a corral on the right and road on the left (east). Turn here and drive 0.1 miles to a half-high witness post on the left (north). From here, walk 20 paces northwest to the 0-foot stake marked with browse tag #199.

**Site Information**

Land Ownership	State
Land Administrator	DWR
Allotment	No data
Elevation	6,200ft (1,890m)
Aspect	West
Slope	3%
Sample Dates	08/17/2006, 08/12/2010, 07/02/2013, 05/31/2017, 05/16/2022

**Table 16R-24.1 Disturbance History.** Recorded history of major disturbances.

Treatment/Disturbance	Name	WRI DB#	Date	Size (acres)
Agriculture - Agricultural Field	-	-	Historic	-
Herbicide - Roundup, Paramount	Twelve Mile WMA Habitat Improvement	273	November 2006	40
Herbicide - Roundup	Twelve Mile WMA Habitat Improvement	273	May 2007	40
Herbicide - Roundup	Twelve Mile WMA Habitat Improvement	273	October 2007	40
Seeding - Truax Drill	Twelve Mile WMA Habitat Improvement	273	October 2007	45
Seeding - Broadcast	Twelve Mile WMA Habitat Improvement	273	January 2008	40

**Table 16R-24.2 Seed Mix.** List of known seeded plant species and rates (if available).

Mix Name			Application Type	Application Date	Acres
12 Mile WMA			Drill	Oct 2007	60
Type	Species	Common Name	Cultivar/Source ID	Bulk lbs/acre	PLS
G	Achnatherum hymenoides	Indian Ricegrass	Rimrock	0.08	0.07
G	Achnatherum hymenoides	Indian Ricegrass	Rimrock	0.42	0.41
G	Agropyron cristatum	Crested Wheatgrass	Douglas	1.00	0.84
G	Agropyron cristatum	Crested Wheatgrass	Hycrest	1.00	0.92
G	Dactylis glomerata	Orchardgrass	Paiute	0.50	0.39
G	Elymus wawawaiensis	Snake River Wheatgrass	Secar	2.00	1.76
G	Poa secunda	Canby Bluegrass	Canbar	0.50	0.45
G	Psathyrostachys juncea	Russian Wildrye		2.00	1.67
G	Pseudoroegneria spicata	Bluebunch Wheatgrass	Anatone	1.00	0.85
G	Thinopyrum intermedium	Intermediate Wheatgrass		2.00	1.92
F	Achillea millefolium	Western Yarrow		0.25	0.24
F	Astragalus cicer	Cicer Milkvetch	Lutana	0.50	0.41
F	Linum perenne	Blue Flax	Appar	0.50	0.46
F	Medicago sativa	Alfalfa	Ladak	1.00	0.92
F	Melilotus officinalis	Yellow Sweetclover		0.25	0.23
F	Sanguisorba minor	Small Burnet	Delar	2.00	1.87
S	Purshia tridentata	Bitterbrush	Millard UT	0.50	0.44

Mix Name			Application Type	Application Date	Acres
12 Mile WMA Kochia			Broadcast	Jan 2008	60
Type	Species	Common Name	Cultivar/Source ID	Bulk lbs/acre	PLS
		Rice Hulls		1.00	0.00
S	Bassia prostrata	Forage Kochia	Immigrant	1.00	0.94

**Wildlife Habitat and Vegetation History****Table 16R-24.3 - Wildlife Seasonal Habitat.** DWR wildlife habitat and seasonality.

Species	Habitat	Season
Mule Deer	crucial	winter/spring
Rocky Mountain Elk	crucial	winter
Shiras Moose	crucial	winter

**Table 16R-24.4 - Vegetation History.** The dominant vegetation type(s) and phase of woodland succession (Tausch, Miller, Roundy, & Chambers, 2009).

Year	Vegetation Type	Woodland Succession
2006	Annual Grass/Field Bindweed	No Encroachment
2010	Field Bindweed	No Encroachment
2013	Perennial Grass/Rubber Rabbitbrush	No Encroachment
2017	Perennial Grass/Rubber Rabbitbrush	No Encroachment
2022	Perennial Grass/Rubber Rabbitbrush	No Encroachment

**Site Notes**

This site is located in a small valley surrounded by pinyon pine (*Pinus edulis*) and Utah juniper (*Juniperus osteosperma*) woodlands and scattered sagebrush. There are some roads and a dry stock pond near the study.

**Soils****Table 16R-24.5 - Soil Analysis Data.** List of chemical and textural soil characteristics determined by laboratory analysis.

Texture	pH	% sand	% silt	% clay	% OM	PPM P	PPM K	ds/m	Sample Date
Sandy Clay Loam	7.6	48.7	17.4	33.8	2.5	17.2	224.0	0.7	08/17/2006

**Site Potential**

1981 - 2010 Average Annual Precipitation                      16 inches  
 NRCS Ecological Site    Upland Loam (Wyoming Big Sagebrush)  
 NRCS Ecological Site #    R028AY309UT  
 States and Transitions    No state and transition model is available for this ecological site.

When the study was established in 2006, this site was dominated by annual grasses, mainly cheatgrass (*Bromus tectorum*), and the noxious and introduced perennial forb field bindweed (*Convolvulus arvensis*). In the first sample year following treatment, annual grass cover decreased, but the site remained dominated by bindweed. Perennial grass cover increased, and a mixture of native and introduced species dominated the site between 2013 and 2022. In addition, the introduced perennial grass species bulbous bluegrass (*Poa bulbosa*) and noxious annual species jointed goatgrass (*Aegilops cylindrica*) have been observed each sample year between 2006 to 2017, but jointed goatgrass was not observed in 2022. These noxious species have only been sampled in low amounts, but attention should be given to these species, as they can invade quickly. The noxious perennial forb species squarrose knapweed (*Centaurea virgata*) and whitetop (*Cardaria draba*) have also been observed in low amounts in different sample years (Table 16R-24.7, Table 16R-24.10, Table 16R-24.11). Although shrubs were initially rare, density of rubber rabbitbrush (*Ericameria nauseosa* ssp. *consimilis* and *E. nauseosa* ssp. *nauseosa* var. *hololeuca*) increased from pre-treatment samplings, and were co-dominant site components in 2013, 2017 and 2022 as a cohort (Photos, Table 16R-24.12, Table 16R-24.13).

## Trend Summary Tables

**Table 16R-24.6 - Shrub/Tree Summary.** Average modified Daubenmire quadrat and line intercept cover by year for shrubs/trees

Year	Quadrat Cover (%)			Line-intercept Cover (%)		
	Preferred Shrub	Other Shrub	Tree	Preferred Shrub	Other Shrub	Tree
2006	-	-	-	-	0.4	-
2010	-	0.9	-	0.1	0.6	-
2013	0.0	0.9	-	0.9	0.7	-
2017	0.8	2.8	-	1.9	2.7	-
2022	0.2	1.9	-	0.3	2.2	-

**Table 16R-24.7 - Herbaceous Summary.** Nested frequency and average modified Daubenmire quadrat cover by year for herbaceous functional groups

Year	Nested Frequency				Quadrat Cover (%)			
	Annual Grass	Perennial Grass	Annual/Biennial Forb	Perennial Forb	Annual Grass	Perennial Grass	Annual/Biennial Forb	Perennial Forb
2006	230	47	357	302	12.5	0.7	7.8	11.1
2010	67	258	354	320	1.0	12.9	9.9	15.8
2013	93	304	369	298	0.8	12.7	6.8	6.3
2017	251	339	447	246	8.1	30.4	26.8	6.8
2022	294	390	471	181	7.8	40.4	36.3	2.6

**Table 16R-24.8 - Basic Ground Cover.** Average modified Daubenmire quadrat cover by year for basic ground cover types.

Year	Cover Type (%)					
	Bare Ground	Cryptogams	Litter	Pavement	Rock	Vegetation
2006	41.6	0.4	24.4	7.7	1.0	35.5
2010	41.1	-	26.4	8.1	0.4	37.3
2013	49.3	-	19.6	3.6	1.9	34.7
2017	23.6	0.0	30.6	6.7	1.5	59.3
2022	26.9	0.0	19.7	5.5	1.6	64.2

**Table 16R-24.9 - Pellet Group Data.** Quadrat frequency and pellet group transect data for animal pellets. Rabbit pellet groups are not sampled in the pellet group transect.

Year	Cattle	Coyote	Mule Deer	Rocky Mountain Elk	Rabbit
	Quadrat Frequency				
2006	7	-	8	-	38
2010	3	-	4	-	4
2013	26	-	14	-	10
2017	10	-	10	-	10
2022	4	-	16	9	-
Year	Days Use Per Acre (ha)				
2006	10.9 (26.9)	-	20.1 (49.7)	-	-
2010	13.8 (34.1)	8.7 (21.5)*	3.4 (8.3)	-	-
2013	26.8 (66.3)	-	24.1 (59.6)	-	-
2017	64.6 (159.6)	-	14.1 (34.8)	0.7 (1.7)	-
2022	13.8 (34.1)	-	40.2 (99.3)	15.4 (38.1)	-

\*Pellets per acre (ha)

**Table 16R-24.10 - Grass Species.** Nested frequency and modified Daubenmire average cover by year.

GRASS SPECIES									
<i>Aegilops cylindrica</i> <sup>ani</sup> (jointed goatgrass)									
<i>Agropyron cristatum</i> <sup>i</sup> (crested wheatgrass)									
<i>Bromus tectorum</i> <sup>ai</sup> (cheatgrass)									
<i>Hordeum pusillum</i> <sup>a</sup> (little barley)									
<i>Poa bulbosa</i> <sup>a</sup> (bulbous bluegrass)									
<i>Poa secunda</i> (Sandberg bluegrass)									
<i>Psathyrostachys juncea</i> <sup>i</sup> (Russian wildrye)									
<i>Pseudoroegneria spicata</i> (bluebunch wheatgrass)									
<i>Thinopyrum intermedium</i> <sup>i</sup> (intermediate wheatgrass)									
year	Nested Frequency								
2006	53	-	189	27	47	-	-	-	-
2010	19	53	44	11	26	2	1	38	218
2013	26	110	69	7	11	17	21	97	214
2017	33	121	240	9	132	7	97	179	106
2022	-	98	294	3	332	7	48	120	94
year	Average Cover (%)								
2006	0.9	-	10.0	1.6	0.7	-	-	-	-
2010	0.3	2.0	0.4	0.4	0.4	0.0	0.1	1.2	9.2
2013	0.1	3.2	0.3	0.4	0.1	0.3	0.3	2.7	6.2
2017	0.1	7.2	7.9	0.0	5.5	0.1	5.8	8.6	3.2
2022	-	8.5	7.7	0.1	13.7	0.0	2.3	12.0	3.9

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

**Table 16R-24.11 - Forb Species.** Nested frequency and modified Daubenmire average cover by year.

FORB SPECIES																
<i>Achillea millefolium</i> (Common yarrow)																
<i>Alyssum alyssoides</i> <sup>aii</sup> (pale madwort)																
<i>Alyssum desertorum</i> <sup>ai</sup> (desert madwort)																
<i>Cardaria draba</i> <sup>ai</sup> (whitetop)																
<i>Centaurea virgata</i> <sup>ai</sup> (squarrose knapweed)																
<i>Ceratocephala testiculata</i> <sup>ai</sup> (curveseed butterwort)																
<i>Collinsia parviflora</i> <sup>a</sup> (maiden blue eyed Mary)																
<i>Convolvulus arvensis</i> <sup>aii</sup> (field bindweed)																
<i>Crepis atri-barba</i> (slender hawkbeard)																
<i>Cryptantha</i> (cryptantha)																
<i>Descurainia pinnata</i> <sup>a</sup> (western tansymustard)																
<i>Erodium cicutarium</i> <sup>ai</sup> (redstem stork's bill)																
<i>Grindelia squarrosa</i> (curlycup gumweed)																
<i>Helianthus annuus</i> <sup>a</sup> (common sunflower)																
<i>Lactuca serriola</i> <sup>ai</sup> (prickly lettuce)																
<i>Machaeranthera canescens</i> (hoary tansyaster)																
<i>Medicago sativa</i> <sup>i</sup> (alfalfa)																
year	Nested Frequency															
2006	-	-	3	-	-	309	3	302	-	3	2	211	-	-	-	1
2010	-	-	5	-	1	333	-	320	-	-	12	87	-	9	-	-
2013	2	-	35	-	2	303	3	290	-	-	-	193	2	-	1	3
2017	-	-	140	1	-	376	6	244	-	-	-	376	-	-	-	1
2022	-	1	274	2	1	418	-	167	8	-	-	369	-	-	-	-
year	Average Cover (%)															
2006	-	-	0.0	-	-	2.4	0.0	11.0	-	0.0	0.0	5.2	-	-	-	0.0
2010	-	-	0.0	-	0.2	7.2	-	15.6	-	-	0.0	2.3	-	0.0	-	-
2013	0.0	-	0.2	-	0.0	1.6	0.0	6.0	-	-	-	4.9	0.1	-	0.0	0.0
2017	-	-	1.1	0.0	-	13.4	0.3	6.8	-	-	-	12.0	-	-	-	0.0
2022	-	0.0	3.9	0.0	0.0	8.9	-	2.4	0.0	-	-	23.5	-	-	-	-

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



FORB SPECIES									
<i>Microsteris gracilis</i> <sup>a</sup> (slender phlox)									
<i>Salsola tragus</i> <sup>ai</sup> (prickly Russian thistle)									
<i>Sanguisorba minor</i> <sup>i</sup> (small burnet)									
<i>Sisymbrium altissimum</i> <sup>ai</sup> (tall tumblemustard)									
<i>Sphaeralcea coccinea</i> (scarlet globemallow)									
<i>Symphoricarichum ascendens</i> (western aster)									
<i>Tragopogon dubius</i> <sup>ai</sup> (yellow salsify)									
<i>Trifolium</i> (clover)									
<i>Veronica biloba</i> <sup>ai</sup> (two-lobed speedwell)									
year	Nested Frequency								
2006	-	-	-	0	-	-	3	-	5
2010	-	27	2	1	-	-	-	-	-
2013	4	6	5	-	-	-	-	3	3
2017	5	-	-	-	-	1	-	-	2
2022	-	-	-	-	6	3	-	-	-
year	Average Cover (%)								
2006	-	-	-	0.0	-	-	0.0	-	0.0
2010	-	0.3	0.0	0.0	-	-	-	-	-
2013	0.0	0.1	0.0	-	-	-	-	0.0	0.0
2017	0.0	-	-	-	-	0.0	-	-	0.0
2022	-	-	-	-	0.2	0.0	-	-	-

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

**Table 16R-24.12 - Shrub and Tree Species.** Average modified Daubenmire quadrat and line intercept cover by year.

SHRUB SPECIES			
<i>Ericameria nauseosa</i> ssp. <i>consimilis</i> (rubber rabbitbrush)			
<i>Ericameria nauseosa</i> ssp. <i>nauseosa</i> var. <i>hololeuca</i> <sup>p</sup> (rubber rabbitbrush)			
<i>Gutierrezia sarothrae</i> (broom snakeweed)			
year	Line Intercept Cover		
2006	-	-	0.4
2010	0.6	0.1	-
2013	0.7	0.9	-
2017	2.7	1.9	-
2022	2.2	0.3	-
year	Quadrat Cover (%)		
2006	-	-	0.0
2010	0.9	0.0	-
2013	0.9	0.0	-
2017	2.8	0.8	-
2022	1.4	0.2	0.4

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

**Table 16R-24.13 - Shrub/Tree Characteristics.** Population characteristics of shrub/tree species populations including density reproduction (seedlings), age distribution, utilization, vigor and average size (height/crown) of plants.

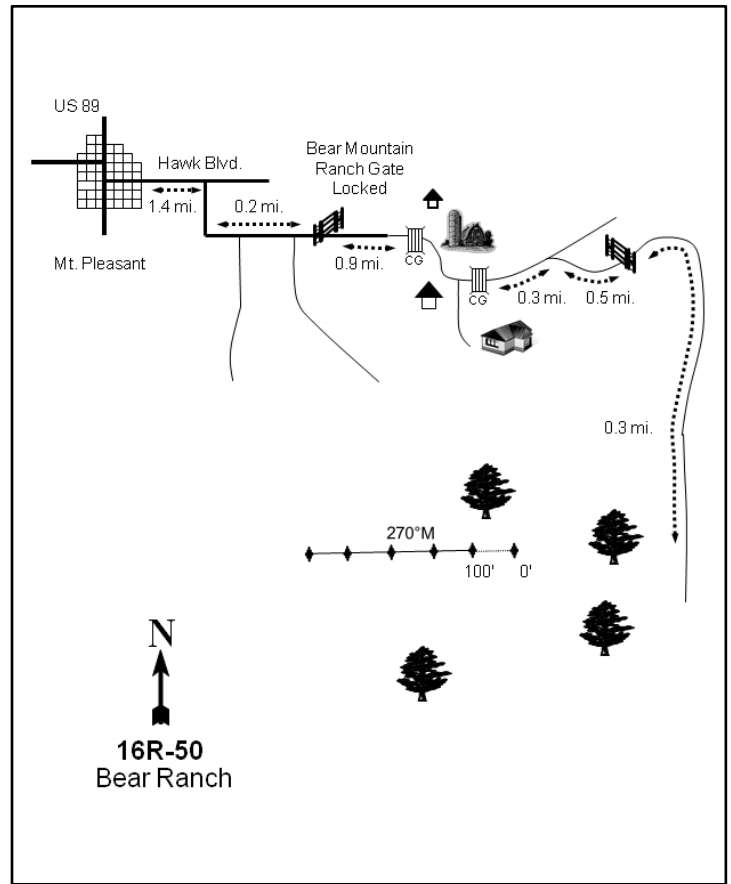
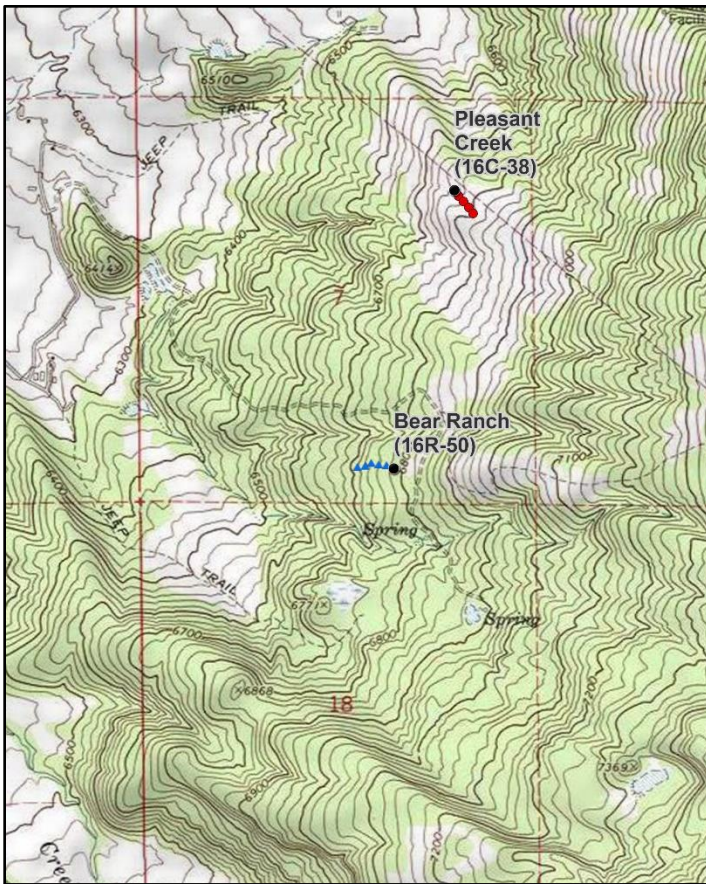
Year	Density		Age Class Distribution			Utilization		Poor Vigor (%)	Average Height Crown (cm)
	Plants Per Acre		Excluding Seedlings			Moderate (%)	Heavy (%)		
	Excluding Seedlings	Seedling	Young (%)	Mature (%)	Decadent (%)				
<b>Ericameria nauseosa ssp. consimilis -- (rubber rabbitbrush)</b>									
2006	-	-	-	-	-	-	-	-	99/166
2010	740	-	97	3	0	3	0	0	63/51
2013	840	-	33	67	0	7	0	50	64/70
2017	800	-	8	93	0	3	0	0	59/69
2022	480	-	0	67	33	4	21	38	- / -
<b>Ericameria nauseosa ssp. nauseosa var. hololeuca<sup>P</sup> -- (rubber rabbitbrush)</b>									
2006	-	-	-	-	-	-	-	-	77/111
2010	40	-	50	50	0	50	0	0	50/48
2013	240	-	25	67	8	8	8	8	62/72
2017	280	-	29	71	0	0	0	0	54/68
2022	120	-	0	67	33	50	0	33	- / -
<b>Gutierrezia sarothrae -- (broom snakeweed)</b>									
2006	20	-	0	100	0	0	0	0	- / -
2010	-	-	-	-	-	-	-	-	34/44
2013	-	-	-	-	-	-	-	-	- / -
2017	40	-	0	100	0	0	0	0	29/38
2022	920	-	2	98	0	0	0	0	- / -

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

**Table 16R-24.15 - Deer Desirable Components Index: Upland 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	0.0	0.0	0.0	0.0	-8.7	0.1	-4.0	-12.6	Very Poor
2010	0.1	0.0	0.0	25.0	-0.6	0.1	-6.0	18.6	Very Poor
2013	1.1	0.0	0.0	25.2	-0.5	0.5	-6.0	20.2	Very Poor
2017	2.4	0.0	0.0	30.0	-5.9	0.1	-6.0	20.5	Very Poor
2022	0.4	0.0	0.0	30.0	-5.9	0.3	-6.0	18.8	Very Poor

## BEAR RANCH - STUDY NO. 16R-50



### Location Information

USGS 7.5 min Map Info  
GPS (0' Stake)

Mount Pleasant SE; Township 15S, Range 5E, Section 07  
NAD 83 UTM ZONE 12, 465496 East 4374859 North

### Transect Information

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

Not Available  
275° magnetic (Lines 2-3: 265° magnetic, Lines 4-5: 245° magnetic)  
500ft  
Line 1 (11ft), Line 2 (34ft), Line 3 (59ft), Line 4 (71ft), Line 5 (95ft)  
Standard

### Directions to Site

From US-89 in Mt. Pleasant, turn east onto Hawk Boulevard and drive for 1.4 miles. Turn right (south) and drive for 0.2 miles to where the Bear Mt. Ranch gate should be. After the gate, drive 0.9 miles and cross a cattle guard; keep driving to another cattle guard. After the second cattle guard, drive 0.3 miles and take the road off to the right; in 0.5 miles there will be another gate. After passing through this gate, drive for 0.3 miles. The transect will be to the right: there is no witness post.

**Site Information**

Land Ownership	Private
Land Administrator	Private
Allotment	No data
Elevation	6,740ft (2,054m)
Aspect	West
Slope	5%
Sample Dates	07/03/2013, 06/01/2017, 07/06/2022

**Table 16R-50.1 Disturbance History.** Recorded history of major disturbances.

Treatment/Disturbance	Name	WRI DB#	Date	Size (acres)
Seeding - Dribbler	Bear Mountain CWMU Habitat Enhancement	2602	October-December 2013	232
Seeding - Aerial After	Bear Mountain CWMU Habitat Enhancement	2602	February 2014	232
Chaining - Two-Way Ely	Bear Mountain CWMU Habitat Enhancement	2602	October-December 2013	232
Seeding - Aerial Before	Bear Mountain CWMU Habitat Enhancement	2602	October 2013	232

**Table 16R-50.2 Seed Mix.** List of known seeded plant species and rates (if available).

Mix Name			Application Type	Application Date	Acres
Bear Mtn CWMU			Aerial	Oct 2013	300
Type	Species	Common Name	Cultivar/Source ID	Bulk lbs/acre	PLS
G	Achnatherum hymenoides	Indian Ricegrass	Nezpar	1.00	0.97
G	Agropyron cristatum	Crested Wheatgrass	Hycrest	1.00	0.87
G	Dactylis glomerata	Orchardgrass	Paiute	0.50	0.43
G	Leymus cinereus	Great Basin Wildrye	DWR IntMtn Tetra	0.50	0.43
G	Pascopyrum smithii	Western Wheatgrass	Arriba	1.00	0.89
G	Poa secunda	Sandberg Bluegrass	UP/Colorado Plateau	0.52	0.38
G	Pseudoroegneria spicata	Bluebunch Wheatgrass	Anatone	1.50	1.35
F	Helianthus annuus	Annual Sunflower	Utah UT	0.50	0.48
F	Linum lewisii	Lewis Flax	Maple Grove	0.49	0.43
F	Medicago sativa	Alfalfa	Ladak	2.00	1.83
F	Melilotus officinalis	Yellow Sweetclover		0.50	0.44
F	Onobrychis viciifolia	Sainfoin	Delaney	2.00	1.96
F	Sanguisorba minor	Small Burnet		2.00	1.84

Mix Name			Application Type	Application Date	Acres
Bear Mtn CWMU Dribbler			Dribbler	Oct 2013	300
Type	Species	Common Name	Cultivar/Source ID	Bulk lbs/acre	PLS
S	Atriplex canescens	Fourwing Saltbush	Juab, Utah, Carbon	0.25	0.12
S	Cercocarpus ledifolius	Curleaf Mountain Mahogany	Sevier UT	0.25	0.20
S	Ephedra viridis	Green Ephedra	Emery UT	0.25	0.23
S	Purshia tridentata	Bitterbrush	Oneida, ID	0.25	0.21

Mix Name			Application Type	Application Date	Acres
Bear Mountain Shrubs			Aerial	Feb 2014	300
Type	Species	Common Name	Cultivar/Source ID	Bulk lbs/acre	PLS
F	Medicago sativa	Alfalfa	Ranger NC	0.50	0.47
S	Artemisia tridentata ssp. vaseyana	Mountain Big Sagebrush	Beaver UT	0.53	0.23
S	Bassia prostrata	Forage Kochia	Beaver UT	0.50	0.31
S	Bassia prostrata	Forage Kochia	Snowstorm	0.67	0.36

**Wildlife Habitat and Vegetation History**

**Table 16R-50.3 - Wildlife Seasonal Habitat.** DWR wildlife habitat and seasonality.

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

**Table 16R-50.4 - Vegetation History.** The dominant vegetation type(s) and phase of woodland succession (Tausch, Miller, Roundy, & Chambers, 2009).

Year	Vegetation Type	Woodland Succession
2013	Juniper/Gambel Oak	Phase III
2017	Gambel Oak/Annual Grass	Phase I
2022	Gambel Oak/Perennial Grass	Phase I

**Site Notes**

There are game trails and evidence of bedding on the site, and Bear Ranch is not far from the study area. Rebar is likely present on all belts -- it was not actively searched for in 2022 because of the amount of litter, but was found on belt three in that sample year.

**Site Potential**

1981 - 2010 Average Annual Precipitation	19 inches
NRCS Ecological Site	Mountain Gravelly Loam (Oak)
NRCS Ecological Site #	R047XA410UT
States and Transitions	No state and transition model is available for this ecological site.

When established in 2013, this study site was dominated by Utah juniper (*Juniperus osteosperma*) and Gambel oak (*Quercus gambelii*) and all other browse species provided little cover. A chaining and seeding treatment later that year (Table 16R-50.1) removed much of the tree cover. Density of oak plants increased, and the site transitioned to one dominated by oak; diversity of browse species also increased (Table 16R-50.12, Table 16R-50.13, Table 16R-50.14). The herbaceous understory has remained diverse, though it was not abundant prior to treatment. In 2017, the introduced annual grass cheatgrass (*Bromus tectorum*) increased in both cover and frequency and became a co-dominant site component, but was nearly absent in 2022. Annual forb cover also increased, mainly due to the introduced species desert madwort (*Alyssum desertorum*). Desert madwort, however, had a notable decrease in 2022 and lent to the overall decrease in annual forbs. Perennial forb cover also increased to a lesser extent between 2012 and 2017, but decreased slightly in 2022. Finally, the introduced and noxious annual forb species gypsyflower (*Cynoglossum officinale*) was sampled for the first time in 2017, but was absent in 2022. However, nodding plumeless thistle (*Carduus nutans*) was also sampled in 2017 and has persisted (Table 16R-50.7, Table 16R-50.10, Table 16R-50.11).

**Trend Summary Tables****Table 16R-50.6 - Shrub/Tree Summary.** Average modified Daubenmire quadrat and line intercept cover by year for shrubs/trees

Year	Quadrat Cover (%)			Line-intercept Cover (%)		
	Preferred Shrub	Other Shrub	Tree	Preferred Shrub	Other Shrub	Tree
2013	20.8	0.0	2.5	30.0	0.1	47.8
2017	10.9	0.5	0.8	18.2	0.1	1.6
2022	16.5	3.1	1.1	33.3	2.4	1.5

**Table 16R-50.7 - Herbaceous Summary.** Nested frequency and average modified Daubenmire quadrat cover by year for herbaceous functional groups

Year	Nested Frequency				Quadrat Cover (%)			
	Annual Grass	Perennial Grass	Annual/Biennial Forb	Perennial Forb	Annual Grass	Perennial Grass	Annual/Biennial Forb	Perennial Forb
2013	78	64	131	188	0.5	0.7	0.4	1.5
2017	290	229	355	119	15.2	11.1	14.9	4.9
2022	23	266	292	101	0.1	27.7	6.1	3.8

**Table 16R-50.8 - Basic Ground Cover.** Average modified Daubenmire quadrat cover by year for basic ground cover types.

Year	Cover Type (%)					
	Bare Ground	Cryptogams	Litter	Pavement	Rock	Vegetation
2013	15.7	3.6	59.0	2.0	5.5	27.6
2017	11.1	-	63.8	3.7	3.4	54.5
2022	19.8	-	64.8	3.9	4.1	46.4

**Table 16R-50.9 - Pellet Group Data.** Quadrat frequency and pellet group transect data for animal pellets. Rabbit pellet groups are not sampled in the pellet group transect.

Year	Cattle	Mule Deer/Domestic Sheep	Rocky Mountain Elk	Rabbit
	Quadrat Frequency			
2013	-	9	1	12
2017	3	13	3	14
2022	-	14	15	18
Year	Days Use Per Acre (ha)			
2013	2.2 (5.4)	22.8 (56.3)	10.7 (26.5)	-
2017	-	18.1 (44.7)	8.1 (19.9)	-
2022	2.9 (7.2)	22.8 (56.3)	26.2 (64.6)	-

**Table 16R-50.10 - Grass Species.** Nested frequency and modified Daubenmire average cover by year.

GRASS SPECIES	Achnatherum hymenoides (Indian ricegrass)	Achnatherum lettermanii (Letterman's needlegrass)	Agropyron cristatum <sup>i</sup> (crested wheatgrass)	Bromus arvensis <sup>ai</sup> (field brome)	Bromus tectorum <sup>ai</sup> (cheatgrass)	Carex rossii (Ross' sedge)	Dactylis glomerata <sup>i</sup> (orchardgrass)	Elymus elymoides (squirreltail)	Leymus cinereus (basin wildrye)	Pascopyrum smithii (western wheatgrass)	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													
2013	22	5	-	-	78	4	-	10	-	-	14	13	-	-
2017	7	9	62	-	290	29	25	19	5	18	35	8	84	-
2022	33	-	84	3	20	15	1	58	13	71	13	16	108	1
year	Average Cover (%)													
2013	0.5	0.0	-	-	0.5	0.0	-	0.1	-	-	0.0	0.1	-	-
2017	0.1	0.1	1.9	-	15.2	1.6	1.4	0.5	0.4	0.6	1.4	0.4	2.7	-
2022	1.5	-	4.9	0.0	0.0	0.7	0.0	3.4	1.5	4.2	0.3	0.3	10.7	0.1

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

**Table 16R-50.11 - Forb Species.** Nested frequency and modified Daubenmire average cover by year.

FORB SPECIES	Achillea millefolium (Common yarrow)	Agoseris glauca (pale agoseris)	Alyssum alyssoides <sup>ai</sup> (pale madwort)	Artemisia ludoviciana (white sagebrush)	Astragalus argophyllus (silverleaf milkvetch)	Astragalus convallarius (lesser rushy milkvetch)	Astragalus utahensis (Utah milkvetch)	Camelina microcarpa <sup>ai</sup> (littledod false flax)	Carduus nutans <sup>ani</sup> (nodding plumeless thistle)	Ceratocephala testiculata <sup>ai</sup> (curveseed butterwort)	Chaenactis douglasii (Douglas' dustymaiden)	Cirsium (thistle)	Collinsia parviflora <sup>a</sup> (maiden blue eyed Mary)	Comandra umbellata (bastard toadflax)	Cryptantha (cryptantha)	Cymopterus (springparsley)	Cynoglossum officinale <sup>ani</sup> (gypsyflower)
year	Nested Frequency																
2013	1	-	22	-	-	19	2	-	-	52	1	-	7	2	1	7	-
2017	18	-	309	-	5	9	1	3	52	8	2	2	-	7	-	12	10
2022	27	10	290	5	6	20	-	-	15	42	-	3	-	-	-	6	-
year	Average Cover (%)																
2013	0.0	-	0.1	-	-	0.1	0.0	-	-	0.1	0.0	-	0.0	0.0	0.0	0.0	-
2017	1.3	-	11.2	-	0.0	0.0	0.0	0.0	2.0	0.1	0.0	0.0	-	0.0	-	0.1	0.4
2022	1.1	0.1	4.9	0.4	0.1	0.4	-	-	0.7	0.4	-	0.0	-	-	-	0.0	-

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

FORB SPECIES																		
Descurainia pinnata <sup>a</sup> (western tansymustard)																		
Erigeron eatonii (Eaton's fleabane)																		
Erodium cicutarium <sup>ai</sup> (redstem stork's bill)																		
Hackelia patens (spotted stickseed)																		
Helianthus annuus <sup>ai</sup> (common sunflower)																		
Lactuca serriola <sup>ai</sup> (prickly lettuce)																		
Linum perenne <sup>i</sup> (blue flax)																		
Lomatium (desertparsley)																		
Medicago sativa <sup>i</sup> (alfalfa)																		
Melilotus officinalis <sup>i</sup> (sweetclover)																		
Microsteris gracilis <sup>a</sup> (slender phlox)																		
Onobrychis vicifolia <sup>i</sup> (sainfoin)																		
Packera multilobata (lobeleaf groundsel)																		
Penstemon (beardtongue)																		
Penstemon humilis (low beardtongue)																		
Phlox austromontana (mountain phlox)																		
Phlox longifolia (longleaf phlox)																		
year	Nested Frequency																	
2013	-	3	-	2	-	-	-	-	-	-	91	-	-	15	-	1	113	
2017	10	1	12	9	4	69	34	-	4	8	-	1	-	-	9	-	1	
2022	-	-	-	22	-	-	1	1	8	-	-	-	2	-	7	0	12	
year	Average Cover (%)																	
2013	-	0.0	-	0.0	-	-	-	-	-	-	0.2	-	-	0.2	-	0.0	0.7	
2017	0.0	0.0	0.4	0.2	0.0	0.6	0.8	-	0.0	0.7	-	0.0	-	-	0.2	-	0.0	
2022	-	-	-	0.6	-	-	0.0	0.0	0.3	-	-	-	0.0	-	0.2	0.0	0.0	

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

FORB SPECIES									
Polygonum douglasii <sup>ai</sup> (Douglas' knotweed)									
Sanguisorba minor <sup>i</sup> (small burnet)									
Silene antirrhina <sup>a</sup> (sleepy silene)									
Streptanthus cordatus (heartleaf twistflower)									
Symphoricarichum ascendens (western aster)									
Tragopogon dubius <sup>ai</sup> (yellow salsify)									
Veronica bitoba <sup>ai</sup> (two-lobe speedwell)									
Vicia americana (American vetch)									
year	Nested Frequency								
2013	4	-	3	1	47	-	7	6	
2017	1	30	-	1	12	9	2	3	
2022	-	7	-	3	8	13	-	-	
year	Average Cover (%)								
2013	0.0	-	0.0	0.0	0.3	-	0.0	0.1	
2017	0.0	1.3	-	0.0	0.2	0.1	0.0	0.0	
2022	-	0.3	-	0.0	0.2	0.1	-	-	

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



**Table 16R-50.12 - Shrub and Tree Species.** Average modified Daubenmire quadrat and line intercept cover by year.

SHRUB SPECIES	Amelanchier utahensis <sup>p</sup> (Utah serviceberry)	Artemisia tridentata ssp. vaseyana <sup>p</sup> (mountain big sagebrush)	Bassia prostrata <sup>pi</sup> (forage kochia)	Cercocarpus montanus <sup>p</sup> (alderleaf mountain mahogany)	Chrysothamnus viscidiflorus ssp. viscidiflorus var. viscidiflorus (yellow rabbitbrush)	Gutierrezia sarothrae (broom snakeweed)	Juniperus osteosperma <sup>i</sup> (Utah juniper)	Mahonia repens (creeping barberry)	Pinus edulis <sup>i</sup> (twoneedle pinyon)	Purshia tridentata <sup>p</sup> (antelope bitterbrush)	Quercus gambelii <sup>p</sup> (Gambel oak)	Symphoricarpos oreophilus <sup>p</sup> (mountain snowberry)
year	Line Intercept Cover (%)											
2013	-	-	-	0.5	-	-	47.8	0.1	-	2.3	26	1.2
2017	-	-	-	-	-	0.1	1.6	0	-	2.1	15	1.1
2022	0.2	0.2	-	-	0.3	2.1	1.5	0	-	3.1	29.4	0.4
year	Quadrat Cover (%)											
2013	0.0	-	-	0.4	-	-	2.5	0.0	0.0	1.6	18.0	0.8
2017	-	-	0.1	-	0.2	0.3	0.6	0.0	0.1	0.5	9.8	0.6
2022	0.0	0.1	0.0	-	1.2	1.9	1.1	0.0	-	1.2	14.5	0.6

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

**Table 16R-50.13 - Shrub/Tree Characteristics.** Population characteristics of shrub/tree species populations including density reproduction (seedlings), age distribution, utilization, vigor and average size (height/crown) of plants.

Year	Density		Age Class Distribution			Utilization		Poor Vigor (%)	Average Height Crown (cm)
	Plants Per Acre		Excluding Seedlings			Moderate (%)	Heavy (%)		
	Excluding Seedlings	Seedling	Young (%)	Mature (%)	Decadent (%)				
<b>Amelanchier utahensis<sup>p</sup> -- (Utah serviceberry)</b>									
2013	20	40	0	100	0	100	0	100	168/95
2017	-	-	-	-	-	-	-	-	-/-
2022	80	-	75	25	0	25	0	0	-/-
<b>Artemisia tridentata ssp. vaseyana<sup>p</sup> -- (mountain big sagebrush)</b>									
2013	-	-	-	-	-	-	-	-	-/-
2017	80	-	25	75	0	0	0	0	33/36
2022	160	-	25	75	0	25	50	0	-/-
<b>Bassia prostrata<sup>pi</sup> -- (forage kochia)</b>									
2013	-	-	-	-	-	-	-	-	-/-
2017	240	-	25	75	0	0	17	0	17/30
2022	60	-	33	67	0	0	0	0	-/-
<b>Cercocarpus montanus<sup>p</sup> -- (alderleaf mountain mahogany)</b>									
2013	60	-	67	33	0	67	33	33	47/82
2017	-	-	-	-	-	-	-	-	49/47
2022	-	-	-	-	-	-	-	-	-/-
<b>Chrysothamnus viscidiflorus ssp. viscidiflorus var. viscidiflorus -- (yellow rabbitbrush)</b>									
2013	-	-	-	-	-	-	-	-	-/-
2017	180	-	0	100	0	11	0	0	23/31
2022	300	20	27	73	0	0	0	0	-/-
<b>Eriogonum heracleoides -- (parsnipflower buckwheat)</b>									
2013	20	-	0	100	0	0	0	0	10/7
2017	-	-	-	-	-	-	-	-	-/-
2022	-	-	-	-	-	-	-	-	-/-
<b>Ericameria nauseosa -- (rubber rabbitbrush)</b>									
2013	-	-	-	-	-	-	-	-	-/-
2017	20	-	0	100	0	0	0	0	-/-
2022	20	-	0	100	0	0	0	0	-/-

Year	Density		Age Class Distribution			Utilization		Poor Vigor (%)	Average Height Crown (cm)
	Plants Per Acre		Excluding Seedlings			Moderate (%)	Heavy (%)		
	Excluding Seedlings	Seedling	Young (%)	Mature (%)	Decadent (%)				
<b>Gutierrezia sarothrae -- (broom snakeweed)</b>									
2013	-	-	-	-	-	-	-	-	15/11
2017	180	60	0	100	0	0	0	0	19/25
2022	1440	-	0	100	0	0	0	0	- / -
<b>Juniperus osteosperma<sup>1</sup> -- (Utah juniper)</b>									
2013	180	60	33	67	0	0	0	11	- / -
2017	60	-	33	67	0	0	0	33	- / -
2022	140	-	57	43	0	0	0	0	- / -
<b>Linanthus pungens -- (granite prickly phlox)</b>									
2013	20	-	0	0	100	0	100	100	5/12
2017	-	-	-	-	-	-	-	-	- / -
2022	-	-	-	-	-	-	-	-	- / -
<b>Mahonia repens -- (creeping barberry)</b>									
2013	800	20	5	95	0	0	0	0	6/10
2017	660	-	0	100	0	0	0	0	7/8
2022	200	-	0	100	0	0	0	0	- / -
<b>Pinus edulis<sup>1</sup> -- (twoneedle pinyon)</b>									
2013	-	20	0	0	0	0	0	0	- / -
2017	20	-	0	100	0	0	0	0	- / -
2022	-	-	-	-	-	-	-	-	- / -
<b>Purshia tridentata<sup>p</sup> -- (antelope bitterbrush)</b>									
2013	560	-	0	100	0	86	4	0	30/104
2017	500	-	52	48	0	40	60	0	22/71
2022	540	-	4	96	0	4	89	0	- / -
<b>Quercus gambelii<sup>p</sup> -- (Gambel oak)</b>									
2013	5220	440	56	44	0	4	0	0	62/62
2017	7820	20	10	90	0	23	30	1	59/54
2022	8820	40	20	78	2	27	5	2	- / -
<b>Rosa woodsii<sup>p</sup> -- (Woods' rose)</b>									
2013	-	-	-	-	-	-	-	-	- / -
2017	20	-	0	100	0	0	0	0	26/24
2022	80	-	50	50	0	0	25	0	- / -
<b>Symphoricarpos oreophilus<sup>p</sup> -- (mountain snowberry)</b>									
2013	820	40	37	63	0	5	5	17	21/33
2017	760	-	29	71	0	50	0	0	25/37
2022	940	20	28	72	0	9	53	0	- / -

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

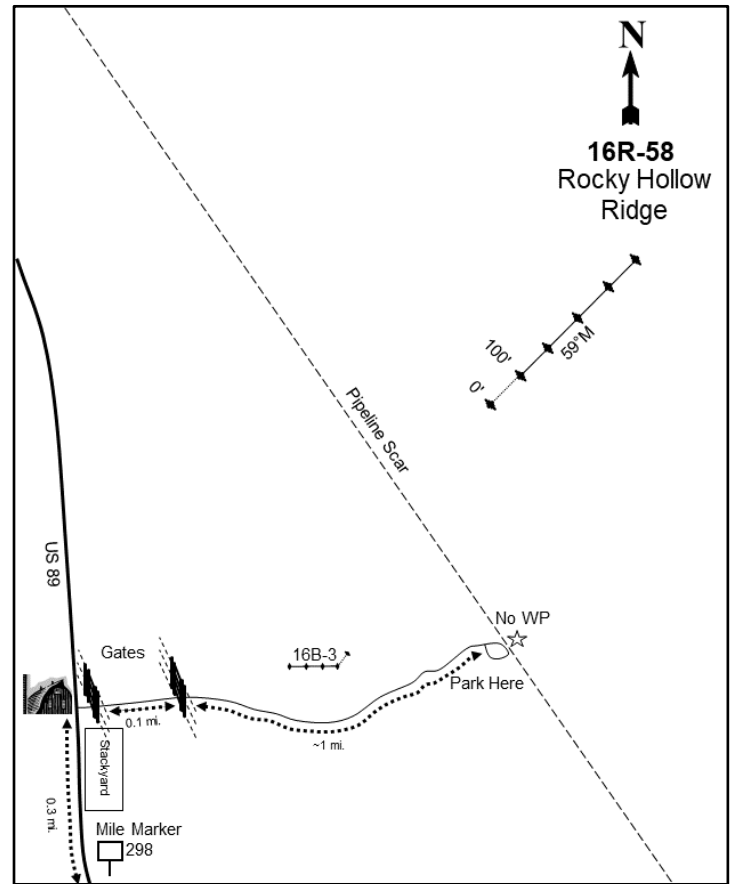
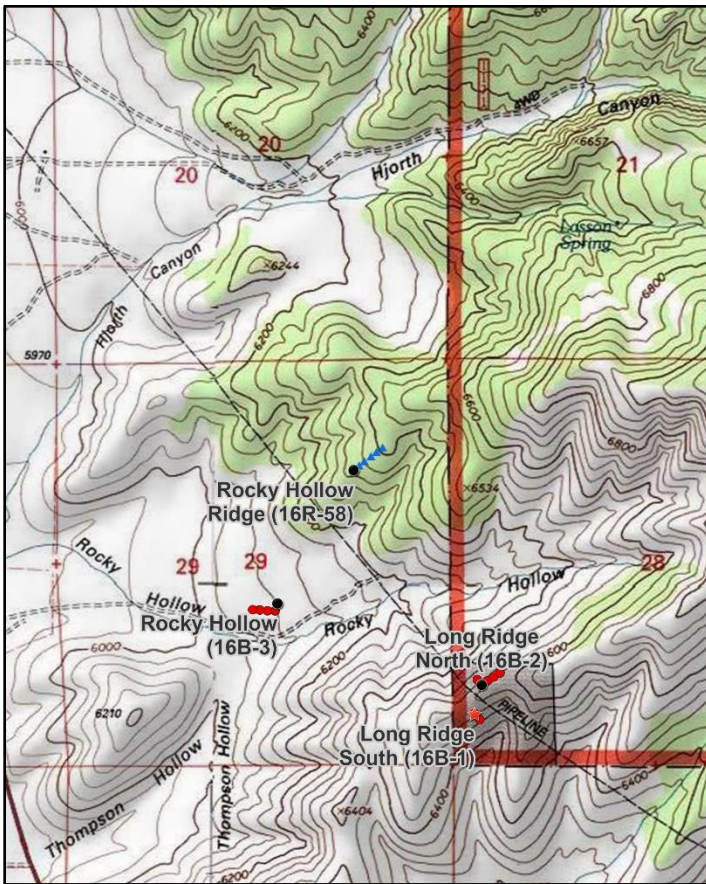
**Table 16R-50.14 - Tree Characteristics.** Point-quarter tree density, size class distribution, and average diameter.

Year	Density	Size Class Distribution					Average Diameter (cm)
	Trees per Acre	Seedling (%)	1-4' (%)	4-8' (%)	8-12' (%)	>12' (%)	
<b>Juniperus osteosperma (Utah juniper)</b>							
2013	169	16	11	11	11	53	17.1
2017	74	11	67	22	-	-	5.4
2022	49	13	56	31	-	-	4.6

**Table 16R-50.15 - Deer Desirable Components Index: Mountain Potential Scale.**

Year	Preferred Browse Cover	Preferred Browse Decadence	Preferred Browse Young	Perennial Grass Cover	Annual Grass Cover	Perennial Forb Cover	Noxious Weeds	Total Score	Ranking
2013	30.0	15.0	15.0	1.4	-0.4	3.0	0.0	64.0	Fair
2017	19.3	15.0	8.0	22.1	-11.4	9.8	-4.0	58.8	Fair
2022	30.0	14.5	9.6	30.0	-0.1	7.6	-2.0	89.7	Good-Excellent

## ROCKY HOLLOW RIDGE - STUDY NO. 16R-58



### Location Information

USGS 7.5 min Map Info  
GPS (0' Stake)

Indianola NW; Township 11S, Range 4E, Section 29  
NAD 83 UTM ZONE 12, 457722 East 4409835 North

### Transect Information

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

Not Available  
42° magnetic  
500ft  
Line 1 (11ft), Line 2 (34ft), Line 3 (59ft), Line 4 (71ft), Line 5 (95ft)  
Standard

### Directions to Site

On US-89, travel 0.3 miles past mile marker 298 to a road and a gate on the right-hand (east) side of the road. Turn right, pass through the gate, and continue 0.1 miles to another gate. Pass through the gate, travel about 1 mile on a rocky road to a parking area and a wooden fence, and park; there is no witness post. Using a GPS, walk along the pipeline scar and up the ridge to the site, which is roughly 0.3 miles from the parking area. There are no stakes or rebar markers.

**Site Information**

Land Ownership	State
Land Administrator	DWR
Allotment	No data
Elevation	6,320ft (1,926m)
Aspect	Southwest
Slope	15-20%
Sample Dates	09/07/2021, 08/31/2022

**Table 16R-58.1 Disturbance History.** Recorded history of major disturbances.

Treatment/Disturbance	Name	WRI DB#	Date	Size (acres)
Mechanical - Bullhog	Thistle Creek Watershed Restoration Phase 2	5558	Winter 2021-2022	743
Seeding - Aerial Before	Thistle Creek Watershed Restoration Phase 2	5558	Fall 2021	743

**Table 16R-58.2 Seed Mix.** List of known seeded plant species and rates (if available).

Mix Name			Application Type	Application Date	Acres
Thistle Creek Bullhog			Aerial	Oct 2021	791
Type	Species	Common Name	Cultivar/Source ID	Bulk lbs/acre	PLS
G	<i>Bromus marginatus</i>	Mountain Brome	Bromar	1.01	0.93
G	<i>Dactylis glomerata</i>	Orchardgrass	Profile	0.51	0.46
G	<i>Leymus cinereus</i>	Great Basin Wildrye	Tetra	0.51	0.38
G	<i>Pascopyrum smithii</i>	Western Wheatgrass	Arriba	2.02	1.62
G	<i>Pseudoroegneria spicata</i>	Bluebunch Wheatgrass	Columbia	2.02	1.94
F	<i>Achillea millefolium</i>	Western Yarrow	Eagle	0.10	0.08
F	<i>Cleome serrulata</i>	Rocky Mountain Beeplant	Kane UT	0.66	0.53
F	<i>Cleome serrulata</i>	Rocky Mountain Beeplant	Sanpete UT	0.32	0.30
F	<i>Medicago sativa</i>	Alfalfa	Ladak	1.01	0.96
F	<i>Medicago sativa</i> ssp. <i>falcata</i>	Yellow Alfalfa	Don	0.70	0.69
F	<i>Medicago sativa</i> ssp. <i>falcata</i>	Yellow Alfalfa	Don	0.32	0.31
F	<i>Penstemon palmeri</i>	Palmer Penstemon	Iron UT	0.10	0.07
F	<i>Sanguisorba minor</i>	Small Burnet	Delar	1.01	0.94
S	<i>Artemisia tridentata</i> ssp. <i>vaseyana</i>	Mountain Big Sagebrush	Wasatch UT	2.02	0.67
S	<i>Bassia prostrata</i>	Forage Kochia	Millard/Beaver UT	0.25	0.21
S	<i>Cercocarpus ledifolius</i>	Curleaf Mountain Mahogany		0.18	0.15

**Wildlife Habitat and Vegetation History****Table 16R-58.3 - Wildlife Seasonal Habitat.** DWR wildlife habitat and seasonality.

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

**Table 16R-58.4 - Vegetation History.** The dominant vegetation type(s) and phase of woodland succession (Tausch, Miller, Roundy, & Chambers, 2009).

Year	Vegetation Type	Woodland Succession
2021	Juniper	Phase III
2022	Perennial Grass	Phase I

**Site Notes**

No Notes

**Site Potential**

1981 - 2010 Average Annual Precipitation	17 inches
NRCS Ecological Site	Mountain Stony Loam (Mountain Big Sagebrush)
NRCS Ecological Site #	R047XC462UT
States and Transitions	No state or transition model is available for this ecological site.

Upon study establishment in 2021, this site was dominated by Utah juniper (*Juniperus osteosperma*) and was considered to be within Phase III of woodland succession (Table 16R-58.6, Table 16R-58.12, Table 16R-58.13). Following the bullhog treatment (Table 16R-58.1), juniper trees were effectively removed and the site was considered to be in Phase I in 2022. Browse species such as mountain big sagebrush (*Artemisia tridentata* ssp. *vaseyana*), antelope bitterbrush (*Purshia tridentata*), and Gambel oak (*Quercus gambelii*) were present, but contributed little cover in 2021; little change in density or cover was observed in 2022 (Table 16R-58.4, Table 16R-58.12, Table 16R-58.13, Table 16R-58.14). The herbaceous understory has been present in moderate amounts, with the perennial grass species bluebunch wheatgrass (*Pseudoroegneria spicata*) contributing a majority of the cover in 2021 and 2022. The introduced annual grass species cheatgrass (*Bromus tectorum*) and field brome (*B. arvensis*) were observed, but in lower amounts than perennial grasses in 2021. However, cheatgrass increased in cover in 2022 and was co-dominant with bluebunch wheatgrass. Both perennial and annual forbs were rare, but increased in diversity following the bullhog due to both disturbance and introduction through seeding (Table 16R-58.7, Table 16R-58.10, Table 16R-58.11).

**Trend Summary Tables**

**Table 16R-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
2021	1.5	3.0	7.1	2.5	5.2	41.3
2022	1.0	1.2	0.2	1.4	1.4	0.3

**Table 16R-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
2021	157	244	12	57	1.4	9.3	0.0	0.5
2022	185	216	90	41	5.1	7.5	1.3	0.4

**Table 16R-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
2021	11.3	7.3	47.6	14.7	17.9	22.6
2022	9.4	1.4	72.9	5.1	11.2	14.2

**Table 16R-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	Mule Deer	Rocky Mountain Elk	Rabbit
	Quadrat Frequency		
2021	35	5	16
2022	28	4	15
Year	Days Use Per Acre (ha)		
2021	158.1 (390.6)	17.4 (43.0)	-
2022	63.0 (155.6)	3.4 (8.3)	-

**Table 16R-58.10 - Grass Species.** Nested frequency and modified Daubenmire average cover by year.

GRASS SPECIES										
Achnatherum hymenoides (Indian ricegrass)										
Bromus arvensis <sup>ai</sup> (field brome)										
Bromus tectorum <sup>ai</sup> (cheatgrass)										
Dactylis glomerata <sup>i</sup> (orchardgrass)										
Elymus elymoides (squirreltail)										
Elymus lanceolatus (thickspike wheatgrass)										
Pascopyrum smithii (western wheatgrass)										
Poa fendleriana (muttongrass)										
Poa secunda (Sandberg bluegrass)										
Pseudoroegneria spicata (bluebunch wheatgrass)										
year	Nested Frequency									
2021	-	26	133	-	66	-	-	14	115	153
2022	3	38	174	1	35	5	3	22	90	151
year	Average Cover (%)									
2021	-	0.3	1.2	-	1.3	-	-	0.1	1.0	6.9
2022	0.1	0.6	4.5	0.0	0.9	0.0	0.1	0.5	1.0	5.0

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

**Table 16R-58.11 - Forb Species.** Nested frequency and modified Daubenmire average cover by year.

FORB SPECIES																	
Achillea millefolium (Common yarrow)																	
Agoseris glauca (pale agoseris)																	
Allium acuminatum (tapertip onion)																	
Alyssum alyssoides <sup>ai</sup> (pale madwort)																	
Alyssum desertorum <sup>ai</sup> (desert madwort)																	
Antennaria dimorpha (low pussytoes)																	
Arabis holboellii <sup>a</sup> (Holboell's rockcress)																	
Artemisia ludoviciana (white sagebrush)																	
Ceratocephala testiculata <sup>ai</sup> (curveseed butterwort)																	
Cleome serrulata <sup>a</sup> (Rocky Mountain beelant)																	
Collinsia parviflora <sup>a</sup> (maiden blue eyed Mary)																	
Descurainia pinnata <sup>a</sup> (western tansymustard)																	
Eriogonum racemosum (redroot buckwheat)																	
Eriogonum umbellatum (sulphur-flower buckwheat)																	
Erodium cicutarium <sup>ai</sup> (redstem stork's bill)																	
Gayophytum ramosissimum <sup>a</sup> (pinyon groundsmoke)																	
Hackelia patens (spotted stickseed)																	
year	Nested Frequency																
2021	-	-	-	-	4	-	1	-	-	-	-	4	10	2	1	-	32
2022	1	2	5	10	49	1	3	2	11	6	15	11	5	-	-	4	1
year	Average Cover (%)																
2021	-	-	-	-	0.0	-	0.0	-	-	-	-	0.0	0.1	0.0	0.0	-	0.2
2022	0.0	0.0	0.0	0.3	0.4	0.0	0.0	0.0	0.0	0.2	0.0	0.3	0.2	-	-	0.0	0.0

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

FORB SPECIES										
<i>Lactuca scariola</i> <sup>ai</sup> (prickly lettuce)										
<i>Lappula occidentalis</i> <sup>a</sup> (flatspine stickseed)										
<i>Lithospermum ruderale</i> (western stoneseed)										
<i>Lomatium nevadense</i> (Nevada biscuitroot)										
<i>Medicago sativa</i> <sup>i</sup> (alfalfa)										
<i>Microsteris gracilis</i> <sup>a</sup> (slender phlox)										
<i>Phlox longifolia</i> (longleaf phlox)										
<i>Polygonum douglasii</i> <sup>a</sup> (Douglas' knotweed)										
<i>Sphaeralcea coccinea</i> (scarlet globemallow)										
<i>Vicia americana</i> (American vetch)										
year	Nested Frequency									
2021	-	-	1	-	-	-	18	3	-	6
2022	0	7	-	4	3	1	18	2	1	-
year	Average Cover (%)									
2021	-	-	0.0	-	-	-	0.1	0.0	-	0.0
2022	0.0	0.1	-	0.0	0.0	0.0	0.0	0.0	0.0	-

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

**Table 16R-58.12 - Shrub and Tree Species.** Average modified Daubenmire quadrat and line intercept cover by year.

SHRUB SPECIES										
<i>Amelanchier utahensis</i> <sup>p</sup> (Utah serviceberry)										
<i>Artemisia tridentata</i> ssp. <i>vaseyana</i> <sup>p</sup> (mountain big sagebrush)										
<i>Atriplex canescens</i> <sup>p</sup> (fourwing saltbush)										
<i>Chrysothamnus viscidiflorus</i> ssp. <i>viscidiflorus</i> var. <i>viscidiflorus</i> (yellow rabbitbrush)										
<i>Juniperus osteosperma</i> <sup>i</sup> (Utah juniper)										
<i>Opuntia polyacantha</i> (plains pricklypear)										
<i>Purshia tridentata</i> <sup>p</sup> (antelope bitterbrush)										
<i>Quercus gambelii</i> <sup>p</sup> (Gambel oak)										
<i>Symphoricarpos oreophilus</i> <sup>p</sup> (mountain snowberry)										
year	Line Intercept Cover (%)									
2021	-	0.2	-	0.5	41.3	4.7	1.6	0.6	0.1	
2022	0.1	-	0	0.3	0.3	1.1	1	0.2	0.1	
year	Quadrat Cover (%)									
2021	-	0.0	-	0.2	7.1	2.8	1.0	0.3	0.2	
2022	0.0	0.2	0.0	0.1	0.2	1.2	0.3	0.5	0.0	

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

**Table 16R-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>Amelanchier utahensis</b> <sup>p</sup> -- (Utah serviceberry)									
2021	20	-	0	0	100	0	0	100	- / -
2022	20	-	100	0	0	0	0	0	- / -
<b>Artemisia tridentata</b> ssp. <i>vaseyana</i> <sup>p</sup> -- (mountain big sagebrush)									
2021	60	-	0	0	100	100	0	100	- / -
2022	80	40	25	0	75	0	50	75	- / -
<b>Atriplex canescens</b> <sup>p</sup> -- (fourwing saltbush)									
2021	-	-	-	-	-	-	-	-	- / -
2022	20	-	100	0	0	0	0	0	- / -
<b>Chrysothamnus viscidiflorus</b> ssp. <i>viscidiflorus</i> var. <i>viscidiflorus</i> -- (yellow rabbitbrush)									
2021	720	-	6	19	75	3	47	86	- / -
2022	540	-	19	82	0	4	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>Gutierrezia sarothrae -- (broom snakeweed)</b>									
2021	-	-	-	-	-	-	-	-	- / -
2022	20	-	0	100	0	0	0	0	- / -
<b>Juniperus osteosperma<sup>i</sup> -- (Utah juniper)</b>									
2021	240	-	17	67	17	8	0	17	- / -
2022	80	-	75	0	25	0	25	25	- / -
<b>Opuntia polyacantha -- (plains pricklypear)</b>									
2021	2240	-	2	80	19	0	0	19	- / -
2022	1980	-	1	93	6	0	0	6	- / -
<b>Purshia tridentata<sup>p</sup> -- (antelope bitterbrush)</b>									
2021	380	-	11	16	74	11	53	79	- / -
2022	260	-	23	54	23	0	85	23	- / -
<b>Quercus gambelii<sup>p</sup> -- (Gambel oak)</b>									
2021	240	-	8	58	33	0	83	42	- / -
2022	200	-	100	0	0	20	40	40	- / -
<b>Symphoricarpos oreophilus<sup>p</sup> -- (mountain snowberry)</b>									
2021	300	-	100	0	0	0	0	0	- / -
2022	160	-	100	0	0	13	38	0	- / -

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

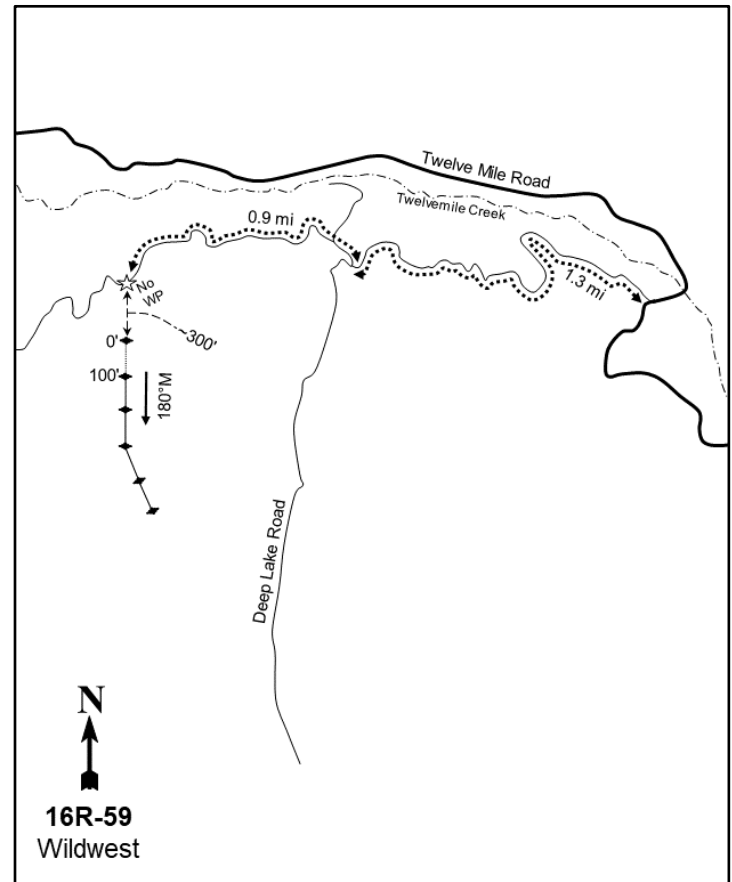
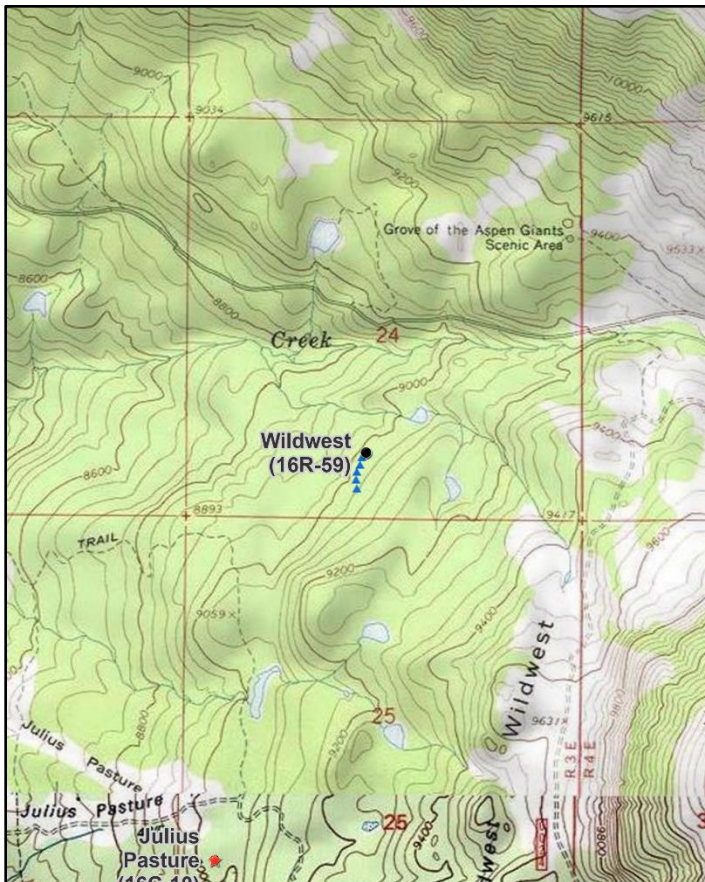
**Table 16R-58.14 - Tree Characteristics.** Point-quarter tree density, size class distribution, and average diameter.

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>							
2021	139	5	-	5	20	70	23.1
2022	22	67	33	-	-	-	3.2

**Table 16R-58.15 - Deer Desirable Components Index: Mountain 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
2021	3.4	0.0	0.0	18.5	-1.1	1.0	0.0	21.8	Very Poor
2022	2.0	0.0	0.0	15.1	-3.8	0.8	0.0	14.0	Very Poor

## WILDWEST - STUDY NO. 16R-59

**Location Information**

USGS 7.5 min Map Info  
GPS (0' Stake)

Black Mountain SE; Township 19S, Range 3E, Section 24  
NAD 83 UTM ZONE 12, 454373 East 4332161 North

**Transect Information**

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

Not Available  
180° 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 junction of 6-Mile Road and Twelve Mile Road, travel for 0.6 miles to an intersection. Turn right (west) on to Old Baldy Guard Station Road and drive for another 1.14 miles to another intersection. Turn right and then turn left at the first opportunity (Cowboy Camp Road). Continue along Cowboy Camp Road for 0.82 miles to the first available parking spot. Use a GPS to locate the 0-foot stake location.

**Site Information**

Land Ownership	Federal
Land Administrator	USFS
Allotment	TWELVE-MILE C & H
Elevation	9,000ft (2,743m)
Aspect	Northwest
Slope	3-10%
Sample Dates	08/18/2022

**Table 16R-59.1 Disturbance History.** Recorded history of major disturbances.

Treatment/Disturbance	Name	WRI DB#	Date	Size (acres)
Fire - Pile and Burn	South Manti Big Game Summer Range Restoration	5658	2022	90000

**Wildlife Habitat and Vegetation History****Table 16R-59.3 - Wildlife Seasonal Habitat.** DWR wildlife habitat and seasonality.

Species	Habitat	Season
Deer	substantial	spring/fall
Mule Deer	substantial	spring/fall
Rocky Mountain Elk	substantial	spring/fall

**Table 16R-59.4 - Vegetation History.** The dominant vegetation type(s) and phase of woodland succession (Tausch, Miller, Roundy, & Chambers, 2009).

Year	Vegetation Type	Woodland Succession
2022	Subalpine Fir	NA

**Site Notes**

No Notes

**Site Potential**

1981 - 2010 Average Annual Precipitation	30 inches
NRCS Ecological Site	High Mountain Loam (Aspen)
NRCS Ecological Site #	F047XA508UT
States and Transitions	No state or transition model is available for this ecological site.

When the study was established in 2022, the plant community on this site was composed mainly of subalpine fir (*Abies lasiocarpa*) and Douglas-fir (*Pseudotsuga menziesii*) with a scattered and young quaking aspen (*Populus tremuloides*) population found throughout the understory (Photos, Table 16R-59.13, Table 16R-59.13a, 16R-59.14). The herbaceous understory consisted of a single grass species, Columbia needlegrass (*Achnatherum nelsonii*), and a diversified, yet sparsely populated forb community (Table 16R-59.10, 16R-59.11). Removal or reduction of conifer trees will likely lead to an increase in understory diversity and health, and promote aspen regeneration. Other implications include a reduction in risk in catastrophic wildfire and increased resilience and resistance to future disturbance.

**Trend Summary Tables**

**Table 16R-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
2022	4.6	0.0	9.1	9.7	0.2	78.7

**Table 16R-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
2022	-	10	77	265	-	0.1	1.6	22.7

**Table 16R-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
2022	0.2	0.2	85.1	0.0	0.4	29.2

**Table 16R-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	Cattle	Mule Deer	Rocky Mountain Elk	Rabbit
	Quadrat Frequency			
2022	2	4	1	4
Year	Days Use Per Acre (ha)			
	2022	4.4 (10.8)	2.0 (5.0)	2.0 (5.0)

**Table 16R-59.10 - Grass Species.** Nested frequency and modified Daubenmire average cover by year.

GRASS SPECIES	
Achnatherum nelsonii (Columbia needlegrass)	
year	Nested
2022	10
year	Average Cover (%)
2022	0.1

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

**Table 16R-59.11 - Forb Species.** Nested frequency and modified Daubenmire average cover by year.

FORB SPECIES	Achillea millefolium (Common yarrow)	Aquilegia coerulea (Colorado blue columbine)	Arnica cordifolia (heartleaf arnica)	Cirsium wheeleri (Wheeler's thistle)	Erigeron eatonii (Eaton's fleabane)	Erigeron speciosus (aspen fleabane)	Eucephalus engelmannii (Engelmann's aster)	Frasera speciosa (elkweed)	Galium <sup>a</sup> (bedstraw)	Geranium richardsonii (Richardson's geranium)	Lathyrus lanszwertii (Nevada pea)	Lupinus argenteus (silvery lupine)	Maianthemum stellatum (starry false lily of the valley)	Mertensia oblongifolia (oblongleaf bluebells)	Osmorhiza depauperata (bluntseed sweetroot)	Pseudostellaria jamesiana (tuber starwort)	Rudbeckia occidentalis (western coneflower)
year	Nested Frequency																
2022	19	10	5	23	7	6	34	9	77	44	81	6	21	7	82	85	19
year	Average Cover (%)																
2022	0.4	0.3	0.2	1.2	0.1	0.3	0.9	0.4	1.6	1.2	4.3	0.6	0.2	0.1	1.7	2.9	0.6

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

FORB SPECIES	Symphotrichum ascendens (western aster)	Symphotrichum eatonii (Eaton's aster)	Taraxacum officinale (common dandelion)	Thalictrum fendleri (Fendler's meadow-rue)	Vicia americana (American vetch)	Viola (violet)
year	Nested Frequency					
2022	5	1	30	13	2	164
year	Average Cover (%)					
2022	0.3	0.0	1.3	0.7	0.1	5.0

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

**Table 16R-59.12 - Shrub and Tree Species.** Average modified Daubenmire quadrat and line intercept cover by year.

SHRUB SPECIES	Abies lasiocarpa <sup>t</sup> (subalpine fir)	Paxistima myrsinites (Oregon boxleaf)	Populus tremuloides <sup>t</sup> (quaking aspen)	Pseudotsuga menziesii <sup>t</sup> (Douglas-fir)	Ribes montigenum <sup>p</sup> (gooseberry currant)	Rosa woodsii <sup>p</sup> (Woods' rose)	Symphoricarpos oreophilus <sup>p</sup> (mountain snowberry)
year	Line Intercept Cover (%)						
2022	51.2	0.2	19.8	7.7	0.1	0.4	9.2
year	Quadrat Cover (%)						
2022	5.5	0.0	1.5	2.1	0.3	0.9	3.4

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

**Table 16R-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 (%)				
<i>Abies lasiocarpa</i> <sup>t</sup> -- (subalpine fir)									
2022	900	160	51	47	2	0	0	2	- / -
<i>Mahonia repens</i> -- (creeping barberry)									
2022	120	-	0	100	0	0	0	0	- / -
<i>Paxistima myrsinites</i> -- (Oregon boxleaf)									
2022	680	20	15	85	0	0	0	0	- / -
<i>Pseudotsuga menziesii</i> <sup>t</sup> -- (Douglas-fir)									
2022	140	-	29	71	0	0	0	0	- / -
<i>Ribes montigenum</i> <sup>p</sup> -- (gooseberry currant)									
2022	440	-	14	86	0	0	0	0	- / -
<i>Rosa woodsii</i> <sup>p</sup> -- (Woods' rose)									
2022	1160	-	14	86	0	0	0	0	- / -
<i>Symphoricarpos oreophilus</i> <sup>p</sup> -- (mountain snowberry)									
2022	3100	20	8	90	2	11	0	2	- / -

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

**Table 16R-59.13a - 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 (%)	
<i>Populus tremuloides</i> (quaking aspen)								
2022	1880	44	51	-	5	2	11	19

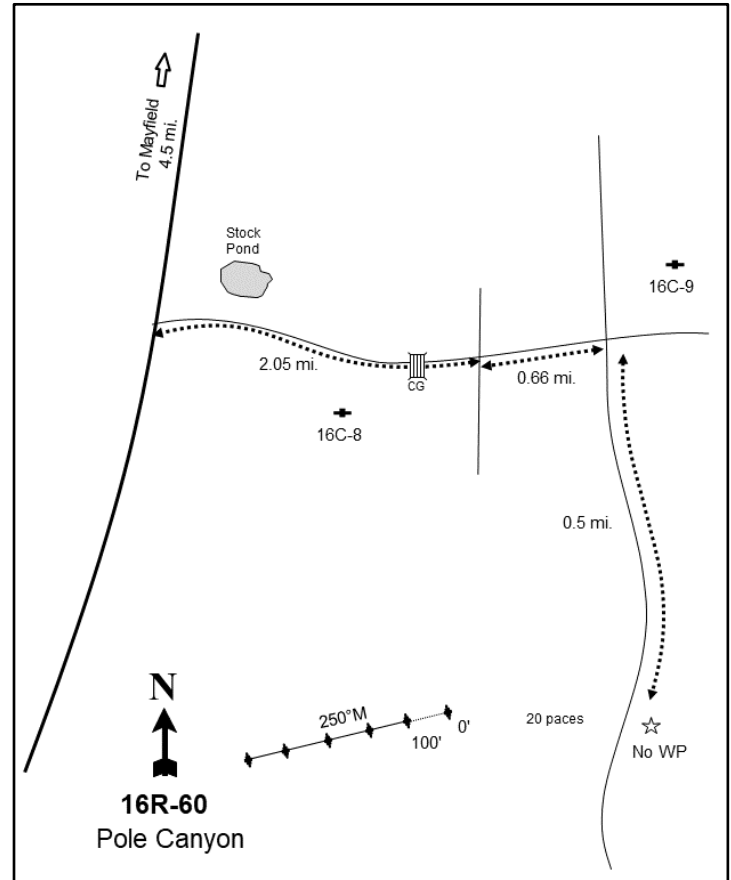
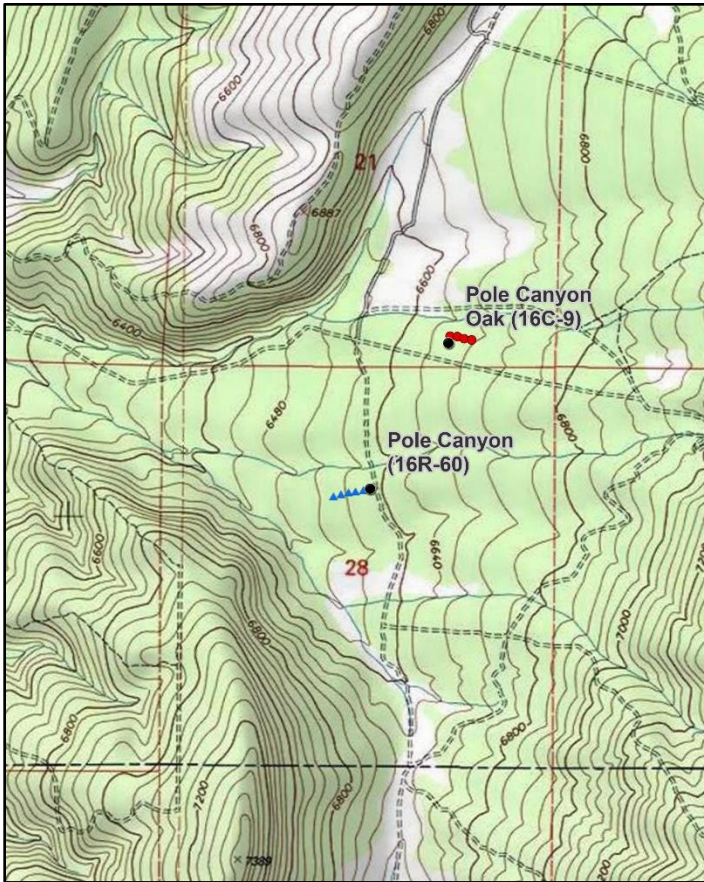
Class I - &lt;= 1.5 feet; Class II - &gt; 1.5 feet to 5 feet; Class III - &gt; 5 feet and up to 1 inch diameter at breast height (dbh); Class IV - &gt; 1 in diameter at breast height (dbh)

**Table 16R-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' (%)	
<i>Abies lasiocarpa</i> (subalpine fir)							
2022	85	25	25	-	-	50	14.3
<i>Populus tremuloides</i> (quaking aspen)							
2022	931	5	55	10	-	30	8.6
<i>Pseudotsuga menziesii</i> (Douglas-fir)							
2022	5	-	-	-	-	100	53.6



## POLE CANYON - STUDY NO. 16R-60

**Location Information**

USGS 7.5 min Map Info  
GPS (0' Stake)

Mayfield SW; Township 20S, Range 2E, Section 28  
NAD 83 UTM ZONE 12, 439854 East 4321739 North

**Transect Information**

Browse Tag # (0' Stake)	Not Available
Transect Bearing	250° magnetic
Length	500ft
Belt Placement	Line 1 (11ft), Line 2 (34ft), Line 3 (59ft), Line 4 (71ft), Line 5 (95ft)
Belt Marker Placement	No Rebar or Stakes

**Directions to Site**

Go south from Main Street in Mayfield through Arapien Valley for 4.5 miles to the Pole Canyon Road. Turn east and travel for 2.05 miles, passing study #16C-8 and crossing a cattle guard to a four-way intersection (South Hollow Road). From the intersection, turn south (right) and travel for another 0.5 miles and park on the east side of the road in the first available pull off. The baseline is located about 10 paces due west, and stakes need to be placed and located by GPS during the next sampling.



**Site Information**

Land Ownership	State
Land Administrator	DWR
Allotment	No data
Elevation	6,600ft (2,012m)
Aspect	West
Slope	5%
Sample Dates	08/30/2022

**Table 16R-60.1 Disturbance History.** Recorded history of major disturbances.

Treatment/Disturbance	Name	WRI DB#	Date	Size (acres)
Mechanical - Bullhog	Twelve Mile Watershed Restoration Project (Proposed)	5916	2023	759
Seeding - Aerial	Twelve Mile Watershed Restoration Project (Proposed)	5916	2023	759

**Wildlife Habitat and Vegetation History****Table 16R-60.3 - Wildlife Seasonal Habitat.** DWR wildlife habitat and seasonality.

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

**Table 16R-60.4 - Vegetation History.** The dominant vegetation type(s) and phase of woodland succession (Tausch, Miller, Roundy, & Chambers, 2009).

Year	Vegetation Type	Woodland Succession
2022	Pinyon-Juniper	Phase III

**Site Notes**

No Notes

**Site Potential**

1981 - 2010 Average Annual Precipitation	17 inches
NRCS Ecological Site	Mountain Gravelly Loam (Oak)
NRCS Ecological Site #	R047XA410UT
States and Transitions	No state or transition model is available for this ecological site.

Upon study establishment in 2022, this site was dominated by Utah juniper (*Juniperus osteosperma*) and twoneedle pinyon (*Pinus edulis*) and was considered to be within Phase III of woodland succession. Browse species such as mountain big sagebrush (*Artemisia tridentata* ssp. *vaseyana*), alderleaf mountain mayhogany (*Cercocarpus montanus*), antelope bitterbrush (*Purshia tridentata*), and Gambel oak (*Quercus gambelii*) were present, but contributed moderate cover. Notable, however, was that few shrubs were considered decadent (Table 16R-60.4, Table 16R-60.12, Table 16R-60.13, Table 16R-60.14). The herbaceous understory was present in low amounts, with the perennial grass species crested wheatgrass (*Agropyron cristatum*) contributing a majority of the cover (Table 16R-60.7, Table 16R-60.10, Table 16R-60.11). It is expected that following the bullhog and seeding treatment (Table 16R-60.1), competition between pinyon-juniper and shrub and herbaceous communities will diminish and forage will improve for wildlife with the expected increase in preferred browse and herbaceous cover.

**Trend Summary Tables**

**Table 16R-60.6 - Shrub/Tree Summary.** Average modified Daubenmire quadrat and line intercept cover by year for shrubs/trees

Year	Quadrat Cover (%)			Line-intercept Cover (%)		
	Preferred Shrub	Other Shrub	Tree	Preferred Shrub	Other Shrub	Tree
2022	19.2	0.0	8.9	31.4	-	24.5

**Table 16R-60.7 - Herbaceous Summary.** Nested frequency and average modified Daubenmire quadrat cover by year for herbaceous functional groups

Year	Nested Frequency				Quadrat Cover (%)			
	Annual Grass	Perennial Grass	Annual/Biennial Forb	Perennial Forb	Annual Grass	Perennial Grass	Annual/Biennial Forb	Perennial Forb
2022	-	183	117	24	-	4.2	0.4	0.2

**Table 16R-60.8 - Basic Ground Cover.** Average modified Daubenmire quadrat cover by year for basic ground cover types.

Year	Cover Type (%)					
	Bare Ground	Cryptogams	Litter	Pavement	Rock	Vegetation
2022	23.3	0.9	52.0	14.3	5.8	30.3

**Table 16R-60.9 - Pellet Group Data.** Quadrat frequency and pellet group transect data for animal pellets. Rabbit pellet groups are not sampled in the pellet group transect.

Year	Cattle	Mule Deer	Rocky Mountain Elk	Rabbit
	Quadrat Frequency			
2022	1	13	2	11
Year	Days Use Per Acre (ha)			
2022	-	57.0 (140.7)	0.7 (1.7)	-

**Table 16R-60.10 - Grass Species.** Nested frequency and modified Daubenmire average cover by year.

GRASS SPECIES	Achnatherum hymenoides (Indian ricegrass)	Agropyron cristatum <sup>i</sup> (crested wheatgrass)	Bromus inermis <sup>i</sup> (smooth brome)	Bromus inermis ssp. inermis var. inermis <sup>i</sup> (smooth brome)	Carex geyeri (Geyer's sedge)	Poa fendleriana (muttongrass)	Poa secunda (Sandberg bluegrass)	Thinopynum intermedium <sup>i</sup> (intermediate wheatgrass)
year	Nested Frequency							
2022	0	105	63	38	1	9	6	0
year	Average Cover (%)							
2022	0.2	2.9	0.6	0.3	0.1	0.1	0.0	0.0

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

**Table 16R-60.11 - Forb Species.** Nested frequency and modified Daubenmire average cover by year.

FORB SPECIES	Nested Frequency							
Alyssum desertorum <sup>ai</sup> (desert madwort)	117	4	1	4	5	2	12	1
Astragalus calycosus (Torrey's milkvetch)								
Astragalus convallarius (lesser rushy milkvetch)								
Ceratocephala testiculata <sup>ai</sup> (curvseed butterwort)								
Eriogonum racemosum (redroot buckwheat)								
Eriogonum umbellatum (sulphur-flower buckwheat)								
Phlox longifolia (longleaf phlox)								
Zigadenus paniculatus (foothill deathcamas)								
year	Average Cover (%)							
2022	0.4	0.0	0.0	0.0	0.0	0.0	0.1	0.0

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

**Table 16R-60.12 - Shrub and Tree Species.** Average modified Daubenmire quadrat and line intercept cover by year.

SHRUB SPECIES	Line Intercept Cover (%)							
Artemisia tridentata ssp. vaseyana <sup>p</sup> (mountain big sagebrush)	0.1	7.1	-	19.1	5.4	1.2	23	
Cercocarpus montanus <sup>p</sup> (alderleaf mountain mahogany)								
Gutierrezia sarothrae (broom snakeweed)								
Juniperus osteosperma <sup>i</sup> (Utah juniper)								
Pinus edulis <sup>i</sup> (twoneedle pinyon)								
Purshia tridentata <sup>p</sup> (antelope bitterbrush)								
Quercus gambelii <sup>p</sup> (Gambel oak)								
year	Quadrat Cover (%)							
2022	0.4	3.5	0.0	7.1	1.8	2.1	13.2	

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

**Table 16R-60.13 - Shrub/Tree Characteristics.** Population characteristics of shrub/tree species populations including density reproduction (seedlings), age distribution, utilization, vigor and average size (height/crown) of plants.

Year	Density		Age Class Distribution			Utilization		Poor Vigor (%)	Average Height Crown (cm)
	Plants Per Acre		Excluding Seedlings			Moderate (%)	Heavy (%)		
	Excluding Seedlings	Seedling	Young (%)	Mature (%)	Decadent (%)				
Artemisia tridentata ssp. vaseyana <sup>p</sup> -- (mountain big sagebrush)									
2022	80	-	0	50	50	0	75	50	- / -
Cercocarpus montanus <sup>p</sup> -- (alderleaf mountain mahogany)									
2022	300	60	27	53	20	13	13	13	- / -
Gutierrezia sarothrae -- (broom snakeweed)									
2022	160	-	50	50	0	0	0	0	- / -
Juniperus osteosperma <sup>i</sup> -- (Utah juniper)									
2022	360	-	50	50	0	0	0	0	- / -
Pinus edulis <sup>i</sup> -- (twoneedle pinyon)									
2022	60	20	67	33	0	0	0	0	- / -
Purshia tridentata <sup>p</sup> -- (antelope bitterbrush)									
2022	220	-	9	82	9	64	27	27	- / -
Quercus gambelii <sup>p</sup> -- (Gambel oak)									
2022	3740	140	45	40	15	2	0	9	- / -

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

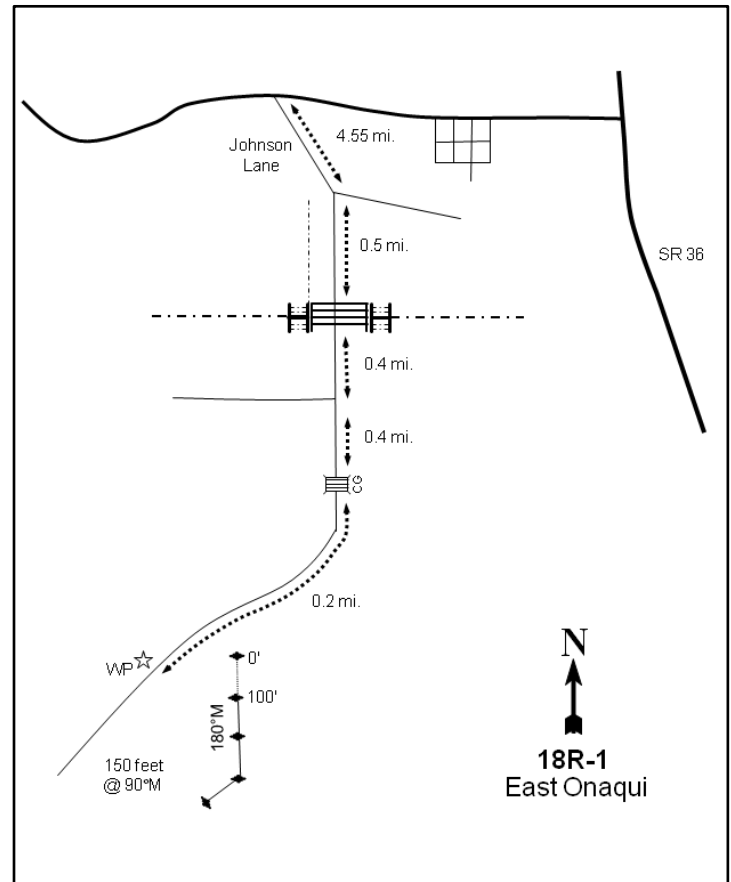
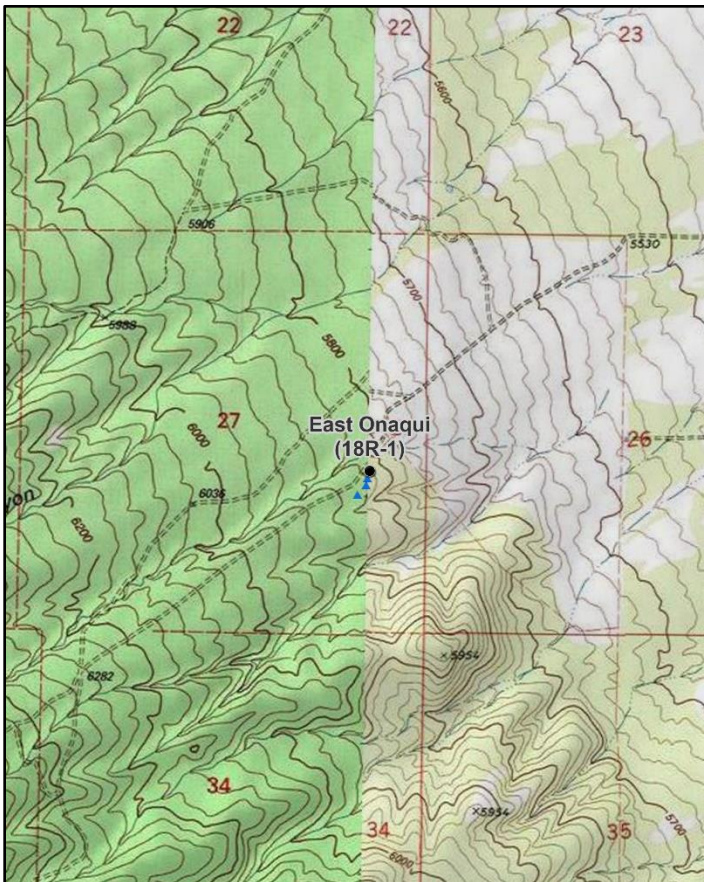
**Table 16R-60.14 - Tree Characteristics.** Point-quarter tree density, size class distribution, and average diameter.

Year	Density	Size Class Distribution					Average Diameter (cm)
	Trees per Acre	Seedling (%)	1-4' (%)	4-8' (%)	8-12' (%)	>12' (%)	
<b>Juniperus osteosperma (Utah juniper)</b>							
2022	238	-	21	5	42	32	14.0
<b>Pinus edulis (twoneedle pinyon)</b>							
2022	39	-	11	11	-	78	15.7

**Table 16R-60.15 - Deer Desirable Components Index: Mountain 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
2022	30.0	10.2	15.0	8.3	0.0	0.5	0.0	64.0	Fair

## EAST ONAQUI - STUDY NO. 18R-1

**Location Information**

USGS 7.5 min Map Info  
GPS (0' Stake)

Johnson Pass SE; Township 6S, Range 6W, Section 27  
NAD 83 UTM ZONE 12, 372402 East 4458305 North

**Transect Information**

Browse Tag # (0' Stake)

578

Transect Bearing

180° magnetic (Line 4: 220° magnetic)

Length

400ft

Belt Placement

Line 1 (11ft & 95ft), Line 2 (34ft), Line 3 (59ft), Line 4 (71ft)

Belt Marker Placement

No Rebar

**Directions to Site**

From State Route 36, turn west onto State Route 199 traveling toward Clover. Turn south on Johnson Lane in Clover. Travel 4.55 miles to a fork and stay right. Drive for 0.5 miles to a gate and continue 0.8 miles to a cattle guard. Proceed for 0.2 miles to a witness post on the right (northwest) side of the road. The 0-foot stake is about 150 feet from the witness post at 90 degrees magnetic and is marked with browse tag #578.

**Site Information**

Land Ownership	Federal
Land Administrator	BLM
Allotment	ONAQUI MOUNTAIN EAST
Elevation	5,820ft (1,774m)
Aspect	Northeast
Slope	5-7%
Sample Dates	09/02/2004, 07/11/2013, 07/19/2016, 06/07/2022

**Table 18R-01.1 Disturbance History.** Recorded history of major disturbances.

Treatment/Disturbance	Name	WRI DB#	Date	Size (acres)
Seeding - Aerial Before	East Onaqui Juniper Thinning and Seeding - Year 1	353	August 2007	332
Mechanical - Bullhog	East Onaqui Juniper Thinning and Seeding - Year 1	353	September 2007-May 2008	418

**Table 18R-01.2 Seed Mix.** List of known seeded plant species and rates (if available).

Mix Name			Application Type	Application Date	Acres
East Onaqui Juniper Thinning and Seeding			Aerial	Aug 2007	332
Type	Species	Common Name	Cultivar/Source ID	Bulk lbs/acre	PLS
G	Agropyron cristatum	Crested Wheatgrass	Ephraim	0.81	0.73
G	Agropyron cristatum	Crested Wheatgrass	Hycrest	0.97	0.89
G	Agropyron fragile	Siberian Wheatgrass	Vavilov	0.91	0.78
G	Dactylis glomerata	Orchardgrass	Paiute	0.35	0.27
G	Elymus wawawaiensis	Snake River Wheatgrass	Secar	0.49	0.39
G	Pascopyrum smithii	Western Wheatgrass	Arriba	0.74	0.60
G	Poa secunda	Canby Bluegrass	Canbar	0.54	0.48
G	Psathyrostachys juncea	Russian Wildrye	Bozoisky	0.84	0.68
G	Pseudoroegneria spicata	Bluebunch Wheatgrass	Anatone	0.27	0.25
G	Pseudoroegneria spicata	Bluebunch Wheatgrass	Anatone	0.64	0.55
F	Medicago sativa	Alfalfa	Ladak	0.55	0.51
F	Medicago sativa	Alfalfa	Ranger	0.54	0.48
F	Medicago sativa	Alfalfa	Spredor 4	0.70	0.67
F	Onobrychis viciifolia	Sainfoin	Eski	1.90	1.74
F	Sanguisorba minor	Small Burnet	Delar	1.70	1.58

**Wildlife Habitat and Vegetation History****Table 18R-01.3 - Wildlife Seasonal Habitat.** DWR wildlife habitat and seasonality.

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

**Table 18R-01.4 - Vegetation History.** The dominant vegetation type(s) and phase of woodland succession (Tausch, Miller, Roundy, & Chambers, 2009).

Year	Vegetation Type	Woodland Succession
2004	Juniper	Phase III
2013	Perennial Grass	Phase I
2016	Perennial Grass/Mixed Shrub	Phase I
2022	Perennial Grass/Mixed Shrub	Phase I

**Site Notes**

There are ravines to the north and south of this site but there is a lack of erosion in both.

**Soils****Table 18R-01.5 - Soil Analysis Data.** List of chemical and textural soil characteristics determined by laboratory analysis.

Texture	pH	%sand	%silt	%clay	%OM	PPM P	PPM K	ds/m	Sample Date
Loam	7.1	36.4	41.1	22.5	3.7	8.2	182.4	0.7	09/02/2004

**Site Potential**

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

When this site was established in 2004, it was dominated by encroaching Utah juniper (*Juniperus osteosperma*) with very little other browse or herbaceous cover. Following a 2007 bullhog and seeding treatment (Table 18R-01.1), the site initially transitioned to one dominated by perennial grasses such as squirreltail (*Elymus elymoides*) and bluebunch wheatgrass (*Pseudoroegneria spicata*). In subsequent years following treatment, perennial grasses have steadily increased with a diverse mixture of native and non-native seeded species providing good cover (Table 18R-01.7, Table 18R-01.10). Shrubs such as Stansbury cliffrose (*Purshia stansburiana*) and rubber rabbitbrush (*Ericameria nauseosa*) have increased in cover since treatment and became a co-dominant in 2016. Although cover and density are currently low as of the most recent sampling, juniper is present, indicating that this site has the potential for future infilling (Table 18R-01.12, Table 18R-01.13, Table 18R-01.14)

**Trend Summary Tables****Table 18R-01.6 - Shrub/Tree Summary.** Average modified Daubenmire quadrat and line intercept cover by year for shrubs/trees

Year	Quadrat Cover (%)			Line-intercept Cover (%)		
	Preferred Shrub	Other Shrub	Tree	Preferred Shrub	Other Shrub	Tree
2004	0.2	-	25.5	1.0	-	38.5
2013	2.1	-	0.4	2.9	-	0.3
2016	4.0	0.0	0.1	7.0	0.4	-
2022	4.4	1.3	0.6	7.5	0.7	0.8

**Table 18R-01.7 - Herbaceous Summary.** Nested frequency and average modified Daubenmire quadrat cover by year for herbaceous functional groups

Year	Nested Frequency				Quadrat Cover (%)			
	Annual Grass	Perennial Grass	Annual/Biennial Forb	Perennial Forb	Annual Grass	Perennial Grass	Annual/Biennial Forb	Perennial Forb
2004	11	290	116	28	0.0	5.8	0.3	0.4
2013	130	305	256	110	1.3	15.4	1.0	2.4
2016	92	325	253	105	1.8	18.8	2.0	2.3
2022	83	350	303	53	0.7	33.2	4.0	1.6

**Table 18R-01.8 - Basic Ground Cover.** Average modified Daubenmire quadrat cover by year for basic ground cover types.

Year	Cover Type (%)					
	Bare Ground	Cryptogams	Litter	Pavement	Rock	Vegetation
2004	9.4	5.6	43.3	32.7	3.5	28.7
2013	6.6	0.1	72.1	4.1	1.4	25.5
2016	8.9	0.5	58.7	5.3	0.3	31.0
2022	16.5	0.0	53.8	5.9	2.3	41.5

**Table 18R-01.9 - Pellet Group Data.** Quadrat frequency and pellet group transect data for animal pellets. Rabbit pellet groups are not sampled in the pellet group transect.

Year	Cattle	Mule Deer	Horse	Rabbit
	Quadrat Frequency			
2004	-	-	-	52
2013	-	5	-	5
2016	3	3	-	18
2022	5	9	-	1
Year	Days Use Per Acre (ha)			
2004	-	3.4 (8.3)	0.6 (1.4)	-
2013	7.2 (17.9)	18.1 (44.7)	-	-
2016	7.2 (17.9)	2.7 (6.6)	0.6 (1.4)	-
2022	2.2 (5.4)	20.1 (49.7)	-	-



**Table 18R-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)	Dactylis glomerata <sup>i</sup> (orchardgrass)	Elymus elymoides (squirreltail)	Elymus trachycaulus (slender 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										
2004	8	-	11	-	78	-	-	259	-	-	-
2013	27	42	130	-	182	15	38	148	3	59	24
2016	12	80	92	0	218	25	19	74	4	68	-
2022	15	117	83	-	99	-	72	140	4	149	10
year	Average Cover (%)										
2004	0.2	-	0.0	-	1.1	-	-	4.5	-	-	-
2013	1.2	1.9	1.3	-	6.1	0.6	0.3	1.7	0.0	3.4	0.2
2016	0.8	5.5	1.8	0.0	7.7	0.7	0.1	0.8	0.3	2.8	-
2022	0.7	8.9	0.7	-	5.7	-	2.3	2.7	0.1	12.6	0.2

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

**Table 18R-01.11 - Forb Species.** Nested frequency and modified Daubenmire average cover by year.

FORB SPECIES	Alyssum alyssoides <sup>ai</sup> (pale madwort)	Alyssum desertorum <sup>ai</sup> (desert madwort)	Antennaria (pussytoes)	Arabis (rockcress)	Astragalus utahensis (Utah milkvetch)	Calochortus nuttallii (sego lily)	Ceratocephala testiculata <sup>ai</sup> (curvseed butterwort)	Chaenactis douglasii (Douglas' dustymaiden)	Cirsium (thistle)	Collinsia parviflora <sup>a</sup> (maiden blue eyed Mary)	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)	Lactuca serriola <sup>ai</sup> (prickly lettuce)	Lathyrus brachycalyx (Bonneville pea)
year	Nested Frequency																
2004	-	95	-	-	-	-	37	-	-	-	2	-	-	-	-	-	-
2013	-	229	3	3	1	5	80	10	-	2	3	-	7	-	-	10	-
2016	-	239	-	-	-	3	-	-	1	5	2	-	3	-	-	19	16
2022	38	279	8	-	-	11	153	-	2	6	2	2	-	2	2	-	9
year	Average Cover (%)																
2004	-	0.2	-	-	-	-	0.1	-	-	-	0.0	-	-	-	-	-	-
2013	-	0.7	0.0	0.0	0.0	0.0	0.2	0.0	-	0.0	0.0	-	0.1	-	-	0.0	-
2016	-	1.7	-	-	-	0.0	-	-	0.0	0.0	0.0	-	0.0	-	-	0.1	0.3
2022	0.4	2.8	0.3	-	-	0.0	0.6	-	0.0	0.0	0.1	0.0	-	0.0	0.0	-	0.4

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

FORB SPECIES	Medicago sativa <sup>i</sup> (alfalfa)	Microsteris gracilis <sup>a</sup> (slender phlox)	Onobrychis vicifolia <sup>i</sup> (sainfoin)	Packera multilobata (lobeleaf groundsel)	Pedicularis centranthera (dwarf lousewort)	Phlox hoodii (spiny phlox)	Phlox longifolia (longleaf phlox)	Sanguisorba minor <sup>i</sup> (small burnet)	Streptanthus cordatus (heartleaf twistflower)	Taraxacum officinale (common dandelion)	Tragopogon dubius <sup>at</sup> (yellow salsify)	Vicia americana (American vetch)	Zigadenus paniculatus (foothill deathcamas)
year	Nested Frequency												
2004	-	-	-	-	-	28	-	-	-	-	-	-	-
2013	14	1	8	-	1	29	15	16	9	-	2	12	7
2016	6	-	12	2	1	29	-	41	4	1	25	-	10
2022	8	7	-	-	-	8	-	-	2	-	10	4	4
year	Average Cover (%)												
2004	-	-	-	-	-	0.4	-	-	-	-	-	-	-
2013	0.6	0.0	0.2	-	0.0	0.7	0.0	0.3	0.1	-	0.0	0.2	0.1
2016	0.4	-	0.2	0.0	0.0	0.6	-	0.6	0.0	0.0	0.1	-	0.1
2022	0.5	0.0	-	-	-	0.1	-	-	0.0	-	0.1	0.1	0.0

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

**Table 18R-01.12 - Shrub and Tree Species.** Average modified Daubenmire quadrat and line intercept cover by year.

SHRUB SPECIES	Artemisia tridentata ssp. vaseyana <sup>p</sup> (mountain big sagebrush)	Ericameria nauseosa ssp. consimilis (rubber rabbitbrush)	Ericameria nauseosa ssp. nauseosa var. speciosa <sup>p</sup> (rubber rabbitbrush)	Gutierrezia sarothrae (broom snakeweed)	Juniperus osteosperma <sup>i</sup> (Utah juniper)	Purshia stansburiana <sup>p</sup> (Stansbury cliffrose)	Purshia tridentata <sup>p</sup> (antelope bitterbrush)
year	Line Intercept Cover (%)						
2004	-	-	-	-	38.5	1	-
2013	-	-	1.2	-	0.3	1.7	-
2016	-	-	3.7	0.4	-	3.3	-
2022	0.1	0.7	3.4	-	0.8	3.9	0.1
year	Quadrat Cover (%)						
2004	-	-	-	-	25.5	0.2	-
2013	-	-	0.9	-	0.4	1.2	-
2016	-	-	2.5	0.0	0.1	1.5	0.0
2022	0.4	1.2	1.1	0.2	0.6	2.9	0.0

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

**Table 18R-01.13 - Shrub/Tree Characteristics.** Population characteristics of shrub/tree species populations including density reproduction (seedlings), age distribution, utilization, vigor and average size (height/crown) of plants.

Year	Density		Age Class Distribution			Utilization		Poor Vigor (%)	Average Height Crown (cm)
	Plants Per Acre		Excluding Seedlings			Moderate (%)	Heavy (%)		
	Excluding Seedlings	Seedling	Young (%)	Mature (%)	Decadent (%)				
<b>Artemisia tridentata ssp. vaseyana<sup>p</sup> -- (mountain big sagebrush)</b>									
2004	20	-	0	0	100	0	100	100	51/96
2013	20	-	0	100	0	0	0	0	31/62
2016	20	-	0	100	0	0	0	100	48/65
2022	60	-	0	100	0	0	0	0	- / -
<b>Chrysothamnus viscidiflorus ssp. viscidiflorus var. viscidiflorus -- (yellow rabbitbrush)</b>									
2004	-	-	-	-	-	-	-	-	-/-
2013	-	-	-	-	-	-	-	-	-/-
2016	20	-	100	0	0	100	0	0	32/36
2022	20	-	0	100	0	0	0	0	- / -
<b>Ericameria nauseosa ssp. consimilis -- (rubber rabbitbrush)</b>									
2004	-	-	-	-	-	-	-	-	-/-
2013	-	-	-	-	-	-	-	-	-/-
2016	-	-	-	-	-	-	-	-	-/-
2022	160	-	25	50	25	25	13	25	- / -
<b>Ericameria nauseosa ssp. consimilis var. oreophila -- (rubber rabbitbrush)</b>									
2004	-	-	-	-	-	-	-	-	-/-
2013	-	-	-	-	-	-	-	-	-/-
2016	-	-	-	-	-	-	-	-	59/76
2022	-	-	-	-	-	-	-	-	-/-
<b>Ericameria nauseosa ssp. nauseosa var. speciosa<sup>p</sup> -- (rubber rabbitbrush)</b>									
2004	-	-	-	-	-	-	-	-	-/-
2013	240	-	17	83	0	25	8	17	44/60
2016	440	-	9	91	0	0	0	5	62/75
2022	460	-	4	65	30	13	0	30	- / -
<b>Gutierrezia sarothrae -- (broom snakeweed)</b>									
2004	60	-	0	0	100	0	0	0	17/21
2013	140	-	29	71	0	0	0	0	26/34
2016	240	20	33	67	0	0	0	0	30/35
2022	180	-	78	22	0	0	0	0	- / -
<b>Juniperus osteosperma<sup>i</sup> -- (Utah juniper)</b>									
2004	620	-	0	74	26	0	0	7	- / -
2013	20	140	0	0	100	0	0	0	- / -
2016	60	20	67	33	0	0	0	0	- / -
2022	140	-	71	29	0	0	0	14	- / -
<b>Purshia stansburiana<sup>p</sup> -- (Stansbury cliffrose)</b>									
2004	60	-	0	100	0	0	67	0	167/188
2013	440	140	41	59	0	41	0	5	42/59
2016	560	-	32	68	0	39	4	0	68/72
2022	460	-	26	74	0	56	9	0	- / -
<b>Purshia tridentata<sup>p</sup> -- (antelope bitterbrush)</b>									
2004	-	-	-	-	-	-	-	-	-/-
2013	-	-	-	-	-	-	-	-	-/-
2016	40	-	100	0	0	0	0	0	- / -
2022	20	-	0	100	0	100	0	0	- / -

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

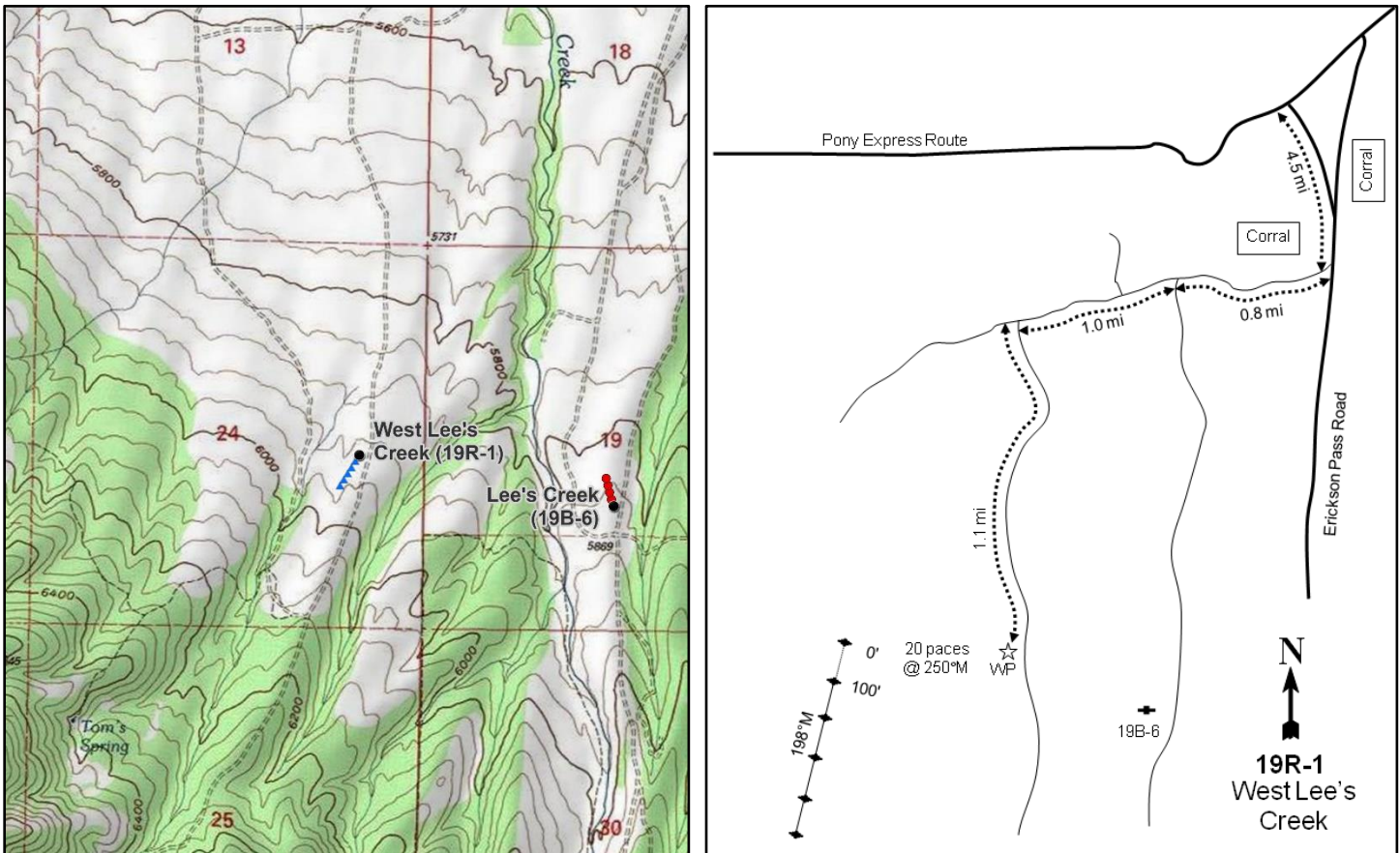
**Table 18R-01.14 - Tree Characteristics.** Point-quarter tree density, size class distribution, and average diameter.

Year	Density	Size Class Distribution					Average Diameter (cm)
	Trees per Acre	Seedling (%)	1-4' (%)	4-8' (%)	8-12' (%)	>12' (%)	
<b>Juniperus osteosperma (Utah juniper)</b>							
2004	568	-	-	-	-	-	44.7
2013	25	40	60	-	-	-	2.0
2016	17	40	60	-	-	-	2.5
2022	26	30	60	-	10	-	5.5

**Table 18R-01.15 - Deer Desirable Components Index: Upland 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
2004	1.5	0.0	0.0	11.7	0.0	0.9	0.0	14.0	Very Poor
2013	4.1	0.0	0.0	30.0	-1.0	4.9	0.0	37.9	Poor
2016	9.6	15.0	10.0	30.0	-1.3	4.5	0.0	67.7	Good
2022	10.4	10.9	7.8	30.0	-0.5	3.2	0.0	61.7	Fair

## WEST LEE'S CREEK - STUDY NO. 19R-1

**Location Information**

USGS 7.5 min Map Info  
GPS (0' Stake)

Indian Peaks SW; Township 9S, Range 8W, Section 24  
NAD 83 UTM ZONE 12, 355941 East 4431203 North

**Transect Information**

Browse Tag # (0' Stake)	166
Transect Bearing	218° magnetic
Length	500ft
Belt Placement	Line 1 (11ft), Line 2 (34ft), Line 3 (59ft), Line 4 (71ft), Line 5 (95ft)
Belt Marker Placement	No Rebar

**Directions to Site**

From the intersection of the Erickson Pass and Pony Express Roads, proceed south on Erickson Pass Road for 4.5 miles to a road on the right (west). Turn right here and proceed west for 1.8 miles to a road on the left. Turn left here and proceed south for 1.1 miles to a witness post on the right (west) side of the road. The 0-foot stake is 20 paces away from the witness post at 250 degrees magnetic and is marked with browse tag #166.

**Site Information**

Land Ownership	Federal
Land Administrator	BLM
Allotment	GOVERNMENT CREEK
Elevation	5,960ft (1,817m)
Aspect	North
Slope	6-8%
Sample Dates	07/14/2004, 07/12/2007, 06/19/2012, 06/06/2017, 06/06/2022

**Table 19R-01.1 Disturbance History.** Recorded history of major disturbances.

Treatment/Disturbance	Name	WRI DB#	Date	Size (acres)
Mechanical - Bullhog	Government Creek GRSG Habitat Improvement	3635	September 2016-February 2017	5746
Chaining - Two-Way Chain Unknown	James Seeding	-	June-December 1970	1500
Seeding - Aerial Before	James Seeding	-	June-December 1970	1500
Mechanical - Bullhog	Lee Canyon HFR	PDB	November 2004-April 2005	700
Seeding - Aerial Before	Lee Canyon HFR	PDB	November 2004	700
Mechanical - Bullhog	Lee Canyon HFR	PDB	May 2009	720

**Table 19R-01.2 Seed Mix.** List of known seeded plant species and rates (if available).

Mix Name			Application Type	Application Date	Acres
Lee Canyon			Aerial	Nov 2004	350
Type	Species	Common Name	Cultivar/Source ID	Bulk lbs/acre	PLS
G	Agropyron cristatum	Crested Wheatgrass	Hycrest	0.57	0.52
G	Agropyron fragile	Siberian Wheatgrass	Vavilov	0.57	0.52
G	Dactylis glomerata	Orchardgrass	Paiute	0.43	0.40
G	Elymus elymoides	Bottlebrush Squirreltail		0.14	0.11
G	Elymus wawawaiensis	Snake River Wheatgrass	Secar	0.43	0.38
G	Pascopyrum smithii	Western Wheatgrass	Arriba	1.00	0.91
G	Poa secunda	Canby Bluegrass		0.43	0.36
G	Psathyrostachys juncea	Russian Wildrye	Bozoisky	0.43	0.40
G	Pseudoroegneria spicata	Bluebunch Wheatgrass	Goldar	0.57	0.55
F	Achillea millefolium	Western Yarrow		0.10	0.10
F	Linum perenne	Blue Flax	Appar	0.57	0.52
F	Medicago sativa	Alfalfa	Ladak+	1.00	0.92
F	Onobrychis viciifolia	Sainfoin	Eski	2.43	2.22
F	Sanguisorba minor	Small Burnet	Delar	2.00	1.89
S	Artemisia tridentata ssp. wyomingensis	Wyoming Big Sagebrush		0.57	0.05
S	Bassia prostrata	Forage Kochia	Immigrant	0.57	0.40

**Wildlife Habitat and Vegetation History****Table 19R-01.3 - Wildlife Seasonal Habitat.** DWR wildlife habitat and seasonality.

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

**Table 19R-01.4 - Vegetation History.** The dominant vegetation type(s) and phase of woodland succession (Tausch, Miller, Roundy, & Chambers, 2009).

Year	Vegetation Type	Woodland Succession
2004	Juniper/Mountain Big Sagebrush	Phase II
2007	Juniper/Mountain Big Sagebrush	Phase II
2012	Perennial Grass/Mountain Big Sagebrush/Antelope Bitterbrush	Phase I
2017	Mountain Big Sagebrush/Antelope Bitterbrush	Phase I
2022	Mountain Big Sagebrush/Antelope Bitterbrush	Phase I

**Site Notes**

The study is located approximately fifteen miles south of Dugway on the northeastern foothills of the Simpson Mountains. Cattle were seen near the site in 2017.

**Soils****Table 19R-01.5 - Soil Analysis Data.** List of chemical and textural soil characteristics determined by laboratory analysis.

Texture	pH	%sand	%silt	%clay	%OM	PPM P	PPM K	ds/m	Sample Date
Clay Loam	6.9	39.3	33.2	27.5	3.3	5.8	217.6	0.8	07/14/2004

**Site Potential**

1981 - 2010 Average Annual Precipitation	15 inches
NRCS Ecological Site	Mountain Stony Loam (Antelope Bitterbrush)
NRCS Ecological Site #	R028AY456UT
States and Transitions	No state and transition model is available for this ecological site.

This site was a Phase II Utah juniper (*Juniperus osteosperma*) woodland with mountain big sagebrush (*Artemisia tridentata* ssp. *vaseyana*) as a co-dominant component from 2004 to 2007. The bullhog treatment between 2007 and 2012 (Table 19R-01.1) removed most of the juniper, and the site transitioned to being dominated by sagebrush and antelope bitterbrush (*Purshia tridentata*) with cover of both of these species steadily increasing since 2007 (Table 19R-01.4, Table 19R-01.12, Table 19R-01.13). The herbaceous understory has remained diverse and abundant following treatment. Perennial grasses -- mainly the introduced species crested wheatgrass (*Agropyron cristatum*) and native species bluebunch wheatgrass (*Pseudoroegneria spicata*) -- have contributed the most herbaceous cover and were a co-dominant site component in 2012. In addition, the introduced perennial species bulbous bluegrass (*Poa bulbosa*) was observed for the first time in 2017, but was present with low abundance in both 2017 and 2022 (Table 19R-01.10). Perennial forbs have contributed more cover than annual forbs in all sample years (Table 19R-01.7, Table 19R-01.11). Continuous tree maintenance to combat encroachment has occurred since site establishment, and tree densities have been decreasing each sample year; tree cover has been absent since 2017 (Table 19R-01.1, Table 19R-01.12, Table 19R-01.13).

**Trend Summary Tables****Table 19R-01.6 - Shrub/Tree Summary.** Average modified Daubenmire quadrat and line intercept cover by year for shrubs/trees

Year	Quadrat Cover (%)			Line-intercept Cover (%)		
	Preferred Shrub	Other Shrub	Tree	Preferred Shrub	Other Shrub	Tree
2004	7.8	-	18.7	6.3	0.2	25.0
2007	6.3	0.0	6.1	5.7	-	18.6
2012	6.3	0.0	1.1	9.3	-	0.9
2017	12.0	0.2	-	14.6	0.3	-
2022	15.7	0.2	-	19.9	0.1	-

**Table 19R-01.7 - Herbaceous Summary.** Nested frequency and average modified Daubenmire quadrat cover by year for herbaceous functional groups

Year	Nested Frequency				Quadrat Cover (%)			
	Annual Grass	Perennial Grass	Annual/Biennial Forb	Perennial Forb	Annual Grass	Perennial Grass	Annual/Biennial Forb	Perennial Forb
2004	-	297	-	37	-	12.8	-	0.6
2007	14	318	214	74	0.0	10.1	1.0	1.2
2012	123	374	247	157	4.9	26.6	0.8	4.8
2017	103	394	324	204	1.9	31.0	3.0	9.0
2022	170	371	355	143	2.2	31.1	5.7	3.3

**Table 19R-01.8 - Basic Ground Cover.** Average modified Daubenmire quadrat cover by year for basic ground cover types.

Year	Cover Type (%)					
	Bare Ground	Cryptogams	Litter	Pavement	Rock	Vegetation
2004	24.9	0.4	37.9	11.4	5.3	38.2
2007	21.1	0.8	43.0	15.5	4.3	28.8
2012	11.2	0.0	56.5	3.6	6.3	46.1
2017	14.7	0.1	61.3	5.7	3.8	48.8
2022	16.0	0.2	44.9	9.9	6.6	46.8



**Table 19R-01.9 - Pellet Group Data.** Quadrat frequency and pellet group transect data for animal pellets. Rabbit pellet groups are not sampled in the pellet group transect.

Year	Cattle	Mule Deer/Pronghorn	Rocky Mountain Elk	Rabbit
	Quadrat Frequency			
2004	1	13	-	31
2007	-	3	3	65
2012	-	2	-	1
2017	-	7	-	1
2022	3	4	-	2
Year	Days Use Per Acre (ha)			
2004	3.6 (9.0)	10.0 (24.8)	-	-
2007	8.0 (19.7)	6.7 (16.6)	7.4 (18.2)	-
2012	-	3.4 (8.3)	-	-
2017	27.6 (68.1)	34.9 (86.1)	-	-
2022	8.0 (19.7)	4.0 (9.9)	-	-

**Table 19R-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)	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							
2004	-	171	-	3	-	183	-	104
2007	1	100	14	4	-	266	-	97
2012	-	187	123	16	-	295	-	83
2017	-	244	103	12	13	279	-	155
2022	-	214	170	3	16	288	2	122
year	Average Cover (%)							
2004	-	5.6	-	0.0	-	2.1	-	5.0
2007	0.0	1.8	0.0	0.0	-	5.5	-	2.7
2012	-	11.9	4.9	0.5	-	9.4	-	4.8
2017	-	13.9	1.9	0.7	0.7	6.8	-	9.0
2022	-	12.2	2.2	0.2	0.5	10.1	0.0	8.1

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

**Table 19R-01.11 - Forb Species.** Nested frequency and modified Daubenmire average cover by year.

FORB SPECIES	Achillea millefolium (Common yarrow)	Agoseris glauca (pale agoseris)	Alyssum desertorum <sup>ai</sup> (desert madwort)	Antennaria dimorpha (low pussytoes)	Arabis (rockcress)	Astragalus cibirarius (browse milkvetch)	Calochortus nuttallii (sego lily)	Castilleja (Indian paintbrush)	Ceratocephala testiculata <sup>ai</sup> (curvseed butterwort)	Chaenactis douglasii (Douglas' dustymaiden)	Cirsium (thistle)	Collinsia parviflora <sup>a</sup> (maiden blue eyed Mary)	Crepis acuminata (tapertip hawkbeard)	Cryptantha (cryptantha)	Cymopterus longipes (longstalk springparsley)	Descurainia pinnata <sup>a</sup> (western tansymustard)	Erodium cicutarium <sup>ai</sup> (redstem stork's bill)
year	Nested Frequency																
2004	-	-	-	-	-	4	-	-	-	-	-	-	-	-	-	-	-
2007	3	-	81	-	-	29	-	-	183	-	-	1	-	-	-	20	-
2012	10	3	229	-	-	40	2	-	83	3	-	-	5	3	15	2	-
2017	8	11	324	4	3	55	30	1	29	2	3	1	-	5	18	-	-
2022	8	5	352	5	1	40	17	-	146	-	-	-	1	5	10	4	4
year	Average Cover (%)																
2004	-	-	-	-	-	0.0	-	-	-	-	-	-	-	-	-	-	-
2007	0.0	-	0.3	-	-	0.6	-	-	0.6	-	-	0.0	-	-	-	0.1	-
2012	0.1	0.0	0.6	-	-	1.3	0.0	-	0.2	0.0	-	-	0.2	0.0	0.1	0.0	-
2017	0.2	0.1	2.9	0.0	0.0	3.6	0.2	0.0	0.1	0.0	0.0	0.0	-	0.0	0.2	-	-
2022	0.1	0.1	4.6	0.0	0.2	1.0	0.1	-	0.9	-	-	-	0.1	0.0	0.2	0.0	0.0

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

FORB SPECIES	Gilia inconspicua <sup>a</sup> (shy gilia)	Holosteum umbellatum <sup>ai</sup> (jagged chickweed)	Lactuca serriola <sup>ai</sup> (prickly lettuce)	Linum perenne <sup>i</sup> (blue flax)	Lomatium grayi (Gray's biscuitroot)	Microsteris gracilis <sup>ai</sup> (slender phlox)	Petrorhiza pumila (rock goldenrod)	Phlox hoodii (spiny phlox)	Phlox longifolia (longleaf phlox)	Silene antirrhina <sup>a</sup> (sleepy silene)	Tragopogon dubius <sup>ai</sup> (yellow salsify)	Vicia americana (American vetch)	Zigadenus paniculatus (foothill deathcamas)
year	Nested Frequency												
2004	-	-	-	-	-	-	16	17	2	-	-	4	-
2007	-	-	-	-	-	-	16	11	11	-	-	14	6
2012	-	-	1	5	-	6	27	23	17	1	2	56	1
2017	1	-	4	1	-	6	23	10	6	-	-	85	4
2022	2	6	-	-	2	7	11	17	8	-	5	46	4
year	Average Cover (%)												
2004	-	-	-	-	-	-	0.4	0.2	0.0	-	-	0.0	-
2007	-	-	-	-	-	-	0.3	0.1	0.0	-	-	0.1	0.0
2012	-	-	0.0	0.3	-	0.0	0.9	0.5	0.1	0.0	0.0	1.1	0.0
2017	0.0	-	0.0	0.1	-	0.0	0.3	0.1	0.0	-	-	4.0	0.1
2022	0.0	0.0	-	-	0.1	0.0	0.3	0.4	0.0	-	0.1	0.6	0.1

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

**Table 19R-01.12 - Shrub and Tree Species.** Average modified Daubenmire quadrat and line intercept cover by year.

SHRUB SPECIES	Line Intercept Cover (%)						
	year						
Artemisia tridentata ssp. vaseyana <sup>p</sup> (mountain big sagebrush)	2004	4.4	-	0.2	25	-	1.9
Chrysothamnus viscidiflorus ssp. viscidiflorus var. stenophyllus (yellow rabbitbrush)	2007	3.8	-	-	18.6	-	1.9
Gutierrezia sarothrae (broom snakeweed)	2012	5.2	-	-	0.9	-	4.1
Juniperus osteosperma <sup>i</sup> (Utah juniper)	2017	9.9	0.1	0.2	-	-	4.7
Opuntia polyacantha (plains pricklypear)	2022	16.3	-	0.1	-	-	3.6
Purshia tridentata <sup>p</sup> (antelope bitterbrush)	year	Quadrat Cover (%)					
	2004	4.8	-	0.0	18.7	-	2.9
	2007	2.8	-	0.0	6.1	0.0	3.6
	2012	2.9	-	0.0	1.1	-	3.3
	2017	8.2	0.2	0.0	-	-	3.8
	2022	11.0	0.1	0.0	-	-	4.7

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

**Table 19R-01.13 - Shrub/Tree Characteristics.** Population characteristics of shrub/tree species populations including density reproduction (seedlings), age distribution, utilization, vigor and average size (height/crown) of plants.

Year	Density		Age Class Distribution			Utilization		Poor Vigor (%)	Average Height Crown (cm)
	Plants Per Acre		Excluding Seedlings			Moderate (%)	Heavy (%)		
	Excluding Seedlings	Seedling	Young (%)	Mature (%)	Decadent (%)				
<b>Artemisia tridentata ssp. vaseyana<sup>p</sup> -- (mountain big sagebrush)</b>									
2004	760	-	21	61	18	18	21	8	63/94
2007	500	40	4	72	24	12	20	68	62/87
2012	1880	440	37	63	0	1	0	11	48/71
2017	2200	-	24	72	5	2	0	5	51/73
2022	2100	60	19	74	7	0	0	8	- / -
<b>Bassia prostrata<sup>pi</sup> -- (forage kochia)</b>									
2004	-	-	-	-	-	-	-	-	- / -
2007	-	-	-	-	-	-	-	-	13/22
2012	-	-	-	-	-	-	-	-	- / -
2017	-	-	-	-	-	-	-	-	- / -
2022	-	-	-	-	-	-	-	-	- / -
<b>Chrysothamnus viscidiflorus ssp. viscidiflorus var. stenophyllus -- (yellow rabbitbrush)</b>									
2004	-	-	-	-	-	-	-	-	- / -
2007	-	-	-	-	-	-	-	-	22/21
2012	-	-	-	-	-	-	-	-	26/60
2017	40	-	100	0	0	0	0	0	34/47
2022	40	-	0	100	0	0	0	0	- / -
<b>Ericameria nauseosa -- (rubber rabbitbrush)</b>									
2004	-	-	-	-	-	-	-	-	64/60
2007	-	-	-	-	-	-	-	-	- / -
2012	-	-	-	-	-	-	-	-	- / -
2017	-	-	-	-	-	-	-	-	32/30
2022	-	-	-	-	-	-	-	-	- / -

Year	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>									
2004	120	-	0	100	0	0	0	0	19/28
2007	40	40	0	100	0	0	0	0	17/22
2012	40	-	50	50	0	0	0	50	16/24
2017	120	-	0	100	0	0	0	0	22/25
2022	20	20	0	100	0	0	0	0	- / -
<b>Juniperus osteosperma<sup>1</sup> -- (Utah juniper)</b>									
2004	380	-	0	100	0	11	0	0	- / -
2007	180	-	0	100	0	0	0	0	- / -
2012	40	-	100	0	0	0	0	0	- / -
2017	20	-	100	0	0	0	0	0	- / -
2022	-	-	-	-	-	-	-	-	- / -
<b>Opuntia polyacantha -- (plains pricklypear)</b>									
2004	-	-	-	-	-	-	-	-	22/52
2007	-	-	-	-	-	-	-	-	19/45
2012	-	-	-	-	-	-	-	-	11/32
2017	-	-	-	-	-	-	-	-	13/19
2022	-	-	-	-	-	-	-	-	- / -
<b>Purshia tridentata<sup>p</sup> -- (antelope bitterbrush)</b>									
2004	180	-	11	33	56	0	89	11	65/154
2007	140	-	0	100	0	71	29	0	63/145
2012	440	40	9	91	0	68	0	0	55/120
2017	480	-	0	100	0	4	4	0	60/120
2022	320	-	0	88	13	0	6	13	- / -

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

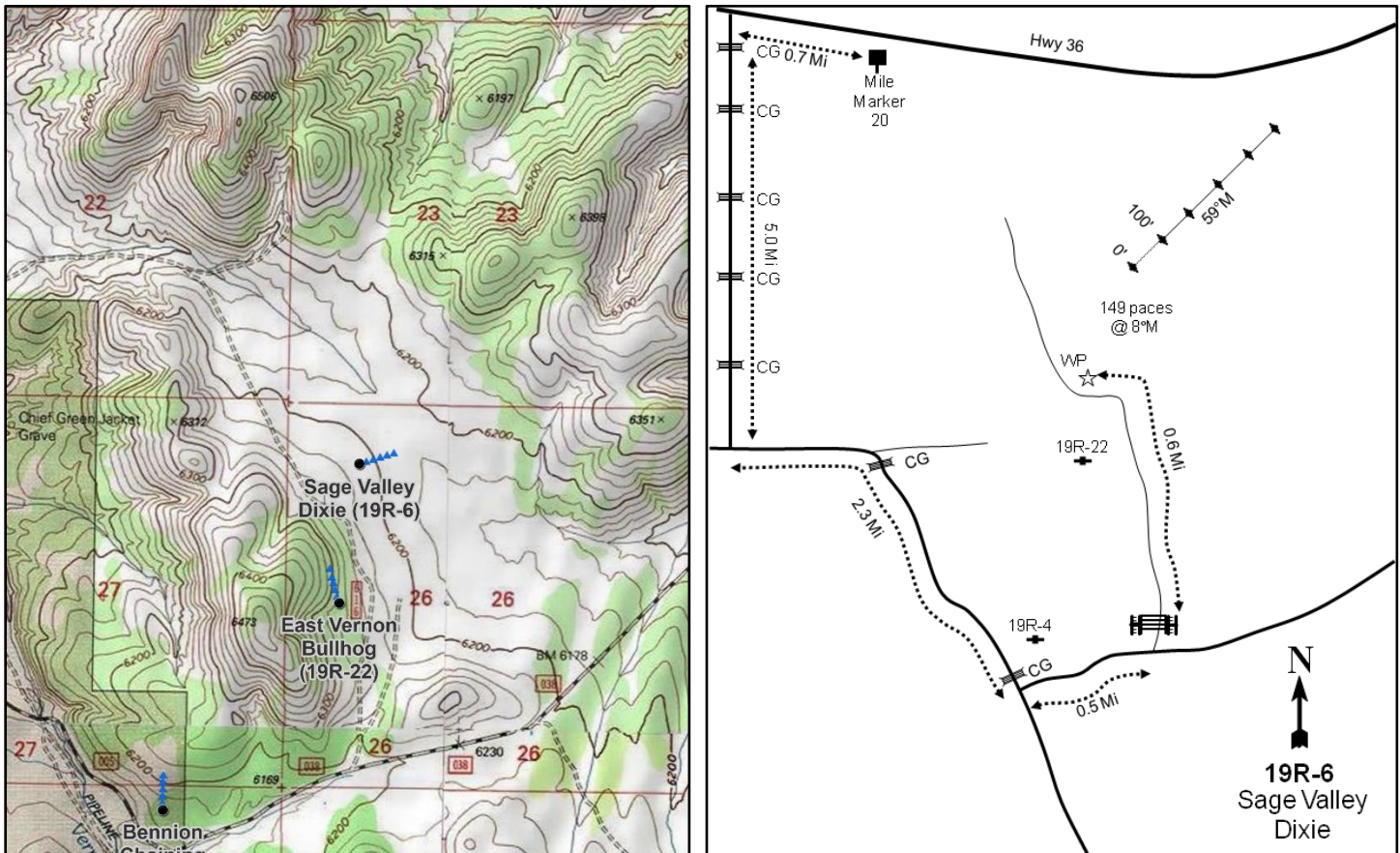
**Table 19R-01.14 - Tree Characteristics.** Point-quarter tree density, size class distribution, and average diameter.

Year	Density	Size Class Distribution					Average Diameter (cm)
	Trees per Acre	Seedling (%)	1-4' (%)	4-8' (%)	8-12' (%)	>12' (%)	
<b>Juniperus osteosperma (Utah juniper)</b>							
2004	276	-	-	35	40	25	14.2
2007	95	-	5	10	50	35	18.8
2012	28	-	38	-	25	38	15.0
2017	17	100	-	-	-	-	1.3
2022	6	20	80	-	-	-	1.8

**Table 19R-01.15 - Deer Desirable Components Index: Mountain 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
2004	8.4	6.1	9.0	25.5	0.0	1.2	0.0	50.2	Poor
2007	7.6	10.2	1.3	20.1	0.0	2.3	0.0	41.6	Very Poor-Poor
2012	12.7	15.0	12.4	30.0	-3.6	9.6	0.0	76.0	Good
2017	19.4	14.1	8.0	30.0	-1.5	10.0	0.0	80.0	Good
2022	25.8	12.7	7.8	30.0	-1.6	6.5	0.0	81.1	Good

## SAGE VALLEY DIXIE - STUDY NO. 19R-6

**Location Information**

USGS 7.5 min Map Info  
GPS (0' Stake)

Vernon SE; Township 9S, Range 5W, Section 26  
NAD 83 UTM ZONE 12, 382215 East 4429773 North

**Transect Information**

Browse Tag # (0' Stake)	154
Transect Bearing	59° magnetic
Length	500ft
Belt Placement	Line 1 (11ft), Line 2 (34ft), Line 3 (59ft), Line 4 (71ft), Line 5 (95ft)
Belt Marker Placement	No Rebar

**Directions to Site**

From Highway 36 south of Vernon, drive to mile marker 20. From there, drive 0.7 miles to a turnoff on the left (west). Turn left and drive south for 5.0 miles, passing several (4 or 5) cattle guards, to a fork. Turn left and drive 0.7 miles to an intersection. Turn right (south), crossing a cattle guard, and drive 1.6 miles to another cattle guard. Directly after the cattle guard turn left (east) and drive 0.5 miles to a road and gate on the left. Turn left, go through the gate, and continue for 0.6 miles to a witness post on the right (northeast) side of the road. Walk 149 paces at 8 degrees magnetic to the 0-foot stake which is marked with browse tag #154.

**Site Information**

Land Ownership	Federal
Land Administrator	USFS
Allotment	BENNION
Elevation	6,200ft (1,890m)
Aspect	Northeast
Slope	2-5%
Sample Dates	06/21/2006, 07/02/2008, 06/04/2012, 06/29/2017, 06/07/2022

**Table 19R-06.1 Disturbance History.** Recorded history of major disturbances.

Treatment/Disturbance	Name	WRI DB#	Date	Size (acres)
Hand Crew - Lop and Scatter	Vernon Ecosystem Phase 4	4900	May-August 2019	7938
Harrow - Two-Way Dixie	Sage Valley/Vernon sagebrush enhancement-Year 1	291	October-November 2006	162
Seeding - Broadcast Before	Sage Valley/Vernon sagebrush enhancement-Year 1	291	October-November 2006	162

**Table 19R-06.2 Seed Mix.** List of known seeded plant species and rates (if available).

Mix Name			Application Type	Application Date	Acres
Sage Valley			Broadcast	Oct 2006	300
Type	Species	Common Name	Cultivar/Source ID	Bulk lbs/acre	PLS
G	Achnatherum hymenoides	Indian Ricegrass	Rimrock	2.00	1.98
G	Hesperostipa comata	Needle and Threadgrass	Beaver UT	0.50	0.38
G	Leymus cinereus	Great Basin Wildrye	Trailhead	0.25	0.20
G	Pascopyrum smithii	Western Wheatgrass	Arriba	1.00	0.76
G	Pseudoroegneria spicata	Bluebunch Wheatgrass	Goldar	2.00	1.87
F	Achillea millefolium	Western Yarrow	SID Columbia	0.10	0.08
F	Cleome serrulata	Rocky Mountain Beeplant	Sanpete UT	0.01	0.01
F	Cleome serrulata	Rocky Mountain Beeplant		0.34	0.33
F	Cleome serrulata	Rocky Mountain Beeplant	Piute UT	0.17	0.15
F	Linum perenne	Blue Flax		0.25	0.22
F	Medicago sativa	Alfalfa	Spreador 4	0.50	0.47
F	Onobrychis viciifolia	Sainfoin	Eski	1.00	0.90
F	Sanguisorba minor	Small Burnet	Delar	1.50	1.39

**Wildlife Habitat and Vegetation History****Table 19R-06.3 - Wildlife Seasonal Habitat.** DWR 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-06.4 - Vegetation History.** The dominant vegetation type(s) and phase of woodland succession (Tausch, Miller, Roundy, & Chambers, 2009).

Year	Vegetation Type	Woodland Succession
2006	Mountain Big Sagebrush	Phase I
2008	Perennial Grass	Phase I
2012	Yellow Rabbitbrush/Mountain Big Sagebrush	Phase I
2017	Yellow Rabbitbrush/Mountain Big Sagebrush	Phase I
2022	Mountain Big Sagebrush/Perennial Grass	Phase I

**Site Notes**

No Notes

**Soils****Table 19R-06.5 - Soil Analysis Data.** List of chemical and textural soil characteristics determined by laboratory analysis.

Texture	pH	%sand	%silt	%clay	%OM	PPM P	PPM K	ds/m	Sample Date
Silt Loam	7.3	32.2	56.0	11.8	2.5	20.3	336.0	0.8	06/19/2006

**Site Potential**

1981 - 2010 Average Annual Precipitation	16 inches
NRCS Ecological Site	Upland Loam (Mountain Big Sagebrush)
NRCS Ecological Site #	R028AY310UT
States and Transitions	No state and transition model is available for this ecological site.

When established prior to treatment in 2006, this study site was dominated by mountain big sagebrush (*Artemisia tridentata* ssp. *vaseyana*). However, a harrow and seeding treatment later that year (Table 19R-06.1) removed much of the sagebrush, and perennial grasses dominated the site in 2008 (Table 19R-06.7). Sagebrush began to recover in 2012, and became co-dominant with the more abundant shrub species yellow rabbitbrush (*Chrysothamnus viscidiflorus* ssp. *viscidiflorus* var. *viscidiflorus*). Although densities of yellow rabbitbrush remained higher than sagebrush in 2022, cover of sagebrush surpassed rabbitbrush and the community was considered to have transitioned to a state dominated by sagebrush. The herbaceous understory has continued to remain diverse, abundant, and mainly comprised of a mixture of perennial grasses (Table 19R-06.10, Table 19R-06.11).

**Trend Summary Tables****Table 19R-06.6 - Shrub/Tree Summary.** Average modified Daubenmire quadrat and line intercept cover by year for shrubs/trees

Year	Quadrat Cover (%)			Line-intercept Cover (%)		
	Preferred Shrub	Other Shrub	Tree	Preferred Shrub	Other Shrub	Tree
2006	14.3	5.0	0.0	21.2	5.8	-
2008	2.2	6.1	-	2.9	7.3	-
2012	4.8	8.8	-	4.5	10.7	-
2017	5.3	9.2	-	6.6	11.5	-
2022	9.3	4.1	-	10.3	6.4	-

**Table 19R-06.7 - Herbaceous Summary.** Nested frequency and average modified Daubenmire quadrat cover by year for herbaceous functional groups

Year	Nested Frequency				Quadrat Cover (%)			
	Annual Grass	Perennial Grass	Annual/Biennial Forb	Perennial Forb	Annual Grass	Perennial Grass	Annual/Biennial Forb	Perennial Forb
2006	79	324	276	120	0.5	12.2	1.4	2.1
2008	108	332	201	172	1.3	17.1	1.5	2.7
2012	119	379	271	157	1.3	22.0	1.6	4.5
2017	68	374	402	187	1.0	20.6	8.5	7.3
2022	122	330	396	184	1.7	13.9	10.4	4.6

**Table 19R-06.8 - Basic Ground Cover.** Average modified Daubenmire quadrat cover by year for basic ground cover types.

Year	Cover Type (%)					
	Bare Ground	Cryptogams	Litter	Pavement	Rock	Vegetation
2006	50.1	0.1	33.9	1.0	0.1	29.0
2008	42.0	-	38.4	2.1	0.5	31.0
2012	19.7	0.0	45.7	1.0	0.2	41.0
2017	34.5	0.6	32.7	2.3	0.1	46.6
2022	51.8	-	27.4	2.2	0.7	37.4



**Table 19R-06.9 - Pellet Group Data.** Quadrat frequency and pellet group transect data for animal pellets. Rabbit pellet groups are not sampled in the pellet group transect.

Year	Cattle	Mule Deer	Rocky Mountain Elk	Rabbit
	Quadrat Frequency			
2006	2	-	-	76
2008	1	-	-	52
2012	5	-	-	2
2017	8	5	-	8
2022	5	3	-	5
Year	Days Use Per Acre (ha)			
2006	4.4 (10.8)	-	-	-
2008	-	-	-	-
2012	37.7 (93.2)	0.7 (1.7)	-	-
2017	47.2 (116.6)	2.0 (5.0)	0.7 (1.7)	-
2022	7.2 (17.9)	-	-	-

**Table 19R-06.10 - Grass Species.** Nested frequency and modified Daubenmire average cover by year.

GRASS SPECIES	Achnatherum hymenoides (Indian ricegrass)	Agropyron cristatum <sup>i</sup> (crested wheatgrass)	Bromus inermis <sup>i</sup> (smooth brome)	Bromus tectorum <sup>ai</sup> (cheatgrass)	Elymus elymoides (squirreltail)	Hesperosipa comata (needle and thread)	Leymus cinereus (basin wildrye)	Pascopyrum smithii (western wheatgrass)	Poa bulbosa <sup>i</sup> (bulbous bluegrass)	Poa secunda (Sandberg bluegrass)	Psathyrostachys juncea <sup>i</sup> (Russian wildrye)	Pseudoroegneria spicata (bluebunch wheatgrass)	Thinopyrum intermedium <sup>i</sup> (intermediate wheatgrass)
year	Nested Frequency												
2006	4	101	110	79	9	-	-	170	-	41	-	-	4
2008	1	68	103	108	13	7	-	173	0	84	0	3	42
2012	22	83	106	119	6	10	-	152	10	103	1	39	70
2017	-	123	122	68	8	-	0	39	53	85	3	109	45
2022	2	136	116	122	21	6	3	87	31	76	-	41	-
year	Average Cover (%)												
2006	0.0	3.9	3.1	0.5	0.3	-	-	3.3	-	1.5	-	-	0.2
2008	0.0	4.2	2.2	1.3	0.4	0.2	-	7.4	0.0	1.4	0.0	0.0	1.3
2012	0.7	5.5	2.5	1.3	0.1	0.2	-	6.0	0.1	2.4	0.1	1.8	2.6
2017	-	5.3	4.4	1.0	0.4	-	0.0	1.0	2.0	1.4	0.1	3.9	2.1
2022	0.0	6.0	3.3	1.7	0.3	0.1	0.1	1.4	0.8	1.5	-	0.4	-

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

**Table 19R-06.11 - Forb Species.** Nested frequency and modified Daubenmire average cover by year.

FORB SPECIES	Achillea millefolium (Common yarrow)	Agoseris glauca (pale agoseris)	Alyssum desertorum <sup>ai</sup> (desert madwort)	Astragalus cibirius (browse milkvetch)	Astragalus convallarius (lesser rushy milkvetch)	Carduus nutans <sup>mi</sup> (nodding plumeless thistle)	Ceratocephala testiculata <sup>ai</sup> (curvseed butterwort)	Chaenactis douglasii (Douglas' dustymaiden)	Collinsia parviflora <sup>a</sup> (maiden blue eyed Mary)	Crepis acuminata (tapertip hawksbeard)	Ipomopsis congesta (ballhead ipomopsis)	Linum perenne <sup>i</sup> (blue flax)	Microsteris gracilis <sup>a</sup> (slender phlox)	Phlox austromontana (mountain phlox)	Phlox longifolia (longleaf phlox)	Trifolium (clover)	Vicia americana (American vetch)
year	Nested Frequency																
2006	-	2	225	14	4	-	112	3	5	5	-	-	69	38	26	3	44
2008	-	-	181	-	17	-	36	1	1	19	3	10	12	30	81	-	79
2012	8	-	190	9	8	-	162	-	16	21	0	3	11	34	30	-	70
2017	4	12	361	12	24	2	201	3	23	11	-	7	29	33	61	-	95
2022	0	-	301	39	7	-	329	-	4	18	-	0	3	25	75	-	95
year	Average Cover (%)																
2006	-	0.0	0.7	0.2	0.2	-	0.5	0.0	0.0	0.1	-	-	0.2	1.2	0.1	0.0	0.3
2008	-	-	1.3	-	0.3	-	0.1	0.1	0.0	0.4	0.0	0.3	0.0	0.2	0.9	-	0.6
2012	0.9	-	0.5	0.1	0.2	-	1.0	-	0.0	0.6	0.0	0.0	0.0	1.4	0.1	-	1.2
2017	0.5	0.4	6.0	0.1	0.4	0.0	2.3	0.0	0.1	0.5	-	0.2	0.1	1.0	1.1	-	3.1
2022	0.0	-	5.9	0.9	0.1	-	4.5	-	0.0	0.2	-	0.0	0.0	0.7	0.9	-	1.7

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

**Table 19R-06.12 - Shrub and Tree Species.** Average modified Daubenmire quadrat and line intercept cover by year.

SHRUB SPECIES	Artemisia tridentata ssp. vaseyana <sup>p</sup> (mountain big sagebrush)	Chrysothamnus viscidiflorus ssp. viscidiflorus var. viscidiflorus (yellow rabbitbrush)	Pinus edulis <sup>t</sup> (twoneedle pinyon)
year	Line Intercept Cover		
2006	21.2	5.8	-
2008	2.9	7.3	-
2012	4.5	10.7	-
2017	6.6	11.5	-
2022	10.3	6.4	-
year	Quadrat Cover (%)		
2006	14.3	5.0	0.0
2008	2.2	6.1	-
2012	4.8	8.8	-
2017	5.3	9.2	-
2022	9.3	4.1	-

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

**Table 19R-06.13 - Shrub/Tree Characteristics.** Population characteristics of shrub/tree species populations including density reproduction (seedlings), age distribution, utilization, vigor and average size (height/crown) of plants.

Year	Density		Age Class Distribution			Utilization		Poor Vigor (%)	Average Height Crown (cm)
	Plants Per Acre		Excluding Seedlings			Moderate (%)	Heavy (%)		
	Excluding Seedlings	Seedling	Young (%)	Mature (%)	Decadent (%)				
<b>Artemisia tridentata ssp. vaseyana<sup>p</sup> -- (mountain big sagebrush)</b>									
2006	3440	760	8	69	23	13	0	22	63/81
2008	1660	40	17	69	14	2	0	35	41/55
2012	1520	20	17	82	1	20	0	3	48/59
2017	1800	-	1	96	3	28	1	2	53/67
2022	1700	20	0	94	6	2	0	6	- / -
<b>Chrysothamnus viscidiflorus ssp. viscidiflorus var. viscidiflorus -- (yellow rabbitbrush)</b>									
2006	4660	-	8	90	2	1	0	1	28/40
2008	4180	80	2	95	3	0	0	0	29/47
2012	4100	-	8	90	2	1	0	0	35/62
2017	5240	-	5	89	6	1	0	3	37/61
2022	5140	520	21	64	14	3	0	10	- / -
<b>Tetradymia canescens -- (spineless horsebrush)</b>									
2006	-	-	-	-	-	-	-	-	30/32
2008	-	-	-	-	-	-	-	-	24/37
2012	-	-	-	-	-	-	-	-	31/57
2017	-	-	-	-	-	-	-	-	32/52

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

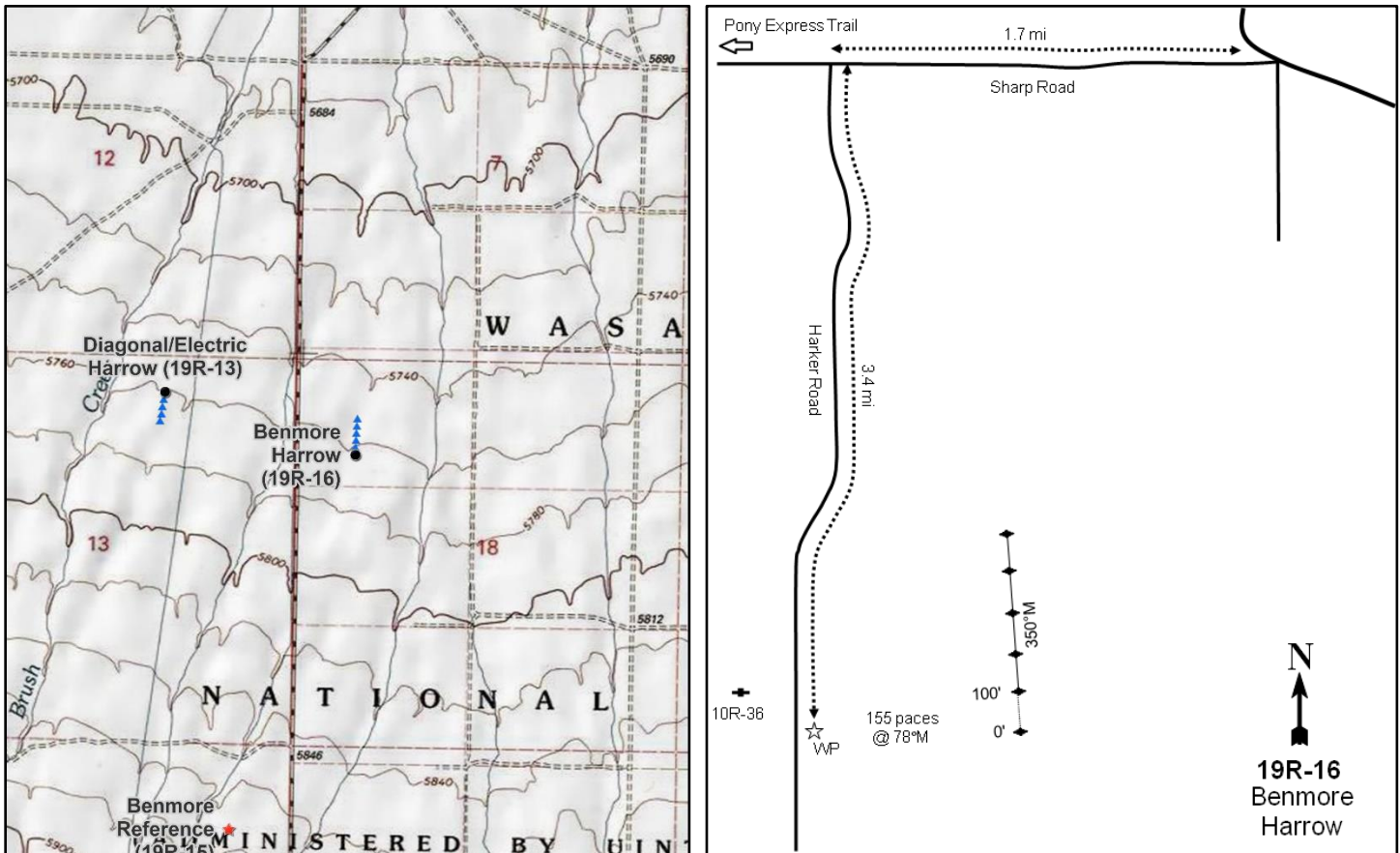
**Table 19R-06.14 - Tree Characteristics.** Point-quarter tree density, size class distribution, and average diameter.

Year	Density	Size Class Distribution					Average Diameter (cm)
	Trees per Acre	Seedling (%)	1-4' (%)	4-8' (%)	8-12' (%)	>12' (%)	
<b>Juniperus osteosperma (Utah juniper)</b>							
2017	6	-	33	67	-	-	8.0

**Table 19R-06.15 - Deer Desirable Components Index: Upland 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	26.5	8.2	4.1	24.5	-0.4	4.3	0.0	67.1	Good
2008	3.6	0.0	0.0	30.0	-1.0	5.3	0.0	38.0	Poor
2012	5.6	0.0	0.0	30.0	-0.9	9.0	0.0	43.7	Poor
2017	8.3	14.0	0.6	30.0	-0.7	10.0	-2.0	60.1	Fair
2022	12.9	13.2	0.0	26.3	-1.2	9.1	0.0	60.3	Fair

## BENMORE HARROW - STUDY NO. 19R-16



### Location Information

USGS 7.5 min Map Info  
GPS (0' Stake)

Vernon SW; Township 9S, Range 5W, Section 18  
NAD 83 UTM ZONE 12, 375744 East 4432965 North

### Transect Information

Browse Tag # (0' Stake)	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	Standard

### Directions to Site

From Vernon, drive for 1.7 miles on Sharp Road (which leads to the Pony Express Trail). Turn left onto Harker Road and continue for 1.0 miles to a fork. Stay left and drive 0.9 miles to another fork. Keep to the right and drive for 1.5 miles to the witness post on the east side of the road. From the witness post, walk 155 paces at 78 degrees magnetic to the 0-foot stake.

**Site Information**

Land Ownership	Federal
Land Administrator	USFS
Allotment	BENMORE
Elevation	5,699ft (1,737m)
Aspect	Northwest
Slope	2%
Sample Dates	07/21/2009, 06/04/2012, 06/06/2017, 06/07/2022

**Table 19R-16.1 Disturbance History.** Recorded history of major disturbances.

Treatment/Disturbance	Name	WRI DB#	Date	Size (acres)
Harrow - Two-Way Chain	Benmore Pastures Dixie Harrow Project	1361	October-December 2009	731
Seeding - Broadcast Before	Benmore Pastures Dixie Harrow Project	1361	October-December 2009	731

**Table 19R-16.2 Seed Mix.** List of known seeded plant species and rates (if available).

Mix Name			Application Type	Application Date	Acres
Benmore Pastures Dixie Harrow			Broadcast	Oct 2009	900
Type	Species	Common Name	Cultivar/Source ID	Bulk lbs/acre	PLS
G	Achnatherum hymenoides	Indian Ricegrass	Rimrock	1.00	0.95
G	Elymus wawawaiensis	Snake River Wheatgrass	Secar	1.00	0.92
G	Leymus cinereus	Great Basin Wildrye	Trailhead	1.00	0.89
G	Pascopyrum smithii	Western Wheatgrass	Arriba	2.00	1.74
G	Poa secunda	Sandberg Bluegrass	Toole MT	0.25	0.21
G	Pseudoroegneria spicata	Bluebunch Wheatgrass	Anatone	2.00	1.82
F	Achillea millefolium	Western Yarrow		0.11	0.10
F	Cleome serrulata	Rocky Mountain Beeplant	Sanpete UT	0.13	0.12
F	Cleome serrulata	Rocky Mountain Beeplant	Sevier UT	0.24	0.22
F	Cleome serrulata	Rocky Mountain Beeplant	Sanpete/Sevier/Paiute	0.11	0.11
F	Linum perenne	Blue Flax	Appar	0.50	0.43
F	Medicago sativa	Alfalfa	Ladak	2.00	1.86
F	Onobrychis viciifolia	Sainfoin	Eski	2.00	1.88
F	Sanguisorba minor	Small Burnet	Delar	2.00	1.68

**Wildlife Habitat and Vegetation History**

**Table 19R-16.3 - Wildlife Seasonal Habitat.** DWR wildlife habitat and seasonality.

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

**Table 19R-16.4 - Vegetation History.** The dominant vegetation type(s) and phase of woodland succession (Tausch, Miller, Roundy, & Chambers, 2009).

Year	Vegetation Type	Woodland Succession
2009	Mountain Big Sagebrush	NA
2012	Perennial Grass	NA
2017	Perennial Grass/Mountain Big Sagebrush	NA
2022	Mountain Big Sagebrush/Perennial Grass	NA

**Site Notes**

No Notes

**Site Potential**

1981 - 2010 Average Annual Precipitation	12 inches
NRCS Ecological Site	Upland Loam (Mountain Big Sagebrush)
NRCS Ecological Site #	R028AY310UT
States and Transitions	No state and transition model is available for this ecological site.

When established in 2009, this study site was dominated by mountain big sagebrush (*Artemisia tridentata* ssp. *vaseyana*). A harrow and seeding project later that year (Table 19R-16.1) removed much of the sagebrush cover, but by the 2017 sample year it began to recover and again became a dominant site component; recruitment of young plants has increased overall from pre-treatment levels (Table 19R-16.12, Table 19R-16.13). Perennial grasses, particularly the introduced species crested wheatgrass (*Agropyron cristatum*) and bulbous bluegrass (*Poa bulbosa*), have been abundant in all sample years. Perennial grasses were also dominant vegetation components in 2012 and 2017, but less so in 2022 with an overall decrease in perennial grass cover occurring the same year (Table 19R-16.7, Table 19R-16.10). Forbs were common in 2009 and 2017, but much of the cover was contributed by the introduced and weedy annual species curvseed butterwort (*Ceratocephala testiculata*). In 2022, annual forb cover decreased, but said cover was contributed evenly by curvseed butterwort and desert madwort (*Alyssum desertorum*) (Table 19R-16.11). Without disturbance, sagebrush will likely continue to increase and it is probable that the plant community will improve in forage production for wildlife over time.

**Trend Summary Tables**

**Table 19R-16.6 - Shrub/Tree Summary.** Average modified Daubenmire quadrat and line intercept cover by year for shrubs/trees

Year	Quadrat Cover (%)			Line-intercept Cover (%)		
	Preferred Shrub	Other Shrub	Tree	Preferred Shrub	Other Shrub	Tree
2009	6.1	0.8	-	7.9	1.6	-
2012	2.3	0.4	-	2.1	0.5	-
2017	3.7	1.7	-	4.2	0.7	-
2022	7.4	1.2	-	6.3	0.4	-

**Table 19R-16.7 - Herbaceous Summary.** Nested frequency and average modified Daubenmire quadrat cover by year for herbaceous functional groups

Year	Nested Frequency				Quadrat Cover (%)			
	Annual Grass	Perennial Grass	Annual/Biennial Forb	Perennial Forb	Annual Grass	Perennial Grass	Annual/Biennial Forb	Perennial Forb
2009	-	323	332	1	-	13.0	10.9	0.0
2012	4	422	360	81	0.0	30.5	1.7	2.4
2017	-	399	444	43	-	35.7	18.5	0.3
2022	1	328	471	1	0.0	19.3	12.0	0.0

**Table 19R-16.8 - Basic Ground Cover.** Average modified Daubenmire quadrat cover by year for basic ground cover types.

Year	Cover Type (%)					
	Bare Ground	Cryptogams	Litter	Pavement	Rock	Vegetation
2009	52.3	3.3	25.1	1.6	0.1	29.4
2012	26.5	0.0	39.3	1.1	0.3	38.8
2017	35.2	0.0	33.4	1.2	0.1	48.5
2022	49.0	0.2	28.9	2.4	0.5	38.7

**Table 19R-16.9 - Pellet Group Data.** Quadrat frequency and pellet group transect data for animal pellets. Rabbit pellet groups are not sampled in the pellet group transect.

Year	Cattle	Mule Deer	Greater Sage-Grouse	Rabbit
	Quadrat Frequency			
2009	11	2	-	64
2012	-	4	1	7
2017	7	3	-	23
2022	5	8	2	4
Year	Days Use Per Acre (ha)			
2009	-	-	-	-
2012	-	0.7 (1.7)	95.8 (236.7)*	-
2017	47.9 (118.4)	-	-	-
2022	11.6 (28.7)	4.7 (11.6)	8.7 (21.5)*	-

\*Pellets per acre (ha)

**Table 19R-16.10 - Grass Species.** Nested frequency and modified Daubenmire average cover by year.

GRASS SPECIES	Agropyron cristatum <sup>i</sup> (crested wheatgrass)	Bromus tectorum <sup>ai</sup> (cheatgrass)	Elymus wawawaiensis (Snake River wheatgrass)	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							
2009	307	-	-	-	-	70	-	-
2012	236	4	-	66	305	100	51	25
2017	269	-	3	117	303	-	64	5
2022	248	1	3	90	111	52	37	-
year	Average Cover (%)							
2009	11.7	-	-	-	-	1.3	-	-
2012	15.5	0.0	-	2.7	7.2	1.8	1.7	1.6
2017	18.7	-	0.1	4.7	9.1	-	3.1	0.0
2022	12.2	0.0	0.0	1.2	2.4	0.8	2.7	-

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

**Table 19R-16.11 - Forb Species.** Nested frequency and modified Daubenmire average cover by year.

FORB SPECIES	Alyssum desertorum <sup>ai</sup> (desert madwort)	Astragalus cibarius (browse milkvetch)	Calochortus nuttallii (sego lily)	Ceratocephala testiculata <sup>ai</sup> (curvseed butterwort)	Comandra umbellata (bastard toadflax)	Linum perenne <sup>i</sup> (blue flax)	Medicago sativa <sup>i</sup> (alfalfa)	Onobrychis viciifolia <sup>i</sup> (sainfoin)	Sanguisorba minor <sup>i</sup> (small burnet)
year	Nested Frequency								
2009	56	1	-	329	-	-	-	-	-
2012	317	7	2	198	1	34	3	31	12
2017	236	2	1	431	-	30	7	5	-
2022	386	-	-	412	1	-	-	-	-
year	Average Cover (%)								
2009	0.3	0.0	-	10.6	-	-	-	-	-
2012	0.7	0.2	0.0	1.0	0.0	1.1	0.0	0.7	0.3
2017	1.7	0.0	0.0	16.8	-	0.1	0.2	0.0	-
2022	5.8	-	-	6.2	0.0	-	-	-	-

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



**Table 19R-16.12 - Shrub and Tree Species.** Average modified Daubenmire quadrat and line intercept cover by year.

SHRUB SPECIES	Line Intercept Cover (%)			
	year	Line Intercept Cover (%)		
Artemisia tridentata ssp. vaseyana <sup>p</sup> (mountain big sagebrush)	2009	7.9	-	1.6
	2012	2.1	-	0.4
	2017	4.2	-	0
	2022	6.3	0.4	-
Chrysothamnus viscidiflorus (yellow rabbitbrush)	2009	6.1	0.0	0.8
	2012	2.3	-	0.1
	2017	3.7	-	0.6
	2022	7.4	1.0	0.2
Ericameria nauseosa (rubber rabbitbrush)	2009	6.1	0.0	0.8
	2012	2.3	-	0.1
	2017	3.7	-	0.6
	2022	7.4	1.0	0.2
Gutierrezia sarothrae (broom snakeweed)	2009	6.1	0.0	0.8
	2012	2.3	-	0.1
	2017	3.7	-	0.6
	2022	7.4	1.0	0.2

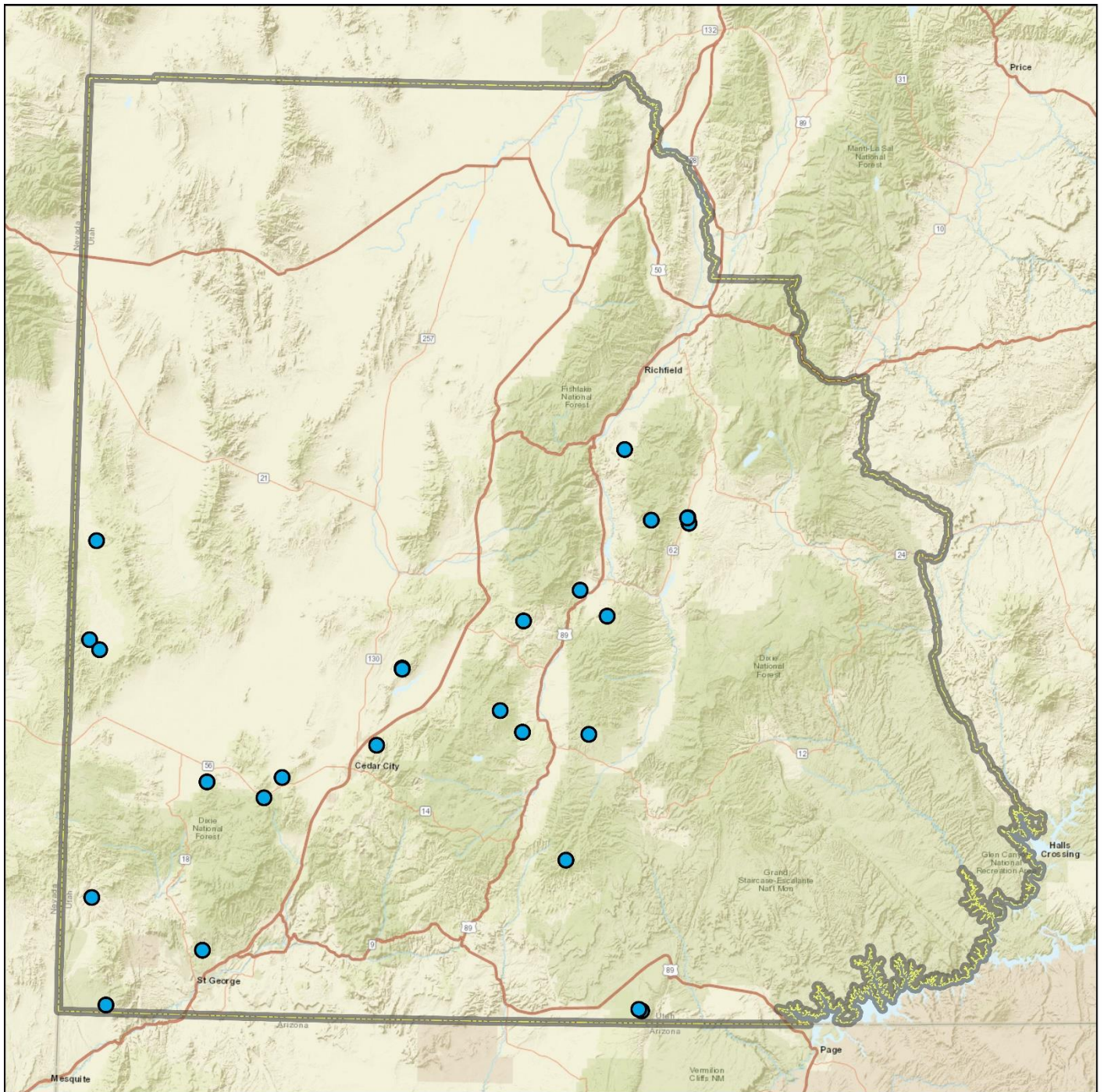
t - Tree Species; p - Preferred Browse; i - Introduced Species

**Table 19R-16.13 - Shrub/Tree Characteristics.** Population characteristics of shrub/tree species populations including density reproduction (seedlings), age distribution, utilization, vigor and average size (height/crown) of plants.

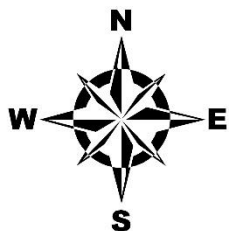
Year	Density		Age Class Distribution			Utilization		Poor Vigor (%)	Average Height Crown (cm)
	Plants Per Acre		Excluding Seedlings			Moderate (%)	Heavy (%)		
	Excluding Seedlings	Seedling	Young (%)	Mature (%)	Decadent (%)				
<b>Artemisia tridentata ssp. vaseyana<sup>p</sup> -- (mountain big sagebrush)</b>									
2009	-	-	-	-	-	-	-	-	63/75
2012	2540	260	76	23	2	4	0	0	31/32
2017	2600	140	27	73	0	5	0	0	40/40
2022	2360	-	14	72	14	24	0	14	- / -
<b>Chrysothamnus viscidiflorus -- (yellow rabbitbrush)</b>									
2009	-	-	-	-	-	-	-	-	50/70
2012	-	-	-	-	-	-	-	-	- / -
2017	-	-	-	-	-	-	-	-	- / -
2022	140	-	0	29	71	0	0	71	- / -
<b>Ericameria nauseosa -- (rubber rabbitbrush)</b>									
2009	-	-	-	-	-	-	-	-	33/34
2012	120	-	0	100	0	0	0	0	39/37
2017	200	-	10	90	0	10	10	0	48/58
2022	20	-	0	0	100	0	0	100	- / -
<b>Gutierrezia sarothrae -- (broom snakeweed)</b>									
2009	-	-	-	-	-	-	-	-	23/26
2012	140	-	29	71	0	0	0	0	23/28
2017	920	-	35	65	0	0	0	0	17/19
2022	80	420	0	75	25	0	0	25	- / -

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

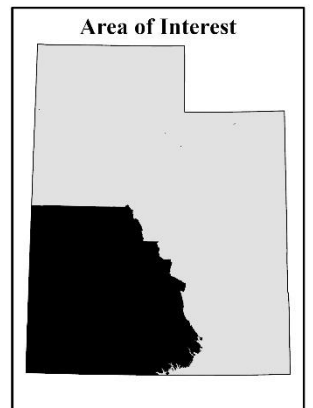
# SOUTHERN REGION



0 5 10 20 30 40 50 60 70 80 Miles



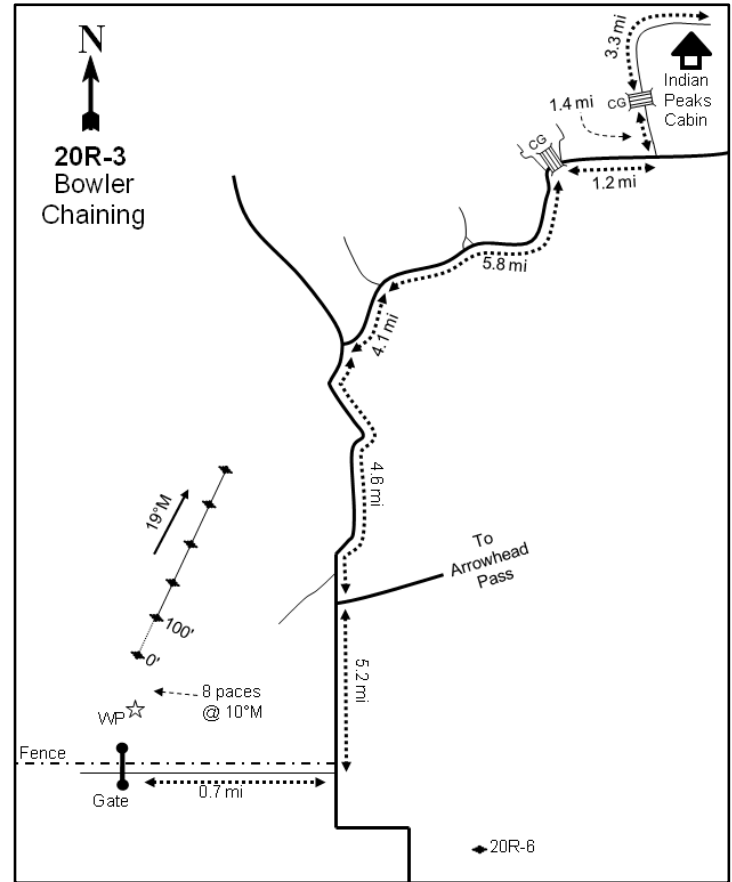
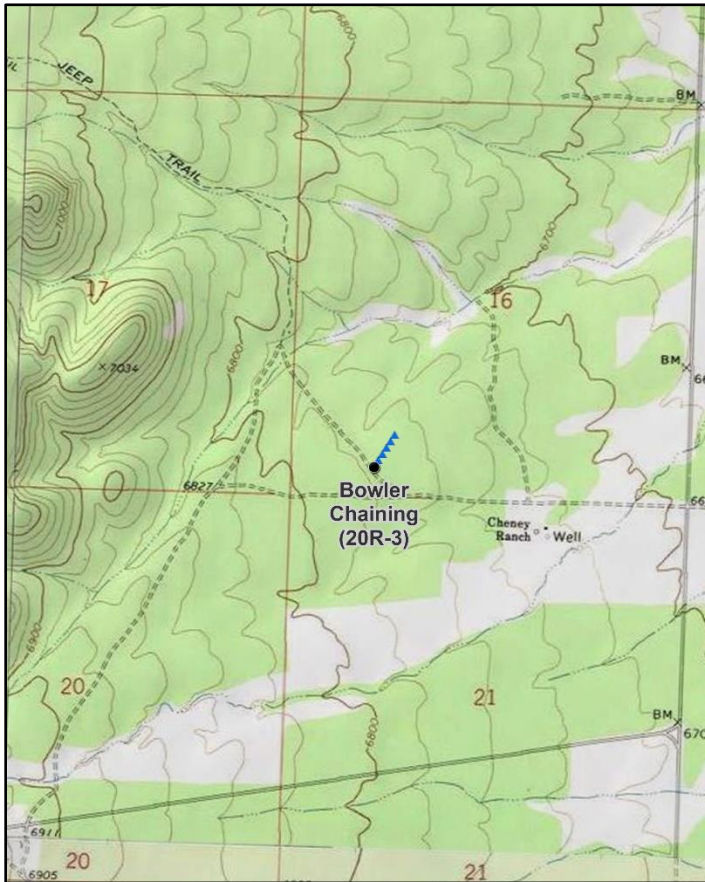
**Region Boundaries**  
Southern Region  
**Study Location**  
2022 WRI Study Sites



Credits: Esri, HERE, Garmin, NGA, USGS, NPS



## BOWLER CHAINING - STUDY NO. 20R-3

**Location Information**

USGS 7.5 min Map Info  
GPS (0' Stake)

Steamboat Mountain S; Township 32S, Range 19W, Section 16  
NAD 83 UTM ZONE 12, 238018 East 4211556 North

**Transect Information**

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

160  
19° magnetic  
500ft  
Line 1 (11ft), Line 2 (34ft), Line 3 (59ft), Line 4 (71ft), Line 5 (95ft)  
Standard

**Directions to Site**

From the Indian Peaks cabin, drive west for 0.3 miles to a fork. Proceed to the left, continue 0.1 miles to another fork, and again stay left. From there, drive 2.9 miles to a cattle guard. From the cattle guard, continue 1.4 miles to a junction. Turn right and drive 1.2 miles to an intersection. Go straight, crossing a 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 right, drive for another 5.2 miles to an intersection, and turn right; a fence runs along this road. Drive 0.7 miles and stop just before a gate. The witness post is to the north of the fence. From the witness post walk 8 paces at 10 degrees magnetic to the 0-foot stake that is marked with browse tag #160.

**Site Information**

Land Ownership	Private
Land Administrator	Private
Allotment	STATELINE
Elevation	6,800ft (2,073m)
Aspect	Northeast
Slope	3%
Sample Dates	07/17/2006, 06/15/2011, 08/04/2015, 06/15/2022

**Table 20R-03.1 Disturbance History.** Recorded history of major disturbances.

Treatment/Disturbance	Name	WRI DB#	Date	Size (acres)
Chaining - Two-Way Ely	Bowler Chaining	563	October-November 2006	854
Seeding - Aerial Before	Bowler Chaining	563	November 2006	854

**Table 20R-03.2 Seed Mix.** List of known seeded plant species and rates (if available).

Mix Name			Application Type	Application Date	Acres
Bowler Chaining			Aerial	Nov 2006	700
Type	Species	Common Name	Cultivar/Source ID	Bulk lbs/acre	PLS
G	Achnatherum hymenoides	Indian Ricegrass	Rimrock	1.00	0.99
G	Agropyron cristatum	Crested Wheatgrass	Douglas	0.50	0.41
G	Agropyron desertorum	Crested Wheatgrass	Hycrest	0.50	0.45
G	Elymus wawawaiensis	Snake River Wheatgrass	Secar	1.00	0.92
G	Festuca brevipila	Hard Fescue	Durar	0.20	0.18
G	Poa secunda	Canby Bluegrass	Canbar	0.20	0.15
G	Poa secunda	Sandberg Bluegrass	Toole MT	0.20	0.18
G	Thinopyrum intermedium	Pubescent Wheatgrass		1.00	0.84
F	Astragalus cicer	Cicer Milkvetch	Lutana	0.50	0.44
F	Linum perenne	Blue Flax		0.25	0.22
F	Medicago sativa	Alfalfa	Ladak	0.36	0.34
F	Medicago sativa	Alfalfa	Nomad	0.36	0.32
F	Medicago sativa	Alfalfa	Ranger	0.36	0.31
F	Melilotus officinalis	Yellow Sweetclover		0.20	0.14
F	Onobrychis viciifolia	Sainfoin	Eski	2.00	1.84
F	Sanguisorba minor	Small Burnet	Delar	1.50	1.39
S	Artemisia tridentata ssp. wyomingensis	Wyoming Big Sagebrush	Beaver UT	1.00	0.23
S	Bassia prostrata	Forage Kochia	Immigrant	1.00	0.57

**Wildlife Habitat and Vegetation History****Table 20R-03.3 - Wildlife Seasonal Habitat.** DWR wildlife habitat and seasonality.

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

**Table 20R-03.4 - Vegetation History.** The dominant vegetation type(s) and phase of woodland succession (Tausch, Miller, Roundy, & Chambers, 2009).

Year	Vegetation Type	Woodland Succession
2006	Pinyon-Juniper	Phase III
2011	Wyoming Big Sagebrush/Perennial Grass	Phase I
2015	Wyoming Big Sagebrush/Perennial Grass	Phase I
2022	Wyoming Big Sagebrush/Perennial Grass	Phase I

**Site Notes**

No Notes

**Soils****Table 20R-03.5 - Soil Analysis Data.** List of chemical and textural soil characteristics determined by laboratory analysis.

Texture	pH	%sand	%silt	%clay	%OM	PPM P	PPM K	ds/m	Sample Date
Clay Loam	6.4	35.9	31.0	33.1	1.7	10.1	188.8	0.5	07/17/2006

**Site Potential**

1981 - 2010 Average Annual Precipitation	14 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.

This site was a singleleaf pinyon (*Pinus monophylla*) and Utah juniper (*Juniperus osteosperma*) dominated woodland in Phase III of woodland succession when it was established in 2006. After the 2006 chaining (Table 20R-03.1), pinyon and juniper decreased (Table 20R-03.4, Table 20R-03.14). In 2011, Wyoming big sagebrush (*Artemisia tridentata* ssp. *wyomingensis*) became a dominant site component along with perennial grasses. Sagebrush has continued to increase in both density and cover over time and is a major component of the community (Table 20R-03.12). The introduced annual grass cheatgrass (*Bromus tectorum*) has been observed on the site, but in minimal amounts (Table 20R-03.10). The post-treatment densities of juniper and pinyon decreased each sample year from 2011 to 2015. However, density for both tree species increased in 2022, indicating that encroachment is active (Table 20R-03.13, Table 20R-03.14). Although the site has been considered to be in Phase I of woodland succession in all post-treatment samplings (Table 20R-03.4), it is likely that without disturbance the community will experience further infilling by pinyon and juniper trees.

**Trend Summary Tables****Table 20R-03.6 - Shrub/Tree Summary.** Average modified Daubenmire quadrat and line intercept cover by year for shrubs/trees

Year	Quadrat Cover (%)			Line-intercept Cover (%)		
	Preferred Shrub	Other Shrub	Tree	Preferred Shrub	Other Shrub	Tree
2006	1.3	0.1	14.3	1.2	0.1	24.5
2011	4.4	0.3	1.1	4.3	0.5	2.2
2015	7.1	3.5	0.0	7.6	5.0	-
2022	8.0	0.3	0.3	10.3	0.2	0.1

**Table 20R-03.7 - Herbaceous Summary.** Nested frequency and average modified Daubenmire quadrat cover by year for herbaceous functional groups

Year	Nested Frequency				Quadrat Cover (%)			
	Annual Grass	Perennial Grass	Annual/Biennial Forb	Perennial Forb	Annual Grass	Perennial Grass	Annual/Biennial Forb	Perennial Forb
2006	1	154	107	239	0.0	3.3	0.3	5.9
2011	17	281	179	236	0.1	13.1	2.4	7.1
2015	5	295	19	137	0.0	18.1	0.4	4.4
2022	15	293	41	108	0.1	15.6	0.2	2.4

**Table 20R-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
2006	21.4	1.8	38.5	27.4	5.6	21.7
2011	16.5	0.1	42.8	5.0	1.2	31.9
2015	29.0	0.0	49.6	10.4	1.9	29.7
2022	39.6	0.0	44.8	8.1	2.0	24.4

**Table 20R-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	Pronghorn	Cattle	Mule Deer	Rocky Mountain Elk	Rabbit
	Quadrat Frequency				
2006	-	-	3	-	46
2011	-	-	3	4	-
2015	1	1	7	1	25
2022	-	7	2	2	8
Year	Days Use Per Acre (ha)				
2006	-	-	2.0 (5.0)	-	-
2011	-	8.0 (19.7)	2.7 (6.6)	7.4 (18.2)	-
2015	-	-	4.0 (9.9)	1.3 (3.3)	-
2022	-	5.1 (12.6)	-	4.0 (9.9)	-

**Table 20R-03.10 - Grass Species.** Nested frequency and modified Daubenmire average cover by year.

GRASS SPECIES																
Achnatherum hymenoides (Indian ricegrass)																
Achnatherum pinetorum (pine needlegrass)																
Agropyron cristatum <sup>i</sup> (crested wheatgrass)																
Bromus tectorum <sup>ai</sup> (cheatgrass)																
Elymus elymoides (squirreltail)																
Elymus wawawaiensis (Snake River wheatgrass)																
Festuca brevipila <sup>i</sup> (hard fescue)																
Koeleria macrantha (prairie Junegrass)																
Leymus cinereus (basin wildrye)																
Pascopyrum smithii (western wheatgrass)																
Pleuraphis jamesii (James' galleta)																
Poa fendleriana (muttongrass)																
Poa secunda (Sandberg bluegrass)																
Psathyrostachys juncea <sup>i</sup> (Russian wildrye)																
Sporobolus cryptandrus (sand dropseed)																
Thinopyrum intermedium <sup>i</sup> (intermediate wheatgrass)																
year	Nested Frequency															
2006	21	7	-	1	124	-	-	-	-	2	-	3	31	-	-	-
2011	36	7	100	17	144	12	29	-	8	57	-	14	17	4	-	4
2015	15	9	150	5	124	4	28	1	3	56	3	9	7	27	3	49
2022	5	37	124	15	43	14	6	1	2	128	-	1	11	22	-	35
year	Average Cover (%)															
2006	0.4	0.3	-	0.0	1.9	-	-	-	-	0.0	-	0.1	0.7	-	-	-
2011	1.4	0.6	3.6	0.1	5.1	0.0	0.5	-	0.2	1.1	-	0.1	0.4	0.2	-	0.1
2015	1.1	0.8	7.7	0.0	3.3	0.3	0.7	0.0	0.2	1.3	0.0	0.4	0.0	1.3	0.1	0.7
2022	0.4	1.1	6.7	0.1	1.3	0.2	0.3	0.0	0.1	3.6	-	0.0	0.1	1.3	-	0.3

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

**Table 20R-03.11 - Forb Species.** Nested frequency and modified Daubenmire average cover by year.

FORB SPECIES																	
Arabis (rockcross)																	
Astragalus convallarius (lesser rushy milkvetch)																	
Astragalus lentiginosus (freckled milkvetch)																	
Astragalus utahensis (Utah milkvetch)																	
Chaenactis douglasii (Douglas' dustymaiden)																	
Chaetopappa ericoides (rose heath)																	
Cirsium (thistle)																	
Cryptantha (cryptantha)																	
Cymopterus (springparsley)																	
Dalea searlsiae (Searl's prairie clover)																	
Descurainia pinnata <sup>a</sup> (western tansymustard)																	
Erigeron pumilus (shaggy fleabane)																	
Eriogonum caespitosum (matted buckwheat)																	
Eriogonum cernuum <sup>a</sup> (nodding buckwheat)																	
Eriogonum ovalifolium (cushion buckwheat)																	
Eriogonum racemosum (redroot buckwheat)																	
Eriogonum umbellatum (sulphur-flower buckwheat)																	
year	Nested Frequency																
2006	10	13	-	6	22	0	-	5	-	-	-	-	150	-	-	-	2
2011	-	7	4	10	14	-	-	4	7	-	91	1	106	-	3	-	0
2015	1	2	-	-	-	10	1	3	-	6	-	3	80	8	5	-	3
2022	-	5	3	1	-	10	-	2	1	9	-	-	64	-	-	4	5
year	Average Cover (%)																
2006	0.0	0.1	-	0.0	0.1	0.0	-	0.0	-	-	-	-	4.1	-	-	-	0.1
2011	-	0.0	0.3	0.0	0.1	-	-	0.0	0.2	-	1.3	0.0	3.4	-	0.0	-	0.0
2015	0.0	0.0	-	-	-	0.1	0.1	0.0	-	0.0	-	0.0	2.9	0.3	0.2	-	0.0
2022	-	0.1	0.0	0.0	-	0.1	-	0.0	0.0	0.3	-	-	1.5	-	-	0.0	0.0

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)																	
Hedysarum boreale (Utah sweetvetch)																	
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)																	
Lomatium (desertparsley)																	
Lupinus argenteus (silvery lupine)																	
Lupinus kingi <sup>a</sup> (King's lupine)																	
Machaeranthera canescens (hoary tansyaster)																	
Medicago sativa <sup>i</sup> (alfalfa)																	
Microsteris gracilis <sup>a</sup> (slender phlox)																	
Packera multilobata (lobeleaf groundsel)																	
Penstemon (beardtongue)																	
Penstemon caespitosus (mat penstemon)																	
year	Nested Frequency																
2006	-	-	14	90	-	28	38	-	-	7	24	-	-	3	8	8	-
2011	39	2	13	15	78	2	-	107	-	44	-	2	5	5	1	-	13
2015	-	-	-	1	-	-	-	15	-	16	3	-	-	-	1	3	5
2022	5	-	-	-	-	11	-	-	2	7	23	-	-	4	-	-	-
year	Average Cover (%)																
2006	-	-	0.1	0.7	-	0.1	0.2	-	-	0.2	0.1	-	-	0.0	0.0	0.0	-
2011	0.1	0.0	0.4	0.0	0.7	0.0	-	1.4	-	0.5	-	0.0	0.0	0.0	0.0	-	0.2
2015	-	-	-	0.0	-	-	-	0.1	-	0.4	0.0	-	-	-	0.1	0.0	0.1
2022	0.0	-	-	-	-	0.1	-	-	0.0	0.3	0.1	-	-	0.0	-	-	-

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

FORB SPECIES										
Phlox austromontana (mountain phlox)										
Phlox longifolia (longleaf phlox)										
Physaria (twimpod)										
Polygonum douglasii <sup>a</sup> (Douglas' knotweed)										
Sanguisorba minor <sup>i</sup> (small burnet)										
Silene antirrhina <sup>a</sup> (sleepy silene)										
Sisymbrium altissimum <sup>ai</sup> (tall tumblemustard)										
Sphaeralcea grossularifolia (gooseberryleaf globemallow)										
Tragopogon dubius <sup>ai</sup> (yellow salsify)										
Trifolium gymnocarpon (hollyleaf clover)										
year	Nested Frequency									
2006	7	8	-	67	-	11	-	-	-	32
2011	8	10	-	55	7	5	2	16	-	17
2015	8	-	2	6	0	-	-	10	2	1
2022	5	5	-	-	-	-	-	2	-	11
year	Average Cover (%)									
2006	0.1	0.0	-	0.1	-	0.0	-	-	-	0.1
2011	0.1	0.0	-	0.1	0.2	0.2	0.0	0.1	-	0.1
2015	0.2	-	0.0	0.0	0.0	-	-	0.0	0.0	0.0
2022	0.1	0.0	-	-	-	-	-	0.0	-	0.0

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



**Table 20R-03.12 - Shrub and Tree Species.** Average modified Daubenmire quadrat and line intercept cover by year.

SHRUB SPECIES	Line Intercept Cover (%)									
	year	Line Intercept Cover (%)								
Artemisia nova <sup>p</sup> (black sagebrush)	2006	0	1.2	-	-	-	-	0.1	17.9	6.6
Artemisia tridentata ssp. wyomingensis <sup>p</sup> (Wyoming big sagebrush)	2011	0.4	3.9	-	-	-	-	0.5	1.3	0.9
Bassia prostrata <sup>pt</sup> (forage kochia)	2015	0.7	6.8	0.1	-	-	0.3	4.7	-	-
Chrysothamnus depressus <sup>p</sup> (longflower rabbitbrush)	2022	1.9	7.8	0.1	0.5	-	0.2	0	0.1	-
Chrysothamnus viscidiflorus ssp. viscidiflorus var. viscidiflorus (yellow rabbitbrush)	year	Quadrat Cover (%)								
Ericameria nauseosa (rubber rabbitbrush)	2006	0.0	1.2	-	-	-	-	0.1	8.8	5.5
Gutierrezia sarothrae (broom snakeweed)	2011	0.0	4.1	0.3	-	-	-	0.3	0.9	0.2
Juniperus osteosperma <sup>t</sup> (Utah juniper)	2015	0.4	6.4	0.3	-	0.0	0.0	3.4	0.0	-
Pinus monophylla <sup>t</sup> (singleleaf pinyon)	2022	1.8	6.1	0.1	0.1	-	0.0	0.3	0.1	0.2

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

**Table 20R-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 nova<sup>p</sup> -- (black sagebrush)</b>									
2006	100	-	20	0	80	0	0	80	28/46
2011	80	60	100	0	0	0	0	0	22/35
2015	320	-	63	38	0	0	0	0	32/56
2022	1400	-	41	57	1	0	0	0	- / -
<b>Artemisia tridentata ssp. wyomingensis<sup>p</sup> -- (Wyoming big sagebrush)</b>									
2006	700	160	11	63	26	0	0	11	46/63
2011	760	1020	13	87	0	3	3	0	43/58
2015	2760	660	72	28	0	12	20	1	50/82
2022	3080	20	56	43	1	19	29	3	- / -
<b>Bassia prostrata<sup>pt</sup> -- (forage kochia)</b>									
2006	-	-	-	-	-	-	-	-	- / -
2011	140	-	0	100	0	29	0	0	9/19
2015	400	20	30	70	0	15	45	0	12/22
2022	520	-	12	46	42	4	8	4	- / -
<b>Chrysothamnus depressus<sup>p</sup> -- (longflower rabbitbrush)</b>									
2006	-	-	-	-	-	-	-	-	- / -
2011	-	-	-	-	-	-	-	-	- / -
2015	20	-	0	100	0	0	100	0	16/32
2022	20	-	0	100	0	0	0	0	- / -
<b>Chrysothamnus viscidiflorus ssp. viscidiflorus var. viscidiflorus -- (yellow rabbitbrush)</b>									
2006	-	-	-	-	-	-	-	-	17/19
2011	-	-	-	-	-	-	-	-	34/39
2015	-	-	-	-	-	-	-	-	40/56
2022	-	-	-	-	-	-	-	-	- / -

Year	Density		Age Class Distribution			Utilization		Poor Vigor (%)	Average Height Crown (cm)
	Plants Per Acre		Excluding Seedlings			Moderate (%)	Heavy (%)		
	Excluding Seedlings	Seedling	Young (%)	Mature (%)	Decadent (%)				
<b>Ericameria nauseosa -- (rubber rabbitbrush)</b>									
2006	-	-	-	-	-	-	-	-	-/-
2011	-	-	-	-	-	-	-	-	51/51
2015	20	-	0	100	0	0	0	0	44/49
2022	-	-	-	-	-	-	-	-	-/-
<b>Gutierrezia sarothrae -- (broom snakeweed)</b>									
2006	540	220	26	74	0	0	0	0	22/21
2011	520	40	35	58	8	0	0	8	16/22
2015	8220	440	13	87	0	2	0	0	21/21
2022	480	140	42	58	0	0	0	0	-/-
<b>Juniperus osteosperma<sup>1</sup> -- (Utah juniper)</b>									
2006	320	40	0	81	19	0	0	0	-/-
2011	140	-	100	0	0	0	0	14	-/-
2015	20	80	100	0	0	0	0	0	-/-
2022	120	-	83	17	0	0	0	0	-/-
<b>Linanthus pungens -- (granite prickly phlox)</b>									
2006	20	-	0	100	0	0	0	0	5/17
2011	20	-	100	0	0	0	0	0	2/5
2015	40	-	0	100	0	0	0	0	5/18
2022	-	-	-	-	-	-	-	-	-/-
<b>Opuntia -- (pricklypear)</b>									
2006	-	-	-	-	-	-	-	-	15/49
2011	-	-	-	-	-	-	-	-	11/44
2015	-	-	-	-	-	-	-	-	12/23
2022	-	-	-	-	-	-	-	-	-/-
<b>Pinus monophylla<sup>1</sup> -- (singleleaf pinyon)</b>									
2006	520	720	81	19	0	0	0	0	-/-
2011	220	100	100	0	0	0	0	0	-/-
2015	60	-	100	0	0	0	0	0	-/-
2022	160	-	75	0	25	0	0	25	-/-

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

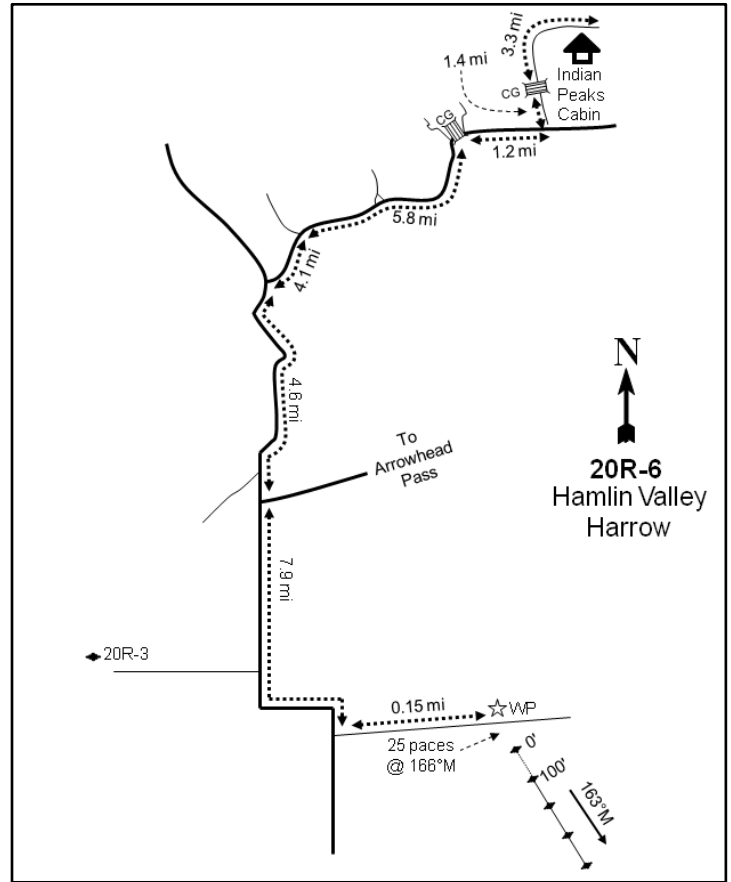
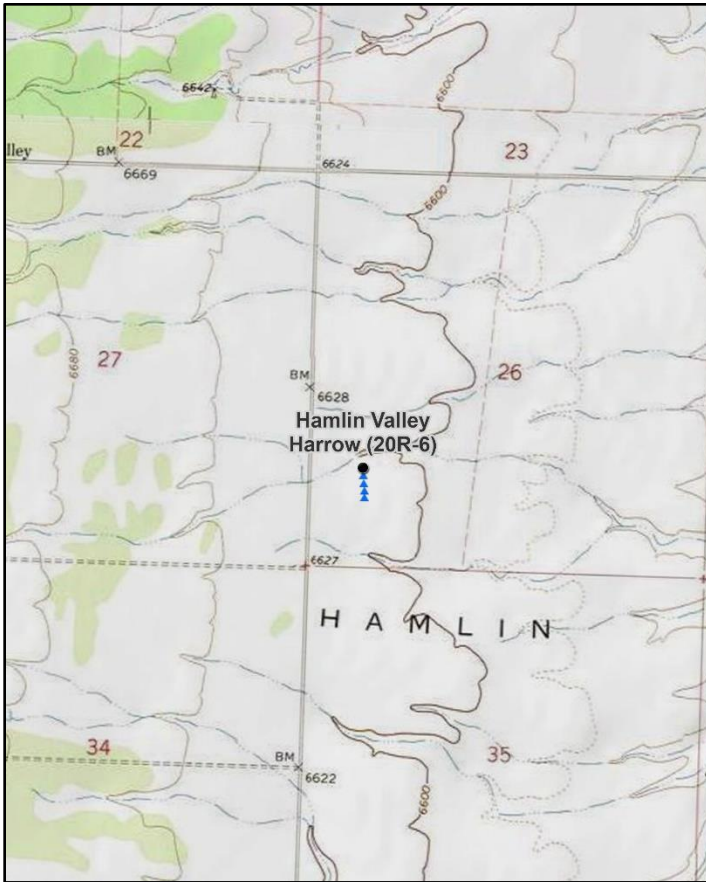
**Table 20R-03.14 - Tree Characteristics.** Point-quarter tree density, size class distribution, and average diameter.

Year	Density	Size Class Distribution					Average Diameter (cm)
	Trees per Acre	Seedling (%)	1-4' (%)	4-8' (%)	8-12' (%)	>12' (%)	
<b>Juniperus osteosperma (Utah juniper)</b>							
2006	211	5	5	15	25	50	22.7
2011	80	-	39	50	11	-	7.6
2015	47	35	59	6	-	-	6.3
2022	56	24	65	12	-	-	3.6
<b>Pinus monophylla (singleleaf pinyon)</b>							
2006	410	65	20	5	-	10	3.9
2011	84	25	70	5	-	-	3.8
2015	125	53	42	5	-	-	1.9
2022	112	21	74	5	-	-	2.2

**Table 20R-03.15 - Deer Desirable Components Index: Upland 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	6.6	0.0	10.0	0.0	18.1	Very Poor
2011	5.4	0.0	0.0	26.2	-0.1	10.0	0.0	41.5	Poor
2015	9.5	15.0	15.0	30.0	0.0	8.7	0.0	78.2	Good-Excellent
2022	12.9	14.5	15.0	30.0	-0.1	4.9	0.0	77.2	Good

## HAMLIN VALLEY HARROW - STUDY NO. 20R-6



### Location Information

USGS 7.5 min Map Info  
GPS (0' Stake)

Eightmile Spring NW; Township 32S, Range 19W, Section 26  
NAD 83 UTM ZONE 12, 241037 East 4208531 North

### Transect Information

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

101  
163° magnetic  
400ft  
Line 1 (34ft), Line 2 (59ft), Line 3 (71ft), Line 4 (11ft & 95ft)  
Standard

### Directions to Site

Drive west from Indian Peaks cabin for 0.3 miles to a fork and 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. Proceed to the right and drive 1.2 miles to an intersection. Go straight, crossing a cattle guard. From the cattle guard, drive 5.8 miles, staying on the main road to a fork. Continue to the left and drive 4.1 miles to another fork. Go left again and proceed for 4.6 miles to a fork leading to Arrowhead Pass. Stay on the main road for another 7.9 miles to a faint old road and turn right. Drive 0.15 miles on this road to the witness post on the left (north) side of the road. The 0-foot stake is 25 paces from the witness post at 166 degrees magnetic and is marked with browse tag #101.

**Site Information**

Land Ownership	Private
Land Administrator	Private
Allotment	No data
Elevation	6,627ft (2,020m)
Aspect	East
Slope	0-1%
Sample Dates	06/23/2008, 06/15/2011, 08/04/2015, 06/15/2022

**Table 20R-06.1 Disturbance History.** Recorded history of major disturbances.

Treatment/Disturbance	Name	WRI DB#	Date	Size (acres)
Harrow - Two-Way Dixie	Hamlin Valley Flinspach	1185	October 2009	320
Seeding - Broadcast Before	Hamlin Valley Flinspach	1185	October 2009	320

**Table 20R-06.2 Seed Mix.** List of known seeded plant species and rates (if available).

Mix Name			Application Type	Application Date	Acres
Hamlin Valley			Broadcast	Oct 2009	320
Type	Species	Common Name	Cultivar/Source ID	Bulk lbs/acre	PLS
G	Achnatherum hymenoides	Indian Ricegrass	Rimrock	1.09	1.01
G	Agropyron cristatum	Crested Wheatgrass	Nordan	0.78	0.69
G	Agropyron fragile	Siberian Wheatgrass	Vavilov (NC)	0.63	0.50
G	Leymus cinereus	Great Basin Wildrye	Trailhead	0.63	0.56
G	Pascopyrum smithii	Western Wheatgrass	Arriba	2.03	1.77
G	Poa secunda	Sandberg Bluegrass	Toole MT	0.47	0.40
G	Pseudoroegneria spicata	Russian Wildrye	Bozoisky	1.09	1.03
G	Thinopyrum intermedium	Intermediate Wheatgrass	Oahe	0.94	0.85
G	Thinopyrum intermedium	Pubescent Wheatgrass	Luna	1.09	0.99
F	Astragalus cicer	Cicer Milkvetch	Lutana	0.47	0.45
F	Linum perenne	Blue Flax	Appar	0.31	0.27
F	Medicago sativa	Alfalfa	Ladak	0.31	0.29
F	Medicago sativa	Alfalfa	Ranger	0.63	0.57
F	Melilotus officinalis	Yellow Sweetclover		0.31	0.29
F	Onobrychis viciifolia	Sainfoin	Eski	2.66	2.50
F	Sanguisorba minor	Small Burnet	Delar	2.03	1.88

**Wildlife Habitat and Vegetation History**

**Table 20R-06.3 - Wildlife Seasonal Habitat.** DWR wildlife habitat and seasonality.

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

**Table 20R-06.4 - Vegetation History.** The dominant vegetation type(s) and phase of woodland succession (Tausch, Miller, Roundy, & Chambers, 2009).

Year	Vegetation Type	Woodland Succession
2008	Wyoming Big Sagebrush/Perennial Grass	No Encroachment
2011	Perennial Grass/Broom Snakeweed	No Encroachment
2015	Perennial Grass/Wyoming Big Sagebrush	No Encroachment
2022	Wyoming Big Sagebrush	No Encroachment

**Site Notes**

The first fifty feet of the study transect were not treated by a two-way Dixie harrow project that was implemented in the area, and as a result belt one was moved to line four (previously line five) to be within the treatment area in 2011.

**Site Potential**

1981 - 2010 Average Annual Precipitation	14 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.

This site was a Wyoming big sagebrush (*Artemisia tridentata* ssp. *wyomingensis*) dominated community upon establishment in 2008; the site was two-way Dixie harrowed later that year (Table 20R-06.1). When the site was sampled in 2011, there was a substantial decrease in the cover of Wyoming big sagebrush and an increase of broom snakeweed (*Gutierrezia sarothrae*), which became the dominant shrub component. Cover and density of Wyoming big sagebrush has since increased and it has been considered to be the dominant community component since 2015 (Table 20R-06.12, Table 20R-06.13). The herbaceous understory has remained diverse and abundant throughout the history of the study (Table 20R-06.7), with the introduced perennial grass species crested wheatgrass (*Agropyron cristatum*) contributing the most cover. The introduced annual species cheatgrass (*Bromus tectorum*) has been observed in all sample years, but in minimal amounts (Table 20R-06.10). Forbs have remained rare in most sample years (Table 20R-06.11).

**Trend Summary Tables**

**Table 20R-06.6 - Shrub/Tree Summary.** Average modified Daubenmire quadrat and line intercept cover by year for shrubs/trees

Year	Quadrat Cover (%)			Line-intercept Cover (%)		
	Preferred Shrub	Other Shrub	Tree	Preferred Shrub	Other Shrub	Tree
2008	14.8	5.0	-	11.9	2.0	-
2011	3.0	6.0	-	2.3	5.2	-
2015	5.1	6.7	-	5.2	5.2	-
2022	10.4	4.6	-	12.5	2.7	-

**Table 20R-06.7 - Herbaceous Summary.** Nested frequency and average modified Daubenmire quadrat cover by year for herbaceous functional groups

Year	Nested Frequency				Quadrat Cover (%)			
	Annual Grass	Perennial Grass	Annual/Biennial Forb	Perennial Forb	Annual Grass	Perennial Grass	Annual/Biennial Forb	Perennial Forb
2008	5	277	3	192	0.0	11.5	0.0	1.6
2011	39	347	120	288	0.3	18.6	0.3	8.3
2015	4	363	-	121	0.0	22.7	-	2.0
2022	21	332	5	123	0.2	15.9	0.1	1.4

**Table 20R-06.8 - Basic Ground Cover.** Average modified Daubenmire quadrat cover by year for basic ground cover types.

Year	Cover Type (%)					
	Bare Ground	Cryptogams	Litter	Pavement	Rock	Vegetation
2008	38.5	0.4	23.7	23.8	0.4	30.7
2011	21.9	0.1	20.5	10.3	0.6	41.2
2015	42.1	0.0	35.2	11.8	1.3	31.3
2022	54.9	0.0	30.8	8.4	1.3	27.6

**Table 20R-06.9 - Pellet Group Data.** Quadrat frequency and pellet group transect data for animal pellets. Rabbit pellet groups are not sampled in the pellet group transect.

Year	Cattle	Mule Deer	Rabbit
	Quadrat Frequency		
2008	3	-	61
2011	1	-	3
2015	7	-	15
2022	4	-	4
Year	Days Use Per Acre (ha)		
2008	13.8 (34.1)	-	-
2011	-	2.7 (6.6)	-
2015	5.8 (14.3)	-	-
2022	29.8 (73.5)	-	-

**Table 20R-06.10 - 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)	Elymus elymoides (squirreltail)	Koeleria macrantha (prairie Junegrass)	Pascopyrum smithii (western wheatgrass)	Poa secunda (Sandberg bluegrass)	Psathyrostachys juncea <sup>i</sup> (Russian wildrye)	Pseudoroegneria spicata (bluebunch wheatgrass)	Thinopyrum intermedium <sup>i</sup> (intermediate wheatgrass)	Vulpia octoflora <sup>a</sup> (sixweeks fescue)
year	Nested Frequency												
2008	-	6	224	9	5	-	14	-	109	-	-	-	-
2011	9	15	284	29	12	3	21	17	143	-	29	58	29
2015	-	6	345	45	4	-	2	9	37	-	-	6	-
2022	5	-	296	44	18	-	-	3	50	11	4	-	3
year	Average Cover (%)												
2008	-	0.2	8.4	0.2	0.0	-	0.7	-	2.0	-	-	-	-
2011	0.1	0.3	13.3	0.8	0.2	0.0	0.1	0.3	2.2	-	0.2	1.3	0.1
2015	-	0.1	19.5	2.8	0.0	-	0.0	0.0	0.2	-	-	0.0	-
2022	0.1	-	13.4	0.9	0.2	-	-	0.0	0.6	0.5	0.2	-	0.0

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

**Table 20R-06.11 - Forb Species.** Nested frequency and modified Daubenmire average cover by year.

FORB SPECIES	Astragalus argophyllus (silverleaf milkvetch)	Astragalus convallarius (lesser rushy milkvetch)	Calochortus nuttallii (sego lily)	Ceratocephala testiculata <sup>ai</sup> (curvseed butterwort)	Crepis acuminata (tapertip hawkbeard)	Cryptantha (cryptantha)	Cymopterus (springparsley)	Erigeron pumilus (shaggy fleabane)	Eriogonum (buckwheat)	Gayophytum ramosissimum <sup>a</sup> (pinyon groundsmoke)	Grindelia squarrosa (curlycup gumweed)	Ipomopsis congesta (ballhead ipomopsis)	Lactuca serriola <sup>ai</sup> (prickly lettuce)	Linum perenne <sup>i</sup> (blue flax)	Lomatium (desertparsley)	Lupinus argenteus (silvery lupine)	Lygodesmia (skeletonplant)
year	Nested Frequency																
2008	4	1	-	2	1	7	12	16	1	-	-	-	-	-	-	0	-
2011	5	-	3	-	-	42	49	61	-	106	5	0	2	28	-	7	-
2015	3	-	-	-	-	47	-	41	-	-	-	-	-	-	-	-	3
2022	2	-	3	-	-	9	16	32	-	5	-	-	-	-	9	1	-
year	Average Cover (%)																
2008	0.0	0.0	-	0.0	0.0	0.0	0.0	0.1	0.0	-	-	-	-	-	-	0.2	-
2011	0.0	-	0.0	-	-	0.5	0.3	0.8	-	0.3	0.0	0.0	0.0	0.7	-	0.0	-
2015	0.0	-	-	-	-	0.5	-	0.4	-	-	-	-	-	-	-	-	0.0
2022	0.0	-	0.0	-	-	0.1	0.1	0.2	-	0.1	-	-	-	-	0.1	0.0	-

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

FORB SPECIES	Machaeranthera canescens (hoary tansyaster)	Medicago sativa <sup>i</sup> (alfalfa)	Microsteris gracilis <sup>a</sup> (slender phlox)	Oenothera (evening primrose)	Onobrychis vicifolia <sup>i</sup> (sainfoin)	Penstemon caespitosus (mat penstemon)	Phlox longifolia (longleaf phlox)	Phlox pulvinata (cushion phlox)	Pleiocanthus spinosus (thorn skeletonweed)	Polygonum douglasii <sup>a</sup> (Douglas' knotweed)	Sanguisorba minor <sup>i</sup> (small burnet)	Sphaeralcea coccinea (scarlet globemallow)	Sphaeralcea grossularifolia (gooseberry/leaf globemallow)	Townsendia (Townsend daisy)	Trifolium (clover)	Zigadenus paniculatus (foothill deathcamas)
year	Nested Frequency															
2008	-	-	1	3	-	8	133	33	5	-	-	2	-	-	14	-
2011	4	28	1	1	69	3	159	31	7	19	51	1	-	1	15	1
2015	-	-	-	-	4	8	2	30	-	-	2	7	1	-	-	-
2022	-	-	-	-	-	1	35	31	4	-	-	3	3	-	1	-
year	Average Cover (%)															
2008	-	-	0.0	0.0	-	0.0	0.5	0.7	0.0	-	-	0.0	-	-	0.0	-
2011	0.0	0.1	0.0	0.0	1.4	0.0	2.2	0.9	0.1	0.0	0.9	0.0	-	0.0	0.1	0.0
2015	-	-	-	-	0.0	0.0	0.0	0.9	-	-	0.1	0.0	0.0	-	-	-
2022	-	-	-	-	-	0.0	0.2	0.6	0.1	-	-	0.0	0.0	-	0.0	-

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

**Table 20R-06.12 - 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)	Chrysothamnus viscidiflorus (yellow rabbitbrush)	Ericameria nauseosa (rubber rabbitbrush)	Ericameria parryi var. parryi (Parry's rabbitbrush)	Gutierrezia sarothrae (broom snakeweed)	Linanthus pungens (granite prickly phlox)
year	Line Intercept Cover (%)					
2008	11.9	0.4	-	-	1.5	0.1
2011	2.3	0.2	-	-	4.9	0.1
2015	5.2	2.1	-	0.5	2.6	-
2022	12.5	1.9	-	-	0.8	0
year	Quadrat Cover (%)					
2008	14.8	1.7	0.0	0.3	2.8	0.2
2011	3.0	0.0	-	-	5.9	0.0
2015	5.1	3.1	-	1.1	2.3	0.1
2022	10.4	2.8	-	-	1.6	0.2

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



**Table 20R-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.

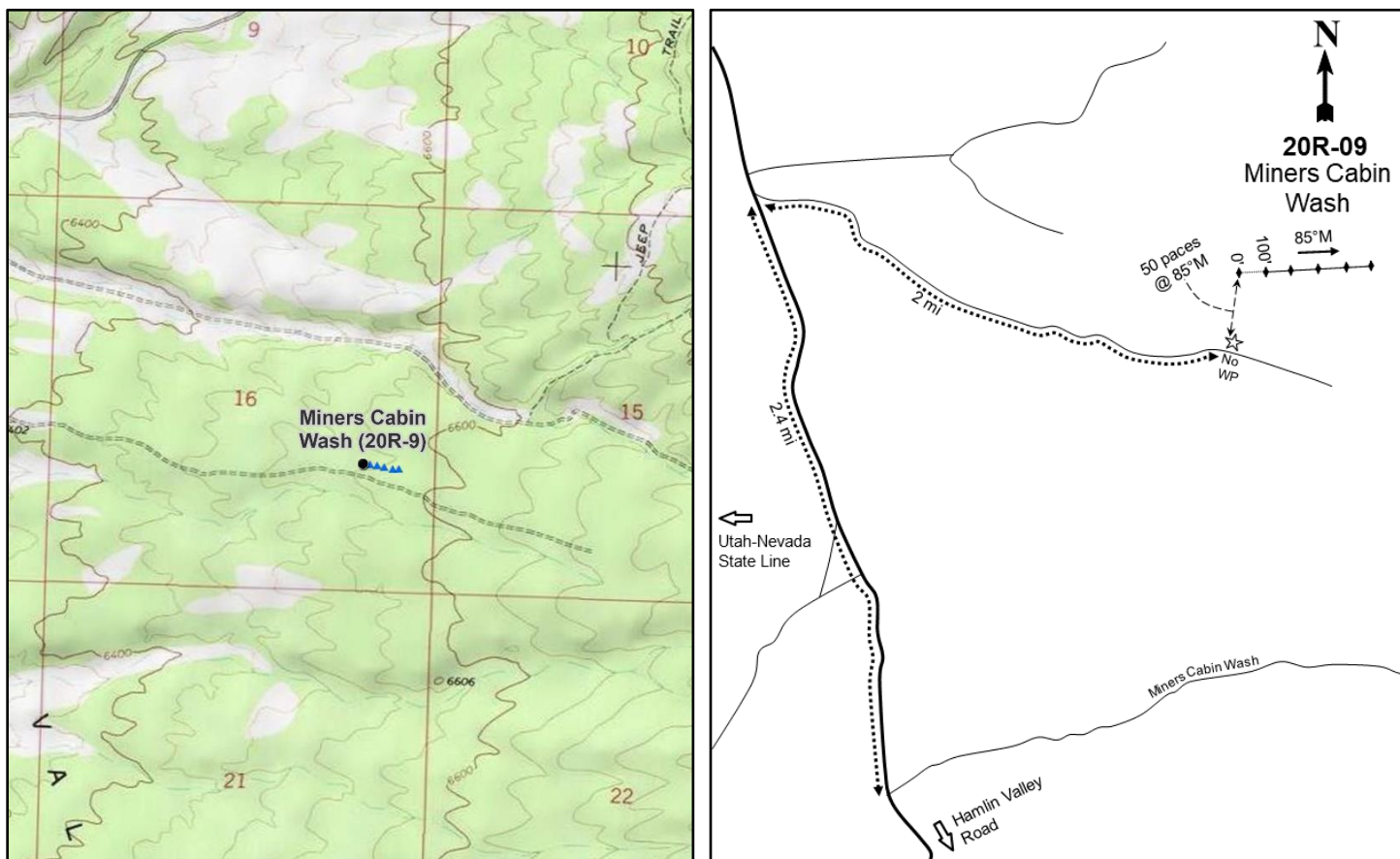
Year	Density		Age Class Distribution			Utilization		Poor Vigor (%)	Average Height Crown (cm)
	Plants Per Acre		Excluding Seedlings			Moderate (%)	Heavy (%)		
	Excluding Seedlings	Seedling	Young (%)	Mature (%)	Decadent (%)				
<b>Artemisia tridentata ssp. wyomingensis<sup>p</sup> -- (Wyoming big sagebrush)</b>									
2008	5040	3600	41	46	13	8	1	8	65/93
2011	4840	5900	65	33	2	4	0	1	26/33
2015	10000	920	63	36	0	18	19	1	29/38
2022	9140	20	35	62	2	18	3	3	- / -
<b>Chrysothamnus viscidiflorus -- (yellow rabbitbrush)</b>									
2008	1280	20	5	91	5	30	28	3	15/30
2011	120	-	17	83	0	0	0	17	10/18
2015	6620	400	20	79	2	2	5	1	17/22
2022	4420	720	46	52	2	5	0	2	- / -
<b>Ericameria nauseosa -- (rubber rabbitbrush)</b>									
2008	-	-	-	-	-	-	-	-	-/-
2011	-	-	-	-	-	-	-	-	18/16
2015	-	-	-	-	-	-	-	-	-/-
2022	-	-	-	-	-	-	-	-	-/-
<b>Ericameria parryi var. parryi -- (Parry's rabbitbrush)</b>									
2008	520	-	15	85	0	0	0	0	11/27
2011	-	-	-	-	-	-	-	-	-/-
2015	880	40	14	82	5	0	7	0	17/26
2022	-	-	-	-	-	-	-	-	-/-
<b>Gutierrezia sarothrae -- (broom snakeweed)</b>									
2008	9640	42780	4	92	5	1	2	3	15/15
2011	19000	2380	44	56	0	0	0	0	14/18
2015	15940	1480	31	69	0	0	0	1	14/13
2022	8320	3440	21	77	2	0	0	1	- / -
<b>Linanthus pungens -- (granite prickly phlox)</b>									
2008	220	-	0	91	9	9	0	0	10/24
2011	120	60	33	67	0	0	0	0	10/20
2015	240	-	0	100	0	0	0	0	13/17
2022	260	-	8	85	8	0	0	8	- / -
<b>Opuntia -- (pricklypear)</b>									
2008	-	-	-	-	-	-	-	-	9/10
2011	20	-	100	0	0	0	0	0	4/5
2015	60	-	67	33	0	0	0	0	5/4
2022	-	-	-	-	-	-	-	-	-/-
<b>Pediocactus simpsonii -- (mountain ball cactus)</b>									
2008	-	20	0	0	0	0	0	0	2/8
2011	-	-	-	-	-	-	-	-	-/-
2015	-	-	-	-	-	-	-	-	-/-
2022	-	-	-	-	-	-	-	-	-/-
<b>Purshia tridentata<sup>p</sup> -- (antelope bitterbrush)</b>									
2008	-	-	-	-	-	-	-	-	-/-
2011	40	-	100	0	0	0	0	0	- / -
2015	-	-	-	-	-	-	-	-	-/-
2022	-	-	-	-	-	-	-	-	-/-
<b>Tetradymia canescens -- (spineless horsebrush)</b>									
2008	20	-	0	100	0	0	0	0	14/17

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

**Table 20R-06.15 - Deer Desirable Components Index: Upland Potential Scale.**

Year	Preferred Browse Cover	Preferred Browse Decadence	Preferred Browse Young	Perennial Grass Cover	Annual Grass Cover	Perennial Forb Cover	Noxious Weeds	Total Score	Ranking
2008	14.9	11.2	15.0	23.0	0.0	3.3	0.0	67.4	Good
2011	2.9	0.0	0.0	30.0	-0.2	10.0	0.0	42.7	Poor
2015	6.5	14.9	15.0	30.0	0.0	4.0	0.0	70.4	Good
2022	15.6	14.3	15.0	30.0	-0.2	2.8	0.0	77.5	Good

## MINERS CABIN WASH - STUDY NO. 20R-9



### Location Information

USGS 7.5 min Map Info  
GPS (0' Stake)

Miners Cabin Wash SW; Township 29S, Range 19W, Section 16  
NAD 83 UTM ZONE 12, 240150 East 4241482 North

### Transect Information

Browse Tag # (0' Stake)	71
Transect Bearing	85° magnetic
Length	500ft
Belt Placement	Line 1 (11ft), Line 2 (34ft), Line 3 (59ft), Line 4 (71ft), Line 5 (95ft)
Belt Marker Placement	Standard

### Directions to Site

From Hamlin Valley Road and North Modena Canyon Road, travel north on Hamlin Valley Road for 22.25 miles to Miners Cabin Wash Road; there is a faint road before the main wash road. Turn onto and follow this faint road east for 2.25 miles. The site is to the left (north) of the road, and there is no witness post.

**Site Information**

Land Ownership	State
Land Administrator	SITLA
Allotment	INDIAN PEAK
Elevation	6,540ft (1,993m)
Aspect	North
Slope	5%
Sample Dates	08/09/2017, 06/15/2022

**Table 20R-09.1 Disturbance History.** Recorded history of major disturbances.

Treatment/Disturbance	Name	WRI DB#	Date	Size (acres)
Chaining - Chain Unknown	Indian Peak/Spanish George (Hamlin Valley Habitat Restoration Project-Sagebrush (Year 3))	3934	October-December 2017	2264
Seeding - Aerial Before	Indian Peak/Spanish George (Hamlin Valley Habitat Restoration Project-Sagebrush (Year 3))	3934	October 2017	2264

**Table 20R-09.2 Seed Mix.** List of known seeded plant species and rates (if available).

Mix Name		Application Type	Application Date	Acres	
Indian Peak Chaining + Shrubs		Aerial	Oct 2017	759	
Type	Species	Common Name	Cultivar/Source ID	Bulk lbs/acre	PLS
G	Achnatherum hymenoides	Indian Ricegrass	Nezpar	3.03	2.85
G	Elymus lanceolatus	Thickspike Wheatgrass	Bannock	0.99	0.90
G	Pascopyrum smithii	Western Wheatgrass	Arriba	0.99	0.90
G	Pseudoroegneria spicata	Bluebunch Wheatgrass	Anatone	2.50	2.39
F	Achillea millefolium	Western Yarrow	Eagle	0.25	0.23
F	Balsamorhiza sagittata	Arrowleaf Balsamroot	Sevier UT	0.14	0.13
F	Linum lewisii	Lewis Flax	Maple Grove	0.26	0.23
F	Medicago sativa	Alfalfa	Ladak	0.53	0.43
F	Penstemon palmeri	Palmer Penstemon	White Pine NV	0.53	0.44
F	Sphaeralcea grossulariifolia	Gooseberryleaf Globemallow	Iron UT	0.10	0.09
S	Artemisia nova	Black Sagebrush	Sevier UT	0.25	0.03
S	Artemisia tridentata ssp. wyomingensis	Wyoming Big Sagebrush	Sevier UT	0.25	0.09

**Wildlife Habitat and Vegetation History****Table 20R-09.3 - Wildlife Seasonal Habitat.** DWR wildlife habitat and seasonality.

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

**Table 20R-09.4 - Vegetation History.** The dominant vegetation type(s) and phase of woodland succession (Tausch, Miller, Roundy, & Chambers, 2009).

Year	Vegetation Type	Woodland Succession
2017	Pinyon-Juniper	Phase III
2022	Perennial Grass	Phase I

**Site Notes**

No Notes

**Site Potential**

1981 - 2010 Average Annual Precipitation	15 inches
NRCS Ecological Site	Upland Gravelly Loam (Black Sagebrush)
NRCS Ecological Site #	R047XB306UT
States and Transitions	No state and transition model is available for this ecological site.

This site was dominated by Utah juniper (*Juniperus osteosperma*) and singleleaf pinyon (*Pinus monophylla*) and was in Phase III of woodland succession as of study establishment in 2017; black sagebrush (*Artemisia nova*) was a lesser but still significant component of the vegetation community. Following the chaining (Table 20R-09.1), trees were significantly reduced -- namely singleleaf pinyon -- and the community transitioned from being dominated by pinyon and juniper trees to one dominated by sagebrush in 2022 (Table 20R-09.4, Table 20R-09.6, Table 20R-09.12, Table 20R-09.13, Table 20R-09.14). Prior to treatment, grasses were not abundant in the understory, with Indian ricegrass (*Achnatherum hymenoides*) and squirreltail (*Elymus elymoides*) being the dominant species. However, in 2022 perennial grasses became the dominant herbaceous component as cover increased, with a majority of the cover being contributed by thickspike wheatgrass (*Elymus lanceolatus*) and western wheatgrass (*Pascopyrum smithii*) (Table 20R-09.10). Forbs have remained limited, but most of the cover has been contributed by the perennial species cushion phlox (*Phlox pulvinata*) and stemless mock goldenweed (*Stenotus acaulis*) for each year sampled (Table 20R-09.11).

**Trend Summary Tables****Table 20R-09.6 - Shrub/Tree Summary.** Average modified Daubenmire quadrat and line intercept cover by year for shrubs/trees

Year	Quadrat Cover (%)			Line-intercept Cover (%)		
	Preferred Shrub	Other Shrub	Tree	Preferred Shrub	Other Shrub	Tree
2017	5.0	0.2	10.0	3.2	0.1	22.7
2022	3.3	0.3	3.2	3.7	1.2	3.0

**Table 20R-09.7 - Herbaceous Summary.** Nested frequency and average modified Daubenmire quadrat cover by year for herbaceous functional groups

Year	Nested Frequency				Quadrat Cover (%)			
	Annual Grass	Perennial Grass	Annual/Biennial Forb	Perennial Forb	Annual Grass	Perennial Grass	Annual/Biennial Forb	Perennial Forb
2017	-	98	38	158	-	1.3	0.5	3.1
2022	10	282	1	95	0.0	16.8	0.0	2.1

**Table 20R-09.8 - Basic Ground Cover.** Average modified Daubenmire quadrat cover by year for basic ground cover types.

Year	Cover Type (%)					
	Bare Ground	Cryptogams	Litter	Pavement	Rock	Vegetation
2017	15.5	2.6	41.5	40.8	3.3	17.1
2022	37.6	-	41.3	11.6	4.6	23.5

**Table 20R-09.9 - Pellet Group Data.** Quadrat frequency and pellet group transect data for animal pellets. Rabbit pellet groups are not sampled in the pellet group transect.

Year	Cattle	Mule Deer	Rocky Mountain Elk	Horse	Rabbit
	Quadrat Frequency				
2017	-	4	7	-	13
2022	2	-	11	4	8
Year	Days Use Per Acre (ha)				
2017	-	2.0 (5.0)	9.4 (23.2)	-	-
2022	0.7 (1.8)	2.0 (5.0)	13.4 (33.1)	8.7 (21.5)	-

**Table 20R-09.10 - Grass Species.** Nested frequency and modified Daubenmire average cover by year.

GRASS SPECIES	Nested Frequency							
Achnatherum hymenoides (Indian ricegrass)	27	11	-	34	-	11	21	-
Achnatherum pinetorum (pine needlegrass)	27	8	10	28	62	13	126	147
Bromus tectorum <sup>ai</sup> (cheatgrass)	Average Cover (%)							
Elymus elymoides (squirreltail)	0.5	0.1	-	0.4	-	0.1	0.2	-
Elymus lanceolatus (thickspike wheatgrass)	1.2	0.2	0.0	0.8	2.5	0.7	5.1	6.3
Hesperostipa comata (needle and thread)								
Pascopyrum smithii (western wheatgrass)								
Pseudoroegneria spicata (bluebunch wheatgrass)								

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

**Table 20R-09.11 - Forb Species.** Nested frequency and modified Daubenmire average cover by year.

FORB SPECIES	Nested Frequency																
Achillea millefolium (Common yarrow)	-	3	33	4	23	-	-	4	35	1	-	6	6	-	14	3	3
Arabis (rockcress)	4	-	4	8	1	1	1	6	-	3	3	17	-	1	-	-	-
Arenaria fendleri (Fendler's sandwort)	Average Cover (%)																
Astragalus (milkvetch)	-	0.0	0.3	0.0	0.1	-	-	0.0	0.5	0.0	-	0.0	0.0	-	0.0	0.0	0.0
Astragalus calycosus (Torrey's milkvetch)	0.0	-	0.0	0.0	0.0	0.0	0.0	0.1	-	0.0	0.0	0.4	-	0.0	-	-	-
Balsamorhiza sagittata (arrowleaf balsamroot)																	
Castilleja angustifolia (northwestern Indian paintbrush)																	
Chaetopappa ericoides (rose heath)																	
Cordylanthus kingii <sup>a</sup> (King's bird's-beak)																	
Cryptantha (cryptantha)																	
Cymopterus (springparsley)																	
Dalea searlsiae (Searls' prairie clover)																	
Erigeron pumilus (shaggy fleabane)																	
Eriogonum (buckwheat)																	
Eriogonum caespitosum (matted buckwheat)																	
Gilia inconspicua <sup>a</sup> (shy gilia)																	
Hymenopappus filifolius (fineleaf hymenopappus)																	

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

FORB SPECIES	Lesquerella wardii (Ward's bladderpod)	Linum lewisii (Lewis flax)	Lupinus argenteus (silvery lupine)	Machaeranthera grindeloides (rayless tansyaster)	Medicago sativa <sup>1</sup> (alfalfa)	Packera multilobata (lobeleaf groundsel)	Penstemon (beardtongue)	Penstemon confusus (Owens Valley beardtongue)	Penstemon limarioides ssp. sileri (Siler's penstemon)	Penstemon palmeri (Palmer's penstemon)	Phlox longifolia (longleaf phlox)	Phlox pulvinata (cushion phlox)	Polygonum douglasii <sup>a</sup> (Douglas' knotweed)	Sphaeralcea grossularifolia (gooseberryleaf globemallow)	Stenotus acaulis (stemless mock goldenweed)	Streptanthus cordatus (heartleaf twistflower)
year	Nested Frequency															
2017	8	-	-	19	-	10	4	42	2	-	-	36	-	-	18	5
2022	-	17	1	-	3	-	-	4	-	12	13	18	1	0	9	1
year	Average Cover (%)															
2017	0.0	-	-	0.1	-	0.1	0.0	0.3	0.0	-	-	1.1	-	-	0.9	0.0
2022	-	0.1	0.0	-	0.1	-	-	0.1	-	0.1	0.1	0.6	0.0	0.0	0.5	0.0

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

**Table 20R-09.12 - Shrub and Tree Species.** Average modified Daubenmire quadrat and line intercept cover by year.

SHRUB SPECIES	Artemisia nova <sup>p</sup> (black sagebrush)	Chrysothamnus viscidiflorus ssp. viscidiflorus var. stenophyllus (yellow rabbitbrush)	Eriogonum microthecum <sup>p</sup> (slender buckwheat)	Gutierrezia sarothrae (broom snakeweed)	Juniperus osteosperma <sup>t</sup> (Utah juniper)	Linanthus pungens (granite prickly phlox)	Pediocactus simpsonii (mountain ball cactus)	Pinus monophylla <sup>t</sup> (singleleaf pinyon)
year	Line Intercept Cover (%)							
2017	3.2	0	-	-	5.8	0.1	-	16.9
2022	3.7	0.6	-	0.6	2.4	-	-	0.6
year	Quadrat Cover (%)							
2017	4.9	0.0	0.0	0.1	2.3	0.0	0.0	7.6
2022	3.3	0.0	0.0	0.3	2.2	-	-	1.0

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

**Table 20R-09.13 - Shrub/Tree Characteristics.** Population characteristics of shrub/tree species populations including density reproduction (seedlings), age distribution, utilization, vigor and average size (height/crown) of plants.

Year	Density		Age Class Distribution			Utilization		Poor Vigor (%)	Average Height Crown (cm)
	Plants Per Acre		Excluding Seedlings			Moderate (%)	Heavy (%)		
	Excluding Seedlings	Seedling	Young (%)	Mature (%)	Decadent (%)				
<b>Artemisia nova<sup>p</sup> -- (black sagebrush)</b>									
2017	2760	20	17	59	24	12	0	7	26/54
2022	1240	40	14	86	0	8	0	2	- / -
<b>Chrysothamnus viscidiflorus ssp. viscidiflorus var. stenophyllus -- (yellow rabbitbrush)</b>									
2017	80	-	25	75	0	0	25	0	12/20
2022	140	160	0	100	0	0	0	0	- / -
<b>Gutierrezia sarothrae -- (broom snakeweed)</b>									
2017	60	-	0	100	0	0	0	0	15/15
2022	140	80	0	100	0	14	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>Juniperus osteosperma<sup>1</sup> -- (Utah juniper)</b>									
2017	220	60	55	46	0	0	0	0	- / -
2022	240	-	75	17	8	0	0	17	- / -
<b>Linanthus pungens -- (granite prickly phlox)</b>									
2017	20	-	0	100	0	0	0	0	13/21
2022	-	-	-	-	-	-	-	-	- / -
<b>Opuntia polyacantha -- (plains pricklypear)</b>									
2017	20	-	0	100	0	0	0	0	9/19
2022	20	-	0	100	0	0	0	0	- / -
<b>Pediocactus simpsonii -- (mountain ball cactus)</b>									
2017	20	-	0	100	0	0	0	0	1/2
2022	-	-	-	-	-	-	-	-	- / -
<b>Pinus monophylla<sup>1</sup> -- (singleleaf pinyon)</b>									
2017	500	160	36	60	4	0	0	4	- / -
2022	140	-	71	29	0	0	0	0	- / -

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

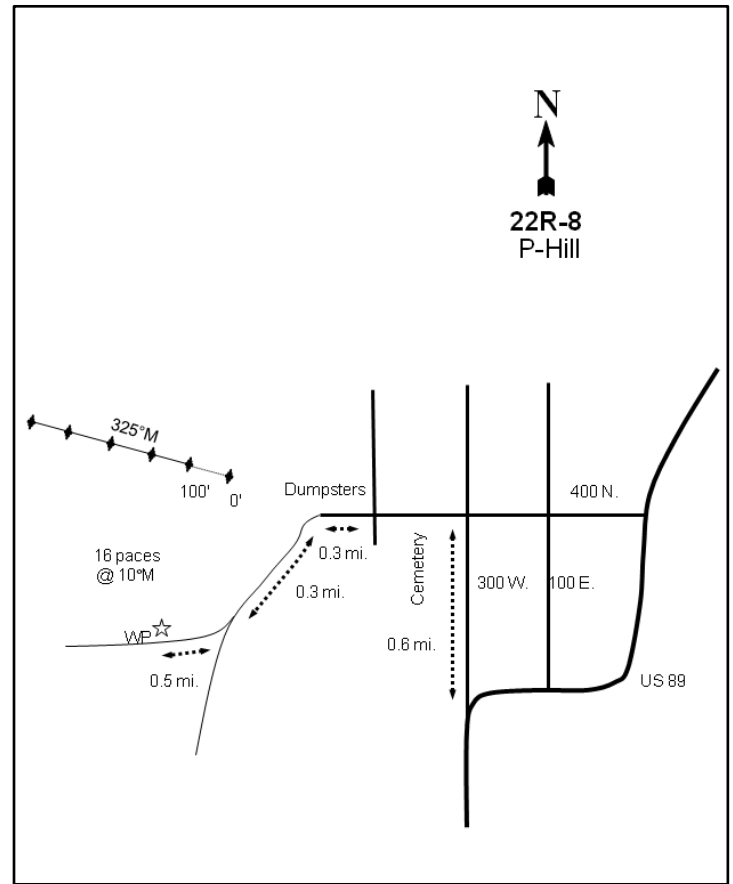
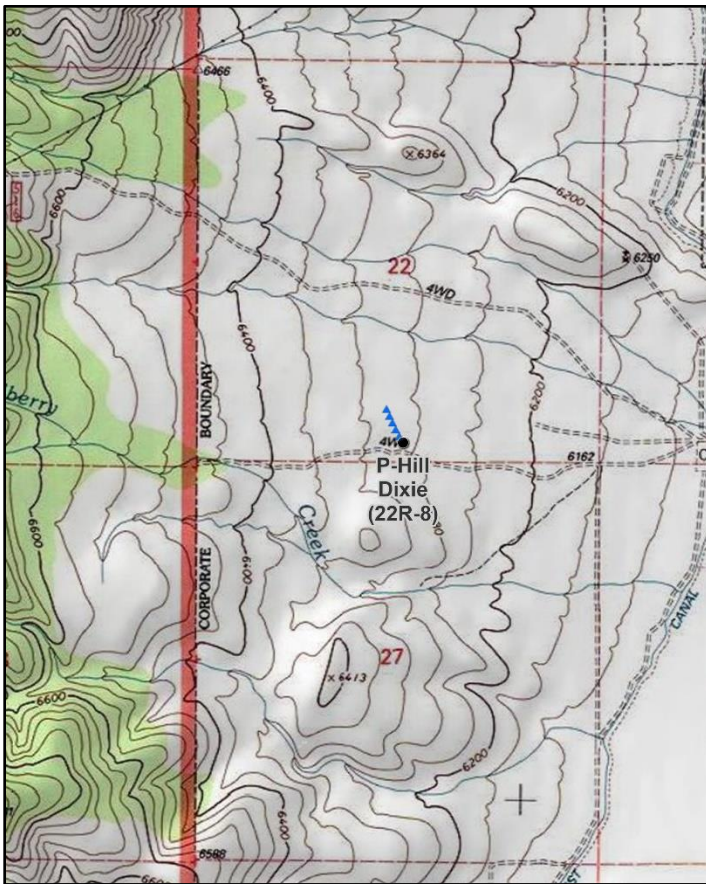
**Table 20R-09.14 - Tree Characteristics.** Point-quarter tree density, size class distribution, and average diameter.

Year	Density	Size Class Distribution					Average Diameter (cm)
	Trees per Acre	Seedling (%)	1-4' (%)	4-8' (%)	8-12' (%)	>12' (%)	
<b>Juniperus osteosperma (Utah juniper)</b>							
2017	95	13	40	27	7	13	11.0
2022	74	31	50	19	-	-	7.1
<b>Pinus monophylla (singleleaf pinyon)</b>							
2017	274	-	5	45	25	25	18.1
2022	51	14	64	21	-	-	3.6

**Table 20R-09.15 - Deer Desirable Components Index: Upland 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
2017	4.0	0.0	0.0	2.6	0.0	6.2	0.0	12.8	Very Poor
2022	4.6	0.0	0.0	30.0	0.0	4.2	0.0	38.9	Poor

## P-HILL DIXIE - STUDY NO. 22R-8



### Location Information

USGS 7.5 min Map Info  
GPS (0' Stake)

Circleville SE; Township 30S, Range 4W, Section 22  
NAD 83 UTM ZONE 12, 386309 East 4226532 North

### Transect Information

Browse Tag # (0' Stake)	73
Transect Bearing	325° magnetic
Length	500ft
Belt Placement	Line 1 (11ft), Line 2 (34ft), Line 3 (59ft), Line 4 (71ft), Line 5 (95ft)
Belt Marker Placement	Standard

### Directions to Site

Traveling north into Circleville, UT on US-89, continue north on 300 West when US-89 bends east (just past 300 South). Drive north on 300 West for 0.6 miles to an intersection. Turn left (west) and drive past the cemetery. At the northwest corner of the cemetery is an intersection; continue straight for 0.3 miles to a two-track road on the right (west). Turn right onto the two-track road and drive 0.5 miles to the half-high witness post on the right (north) side of the road. From the half-high witness post, walk 16 paces at 10 degrees magnetic to the 0-foot stake which is marked with browse tag #73.

**Site Information**

Land Ownership	Federal
Land Administrator	BLM
Allotment	No data
Elevation	6,300ft (1,920m)
Aspect	East
Slope	6%
Sample Dates	07/12/2005, 06/11/2008, 05/30/2013, 08/01/2017, 07/28/2022

**Table 22R-08.1 Disturbance History.** Recorded history of major disturbances.

Treatment/Disturbance	Name	WRI DB#	Date	Size (acres)
Harrow - Two-Way Dixie	P-Hill One-way Harrow	119	October 2005-February 2006	1784
Seeding - Broadcast After	P-Hill One-way Harrow	119	October 2005-February 2006	1784

**Table 22R-08.2 Seed Mix.** List of known seeded plant species and rates (if available).

Mix Name			Application Type	Application Date	Acres
P-Hill			Broadcast	Oct 2005	3500
Type	Species	Common Name	Cultivar/Source ID	Bulk lbs/acre	PLS
G	Agropyron cristatum	Crested Wheatgrass	Hycrest	1.00	0.00
G	Festuca ovina	Sheep Fescue	Covar	1.00	0.00
G	Leymus cinereus	Great Basin Wildrye	Magnar	1.00	0.00
G	Poa secunda	Sandberg Bluegrass	Blue Mt.	1.50	0.00
G	Psathyrostachys juncea	Russian Wildrye	Bozoisky	1.00	0.00
G	Thinopyrum intermedium	Pubescent Wheatgrass	Luna	2.00	0.00
F	Helianthus annuus	Annual Sunflower		1.00	0.00
F	Linum perenne	Blue Flax	Appar	1.50	0.00
F	Medicago sativa	Alfalfa	Ladak	0.50	0.00
F	Melilotus officinalis	Yellow Sweetclover	Madrid	1.00	0.00
F	Onobrychis viciifolia	Sainfoin	Eski	1.00	0.00
F	Sanguisorba minor	Small Burnet	Delar	2.00	0.00
S	Atriplex canescens	Fourwing Saltbush		1.00	0.00
S	Bassia prostrata	Forage Kochia	Immigrant	1.50	0.00

Mix Name			Application Type	Application Date	Acres
P-Hill One-way Harrow			Broadcast	Oct 2005	3500
Type	Species	Common Name	Cultivar/Source ID	Bulk lbs/acre	PLS
F	Helianthus annuus	Annual Sunflower		0.29	0.00
F	Helianthus annuus	Annual Sunflower		0.26	0.00

**Wildlife Habitat and Vegetation History****Table 22R-08.3 - Wildlife Seasonal Habitat.** DWR wildlife habitat and seasonality.

Species	Habitat	Season
Mule Deer	crucial	winter

**Table 22R-08.4 - Vegetation History.** The dominant vegetation type(s) and phase of woodland succession (Tausch, Miller, Roundy, & Chambers, 2009).

Year	Vegetation Type	Woodland Succession
2005	Mountain Big Sagebrush	Phase I
2008	Mountain Big Sagebrush	Phase I
2013	Mountain Big Sagebrush	Phase I
2017	Mountain Big Sagebrush/Annual Grass	Phase I
2022	Mountain Big Sagebrush	Phase I

**Site Notes**

The project was completed in a mosaic pattern over the entire project area, and as a result, part of the study transect was not treated by the harrow or was only one-way harrowed (WRI Database, 2022).

**Soils****Table 22R-08.5 - Soil Analysis Data.** List of chemical and textural soil characteristics determined by laboratory analysis.

Texture	pH	%sand	%silt	%clay	%OM	PPM P	PPM K	ds/m	Sample Date
Sandy Loam	6.7	64.4	23.8	11.8	0.3	17.2	240.0	0.4	07/12/2005

**Site Potential**

1981 - 2010 Average Annual Precipitation	10 inches
NRCS Ecological Site	Semidesert Gravelly Loam (Wyoming Big Sagebrush)
NRCS Ecological Site #	R028AY214UT
States and Transitions	2005 - Reference State: Community Phase 1.1 2008-Present - Current Potential State: Community Phase 2.1

This site has existed as a mountain big sagebrush (*Artemisia tridentata* ssp. *vaseyana*) dominated plant community since study establishment in 2005. Sagebrush cover decreased following treatment, but the age class distribution has diversified (Table 22R-08.12, Table 22R-08.13). Annual forbs contributed a majority of the herbaceous cover from 2005 to 2013 and again in 2022. Annual grass cover remained low except in 2017, when the introduced species cheatgrass (*Bromus tectorum*) was the dominant herbaceous component (Table 22R-08.7, Table 22R-08.10, Table 22R-08.11). The site could be at risk for a modified fire regime and reduced resiliency should annual grass cover increase again in the future (USDA-ARS Jornada Experimental Range, 2022).

**Trend Summary Tables****Table 22R-08.6 - Shrub/Tree Summary.** Average modified Daubenmire quadrat and line intercept cover by year for shrubs/trees

Year	Quadrat Cover (%)			Line-intercept Cover (%)		
	Preferred Shrub	Other Shrub	Tree	Preferred Shrub	Other Shrub	Tree
2005	25.3	0.1	-	29.2	-	-
2008	6.4	-	-	8.0	-	-
2013	11.3	0.0	-	12.1	0.1	-
2017	9.3	0.1	-	13.6	-	-
2022	10.7	0.1	-	16.2	0.2	-

**Table 22R-08.7 - Herbaceous Summary.** Nested frequency and average modified Daubenmire quadrat cover by year for herbaceous functional groups

Year	Nested Frequency				Quadrat Cover (%)			
	Annual Grass	Perennial Grass	Annual/Biennial Forb	Perennial Forb	Annual Grass	Perennial Grass	Annual/Biennial Forb	Perennial Forb
2005	3	9	105	20	0.0	0.1	1.0	0.1
2008	-	14	54	1	-	0.1	1.4	0.0
2013	56	18	176	27	0.3	0.1	7.2	0.1
2017	253	46	51	30	15.8	0.8	1.2	0.6
2022	114	73	199	12	1.4	2.2	3.7	0.3

**Table 22R-08.8 - Basic Ground Cover.** Average modified Daubenmire quadrat cover by year for basic ground cover types.

Year	Cover Type (%)					
	Bare Ground	Cryptogams	Litter	Pavement	Rock	Vegetation
2005	33.3	0.5	26.7	23.4	9.8	25.5
2008	42.2	0.2	30.2	16.5	13.3	8.2
2013	33.8	1.0	41.0	4.0	9.0	19.0
2017	31.8	0.2	36.2	10.9	12.9	27.8
2022	39.4	0.2	34.4	24.1	14.8	18.0

**Table 22R-08.9 - Pellet Group Data.** Quadrat frequency and pellet group transect data for animal pellets. Rabbit pellet groups are not sampled in the pellet group transect.

Year	Mule Deer	Rocky Mountain Elk	Rabbit
	Quadrat Frequency		
2005	14	2	36
2008	20	-	93
2013	21	-	21
2017	13	-	59
2022	7	-	20
Year	Days Use Per Acre (ha)		
2005	28.1 (69.5)	0.7 (1.7)	-
2008	43.6 (107.6)	0.7 (1.7)	-
2013	30.8 (76.1)	3.4 (8.3)	-
2017	7.4 (18.2)	-	-
2022	33.5 (82.8)	-	-

**Table 22R-08.10 - Grass Species.** Nested frequency and modified Daubenmire average cover by year.

GRASS SPECIES	Achnatherum hymenoides (Indian ricegrass)	Aristida purpurea (purple threeawn)	Bouteloua gracilis (blue grama)	Bromus tectorum <sup>a</sup> (cheatgrass)	Elymus elymoides (squirreltail)	Festuca idahoensis (Idaho fescue)	Hesperosipa comata (needle and thread)	Vulpia octoflora <sup>a</sup> (six weeks fescue)
year	Nested Frequency							
2005	-	9	-	-	-	-	0	3
2008	-	11	3	-	0	-	-	-
2013	-	7	-	56	9	3	0	-
2017	-	17	7	253	23	-	-	-
2022	1	48	5	113	18	-	2	1
year	Average Cover (%)							
2005	-	0.1	-	-	-	-	0.0	0.0
2008	-	0.1	0.0	-	0.0	-	-	-
2013	-	0.1	-	0.3	0.0	0.0	0.0	-
2017	-	0.3	0.0	15.8	0.5	-	-	-
2022	0.0	1.3	0.1	1.4	0.8	-	0.0	0.0

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

**Table 22R-08.11 - Forb Species.** Nested frequency and modified Daubenmire average cover by year.

FORB SPECIES	Nested Frequency																																																																																																																																																																																																																																									
year	Average Cover (%)																																																																																																																																																																																																																																									
Astragalus lentiginosus (freckled milkvetch)	20	80	5	17	6	-	4	-	0	-	-	-	-	-	Descurainia pinnata <sup>a</sup> (western tansymustard)	-	-	-	-	-	5	11	1	-	37	6	0	-	-	Eriogonum cernuum <sup>a</sup> (nodding buckwheat)	22	3	-	8	-	-	136	-	5	36	110	-	2	3	Gayophytum ramosissimum <sup>a</sup> (pinyon groundsmoke)	28	-	-	-	-	-	39	-	-	-	26	-	2	-	Gilia inconspicua <sup>a</sup> (shy gilia)	10	14	-	4	-	-	182	-	-	15	1	-	2	-	Helianthus annuus <sup>si</sup> (common sunflower)	Average Cover (%)														Lappula occidentalis <sup>a</sup> (flatspine stickseed)	2005	0.1	0.9	0.0	0.1	0.0	-	0.0	-	0.0	-	-	-	-	Linum perenne <sup>i</sup> (blue flax)	2008	-	-	-	-	-	0.2	0.4	0.0	-	0.3	0.6	0.0	-	Lygodesmia (skeletonplant)	2013	0.0	0.0	-	0.0	-	-	3.6	-	0.0	0.1	3.5	-	0.0	Salsola tragus <sup>ai</sup> (prickly Russian thistle)	2017	0.6	-	-	-	-	-	0.4	-	-	-	0.8	-	0.0	Sisymbrium altissimum <sup>ai</sup> (tall tumbled mustard)	2022	0.3	0.1	-	0.0	-	-	3.0	-	-	0.6	0.1	-	0.0	Solanum (nightshade)	Line Intercept														Sphaeralcea grossularifolia (gooseberry/leaf globemallow)	2005	29.2	0	Verbascum thapsus <sup>ai</sup> (common mullein)	2008	8	-		2013	12.1	0.1		2017	13.6	-		2022	16.2	0.2		Quadrat Cover (%)															2005	25.3	0.1		2008	6.4	-		2013	11.3	0.0		2017	9.3	0.1		2022	10.7	0.1
Descurainia pinnata <sup>a</sup> (western tansymustard)	-	-	-	-	-	5	11	1	-	37	6	0	-	-	Eriogonum cernuum <sup>a</sup> (nodding buckwheat)	22	3	-	8	-	-	136	-	5	36	110	-	2	3	Gayophytum ramosissimum <sup>a</sup> (pinyon groundsmoke)	28	-	-	-	-	-	39	-	-	-	26	-	2	-	Gilia inconspicua <sup>a</sup> (shy gilia)	10	14	-	4	-	-	182	-	-	15	1	-	2	-	Helianthus annuus <sup>si</sup> (common sunflower)	Average Cover (%)														Lappula occidentalis <sup>a</sup> (flatspine stickseed)	2005	0.1	0.9	0.0	0.1	0.0	-	0.0	-	0.0	-	-	-	-	Linum perenne <sup>i</sup> (blue flax)	2008	-	-	-	-	-	0.2	0.4	0.0	-	0.3	0.6	0.0	-	Lygodesmia (skeletonplant)	2013	0.0	0.0	-	0.0	-	-	3.6	-	0.0	0.1	3.5	-	0.0	Salsola tragus <sup>ai</sup> (prickly Russian thistle)	2017	0.6	-	-	-	-	-	0.4	-	-	-	0.8	-	0.0	Sisymbrium altissimum <sup>ai</sup> (tall tumbled mustard)	2022	0.3	0.1	-	0.0	-	-	3.0	-	-	0.6	0.1	-	0.0	Solanum (nightshade)	Line Intercept														Sphaeralcea grossularifolia (gooseberry/leaf globemallow)	2005	29.2	0	Verbascum thapsus <sup>ai</sup> (common mullein)	2008	8	-		2013	12.1	0.1		2017	13.6	-		2022	16.2	0.2		Quadrat Cover (%)															2005	25.3	0.1		2008	6.4	-		2013	11.3	0.0		2017	9.3	0.1		2022	10.7	0.1															
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a - Annual/Biennial; n - Noxious Weed; i - Introduced Species

**Table 22R-08.12 - Shrub and Tree Species.** Average modified Daubenmire quadrat and line intercept cover by year.

SHRUB SPECIES	Line Intercept	
Artemisia tridentata ssp. vaseyana <sup>p</sup> (mountain big sagebrush)	29.2	0
Opuntia polyacantha (plains pricklypear)	8	-
	12.1	0.1
	13.6	-
	16.2	0.2
year	Quadrat Cover (%)	
2005	25.3	0.1
2008	6.4	-
2013	11.3	0.0
2017	9.3	0.1
2022	10.7	0.1

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

**Table 22R-08.13 - Shrub/Tree Characteristics.** Population characteristics of shrub/tree species populations including density reproduction (seedlings), age distribution, utilization, vigor and average size (height/crown) of plants.

Year	Density		Age Class Distribution			Utilization		Poor Vigor (%)	Average Height Crown (cm)
	Plants Per Acre		Excluding Seedlings			Moderate (%)	Heavy (%)		
	Excluding Seedlings	Seedling	Young (%)	Mature (%)	Decadent (%)				
<b>Artemisia tridentata ssp. vaseyana<sup>p</sup> -- (mountain big sagebrush)</b>									
2005	5340	200	0	58	42	14	25	14	64/88
2008	2420	20	6	42	52	36	23	39	43/64
2013	5480	40	68	27	5	25	4	16	49/82
2017	3960	-	37	54	9	37	6	5	53/78
2022	3520	-	4	52	44	11	22	40	- / -
<b>Opuntia polyacantha -- (plains pricklypear)</b>									
2005	80	-	0	100	0	0	0	25	13/42
2008	-	-	-	-	-	-	-	-	12/34
2013	40	-	0	100	0	0	0	0	13/46
2017	60	-	0	100	0	0	0	0	11/32
2022	20	-	0	100	0	0	0	0	- / -
<b>Pinus edulis<sup>t</sup> -- (twoneedle pinyon)</b>									
2005	-	-	-	-	-	-	-	-	- / -
2008	-	-	-	-	-	-	-	-	- / -
2013	-	-	-	-	-	-	-	-	- / -
2017	-	20	0	0	0	0	0	0	- / -

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

**Table 22R-08.14 - Tree Characteristics.** Point-quarter tree density, size class distribution, and average diameter.

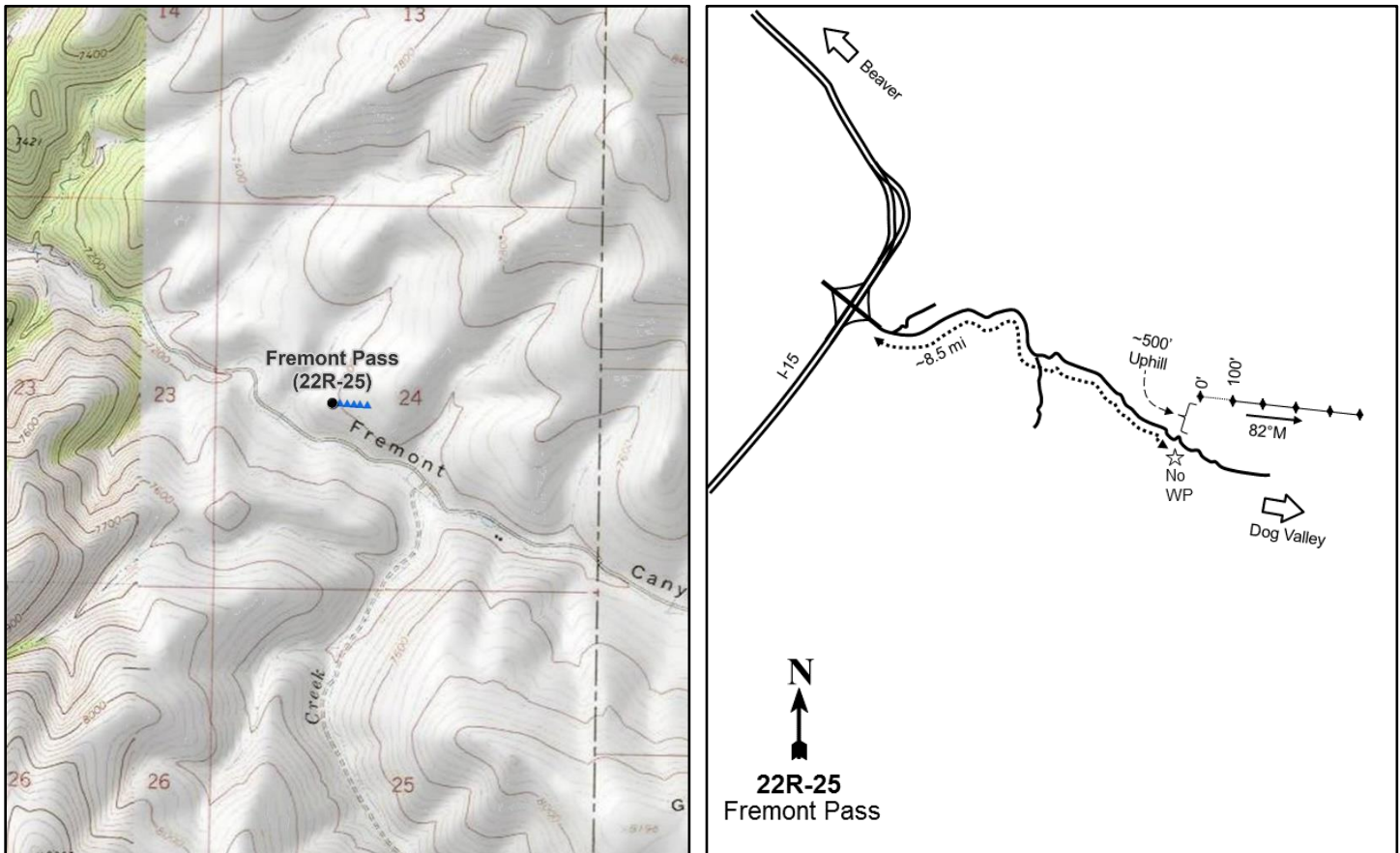
Year	Density	Size Class Distribution					Average Diameter (cm)
	Trees per Acre	Seedling (%)	1-4' (%)	4-8' (%)	8-12' (%)	>12' (%)	
<b>Pinus edulis (twoneedle pinyon)</b>							
2017	1	100	-	-	-	-	1.0

**Table 22R-08.15 - Deer Desirable Components Index: Semidesert 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
2005	30.0	2.3	0.0	0.2	0.0	0.2	0.0	32.7	Fair
2008	10.0	-0.6	2.9	0.3	0.0	0.0	0.0	12.6	Poor
2013	15.1	13.5	15.0	0.3	-0.2	0.1	0.0	43.8	Fair-Good
2017	17.0	12.3	15.0	1.6	-11.8	1.3	0.0	35.4	Fair
2022	20.3	1.9	2.0	4.3	-1.1	0.6	0.0	28.0	Fair



## FREMONT PASS - STUDY NO. 22R-25

**Location Information**

USGS 7.5 min Map Info  
GPS (0' Stake)

Fremont Pass NW; Township 31S, Range 6W, Section 24  
NAD 83 UTM ZONE 12, 369210 East 4217227 North

**Transect Information**

Browse Tag # (0' Stake)	619
Transect Bearing	82° magnetic
Length	500ft
Belt Placement	Line 1 (11ft), Line 2 (34ft), Line 3 (59ft), Line 4 (71ft), Line 5 (95ft)
Belt Marker Placement	No Rebar; Line 5: 98ft Long

**Directions to Site**

From exit 100 on I-15, turn onto Fremont Road. Travel east on Fremont Road for 8.5 miles, then park on the side of the road; there is no witness post. The 0-foot stake is 500 feet north of and uphill from the road and is marked by browse tag #619.

**Site Information**

Land Ownership	Private
Land Administrator	Private
Allotment	FREMONT
Elevation	7,400ft (2,256m)
Aspect	West
Slope	10-15%
Sample Dates	08/15/2018, 08/10/2022

**Table 22R-25.1 Disturbance History.** Recorded history of major disturbances.

Treatment/Disturbance	Name	WRI DB#	Date	Size (acres)
Hand Crew - Lop and Scatter	Little Bear Valley to Fremont Canyon Sagebrush Steppe Habitat Restoration	4402	Winter 2018-August 2019	1856

**Wildlife Habitat and Vegetation History****Table 22R-25.3 - Wildlife Seasonal Habitat.** DWR wildlife habitat and seasonality.

Species	Habitat	Season
Mule Deer	crucial	winter
Rocky Mountain Elk	substantial	summer
Greater Sage-Grouse		undefined & undefined

**Table 22R-25.4 - Vegetation History.** The dominant vegetation type(s) and phase of woodland succession (Tausch, Miller, Roundy, & Chambers, 2009).

Year	Vegetation Type	Woodland Succession
2018	Pinyon-Juniper/Black Sagebrush	Phase II transitioning to Phase III
2022	Annual Grass	Phase I

**Site Notes**

No Notes

**Site Potential**

1981 - 2010 Average Annual Precipitation	18 inches
NRCS Ecological Site	Upland Stony Loam (Black Sagebrush)
NRCS Ecological Site #	R047XB332UT
States and Transitions	No state and transition model is available for this ecological site.

This study site was established in 2018 to monitor a lop and scatter treatment (Table 22R-25.1). When established, this site was dominated by both twoneedle pinyon (*Pinus edulis*) and Utah juniper (*Juniperus osteosperma*). A small amount of shrub cover was provided in the open areas by black sagebrush (*Artemisia nova*) and mountain big sagebrush (*A. tridentata* ssp. *vaseyana*) (Table 22R-25.12, Table 22R-25.13, Table 22R-25.14). The understory provided limited cover, being dominated by the perennial grass blue grama (*Bouteloua gracilis*) with other native species found in small amounts. The introduced annual grass species cheatgrass (*Bromus tectorum*) was observed in cover and frequency data, but also in small amounts (Table 22R-25.10). Annual and perennial forb species were present as well, but they contributed very little cover and frequency (Table 22R-25.7, Table 22R-25.10, Table 22R-25.11). Following the treatment, pinyon and juniper cover and density decreased significantly, and shrubs remained rare (Table 22R-25.6, Table 22R-25.12, Table 22R-25.13, Table 22R-25.14). However, cheatgrass increased substantially and became the dominant vegetation component in 2022 (Table 22R-25.10).

**Trend Summary Tables**

**Table 22R-25.6 - Shrub/Tree Summary.** Average modified Daubenmire quadrat and line intercept cover by year for shrubs/trees

Year	Quadrat Cover (%)			Line-intercept Cover (%)		
	Preferred Shrub	Other Shrub	Tree	Preferred Shrub	Other Shrub	Tree
2018	1.0	0.4	17.2	0.7	0.4	34.5
2022	3.0	0.3	-	2.0	0.1	0.1

**Table 22R-25.7 - Herbaceous Summary.** Nested frequency and average modified Daubenmire quadrat cover by year for herbaceous functional groups

Year	Nested Frequency				Quadrat Cover (%)			
	Annual Grass	Perennial Grass	Annual/Biennial Forb	Perennial Forb	Annual Grass	Perennial Grass	Annual/Biennial Forb	Perennial Forb
2018	35	207	37	67	0.1	6.9	0.2	0.3
2022	345	149	131	64	20.1	4.7	1.8	0.7

**Table 22R-25.8 - Basic Ground Cover.** Average modified Daubenmire quadrat cover by year for basic ground cover types.

Year	Cover Type (%)					
	Bare Ground	Cryptogams	Litter	Pavement	Rock	Vegetation
2018	24.4	0.5	38.2	8.0	31.2	26.1
2022	13.9	0.1	47.4	9.3	23.2	28.4

**Table 22R-25.9 - Pellet Group Data.** Quadrat frequency and pellet group transect data for animal pellets. Rabbit pellet groups are not sampled in the pellet group transect.

Year	Cattle	Mule Deer	Rocky Mountain Elk	Rabbit
	Quadrat Frequency			
2018	-	6	1	20
2022	4	2	-	-
Year	Days Use Per Acre (ha)			
2018	2.2 (5.4)	8.7 (21.5)	0.7 (1.7)	-
2022	9.4 (23.3)	4.7 (11.6)	6.0 (14.9)	-

**Table 22R-25.10 - Grass Species.** Nested frequency and modified Daubenmire average cover by year.

GRASS SPECIES	Achnatherum hymenoides (Indian ricegrass)	Achnatherum lettermanii (Letterman's needlegrass)	Bouteloua gracilis (blue grama)	Bromus tectorum <sup>a</sup> (cheatgrass)	Carex (sedge)	Elymus elymoides (squirreltail)	Hesperostipa comata (needle and thread)	Pascopyrum smithii (western wheatgrass)	Poa fendleriana (muttongrass)	Poa secunda (Sandberg bluegrass)
year	Nested Frequency									
2018	4	1	123	35	10	9	4	3	74	4
2022	4	-	61	345	4	19	-	3	59	25
year	Average Cover (%)									
2018	0.0	0.0	5.2	0.1	0.3	0.0	0.0	0.0	1.3	0.0
2022	0.2	-	1.3	20.1	0.1	0.5	-	0.0	2.0	0.5

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

**Table 22R-25.11 - Forb Species.** Nested frequency and modified Daubenmire average cover by year.

FORB SPECIES	Alyssum desertorum <sup>ai</sup> (desert madwort)	Arabis (rockcress)	Artemisia ludoviciana (white sagebrush)	Astragalus (milkvetch)	Chamaesyce (sandmat)	Chamaesyce albomarginata (whitemargin sandmat)	Collinsia parviflora <sup>a</sup> (maiden blue eyed Mary)	Collomia linearis <sup>a</sup> (tiny trumpet)	Descurainia pinnata <sup>a</sup> (western fansymustard)	Draba <sup>a</sup> (draba)	Erigeron divergens <sup>a</sup> (spreading fleabane)	Erigeron eatonii (Eaton's fleabane)	Erigeron flagellaris (trailing fleabane)	Erigeron pumilus (shaggy fleabane)	Erysimum capitatum <sup>a</sup> (sanddune wallflower)	Hymenopappus filifolius (fineleaf hymenopappus)	Lomatium (desertparsley)
year	Nested Frequency																
2018	19	3	3	2	29	-	4	-	-	-	-	2	6	6	1	-	-
2022	50	1	1	10	1	1	35	4	3	9	26	-	21	18	-	2	7
year	Average Cover (%)																
2018	0.1	0.0	0.0	0.0	0.1	-	0.0	-	-	-	-	0.0	0.0	0.0	0.0	-	-
2022	0.7	0.0	0.0	0.1	0.0	0.0	0.3	0.1	0.0	0.0	0.2	-	0.2	0.1	-	0.0	0.0

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

FORB SPECIES	Microsteris gracilis <sup>a</sup> (slender phlox)	Packera multilobata (lobeleaf groundsel)	Penstemon (beardtongue)	Phlox longifolia (longleaf phlox)	Polygonum douglasii <sup>a</sup> (Douglas' knotweed)	Portulaca oleracea <sup>ai</sup> (little hogweed)	Taraxacum officinale (common dandelion)
year	Nested Frequency						
2018	13	4	8	2	4	1	2
2022	84	9	2	4	-	3	-
year	Average Cover (%)						
2018	0.1	0.0	0.1	0.0	0.0	0.0	0.0
2022	0.4	0.2	0.0	0.0	-	0.0	-

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

**Table 22R-25.12 - Shrub and Tree Species.** Average modified Daubenmire quadrat and line intercept cover by year.

SHRUB SPECIES	Line Intercept Cover (%)								
	Artemisia nova <sup>p</sup> (black sagebrush)	Artemisia tridentata ssp. vaseyana <sup>p</sup> (mountain big sagebrush)	Cercocarpus ledifolius var. ledifolius <sup>p</sup> (curl-leaf mountain mahogany)	Gutierrezia sarothrae (broom snakeweed)	Juniperus osteosperma <sup>i</sup> (Utah juniper)	Pediocactus simpsonii (mountain ball cactus)	Pinus edulis <sup>t</sup> (twoneedle pinyon)	Purshia tridentata <sup>p</sup> (antelope bitterbrush)	Symphoricarpos oreophilus <sup>p</sup> (mountain snowberry)
year	Line Intercept Cover (%)								
2018	0.4	0.1	-	0.4	9.4	-	25.1	0.2	-
2022	1.5	0.1	-	0.1	0.1	-	-	0.4	-
year	Quadrat Cover (%)								
2018	0.4	0.4	0.0	0.4	4.5	0.0	12.7	0.1	0.0
2022	1.9	0.5	-	0.3	0.0	-	-	0.4	0.1

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

**Table 22R-25.13 - Shrub/Tree Characteristics.** Population characteristics of shrub/tree species populations including density reproduction (seedlings), age distribution, utilization, vigor and average size (height/crown) of plants.

Year	Density		Age Class Distribution			Utilization		Poor Vigor (%)	Average Height Crown (cm)
	Plants Per Acre		Excluding Seedlings			Moderate (%)	Heavy (%)		
	Excluding Seedlings	Seedling	Young (%)	Mature (%)	Decadent (%)				
<b>Artemisia nova<sup>p</sup> -- (black sagebrush)</b>									
2018	320	20	13	38	50	13	0	50	27/38
2022	540	-	11	89	0	4	0	7	- / -
<b>Artemisia tridentata ssp. vaseyana<sup>p</sup> -- (mountain big sagebrush)</b>									
2018	640	20	13	41	47	3	0	44	30/48
2022	120	-	50	50	0	0	0	0	- / -
<b>Gutierrezia sarothrae -- (broom snakeweed)</b>									
2018	1300	-	5	88	8	0	0	6	15/14
2022	640	-	59	41	0	0	0	0	- / -
<b>Juniperus osteosperma<sup>i</sup> -- (Utah juniper)</b>									
2018	100	20	40	60	0	0	0	0	- / -
2022	40	-	100	0	0	0	0	0	- / -
<b>Opuntia -- (pricklypear)</b>									
2018	20	-	0	100	0	0	0	0	8/27
2022	20	-	0	100	0	0	0	0	- / -
<b>Pediocactus simpsonii -- (mountain ball cactus)</b>									
2018	20	-	0	100	0	0	0	0	3/6
2022	-	-	-	-	-	-	-	-	- / -
<b>Pinus edulis<sup>t</sup> -- (twoneedle pinyon)</b>									
2018	120	40	50	50	0	0	0	0	- / -
2022	-	-	-	-	-	-	-	-	- / -
<b>Purshia tridentata<sup>p</sup> -- (antelope bitterbrush)</b>									
2018	60	-	0	100	0	0	67	0	40/78
2022	160	-	38	63	0	13	0	0	- / -
<b>Symphoricarpos oreophilus<sup>p</sup> -- (mountain snowberry)</b>									
2018	40	-	0	100	0	0	0	0	21/26
2022	20	-	0	100	0	0	0	100	- / -

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

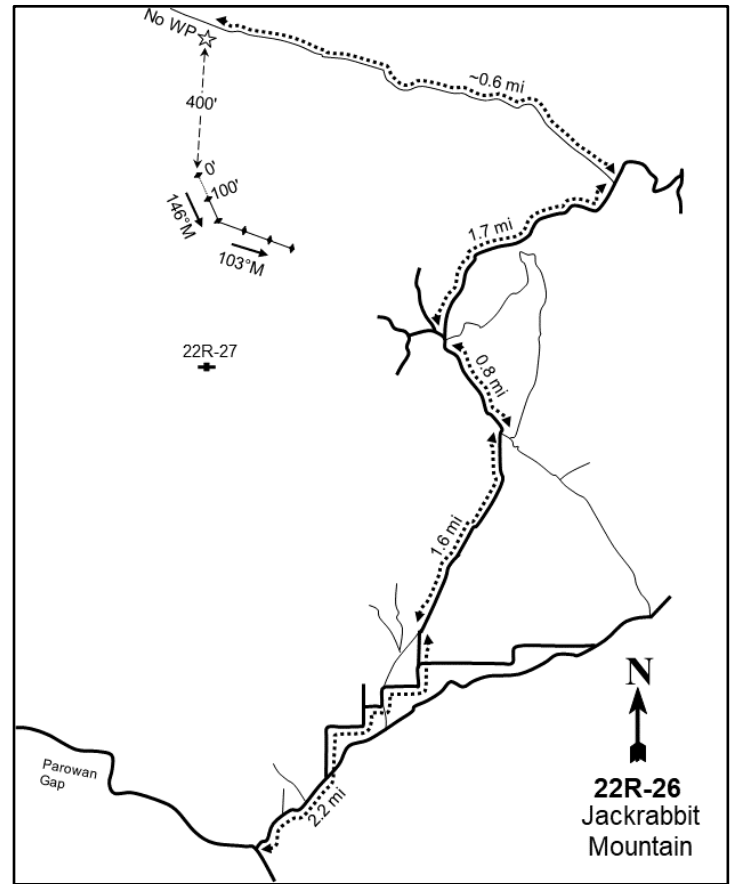
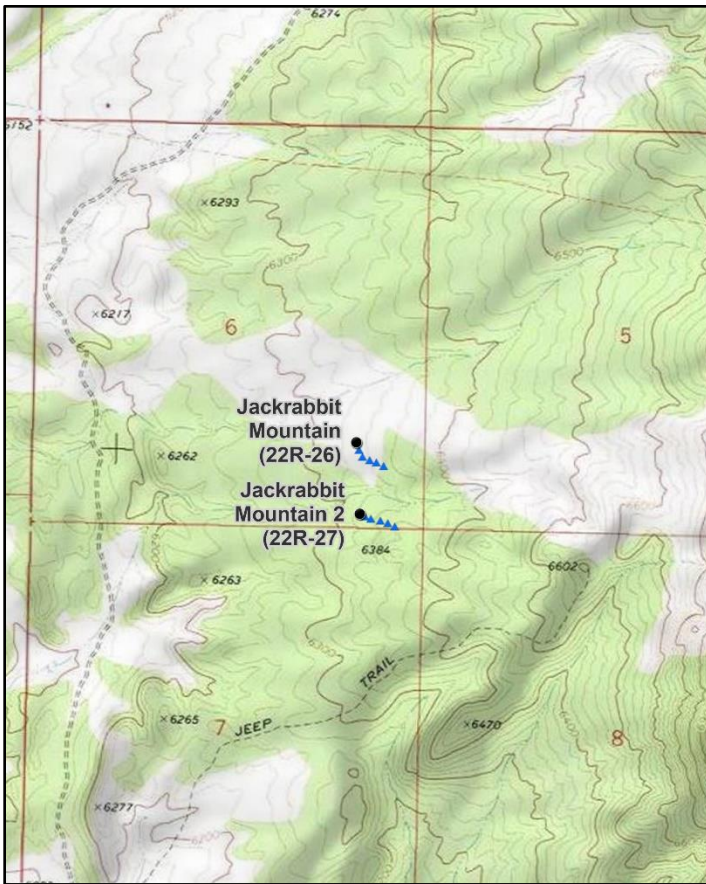
**Table 22R-25.14 - Tree Characteristics.** Point-quarter tree density, size class distribution, and average diameter.

Year	Density	Size Class Distribution					Average Diameter (cm)
	Trees per Acre	Seedling (%)	1-4' (%)	4-8' (%)	8-12' (%)	>12' (%)	
<b>Juniperus osteosperma (Utah juniper)</b>							
2018	50	5	16	16	16	47	32.5
2022	9	83	-	17	-	-	1.8
<b>Pinus edulis (twoneedle pinyon)</b>							
2018	77	28	33	11	11	17	6.1
2022	15	83	-	17	-	-	2.0

**Table 22R-25.15 - Deer Desirable Components Index: Upland Potential Scale.**

Year	Preferred Browse Cover	Preferred Browse Decadence	Preferred Browse Young	Perennial Grass Cover	Annual Grass Cover	Perennial Forb Cover	Noxious Weeds	Total Score	Ranking
2018	0.9	0.0	0.0	13.9	-0.1	0.5	0.0	15.3	Very Poor
2022	2.6	0.0	0.0	9.3	-15.1	1.4	0.0	-1.8	Very Poor

## 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)

552

Transect Bearing

146° magnetic (Lines 3-5: 103° 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

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. 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, 08/08/2022

**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	4786	Fall 2019	873

**Wildlife Habitat and Vegetation History**

**Table 22R-26.3 - Wildlife Seasonal Habitat.** DWR 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
2022	Mountain Big Sagebrush	Phase I

**Site Notes**

No Notes

**Site Potential**

1981 - 2010 Average Annual Precipitation	13 inches
NRCS Ecological Site	Upland Loam (Bonneville Big Sagebrush)
NRCS Ecological Site #	R028AY310UT
States and Transitions	2019 - Utah Juniper/Invasive Annuals State: Community Phase 3.1 2022-Present - Current Potential State: Community Phase 2.1

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 dominant shrub component (Photos, Table 22R-26.12, Table 22R-26.13). 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). Following the lop and scatter treatment (Table 22R-26.1), pinyon and juniper trees were removed and mountain big sagebrush remained the dominant shrub species (Table 22R-26.12, Table 22R-26.14). The herbaceous understory remained limited with a slight increase in perennial grass cover and a decrease in cover of annual forbs (Table 22R-26.7) (USDA-ARS Jornada Experimental Range, 2022).

**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
2022	6.5	2.1	0.1	13.0	2.0	0.5

**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
2022	43	65	119	14	0.2	2.5	2.2	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
2022	17.8	0.3	52.3	26.6	7.3	12.9

**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
2022	2	11
Year	Days Use Per Acre (ha)	
	2019	0.7 (1.7)
2022	2.0 (5.0)	-

**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> (six weeks fescue)
year	Nested Frequency				
2019	2	9	25	6	7
2022	2	43	54	11	-
year	Average Cover (%)				
2019	0.0	0.0	0.1	0.0	0.0
2022	0.2	0.2	2.1	0.2	-

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	Astragalus (milk vetch)	Ceratocephala testiculata <sup>ai</sup> (curseweed butterwort)	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)	Lactuca serriola <sup>ai</sup> (prickly lettuce)	Lesquerella (bladderpod)	Machaeranthera canescens (hoary tansyaster)	Phlox hoodii (spiny phlox)	Phlox longifolia (longleaf phlox)	Pleiacanthus spinosus (thorn skeletonweed)
year	Nested Frequency																
2019	20	19	3	3	4	62	3	2	8	4	274	-	1	-	13	2	-
2022	-	-	8	-	2	21	-	19	-	-	97	8	-	0	2	-	3
year	Average Cover (%)																
2019	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	-
2022	-	-	0.1	-	0.0	0.1	-	0.4	-	-	1.4	0.2	-	0.1	0.0	-	0.1

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

FORB SPECIES	Sisymbrium altissimum <sup>ai</sup> (tall tumblemustard)	Streptanthus cordatus (heartleaf twistflower)
year	Nested	
2019	-	-
2022	2	1
year	Average Cover (%)	
2019	-	-
2022	0.0	0.0

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 (%)					
	Artemisia nova <sup>p</sup> (black sagebrush)	Artemisia tridentata ssp. vaseyana <sup>p</sup> (mountain big sagebrush)	Ephedra nevadensis <sup>p</sup> (Nevada jointfir)	Juniperus osteosperma <sup>i</sup> (Utah juniper)	Linanthus pungens (granite prickly phlox)	Pinus edulis <sup>i</sup> (twoneedle pinyon)
year	Line Intercept Cover (%)					
2019	1.7	4.5	0.9	12	0.8	12.7
2022	2.7	9.6	0.7	0.5	2	-
year	Quadrat Cover (%)					
2019	1.4	6.2	0.9	7.0	1.0	10.5
2022	1.5	4.9	0.1	0.1	2.1	-

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
2022	500	-	4	64	32	0	0	36	- / -
<b>Artemisia tridentata ssp. vaseyana<sup>p</sup> -- (mountain big sagebrush)</b>									
2019	2520	-	1	31	68	0	10	70	47/60
2022	1580	20	3	75	23	0	1	22	- / -
<b>Ephedra nevadensis<sup>p</sup> -- (Nevada jointfir)</b>									
2019	720	-	3	58	39	0	6	39	37/35
2022	200	-	20	80	0	0	0	0	- / -
<b>Ephedra viridis<sup>p</sup> -- (mormon tea)</b>									
2019	160	-	13	88	0	0	0	38	77/162
2022	-	-	-	-	-	-	-	-	- / -
<b>Juniperus osteosperma<sup>i</sup> -- (Utah juniper)</b>									
2019	160	-	75	25	0	0	0	0	- / -
2022	180	-	100	0	0	0	0	11	- / -
<b>Linanthus pungens -- (granite prickly phlox)</b>									
2019	4960	-	10	90	0	0	0	0	13/14
2022	2820	-	9	90	1	0	0	1	- / -
<b>Opuntia polyacantha -- (plains pricklypear)</b>									
2019	20	-	0	100	0	0	0	0	11/39
2022	40	-	0	100	0	0	0	0	- / -
<b>Peraphyllum ramosissimum<sup>p</sup> -- (wild crab apple)</b>									
2019	-	-	-	-	-	-	-	-	142/148
2022	-	-	-	-	-	-	-	-	- / -
<b>Pinus edulis<sup>i</sup> -- (twoneedle pinyon)</b>									
2019	80	40	50	50	0	0	0	0	- / -
2022	-	20	0	0	0	0	0	0	- / -

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

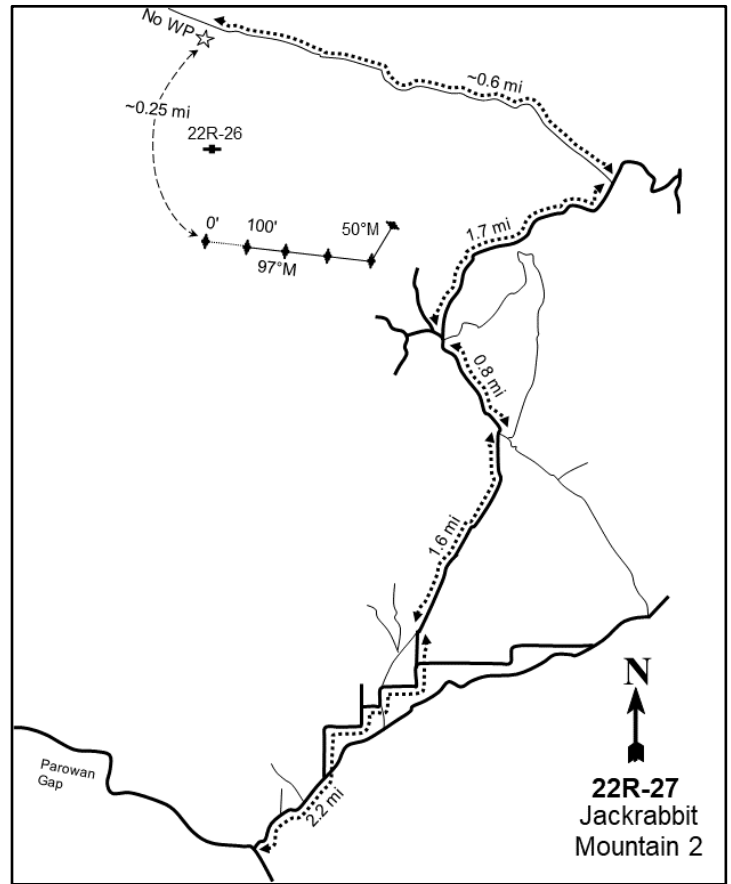
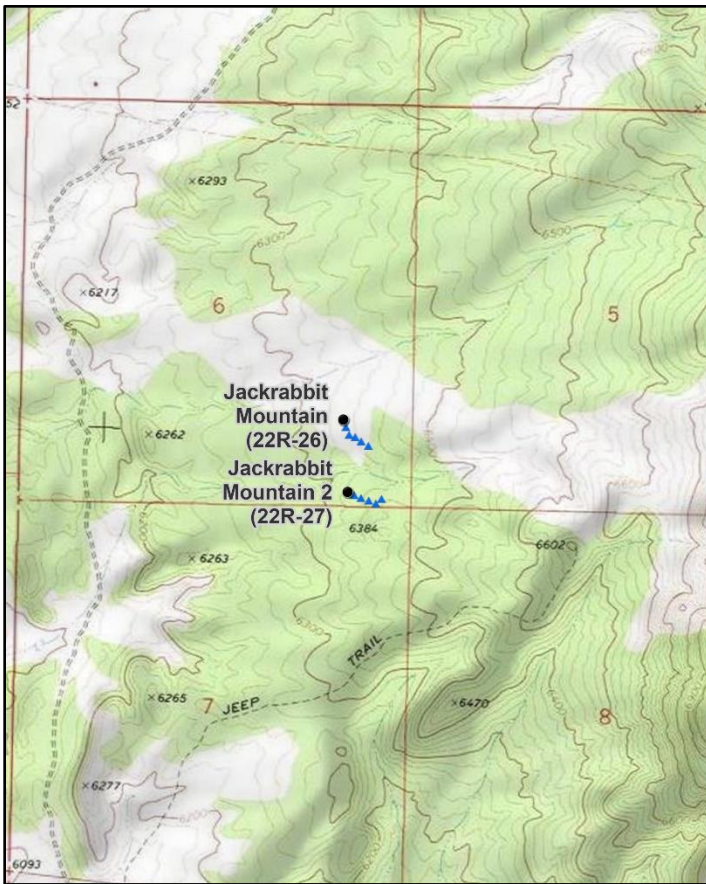
**Table 22R-26.14 - Tree Characteristics.** Point-quarter tree density, size class distribution, and average diameter.

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
2022	64	29	71	-	-	-	4.1
<b>Pinus edulis (twoneedle pinyon)</b>							
2019	129	-	10	50	35	5	13.2
2022	16	75	25	-	-	-	2.8

**Table 22R-26.15 - Deer Desirable Components Index: Upland 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
2022	16.3	8.0	1.9	4.9	-0.1	0.7	0.0	31.6	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

1833  
97° magnetic (Line 5: 50° magnetic)  
500ft  
Line 1 (11ft), Line 2 (34ft), Line 3 (59ft), Line 4 (71ft), Line 5 (95ft)  
Standard

### 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; 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, 08/08/2022

**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	4786	Fall 2019	1692
Mechanical - Bullhog	Chipman Peak-Benson Vegetation Treatment	4786	January-June 2020	1496

**Table 22R-27.2 Seed Mix.** List of known seeded plant species and rates (if available).

Mix Name			Application Type	Application Date	Acres
Chipman Peak Benson Mastication			Aerial	Nov 2019	1692
Type	Species	Common Name	Cultivar/Source ID	Bulk lbs/acre	PLS
G	Achnatherum hymenoides	Indian Ricegrass	Rimrock	0.59	0.57
G	Achnatherum hymenoides	Indian Ricegrass	Rimrock	0.89	0.74
G	Agropyron cristatum	Crested Wheatgrass	Ephraim	0.52	0.46
G	Agropyron cristatum	Crested Wheatgrass	Ephraim	0.49	0.44
G	Elymus lanceolatus	Thickspike Wheatgrass	Bannock II	1.00	0.97
G	Pascopyrum smithii	Western Wheatgrass	Recovery	1.48	1.34
G	Poa secunda	Nevada Bluegrass	Opportunity	0.25	0.22
G	Poa secunda	Sandberg Bluegrass	Mountain Home	0.25	0.23
G	Pseudoroegneria spicata	Bluebunch Wheatgrass	Anatone	1.00	0.95
F	Achillea millefolium	Western Yarrow	Eagle	0.10	0.09
F	Astragalus cicer	Cicer Milkvetch	Lutana	0.25	0.25
F	Linum perenne	Blue Flax	Appar	0.50	0.43
F	Medicago sativa	Alfalfa	Ladak 65	0.30	0.29
F	Melilotus officinalis	Yellow Sweetclover		0.50	0.49
F	Onobrychis viciifolia	Sainfoin	Shoshone	0.50	0.47
F	Penstemon palmeri	Palmer Penstemon	Beaver UT	0.20	0.19
F	Sanguisorba minor	Small Burnet	Delar	1.00	0.92
F	Sphaeralcea coccinea	Scarlet Globemallow	Iron, UT	0.02	0.01
F	Sphaeralcea grossulariifolia	Gooseberryleaf Globemallow	White Pine NV	0.03	0.02
S	Bassia prostrata	Forage Kochia	Sanpete, UT	0.21	0.15

**Wildlife Habitat and Vegetation History**

**Table 22R-27.3 - Wildlife Seasonal Habitat.** DWR 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
2022	Perennial Grass-Forb/Mountain Big Sagebrush	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	2019 - Utah Juniper/Invasive Annuals State: Community Phase 3.1 2022-Present - Current Potential State: Community Phase 2.1

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 (Photos, Table 22R-27.12, Table 22R-12.13). 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). Following the bullhog and seeding treatment (Table 22R-26.1), pinyon and juniper trees were removed and mountain big sagebrush remained the dominant shrub species (Table 22R-26.12, Table 22R-26.14). The herbaceous understory improved with an increase of perennial forb and grass cover, both of which were co-dominant vegetation components in 2022. Annual grass has remained rare (Table 22R-26.7) (USDA-ARS Jornada Experimental Range, 2022).

**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
2022	2.3	0.8	0.2	4.0	0.6	-

**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
2022	48	130	79	111	0.3	4.1	3.4	5.4

**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
2022	7.6	0.2	71.3	16.2	4.4	14.3

**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
2022	8	15
Year	Days Use Per Acre (ha)	
2019	2.0 (5.0)	-
2022	13.4 (33.1)	-

**Table 22R-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)	Festuca idahoensis (Idaho fescue)	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								
2019	-	8	12	-	9	-	-	-	18
2022	15	48	98	4	10	8	6	11	5
year	Average Cover (%)								
2019	-	0.0	0.1	-	0.0	-	-	-	0.0
2022	0.4	0.3	2.5	0.2	0.1	0.4	0.0	0.5	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	Achillea millefolium (Common yarrow)	Astragalus (milkvetch)	Ceratocephala testiculata <sup>ai</sup> (curveseed butterwort)	Chaenactis douglasii (Douglas' dustymaiden)	Chamaesyce (sandmat)	Cryptantha (cryptantha)	Descurainia pinnata <sup>a</sup> (western tansymustard)	Draba <sup>a</sup> (draba)	Erigeron pumilus (shaggy fleabane)	Eriogonum caespitosum (matted buckwheat)	Eriogonum cernuum <sup>a</sup> (nodding buckwheat)	Eriogonum umbellatum (sulphur-flower buckwheat)	Frasera albomarginata (desert frasera)	Gayophytum ramosissimum <sup>a</sup> (pinyon groundsmoke)	Gilia inconspicua <sup>a</sup> (shy gilia)	Hedysarum boreale (Utah sweetvetch)	Lactuca serriola <sup>ai</sup> (prickly lettuce)
year	Nested Frequency																
2019	-	12	10	-	9	6	49	1	-	6	7	8	28	28	236	-	-
2022	5	1	-	10	28	-	11	-	2	-	31	14	5	3	43	3	9
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	-	-
2022	0.2	0.0	-	0.1	0.2	-	0.2	-	0.2	-	1.3	0.2	0.1	0.1	1.1	0.1	0.3

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

FORB SPECIES	Lappula occidentalis <sup>a</sup> (flatspine stickseed)	Lesquerella (bladderpod)	Linum perenne <sup>i</sup> (blue flax)	Medicago sativa <sup>i</sup> (alfalfa)	Melilotus officinalis <sup>i</sup> (sweetclover)	Penstemon palmeri (Palmer's penstemon)	Phlox austromontana (mountain phlox)	Phlox hoodii (spiny phlox)	Phlox longifolia (longleaf phlox)	Sanguisorba minor <sup>i</sup> (small burnet)	Sisymbrium altissimum <sup>at</sup> (tall tumblemustard)	Stephanomeria exigua (small wireletuce)	Streptanthus cordatus (heartleaf twistflower)
year	Nested Frequency												
2019	0	1	-	-	-	-	-	10	-	-	-	-	3
2022	-	-	28	6	6	1	4	5	2	8	3	3	15
year	Average Cover (%)												
2019	0.0	0.0	-	-	-	-	-	0.0	-	-	-	-	0.0
2022	-	-	2.4	0.2	0.1	0.0	0.0	0.2	0.0	0.7	0.2	0.2	0.4

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	Artemisia tridentata ssp. vaseyana <sup>p</sup> (mountain big sagebrush)	Bassia prostrata <sup>pi</sup> (forage kochia)	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)
year	Line Intercept Cover (%)					
2019	1.9	-	0.1	24.2	0	13.3
2022	3.3	-	0.7	-	0.6	-
year	Quadrat Cover (%)					
2019	1.3	-	0.0	16.9	0.1	8.8
2022	2.1	0.1	0.2	0.2	0.8	0.0

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
2022	-	-	-	-	-	-	-	-	-/-
<b>Artemisia tridentata ssp. vaseyana<sup>p</sup> -- (mountain big sagebrush)</b>									
2019	1180	-	0	15	85	2	44	88	50/61
2022	960	160	8	85	6	0	0	6	-/-
<b>Bassia prostrata<sup>pi</sup> -- (forage kochia)</b>									
2019	-	-	-	-	-	-	-	-	-/-
2022	120	-	0	100	0	17	0	0	-/-
<b>Ephedra nevadensis<sup>p</sup> -- (Nevada jointfir)</b>									
2019	380	-	21	32	47	11	42	79	34/34
2022	120	-	0	100	0	0	17	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>Ephedra viridis<sup>p</sup> -- (mormon tea)</b>									
2019	-	-	-	-	-	-	-	-	62/92
2022	-	-	-	-	-	-	-	-	-/-
<b>Juniperus osteosperma<sup>i</sup> -- (Utah juniper)</b>									
2019	160	20	0	100	0	0	0	0	-/-
2022	140	-	86	14	0	0	0	0	-/-
<b>Linanthus pungens -- (granite prickly phlox)</b>									
2019	700	-	9	91	0	0	0	0	11/12
2022	1240	20	26	66	8	0	0	8	-/-
<b>Opuntia polyacantha -- (plains pricklypear)</b>									
2019	20	-	0	100	0	0	0	0	11/27
2022	-	-	-	-	-	-	-	-	-/-
<b>Peraphyllum ramosissimum<sup>p</sup> -- (wild crab apple)</b>									
2019	20	-	0	100	0	0	100	0	17/23
2022	-	-	-	-	-	-	-	-	-/-
<b>Pinus edulis<sup>i</sup> -- (twoneedle pinyon)</b>									
2019	140	220	43	57	0	0	0	0	-/-
2022	20	-	100	0	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

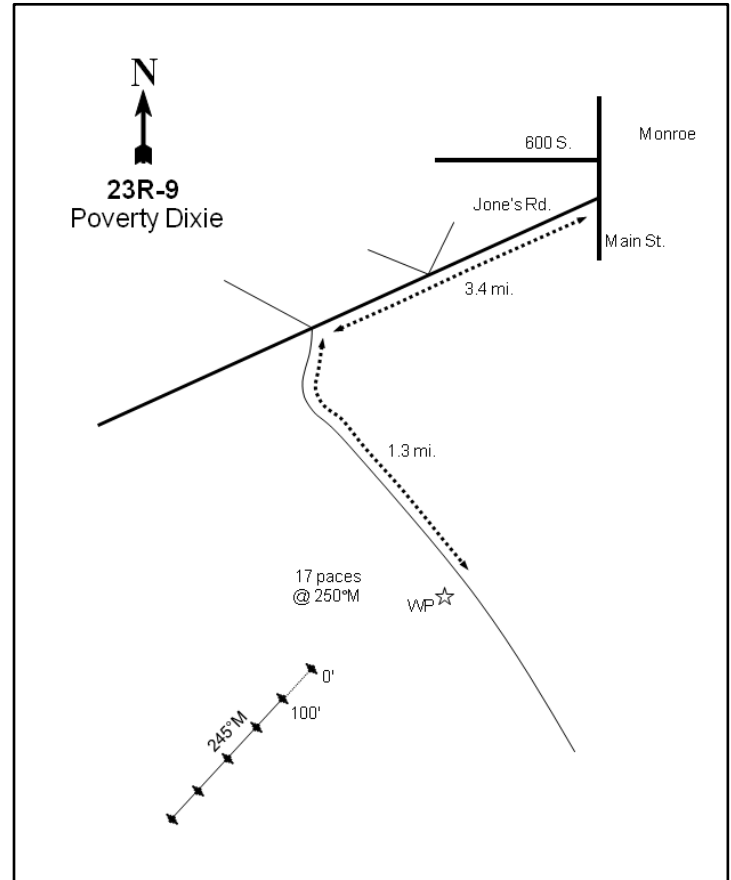
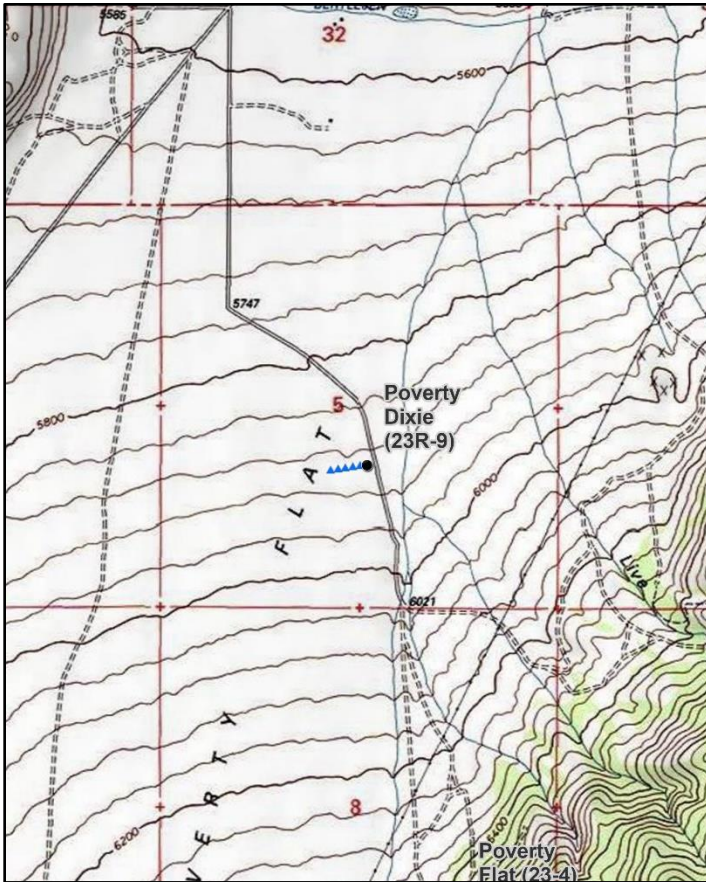
**Table 22R-27.14 - Tree Characteristics.** Point-quarter tree density, size class distribution, and average diameter.

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
2022	51	41	59	-	-	-	1.8
<b>Pinus edulis (twoneedle pinyon)</b>							
2019	180	5	35	20	35	5	12.3
2022	26	36	64	-	-	-	2.1

**Table 22R-27.15 - Deer Desirable Components Index: Upland 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
2022	5.0	0.0	0.0	8.2	-0.2	10.0	0.0	23.0	Very Poor

## POVERTY DIXIE - STUDY NO. 23R-9

**Location Information**

USGS 7.5 min Map Info  
GPS (0' Stake)

Antelope Range NE; Township 26S, Range 3W, Section 05  
NAD 83 UTM ZONE 12, 399782 East 4269106 North

**Transect Information**

Browse Tag # (0' Stake)	76
Transect Bearing	245° magnetic
Length	500ft
Belt Placement	Line 1 (11ft), Line 2 (34ft), Line 3 (59ft), Line 4 (71ft), Line 5 (95ft)
Belt Marker Placement	Belt 4: No Rebar

**Directions to Site**

From 600 South and Main Street in Monroe, turn southwest onto Jones Road, which is a gravel road coming in at a 45 degree angle. Proceed for 3.4 miles to a junction and stay left. Continue on this road for 1.3 miles to a half-high witness post on the right (west) side of the road. From the half-high witness post, walk 17 paces at 250 degrees magnetic to the 0-foot stake. The 0-foot stake is marked with browse tag #76.

**Site Information**

Land Ownership	Federal
Land Administrator	BLM
Allotment	MONROE CO-OP
Elevation	5,900ft (1,798m)
Aspect	North
Slope	5%
Sample Dates	07/14/2005, 08/12/2010, 08/05/2013, 08/02/2017, 06/01/2022

**Table 23R-09.1 Disturbance History.** Recorded history of major disturbances.

Treatment/Disturbance	Name	WRI DB#	Date	Size (acres)
Seeding - Aerial After	Poverty Flat	139	December 2005	2108
Fire - Wildfire	Flat	LTDL	July 1997	5425
Seeding - Rangeland Drill	Flat Fire Rehabilitation	LTDL	November-December 1997	3400
Seeding - Aerial	Flat Fire Rehabilitation	LTDL	November 1997	3000
Harrow - One-Way Dixie	Poverty Flat	139	November 2005	2108
Seeding - Broadcast After	Poverty Flat	139	November 2005	2108
Seeding - Aerial	Flat Fire Rehabilitation	LTDL	November 1997	400

**Table 23R-09.2 Seed Mix.** List of known seeded plant species and rates (if available).

Mix Name			Application Type	Application Date	Acres
Poverty Flat			Broadcast	Nov 2005	2000
Type	Species	Common Name	Cultivar/Source ID	Bulk lbs/acre	PLS
G	Agropyron cristatum	Crested Wheatgrass	Hycrest	1.00	0.94
G	Leymus cinereus	Great Basin Wildrye	Trailhead	0.14	0.12
G	Leymus cinereus	Great Basin Wildrye	Trailhead	0.17	0.15
G	Leymus cinereus	Great Basin Wildrye	Trailhead	0.50	0.39
G	Leymus cinereus	Great Basin Wildrye	Trailhead	0.17	0.16
G	Poa secunda	Sandberg Bluegrass	SID OR	0.75	0.60
G	Psathyrostachys juncea	Russian Wildrye		1.00	0.90
G	Thinopyrum intermedium	Pubescent Wheatgrass		2.00	1.67
F	Helianthus annuus	Annual Sunflower		0.02	0.02
F	Helianthus annuus	Annual Sunflower		0.50	0.48
F	Helianthus annuus	Annual Sunflower		0.13	0.08
F	Linum perenne	Blue Flax		0.33	0.28
F	Linum perenne	Blue Flax		0.50	0.42
F	Medicago sativa	Alfalfa	Ladak+	0.15	0.14
F	Medicago sativa	Alfalfa	Nomad	0.17	0.16
F	Medicago sativa	Alfalfa	Spredor 4	0.17	0.16
F	Melilotus officinalis	Yellow Sweetclover		0.25	0.18
F	Onobrychis viciifolia	Sainfoin	Eski	2.50	2.34
F	Sanguisorba minor	Small Burnet	Delar	2.00	1.89
F	Sanguisorba minor	Small Burnet		2.50	0.00
S	Atriplex canescens	Fourwing Saltbush	Wayne UT	0.63	0.16

Mix Name			Application Type	Application Date	Acres
Poverty Flat Browse			Aerial	Dec 2005	2000
Type	Species	Common Name	Cultivar/Source ID	Bulk lbs/acre	PLS
S	Artemisia tridentata ssp. wyomingensis	Wyoming Big Sagebrush	Utah UT	0.15	0.02
S	Artemisia tridentata ssp. wyomingensis	Wyoming Big Sagebrush	Utah UT	0.35	0.08
S	Artemisia tridentata ssp. wyomingensis	Wyoming Big Sagebrush	Utah UT	0.50	0.09
S	Bassia prostrata	Forage Kochia	Millard UT	1.25	0.75
S	Bassia prostrata	Forage Kochia	Millard UT	0.25	0.16

Mix Name			Application Type	Application Date	Acres
Poverty Flat			Drill	Nov 1997	3400
Type	Species	Common Name	Cultivar/Source ID	Bulk lbs/acre	PLS
G	<i>Achnatherum hymenoides</i>	Indian Ricegrass	Nezpar	0.50	0.00
G	<i>Agropyron cristatum</i>	Crested Wheatgrass	Ephraim	1.00	0.00
G	<i>Agropyron cristatum</i>	Crested Wheatgrass	Hycrest	2.00	0.00
G	<i>Leymus cinereus</i>	Great Basin Wildrye	Magnar	1.00	0.00
G	<i>Thinopyrum intermedium</i>	Pubescent Wheatgrass	Luna	1.00	0.00
F	<i>Medicago sativa</i>	Alfalfa	Ladak	2.00	0.00
F	<i>Melilotus officinalis</i>	Yellow Sweetclover		0.70	0.00

Mix Name			Application Type	Application Date	Acres
Flat Fire First Aerial			Aerial	Nov 1997	3000
Type	Species	Common Name	Cultivar/Source ID	Bulk lbs/acre	PLS
F	<i>Helianthus annuus</i>	Annual Sunflower		0.10	0.00
S	<i>Artemisia tridentata ssp. wyomingensis</i>	Wyoming Big Sagebrush		1.00	0.00
S	<i>Atriplex canescens</i>	Fourwing Saltbush		3.00	0.00

Mix Name			Application Type	Application Date	Acres
Flat Fire Second Aerial			Aerial	Nov 1997	400
Type	Species	Common Name	Cultivar/Source ID	Bulk lbs/acre	PLS
S	<i>Bassia prostrata</i>	Forage Kochia		1.20	0.00

**Wildlife Habitat and Vegetation History**

**Table 23R-09.3 - Wildlife Seasonal Habitat.** DWR wildlife habitat and seasonality.

Species	Habitat	Season
Mule Deer	crucial	winter

**Table 23R-09.4 - Vegetation History.** The dominant vegetation type(s) and phase of woodland succession (Tausch, Miller, Roundy, & Chambers, 2009).

Year	Vegetation Type	Woodland Succession
2005	Annual Grass	NA
2010	Annual-Perennial Grass	NA
2013	Annual-Perennial Grass	NA
2017	Annual-Perennial Grass	NA
2022	Annual Grass	NA

**Site Notes**

A wildfire occurred in this area in July of 1997 and removed the Wyoming big sagebrush (*Artemisia tridentata ssp. wyomingensis*) component. The original seeding process failed due to lack of spring precipitation and extreme competition with existing cheatgrass (*Bromus tectorum*) (WRI Database, 2022).

**Soils**

**Table 23R-09.5 - Soil Analysis Data.** List of chemical and textural soil characteristics determined by laboratory analysis.

Texture	pH	%sand	%silt	%clay	%OM	PPM P	PPM K	ds/m	Sample Date
Sandy Loam	6.8	60.5	24.7	14.8	2.4	16.1	204.8	0.5	07/14/2005

**Site Potential**

1981 - 2010 Average Annual Precipitation                      9 inches  
 NRCS Ecological Site    Semidesert Gravelly Loam (Wyoming Big Sagebrush)  
 NRCS Ecological Site #    R028AY214UT  
 States and Transitions    No state and transition model is available for this ecological site.

When this site was established prior to treatment in 2005, the introduced annual grass cheatgrass (*Bromus tectorum*) was the dominant plant species, and it was co-dominant with the introduced perennial species crested wheatgrass (*Agropyron cristatum*) from 2010 to 2017. However, the cover of crested wheatgrass decreased in 2022, leaving cheatgrass as the sole dominant component. Annual forbs were moderately abundant in the understory before treatment and in 2022, but were rare in other post-treatment samplings. More specifically, the annual forbs contributing the most cover in 2022 were the weedy introduced species desert madwort (*Alyssum desertorum*) and redstem stork's bill (*Erodium cicutarium*) (Table 23R-09.7, Table 23R-09.10, Table 23R-09.11). The shrub layer has mainly consisted of two species throughout the duration of the study: forage kochia (*Bassia prostrata*) and fourwing saltbush (*Atriplex canescens*), the density and cover of which have exhibited an overall post-treatment increase (Table 23R-09.12, Table 23R-09.13).



**Trend Summary Tables**

**Table 23R-09.6 - Shrub/Tree Summary.** Average modified Daubenmire quadrat and line intercept cover by year for shrubs/trees

Year	Quadrat Cover (%)			Line-intercept Cover (%)		
	Preferred Shrub	Other Shrub	Tree	Preferred Shrub	Other Shrub	Tree
2005	1.2	-	-	2.1	-	-
2010	7.2	-	-	11.7	0.2	-
2013	6.8	0.0	-	7.7	-	-
2017	7.1	-	-	9.8	-	-
2022	10.2	-	-	10.1	-	-

**Table 23R-09.7 - Herbaceous Summary.** Nested frequency and average modified Daubenmire quadrat cover by year for herbaceous functional groups

Year	Nested Frequency				Quadrat Cover (%)			
	Annual Grass	Perennial Grass	Annual/Biennial Forb	Perennial Forb	Annual Grass	Perennial Grass	Annual/Biennial Forb	Perennial Forb
2005	413	209	366	22	15.3	6.8	8.6	0.4
2010	363	172	62	5	14.2	11.2	0.7	0.1
2013	414	215	4	-	15.3	10.6	0.0	-
2017	378	250	28	2	16.9	12.7	0.2	0.0
2022	457	113	144	-	25.5	4.1	3.3	-

**Table 23R-09.8 - Basic Ground Cover.** Average modified Daubenmire quadrat cover by year for basic ground cover types.

Year	Cover Type (%)					
	Bare Ground	Cryptogams	Litter	Pavement	Rock	Vegetation
2005	22.8	-	32.9	13.1	9.4	29.9
2010	24.6	0.1	23.3	20.8	10.2	33.3
2013	18.0	0.0	39.4	9.3	11.3	38.4
2017	14.8	0.1	32.4	24.9	12.4	35.9
2022	22.7	0.2	26.4	20.4	10.0	43.8

**Table 23R-09.9 - Pellet Group Data.** Quadrat frequency and pellet group transect data for animal pellets. Rabbit pellet groups are not sampled in the pellet group transect.

Year	Cattle	Mule Deer	Rocky Mountain Elk	Rabbit
	Quadrat Frequency			
2005	4	-	2	14
2010	7	-	-	2
2013	9	-	13	5
2017	8	1	-	6
2022	11	-	1	1
Year	Days Use Per Acre (ha)			
2005	16.0 (39.5)	2.0 (5.0)	2.7 (6.6)	-
2010	29.0 (71.7)	0.7 (1.7)	-	-
2013	25.4 (62.8)	-	17.4 (43.0)	-
2017	11.6 (28.7)	-	0.7 (1.7)	-
2022	41.4 (102.2)	3.4 (8.3)	0.7 (1.7)	-

**Table 23R-09.10 - Grass Species.** Nested frequency and modified Daubenmire average cover by year.

GRASS SPECIES	Achnatherum hymenoides (Indian ricegrass)	Agropyron cristatum <sup>i</sup> (crested wheatgrass)	Aristida purpurea (purple threeawn)	Bouteloua gracilis (blue grama)	Bromus tectorum <sup>ai</sup> (cheatgrass)	Elymus elymoides (squirreltail)	Poa secunda (Sandberg bluegrass)	Thinopyrum intermedium <sup>i</sup> (intermediate wheatgrass)
year	Nested Frequency							
2005	0	135	-	3	413	82	-	16
2010	-	157	-	-	363	24	3	4
2013	-	205	-	-	414	4	2	5
2017	-	247	1	-	378	1	1	4
2022	1	105	7	-	457	-	-	-
year	Average Cover (%)							
2005	0.0	4.8	-	0.0	15.3	1.3	-	0.7
2010	-	10.4	-	-	14.2	0.7	0.0	0.2
2013	-	9.8	-	-	15.3	0.4	0.0	0.4
2017	-	12.4	0.0	-	16.9	0.0	0.0	0.1
2022	0.1	3.9	0.0	-	25.5	-	-	-

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

**Table 23R-09.11 - Forb Species.** Nested frequency and modified Daubenmire average cover by year.

FORB SPECIES	Alyssum desertorum <sup>ai</sup> (desert madwort)	Amaranthus blitoides <sup>ai</sup> (mat amaranth)	Ceratocephala testiculata <sup>ai</sup> (curveseed butterwort)	Chamaesyce (sandmat)	Collinsia parviflora <sup>a</sup> (maiden blue eyed Mary)	Cryptantha (cryptantha)	Descurainia pinnata <sup>a</sup> (western tansymustard)	Draba <sup>a</sup> (draba)	Erodium cicutarium <sup>ai</sup> (redstem stork's bill)	Lactuca serriola <sup>ai</sup> (prickly lettuce)	Medicago sativa <sup>a</sup> (alfalfa)	Salsola tragus <sup>ai</sup> (prickly Russian thistle)	Sisymbrium altissimum <sup>ai</sup> (tall tumblemustard)	unknown annual forb <sup>a</sup> (unknown forb)
year	Nested Frequency													
2005	-	34	22	16	21	3	39	9	-	-	3	279	205	-
2010	-	-	-	5	-	-	5	-	-	2	-	34	0	32
2013	-	-	-	-	-	-	-	-	-	-	-	-	4	-
2017	-	-	-	-	-	2	-	2	26	-	-	-	-	-
2022	101	-	12	-	-	-	1	-	56	-	-	8	11	-
year	Average Cover (%)													
2005	-	0.2	0.1	0.0	0.1	0.0	0.1	0.0	-	-	0.4	1.5	6.6	-
2010	-	-	-	0.1	-	-	0.1	-	-	0.0	-	0.5	0.0	0.1
2013	-	-	-	-	-	-	-	-	-	-	-	-	0.0	-
2017	-	-	-	-	-	0.0	-	0.0	0.2	-	-	-	-	-
2022	1.5	-	0.0	-	-	-	0.0	-	1.3	-	-	0.2	0.3	-

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

**Table 23R-09.12 - Shrub and Tree Species.** Average modified Daubenmire quadrat and line intercept cover by year.

SHRUB SPECIES			
Atriplex canescens <sup>p</sup> (fourwing saltbush)			
Bassia prostrata <sup>pi</sup> (forage kochia)			
Opuntia polyacantha (plains pricklypear)			
year	Line Intercept Cover		
2005	0.9	1.2	-
2010	2.9	8.8	0.2
2013	3.7	4	-
2017	1.9	7.9	-
2022	1.8	8.3	-
year	Quadrat Cover (%)		
2005	0.6	0.6	-
2010	2.6	4.6	0.0
2013	1.9	4.9	0.0
2017	0.3	6.8	-
2022	0.5	9.7	-

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

**Table 23R-09.13 - Shrub/Tree Characteristics.** Population characteristics of shrub/tree species populations including density reproduction (seedlings), age distribution, utilization, vigor and average size (height/crown) of plants.

Year	Density		Age Class Distribution			Utilization		Poor Vigor (%)	Average Height Crown (cm)
	Plants Per Acre		Excluding Seedlings			Moderate (%)	Heavy (%)		
	Excluding Seedlings	Seedling	Young (%)	Mature (%)	Decadent (%)				
<b>Artemisia tridentata ssp. wyomingensis<sup>p</sup> -- (Wyoming big sagebrush)</b>									
2005	-	-	-	-	-	-	-	-	27/38
2010	-	-	-	-	-	-	-	-	44/59
2013	-	-	-	-	-	-	-	-	-/-
2017	-	-	-	-	-	-	-	-	34/86
2022	-	-	-	-	-	-	-	-	-/-
<b>Atriplex canescens<sup>p</sup> -- (fourwing saltbush)</b>									
2005	20	-	0	100	0	0	0	0	87/120
2010	60	20	0	100	0	0	0	0	97/164
2013	40	-	0	100	0	0	0	0	115/198
2017	40	-	0	100	0	0	0	0	77/143
2022	80	-	25	75	0	100	0	0	-/-
<b>Bassia prostrata<sup>pi</sup> -- (forage kochia)</b>									
2005	4000	11320	81	17	3	0	0	0	44/48
2010	3140	6720	14	86	0	0	0	0	57/86
2013	10100	540	41	59	0	25	0	42	28/47
2017	15080	400	51	49	1	39	12	0	23/37
2022	14380	89180	2	98	0	26	8	0	-/-
<b>Opuntia polyacantha -- (plains pricklypear)</b>									
2005	20	20	0	100	0	0	0	100	16/56
2010	80	-	0	100	0	0	0	0	16/67
2013	40	-	0	50	50	0	0	50	10/30
2017	-	-	-	-	-	-	-	-	11/15
2022	-	-	-	-	-	-	-	-	-/-

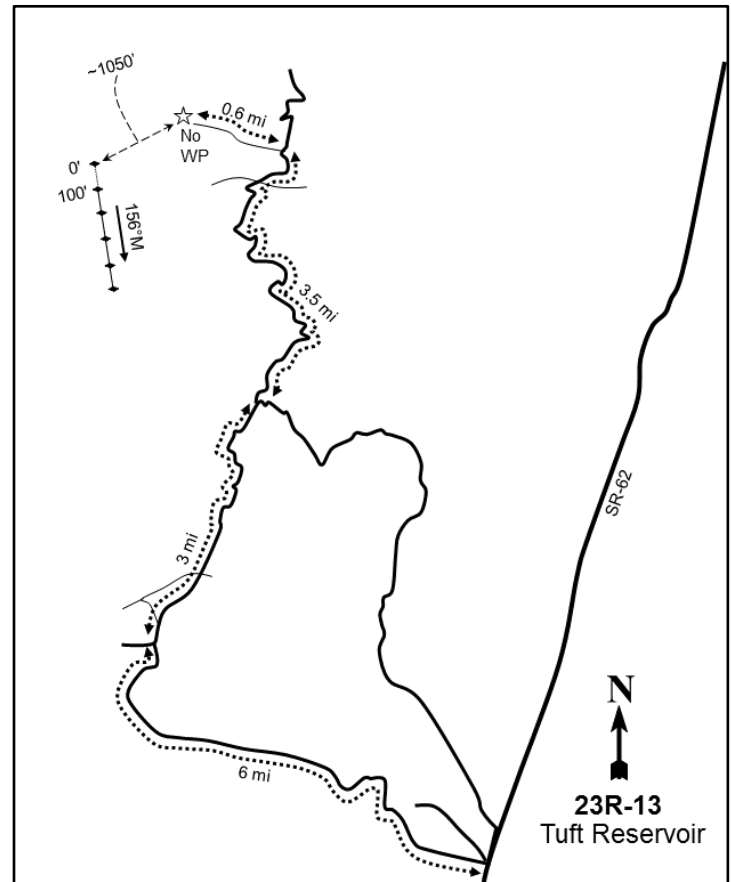
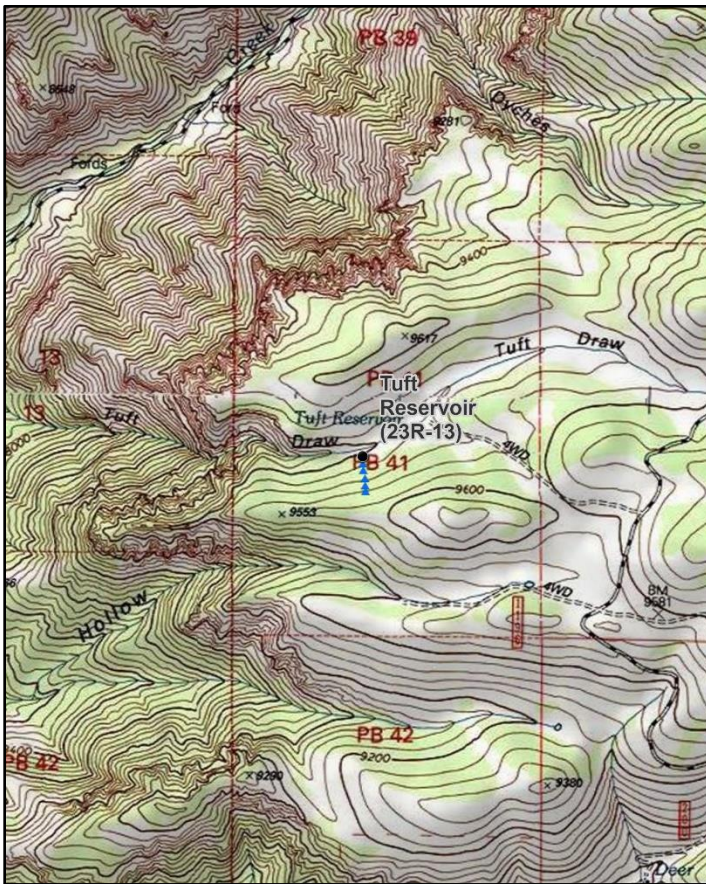
Year	Density		Age Class Distribution			Utilization		Poor Vigor (%)	Average Height Crown (cm)
	Plants Per Acre		Excluding Seedlings			Moderate (%)	Heavy (%)		
	Excluding Seedlings	Seedling	Young (%)	Mature (%)	Decadent (%)				
Pediocactus simpsonii -- (mountain ball cactus)									
2005	-	-	-	-	-	-	-	-	-/-
2010	-	-	-	-	-	-	-	-	-/-
2013	-	-	-	-	-	-	-	-	-/-
2017	-	-	-	-	-	-	-	-	-/-
2022	20	-	0	100	0	0	0	0	- / -

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

**Table 23R-09.15 - Deer Desirable Components Index: Semidesert 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
2005	2.9	0.0	0.0	13.6	-11.5	0.8	0.0	5.9	Very Poor
2010	16.8	15.0	5.3	22.4	-10.6	0.1	0.0	49.0	Good
2013	10.6	15.0	10.5	21.2	-11.5	0.0	0.0	45.8	Fair-Good
2017	14.2	14.8	15.0	25.4	-12.7	0.0	0.0	56.8	Good
2022	14.7	14.9	3.1	8.2	-19.2	0.0	0.0	21.8	Poor

## TUFT RESERVOIR - STUDY NO. 23R-13

**Location Information**

USGS 7.5 min Map Info  
GPS (0' Stake)

Malmsten Peak NE; Township 28S, Range 2W, Section 41  
NAD 83 UTM ZONE 12, 407789 East 4247704 North

**Transect Information**

Browse Tag # (0' Stake)	559
Transect Bearing	156° magnetic
Length	500ft
Belt Placement	Line 1 (11ft), Line 2 (34ft), Line 3 (59ft), Line 4 (71ft), Line 5 (95ft)
Belt Marker Placement	Standard

**Directions to Site**

Traveling south on SR-62, turn right (east) onto Pole Canyon Road. Continue on this road for 6 miles to a 'T' junction, then turn right (north) onto Forshea Monroe Mountain Road. Proceed for 3 miles to a fork and stay left to continue onto Langdon Monroe Mountain Road (the right fork, Rock Canyon Road, leads back to SR-62). Travel for 3.5 miles, then turn left (west) onto a minor road. Continue for 0.6 miles and park; there is no witness post. The transect is approximately 1050 feet west of the road.

**Site Information**

Land Ownership	Federal
Land Administrator	USFS
Allotment	Dry Lake Allotment
Elevation	No data
Aspect	North
Slope	20-25%
Sample Dates	07/31/2018, 08/09/2022

**Table 23R-13.1 Disturbance History.** Recorded history of major disturbances.

Treatment/Disturbance	Name	WRI DB#	Date	Size (acres)
Fire - Prescribed	Monroe Mountain Aspen Ecosystems Restoration Project Phase 3	4396	May 2018	4611

**Wildlife Habitat and Vegetation History****Table 23R-13.3 - Wildlife Seasonal Habitat.** DWR wildlife habitat and seasonality.

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

**Table 23R-13.4 - Vegetation History.** The dominant vegetation type(s) and phase of woodland succession (Tausch, Miller, Roundy, & Chambers, 2009).

Year	Vegetation Type	Woodland Succession
2018	Perennial Forb	NA
2022	Aspen/Perennial Forb	NA

**Site Notes**

No Notes

**Site Potential**

1981 - 2010 Average Annual Precipitation	23 inches
NRCS Ecological Site	High Mountain Loam (Aspen)
NRCS Ecological Site #	R047XB508UT
States and Transitions	No state and transition model is available for this ecological site.

This study site was established in 2018 soon after a prescribed burn (Table 23R-13.1). Vegetation cover in general was low, with the perennial forb common dandelion (*Taraxacum officinale*) contributing the most cover of any single species in 2018. However, the community is transitioning from a forb dominated state to one that is dominated by quaking aspen (*Populus tremuloides*) as of 2022 (Table 23R-13.7, Table 23R-13.11). The shrub component was sparse and mainly dominated by grayleaf red raspberry (*Rubus idaeus* ssp. *strigosus*) and creeping barberry (*Mahonia repens*) immediately following the fire, but in 2022 these shrubs, along with Woods' rose (*Rosa woodsii*), became a major contributor to community composition (Table 23R-13.12, Table 23R-13.13). Quaking aspen was beginning to regenerate after the burn, with all of the plants considered to be either Class I or Class II in 2018, which then transitioned to larger Class II and Class III trees in 2022 (Table 23R-13.13a). In 2018, one-third of the aspen plants exhibited heavy utilization, but under a fifth of the aspen population received moderate utilization and 1% received heavy utilization in 2022 (Table 23R-13.13); sustained heavy browsing may affect long-term establishment of the aspen stand.

## Trend Summary Tables

**Table 23R-13.6 - Shrub/Tree Summary.** Average modified Daubenmire quadrat and line intercept cover by year for shrubs/trees

Year	Quadrat Cover (%)			Line-intercept Cover (%)		
	Preferred Shrub	Other Shrub	Tree	Preferred Shrub	Other Shrub	Tree
2018	0.4	2.3	0.2	0.3	1.7	0.5
2022	4.9	11.7	8.3	8.0	16.0	17.3

**Table 23R-13.7 - Herbaceous Summary.** Nested frequency and average modified Daubenmire quadrat cover by year for herbaceous functional groups

Year	Nested Frequency				Quadrat Cover (%)			
	Annual Grass	Perennial Grass	Annual/Biennial Forb	Perennial Forb	Annual Grass	Perennial Grass	Annual/Biennial Forb	Perennial Forb
2018	-	26	3	91	-	0.4	0.0	3.5
2022	3	40	100	140	0.0	1.4	1.6	5.9

**Table 23R-13.8 - Basic Ground Cover.** Average modified Daubenmire quadrat cover by year for basic ground cover types.

Year	Cover Type (%)					
	Bare Ground	Cryptogams	Litter	Pavement	Rock	Vegetation
2018	42.3	0.4	48.9	1.6	19.6	6.2
2022	34.0	0.0	38.4	2.8	20.0	31.7

**Table 23R-13.9 - Pellet Group Data.** Quadrat frequency and pellet group transect data for animal pellets. Rabbit pellet groups are not sampled in the pellet group transect.

Year	Cattle	Mule Deer	Rocky Mountain Elk	Rabbit
	Quadrat Frequency			
2018	-	-	-	-
2022	1	9	13	1
Days Use Per Acre (ha)				
2018	0.7 (1.8)	-	4.0 (9.9)	-
2022	3.6 (9.0)	6.7 (16.6)	24.1 (59.6)	-

**Table 23R-13.10 - Grass Species.** Nested frequency and modified Daubenmire average cover by year.

GRASS SPECIES	Achnatherum nelsonii (Columbia needlegrass)	Bromus tectorum <sup>ai</sup> (cheatgrass)	Carex rossii (Ross' sedge)	Elymus trachycaulus (slender wheatgrass)	Hesperostipa comata (needle and thread)	Thinopyrum intermedium <sup>i</sup> (intermediate wheatgrass)
year	Nested Frequency					
2018	11	-	15	2	-	3
2022	17	3	8	4	12	0
year	Average Cover (%)					
2018	0.2	-	0.2	0.0	-	0.0
2022	0.5	0.0	0.5	0.2	0.2	0.0

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



**Table 23R-13.11 - Forb Species.** Nested frequency and modified Daubenmire average cover by year.

FORB SPECIES	Achillea millefolium (Common yarrow)	Androsace septentrionalis <sup>a</sup> (pygmyflower rockjasmine)	Aquilegia coerulea (Colorado blue columbine)	Arnica cordifolia (heartleaf arnica)	Chamerion angustifolium (fireweed)	Chenopodium atrovirens <sup>a</sup> (pinyon goosefoot)	Corydalis aurea <sup>a</sup> (scrambled eggs)	Cryptantha (cryptantha)	Descurainia californica <sup>a</sup> (Sierra tansymustard)	Erigeron speciosus (aspen fleabane)	Gayophytum ramosissimum <sup>a</sup> (pinyon groundsmoke)	Penstemon (beardtongue)	Penstemon watsonii (Watson's penstemon)	Polygonum douglasii <sup>a</sup> (Douglas' knotweed)	Senecio integerrimus <sup>a</sup> (lambstongue ragwort)	Taraxacum officinale (common dandelion)
year	Nested Frequency															
2018	7	-	4	27	15	-	1	-	-	-	-	-	-	-	2	58
2022	17	3	-	33	18	59	12	1	5	23	17	16	4	6	3	63
year	Average Cover (%)															
2018	0.0	-	0.0	0.6	0.4	-	0.0	-	-	-	-	-	-	-	0.0	2.5
2022	0.1	0.1	-	0.5	0.5	1.0	0.2	0.0	0.0	1.2	0.1	0.6	0.1	0.0	0.1	2.7

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

**Table 23R-13.12 - Shrub and Tree Species.** Average modified Daubenmire quadrat and line intercept cover by year.

SHRUB SPECIES	Artemisia tridentata ssp. vaseyana <sup>p</sup> (mountain big sagebrush)	Chrysothamnus viscidiflorus ssp. viscidiflorus var. stenophyllus (yellow rabbitbrush)	Ericameria nauseosa (rubber rabbitbrush)	Mahonia repens (creeping barberry)	Populus tremuloides <sup>t</sup> (quaking aspen)	Purshia tridentata <sup>p</sup> (antelope bitterbrush)	Ribes cereum <sup>p</sup> (wax currant)	Rosa woodsii <sup>p</sup> (Woods' rose)	Rubus idaeus ssp. strigosus (grayleaf red raspberry)
year	Line Intercept Cover (%)								
2018	-	-	-	0.5	0.5	-	-	0.3	1.2
2022	0.4	0.4	0.1	3.2	17.3	-	0.5	7.1	12.3
year	Quadrat Cover (%)								
2018	-	-	-	0.7	0.2	-	-	0.4	1.6
2022	0.0	0.1	0.0	3.3	8.3	0.2	0.3	4.4	8.3

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

**Table 23R-13.13 - Shrub/Tree Characteristics.** Population characteristics of shrub/tree species populations including density reproduction (seedlings), age distribution, utilization, vigor and average size (height/crown) of plants.

Year	Density		Age Class Distribution			Utilization		Poor Vigor (%)	Average Height Crown (cm)
	Plants Per Acre		Excluding Seedlings			Moderate (%)	Heavy (%)		
	Excluding Seedlings	Seedling	Young (%)	Mature (%)	Decadent (%)				
Artemisia tridentata ssp. vaseyana <sup>p</sup> -- (mountain big sagebrush)									
2018	-	-	-	-	-	-	-	-	-/-
2022	140	-	0	100	0	0	0	0	-/-
Chrysothamnus viscidiflorus ssp. viscidiflorus var. stenophyllus -- (yellow rabbitbrush)									
2018	-	-	-	-	-	-	-	-	-/-
2022	60	-	0	100	0	0	0	0	-/-
Ericameria nauseosa -- (rubber rabbitbrush)									
2018	-	-	-	-	-	-	-	-	-/-
2022	240	20	58	33	8	0	0	8	-/-

Year	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>Mahonia repens -- (creeping barberry)</b>									
2018	3100	-	18	82	0	0	0	0	8/13
2022	9680	-	1	99	0	0	0	0	- / -
<b>Pseudotsuga menziesii<sup>i</sup> -- (Douglas-fir)</b>									
2018	20	-	0	100	0	0	0	0	- / -
2022	-	-	-	-	-	-	-	-	- / -
<b>Purshia tridentata<sup>p</sup> -- (antelope bitterbrush)</b>									
2018	-	-	-	-	-	-	-	-	- / -
2022	60	-	100	0	0	0	0	0	- / -
<b>Ribes cereum<sup>p</sup> -- (wax currant)</b>									
2018	20	-	100	0	0	0	0	0	27/29
2022	200	-	10	90	0	0	0	0	- / -
<b>Rosa woodsii<sup>p</sup> -- (Woods' rose)</b>									
2018	760	-	90	11	0	63	0	0	19/17
2022	1680	20	6	94	0	24	1	1	- / -
<b>Rubus idaeus ssp. strigosus -- (grayleaf red raspberry)</b>									
2018	1920	5240	89	12	0	12	23	0	13/16
2022	11560	-	23	78	0	23	1	0	- / -
<b>Symphoricarpos oreophilus<sup>p</sup> -- (mountain snowberry)</b>									
2018	-	-	-	-	-	-	-	-	17/21
2022	20	-	0	100	0	0	0	0	- / -

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

**Table 23R-13.13a - Aspen Characteristics.** Characteristics of aspen populations including density, size class distribution, and vigor of plants.

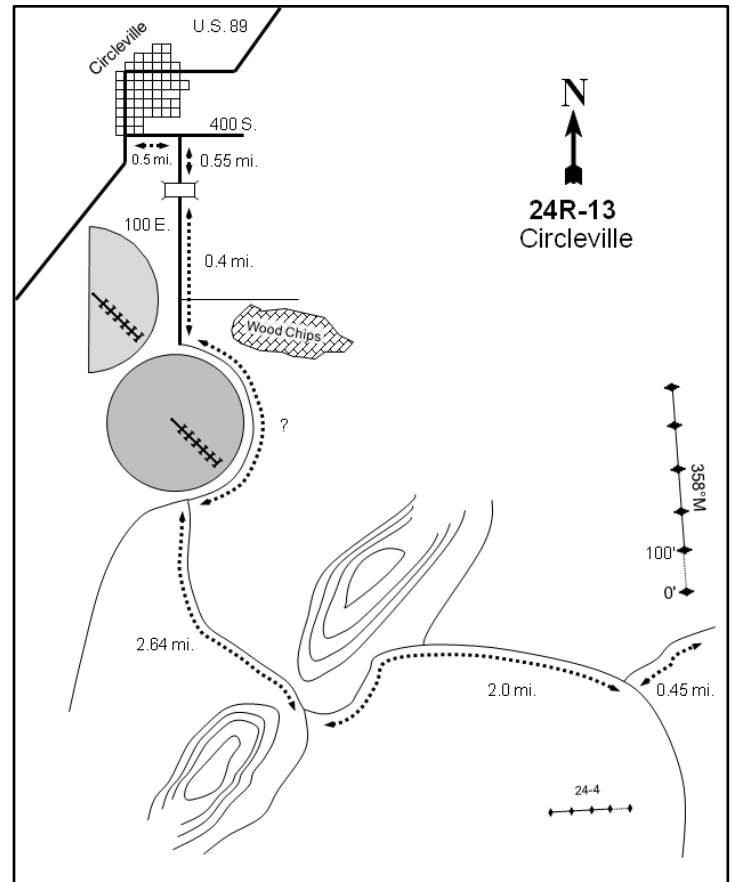
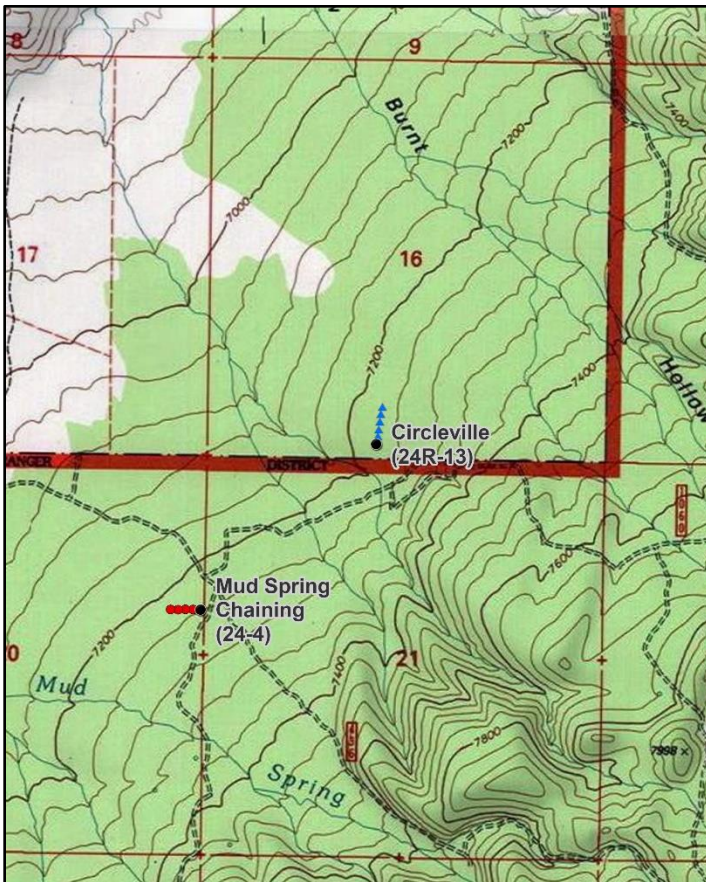
Year	Density	Size Class Distribution				Utilization		Poor Vigor (%)
	Plants per Acre	Class I (%)	Class II (%)	Class III (%)	Class IV (%)	Moderate (%)	Heavy (%)	
<b>Populus tremuloides (quaking aspen)</b>								
2018	1000	84	16	-	-	0	38	0
2022	2460	2	80	18	-	17	1	1

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 23R-13.14 - Tree Characteristics.** Point-quarter tree density, size class distribution, and average diameter.

Year	Density	Size Class Distribution					Average Diameter (cm)
	Trees per Acre	Seedling (%)	1-4' (%)	4-8' (%)	8-12' (%)	>12' (%)	
<b>Populus tremuloides (quaking aspen)</b>							
2018	326	100	-	-	-	-	0.7
2022	500	-	84	16	-	-	2.5

## CIRCLEVILLE - STUDY NO. 24R-13

**Location Information**

USGS 7.5 min Map Info  
GPS (0' Stake)

Mount Dutton NW; Township 31S, Range 3W, Section 16  
NAD 83 UTM ZONE 12, 394485 East 4218701 North

**Transect Information**

Browse Tag # (0' Stake)	583
Transect Bearing	0° magnetic
Length	500ft
Belt Placement	Line 1 (11ft), Line 2 (34ft), Line 3 (71ft), Line 4 (59ft), Line 5 (95ft)
Belt Marker Placement	Belt 3: 1ft

**Directions to Site**

Traveling south on US-89 in Circleville, turn left (east) onto 400 South. Drive for 0.5 miles and turn right (south) onto 100 East. After 0.55 miles there will be a bridge: continue for another 0.4 miles. At this point the road will curve around a center pivot field; about halfway around the field there will be a road that heads south. Take this road and drive for 2.64 miles at which point the road will fork. Take the left fork and drive for 2 miles. Then take the road to the left and drive for 0.45 miles. The transect will be to the left (north) of the road.

**Site Information**

Land Ownership	State
Land Administrator	SITLA
Allotment	No data
Elevation	7,273ft (2,217m)
Aspect	West
Slope	5%
Sample Dates	07/29/2013, 08/17/2016, 07/27/2022

**Table 24R-13.1 Disturbance History.** Recorded history of major disturbances.

Treatment/Disturbance	Name	WRI DB#	Date	Size (acres)
Seeding - Dribbler Before	Circleville Vegetation Enhancement	2706	October 2013	459
Seeding - Aerial After	Circleville Vegetation Enhancement	2706	February 2014	459
Chaining - Two-Way Ely	Circleville Vegetation Enhancement	2706	October 2013	459
Seeding - Aerial Before	Circleville Vegetation Enhancement	2706	October 2013	459

**Table 24R-13.2 Seed Mix.** List of known seeded plant species and rates (if available).

Mix Name			Application Type	Application Date	Acres
Circleville Chaining			Aerial	Oct 2013	460
Type	Species	Common Name	Cultivar/Source ID	Bulk lbs/acre	PLS
G	Achnatherum hymenoides	Indian Ricegrass	Rimrock	2.07	1.92
G	Agropyron fragile	Siberian Wheatgrass	Vavilov	1.96	1.62
G	Elymus wawawaiensis	Snake River Wheatgrass	Secar	0.98	0.91
G	Elymus wawawaiensis	Snake River Wheatgrass	Secar	0.54	0.47
G	Leymus cinereus	Great Basin Wildrye	DWR IntMtn Tetra	0.87	0.74
G	Thinopyrum intermedium	Intermediate Wheatgrass	Clarke	1.30	0.81
F	Astragalus cicer	Cicer Milkvetch	Lutana	0.98	0.94
F	Linum perenne	Blue Flax	Appar	0.54	0.47
F	Medicago sativa	Alfalfa	Ranger	2.07	1.86
F	Sanguisorba minor	Small Burnet	Delar	2.07	1.87

Mix Name			Application Type	Application Date	Acres
Circleville Chaining Secondary			Aerial	Feb 2014	460
Type	Species	Common Name	Cultivar/Source ID	Bulk lbs/acre	PLS
F	Medicago sativa	Alfalfa	Ranger (NC)	0.33	0.31
S	Artemisia tridentata ssp. wyomingensis	Wyoming Big Sagebrush	Piute UT	0.35	0.10
S	Bassia prostrata	Forage Kochia	Beaver UT	0.49	0.30
S	Bassia prostrata	Forage Kochia	Snowstorm	0.22	0.12

**Wildlife Habitat and Vegetation History****Table 24R-13.3 - Wildlife Seasonal Habitat.** DWR wildlife habitat and seasonality.

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

**Table 24R-13.4 - Vegetation History.** The dominant vegetation type(s) and phase of woodland succession (Tausch, Miller, Roundy, & Chambers, 2009).

Year	Vegetation Type	Woodland Succession
2013	Pinyon-Juniper	Phase III
2016	Perennial Grass	Phase I
2022	Perennial Grass/Mixed Shrub	Phase I

**Site Notes**

There are a lot of flow patterns and soil movement on this site. In addition, there are many large rocks holding the surface relatively stable. A small number of other active gullies are in the area.

**Site Potential**

1981 - 2010 Average Annual Precipitation	13 inches
NRCS Ecological Site	Upland Stony Loam (Mountain Big Sagebrush)
NRCS Ecological Site #	R047XB336UT
States and Transitions	No state and transition model is available for this ecological site.

When this study site was established in 2013, it was a twoneedle pinyon (*Pinus edulis*) and Utah juniper (*Juniperus osteosperma*) woodland that was considered to be in Phase III of woodland succession (Table 24R-13.4). Other browse cover was minimal and was mainly contributed by mountain big sagebrush (*Artemisia tridentata* ssp. *vaseyana*) (Table 24R-13.12). A chaining and seeding treatment (Table 24R-13.1) removed most of the pinyon and juniper, causing the site to transition to one dominated by a mix of seeded perennial grass species (Table 24R-13.2, Table 24R-13.7, Table 24R-13.10). Sagebrush and other shrub species increased in cover following the treatment. Juniper seedlings and a few mature trees remained present, indicating that this site has the potential to be infilled in the future (Table 24R-13.12, Table 24R-13.13, Table 24R-13.14).

**Trend Summary Tables****Table 24R-13.6 - Shrub/Tree Summary.** Average modified Daubenmire quadrat and line intercept cover by year for shrubs/trees

Year	Quadrat Cover (%)			Line-intercept Cover (%)		
	Preferred Shrub	Other Shrub	Tree	Preferred Shrub	Other Shrub	Tree
2013	0.3	0.3	11.8	1.1	0.2	34.9
2016	1.2	0.6	0.2	0.2	1.4	0.4
2022	2.6	1.3	-	3.5	1.6	0.3

**Table 24R-13.7 - Herbaceous Summary.** Nested frequency and average modified Daubenmire quadrat cover by year for herbaceous functional groups

Year	Nested Frequency				Quadrat Cover (%)			
	Annual Grass	Perennial Grass	Annual/Biennial Forb	Perennial Forb	Annual Grass	Perennial Grass	Annual/Biennial Forb	Perennial Forb
2013	-	114	5	63	-	1.7	0.0	0.2
2016	8	313	34	110	0.0	12.5	0.5	2.0
2022	5	293	49	28	0.1	9.3	0.3	0.3

**Table 24R-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
2013	9.7	1.5	51.2	13.6	17.0	14.4
2016	27.7	0.0	46.0	5.9	16.2	17.5
2022	33.5	0.7	44.4	14.1	20.7	15.2

**Table 24R-13.9 - Pellet Group Data.** Quadrat frequency and pellet group transect data for animal pellets. Rabbit pellet groups are not sampled in the pellet group transect.

Year	Cattle	Mule Deer	Rocky Mountain Elk	Rabbit
	Quadrat Frequency			
2013	-	-	2	2
2016	7	5	3	37
2022	1	2	6	9
Year	Days Use Per Acre (ha)			
2013	-	0.7 (1.7)	2.0 (5.0)	-
2016	18.1 (44.8)	-	8.7 (21.5)	-
2022	8.0 (19.7)	-	6.7 (16.6)	-

**Table 24R-13.10 - Grass Species.** Nested frequency and modified Daubenmire average cover by year.

GRASS SPECIES	Achnatherum hymenoides (Indian ricegrass)	Achnatherum lettermanii (Letterman's needlegrass)	Agropyron cristatum <sup>i</sup> (crested wheatgrass)	Bouteloua gracilis (blue grama)	Bromus tectorum <sup>ai</sup> (cheatgrass)	Elymus elymoides (squirreltail)	Koeleria macrantha (prairie Junegrass)	Leymus cinereus (basin wildrye)	Psathyrostachys juncea <sup>i</sup> (Russian wildrye)	Pseudoroegneria spicata (bluebunch wheatgrass)	Thinopyrum intermedium <sup>i</sup> (intermediate wheatgrass)
year	Nested Frequency										
2013	4	26	-	38	-	56	1	-	-	-	-
2016	119	5	110	41	8	121	27	4	21	3	11
2022	87	-	192	25	5	68	66	5	5	-	5
year	Average Cover (%)										
2013	0.2	0.4	-	0.8	-	0.4	0.0	-	-	-	-
2016	2.9	0.0	4.1	1.5	0.0	2.4	0.7	0.0	0.3	0.0	0.5
2022	1.9	-	5.4	0.2	0.1	0.7	1.0	0.0	0.1	-	0.0

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

**Table 24R-13.11 - Forb Species.** Nested frequency and modified Daubenmire average cover by year.

FORB SPECIES	Antennaria microphylla (littleleaf pussytoes)	Arabis (rockcross)	Astragalus lentiginosus (freckled milkvetch)	Chaenactis douglasii (Douglas' dustymaiden)	Cryptantha (cryptantha)	Descurainia pinnata <sup>a</sup> (western tansymustard)	Erigeron pumilus (shaggy fleabane)	Hymenopappus filifolius (fineleaf hymenopappus)	Ipomopsis aggregata (scarlet gilia)	Lactuca scariola <sup>ai</sup> (prickly lettuce)	Lappula occidentalis <sup>ai</sup> (flatspine stickseed)	Linum perenne <sup>i</sup> (blue flax)	Medicago sativa <sup>i</sup> (alfalfa)	Nicotiana attenuata <sup>a</sup> (coyote tobacco)	Penstemon (beardtongue)	Salsola tragus <sup>ai</sup> (prickly Russian thistle)	Sanguisorba minor <sup>i</sup> (small burnet)
year	Nested Frequency																
2013	-	53	-	2	1	5	-	-	8	-	-	-	-	-	1	-	-
2016	1	-	4	-	3	6	3	9	-	12	1	94	7	6	-	5	3
2022	-	5	4	12	2	29	1	-	7	3	15	-	-	-	-	3	-
year	Average Cover (%)																
2013	-	0.1	-	0.0	0.0	0.0	-	-	0.0	-	-	-	-	-	0.0	-	-
2016	0.0	-	0.0	-	0.0	0.1	0.0	0.4	-	0.0	0.0	1.4	0.0	0.3	-	0.0	0.0
2022	-	0.0	0.2	0.0	0.0	0.1	0.0	-	0.0	0.0	0.0	-	-	-	-	0.2	-

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

FORB SPECIES	Nested Frequency		
<i>Sisymbrium altissimum</i> <sup>ai</sup> (tall tumblemustard)	-	-	-
<i>Solanum triflorum</i> <sup>a</sup> (cutleaf nightshade)	1	1	3
<i>Tragopogon dubius</i> <sup>ai</sup> (yellow salsify)	2	1	-
year	Average Cover (%)		
2013	-	-	-
2016	0.0	0.0	0.1
2022	0.0	0.0	-

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

**Table 24R-13.12 - Shrub and Tree Species.** Average modified Daubenmire quadrat and line intercept cover by year.

SHRUB SPECIES	Line Intercept Cover (%)							
<i>Artemisia tridentata</i> ssp. <i>vaseyana</i> <sup>p</sup> (mountain big sagebrush)	1.1	-	-	0.2	10.4	-	-	24.5
<i>Bassia prostrata</i> <sup>ai</sup> (forage kochia)	0.2	0	-	1.4	0.4	-	-	-
<i>Ericameria nauseosa</i> (rubber rabbitbrush)	3.5	-	1.5	0.1	0.3	-	-	-
<i>Gutierrezia sarothrae</i> (broom snakeweed)	Quadrat Cover (%)							
<i>Juniperus osteosperma</i> <sup>t</sup> (Utah juniper)	0.3	-	-	0.3	1.1	-	0.0	10.7
<i>Opuntia</i> (pricklypear)	1.0	0.3	0.2	0.4	0.2	0.0	-	-
<i>Pediocactus simpsonii</i> (mountain ball cactus)	2.5	0.2	1.3	0.1	0.0	0.0	0.0	-
<i>Pinus edulis</i> <sup>t</sup> (twoneedle pinyon)								

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

**Table 24R-13.13 - Shrub/Tree Characteristics.** Population characteristics of shrub/tree species populations including density reproduction (seedlings), age distribution, utilization, vigor and average size (height/crown) of plants.

Year	Density		Age Class Distribution			Utilization		Poor Vigor (%)	Average Height Crown (cm)
	Plants Per Acre		Excluding Seedlings			Moderate (%)	Heavy (%)		
	Excluding Seedlings	Seedling	Young (%)	Mature (%)	Decadent (%)				
<b>Artemisia tridentata</b> ssp. <i>vaseyana</i> <sup>p</sup> -- (mountain big sagebrush)									
2013	380	240	11	90	0	11	0	0	53/70
2016	340	100	29	71	0	0	0	0	44/69
2022	880	60	43	52	5	23	14	5	- / -
<b>Bassia prostrata</b> <sup>pi</sup> -- (forage kochia)									
2013	-	-	-	-	-	-	-	-	- / -
2016	640	20	28	72	0	16	31	0	10/17
2022	640	20	16	84	0	3	41	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>Cercocarpus ledifolius<sup>p</sup> -- (curl-leaf mountain mahogany)</b>									
2013	-	-	-	-	-	-	-	-	-/-
2016	-	-	-	-	-	-	-	-	84/93
2022	-	-	-	-	-	-	-	-	-/-
<b>Chrysothamnus viscidiflorus ssp. viscidiflorus var. viscidiflorus -- (yellow rabbitbrush)</b>									
2013	-	-	-	-	-	-	-	-	-/-
2016	-	-	-	-	-	-	-	-	28/40
2022	-	-	-	-	-	-	-	-	-/-
<b>Ericameria nauseosa -- (rubber rabbitbrush)</b>									
2013	-	-	-	-	-	-	-	-	-/-
2016	20	20	0	100	0	0	0	0	54/71
2022	720	1300	8	92	0	0	0	3	- / -
<b>Gutierrezia sarothrae -- (broom snakeweed)</b>									
2013	340	-	35	65	0	0	0	0	19/19
2016	400	-	10	90	0	0	0	0	28/43
2022	340	1120	77	24	0	0	0	0	- / -
<b>Juniperus osteosperma<sup>t</sup> -- (Utah juniper)</b>									
2013	80	-	25	75	0	0	0	0	- / -
2016	80	120	75	0	25	0	0	25	- / -
2022	120	-	83	0	17	0	0	17	- / -
<b>Krascheninnikovia lanata<sup>p</sup> -- (winterfat)</b>									
2013	-	-	-	-	-	-	-	-	-/-
2016	-	-	-	-	-	-	-	-	-/-
2022	20	-	100	0	0	0	100	0	- / -
<b>Opuntia -- (pricklypear)</b>									
2013	20	-	0	100	0	0	0	0	10/22
2016	20	-	0	100	0	0	0	0	15/31
2022	20	20	0	100	0	0	0	0	- / -
<b>Pediocactus simpsonii -- (mountain ball cactus)</b>									
2013	40	-	0	100	0	0	0	0	3/5
2016	-	-	-	-	-	-	-	-	-/-
2022	20	-	0	100	0	0	0	0	- / -
<b>Pinus edulis<sup>t</sup> -- (twoneedle pinyon)</b>									
2013	460	60	30	65	4	0	0	4	- / -
2016	-	-	-	-	-	-	-	-	-/-
2022	20	-	100	0	0	0	0	0	- / -
<b>Purshia tridentata<sup>p</sup> -- (antelope bitterbrush)</b>									
2013	-	-	-	-	-	-	-	-	-/-
2016	-	-	-	-	-	-	-	-	46/62
2022	-	-	-	-	-	-	-	-	-/-
<b>Yucca -- (yucca)</b>									
2013	-	-	-	-	-	-	-	-	22/28

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

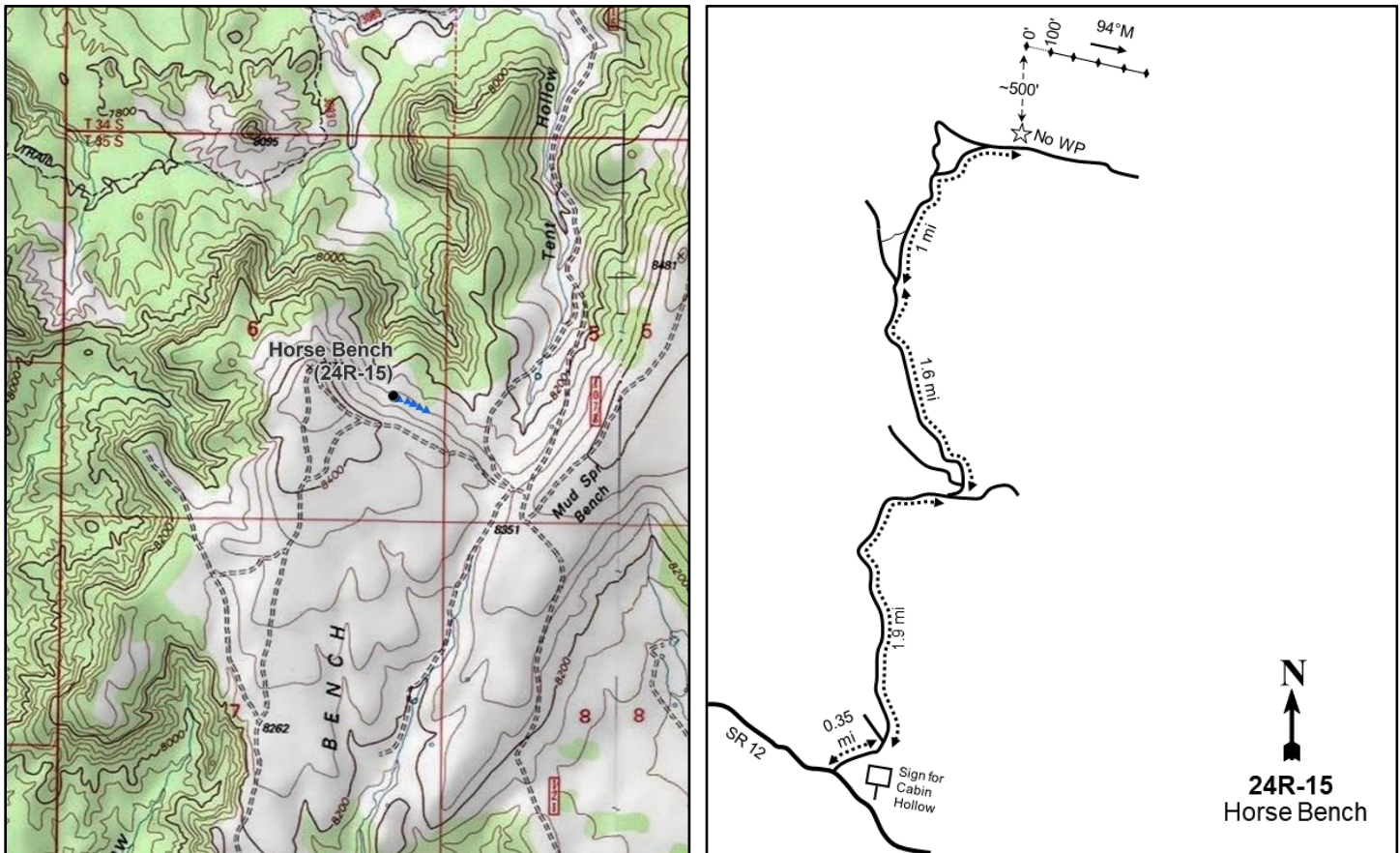
**Table 24R-13.14 - Tree Characteristics.** Point-quarter tree density, size class distribution, and average diameter.

Year	Density	Size Class Distribution					Average Diameter (cm)
	Trees per Acre	Seedling (%)	1-4' (%)	4-8' (%)	8-12' (%)	>12' (%)	
<b>Juniperus osteosperma (Utah juniper)</b>							
2013	56	17	17	6	11	50	28.4
2016	119	70	15	15	-	-	2.5
2022	175	68	26	5	-	-	1.2
<b>Pinus edulis (twoneedle pinyon)</b>							
2013	182	5	5	5	20	65	24.9
2016	13	50	50	-	-	-	2.3
2022	14	11	89	-	-	-	2.0

**Table 24R-13.15 - Deer Desirable Components Index: Upland Potential Scale.**

Year	Preferred Browse Cover	Preferred Browse Decadence	Preferred Browse Young	Perennial Grass Cover	Annual Grass Cover	Perennial Forb Cover	Noxious Weeds	Total Score	Ranking
2013	1.4	0.0	0.0	3.5	0.0	0.4	0.0	5.3	Very Poor
2016	0.3	0.0	0.0	25.1	0.0	4.0	0.0	29.3	Very Poor
2022	4.4	0.0	0.0	18.6	-0.1	0.6	0.0	23.5	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 and the 0-foot baseline stake is marked with browse tag #80.

**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, 08/10/2022

**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	4993	August-October 2019	895

**Wildlife Habitat and Vegetation History****Table 24R-15.3 - Wildlife Seasonal Habitat.** DWR 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
2022	Ponderosa Pine/Mixed Shrub	Phase I

**Site Notes**

No Notes

**Site Potential**

1981 - 2010 Average Annual Precipitation	18 inches
NRCS Ecological Site	Mountain Gravelly Loam (Ponderosa Pine)
NRCS Ecological Site #	R047XB412UT
States and Transitions	No state and transition model is available for this ecological site.

Since establishment in 2019, this site has been 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 (*A. tridentata* ssp. *vaseyana*), among others. Other conifers such as white fir (*Abies concolor*) and Rocky Mountain juniper (*Juniperus scopulorum*) have also been present in low amounts (Table 24R-15.12, Table 24R-15.13, Table 24R-15.14). However, when the study was established, it and surrounding area had been very recently treated by a bullhog (Photos, Table 24R-15.1) suggesting that conifer density was higher in the weeks leading up to study establishment. The herbaceous understory has remained 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).

**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
2022	24.7	2.0	0.9	29.4	2.3	24.7

**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
2022	-	252	-	132	-	7.8	-	1.8

**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
2022	12.3	1.7	70.2	3.0	6.4	34.8

**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
2022	1	15	3	1
Year	Days Use Per Acre (ha)			
2019	1.5 (3.6)	24.1 (59.6)	2.0 (5.0)	-
2022	2.9 (7.2)	20.8 (51.3)	1.3 (3.3)	-

**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
2022	69	34	-	22	4	183	-	-
year	Average Cover (%)							
2019	1.2	0.9	0.3	0.6	0.0	1.2	0.1	0.0
2022	1.5	0.4	-	0.5	0.2	5.2	-	-

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)	Arabis (rockcress)	Artemisia carruthii (Carruth's sagewort)	Astragalus convallarius (lesser rushy milkvetch)	Astragalus newberryi (Newberry's 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)	Erigeron racemosus (redroot buckwheat)	Erigeron umbellatum (sulphur-flower buckwheat)	Hymenoxys richardsonii (pingue rubberweed)	Lotus utahensis (Utah bird's-foot trefoil)	
year	Nested Frequency																	
2019	6	1	-	-	22	-	3	1	3	53	3	7	2	48	-	6	3	
2022	7	10	6	0	10	3	-	1	2	-	-	37	8	24	1	1	3	
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	
2022	0.2	0.1	0.0	0.0	0.1	0.0	-	0.0	0.0	-	-	0.1	0.0	0.1	0.0	0.0	0.0	

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

FORB SPECIES	Lupinus (lupine)	Lupinus argenteus (silvery lupine)	Packera multilobata (lobeleaf groundsel)	Penstemon strictus (Rocky Mountain penstemon)	Phlox austromontana (mountain phlox)	Phlox longifolia (longleaf phlox)	Polygonum douglasii <sup>a</sup> (Douglas' knotweed)	Potentilla gracilis (slender cinquefoil)	Sphaeralcea coccinea (scarlet globemallow)	Symphoricarpos ascendens (western aster)
year	Nested Frequency									
2019	8	35	3	4	8	3	5	3	6	17
2022	-	10	1	17	6	2	-	27	14	-
year	Average Cover (%)									
2019	0.0	2.4	0.0	0.0	0.4	0.0	0.0	0.0	0.1	0.2
2022	-	0.0	0.0	0.1	0.4	0.0	-	0.2	0.4	-

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	Amelanchier utahensis <sup>p</sup> (Utah serviceberry)	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	Line Intercept Cover (%)															
2019	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
2022	0.1	10.1	1.8	0.3	0.7	1.3	0.5	0.2	0.1	-	24.5	4.3	0.1	-	12.3	0.1
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
2022	0.4	8.0	1.8	0.0	2.1	1.5	0.2	0.1	0.1	0.1	0.9	3.8	0.5	-	8.1	0.1

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
2022	440	40	50	41	9	9	46	9	- / -
<b>Artemisia nova<sup>p</sup> -- (black sagebrush)</b>									
2019	3960	-	1	55	45	19	13	44	42/51
2022	4440	40	10	60	30	20	4	23	- / -
<b>Artemisia tridentata ssp. vaseyana<sup>p</sup> -- (mountain big sagebrush)</b>									
2019	540	-	4	26	70	0	30	67	59/64
2022	520	20	4	62	35	15	4	35	- / -
<b>Ceanothus -- (ceanothus)</b>									
2019	160	-	0	100	0	25	0	0	30/54
2022	160	-	38	63	0	38	63	0	- / -
<b>Chrysothamnus depressus<sup>p</sup> -- (longflower rabbitbrush)</b>									
2019	1280	20	0	94	6	5	11	6	16/24
2022	1680	-	19	61	20	29	23	12	- / -
<b>Chrysothamnus viscidiflorus ssp. viscidiflorus var. viscidiflorus -- (yellow rabbitbrush)</b>									
2019	1100	-	9	75	16	0	0	16	43/36
2022	1120	-	11	73	16	0	0	16	- / -
<b>Ericameria nauseosa -- (rubber rabbitbrush)</b>									
2019	20	-	0	100	0	0	0	0	40/28
2022	100	-	100	0	0	0	0	0	- / -
<b>Ericameria parryi -- (Parry's rabbitbrush)</b>									
2019	200	-	0	100	0	0	10	0	23/28
2022	660	600	30	70	0	0	0	0	- / -
<b>Gutierrezia sarothrae -- (broom snakeweed)</b>									
2019	60	-	0	100	0	0	0	0	16/16
2022	140	20	100	0	0	0	0	0	- / -
<b>Juniperus scopulorum<sup>i</sup> -- (Rocky Mountain juniper)</b>									
2019	20	-	0	100	0	0	0	0	- / -
2022	20	20	100	0	0	0	0	0	- / -



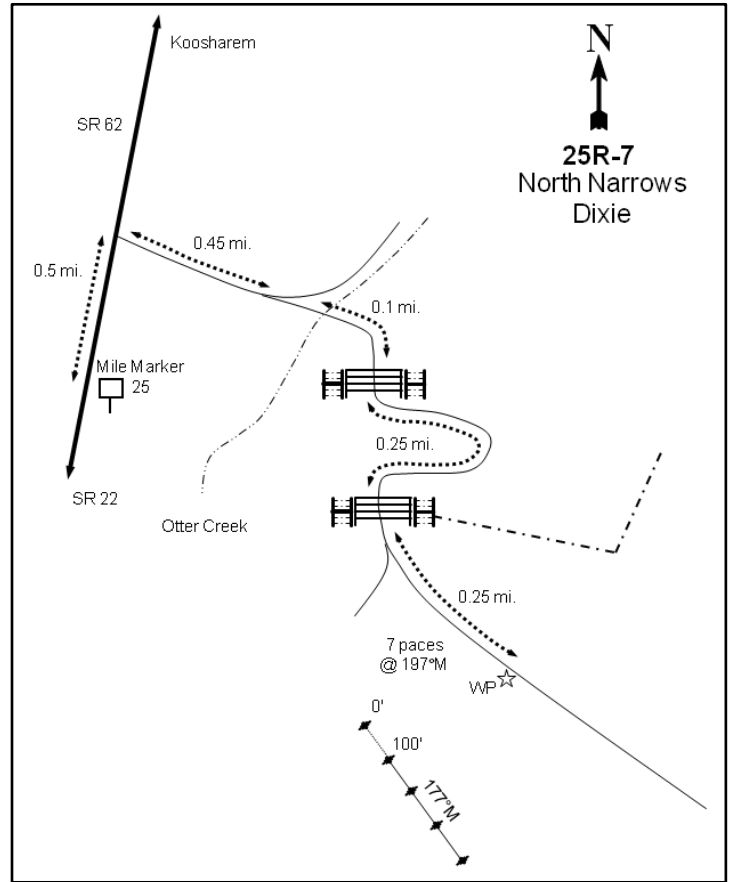
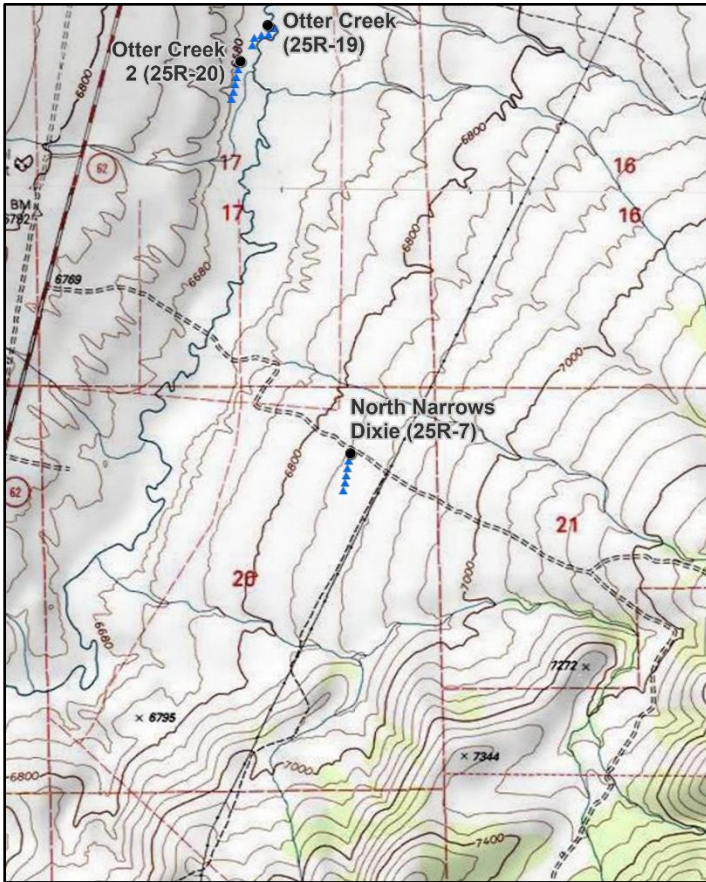
Year	Density		Age Class Distribution			Utilization		Poor Vigor (%)	Average Height Crown (cm)
	Plants Per Acre		Excluding Seedlings			Moderate (%)	Heavy (%)		
	Excluding Seedlings	Seedling	Young (%)	Mature (%)	Decadent (%)				
<b>Linanthus pungens -- (granite prickly phlox)</b>									
2019	140	-	0	100	0	0	0	0	13/17
2022	180	-	0	89	11	0	0	11	- / -
<b>Mahonia repens -- (creeping barberry)</b>									
2019	40	-	0	100	0	0	0	0	8/13
2022	60	-	0	100	0	0	0	0	- / -
<b>Opuntia polyacantha -- (plains pricklypear)</b>									
2019	20	-	0	100	0	0	0	0	13/23
2022	120	-	17	67	17	0	0	17	- / -
<b>Pinus ponderosa<sup>t</sup> -- (ponderosa pine)</b>									
2019	-	-	-	-	-	-	-	-	- / -
2022	20	-	0	100	0	0	0	0	- / -
<b>Purshia tridentata<sup>p</sup> -- (antelope bitterbrush)</b>									
2019	1840	-	4	80	15	47	10	10	56/82
2022	1620	20	16	72	12	31	53	16	- / -
<b>Ribes<sup>p</sup> -- (currant)</b>									
2019	40	-	0	100	0	0	0	0	66/67
2022	60	-	0	67	33	33	0	33	- / -
<b>Rosa woodsii<sup>p</sup> -- (Woods' rose)</b>									
2019	60	-	0	67	33	0	0	33	39/34
2022	40	-	0	100	0	0	0	0	- / -
<b>Symphoricarpos oreophilus<sup>p</sup> -- (mountain snowberry)</b>									
2019	4360	60	5	90	5	6	1	5	28/47
2022	7940	680	20	76	4	3	22	3	- / -
<b>Tetradymia canescens -- (spineless horsebrush)</b>									
2019	240	-	0	83	17	0	0	17	37/35
2022	160	-	13	75	13	0	13	13	- / -

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
2022	5	-	-	25	-	75	17.3
<b>Juniperus scopulorum (Rocky Mountain juniper)</b>							
2019	10	-	13	63	13	13	8.3
2022	10	-	33	67	-	-	6.3
<b>Pinus edulis (twoneedle pinyon)</b>							
2022	1	-	100	-	-	-	4.0
<b>Pinus ponderosa (ponderosa pine)</b>							
2019	20	-	-	-	17	83	44.3
2022	21	-	-	-	8	92	42.2
<b>Pseudotsuga menziesii (Douglas-fir)</b>							
2022	3	-	-	100	-	-	4.0

## NORTH NARROWS DIXIE - STUDY NO. 25R-7



### Location Information

USGS 7.5 min Map Info  
GPS (0' Stake)

Parker Knoll NE; Township 28S, Range 1W, Section 20  
NAD 83 UTM ZONE 12, 419225 East 4246756 North

### Transect Information

Browse Tag # (0' Stake)	110
Transect Bearing	177° magnetic
Length	500ft
Belt Placement	Line 1 (11ft), Line 2 (34ft), Line 3 (59ft), Line 4 (71ft), Line 5 (95ft)
Belt Marker Placement	No Rebar

### Directions to Site

Proceed south of Koosharem on SR-62 and turn left (east) 0.5 miles before mile marker 27. Drive 0.45 miles to Otter Creek and continue for 0.1 miles to a gate. Drive 0.25 miles to another gate, then proceed 0.25 miles to the witness post on the right (southwest) side of the road. The 0-foot stake is 7 paces from the witness post at 197 degrees magnetic and is marked with browse tag #110.

**Site Information**

Land Ownership	Federal
Land Administrator	BLM
Allotment	NORTH NARROWS
Elevation	6,775ft (2,065m)
Aspect	West
Slope	8%
Sample Dates	06/11/2008, 06/25/2009, 08/19/2010, 08/05/2013, 08/30/2017, 05/31/2022

**Table 25R-07.1 Disturbance History.** Recorded history of major disturbances.

Treatment/Disturbance	Name	WRI DB#	Date	Size (acres)
Harrow - Two-Way Dixie	North Narrows Year 1	1155	October-December 2008	1369
Seeding - Broadcast Before	North Narrows Year 1	1155	October 2008	1369
Seeding - Broadcast After	North Narrows Year 1	1155	December 2008	1369

**Table 25R-07.2 Seed Mix.** List of known seeded plant species and rates (if available).

Mix Name			Application Type	Application Date	Acres
North Narrows East			Broadcast	Oct 2008	2050
Type	Species	Common Name	Cultivar/Source ID	Bulk lbs/acre	PLS
G	Agropyron cristatum	Crested Wheatgrass	Douglas	0.12	0.10
G	Agropyron cristatum	Crested Wheatgrass	Hycrest	0.12	0.11
G	Elymus wawawaiensis	Snake River Wheatgrass	Secar	0.50	0.38
G	Festuca ovina	Sheep Fescue		0.24	0.23
G	Leymus cinereus	Great Basin Wildrye	Trailhead	0.73	0.66
G	Psathyrostachys juncea	Russian Wildrye	Bozoisky	1.20	1.02
G	Thinopyrum intermedium	Pubescent Wheatgrass	Luna	1.22	1.07
G	Thinopyrum intermedium	Pubescent Wheatgrass	Luna	0.27	0.24
F	Astragalus cicer	Cicer Milkvetch	Lutana	0.39	0.38
F	Helianthus annuus	Annual Sunflower		0.26	0.24
F	Helianthus annuus	Annual Sunflower		0.20	0.18
F	Linum perenne	Blue Flax	Appar	0.05	0.05
F	Linum perenne	Blue Flax	Appar	0.20	0.16
F	Medicago sativa	Alfalfa	Ladak	0.24	0.23
F	Medicago sativa	Alfalfa	Ranger	0.24	0.22
F	Melilotus officinalis	Yellow Sweetclover		1.00	0.90
F	Sanguisorba minor	Small Burnet	Delar	2.10	1.94
F	Sanguisorba minor	Small Burnet	Delar	0.90	0.77
S	Atriplex canescens	Fourwing Saltbush	Central UT	0.24	0.10

Mix Name			Application Type	Application Date	Acres
North Narrows East Kochia			Broadcast	Dec 2008	2050
Type	Species	Common Name	Cultivar/Source ID	Bulk lbs/acre	PLS
		Rice Hulls		0.32	0.00
S	Bassia prostrata	Forage Kochia	Humbolt/Lander NV	0.61	0.41

**Wildlife Habitat and Vegetation History****Table 25R-07.3 - Wildlife Seasonal Habitat.** DWR 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	brood-rearing

**Table 25R-07.4 - Vegetation History.** The dominant vegetation type(s) and phase of woodland succession (Tausch, Miller, Roundy, & Chambers, 2009).

Year	Vegetation Type	Woodland Succession
2008	Mountain Big Sagebrush	Phase I
2009	Mountain Big Sagebrush	Phase I
2010	Mountain Big Sagebrush	Phase I
2013	Mountain Big Sagebrush	Phase I
2017	Mountain Big Sagebrush	Phase I
2022	Mountain Big Sagebrush	Phase I

**Site Notes**

Pellet group data estimated heavy deer presence in 2008 prior to treatment (Table 25R-07.9). In 2008, a deer shed and carcass were found on the site, as well as dead rabbit remains. Coyote scat, elk pellets, sage-grouse pellets, and horse droppings were also on the site in 2008, but did not fall within the sample area.

**Site Potential**

1981 - 2010 Average Annual Precipitation                      9 inches  
 NRCS Ecological Site    Semidesert Loam (Wyoming Big Sagebrush)  
 NRCS Ecological Site #    R047XB222UT  
 States and Transitions    No state and transition model is available for this ecological site.

This site has existed as a mountain big sagebrush (*Artemisia tridentata* ssp. *vaseyana*) plant community since study establishment in 2008. While mountain big sagebrush is the dominant browse species, there are other shrub species present that provide some cover (Table 25R-07.12). Following the harrow and seeding treatment (Table 25R-07.1), sagebrush age class distribution has diversified and density has increased (Table 25R-07.13). The herbaceous understory has been chiefly comprised of perennial grasses that have generally increased in abundance since treatment. Forbs have remained sparse, except for the 2010 sample year when there was an increase in annual forb cover (Table 25R-07.10, 25R-07.11). This site will likely remain in this state without a major disturbance.

**Trend Summary Tables****Table 25R-07.6 - Shrub/Tree Summary.** Average modified Daubenmire quadrat and line intercept cover by year for shrubs/trees

Year	Quadrat Cover (%)			Line-intercept Cover (%)		
	Preferred Shrub	Other Shrub	Tree	Preferred Shrub	Other Shrub	Tree
2008	24.8	0.9	-	22.7	0.4	-
2009	5.1	0.3	-	5.7	0.3	-
2010	10.2	0.8	-	12.5	0.2	-
2013	7.3	1.2	-	9.8	1.3	-
2017	8.0	1.1	-	11.2	1.2	-
2022	7.1	1.4	-	7.8	0.7	-

**Table 25R-07.7 - Herbaceous Summary.** Nested frequency and average modified Daubenmire quadrat cover by year for herbaceous functional groups

Year	Nested Frequency				Quadrat Cover (%)			
	Annual Grass	Perennial Grass	Annual/Biennial Forb	Perennial Forb	Annual Grass	Perennial Grass	Annual/Biennial Forb	Perennial Forb
2008	-	270	9	45	-	8.5	0.0	0.4
2009	3	212	50	91	0.0	5.3	1.8	0.7
2010	2	270	166	67	0.0	13.6	8.9	2.0
2013	100	330	3	12	0.4	12.5	0.0	0.1
2017	302	343	9	9	5.7	16.3	0.1	0.0
2022	184	312	112	22	1.4	13.0	0.5	0.1

**Table 25R-07.8 - Basic Ground Cover.** Average modified Daubenmire quadrat cover by year for basic ground cover types.

Year	Cover Type (%)					
	Bare Ground	Cryptogams	Litter	Pavement	Rock	Vegetation
2008	23.2	0.4	24.4	18.2	12.7	31.8
2009	38.4	0.3	24.5	8.0	15.0	14.9
2010	30.5	0.1	23.5	9.4	18.6	32.5
2013	20.9	0.0	32.4	7.2	14.7	25.6
2017	22.8	0.1	31.9	13.0	18.8	32.7
2022	29.2	0.1	29.6	15.4	20.9	23.7

**Table 25R-07.9 - Pellet Group Data.** Quadrat frequency and pellet group transect data for animal pellets. Rabbit pellet groups are not sampled in the pellet group transect.

Year	Cattle	Mule Deer	Rocky Mountain Elk	Greater Sage-Grouse	Horse	Rabbit
	Quadrat Frequency					
2008	1	20	3	1	-	72
2009	-	12	2	-	-	24
2010	1	1	-	-	-	2
2013	9	13	7	-	-	24
2017	6	6	2	-	-	45
2022	2	25	4	-	-	7
Year	Days Use Per Acre (ha)					
2008	4.4 (10.8)	59.0 (145.7)	2.0 (5.0)	-	-	-
2009	0.7 (1.8)	10.7 (26.5)	-	-	-	-
2010	0.7 (1.8)	4.0 (9.9)	-	-	-	-
2013	9.4 (23.3)	13.4 (33.1)	2.7 (6.6)	8.7 (21.5)*	0.6 (1.4)	-
2017	13.8 (34.1)	15.4 (38.1)	8.1 (19.9)	34.9 (86.1)*	-	-
2022	15.3 (37.7)	38.9 (96.0)	2.7 (6.6)	8.7 (21.5)*	-	-

\*Pellets per acre (ha)

**Table 25R-07.10 - Grass Species.** Nested frequency and modified Daubenmire average cover by year.

GRASS SPECIES	Nested Frequency											
	year	Nested Frequency										
Achnatherum hymenoides (Indian ricegrass)	89	-	79	-	126	-	53	-	-	-	-	-
Agropyron cristatum <sup>i</sup> (crested wheatgrass)	72	58	33	3	40	-	29	31	-	6	4	3
Bouteloua gracilis (blue grama)	118	45	63	2	72	-	32	-	-	0	10	32
Bromus tectorum <sup>ai</sup> (cheatgrass)	200	66	69	100	71	-	54	-	1	16	8	10
Elymus elymoides (squirreltail)	160	23	66	302	42	0	140	-	6	21	13	3
Festuca idahoensis (Idaho fescue)	2022	172	7	38	184	38	-	131	-	-	55	2
Hesperostipa comata (needle and thread)	year	Average Cover (%)										
Leymus cinereus (basin wildrye)	2008	3.3	-	2.3	-	1.9	-	1.1	-	-	-	-
Pleuraphis jamesii (James' galleta)	2009	1.9	0.7	0.9	0.0	0.8	-	0.5	0.4	-	0.1	0.0
Psathyrostachys juncea <sup>i</sup> (Russian wildrye)	2010	5.5	2.2	1.8	0.0	1.9	-	1.2	-	-	0.2	0.0
Sporobolus cryptandrus (sand dropseed)	2013	6.3	1.6	2.0	0.4	1.0	-	0.9	-	0.0	0.5	0.1
Thinopyrum intermedium <sup>i</sup> (intermediate wheatgrass)	2017	6.2	0.5	2.0	5.7	0.6	0.0	6.4	-	0.0	0.4	0.2
	2022	6.3	0.0	0.2	1.4	0.6	-	4.2	-	-	1.6	0.0

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

**Table 25R-07.11 - Forb Species.** Nested frequency and modified Daubenmire average cover by year.

FORB SPECIES	Astragalus (milkvetch)	Astragalus cibaribus (browse milkvetch)	Astragalus lentiginosus (freckled milkvetch)	Chenopodium album <sup>a</sup> (lambsquarters)	Chenopodium leptophyllum <sup>a</sup> (narrowleaf goosefoot)	Cleome serrulata <sup>a</sup> (Rocky Mountain beeplant)	Cryptantha (cryptantha)	Cryptantha <sup>a</sup> (annual cryptantha)	Cymopterus (springparsley)	Descurainia pinnata <sup>a</sup> (western tansymustard)	Erigeron (fleabane)	Erigeron pumilus (shaggy fleabane)	Eriogonum ovalifolium (cushion buckwheat)	Eriogonum umbellatum (sulphur-flower buckwheat)	Gayophytum ramosissimum <sup>a</sup> (pinyon groundsmoke)	Helianthus annuus <sup>a</sup> (common sunflower)	Lappula occidentalis <sup>a</sup> (flatspine stickseed)
year	Nested Frequency																
2008	-	-	-	-	-	-	-	-	2	-	6	-	4	-	-	-	6
2009	1	3	-	15	-	-	-	-	-	-	4	2	-	1	-	14	5
2010	-	10	-	-	60	10	-	-	-	24	-	6	12	12	2	20	49
2013	-	-	-	-	-	1	-	-	-	-	-	9	-	1	-	-	-
2017	-	-	1	-	-	-	-	2	-	1	2	1	-	-	-	-	6
2022	-	-	-	-	-	-	2	95	-	28	-	-	1	-	-	-	-
year	Average Cover (%)																
2008	-	-	-	-	-	-	-	-	0.0	-	0.0	-	0.2	-	-	-	0.0
2009	0.0	0.1	-	0.4	-	-	-	-	-	-	0.1	0.0	-	0.0	-	0.6	0.1
2010	-	0.1	-	-	2.4	0.3	-	-	-	0.2	-	0.0	0.6	0.7	0.3	0.6	1.1
2013	-	-	-	-	-	0.0	-	-	-	-	-	0.0	-	0.0	-	-	-
2017	-	-	0.0	-	-	-	-	0.0	-	0.0	0.0	0.0	-	-	-	-	0.0
2022	-	-	-	-	-	-	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)	Medicago sativa <sup>i</sup> (alfalfa)	Melilotus officinalis <sup>i</sup> (sweetclover)	Phlox longifolia (longleaf phlox)	Salsola tragus <sup>ni</sup> (prickly Russian thistle)	Sanguisorba minor <sup>i</sup> (small burnet)	Sphaeralcea grossularifolia (gooseberry/leaf globemallow)	Trifolium (clover)	unknown annual forb <sup>a</sup> (unknown forb)
year	Nested Frequency								
2008	-	-	-	32	3	-	-	2	-
2009	5	27	24	30	15	20	0	4	7
2010	6	10	2	16	76	-	0	-	-
2013	-	-	-	2	2	-	-	-	-
2017	2	-	-	5	-	-	-	-	-
2022	-	-	-	-	-	-	16	3	-
year	Average Cover (%)								
2008	-	-	-	0.1	0.0	-	-	0.0	-
2009	0.1	0.1	0.2	0.1	0.7	0.0	0.0	0.0	0.1
2010	0.0	0.1	0.2	0.2	3.9	-	0.0	-	-
2013	-	-	-	0.0	0.0	-	-	-	-
2017	0.0	-	-	0.0	-	-	-	-	-
2022	-	-	-	-	-	-	0.1	0.0	-

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

**Table 25R-07.12 - Shrub and Tree Species.** Average modified Daubenmire quadrat and line intercept cover by year.

SHRUB SPECIES	Artemisia tridentata ssp. vaseyana <sup>p</sup> (mountain big sagebrush)	Bassia prostrata <sup>pi</sup> (forage kochia)	Chrysothamnus viscidiflorus (yellow rabbitbrush)	Gutierrezia sarothrae (broom snakeweed)	Opuntia polyacantha (plains pricklypear)
year	Line Intercept Cover (%)				
2008	22.7	-	0.2	0.1	0.1
2009	5.3	0.4	0.3	0	-
2010	8.8	3.7	0.1	0.1	-
2013	8.5	1.3	0.8	0.5	-
2017	9.6	1.6	0.5	0.7	-
2022	7.1	0.7	0.6	-	0.1
year	Quadrat Cover (%)				
2008	24.8	-	0.3	0.1	0.5
2009	4.9	0.1	0.3	0.0	0.0
2010	8.4	1.8	0.8	0.0	0.0
2013	6.2	1.1	0.6	0.5	0.1
2017	6.6	1.4	0.4	0.7	-
2022	5.5	1.6	1.0	0.0	0.3

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

**Table 25R-07.13 - Shrub/Tree Characteristics.** Population characteristics of shrub/tree species populations including density reproduction (seedlings), age distribution, utilization, vigor and average size (height/crown) of plants.

Year	Density		Age Class Distribution			Utilization		Poor Vigor (%)	Average Height Crown (cm)
	Plants Per Acre		Excluding Seedlings			Moderate (%)	Heavy (%)		
	Excluding Seedlings	Seedling	Young (%)	Mature (%)	Decadent (%)				
<b>Artemisia tridentata ssp. vaseyana<sup>p</sup> -- (mountain big sagebrush)</b>									
2008	7100	540	6	48	46	30	18	20	36/57
2009	-	-	-	-	-	-	-	-	23/33
2010	2880	280	19	68	13	2	0	12	37/57
2013	3200	1880	21	71	8	50	21	15	34/56
2017	3200	20	18	77	6	28	6	3	33/58
2022	2520	-	7	56	37	37	19	54	- / -
<b>Atriplex canescens<sup>p</sup> -- (fourwing saltbush)</b>									
2008	-	-	-	-	-	-	-	-	- / -
2009	-	-	-	-	-	-	-	-	- / -
2010	-	-	-	-	-	-	-	-	- / -
2013	20	-	0	100	0	0	100	0	41/58
2017	-	-	-	-	-	-	-	-	44/49
2022	100	-	0	100	0	0	100	0	- / -
<b>Bassia prostrata<sup>pi</sup> -- (forage kochia)</b>									
2008	-	-	-	-	-	-	-	-	- / -
2009	-	-	-	-	-	-	-	-	15/21
2010	1340	320	13	87	0	0	0	0	41/48
2013	8500	2040	80	20	0	22	1	0	15/27
2017	7500	-	17	83	0	5	5	0	8/17
2022	6160	140	41	59	1	38	29	1	- / -



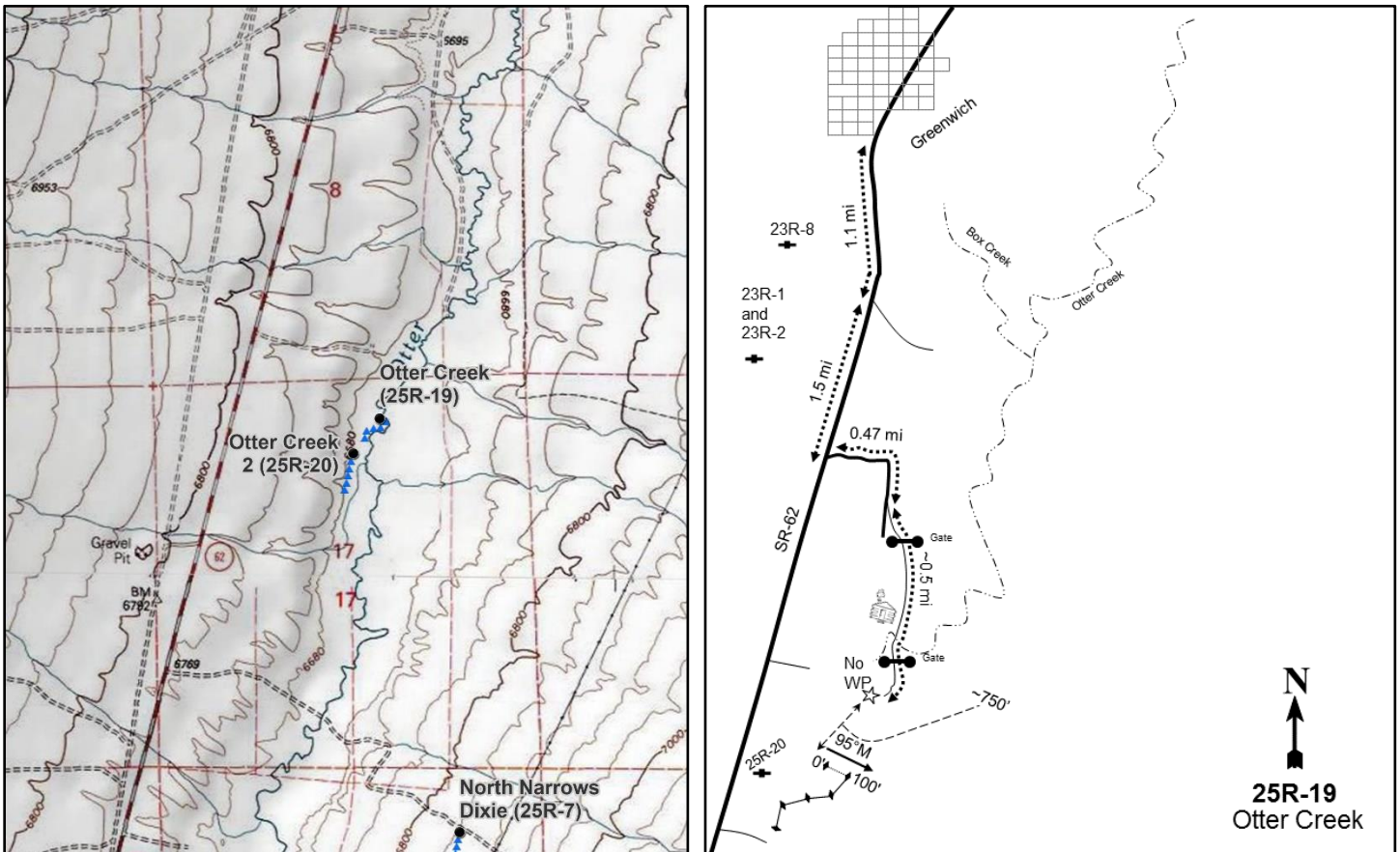
Year	Density		Age Class Distribution			Utilization		Poor Vigor (%)	Average Height Crown (cm)
	Plants Per Acre		Excluding Seedlings			Moderate (%)	Heavy (%)		
	Excluding Seedlings	Seedling	Young (%)	Mature (%)	Decadent (%)				
<b>Chrysothamnus viscidiflorus -- (yellow rabbitbrush)</b>									
2008	340	-	0	88	12	53	18	12	11/18
2009	-	-	-	-	-	-	-	-	14/18
2010	260	380	0	100	0	0	0	0	21/34
2013	400	280	20	80	0	0	0	0	22/41
2017	720	-	14	81	6	0	0	6	15/23
2022	680	-	3	59	38	6	27	41	- / -
<b>Echinocereus -- (hedgehog cactus)</b>									
2008	-	-	-	-	-	-	-	-	-/-
2009	-	-	-	-	-	-	-	-	2/6
2010	-	-	-	-	-	-	-	-	-/-
2013	-	-	-	-	-	-	-	-	-/-
2017	-	-	-	-	-	-	-	-	-/-
2022	-	-	-	-	-	-	-	-	-/-
<b>Ericameria nauseosa -- (rubber rabbitbrush)</b>									
2008	-	-	-	-	-	-	-	-	-/-
2009	-	-	-	-	-	-	-	-	17/22
2010	20	-	0	100	0	0	0	0	32/33
2013	-	-	-	-	-	-	-	-	-/-
2017	-	-	-	-	-	-	-	-	-/-
2022	-	-	-	-	-	-	-	-	-/-
<b>Gutierrezia sarothrae -- (broom snakeweed)</b>									
2008	700	80	0	74	26	29	34	20	12/15
2009	-	-	-	-	-	-	-	-	15/17
2010	-	-	-	-	-	-	-	-	23/26
2013	1420	460	25	75	0	0	0	1	14/17
2017	1660	-	2	98	0	0	0	0	16/18
2022	-	800	0	0	0	0	0	0	- / -
<b>Opuntia polyacantha -- (plains pricklypear)</b>									
2008	320	-	0	81	19	0	0	6	9/23
2009	-	-	-	-	-	-	-	-	7/15
2010	80	-	0	100	0	0	0	0	9/20
2013	200	-	50	40	10	0	0	10	8/21
2017	60	-	0	100	0	0	0	0	9/22
2022	180	-	11	67	22	0	0	22	- / -
<b>Pediocactus simpsonii -- (mountain ball cactus)</b>									
2008	20	-	0	100	0	0	0	0	2/5

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

**Table 25R-07.15 - Deer Desirable Components Index: Semidesert 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	28.4	1.1	3.0	17.1	0.0	0.7	0.0	50.2	Good
2009	7.2	0.0	0.0	10.6	0.0	1.5	0.0	19.3	Poor
2010	16.6	12.2	8.6	27.2	0.0	4.0	0.0	68.5	Excellent
2013	12.6	12.9	14.2	25.0	-0.3	0.1	0.0	64.5	Good-Excellent
2017	14.4	13.6	8.7	30.0	-4.3	0.1	0.0	62.4	Good
2022	9.9	5.0	5.1	26.0	-1.1	0.2	0.0	45.1	Fair-Good

## OTTER CREEK - STUDY NO. 25R-19



### Location Information

USGS 7.5 min Map Info  
GPS (0' Stake)

Greenwich SE; Township 28S, Range 1W, Section 17  
NAD 83 UTM ZONE 12, 418890 East 4248490 North

### Transect Information

Browse Tag # (0' Stake)	70
Transect Bearing	95° magnetic (Line 1: 95° magnetic, Line 2: 210° magnetic, Line 3: 250° magnetic, Line 4: 240° magnetic, Line 5: 180° magnetic)
Length	500ft
Belt Placement	Read Baseline, No Belts
Belt Marker Placement	No Belts

### Directions to Site

Travel south on SR-62 from the town of Greenwich for approximately 2.6 miles to a road to the left (east). Turn onto this road and proceed for 0.47 miles to a fork in the road: bear left. Continue for about 0.5 miles, passing through two gates, to the end of the road and park; there is no witness post. Use a GPS to navigate roughly 750 feet southwest to the transect.

**Site Information**

Land Ownership	Private
Land Administrator	Private
Allotment	No data
Elevation	No data
Aspect	South
Slope	1%
Sample Dates	07/12/2018, 06/21/2022

**Table 25R-19.1 Disturbance History.** Recorded history of major disturbances.

Treatment/Disturbance	Name	WRI DB#	Date	Size (acres)
Seeding - Hand Transplant	Otter Creek Stream Restoration Phase III	4398	Spring 2019	2
Mechanical - Stream Corridor/Channel Improvements	Otter Creek Stream Restoration Phase III	4398	September 2018-November 2019	2
Seeding - Broadcast After	Otter Creek Stream Restoration Phase III	4398	September 2018-November 2019	2

**Table 25R-19.2 Seed Mix.** List of known seeded plant species and rates (if available).

Mix Name			Application Type	Application Date	Acres
Otter Creek Riparian			Broadcast	Mar 2019	13
Type	Species	Common Name	Cultivar/Source ID	Bulk lbs/acre	PLS
G	<i>Agrostis gigantea</i>	Redtop		0.08	0.06
G	<i>Carex nebrascensis</i>	Nebraska Sedge		0.08	0.06
G	<i>Carex nebrascensis</i>	Nebraska Sedge		0.46	0.35
G	<i>Eleocharis palustris</i>	Creeping Spikerush		0.54	0.41
G	<i>Juncus arcticus</i>	Baltic Rush		0.08	0.06

**Wildlife Habitat and Vegetation History**

**Table 25R-19.3 - Wildlife Seasonal Habitat.** DWR wildlife habitat and seasonality.

Species	Habitat	Season
Mule Deer	crucial	winter
Greater Sage-Grouse		

**Table 25R-19.4 - Vegetation History.** The dominant vegetation type(s) and phase of woodland succession (Tausch, Miller, Roundy, & Chambers, 2009).

Year	Vegetation Type	Woodland Succession
2018	Perennial Grass	NA
2022	Perennial Grass	NA

**Site Notes**

In 2018, it was noted that grasses exhibited signs of heavy livestock grazing. Erosion was also observed along the streambank adjacent to the site. Identification for Kentucky bluegrass (*Poa pratensis*) in 2018 and 2022 may have actually been fowl bluegrass (*P. palustris*).

**Site Potential**

1981 - 2010 Average Annual Precipitation	9 inches
NRCS Ecological Site	Semiwet Fresh Meadow (Narrowleaf Cottonwood)
NRCS Ecological Site #	R047XB006UT
States and Transitions	No state and transition model is available for this ecological site.

This site has been dominated by perennial grasses and graminoids, particularly arctic rush (*Juncus balticus*), since study establishment in 2018. The introduced perennial grass species Kentucky bluegrass (*Poa pratensis*) also contributed significant cover in 2018, but exhibited a post-treatment decrease when the site was sampled in 2022. Perennial and annual forbs have also been abundant. Much of the forb cover was provided by meadow thistle (*Cirsium scariosum*) and western aster (*Symphotrichum ascendens*) in 2018. In 2022, however, most of the cover was contributed by the introduced annual species herb sophia (*Descurainia sophia*) and the noxious introduced perennial whitetop (*Cardaria draba*) (Table 25R-19.7, Table 25R-19.10, Table 25R-19.11). Shrubs were rare in 2018, with only dwarf goldenbush (*Ericameria nana*) providing any cover, although rubber rabbitbrush (*Ericameria nauseosa*) was observed in height crown measurements. No shrubs were observed in either cover or density measurements in 2022 (Table 25R-19.12, Table 25R-19.13).

**Trend Summary Tables**

**Table 25R-19.6 - Shrub/Tree Summary.** Average modified Daubenmire quadrat and line intercept cover by year for shrubs/trees

Year	Quadrat Cover (%)			Line-intercept Cover (%)		
	Preferred Shrub	Other Shrub	Tree	Preferred Shrub	Other Shrub	Tree
2018	-	0.2	-	-	0.2	-
2022	-	-	-	-	-	-

**Table 25R-19.7 - Herbaceous Summary.** Nested frequency and average modified Daubenmire quadrat cover by year for herbaceous functional groups

Year	Nested Frequency				Quadrat Cover (%)			
	Annual Grass	Perennial Grass	Annual/Biennial Forb	Perennial Forb	Annual Grass	Perennial Grass	Annual/Biennial Forb	Perennial Forb
2018	-	475	211	373	-	65.6	13.6	16.7
2022	-	440	202	321	-	38.7	12.4	16.6

**Table 25R-19.8 - Basic Ground Cover.** Average modified Daubenmire quadrat cover by year for basic ground cover types.

Year	Cover Type (%)					
	Bare Ground	Cryptogams	Litter	Pavement	Rock	Vegetation
2018	4.0	0.0	38.2	-	0.8	75.8
2022	15.7	0.0	42.0	0.0	-	60.9

**Table 25R-19.9 - Pellet Group Data.** Quadrat frequency and pellet group transect data for animal pellets. Rabbit pellet groups are not sampled in the pellet group transect.

Year	Cattle	Mule Deer	Horse
	Quadrat Frequency		
2018	57	1	-
2022	2	-	-
Year	Days Use Per Acre (ha)		
2018	79.1 (195.5)	-	-
2022	6.5 (16.1)	-	1.2 (2.9)

**Table 25R-19.10 - Grass Species.** Nested frequency and modified Daubenmire average cover by year.

GRASS SPECIES	Agrostis stolonifera <sup>i</sup> (creeping bentgrass)	Carex aquatilis (water sedge)	Carex nebrascensis (Nebraska sedge)	Carex praegracilis (clustered field sedge)	Carex utriculata (Northwest Territory sedge)	Deschampsia cespitosa (tufted hairgrass)	Eleocharis palustris (common spikerush)	Elymus trachycaulus (slender wheatgrass)	Hordeum brachyantherum (meadow barley)	Juncus arcticus (arctic rush)	Leymus cinereus (basin wildrye)	Melica bulbosa (oniongrass)	Pascopyrum smithii (western wheatgrass)	Phleum alpinum (alpine timothy)	Poa palustris (fowl bluegrass)	Poa pratensis <sup>i</sup> (Kentucky bluegrass)
year	Nested Frequency															
2018	103	-	226	95	119	43	-	26	12	399	-	2	-	13	-	366
2022	7	10	202	40	3	0	16	14	-	393	9	-	13	19	3	59
year	Average Cover (%)															
2018	2.0	-	6.1	1.5	3.5	3.0	-	0.5	0.1	22.9	-	0.0	-	0.2	-	25.9
2022	0.2	0.2	7.0	1.7	0.1	0.0	0.2	0.5	-	25.1	0.5	-	0.4	0.8	0.0	2.0

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

**Table 25R-19.11 - Forb Species.** Nested frequency and modified Daubenmire average cover by year.

FORB SPECIES	Achillea millefolium (Common yarrow)	Arabis (rockcress)	Argentina anserina (silverweed cinquefoil)	Astragalus (milkvetch)	Cardaria draba <sup>iii</sup> (whitetop)	Cerastium (mouse-ear chickweed)	Chenopodium fremontii <sup>ia</sup> (Fremont's goosefoot)	Cirsium scariosum <sup>a</sup> (meadow thistle)	Descurainia incana <sup>a</sup> (mountain tansymustard)	Descurainia sophia <sup>ai</sup> (herb sophia)	Epilobium brachycarpum <sup>a</sup> (tall annual willowherb)	Equisetum arvense (field horsetail)	Equisetum laevigatum (smooth horsetail)	Helianthus annuus <sup>a</sup> (common sunflower)	Lactuca serriola <sup>ai</sup> (prickly lettuce)	Linum lewisii (Lewis flax)	Machaeranthera grindelioides var. depressa (rayless tansyaster)
year	Nested Frequency																
2018	137	-	-	10	-	-	-	211	-	-	-	-	11	-	-	-	46
2022	51	3	8	-	102	17	7	62	34	100	7	36	43	16	31	2	6
year	Average Cover (%)																
2018	1.8	-	-	0.1	-	-	-	13.6	-	-	-	-	0.0	-	-	-	0.6
2022	1.4	0.0	0.2	-	5.0	0.5	0.0	3.5	0.7	6.2	0.1	1.6	1.0	0.3	0.8	0.0	0.1

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

FORB SPECIES	Polygonum aviculare <sup>i</sup> (prostrate knotweed)	Potentilla gracilis (slender cinquefoil)	Potentilla hippiana (woolly cinquefoil)	Ranunculus cymbalaria (alkali buttercup)	Rumex (dock)	Sidalcea neomexicana (salt spring checkerbloom)	Sisymbrium altissimum <sup>ai</sup> (tall tumblemustard)	Symphyotrichum ascendens (western aster)	Taraxacum officinale (common dandelion)	Thermopsis montana (mountain goldenbanner)	Trifolium (clover)	Trifolium gymnocarpon (hollyleaf clover)	Trifolium repens <sup>i</sup> (white clover)
year	Nested Frequency												
2018	7	4	6	-	-	18	-	231	93	33	101	-	-
2022	-	-	7	6	3	13	20	68	14	127	-	3	7
year	Average Cover (%)												
2018	0.3	0.2	0.1	-	-	0.3	-	6.6	1.7	3.1	2.1	-	-
2022	-	-	0.1	0.0	0.0	0.4	0.8	1.8	0.4	4.2	-	0.0	0.0

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

**Table 25R-19.12 - Shrub and Tree Species.** Average modified Daubenmire quadrat and line intercept cover by year.

SHRUB SPECIES	Ericameria nana (dwarf goldenbush)
year	Line
2018	0.2
2022	-
year	Quadrat Cover (%)
2018	0.2
2022	-

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

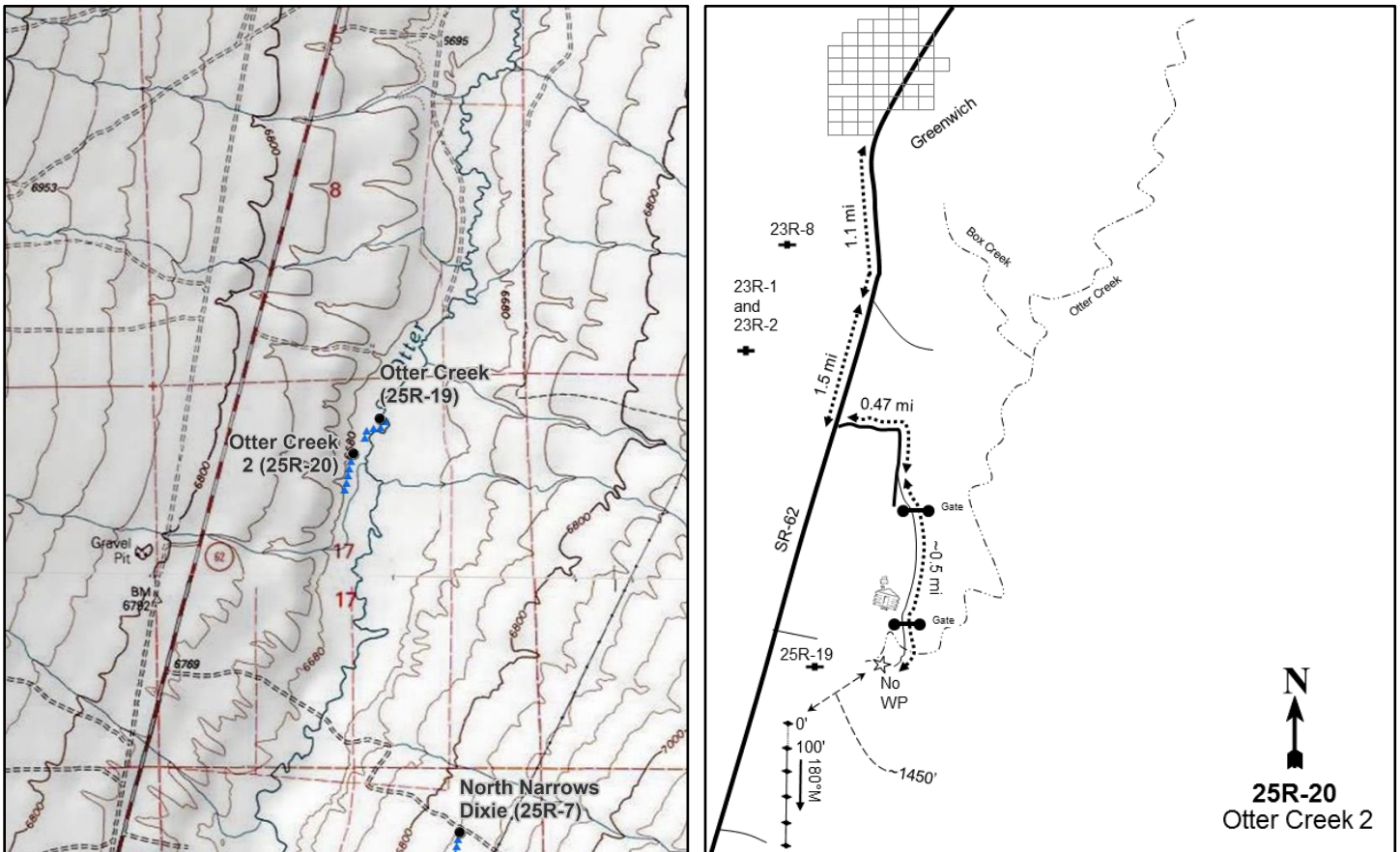
**Table 25R-19.13 - Shrub/Tree Characteristics.** Population characteristics of shrub/tree species populations including density reproduction (seedlings), age distribution, utilization, vigor and average size (height/crown) of plants.

Year	Density		Age Class Distribution			Utilization		Poor Vigor (%)	Average Height Crown (cm)
	Plants Per Acre		Excluding Seedlings			Moderate (%)	Heavy (%)		
	Excluding Seedlings	Seedling	Young (%)	Mature (%)	Decadent (%)				
Ericameria nauseosa -- (rubber rabbitbrush)									
2018	-	-	-	-	-	-	-	-	73/116
Ericameria nana -- (dwarf goldenbush)									
2018	20	-	0	100	0	0	0	0	91/108

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



## OTTER CREEK 2 - STUDY NO. 25R-20



### Location Information

USGS 7.5 min Map Info  
GPS (0' Stake)

Greenwich SE; Township 28S, Range 1W, Section 17  
NAD 83 UTM ZONE 12, 418779 East 4248344 North

### Transect Information

Browse Tag # (0' Stake)	72
Transect Bearing	180° magnetic
Length	500ft
Belt Placement	Read Baseline, No Belts
Belt Marker Placement	No Belts

### Directions to Site

Travel south on SR-62 from the town of Greenwich for approximately 2.6 miles to a road to the left (east). Turn onto this road and proceed for 0.47 miles to a fork in the road: bear left. Continue for about 0.5 miles, passing through two gates, to the end of the road and park; there is no witness post. Use a GPS to navigate roughly 1450 feet southwest to the transect.



**Site Information**

Land Ownership	Private
Land Administrator	Private
Allotment	No data
Elevation	No data
Aspect	South
Slope	13%
Sample Dates	07/12/2018, 06/21/2022

**Table 25R-20.1 Disturbance History.** Recorded history of major disturbances.

Treatment/Disturbance	Name	WRI DB#	Date	Size (acres)
Herbicide - Herbicide Unknown	Otter Creek Stream Restoration Phase III	4398	September 2018-November 2019	81
Seeding - Broadcast Before	Otter Creek Stream Restoration Phase III	4398	September 2018-November 2019	81
Mechanical - Mower	Otter Creek Stream Restoration Phase III	4398	September 2018-November 2019	81

**Table 25R-20.2 Seed Mix.** List of known seeded plant species and rates (if available).

Mix Name			Application Type	Application Date	Acres
Otter Creek Upland			Broadcast Before	Sep 2018	13
Type	Species	Common Name	Cultivar/Source ID	Bulk lbs/acre	PLS
G	Bouteloua gracilis	Blue Grama	Hachita	0.23	0.17
G	Distichlis spicata	Inland Saltgrass	Box Elder UT	0.54	0.46
G	Elymus lanceolatus ssp. lanceolatus	Streambank Wheatgrass	Sodar	0.38	0.33
G	Elymus wawawaiensis	Snake River Wheatgrass	Discovery	0.54	0.40
G	Juncus arcticus	Baltic Rush		0.08	0.06
G	Leymus cinereus	Great Basin Wildrye	Magnar	1.00	0.73
G	Pascopyrum smithii	Western Wheatgrass	Arriba	0.92	0.80
G	Sporobolus cryptandrus	Sand Dropseed		0.08	0.07
F	Achillea millefolium	Western Yarrow	Eagle	0.08	0.06
F	Cleome serrulata	Rocky Mountain Beeplant		1.31	1.28
F	Helianthus annuus	Annual Sunflower		2.00	1.84
F	Linum perenne	Blue Flax		0.38	0.19
F	Medicago sativa	Alfalfa	Ladak DL	0.62	0.57
F	Onobrychis viciifolia	Sainfoin	Shoshone	4.62	4.05
F	Sanguisorba minor	Small Burnet	Delar	2.00	1.75

**Wildlife Habitat and Vegetation History**

**Table 25R-20.3 - Wildlife Seasonal Habitat.** DWR wildlife habitat and seasonality.

Species	Habitat	Season
Mule Deer	crucial	winter
Greater Sage-Grouse		

**Table 25R-20.4 - Vegetation History.** The dominant vegetation type(s) and phase of woodland succession (Tausch, Miller, Roundy, & Chambers, 2009).

Year	Vegetation Type	Woodland Succession
2018	Rubber Rabbitbrush	NA
2022	Rubber Rabbitbrush/Perennial Grass	NA

**Site Notes**

Signs of moderate to heavy livestock grazing of grasses were observed in 2018. Identification for Kentucky bluegrass (*Poa pratensis*) in 2018 may have actually been fowl bluegrass (*Poa palustris*).

**Site Potential**

1981 - 2010 Average Annual Precipitation	9 inches
NRCS Ecological Site	Semiwet Fresh Meadow (Riparian)
NRCS Ecological Site #	R047XB004UT
States and Transitions	No state and transition model is available for this ecological site.

Rubber rabbitbrush (*Ericameria nauseosa*) has been the dominant vegetation component of the plant community on this site since study establishment in 2018. Basin big sagebrush (*Artemisia tridentata* ssp. *tridentata*) was the only other shrub species observed in 2018, and in much lower amounts. An additional rubber rabbitbrush species (*E. nauseosa* ssp. *consimilis*) was also observed in 2022. Both cover and density of rabbitbrush decreased following the mowing and herbicide treatment (Table 25R-20.1, Table 25R-20.12, Table 25R-20.13). The herbaceous understory has also been abundant in both sample years. Perennial grasses and graminoids were co-dominant with rubber rabbitbrush in 2022, and much of the cover was provided by clustered field sedge (*Carex praegracilis*), fowl bluegrass (*Poa palustris*), and saltgrass (*Distichlis spicata*). The introduced annual grass species cheatgrass (*Bromus tectorum*) was also observed in both sample years, but in low abundance. Forbs have remained somewhat diverse, but have decreased in cover following treatment (Table 25R-20.7, Table 25R-20.10, Table 25R-20.11).

**Trend Summary Tables**

**Table 25R-20.6 - Shrub/Tree Summary.** Average modified Daubenmire quadrat and line intercept cover by year for shrubs/trees

Year	Quadrat Cover (%)			Line-intercept Cover (%)		
	Preferred Shrub	Other Shrub	Tree	Preferred Shrub	Other Shrub	Tree
2018	1.3	22.6	-	1.2	31.6	-
2022	-	8.1	-	-	13.6	-

**Table 25R-20.7 - Herbaceous Summary.** Nested frequency and average modified Daubenmire quadrat cover by year for herbaceous functional groups

Year	Nested Frequency				Quadrat Cover (%)			
	Annual Grass	Perennial Grass	Annual/Biennial Forb	Perennial Forb	Annual Grass	Perennial Grass	Annual/Biennial Forb	Perennial Forb
2018	4	369	8	156	0.0	32.5	0.1	4.5
2022	6	410	13	109	0.9	35.0	0.5	1.2

**Table 25R-20.8 - Basic Ground Cover.** Average modified Daubenmire quadrat cover by year for basic ground cover types.

Year	Cover Type (%)					
	Bare Ground	Cryptogams	Litter	Pavement	Rock	Vegetation
2018	25.9	0.6	46.0	4.0	1.4	52.2
2022	20.2	0.7	47.4	1.7	1.3	45.5

**Table 25R-20.9 - Pellet Group Data.** Quadrat frequency and pellet group transect data for animal pellets. Rabbit pellet groups are not sampled in the pellet group transect.

Year	Cattle	Cattle/Bison	Mule Deer	Rocky Mountain Elk	Rabbit
	Quadrat Frequency				
2018	22	1	-	-	23
2022	9	-	1	-	13
Year	Days Use Per Acre (ha)				
2018	31.9 (78.9)	-	-	1.3 (3.3)	-
2022	20.3 (50.2)	-	2.0 (5.0)	3.4 (8.3)	-

**Table 25R-20.10 - Grass Species.** Nested frequency and modified Daubenmire average cover by year.

GRASS SPECIES	Agrostis stolonifera <sup>i</sup> (creeping bentgrass)	Bromus tectorum <sup>ai</sup> (cheatgrass)	Carex praegracilis (clustered field sedge)	Deschampsia cespitosa (tufted hairgrass)	Distichlis spicata (saltgrass)	Elymus elymoides (squirreltail)	Hesperostipa comata (needle and thread)	Juncus arcticus (arctic rush)	Pascopyrum smithii (western wheatgrass)	Phleum alpinum (alpine timothy)	Poa fendleriana (muttongrass)	Poa palustris (fowl bluegrass)	Poa pratensis <sup>i</sup> (Kentucky bluegrass)	Poa secunda (Sandberg bluegrass)
year	Nested Frequency													
2018	8	4	212	111	176	5	5	109	34	-	4	-	86	2
2022	-	6	148	-	216	-	-	115	76	2	11	202	-	-
year	Average Cover (%)													
2018	0.2	0.0	11.4	6.4	6.3	0.2	0.1	1.7	0.3	-	0.4	-	5.5	0.0
2022	-	0.9	6.8	-	10.2	-	-	2.9	2.7	0.0	0.8	11.7	-	-

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

**Table 25R-20.11 - Forb Species.** Nested frequency and modified Daubenmire average cover by year.

FORB SPECIES	Astragalus argophyllus (silverleaf milkvetch)	Cirsium scariosum <sup>a</sup> (meadow thistle)	Descurainia incana <sup>a</sup> (mountain tansymustard)	Equisetum laevigatum (smooth horsetail)	Machaeranthera grindelioides var. depressa (rayless tansyaster)	Malacothrix <sup>a</sup> (desertdandelion)	Symphyotrichum ascendens (western aster)	Taraxacum officinale (common dandelion)
year	Nested Frequency							
2018	6	-	-	132	40	8	9	3
2022	-	0	13	103	-	-	10	1
year	Average Cover (%)							
2018	0.3	-	-	2.6	1.2	0.1	0.2	0.1
2022	-	0.0	0.5	0.9	-	-	0.2	0.0

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

**Table 25R-20.12 - Shrub and Tree Species.** Average modified Daubenmire quadrat and line intercept cover by year.

SHRUB SPECIES	Line Intercept Cover		
	Artemisia tridentata ssp. tridentata <sup>p</sup> (basin big sagebrush)	1.2	31.6
Ericameria nauseosa (rubber rabbitbrush)	-	10	3.6
Ericameria nauseosa ssp. consimilis (rubber rabbitbrush)	-	-	-
year	Quadrat Cover (%)		
	2018	1.3	22.6
2022	-	6.0	2.1

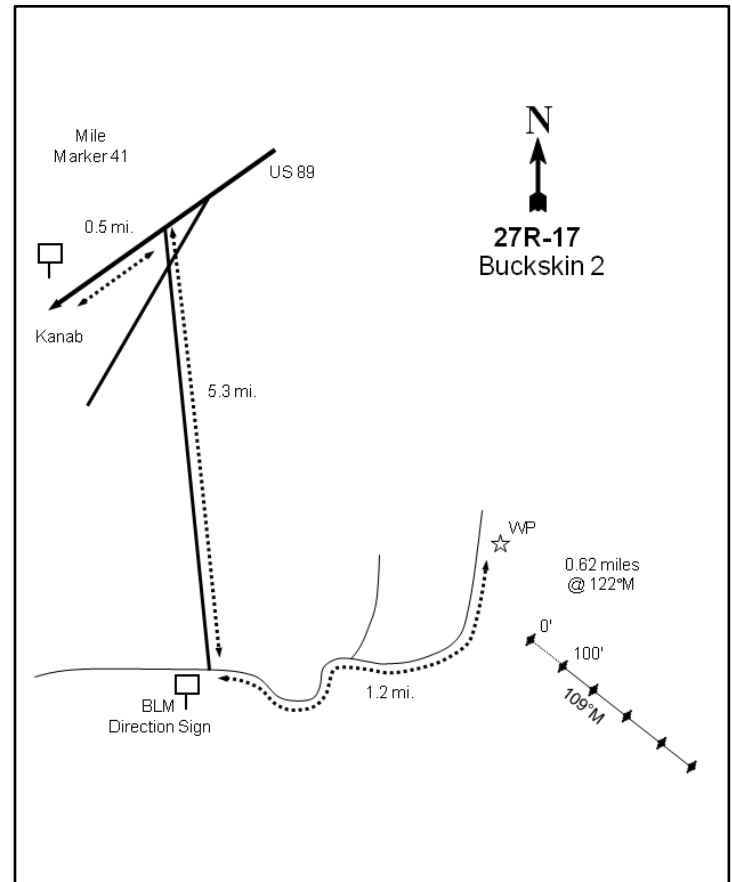
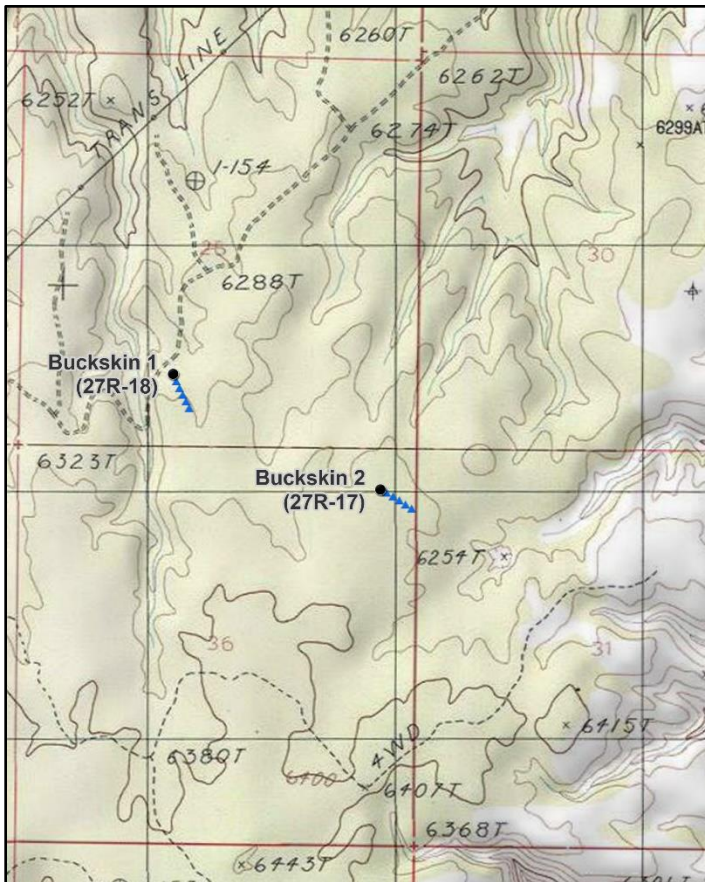
t - Tree Species; p - Preferred Browse; i - Introduced Species

**Table 25R-20.13 - Shrub/Tree Characteristics.** Population characteristics of shrub/tree species populations including density reproduction (seedlings), age distribution, utilization, vigor and average size (height/crown) of plants.

Year	Density		Age Class Distribution			Utilization		Poor Vigor (%)	Average Height Crown (cm)
	Plants Per Acre		Excluding Seedlings			Moderate (%)	Heavy (%)		
	Excluding Seedlings	Seedling	Young (%)	Mature (%)	Decadent (%)				
<b>Artemisia tridentata ssp. tridentata<sup>p</sup> -- (basin big sagebrush)</b>									
2018	200	-	10	90	0	0	0	0	94/66
2022	60	-	0	33	67	33	0	33	- / -
<b>Ericameria nauseosa -- (rubber rabbitbrush)</b>									
2018	3400	-	19	75	7	12	4	8	97/122
2022	1300	-	8	86	6	2	0	6	- / -
<b>Ericameria nauseosa ssp. consimilis -- (rubber rabbitbrush)</b>									
2018	-	-	-	-	-	-	-	-	- / -
2022	340	-	6	94	0	0	0	0	- / -

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

## BUCKSKIN 2 - STUDY NO. 27R-17

**Location Information**

USGS 7.5 min Map Info  
GPS (0' Stake)

Pine Hollow Canyon S; Township 43S, Range 3W, Section 36  
NAD 83 UTM ZONE 12, 404886 East 4099205 North

**Transect Information**

Browse Tag # (0' Stake)	90
Transect Bearing	109° magnetic
Length	500ft
Belt Placement	Line 1 (11ft), Line 2 (34ft), Line 3 (59ft), Line 4 (71ft), Line 5 (95ft)
Belt Marker Placement	No Rebar

**Directions to Site**

Drive west from Kanab on US-89 to mile marker 41. Continue past the mile marker for 0.5 miles to a road on the right (south). Turn right and drive for 0.1 miles to another road. Continue on the main road for 5.2 miles to a three-way intersection. Turn left and then drive 1.2 miles to the witness post on the right (east) side of the road. From the witness post, walk 0.62 miles at 122 degrees magnetic to the 0-foot stake (use GPS) which is marked with browse tag #90.

**Site Information**

Land Ownership	Federal
Land Administrator	BLM
Allotment	No data
Elevation	6,367ft (1,941m)
Aspect	West
Slope	2%
Sample Dates	08/09/2005, 06/17/2008, 08/06/2013, 08/28/2017, 07/26/2022

**Table 27R-17.1 Disturbance History.** Recorded history of major disturbances.

Treatment/Disturbance	Name	WRI DB#	Date	Size (acres)
Hand Crew - Lop and Scatter	Buckskin P-J Thinning 2005	112	November 2005	882
Seeding - Aerial	Buckskin P-J Thinning 2005	112	November 2005	418
Fire - Wildfire	Buckskin	-	June 2006	1437
Chaining - One-Way Ely	Lower Buckskin Telephone Wash Sagebrush Restoration Year 1	453	November-December 2006	1437
Seeding - Aerial Before	Lower Buckskin Telephone Wash Sagebrush Restoration Year 1	453	November 2006	1437
Seeding - Aerial After	Lower Buckskin Telephone Wash Sagebrush Restoration Year 1	453	February 2007	1437

**Table 27R-17.2 Seed Mix.** List of known seeded plant species and rates (if available).

Mix Name			Application Type	Application Date	Acres
Buckskin PJ Thinning			Aerial	Nov 2005	420
Type	Species	Common Name	Cultivar/Source ID	Bulk lbs/acre	PLS
G	<i>Achnatherum hymenoides</i>	Indian Ricegrass	Rimrock	1.07	1.04
G	<i>Bouteloua gracilis</i>	Blue Grama	Bad River	0.37	0.29
G	<i>Bouteloua gracilis</i>	Blue Grama		1.14	0.38
G	<i>Hesperostipa comata</i>	Needle and Threadgrass	Beaver UT	0.24	0.18
G	<i>Pascopyrum smithii</i>	Western Wheatgrass		1.07	0.88
G	<i>Poa secunda</i>	Sandberg Bluegrass	Toole MT	0.83	0.75
F	<i>Penstemon palmeri</i>	Palmer Penstemon	Washington UT	0.24	0.18
S	<i>Artemisia nova</i>	Black Sagebrush	Sanpete UT	0.41	0.05
S	<i>Ephedra viridis</i>	Green Ephedra		0.42	0.16
S	<i>Purshia stansburiana</i>	Stansbury Cliffrose		0.00	0.00
S	<i>Purshia stansburiana</i>	Stansbury Cliffrose		0.11	0.04
S	<i>Purshia stansburiana</i>	Stansbury Cliffrose		0.36	0.25

Mix Name			Application Type	Application Date	Acres
Buckskin Fire Aerial #1			Aerial	Nov 2006	1400
Type	Species	Common Name	Cultivar/Source ID	Bulk lbs/acre	PLS
G	<i>Achnatherum hymenoides</i>	Indian Ricegrass	Rimrock	1.00	0.99
G	<i>Agropyron cristatum</i>	Crested Wheatgrass	Douglas	1.00	0.84
G	<i>Agropyron cristatum</i>	Crested Wheatgrass	CDII	0.50	0.44
G	<i>Agropyron cristatum</i>	Crested Wheatgrass	Hycrest	0.50	0.44
G	<i>Agropyron fragile</i>	Siberian Wheatgrass	Vavilov	0.06	0.06
G	<i>Agropyron fragile</i>	Siberian Wheatgrass	Vavilov	0.93	0.81
G	<i>Bouteloua curtipendula</i>	Sideoats Grama	Pierre	0.10	0.09
G	<i>Elymus hoffmannii</i>	Newhy Wheatgrass		0.63	0.54
G	<i>Elymus lanceolatus</i>	Thickspike Wheatgrass	Bannock	0.41	0.37
G	<i>Elymus lanceolatus</i>	Thickspike Wheatgrass	Bannock	0.57	0.52
G	<i>Elymus wawawaiensis</i>	Snake River Wheatgrass	Secar	0.56	0.49
G	<i>Elymus wawawaiensis</i>	Snake River Wheatgrass	Secar	1.43	1.08
G	<i>Pascopyrum smithii</i>	Western Wheatgrass	Arriba	1.00	0.81
G	<i>Poa secunda</i>	Canby Bluegrass	Canbar	0.50	0.45
G	<i>Psathyrostachys juncea</i>	Russian Wildrye		0.68	0.63
G	<i>Psathyrostachys juncea</i>	Russian Wildrye	Bozoisky	1.32	1.24
G	<i>Thinopyrum intermedium</i>	Pubescent Wheatgrass		1.00	0.84
F	<i>Medicago sativa</i>	Alfalfa	Ladak	0.50	0.47
F	<i>Penstemon palmeri</i>	Palmer Penstemon	Washington UT	0.14	0.10
F	<i>Sanguisorba minor</i>	Small Burnet	Delar	0.50	0.46

Mix Name			Application Type	Application Date	Acres
Buckskin Fire Aerial #2			Aerial	Feb 2007	1400
Type	Species	Common Name	Cultivar/Source ID	Bulk lbs/acre	PLS
S	<i>Artemisia tridentata</i> ssp. <i>wyomingensis</i>	Wyoming Big Sagebrush	Beaver UT	1.00	0.22
S	<i>Bassia prostrata</i>	Forage Kochia	Rocky Mountain	1.00	0.64

### Wildlife Habitat and Vegetation History

**Table 27R-17.3 - Wildlife Seasonal Habitat.** DWR wildlife habitat and seasonality.

Species	Habitat	Season
Mule Deer	crucial	winter

**Table 27R-17.4 - Vegetation History.** The dominant vegetation type(s) and phase of woodland succession (Tausch, Miller, Roundy, & Chambers, 2009).

Year	Vegetation Type	Woodland Succession
2005	Pinyon-Juniper	Phase II transitioning to Phase III
2008	Forage Kochia/Annual Grass	Phase I
2013	Forage Kochia/Annual Grass	Phase I
2017	Forage Kochia/Annual Grass	Phase I
2022	Forage Kochia/Annual Grass	Phase I

### Site Notes

The study was originally established in 2005 (prior to treatment) to monitor the effects of a lop and scatter and seeding project completed in November of 2005. A wildfire (Buckskin Fire) burned 1,437 acres, which included the study site, in the summer of 2006. A chaining and seeding project was implemented following the Buckskin Fire. The entire study site was burned, but only half of the study site was chained during the post-fire treatment (Table 27R-17.1). Pellet groups were sampled in high abundance for elk in 2005 and deer in 2013 (Table 27R-17.9).

### Soils

**Table 27R-17.5 - Soil Analysis Data.** List of chemical and textural soil characteristics determined by laboratory analysis.

Texture	pH	%sand	%silt	%clay	%OM	PPM P	PPM K	ds/m	Sample Date
Loam	7.5	36.4	46.8	16.8	3.4	13.0	92.8	0.6	08/09/2005

### Site Potential

1981 - 2010 Average Annual Precipitation	12 inches
NRCS Ecological Site	Upland Shallow Loam (Cliffrose)
NRCS Ecological Site #	R035XY313UT
States and Transitions	2005 - Current Potential State: Community Phase 2.4 2008-Present - Current Potential State: Community Phase 2.2

When the study was established in 2005, the site was dominated by encroaching twoneedle pinyon (*Pinus edulis*) and Utah juniper (*Juniperus osteosperma*). There were a diverse number of other browse species present, but they provided limited cover (Table 27R-17.12). Forb diversity was also high, although cover was low (Table 27R-17.11). The introduced annual grass species cheatgrass (*Bromus tectorum*) and browse species forage kochia (*Kochia prostrata*) increased in cover and have become co-dominant following the treatments and wildfire. Mountain big sagebrush (*Artemisia tridentata* ssp. *vaseyana*) has steadily increased over the sample years, although cover remains low as of 2022 (Table 27R-17.1, Table 27R-17.10, Table 27R-17.12). The high abundance of cheatgrass on this study site could potentially diminish the resilience of the plant community and lead to the increased risk of future wildfire (USDA-ARS Jornada Experimental Range, 2022).



## Trend Summary Tables

**Table 27R-17.6 - Shrub/Tree Summary.** Average modified Daubenmire quadrat and line intercept cover by year for shrubs/trees

Year	Quadrat Cover (%)			Line-intercept Cover (%)		
	Preferred Shrub	Other Shrub	Tree	Preferred Shrub	Other Shrub	Tree
2005	2.4	1.1	10.5	3.3	0.5	38.6
2008	1.6	0.0	-	2.1	0.3	-
2013	10.5	0.3	-	13.5	1.0	0.4
2017	12.1	3.7	0.6	14.3	7.5	2.2
2022	12.2	1.4	0.3	20.2	2.1	1.0

**Table 27R-17.7 - Herbaceous Summary.** Nested frequency and average modified Daubenmire quadrat cover by year for herbaceous functional groups

Year	Nested Frequency				Quadrat Cover (%)			
	Annual Grass	Perennial Grass	Annual/Biennial Forb	Perennial Forb	Annual Grass	Perennial Grass	Annual/Biennial Forb	Perennial Forb
2005	169	13	296	76	1.6	0.0	6.0	0.9
2008	30	9	93	16	0.2	0.0	1.6	0.1
2013	314	11	157	53	9.4	0.3	3.9	0.9
2017	416	38	37	77	19.8	1.1	0.8	1.9
2022	414	36	108	66	13.7	1.8	1.0	1.1

**Table 27R-17.8 - Basic Ground Cover.** Average modified Daubenmire quadrat cover by year for basic ground cover types.

Year	Cover Type (%)					
	Bare Ground	Cryptogams	Litter	Pavement	Rock	Vegetation
2005	16.2	5.3	45.2	22.0	9.5	20.8
2008	31.8	0.5	13.6	42.5	17.4	3.3
2013	21.5	-	38.8	18.7	16.1	25.9
2017	13.9	0.1	42.3	16.7	12.7	36.7
2022	24.6	0.4	37.9	30.4	13.8	28.6

**Table 27R-17.9 - Pellet Group Data.** Quadrat frequency and pellet group transect data for animal pellets. Rabbit pellet groups are not sampled in the pellet group transect.

Year	Cattle	Mule Deer	Rocky Mountain Elk	Rabbit
	Quadrat Frequency			
2005	-	15	-	32
2008	1	3	-	68
2013	4	31	-	23
2017	6	15	-	39
2022	5	23	-	1
Year	Days Use Per Acre (ha)			
2005	0.7 (1.8)	12.1 (29.8)	47.6 (117.5)	-
2008	2.9 (7.2)	6.7 (16.6)	0.7 (1.7)	-
2013	23.2 (57.4)	63.7 (157.3)	-	-
2017	8.7 (21.5)	37.5 (92.7)	-	-
2022	-	30.2 (74.5)	-	-

**Table 27R-17.10 - Grass Species.** Nested frequency and modified Daubenmire average cover by year.

GRASS SPECIES	Achnatherum hymenoides (Indian ricegrass)	Agropyron cristatum <sup>i</sup> (crested wheatgrass)	Aristida purpurea (purple threeawn)	Bromus tectorum <sup>ai</sup> (cheatgrass)	Elymus elymoides (squirreltail)	Elymus lanceolatus (thickspike wheatgrass)	Elymus wawawaiensis (Snake River wheatgrass)	Hesperostipa comata (needle and thread)	Poa fendleriana (muttongrass)	Psathyrostachys juncea <sup>i</sup> (Russian wildrye)	Thinopyrum intermedium <sup>i</sup> (intermediate wheatgrass)	Vulpia octoflora <sup>a</sup> (sixweeks fescue)
year	Nested Frequency											
2005	-	-	-	169	6	-	-	4	3	-	-	12
2008	-	-	-	30	2	-	-	2	-	-	5	3
2013	1	1	-	314	3	-	1	-	-	2	3	-
2017	3	5	2	416	18	9	0	-	-	4	1	-
2022	1	2	8	414	12	-	-	-	-	9	4	-
year	Average Cover (%)											
2005	-	-	-	1.6	0.0	-	-	0.0	0.0	-	-	0.1
2008	-	-	-	0.1	0.0	-	-	0.0	-	-	0.0	0.0
2013	0.1	0.0	-	9.4	0.1	-	0.0	-	-	0.0	0.0	-
2017	0.2	0.2	0.1	19.8	0.2	0.2	0.0	-	-	0.1	0.0	-
2022	0.1	0.1	0.6	13.7	0.4	-	-	-	-	0.5	0.0	-

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

**Table 27R-17.11 - Forb Species.** Nested frequency and modified Daubenmire average cover by year.

FORB SPECIES	Arabis (rockcress)	Astragalus utahensis (Utah milkvetch)	Ceratocephala testiculata <sup>ai</sup> (curvseed butterwort)	Chaenactis douglasii (Douglas' dustymaiden)	Chamaesyce (sandmat)	Chenopodium fremontii <sup>a</sup> (Fremont's goosefoot)	Collinsia parviflora <sup>a</sup> (maiden blue eyed Mary)	Cordylanthus <sup>a</sup> (bird's-beak)	Cryptantha <sup>a</sup> (annual cryptantha)	Dalea searlsiae (Searls' prairie clover)	Descurainia pinnata <sup>a</sup> (western tansymustard)	Draba <sup>a</sup> (draba)	Eriogonum (buckwheat)	Eriogonum cernuum <sup>a</sup> (nodding buckwheat)	Erodium cicutarium <sup>ai</sup> (redstem stork's bill)	Frasera albomarginata (desert fraseria)	Gayophytum ramosissimum <sup>a</sup> (pinyon groundsmoke)
year	Nested Frequency																
2005	-	1	-	1	5	1	25	96	-	-	-	144	9	5	4	0	11
2008	-	1	-	-	0	2	-	1	5	-	17	20	-	4	-	0	1
2013	6	2	3	-	17	1	-	-	-	3	-	-	-	8	4	10	-
2017	-	-	-	-	37	-	-	10	-	4	-	-	-	1	4	31	-
2022	-	-	61	-	41	-	2	3	2	4	-	28	-	-	4	15	-
year	Average Cover (%)																
2005	-	0.0	-	0.0	0.1	0.0	0.0	3.9	-	-	-	0.7	0.0	0.0	0.0	0.0	0.0
2008	-	0.0	-	-	0.0	0.0	-	0.0	0.0	-	0.3	0.1	-	0.0	-	0.0	0.0
2013	0.0	0.0	0.0	-	0.3	0.0	-	-	-	0.0	-	-	-	0.0	0.0	0.1	-
2017	-	-	-	-	0.8	-	-	0.4	-	0.0	-	-	-	0.0	0.0	0.3	-
2022	-	-	0.3	-	0.3	-	0.0	0.0	0.0	0.1	-	0.1	-	-	0.0	0.3	-

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

FORB SPECIES																	
<i>Gilia inconspicua</i> <sup>a</sup> (shy gilia)																	
<i>Ipomopsis aggregata</i> (scarlet gilia)																	
<i>Lappula occidentalis</i> <sup>a</sup> (flatspine stickseed)																	
<i>Lesquerella</i> (bladderpod)																	
<i>Machaeranthera canescens</i> (hoary tansyaster)																	
<i>Mentzelia albicaulis</i> <sup>a</sup> (whitestem blazingstar)																	
<i>Microsteris gracilis</i> <sup>a</sup> (slender phlox)																	
<i>Nicotiana attenuata</i> <sup>a</sup> (coyote tobacco)																	
<i>Packera multilobata</i> (lobeleaf groundsel)																	
<i>Penstemon palmeri</i> (Palmer's penstemon)																	
<i>Penstemon thompsoniae</i> (Thompson's beardtongue)																	
<i>Petradoria pumila</i> (rock goldenrod)																	
<i>Phacelia</i> <sup>a</sup> (phacelia)																	
<i>Phlox longifolia</i> (longleaf phlox)																	
<i>Salsola tragus</i> <sup>a</sup> (prickly Russian thistle)																	
<i>Sisymbrium altissimum</i> <sup>a</sup> (tall tumbleweed)																	
<i>Sphaeralcea parvifolia</i> (smallflower globemallow)																	
year	Nested Frequency																
2005	178	3	62	4	-	-	4	-	3	-	19	19	-	18	-	-	-
2008	6	-	-	-	-	7	3	8	-	-	2	-	8	8	33	-	-
2013	-	-	-	-	-	-	-	-	-	9	9	-	3	6	142	24	3
2017	-	-	-	8	-	-	-	-	4	5	6	3	-	-	11	13	2
2022	9	-	3	-	1	-	-	-	6	6	1	-	-	-	12	6	2
year	Average Cover (%)																
2005	1.0	0.0	0.2	0.0	-	-	0.0	-	0.0	-	0.1	0.6	-	0.0	-	-	-
2008	0.0	-	-	-	-	0.1	0.0	0.1	-	-	0.0	-	0.1	0.0	1.0	-	-
2013	-	-	-	-	-	-	-	-	-	0.4	0.1	-	0.2	0.0	2.7	1.0	0.0
2017	-	-	-	0.0	-	-	-	-	0.0	0.5	0.1	0.0	-	-	0.1	0.3	0.1
2022	0.0	-	0.0	-	0.0	-	-	-	0.1	0.2	0.0	-	-	-	0.3	0.3	0.2

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

FORB SPECIES		
<i>Streptanthus cordatus</i> (heartleaf twistflower)		
<i>Tragopogon dubius</i> <sup>a</sup> (yellow salsify)		
year	Nested	
2005	2	-
2008	5	-
2013	-	-
2017	-	4
2022	-	-
year	Average Cover (%)	
2005	0.0	-
2008	0.0	-
2013	-	-
2017	-	0.0
2022	-	-

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

**Table 27R-17.12 - Shrub and Tree Species.** Average modified Daubenmire quadrat and line intercept cover by year.

SHRUB SPECIES	Line Intercept Cover (%)											
	year											
Artemisia tridentata ssp. vaseyana <sup>p</sup> (mountain big sagebrush)	0.8	-	-	0.1	0.8	0.1	21.8	0.3	16.8	1.7	-	-
Bassia prostrata <sup>pi</sup> (forage kochia)	0	2.1	-	-	-	0.1	-	0.2	-	-	-	-
Cylindropuntia whipplei (Whipple cholla)	0.4	12.2	-	-	0.5	1	-	-	0.4	0.4	-	-
Echinocereus (hedgheg cactus)	2.1	11.4	-	-	-	7.1	1.3	-	0.9	0.8	0.4	-
Ephedra viridis <sup>p</sup> (mormon tea)	3.3	16.2	-	-	0.7	1.6	0.8	-	0.2	-	0.5	-
Gutierrezia sarothrae (broom snakeweed)	year	Quadrat Cover (%)										
Juniperus osteosperma <sup>i</sup> (Utah juniper)	2005	1.6	-	-	0.1	0.6	0.2	3.1	0.7	7.4	0.2	0.0
Opuntia (pricklypear)	2008	0.2	1.2	-	-	0.1	0.0	-	0.0	-	0.2	-
Pinus edulis <sup>i</sup> (twoneedle pinyon)	2013	0.5	10.0	0.0	-	0.0	0.3	-	-	0.0	0.0	-
Purshia stansburiana <sup>p</sup> (Stansbury cliffrose)	2017	1.7	10.2	0.0	-	0.1	3.6	0.0	-	0.6	0.0	0.0
Yucca baccata (banana yucca)	2022	2.5	9.6	0.1	-	0.2	1.2	0.1	-	0.1	0.0	0.0

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

**Table 27R-17.13 - Shrub/Tree Characteristics.** Population characteristics of shrub/tree species populations including density reproduction (seedlings), age distribution, utilization, vigor and average size (height/crown) of plants.

Year	Density		Age Class Distribution			Utilization		Poor Vigor (%)	Average Height Crown (cm)
	Plants Per Acre		Excluding Seedlings			Moderate (%)	Heavy (%)		
	Excluding Seedlings	Seedling	Young (%)	Mature (%)	Decadent (%)				
<b>Amelanchier utahensis<sup>p</sup> -- (Utah serviceberry)</b>									
2005	-	-	-	-	-	-	-	-	110/89
2008	-	-	-	-	-	-	-	-	-/-
2013	-	-	-	-	-	-	-	-	74/116
2017	-	-	-	-	-	-	-	-	111/127
2022	-	-	-	-	-	-	-	-	-/-
<b>Artemisia tridentata ssp. vaseyana<sup>p</sup> -- (mountain big sagebrush)</b>									
2005	580	40	7	41	52	14	0	35	70/82
2008	60	160	67	0	33	33	33	0	-/-
2013	260	20	39	62	0	0	8	0	36/51
2017	1020	160	77	22	2	8	0	0	54/86
2022	800	-	30	65	5	15	10	5	-/-
<b>Bassia prostrata<sup>pi</sup> -- (forage kochia)</b>									
2005	-	-	-	-	-	-	-	-	-/-
2008	3200	3120	25	74	1	8	57	1	13/23
2013	24120	9220	51	49	0	19	1	0	26/39
2017	21600	180	23	77	0	7	3	0	20/35
2022	21300	140	14	85	0	34	23	1	-/-
<b>Cercocarpus montanus<sup>p</sup> -- (alderleaf mountain mahogany)</b>									
2005	20	-	0	0	100	100	0	0	-/-
2008	-	-	-	-	-	-	-	-	-/-
2013	-	-	-	-	-	-	-	-	-/-
2017	-	-	-	-	-	-	-	-	87/182
2022	160	-	0	100	0	0	0	0	-/-

Year	Density		Age Class Distribution			Utilization		Poor Vigor (%)	Average Height Crown (cm)
	Plants Per Acre		Excluding Seedlings			Moderate (%)	Heavy (%)		
	Excluding Seedlings	Seedling	Young (%)	Mature (%)	Decadent (%)				
<b>Cylindropuntia whipplei -- (Whipple cholla)</b>									
2005	-	-	-	-	-	-	-	-	-/-
2008	-	-	-	-	-	-	-	-	-/-
2013	40	-	50	50	0	0	0	0	18/56
2017	40	-	0	100	0	0	0	0	27/83
2022	20	-	0	100	0	0	0	0	-/-
<b>Echinocereus -- (hedgehog cactus)</b>									
2005	20	-	0	100	0	0	0	0	18/36
2008	-	-	-	-	-	-	-	-	-/-
2013	-	-	-	-	-	-	-	-	-/-
2017	-	-	-	-	-	-	-	-	-/-
2022	-	-	-	-	-	-	-	-	-/-
<b>Ephedra viridis<sup>p</sup> -- (mormon tea)</b>									
2005	260	40	23	77	0	54	0	0	69/79
2008	100	-	40	40	20	0	40	20	24/53
2013	20	-	0	100	0	0	0	0	50/58
2017	120	-	0	100	0	0	100	100	55/87
2022	40	-	0	50	50	50	0	50	-/-
<b>Ericameria parryi var. parryi -- (Parry's rabbitbrush)</b>									
2005	-	-	-	-	-	-	-	-	-/-
2008	20	-	0	100	0	0	0	0	-/-
2013	-	-	-	-	-	-	-	-	-/-
2017	-	-	-	-	-	-	-	-	30/94
2022	20	-	0	100	0	0	0	0	-/-
<b>Escobaria -- (foxtail cactus)</b>									
2005	-	-	-	-	-	-	-	-	4/6
2008	-	-	-	-	-	-	-	-	-/-
2013	-	-	-	-	-	-	-	-	-/-
2017	-	-	-	-	-	-	-	-	-/-
2022	-	-	-	-	-	-	-	-	-/-
<b>Gutierrezia sarothrae -- (broom snakeweed)</b>									
2005	140	-	0	100	0	0	0	0	22/28
2008	220	40	0	100	0	0	0	0	19/23
2013	880	-	27	71	2	0	0	2	25/37
2017	5820	140	13	86	1	0	0	1	23/39
2022	2120	40	26	75	0	0	0	0	-/-
<b>Juniperus osteosperma<sup>1</sup> -- (Utah juniper)</b>									
2005	180	80	22	78	0	0	0	0	-/-
2008	-	-	-	-	-	-	-	-	-/-
2013	-	-	-	-	-	-	-	-	-/-
2017	-	-	-	-	-	-	-	-	-/-
2022	-	-	-	-	-	-	-	-	-/-
<b>Opuntia -- (pricklypear)</b>									
2005	680	-	0	94	6	0	0	3	15/46
2008	20	-	0	100	0	0	0	0	19/50
2013	-	-	-	-	-	-	-	-	10/20
2017	-	-	-	-	-	-	-	-	11/47
2022	-	-	-	-	-	-	-	-	-/-
<b>Pediocactus simpsonii -- (mountain ball cactus)</b>									
2005	-	-	-	-	-	-	-	-	-/-
2008	-	-	-	-	-	-	-	-	-/-
2013	-	-	-	-	-	-	-	-	25/44
2017	-	-	-	-	-	-	-	-	-/-
2022	-	-	-	-	-	-	-	-	-/-

Year	Density		Age Class Distribution			Utilization		Poor Vigor (%)	Average Height Crown (cm)
	Plants Per Acre		Excluding Seedlings			Moderate (%)	Heavy (%)		
	Excluding Seedlings	Seedling	Young (%)	Mature (%)	Decadent (%)				
<b>Pinus edulis<sup>t</sup> -- (twoneedle pinyon)</b>									
2005	260	200	46	46	8	0	0	0	- / -
2008	-	-	-	-	-	-	-	-	- / -
2013	-	-	-	-	-	-	-	-	- / -
2017	-	-	-	-	-	-	-	-	- / -
2022	-	-	-	-	-	-	-	-	- / -
<b>Purshia stansburiana<sup>p</sup> -- (Stansbury cliffrose)</b>									
2005	140	-	14	43	43	29	57	14	139/117
2008	40	20	0	50	50	50	50	50	17/24
2013	20	-	100	0	0	100	0	0	52/51
2017	40	-	50	50	0	0	0	0	94/108
2022	20	-	0	100	0	0	100	0	- / -
<b>Quercus gambelii<sup>p</sup> -- (Gambel oak)</b>									
2005	-	-	-	-	-	-	-	-	- / -
2008	-	-	-	-	-	-	-	-	- / -
2013	-	-	-	-	-	-	-	-	- / -
2017	-	-	-	-	-	-	-	-	230/155
2022	-	-	-	-	-	-	-	-	- / -
<b>Yucca baccata -- (banana yucca)</b>									
2005	20	-	0	100	0	0	0	0	40/73
2008	-	-	-	-	-	-	-	-	- / -
2013	20	-	0	100	0	0	0	0	37/57
2017	20	-	0	100	0	0	0	0	37/75
2022	20	-	0	100	0	0	0	0	- / -

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

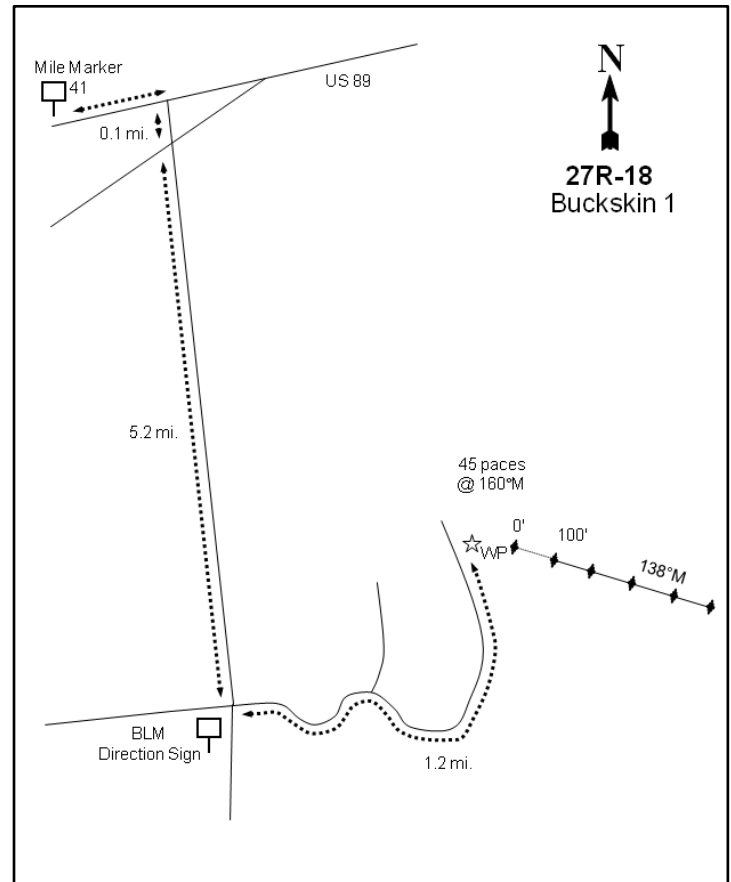
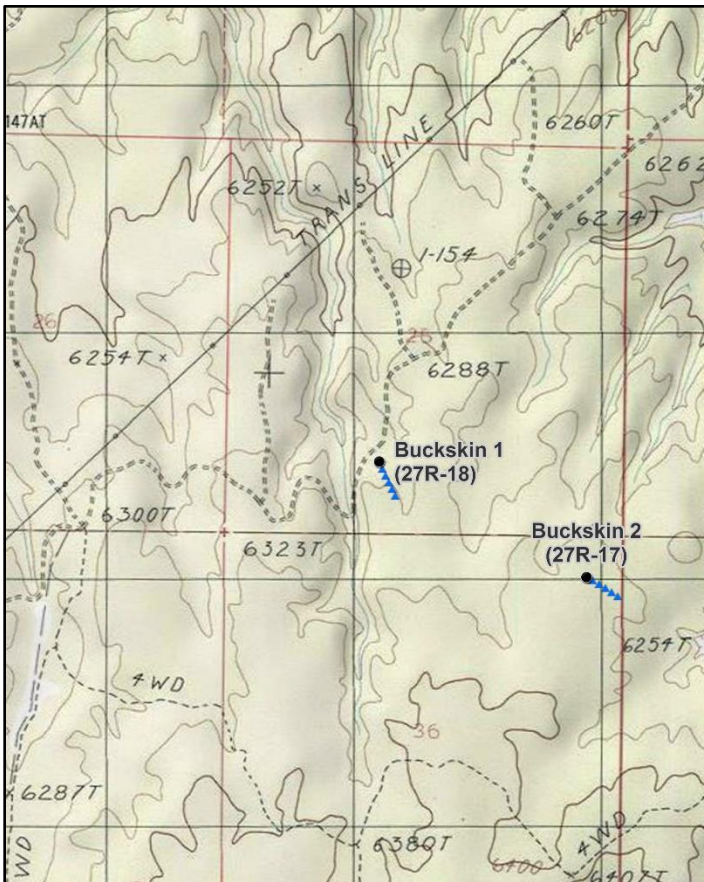
**Table 27R-17.14 - Tree Characteristics.** Point-quarter tree density, size class distribution, and average diameter.

Year	Density	Size Class Distribution					Average Diameter (cm)
	Trees per Acre	Seedling (%)	1-4' (%)	4-8' (%)	8-12' (%)	>12' (%)	
<b>Juniperus osteosperma (Utah juniper)</b>							
2005	156	10	20	10	-	60	25.9
2017	8	50	50	-	-	-	5.0
2022	4	-	100	-	-	-	4.0
<b>Pinus edulis (twoneedle pinyon)</b>							
2005	272	30	20	25	10	15	6.9

**Table 27R-17.15 - Deer Desirable Components Index: Upland 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
2005	4.6	0.0	0.0	0.1	-1.2	1.9	0.0	5.3	Very Poor
2008	3.2	0.0	0.0	0.1	-0.1	0.3	0.0	3.3	Very Poor
2013	20.0	15.0	15.0	0.6	-7.1	1.8	0.0	45.3	Poor
2017	20.9	14.9	15.0	2.2	-14.9	3.8	0.0	42.0	Poor
2022	29.3	14.2	8.2	3.5	-10.3	2.2	0.0	47.1	Poor

## BUCKSKIN 1 - STUDY NO. 27R-18



### Location Information

USGS 7.5 min Map Info  
GPS (0' Stake)

Pine Hollow Canyon S; Township 43S, Range 3W, Section 25  
NAD 83 UTM ZONE 12, 404046 East 4099673 North

### Transect Information

Browse Tag # (0' Stake)

91

Transect Bearing

138° magnetic

Length

500ft

Belt Placement

Line 1 (11ft), Line 2 (34ft), Line 3 (59ft), Line 4 (71ft), Line 5 (95ft)

Belt Marker Placement

No Rebar

### Directions to Site

Drive west from Kanab on US-89 to mile marker 41. Continue past the mile marker for 0.5 miles to a road on the right (south). Turn right and drive for 0.1 miles to another road. Continue on the main road for 5.2 miles to a three-way intersection. Turn left and then drive 1.2 miles to the witness post on the right (east) side of the road. From the witness post, walk 45 paces at 160 degrees magnetic to the 0-foot stake. The 0-foot stake is marked with browse tag #91.



**Site Information**

Land Ownership	Federal
Land Administrator	BLM
Allotment	MOLLIES NIPPLE
Elevation	6,315ft (1,925m)
Aspect	North
Slope	5%
Sample Dates	08/09/2005, 06/17/2008, 08/06/2013, 08/29/2017, 07/27/2022

**Table 27R-18.1 Disturbance History.** Recorded history of major disturbances.

Treatment/Disturbance	Name	WRI DB#	Date	Size (acres)
Fire - Wildfire	Buckskin	-	June 2006	1437
Chaining - One-Way Ely	Lower Buckskin Telephone Wash Sagebrush Restoration Year 1	453	November-December 2006	1437
Seeding - Aerial Before	Lower Buckskin Telephone Wash Sagebrush Restoration Year 1	453	November 2006	1437
Seeding - Aerial After	Lower Buckskin Telephone Wash Sagebrush Restoration Year 1	453	February 2007	1437

**Table 27R-18.2 Seed Mix.** List of known seeded plant species and rates (if available).

Mix Name			Application Type	Application Date	Acres
Buckskin Fire Aerial #1			Aerial	Nov 2006	1400
Type	Species	Common Name	Cultivar/Source ID	Bulk lbs/acre	PLS
G	Achnatherum hymenoides	Indian Ricegrass	Rimrock	1.00	0.99
G	Agropyron cristatum	Crested Wheatgrass	Douglas	1.00	0.84
G	Agropyron cristatum	Crested Wheatgrass	CDII	0.50	0.44
G	Agropyron cristatum	Crested Wheatgrass	Hycrest	0.50	0.44
G	Agropyron fragile	Siberian Wheatgrass	Vavilov	0.06	0.06
G	Agropyron fragile	Siberian Wheatgrass	Vavilov	0.93	0.81
G	Bouteloua curtipendula	Sideoats Grama	Pierre	0.10	0.09
G	Elymus hoffmannii	Newhy Wheatgrass		0.63	0.54
G	Elymus lanceolatus	Thickspike Wheatgrass	Bannock	0.41	0.37
G	Elymus lanceolatus	Thickspike Wheatgrass	Bannock	0.57	0.52
G	Elymus wawawaiensis	Snake River Wheatgrass	Secar	0.56	0.49
G	Elymus wawawaiensis	Snake River Wheatgrass	Secar	1.43	1.08
G	Pascopyrum smithii	Western Wheatgrass	Arriba	1.00	0.81
G	Poa secunda	Canby Bluegrass	Canbar	0.50	0.45
G	Psathyrostachys juncea	Russian Wildrye		0.68	0.63
G	Psathyrostachys juncea	Russian Wildrye	Bozoisky	1.32	1.24
G	Thinopyrum intermedium	Pubescent Wheatgrass		1.00	0.84
F	Medicago sativa	Alfalfa	Ladak	0.50	0.47
F	Penstemon palmeri	Palmer Penstemon	Washington UT	0.14	0.10
F	Sanguisorba minor	Small Burnet	Delar	0.50	0.46

Mix Name			Application Type	Application Date	Acres
Buckskin Fire Aerial #2			Aerial	Feb 2007	1400
Type	Species	Common Name	Cultivar/Source ID	Bulk lbs/acre	PLS
S	Artemisia tridentata ssp. wyomingensis	Wyoming Big Sagebrush	Beaver UT	1.00	0.22
S	Bassia prostrata	Forage Kochia	Rocky Mountain	1.00	0.64

**Wildlife Habitat and Vegetation History****Table 27R-18.3 - Wildlife Seasonal Habitat.** DWR wildlife habitat and seasonality.

Species	Habitat	Season
Mule Deer	crucial	winter

**Table 27R-18.4 - Vegetation History.** The dominant vegetation type(s) and phase of woodland succession (Tausch, Miller, Roundy, & Chambers, 2009).

Year	Vegetation Type	Woodland Succession
2005	Pinyon-Juniper	Phase II transitioning to Phase III
2008	Annual Grass	Phase I
2013	Forage Kochia/Perennial Grass	Phase I
2017	Mountain Big Sagebrush/Forage Kochia/Perennial Grass	Phase I
2022	Mountain Big Sagebrush/Forage Kochia/Perennial Grass	Phase I

**Site Notes**

The study was originally established in 2005 as a reference site to the Buckskin 2 (27R-17) study site. In the summer of 2006 a wildfire (Buckskin Fire) burned 1,437 acres including the study site; a chaining and seeding project was implemented following the fire (Table 27R-18.1). In 2005, pellet groups were sampled in high abundance for elk, and in 2008 and 2013 pellet group abundance was estimated to be high for deer (Table 27R-18.9).

**Soils**

**Table 27R-18.5 - Soil Analysis Data.** List of chemical and textural soil characteristics determined by laboratory analysis.

Texture	pH	%sand	%silt	%clay	%OM	PPM P	PPM K	ds/m	Sample Date
Sandy Clay	7.2	45.1	18.1	36.8	1.4	17.9	108.8	0.5	08/09/2005

**Site Potential**

1981 - 2010 Average Annual Precipitation 12 inches  
 NRCS Ecological Site Upland Shallow Loam (Cliffrose)  
 NRCS Ecological Site # R035XY313UT  
 States and Transitions 2005 - Current Potential State: Community Phase 2.4  
 2008-Present - Current Potential State: Community Phase 2.2

When established in 2005, this study site was dominated by encroaching twoneedle pinyon (*Pinus edulis*) and Utah juniper (*Juniperus osteosperma*) trees (Table 27R-18.14). There were other browse species present, but they contributed little cover (Table 27R-18.12). The herbaceous understory consisted mainly of annual forbs with sparse grass cover (Table 27R-18.7). Annual grass -- mainly the introduced species cheatgrass (*Bromus tectorum*) -- was the dominant component in the first sample year following treatment, but has since fluctuated over the study period between low to moderate abundance. Following the post-fire treatment, forage kochia (*Bassia prostrata*), mountain big sagebrush (*Artemisia tridentata* ssp. *vaseyana*), and perennial grasses have increased in abundance and provide moderate cover on the site. Forbs have remained diverse, although cover has been low (Table 27R-18.10, Table 27R-18.11, Table 27R-18.12, Table 27R-18.13). The high abundance of cheatgrass on this study could potentially diminish the resilience of this site and lead to the increased risk of future wildfire (USDA-ARS Jornada Experimental Range, 2022).

**Trend Summary Tables**

**Table 27R-18.6 - Shrub/Tree Summary.** Average modified Daubenmire quadrat and line intercept cover by year for shrubs/trees

Year	Quadrat Cover (%)			Line-intercept Cover (%)		
	Preferred Shrub	Other Shrub	Tree	Preferred Shrub	Other Shrub	Tree
2005	0.6	2.6	2.9	1.2	1.8	33.6
2008	1.5	0.8	0.0	1.5	0.7	-
2013	5.3	1.0	0.4	6.9	0.5	-
2017	9.5	2.9	0.5	14.3	4.1	0.8
2022	10.8	0.3	0.7	16.9	-	1.0

**Table 27R-18.7 - Herbaceous Summary.** Nested frequency and average modified Daubenmire quadrat cover by year for herbaceous functional groups

Year	Nested Frequency				Quadrat Cover (%)			
	Annual Grass	Perennial Grass	Annual/Biennial Forb	Perennial Forb	Annual Grass	Perennial Grass	Annual/Biennial Forb	Perennial Forb
2005	193	26	316	91	1.3	0.3	8.8	1.7
2008	307	142	46	145	8.2	1.7	0.1	2.8
2013	60	256	-	111	0.5	7.7	-	2.4
2017	109	292	26	110	1.9	16.6	0.5	5.7
2022	226	259	41	79	7.0	10.6	0.3	2.9

**Table 27R-18.8 - Basic Ground Cover.** Average modified Daubenmire quadrat cover by year for basic ground cover types.

Year	Cover Type (%)					
	Bare Ground	Cryptogams	Litter	Pavement	Rock	Vegetation
2005	18.7	2.7	45.8	21.6	9.6	14.7
2008	12.1	0.1	66.4	6.2	7.9	15.6
2013	20.6	0.0	57.6	7.9	7.6	20.6
2017	20.8	0.1	46.2	10.0	8.2	34.2
2022	28.6	0.9	47.4	11.5	9.2	30.6

**Table 27R-18.9 - Pellet Group Data.** Quadrat frequency and pellet group transect data for animal pellets. Rabbit pellet groups are not sampled in the pellet group transect.

Year	Cattle	Mule Deer	Rocky Mountain Elk	Rabbit
	Quadrat Frequency			
2005	1	23	2	69
2008	1	18	5	54
2013	5	32	-	19
2017	3	10	1	25
2022	1	22	1	5
Year	Days Use Per Acre (ha)			
2005	2.9 (7.2)	3.4 (8.3)	53.6 (132.4)	-
2008	6.5 (16.1)	44.2 (109.2)	-	-
2013	16.0 (39.5)	53.6 (132.4)	-	-
2017	10.2 (25.1)	46.2 (114.2)	-	-
2022	-	24.8 (61.2)	4.0 (9.9)	-

**Table 27R-18.10 - Grass Species.** Nested frequency and modified Daubenmire average cover by year.

GRASS SPECIES	Achnatherum hymenoides (Indian ricegrass)	Agropyron cristatum <sup>i</sup> (crested wheatgrass)	Bouteloua gracilis (blue grama)	Bromus tectorum <sup>ai</sup> (cheatgrass)	Elymus elymoides (squirreltail)	Elymus lanceolatus (thickspike wheatgrass)	Elymus wawawaiensis (Snake River wheatgrass)	Hesperosipa comata (needle and thread)	Pascopyrum smithii (western wheatgrass)	Poa secunda (Sandberg bluegrass)	Psathyrostachys juncea <sup>i</sup> (Russian wildrye)	Pseudoroegneria spicata (bluebunch wheatgrass)	Thinopyrum intermedium <sup>i</sup> (intermediate wheatgrass)	Vulpia octoflora <sup>a</sup> (sixweeks fescue)
year	Nested Frequency													
2005	-	-	-	179	24	-	-	-	-	2	-	-	-	34
2008	12	46	-	306	45	9	41	-	-	-	-	4	36	16
2013	0	85	-	60	44	133	16	1	-	12	22	-	23	-
2017	-	149	3	109	34	29	14	-	89	9	17	8	81	3
2022	4	123	5	218	33	12	26	-	11	4	17	15	107	57
year	Average Cover (%)													
2005	-	-	-	1.1	0.3	-	-	-	-	0.0	-	-	-	0.1
2008	0.1	0.3	-	8.2	0.4	0.1	0.4	-	-	-	-	0.0	0.4	0.0
2013	0.0	2.4	-	0.5	0.4	3.3	0.2	0.0	-	0.0	0.9	-	0.4	-
2017	-	7.0	0.1	1.9	1.0	0.8	0.2	-	3.7	0.0	0.6	0.2	2.8	0.0
2022	0.0	4.3	0.1	5.5	0.7	0.2	1.0	-	0.3	0.0	0.6	0.9	2.3	1.6

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

**Table 27R-18.11 - Forb Species.** Nested frequency and modified Daubenmire average cover by year.

FORB SPECIES	Alyssum desertorum <sup>ai</sup> (desert madwort)	Arabis (rockcress)	Astragalus lentiginosus (freckled milkvetch)	Astragalus megacarpus (great bladderly milkvetch)	Calochortus nuttallii (sego lily)	Ceratocephala testiculata <sup>ai</sup> (curvseed butterwort)	Chaenactis douglasii (Douglas' dustymaiden)	Cordylanthus kingii <sup>a</sup> (King's bird's-beak)	Cryptantha (cryptantha)	Cymopterus (springparsley)	Dalea searlsiae (Searls' prairie clover)	Descurainia pinnata <sup>a</sup> (western tansymustard)	Draba <sup>a</sup> (draba)	Eriogonum (buckwheat)	Eriogonum umbellatum (sulphur-flower buckwheat)	Erodium cicutarium <sup>ai</sup> (redstem stork's bill)	Frasera albomarginata (desert frasera)	
year	Nested Frequency																	
2005	-	31	-	19	3	5	13	128	-	8	-	4	126	10	12	16	2	
2008	-	8	-	7	2	5	25	4	29	22	25	2	3	-	40	-	3	
2013	-	-	-	7	4	-	6	-	-	6	22	-	-	-	61	-	-	
2017	-	5	-	7	-	-	7	17	-	-	23	5	5	-	48	-	3	
2022	1	-	10	7	6	23	-	-	-	-	10	-	11	-	37	-	-	
year	Average Cover (%)																	
2005	-	0.1	-	0.4	0.0	0.0	0.1	6.7	-	0.0	-	0.0	0.5	0.2	0.5	0.5	0.2	
2008	-	0.0	-	0.1	0.0	0.0	0.4	0.0	0.2	0.3	0.7	0.0	0.0	-	0.6	-	0.0	
2013	-	-	-	0.3	0.0	-	0.1	-	-	0.0	0.9	-	-	-	0.5	-	-	
2017	-	0.0	-	0.4	-	-	0.0	0.5	-	-	1.7	0.0	0.0	-	1.1	-	0.0	
2022	0.0	-	0.1	0.3	0.0	0.2	-	-	-	-	0.3	-	0.0	-	0.8	-	-	

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)	Hymenopappus filifolius (fineleaf hymenopappus)	Ipomopsis aggregata (scarlet gilia)	Lappula occidentalis <sup>a</sup> (flatspine stickseed)	Lesquerella (bladderpod)	Medicago sativa <sup>a</sup> (alfalfa)	Mentzelia albicaulis <sup>a</sup> (whitestem blazingstar)	Microsteris gracilis <sup>a</sup> (slender phlox)	Packera multilobata (lobeleaf groundsel)	Penstemon (beardtongue)	Penstemon palmeri (Palmer's penstemon)	Penstemon thompsoniae (Thompson's beardtongue)	Petroradia pumila (rock goldenrod)	Phlox hoodii (spiny phlox)	Polygonum douglasii <sup>a</sup> (Douglas' knotweed)	Salsola tragus <sup>ai</sup> (prickly Russian thistle)	
year	Nested Frequency																	
2005	13	124	-	2	99	3	-	-	7	0	1	-	7	7	0	2	-	
2008	7	11	-	-	6	-	5	4	6	5	-	4	2	6	0	-	2	
2013	-	-	-	-	-	-	-	-	-	-	-	1	3	24	-	-	-	
2017	-	-	7	-	-	2	-	-	-	0	3	-	9	32	-	-	-	
2022	-	11	2	-	-	-	9	-	2	-	-	-	3	15	-	-	-	
year	Average Cover (%)																	
2005	0.0	0.5	-	0.0	0.3	0.0	-	-	0.0	0.0	0.0	-	0.1	0.2	0.0	0.0	-	
2008	0.0	0.0	-	-	0.0	-	0.0	0.0	0.0	0.0	-	0.1	0.0	0.1	0.0	-	0.0	
2013	-	-	-	-	-	-	-	-	-	-	-	0.0	0.0	0.3	-	-	-	
2017	-	-	0.1	-	-	0.0	-	-	-	0.0	0.0	-	0.1	2.3	-	-	-	
2022	-	0.0	0.0	-	-	-	0.4	-	0.0	-	-	-	0.0	0.9	-	-	-	

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

FORB SPECIES			
	Sanguisorba minor <sup>i</sup> (small burnet)		
	Sphaeralcea parvifolia (smallflower globemallow)		
	unknown annual forb <sup>a</sup> (unknown forb)		
year	Nested Frequency		
2005	-	-	33
2008	2	11	-
2013	2	11	-
2017	-	2	-
2022	-	1	-
year	Average Cover (%)		
2005	-	-	0.2
2008	0.0	0.2	-
2013	0.0	0.1	-
2017	-	0.0	-
2022	-	0.0	-

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

**Table 27R-18.12 - Shrub and Tree Species.** Average modified Daubenmire quadrat and line intercept cover by year.

SHRUB SPECIES															
Artemisia tridentata ssp. vaseyana <sup>p</sup> (mountain big sagebrush)															
Bassia prostrata <sup>pi</sup> (forage kochia)															
Cercocarpus montanus <sup>p</sup> (alderleaf mountain mahogany)															
Chrysothamnus viscidiflorus ssp. viscidiflorus var. viscidiflorus (yellow rabbitbrush)															
Cylindropuntia whipplei (Whipple cholla)															
Ephedra viridis <sup>p</sup> (mormon tea)															
Escobaria (foxtail cactus)															
Gutierrezia sarothrae (broom snakeweed)															
Juniperus osteosperma <sup>i</sup> (Utah juniper)															
Opuntia (pricklypear)															
Pediocactus simpsonii (mountain ball cactus)															
Pinus edulis <sup>i</sup> (twoneedle pinyon)															
Purshia stansburiana <sup>p</sup> (Stansbury cliffrose)															
Yucca baccata (banana yucca)															
year	Line Intercept Cover (%)														
2005	1.1	-	-	-	-	-	-	0.6	21.1	0.5	-	12.5	0.1	0.7	
2008	0.3	1.1	-	-	0	0	-	0.2	-	-	-	-	0.1	0.5	
2013	1.6	5.2	-	-	-	-	-	0.5	-	-	-	-	0.1	-	
2017	6.1	7.9	-	-	0	-	-	4.1	0.8	-	-	-	0.3	-	
2022	8.1	8.2	-	-	-	-	-	0	1	-	-	-	0.6	-	
year	Quadrat Cover (%)														
2005	0.5	-	-	-	0.6	-	0.0	0.5	2.0	1.0	0.0	0.9	0.2	0.5	
2008	0.0	1.4	0.0	0.0	0.3	0.0	-	0.4	0.0	0.1	-	-	0.0	0.0	
2013	1.2	4.1	-	-	0.2	0.0	-	0.8	0.0	-	0.0	0.4	0.0	-	
2017	2.2	7.0	-	-	0.0	0.0	-	2.7	0.5	-	0.0	-	0.3	0.1	
2022	4.8	5.8	-	-	-	-	-	0.3	0.7	-	0.0	-	0.2	0.0	

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

**Table 27R-18.13 - Shrub/Tree Characteristics.** Population characteristics of shrub/tree species populations including density reproduction (seedlings), age distribution, utilization, vigor and average size (height/crown) of plants.

Year	Density		Age Class Distribution			Utilization		Poor Vigor (%)	Average Height Crown (cm)
	Plants Per Acre		Excluding Seedlings			Moderate (%)	Heavy (%)		
	Excluding Seedlings	Seedling	Young (%)	Mature (%)	Decadent (%)				
<b>Amelanchier utahensis<sup>P</sup> -- (Utah serviceberry)</b>									
2005	-	-	-	-	-	-	-	-	141/123
2008	-	-	-	-	-	-	-	-	14/37
2013	-	-	-	-	-	-	-	-	-/-
2017	-	-	-	-	-	-	-	-	75/84
2022	-	-	-	-	-	-	-	-	-/-
<b>Artemisia tridentata ssp. vaseyana<sup>P</sup> -- (mountain big sagebrush)</b>									
2005	340	80	12	59	29	18	0	24	48/63
2008	1220	120	93	5	2	3	2	0	35/49
2013	720	-	31	69	0	3	0	0	36/58
2017	1180	140	37	61	2	20	10	2	49/78
2022	1180	-	48	53	0	20	12	0	-/-
<b>Bassia prostrata<sup>PI</sup> -- (forage kochia)</b>									
2005	-	-	-	-	-	-	-	-	-/-
2008	9220	940	48	52	0	3	55	0	10/16
2013	16920	11300	53	48	0	6	2	1	23/35
2017	18100	820	22	78	0	3	0	0	15/27
2022	18180	260	20	80	0	37	2	0	-/-
<b>Cercocarpus montanus<sup>P</sup> -- (alderleaf mountain mahogany)</b>									
2005	-	-	-	-	-	-	-	-	23/31
2008	60	-	100	0	0	0	0	0	7/6
2013	-	-	-	-	-	-	-	-	-/-
2017	-	-	-	-	-	-	-	-	100/61
2022	-	-	-	-	-	-	-	-	-/-
<b>Chrysothamnus viscidiflorus ssp. viscidiflorus var. viscidiflorus -- (yellow rabbitbrush)</b>									
2005	-	-	-	-	-	-	-	-	-/-
2008	20	-	0	100	0	0	0	0	23/30
2013	-	-	-	-	-	-	-	-	-/-
2017	-	-	-	-	-	-	-	-	-/-
2022	-	-	-	-	-	-	-	-	-/-
<b>Cylindropuntia whipplei -- (Whipple cholla)</b>									
2005	180	-	11	89	0	0	0	0	19/60
2008	180	-	22	44	33	0	0	11	14/52
2013	160	-	13	75	13	0	0	13	14/53
2017	100	-	20	80	0	0	0	0	10/44
2022	20	-	100	0	0	0	0	0	-/-
<b>Ephedra viridis<sup>P</sup> -- (mormon tea)</b>									
2005	20	-	0	100	0	100	0	0	65/78
2008	80	-	0	50	50	0	100	0	33/40
2013	40	-	100	0	0	0	0	0	37/45
2017	40	-	0	100	0	100	0	0	50/51
2022	-	-	-	-	-	-	-	-	-/-
<b>Escobaria -- (foxtail cactus)</b>									
2005	60	-	0	100	0	0	0	0	3/5
2008	-	-	-	-	-	-	-	-	-/-
2013	-	-	-	-	-	-	-	-	-/-
2017	-	-	-	-	-	-	-	-	-/-
2022	-	-	-	-	-	-	-	-	-/-

Year	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>									
2005	600	60	0	100	0	0	0	0	17/25
2008	940	20	4	96	0	0	0	0	15/15
2013	1240	-	2	94	5	0	0	3	14/24
2017	5600	-	10	90	0	0	0	0	21/32
2022	1100	-	4	95	2	0	0	2	- / -
<b>Juniperus osteosperma<sup>1</sup> -- (Utah juniper)</b>									
2005	240	60	25	67	8	0	0	0	- / -
2008	60	60	67	0	33	0	0	67	- / -
2013	100	20	100	0	0	0	0	0	- / -
2017	160	-	38	63	0	0	0	0	- / -
2022	120	-	100	0	0	0	0	0	- / -
<b>Opuntia -- (pricklypear)</b>									
2005	680	20	3	91	6	0	0	6	15/46
2008	40	-	0	100	0	0	0	0	15/57
2013	20	-	0	100	0	0	0	0	- / -
2017	-	-	-	-	-	-	-	-	- / -
2022	-	-	-	-	-	-	-	-	- / -
<b>Pediocactus simpsonii -- (mountain ball cactus)</b>									
2005	20	-	100	0	0	0	0	0	- / -
2008	-	-	-	-	-	-	-	-	- / -
2013	60	-	0	100	0	0	0	0	5/6
2017	40	-	0	100	0	0	0	0	2/7
2022	40	-	0	100	0	0	0	0	- / -
<b>Pinus edulis<sup>t</sup> -- (twoneedle pinyon)</b>									
2005	40	80	0	100	0	0	0	0	- / -
2008	-	-	-	-	-	-	-	-	- / -
2013	-	-	-	-	-	-	-	-	- / -
2017	-	-	-	-	-	-	-	-	- / -
2022	-	-	-	-	-	-	-	-	- / -
<b>Purshia stansburiana<sup>p</sup> -- (Stansbury cliffrose)</b>									
2005	100	-	0	80	20	0	100	0	103/97
2008	40	20	100	0	0	0	0	0	14/18
2013	80	-	25	75	0	50	0	0	57/71
2017	60	-	0	100	0	0	33	0	93/104
2022	60	-	0	100	0	33	67	0	- / -
<b>Yucca baccata -- (banana yucca)</b>									
2005	120	-	17	83	0	0	0	0	46/77
2008	20	-	0	100	0	0	0	0	32/53
2013	120	-	0	100	0	0	0	0	27/52
2017	60	-	67	33	0	0	0	0	37/55

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



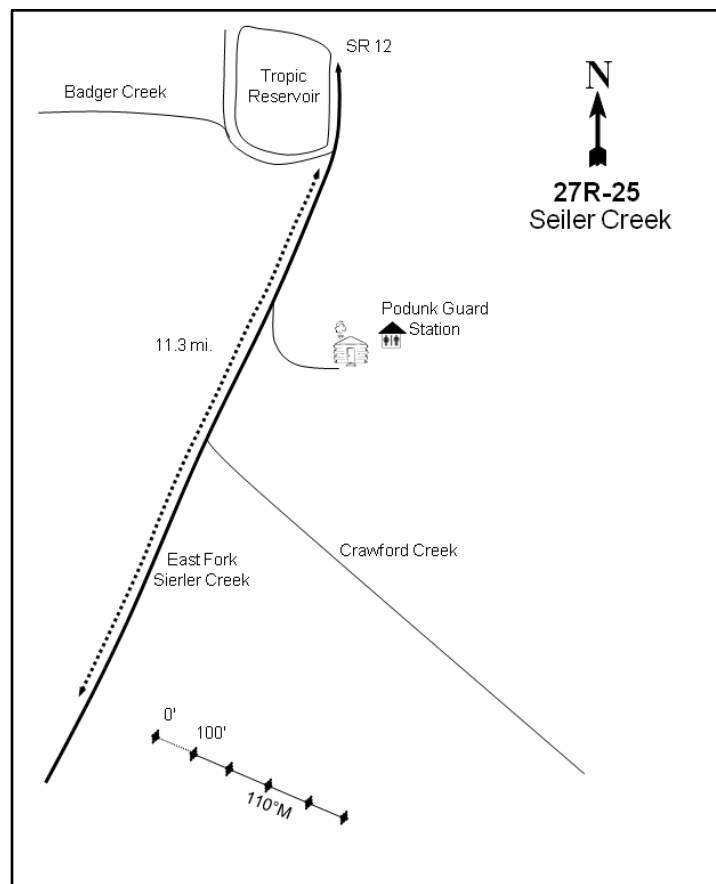
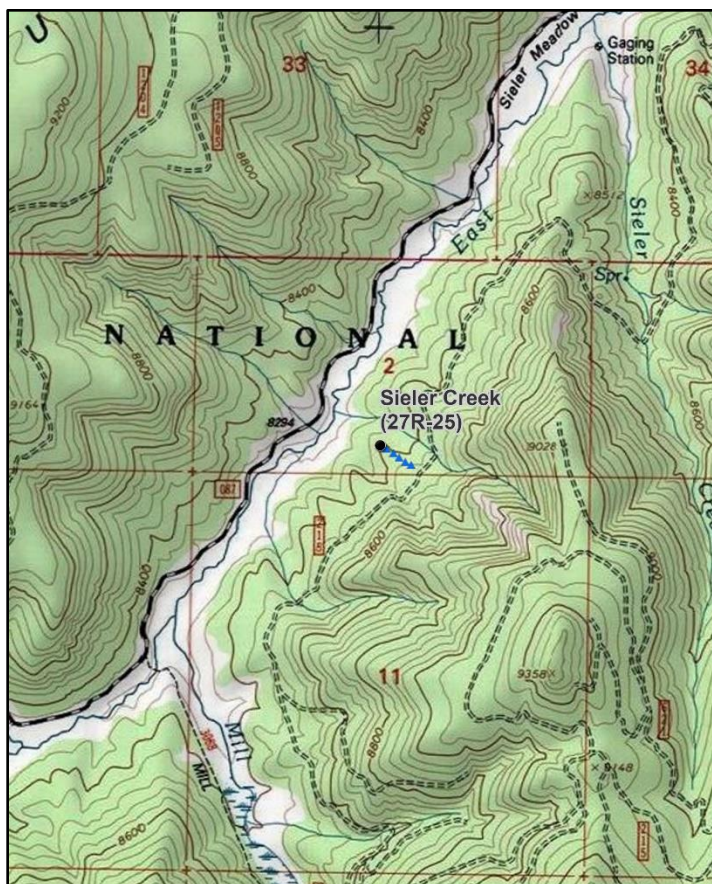
**Table 27R-18.14 - Tree Characteristics.** Point-quarter tree density, size class distribution, and average diameter.

Year	Density	Size Class Distribution					Average Diameter (cm)
	Trees per Acre	Seedling (%)	1-4' (%)	4-8' (%)	8-12' (%)	>12' (%)	
<b>Juniperus osteosperma (Utah juniper)</b>							
2005	127	5	15	5	10	65	33.5
2008	19	-	100	-	-	-	17.9
2013	22	27	73	-	-	-	9.8
2017	36	33	67	-	-	-	3.3
2022	23	38	38	23	-	-	3.5
<b>Pinus edulis (twoneedle pinyon)</b>							
2005	89	17	28	11	22	22	11.2
2022	5	100	-	-	-	-	1.0

**Table 27R-18.15 - Deer Desirable Components Index: Upland 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
2005	1.5	0.0	0.0	0.6	-0.9	3.5	0.0	4.6	Very Poor
2008	2.2	0.0	0.0	3.4	-6.2	5.5	0.0	5.0	Very Poor
2013	10.0	15.0	15.0	15.4	-0.4	4.7	0.0	59.7	Fair
2017	19.9	14.7	13.9	30.0	-1.4	10.0	0.0	87.1	Excellent
2022	23.3	15.0	15.0	21.1	-5.3	5.8	0.0	74.9	Good

## SIELER CREEK - STUDY NO. 27R-25



### Location Information

USGS 7.5 min Map Info  
GPS (0' Stake)

Podunk Creek NW; Township 39S, Range 4W, Section 02  
NAD 83 UTM ZONE 12, 382017 East 4144864 North

### Transect Information

Browse Tag # (0' Stake)	Not Available
Transect Bearing	110° magnetic
Length	500ft
Belt Placement	Line 1 (11ft), Line 2 (34ft), Line 3 (59ft), Line 4 (71ft), Line 5 (95ft)
Belt Marker Placement	No Rebar

### Directions to Site

On SR-12 at the southern end of Tropic Reservoir, drive south for 11.3 miles. The study site will be on the left (east) side of the road.

**Site Information**

Land Ownership	Federal
Land Administrator	USFS
Allotment	East Fork/Crawford
Elevation	8,367ft (2,550m)
Aspect	West
Slope	6-8%
Sample Dates	07/31/2013, 08/24/2016, 08/10/2022

**Table 27R-25.1 Disturbance History.** Recorded history of major disturbances.

Treatment/Disturbance	Name	WRI DB#	Date	Size (acres)
Hand Crew - Lop-Pile-Burn	Sieler Stewardship	2716	August-September 2014	70
Logging - Coppice Cutting	Sieler Stewardship	2716	October-June 2014-2015	70

**Wildlife Habitat and Vegetation History**

**Table 27R-25.3 - Wildlife Seasonal Habitat.** DWR wildlife habitat and seasonality.

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

**Table 27R-25.4 - Vegetation History.** The dominant vegetation type(s) and phase of woodland succession (Tausch, Miller, Roundy, & Chambers, 2009).

Year	Vegetation Type	Woodland Succession
2013	Quaking Aspen-Conifer Encroached	NA
2016	Perennial Grass	NA
2022	Perennial Grass	NA

**Site Notes**

There is evidence of a historic logging treatment toward the end of the transect.

**Site Potential**

1981 - 2010 Average Annual Precipitation	25 inches
NRCS Ecological Site	High Mountain Loam (Aspen)
NRCS Ecological Site #	R047XB508UT
States and Transitions	No state and transition model is available for this ecological site.

When established in 2013, the site was dominated by a mixture of conifers and quaking aspen (*Populus tremuloides*); most of the shrub and tree cover was removed by a 2014 logging/clear-cut treatment (Table 27R-25.1, Table 27R-25.12). The herbaceous understory was initially lacking, but perennial grasses -- mainly Kentucky bluegrass (*Poa pratensis*) and Ross' sedge (*Carex rossii*) -- increased in cover and dominated the site following treatment (Table 27R-25.7, Table 27R-25.10). Aspen may be slow to re-establish on this site: a majority of the plants showed moderate to heavy use in 2016, and in 2022 density decreased substantially. Subalpine fir (*Abies lasiocarpa*) was recorded in cover and density data in low amounts following treatment, indicating that this site could again be encroached by conifers in the future (Table 27R-25.12, Table 27R-25.13).

**Trend Summary Tables**

**Table 27R-25.6 - Shrub/Tree Summary.** Average modified Daubenmire quadrat and line intercept cover by year for shrubs/trees

Year	Quadrat Cover (%)			Line-intercept Cover (%)		
	Preferred Shrub	Other Shrub	Tree	Preferred Shrub	Other Shrub	Tree
2013	1.4	0.8	18.1	0.1	1.4	57.8
2016	0.5	0.6	0.3	0.5	0.2	0.5
2022	1.8	0.5	0.4	5.5	0.9	0.9

**Table 27R-25.7 - Herbaceous Summary.** Nested frequency and average modified Daubenmire quadrat cover by year for herbaceous functional groups

Year	Nested Frequency				Quadrat Cover (%)			
	Annual Grass	Perennial Grass	Annual/Biennial Forb	Perennial Forb	Annual Grass	Perennial Grass	Annual/Biennial Forb	Perennial Forb
2013	-	44	1	61	-	1.8	0.0	4.0
2016	-	208	125	149	-	13.1	6.3	3.9
2022	-	405	53	225	-	37.9	1.3	11.8

**Table 27R-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
2013	0.4	0.2	90.5	-	-	24.3
2016	15.7	0.1	64.7	0.3	0.1	24.0
2022	23.3	0.8	49.8	0.5	0.1	49.5

**Table 27R-25.9 - Pellet Group Data.** Quadrat frequency and pellet group transect data for animal pellets. Rabbit pellet groups are not sampled in the pellet group transect.

Year	Cattle	Mule Deer	Rocky Mountain Elk
	Quadrat Frequency		
2013	-	-	-
2016	-	3	1
2022	5	1	3
Days Use Per Acre (ha)			
2013	-	3.4 (8.3)	0.7 (1.7)
2016	2.9 (7.2)	2.0 (5.0)	6.7 (16.6)
2022	8.7 (21.5)	6.7 (16.6)	6.0 (14.9)

**Table 27R-25.10 - Grass Species.** Nested frequency and modified Daubenmire average cover by year.

GRASS SPECIES	Achnatherum nelsonii (Columbia needlegrass)	Bromus marginatus (mountain brome)	Bromus porteri (Porter brome)	Carex microptera (smallwing sedge)	Carex rossii (Ross' sedge)	Carex vallicola (valley sedge)	Deschampsia (hairgrass)	Elymus trachycaulus (stender wheatgrass)	Hordeum jubatum (foxtail barley)	Koeleria macrantha (prairie Junegrass)	Phleum pratense <sup>i</sup> (timothy)	Poa (bluegrass)	Poa pratensis <sup>i</sup> (Kentucky bluegrass)
year	Nested Frequency												
2013	11	6	3	-	-	-	-	2	-	1	-	-	31
2016	-	12	2	17	112	15	1	23	-	2	-	2	74
2022	7	-	-	7	64	7	-	86	21	6	3	-	326
year	Average Cover (%)												
2013	0.6	0.0	0.0	-	-	-	-	0.0	-	0.0	-	-	1.1
2016	-	0.8	0.0	1.1	4.4	0.7	0.1	0.7	-	0.0	-	0.1	5.0
2022	0.4	-	-	0.6	4.2	0.7	-	3.5	0.4	0.2	0.1	-	27.8

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

**Table 27R-25.11 - Forb Species.** Nested frequency and modified Daubenmire average cover by year.

FORB SPECIES	Achillea millefolium (Common yarrow)	Agoseris glauca (pale agoseris)	Androsace septentrionalis <sup>ai</sup> (pygmyflower rockjasmine)	Antennaria (pussytoes)	Arabis drummondii (Drummond's rockress)	Arenaria (sandwort)	Chenopodium atrovirens <sup>a</sup> (pinyon goosefoot)	Chenopodium leptophyllum <sup>a</sup> (narrowleaf goosefoot)	Chenopodium rubrum <sup>a</sup> (red goosefoot)	Cirsium (thistle)	Cirsium vulgare <sup>ai</sup> (bull thistle)	Conyza <sup>a</sup> (horseweed)	Descurainia incana <sup>a</sup> (mountain tansymustard)	Dracocephalum parviflorum (American dragonhead)	Epilobium (willowherb)	Erigeron divergens <sup>a</sup> (spreading fleabane)	Erigeron flagellaris (trailing fleabane)
year	Nested Frequency																
2013	24	1	1	2	1	-	-	-	-	-	-	-	-	-	-	-	19
2016	9	-	14	-	-	-	119	-	-	-	0	1	0	4	3	1	12
2022	22	5	10	3	-	7	24	10	4	6	3	-	0	22	-	1	14
year	Average Cover (%)																
2013	0.6	0.0	0.0	0.1	0.0	-	-	-	-	-	-	-	-	-	-	-	0.8
2016	0.2	-	0.3	-	-	-	5.5	-	-	-	0.4	0.0	0.0	0.3	0.0	0.1	0.1
2022	0.8	0.0	0.0	0.1	-	0.1	0.7	0.2	0.0	0.2	0.3	-	0.0	0.4	-	0.0	0.3

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

FORB SPECIES	Fragaria virginiana (Virginia strawberry)	Gayophytum ramosissimum <sup>a</sup> (pinyon groundsmoke)	Lappula occidentalis <sup>a</sup> (flatspine stickseed)	Lathyrus lanszwertii (Nevada pea)	Ligusticum porteri (Porter's licorice-root)	Mertensia arizonica (aspen bluebells)	Osmorhiza depauperata (bluntseed sweetroot)	Physaria (twinpod)	Polygonum aviculare <sup>i</sup> (prostrate knotweed)	Potentilla gracilis (slender cinquefoil)	Ranunculus inamoenus (graceful buttercup)	Symphyotrichum ascendens (western aster)	Taraxacum officinale (common dandelion)	Thalictrum fendleri (Fendler's meadow-rue)	Tragopogon dubius <sup>ai</sup> (yellow salsify)	Trifolium (clover)	Vicia americana (American vetch)
year	Nested Frequency																
2013	1	-	-	7	2	4	11	2	-	-	1	11	15	4	-	11	10
2016	0	-	-	3	1	2	-	-	5	-	21	3	78	3	0	16	49
2022	-	1	2	10	-	-	-	8	17	2	14	21	161	1	2	-	4
year	Average Cover (%)																
2013	0.0	-	-	0.6	0.1	0.1	0.4	0.0	-	-	0.0	0.3	0.5	0.0	-	0.2	0.0
2016	0.0	-	-	0.0	0.0	0.0	-	-	0.1	-	0.3	0.0	2.2	0.0	0.0	0.1	0.4
2022	-	0.0	0.0	0.1	-	-	-	0.1	0.2	0.0	0.1	0.7	8.8	0.0	0.0	-	0.0

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

FORB SPECIES	
	Viola (violet)
year	Nested
2013	5
2016	-
2022	3
year	Average Cover (%)
2013	0.0
2016	-
2022	0.0

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

**Table 27R-25.12 - Shrub and Tree Species.** Average modified Daubenmire quadrat and line intercept cover by year.

SHRUB SPECIES												
Abies lasiocarpa <sup>a</sup> (subalpine fir)												
Ericameria nauseosa (rubber rabbitbrush)												
Ericameria parryi var. parryi (Parry's rabbitbrush)												
Juniperus communis (common juniper)												
Mahonia repens (creeping barberry)												
Picea engelmannii <sup>a</sup> (Engelmann spruce)												
Pinus flexilis <sup>a</sup> (limber pine)												
Populus tremuloides <sup>a</sup> (quaking aspen)												
Ribes cereum <sup>p</sup> (wax currant)												
Ribes montigenum <sup>p</sup> (gooseberry currant)												
Symphoricarpos oreophilus <sup>p</sup> (mountain snowberry)												
year	Line Intercept Cover (%)											
2013	34.5	0.1	-	1.3	-	10.4	1	11.9	-	-	0.1	
2016	0.2	-	0.2	-	-	-	-	0.3	0.3	-	0.2	
2022	-	-	0.9	-	-	0.8	-	0.1	2.2	2.4	0.9	
year	Quadrat Cover (%)											
2013	12.4	0.3	-	0.4	0.0	1.4	0.6	3.6	1.2	-	0.2	
2016	0.0	-	0.6	-	-	-	-	0.3	0.3	0.0	0.1	
2022	-	-	0.5	-	-	0.4	-	0.0	1.8	0.0	0.0	

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

**Table 27R-25.13 - Shrub/Tree Characteristics.** Population characteristics of shrub/tree species populations including density reproduction (seedlings), age distribution, utilization, vigor and average size (height/crown) of plants.

Year	Density		Age Class Distribution			Utilization		Poor Vigor (%)	Average Height Crown (cm)
	Plants Per Acre		Excluding Seedlings			Moderate (%)	Heavy (%)		
	Excluding Seedlings	Seedling	Young (%)	Mature (%)	Decadent (%)				
<b>Abies lasiocarpa<sup>t</sup> -- (subalpine fir)</b>									
2013	3080	1360	94	5	1	0	0	3	- / -
2016	140	20	100	0	0	0	0	0	- / -
2022	20	-	100	0	0	0	0	0	- / -
<b>Ericameria nauseosa -- (rubber rabbitbrush)</b>									
2013	80	-	0	100	0	0	0	25	58/73
2016	-	-	-	-	-	-	-	-	- / -
2022	40	-	0	100	0	0	0	0	- / -
<b>Ericameria parryi var. parryi -- (Parry's rabbitbrush)</b>									
2013	-	-	-	-	-	-	-	-	- / -
2016	200	-	0	100	0	0	0	10	35/43
2022	460	-	0	96	4	0	0	4	- / -
<b>Juniperus communis -- (common juniper)</b>									
2013	260	-	8	92	0	0	0	0	73/120
2016	-	-	-	-	-	-	-	-	- / -
2022	-	-	-	-	-	-	-	-	- / -
<b>Mahonia repens -- (creeping barberry)</b>									
2013	160	-	0	100	0	0	0	0	12/22
2016	-	-	-	-	-	-	-	-	- / -
2022	-	-	-	-	-	-	-	-	- / -
<b>Picea engelmannii<sup>t</sup> -- (Engelmann spruce)</b>									
2013	220	20	36	36	27	0	0	9	- / -
2016	-	-	-	-	-	-	-	-	- / -
2022	60	-	100	0	0	0	0	0	- / -
<b>Ribes cereum<sup>p</sup> -- (wax currant)</b>									
2013	40	-	50	50	0	0	50	0	37/59
2016	460	220	74	26	0	13	30	4	20/27
2022	800	-	25	73	3	5	25	8	- / -
<b>Ribes montigenum<sup>p</sup> -- (gooseberry currant)</b>									
2013	-	-	-	-	-	-	-	-	- / -
2016	40	-	100	0	0	0	0	0	23/28
2022	-	-	-	-	-	-	-	-	- / -
<b>Rosa woodsii<sup>p</sup> -- (Woods' rose)</b>									
2013	-	-	-	-	-	-	-	-	- / -
2016	-	-	-	-	-	-	-	-	27/31
2022	-	-	-	-	-	-	-	-	- / -
<b>Symphoricarpos oreophilus<sup>p</sup> -- (mountain snowberry)</b>									
2013	240	-	42	58	0	0	0	0	27/43
2016	80	-	0	100	0	0	100	0	39/66
2022	220	-	27	73	0	0	64	0	- / -

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

**Table 27R-25.13a - Aspen Characteristics.** Characteristics of aspen populations including density, size class distribution, and vigor of plants.

Year	Density	Size Class Distribution				Utilization		Poor Vigor (%)
	Plants per Acre	Class I (%)	Class II (%)	Class III (%)	Class IV (%)	Moderate (%)	Heavy (%)	
<b>Populus tremuloides (quaking aspen)</b>								
2013	1680	51	46	-	2	5	0	0
2016	880	70	30	-	-	15	85	8
2022	20	100	-	-	-	0	0	0

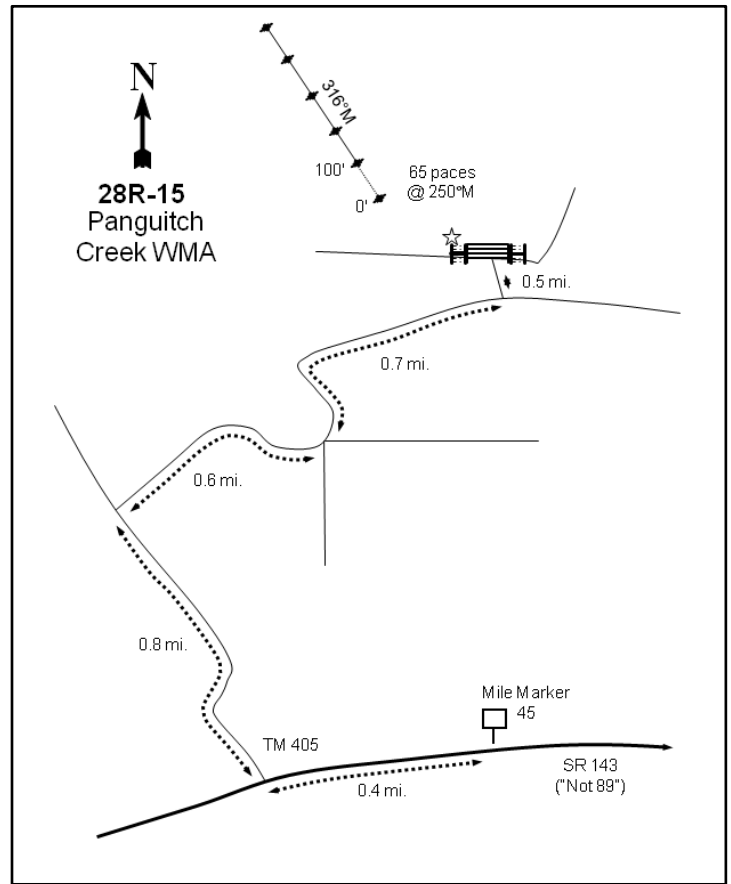
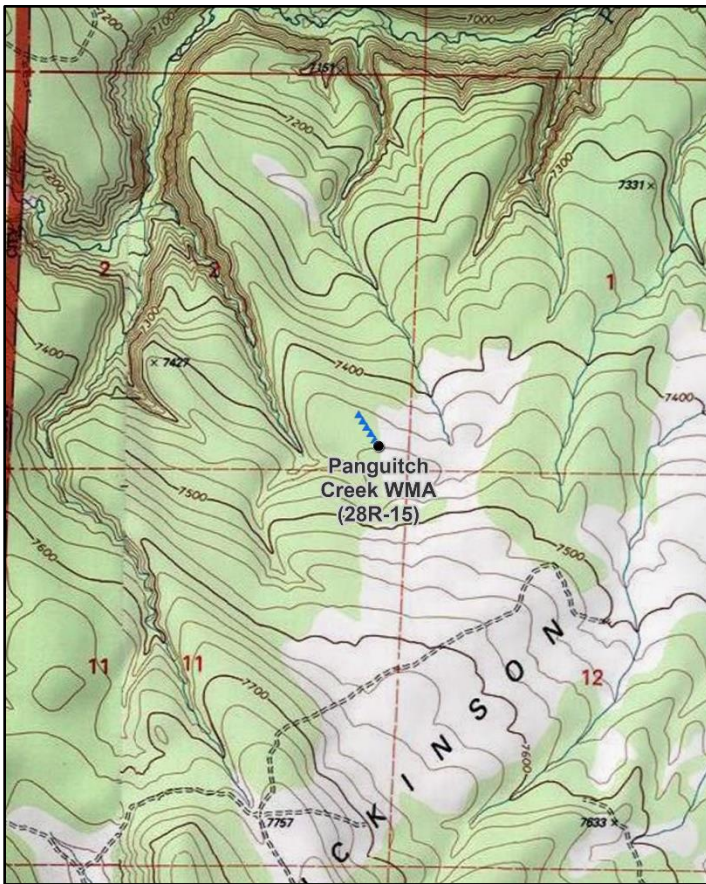
Class I - <= 1.5 feet; Class II - > 1.5 feet to 5 feet; Class III - > 5 feet and up to 1 inch diameter at breast height (dbh); Class IV - > 1 in diameter at breast height (dbh)



**Table 27R-25.14 - Tree Characteristics.** Point-quarter tree density, size class distribution, and average diameter.

Year	Density	Size Class Distribution					Average Diameter (cm)
	Trees per Acre	Seedling (%)	1-4' (%)	4-8' (%)	8-12' (%)	>12' (%)	
<b>Abies concolor (white fir)</b>							
2013	346	11	42	-	5	42	17.5
2016	24	20	80	-	-	-	2.4
<b>Abies lasiocarpa (subalpine fir)</b>							
2022	19	-	90	10	-	-	4.4
<b>Picea engelmannii (Engelmann spruce)</b>							
2013	136	-	-	16	11	74	24.2
2016	3	100	-	-	-	-	1.0
<b>Populus tremuloides (quaking aspen)</b>							
2013	264	30	35	10	-	25	11.6
2016	55	71	29	-	-	-	1.2

## PANGUITCH CREEK WMA - STUDY NO. 28R-15



### Location Information

USGS 7.5 min Map Info  
GPS (0' Stake)

Panguitch SW; Township 35S, Range 6W, Section 02  
NAD 83 UTM ZONE 12, 368890 East 4183562 North

### Transect Information

Browse Tag # (0' Stake)	532
Transect Bearing	316° magnetic
Length	500ft
Belt Placement	Line 1 (11ft), Line 2 (34ft), Line 3 (59ft), Line 4 (71ft), Line 5 (95ft)
Belt Marker Placement	No Rebar

### Directions to Site

From the stoplight in Panguitch, travel on Highway 143 (also known as "Not 89"). Turn right (north) 0.4 miles west from mile marker 45. From trail marker 405 go through the gate and continue for 0.8 miles. Turn right and drive for 0.6 miles, turn left and go 0.7 miles, and then turn left again and proceed for 0.1 miles. Walk down the trail to the WMA fence. From the east gate post, walk 65 paces at 250 degrees magnetic to the 0-foot stake which is marked with browse tag #532.

**Site Information**

Land Ownership	State
Land Administrator	DWR
Allotment	SOUTH CANYON
Elevation	7,400ft (2,256m)
Aspect	West-Northwest
Slope	1-3%
Sample Dates	06/23/2009, 07/15/2010, 08/05/2013, 08/29/2017, 07/26/2022

**Table 28R-15.1 Disturbance History.** Recorded history of major disturbances.

Treatment/Disturbance	Name	WRI DB#	Date	Size (acres)
Chaining - Two-Way Ely	Panguitch Creek WMA PJ Thinning	1206	November 2008	383
Seeding - Aerial Before	Panguitch Creek WMA PJ Thinning	1206	November 2008	383
Seeding - Dribbler	Panguitch Creek WMA PJ Thinning	1206	November 2008	383
Hand Crew - Lop and Scatter	Annual Habitat Restoration Project Maintenance	1998	August 2013	1274

**Table 28R-15.2 Seed Mix.** List of known seeded plant species and rates (if available).

Mix Name			Application Type	Application Date	Acres
Panguitch Creek WMA PJ Chain/Bullhog			Aerial	Nov 2008	383
Type	Species	Common Name	Cultivar/Source ID	Bulk lbs/acre	PLS
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-15.3 - Wildlife Seasonal Habitat.** DWR 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	brood-rearing

**Table 28R-15.4 - Vegetation History.** The dominant vegetation type(s) and phase of woodland succession (Tausch, Miller, Roundy, & Chambers, 2009).

Year	Vegetation Type	Woodland Succession
2009	Black Sagebrush	Phase I
2010	Black Sagebrush	Phase I
2013	Black Sagebrush/Perennial Grass	Phase I
2017	Black Sagebrush/Perennial Grass	Phase I
2022	Black Sagebrush/Perennial Grass	Phase I

**Site Notes**

In 2009, data was collected along the baseline and belt transects were not used. In 2010, the study was converted to the normal methodology with belts intersecting the baseline at randomized intervals. Pellet group data estimated a heavy presence by deer in 2013 (Table 28R-15.9).

**Site Potential**

1981 - 2010 Average Annual Precipitation	15 inches
NRCS Ecological Site	Upland Gravelly Loam (Black Sagebrush)
NRCS Ecological Site #	R047XB306UT
States and Transitions	No state and transition model is available for this ecological site.

Since study establishment in 2009, this site has remained a black sagebrush (*Artemisia nova*) dominated plant community with a few other shrubs present that have contributed nominal cover (Table 28R-15.12). The herbaceous understory has consisted of a diverse mixture of perennial grasses and forbs, although forbs provided minimal cover. The perennial species blue grama (*Bouteloua gracilis*) has been the most abundant grass in all sample years, and has been a co-dominant vegetation component since 2013 (Table 28R-15.7, Table 28R-15.10, Table 28R-15.11). Although a majority of twoneedle pinyon (*Pinus edulis*) trees were removed prior to study establishment, remaining trees indicate that there is potential for future infilling to occur (Table 28R-15.14).

**Trend Summary Tables****Table 28R-15.6 - Shrub/Tree Summary.** Average modified Daubenmire quadrat and line intercept cover by year for shrubs/trees

Year	Quadrat Cover (%)			Line-intercept Cover (%)		
	Preferred Shrub	Other Shrub	Tree	Preferred Shrub	Other Shrub	Tree
2009	7.0	0.3	1.2	7.3	0.1	2.9
2010	7.8	0.6	1.0	10.5	0.1	1.4
2013	7.7	1.0	0.5	10.1	0.7	0.7
2017	10.3	2.2	-	13.4	1.8	-
2022	13.1	0.1	0.1	16.4	-	-

**Table 28R-15.7 - Herbaceous Summary.** Nested frequency and average modified Daubenmire quadrat cover by year for herbaceous functional groups

Year	Nested Frequency				Quadrat Cover (%)			
	Annual Grass	Perennial Grass	Annual/Biennial Forb	Perennial Forb	Annual Grass	Perennial Grass	Annual/Biennial Forb	Perennial Forb
2009	-	123	1	21	-	3.6	0.0	0.1
2010	2	133	36	52	0.0	4.0	1.4	1.5
2013	-	336	7	79	-	14.7	0.0	0.9
2017	-	396	8	82	-	27.3	0.0	1.2
2022	-	366	19	166	-	21.8	0.1	2.7

**Table 28R-15.8 - Basic Ground Cover.** Average modified Daubenmire quadrat cover by year for basic ground cover types.

Year	Cover Type (%)					
	Bare Ground	Cryptogams	Litter	Pavement	Rock	Vegetation
2009	18.9	0.3	52.2	6.3	11.1	15.1
2010	16.4	0.0	56.8	8.1	11.9	17.1
2013	10.3	0.0	47.5	3.4	16.9	27.0
2017	8.7	-	46.6	7.3	10.9	40.6
2022	20.4	0.1	48.1	10.5	15.6	36.3

**Table 28R-15.9 - Pellet Group Data.** Quadrat frequency and pellet group transect data for animal pellets. Rabbit pellet groups are not sampled in the pellet group transect.

Year	Cattle	Mule Deer	Rocky Mountain Elk	Rabbit
	Quadrat Frequency			
2009	-	5	1	6
2010	-	6	1	7
2013	1	24	10	13
2017	-	32	2	19
2022	-	31	2	2
Year	Days Use Per Acre (ha)			
2009	-	-	-	-
2010	-	2.7 (6.6)	0.7 (1.7)	-
2013	-	46.2 (114.2)	10.0 (24.8)	-
2017	-	64.3 (158.9)	10.0 (24.8)	-
2022	-	7.4 (18.2)	4.7 (11.6)	-

**Table 28R-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)	Bouteloua gracilis (blue grama)	Bromus tectorum <sup>ai</sup> (cheatgrass)	Carex (sedge)	Elymus elymoides (squirreltail)	Hesperosipa comata (needle and thread)	Poa fendleriana (muttongrass)	Poa secunda (Sandberg bluegrass)	Psathyrostachys juncea <sup>i</sup> (Russian wildrye)	Pseudoroegneria spicata (bluebunch wheatgrass)	Thinopyrum intermedium <sup>i</sup> (intermediate wheatgrass)
year	Nested Frequency											
2009	16	11	88	-	-	4	10	-	-	-	-	6
2010	6	2	67	2	-	48	3	9	-	2	-	13
2013	13	7	233	-	7	81	14	32	-	14	15	43
2017	16	4	298	-	20	72	4	38	-	14	19	95
2022	9	7	226	-	37	88	17	28	1	29	5	124
year	Average Cover (%)											
2009	0.1	0.0	3.3	-	-	0.0	0.1	-	-	-	-	0.0
2010	0.1	0.0	2.3	0.0	-	1.0	0.0	0.1	-	0.0	-	0.3
2013	0.5	0.1	8.4	-	0.2	2.0	0.1	1.2	-	0.7	0.5	0.9
2017	0.4	0.1	16.4	-	0.4	3.1	0.0	2.7	-	0.3	0.6	3.2
2022	0.5	0.2	8.7	-	0.9	2.0	0.8	1.2	0.0	1.9	0.3	5.4

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

**Table 28R-15.11 - Forb Species.** Nested frequency and modified Daubenmire average cover by year.

FORB SPECIES	Arabid (rockcress)	Astragalus argophyllus (silverleaf milkvetch)	Astragalus calycosus (Torrey's milkvetch)	Astragalus lentiginosus (freckled milkvetch)	Chenopodium album <sup>a</sup> (lambsquarters)	Chenopodium leptophyllum <sup>a</sup> (narrowleaf goosefoot)	Cryptantha (cryptantha)	Descurainia pinnata <sup>a</sup> (western tansymustard)	Draba <sup>a</sup> (draba)	Erigeron pumilus (shaggy fleabane)	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)	Lesquerella (bladderpod)	Linum kingii (King's flax)	Linum perenne <sup>i</sup> (blue flax)
year	Nested Frequency																
2009	-	-	-	-	1	-	1	-	-	2	-	-	-	-	-	-	-
2010	-	-	2	-	3	17	3	6	3	3	7	2	3	-	2	-	4
2013	-	-	-	-	-	-	21	-	-	3	-	-	-	-	-	6	32
2017	2	1	-	7	-	2	14	-	-	9	-	3	-	-	8	19	13
2022	-	-	-	3	-	-	7	16	-	-	-	-	-	3	-	104	7
year	Average Cover (%)																
2009	-	-	-	-	0.0	-	0.0	-	-	0.0	-	-	-	-	-	-	-
2010	-	-	0.3	-	0.2	0.2	0.2	0.0	0.2	0.0	0.8	0.0	0.0	-	0.1	-	0.1
2013	-	-	-	-	-	-	0.3	-	-	0.0	-	-	-	-	-	0.0	0.2
2017	0.0	0.0	-	0.3	-	0.0	0.3	-	-	0.1	-	0.0	-	-	0.1	0.1	0.0
2022	-	-	-	0.0	-	-	0.2	0.1	-	-	-	-	-	0.0	-	1.8	0.0

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

FORB SPECIES	Medicago sativa <sup>a</sup> (alfalfa)	Packera multilobata (lobeleaf groundsel)	Penstemon (beardtongue)	Penstemon palmeri (Palmer's penstemon)	Phlox longifolia (longleaf phlox)	Pleiocanthus spinosus (thorn skeletonweed)	Sisymbrium altissimum <sup>ai</sup> (tall tumbledmustard)	Sphaeralcea coccinea (scarlet globemallow)	Tragopogon dubius <sup>ai</sup> (yellow salsify)	Trifolium (clover)
year	Nested Frequency									
2009	2	9	-	-	7	-	-	-	-	-
2010	2	27	2	-	7	2	-	2	-	2
2013	-	16	-	3	3	1	7	4	-	-
2017	-	11	-	-	7	1	-	7	3	-
2022	-	65	-	-	11	1	-	10	-	-
year	Average Cover (%)									
2009	0.0	0.1	-	-	0.0	-	-	-	-	-
2010	0.0	0.4	0.2	-	0.0	0.1	-	0.0	-	0.0
2013	-	0.1	-	0.1	0.0	0.1	0.0	0.0	-	-
2017	-	0.1	-	-	0.0	0.1	-	0.1	0.0	-
2022	-	0.3	-	-	0.0	0.1	-	0.2	-	-

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

**Table 28R-15.12 - Shrub and Tree Species.** Average modified Daubenmire quadrat and line intercept cover by year.

SHRUB SPECIES	Line Intercept Cover (%)							
	Artemisia nova <sup>p</sup> (black sagebrush)	Artemisia tridentata ssp. wyomingensis <sup>p</sup> (Wyoming big sagebrush)	Chrysothamnus viscidiflorus (yellow rabbitbrush)	Gutierrezia sarothrae (broom snakeweed)	Opuntia (pricklypear)	Pediocactus simpsonii (mountain ball cactus)	Pinus edulis <sup>t</sup> (twoneedle pinyon)	Sclerocactus (fishhook cactus)
year	Line Intercept Cover (%)							
2009	7.3	-	-	0.1	-	-	2.9	-
2010	10.5	-	-	-	0.1	-	1.4	-
2013	10.1	-	-	0.6	0.1	-	0.7	-
2017	13.2	0.2	-	1.7	0.1	-	-	-
2022	16.4	-	-	-	-	-	0	-
year	Quadrat Cover (%)							
2009	7.0	-	0.0	0.1	0.1	-	1.2	0.0
2010	7.8	-	-	0.2	0.3	-	1.0	-
2013	7.7	-	-	0.8	0.2	-	0.5	-
2017	10.3	0.0	-	2.1	0.0	0.0	-	-
2022	13.1	-	-	0.1	-	-	0.1	-

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

**Table 28R-15.13 - Shrub/Tree Characteristics.** Population characteristics of shrub/tree species populations including density reproduction (seedlings), age distribution, utilization, vigor and average size (height/crown) of plants.

Year	Density		Age Class Distribution			Utilization		Poor Vigor (%)	Average Height Crown (cm)
	Plants Per Acre		Excluding Seedlings			Moderate (%)	Heavy (%)		
	Excluding Seedlings	Seedling	Young (%)	Mature (%)	Decadent (%)				
<b>Amelanchier utahensis<sup>p</sup> -- (Utah serviceberry)</b>									
2009	-	-	-	-	-	-	-	-	-/-
2010	-	-	-	-	-	-	-	-	-/-
2013	-	-	-	-	-	-	-	-	-/-
2017	-	-	-	-	-	-	-	-	37/54
2022	-	-	-	-	-	-	-	-	-/-
<b>Artemisia nova<sup>p</sup> -- (black sagebrush)</b>									
2009	-	-	-	-	-	-	-	-	26/47
2010	3800	80	9	87	4	1	0	5	37/54
2013	7580	5440	45	52	2	25	13	7	23/49
2017	13140	180	53	45	2	8	8	1	26/55
2022	9880	480	30	63	7	13	11	6	-/-
<b>Artemisia tridentata ssp. wyomingensis<sup>p</sup> -- (Wyoming big sagebrush)</b>									
2009	-	-	-	-	-	-	-	-	-/-
2010	-	-	-	-	-	-	-	-	-/-
2013	-	-	-	-	-	-	-	-	-/-
2017	20	-	100	0	0	0	0	0	-/-
2022	20	-	0	100	0	0	100	0	-/-
<b>Bassia prostrata<sup>pi</sup> -- (forage kochia)</b>									
2009	-	-	-	-	-	-	-	-	-/-
2010	-	-	-	-	-	-	-	-	38/32
2013	-	-	-	-	-	-	-	-	-/-
2017	-	-	-	-	-	-	-	-	-/-
2022	-	-	-	-	-	-	-	-	-/-



Year	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>									
2009	-	-	-	-	-	-	-	-	16/13
2010	220	-	9	91	0	0	0	0	23/25
2013	2020	300	36	63	1	0	0	1	16/20
2017	5020	-	2	98	0	0	0	0	17/20
2022	740	1360	41	60	0	0	0	0	- / -
<b>Juniperus osteosperma<sup>1</sup> -- (Utah juniper)</b>									
2009	-	-	-	-	-	-	-	-	- / -
2010	-	-	-	-	-	-	-	-	- / -
2013	20	-	100	0	0	0	0	0	- / -
2017	-	-	-	-	-	-	-	-	- / -
2022	-	-	-	-	-	-	-	-	- / -
<b>Opuntia -- (pricklypear)</b>									
2009	-	-	-	-	-	-	-	-	20/31
2010	160	-	25	75	0	0	0	0	13/28
2013	140	-	0	100	0	0	0	14	12/40
2017	60	-	0	100	0	0	0	0	11/31
2022	-	-	-	-	-	-	-	-	- / -
<b>Pediocactus simpsonii -- (mountain ball cactus)</b>									
2009	-	-	-	-	-	-	-	-	- / -
2010	-	-	-	-	-	-	-	-	- / -
2013	-	-	-	-	-	-	-	-	- / -
2017	20	40	0	100	0	0	0	0	2/4
2022	-	-	-	-	-	-	-	-	- / -
<b>Pinus edulis<sup>t</sup> -- (twoneedle pinyon)</b>									
2009	-	-	-	-	-	-	-	-	- / -
2010	80	-	75	25	0	0	0	0	- / -
2013	200	-	70	10	20	10	10	20	- / -
2017	20	-	100	0	0	0	0	0	- / -
2022	40	40	100	0	0	0	0	0	- / -
<b>Purshia tridentata<sup>p</sup> -- (antelope bitterbrush)</b>									
2009	-	-	-	-	-	-	-	-	- / -
2010	-	-	-	-	-	-	-	-	- / -
2013	-	-	-	-	-	-	-	-	- / -
2017	-	-	-	-	-	-	-	-	15/16
2022	-	-	-	-	-	-	-	-	- / -
<b>Sclerocactus -- (fishhook cactus)</b>									
2009	-	-	-	-	-	-	-	-	- / -
2010	-	-	-	-	-	-	-	-	- / -
2013	-	-	-	-	-	-	-	-	- / -
2017	20	-	0	100	0	0	0	0	3/5

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

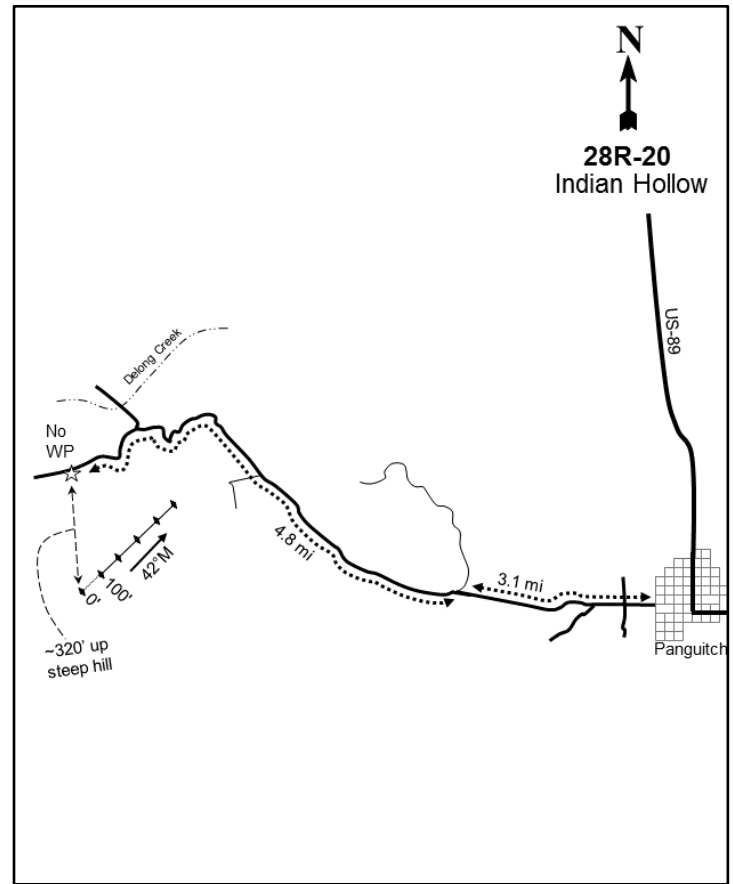
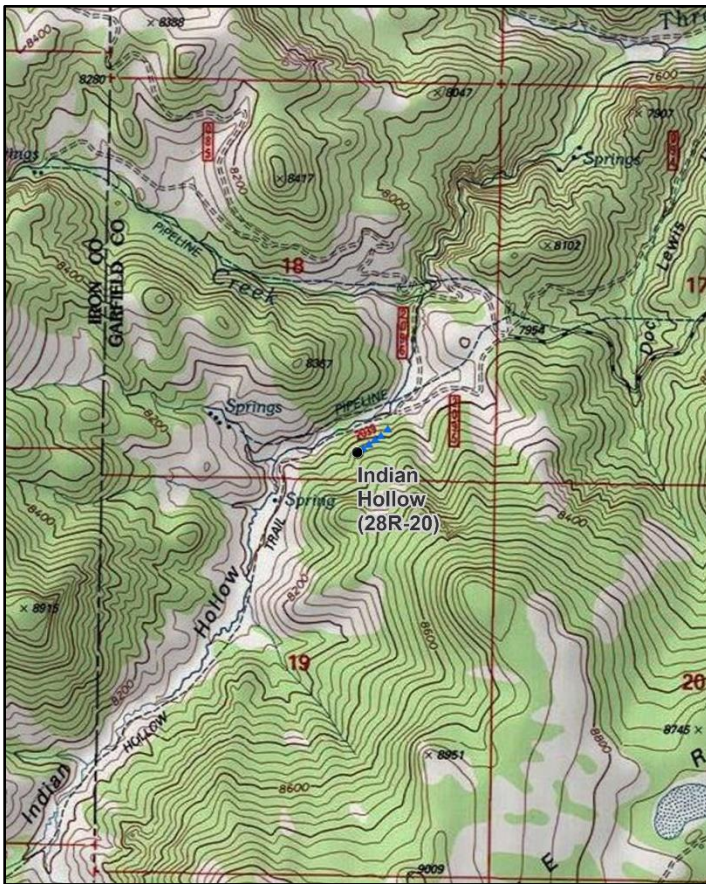
**Table 28R-15.14 - Tree Characteristics.** Point-quarter tree density, size class distribution, and average diameter.

Year	Density	Size Class Distribution					Average Diameter (cm)
	Trees per Acre	Seedling (%)	1-4' (%)	4-8' (%)	8-12' (%)	>12' (%)	
<b>Pinus edulis (twoneedle pinyon)</b>							
2009	31	-	81	19	-	-	4.0
2010	109	11	74	16	-	-	4.7
2013	78	-	79	21	-	-	4.6
2017	9	40	60	-	-	-	1.8
2022	26	63	38	-	-	-	2.5

**Table 28R-15.15 - Deer Desirable Components Index: Upland 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
2009	9.1	0.0	0.0	7.2	0.0	0.2	0.0	16.5	Very Poor
2010	13.1	13.9	4.5	8.0	0.0	3.0	0.0	42.4	Poor
2013	12.6	14.3	15.0	29.4	0.0	1.8	0.0	73.1	Good
2017	16.8	14.5	15.0	30.0	0.0	2.4	0.0	78.6	Good-Excellent
2022	20.5	12.9	15.0	30.0	0.0	5.4	0.0	83.9	Excellent

## INDIAN HOLLOW - STUDY NO. 28R-20



### Location Information

USGS 7.5 min Map Info  
GPS (0' Stake)

Fivemile Ridge NW; Township 34S, Range 6W, Section 18  
NAD 83 UTM ZONE 12, 362160 East 4190107 North

### Transect Information

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

Not Available  
42° magnetic  
500ft  
Line 1 (11ft), Line 2 (34ft), Line 3 (59ft), Line 4 (71ft), Line 5 (95ft)  
Standard

### Directions to Site

From the town of Panguitch, travel west on West Pigweed Lane for 3.1 miles, passing through a four-way intersection and Penny Pond Road on the left (south) to a fork with Mud Spring road on the right (north). Stay to the left and drive for another 4.8 miles, staying right at the fork with Fivemile Ridge Road, then turning left at a four-way intersection. Pull off of the road, park, and hike south up the steep hill for about 320 feet to the transect.

**Site Information**

Land Ownership	Federal
Land Administrator	USFS
Allotment	Little Valleys
Elevation	8,100ft (2,469m)
Aspect	Northwest
Slope	40%
Sample Dates	09/04/2018, 08/10/2022

**Table 28R-20.1 Disturbance History.** Recorded history of major disturbances.

Treatment/Disturbance	Name	WRI DB#	Date	Size (acres)
Hand Crew - Lop and Pile	Brian Head Fire Rehabilitation Phase II	4532	Fall 2017	188
Fire - Prescribed	Brian Head Fire Rehabilitation Phase II	4532	Fall 2018	188

**Wildlife Habitat and Vegetation History**

**Table 28R-20.3 - Wildlife Seasonal Habitat.** DWR wildlife habitat and seasonality.

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

**Table 28R-20.4 - Vegetation History.** The dominant vegetation type(s) and phase of woodland succession (Tausch, Miller, Roundy, & Chambers, 2009).

Year	Vegetation Type	Woodland Succession
2018	Snowberry/Mixed Conifer Forest	NA
2022	Snowberry/Mixed Conifer Forest	NA

**Site Notes**

No Notes

**Site Potential**

1981 - 2010 Average Annual Precipitation	20 inches
NRCS Ecological Site	High Mountain Loam (Douglas Fir)
NRCS Ecological Site #	R047XB512UT
States and Transitions	No state and transition model is available for this ecological site.

Mountain snowberry (*Symphoricarpos oreophilus*) has been the most abundant shrub species on this site since study establishment in 2018, although a large number of other species have been also present in lesser amounts. Mixed conifer species, including twoneedle pinyon (*Pinus edulis*), ponderosa pine (*P. ponderosa*), white fir (*Abies concolor*), and Douglas-fir (*Pseudotsuga menziesii*) have remained co-dominant site components (Table 28R-20.12, Table 28R-20.13, Table 28R-20.14). The herbaceous understory has remained abundant and mainly composed of the native perennial grass species muttongrass (*Poa fendleriana*) and the perennial forb mountain phlox (*Phlox austromontana*) (Table 28R-20.7, Table 28R-20.10, Table 28R-20.11). A prescribed fire in the fall of 2018 burned the tree litter left over by a 2017 lop and pile treatment and also thinned the tree canopy by killing some of the remaining conifer trees (Table 28R-20.1).

**Trend Summary Tables**

**Table 28R-20.6 - Shrub/Tree Summary.** Average modified Daubenmire quadrat and line intercept cover by year for shrubs/trees

Year	Quadrat Cover (%)			Line-intercept Cover (%)		
	Preferred Shrub	Other Shrub	Tree	Preferred Shrub	Other Shrub	Tree
2018	12.5	7.9	0.4	19.7	10.8	27.0
2022	23.7	6.0	2.0	41.1	7.7	17.2

**Table 28R-20.7 - Herbaceous Summary.** Nested frequency and average modified Daubenmire quadrat cover by year for herbaceous functional groups

Year	Nested Frequency				Quadrat Cover (%)			
	Annual Grass	Perennial Grass	Annual/Biennial Forb	Perennial Forb	Annual Grass	Perennial Grass	Annual/Biennial Forb	Perennial Forb
2018	-	193	5	185	-	7.1	0.0	8.6
2022	-	243	10	215	-	11.8	1.4	10.4

**Table 28R-20.8 - Basic Ground Cover.** Average modified Daubenmire quadrat cover by year for basic ground cover types.

Year	Cover Type (%)					
	Bare Ground	Cryptogams	Litter	Pavement	Rock	Vegetation
2018	2.1	1.2	74.8	1.0	13.2	30.7
2022	8.7	0.4	57.7	3.1	14.8	46.3

**Table 28R-20.9 - Pellet Group Data.** Quadrat frequency and pellet group transect data for animal pellets. Rabbit pellet groups are not sampled in the pellet group transect.

Year	Cattle	Mule Deer	Rocky Mountain Elk	Rabbit
	Quadrat Frequency			
2018	-	9	1	3
2022	2	7	1	2
Year	Days Use Per Acre (ha)			
2018	-	8.1 (19.9)	1.3 (3.3)	-
2022	-	20.8 (51.3)	3.4 (8.3)	-

**Table 28R-20.10 - Grass Species.** Nested frequency and modified Daubenmire average cover by year.

GRASS SPECIES	Achnatherum lettermanii (Letterman's needlegrass)	Carex rossii (Ross' sedge)	Elymus elymoides (squirreltail)	Pascopyrum smithii (western wheatgrass)	Poa fendleriana (muttongrass)
year	Nested Frequency				
2018	36	7	1	2	164
2022	13	6	2	4	229
year	Average Cover (%)				
2018	0.9	0.1	0.0	0.0	6.1
2022	0.5	0.2	0.1	0.0	10.9

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

**Table 28R-20.11 - Forb Species.** Nested frequency and modified Daubenmire average cover by year.

FORB SPECIES	Achillea millefolium (Common yarrow)	Antennaria (pussytoes)	Arabis holboellii <sup>a</sup> (Holboell's rockcress)	Arenaria (sandwort)	Astragalus miser (timber milkvetch)	Castilleja linariifolia (Wyoming Indian paintbrush)	Chenopodium album <sup>a</sup> (lambsquarters)	Crepis acuminata (taupertip hawksbeard)	Descurainia incana <sup>a</sup> (mountain tansymustard)	Draba <sup>a</sup> (draba)	Dracocephalum parviflorum (American dragonhead)	Erigeron eatonii (Eaton's fleabane)	Eriogonum racemosum (redroot buckwheat)	Gayophytum ramosissimum <sup>a</sup> (pinon groundsmoke)	Geranium richardsonii (Richardson's geranium)	Heuchera parvifolia (littleleaf alumroot)	Lappula occidentalis <sup>a</sup> (flatspine stickseed)
year	Nested Frequency																
2018	6	-	4	-	23	9	-	-	-	1	-	-	15	-	13	24	-
2022	6	1	-	2	11	3	4	1	0	-	1	7	20	1	-	27	6
year	Average Cover (%)																
2018	0.0	-	0.0	-	0.5	0.1	-	-	-	0.0	-	-	0.1	-	0.1	0.2	-
2022	0.0	0.0	-	0.0	0.2	0.0	0.4	0.0	0.0	-	0.0	0.1	0.3	0.0	-	0.5	1.0

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

FORB SPECIES	Lathyrus brachycalyx (Bonneville pea)	Lomatium (desertparsley)	Lupinus argenteus (silvery lupine)	Packera multiflobata (lobeleaf groundsel)	Penstemon watsonii (Watson's penstemon)	Phlox austromontana (mountain phlox)	Potentilla diversifolia (varileaf cinquefoil)	Silene drummondii (Drummond's campion)	Symphyotrichum ascendens (western aster)	Taraxacum officinale (common dandelion)	Vicia americana (American vetch)
year	Nested Frequency										
2018	9	-	-	13	34	131	1	1	5	12	3
2022	15	3	3	-	49	163	1	-	-	7	-
year	Average Cover (%)										
2018	0.1	-	-	0.1	0.3	6.9	0.0	0.0	0.0	0.1	0.0
2022	0.1	0.0	0.2	-	1.3	7.6	0.0	-	-	0.0	-

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

**Table 28R-20.12 - Shrub and Tree Species.** Average modified Daubenmire quadrat and line intercept cover by year.

SHRUB SPECIES	Abies concolor <sup>t</sup> (white fir)	Amelanchier utahensis <sup>p</sup> (Utah serviceberry)	Artemisia tridentata ssp. vaseyana <sup>p</sup> (mountain big sagebrush)	Cercocarpus ledifolius <sup>p</sup> (curl-leaf mountain mahogany)	Chrysothamnus depressus <sup>p</sup> (longflower rabbitbrush)	Chrysothamnus viscidiflorus ssp. viscidiflorus var. viscidiflorus (yellow rabbitbrush)	Juniperus communis (common juniper)	Mahonia repens (creeping barberry)	Opuntia polyacantha (plains pricklypear)	Paxistima myrsinites (Oregon boxleaf)	Pinus edulis <sup>t</sup> (twoneedle pinyon)	Pinus ponderosa <sup>t</sup> (ponderosa pine)	Prunus virginiana <sup>p</sup> (chokecherry)	Pseudotsuga menziesii <sup>t</sup> (Douglas-fir)	Ribes cereum <sup>p</sup> (wax currant)	Rosa woodsii <sup>p</sup> (Woods' rose)	Sambucus racemosa <sup>p</sup> (red elderberry)
year	Line Intercept Cover (%)																
2018	-	1.2	0.7	-	-	0.5	7.1	0.2	-	3	-	1.9	0.8	25.1	1.1	0	0.2
2022	3.9	2.8	0.7	-	-	0.3	6.3	0.3	-	0.8	-	1.2	2.3	12.1	1.4	-	-
year	Quadrat Cover (%)																
2018	0.2	0.9	0.0	0.0	0.0	0.2	4.6	0.7	-	2.4	0.0	0.0	1.0	0.2	1.0	0.3	0.0
2022	0.7	1.0	0.3	0.0	-	0.5	4.4	0.3	0.0	0.9	-	0.4	1.0	0.9	1.1	0.5	-

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

SHRUB SPECIES	Symphoricarpos oreophilus <sup>p</sup> (mountain snowberry)
year	Line
2018	15.7
2022	33.9
year	Quadrat Cover (%)
2018	9.1
2022	19.7

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

**Table 28R-20.13 - Shrub/Tree Characteristics.** Population characteristics of shrub/tree species populations including density reproduction (seedlings), age distribution, utilization, vigor and average size (height/crown) of plants.

Year	Density		Age Class Distribution			Utilization		Poor Vigor (%)	Average Height Crown (cm)
	Plants Per Acre		Excluding Seedlings			Moderate (%)	Heavy (%)		
	Excluding Seedlings	Seedling	Young (%)	Mature (%)	Decadent (%)				
<b>Abies concolor<sup>t</sup> -- (white fir)</b>									
2018	-	-	-	-	-	-	-	-	- / -
2022	40	-	0	100	0	0	0	0	- / -
<b>Amelanchier utahensis<sup>p</sup> -- (Utah serviceberry)</b>									
2018	760	-	13	82	5	29	8	13	60/45
2022	1160	20	28	57	16	7	47	16	- / -
<b>Artemisia tridentata ssp. vaseyana<sup>p</sup> -- (mountain big sagebrush)</b>									
2018	140	-	0	71	29	0	0	71	55/48
2022	200	-	30	50	20	20	20	10	- / -



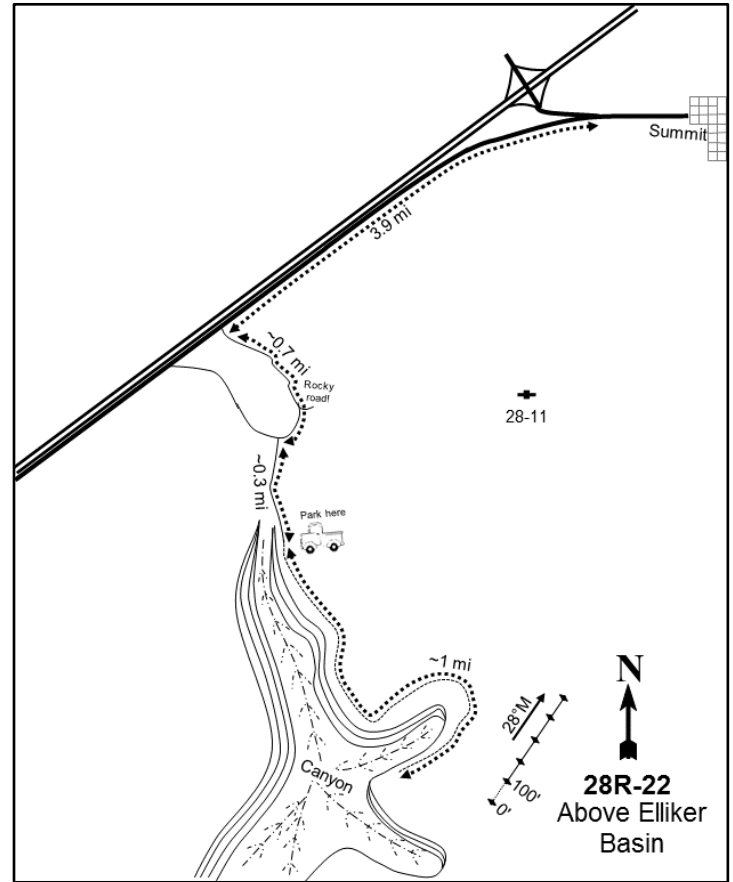
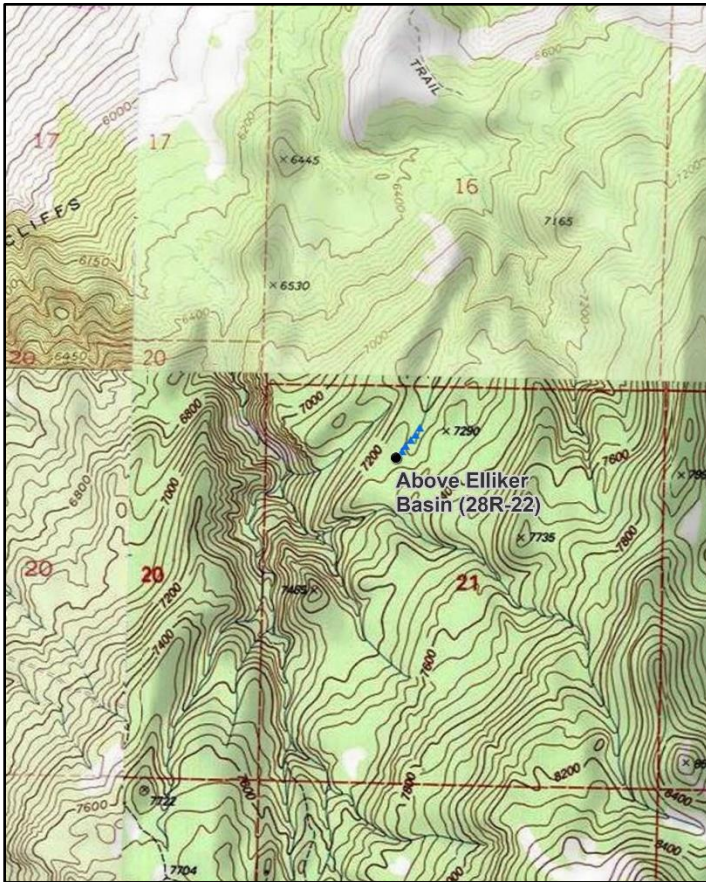
Year	Density		Age Class Distribution			Utilization		Poor Vigor (%)	Average Height Crown (cm)
	Plants Per Acre		Excluding Seedlings			Moderate (%)	Heavy (%)		
	Excluding Seedlings	Seedling	Young (%)	Mature (%)	Decadent (%)				
<b>Cercocarpus ledifolius<sup>p</sup> -- (curl-leaf mountain mahogany)</b>									
2018	60	-	100	0	0	67	0	0	148/74
2022	260	-	62	39	0	0	0	0	-/-
<b>Chrysothamnus depressus<sup>p</sup> -- (longflower rabbitbrush)</b>									
2018	40	-	0	100	0	0	0	0	-/-
2022	-	-	-	-	-	-	-	-	-/-
<b>Chrysothamnus viscidiflorus ssp. viscidiflorus var. viscidiflorus -- (yellow rabbitbrush)</b>									
2018	260	-	23	77	0	0	0	8	28/27
2022	260	-	8	85	8	0	0	8	-/-
<b>Juniperus communis -- (common juniper)</b>									
2018	500	20	8	92	0	0	0	0	75/167
2022	680	-	18	82	0	0	0	0	-/-
<b>Juniperus scopulorum<sup>t</sup> -- (Rocky Mountain juniper)</b>									
2018	-	-	-	-	-	-	-	-	-/-
2022	40	-	100	0	0	0	0	0	-/-
<b>Mahonia repens -- (creeping barberry)</b>									
2018	1320	-	0	100	0	0	0	17	8/12
2022	1220	-	23	77	0	0	0	0	-/-
<b>Opuntia polyacantha -- (plains pricklypear)</b>									
2018	100	-	0	100	0	0	0	20	9/17
2022	60	-	33	33	33	0	0	33	-/-
<b>Paxistima myrsinites -- (Oregon boxleaf)</b>									
2018	4940	-	5	95	0	0	0	0	11/19
2022	3780	60	19	81	0	0	0	0	-/-
<b>Pinus edulis<sup>t</sup> -- (twoneedle pinyon)</b>									
2018	80	-	100	0	0	0	0	25	-/-
2022	-	-	-	-	-	-	-	-	-/-
<b>Pinus ponderosa<sup>t</sup> -- (ponderosa pine)</b>									
2018	20	-	100	0	0	0	0	0	-/-
2022	20	-	0	100	0	0	0	0	-/-
<b>Prunus virginiana<sup>p</sup> -- (chokecherry)</b>									
2018	1080	-	4	94	2	41	2	2	59/46
2022	1300	-	43	52	5	9	26	5	-/-
<b>Pseudotsuga menziesii<sup>t</sup> -- (Douglas-fir)</b>									
2018	160	-	25	63	13	0	0	13	-/-
2022	100	20	40	40	20	0	0	20	-/-
<b>Purshia tridentata<sup>p</sup> -- (antelope bitterbrush)</b>									
2018	-	-	-	-	-	-	-	-	24/63
2022	-	-	-	-	-	-	-	-	-/-
<b>Ribes cereum<sup>p</sup> -- (wax currant)</b>									
2018	60	-	0	100	0	0	0	0	118/99
2022	100	-	60	40	0	0	0	0	-/-
<b>Rosa woodsii<sup>p</sup> -- (Woods' rose)</b>									
2018	220	-	27	73	0	0	0	0	22/15
2022	320	-	25	50	25	0	31	25	-/-
<b>Sambucus racemosa<sup>p</sup> -- (red elderberry)</b>									
2018	-	-	-	-	-	-	-	-	162/100
2022	20	-	0	100	0	0	0	0	-/-
<b>Symphoricarpos oreophilus<sup>p</sup> -- (mountain snowberry)</b>									
2018	6860	-	2	98	0	8	0	2	32/43
2022	14680	40	8	91	1	15	7	1	-/-

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

**Table 28R-20.14 - Tree Characteristics.** Point-quarter tree density, size class distribution, and average diameter.

Year	Density	Size Class Distribution					Average Diameter (cm)
	Trees per Acre	Seedling (%)	1-4' (%)	4-8' (%)	8-12' (%)	>12' (%)	
<b>Abies concolor (white fir)</b>							
2018	44	67	33	-	-	-	4.7
2022	2	-	100	-	-	-	5.0
<b>Juniperus osteosperma (Utah juniper)</b>							
2018	45	100	-	-	-	-	3.0
<b>Juniperus scopulorum (Rocky Mountain juniper)</b>							
2018	48	75	25	-	-	-	1.8
2022	69	57	43	-	-	-	1.7
<b>Pinus edulis (twoneedle pinyon)</b>							
2018	45	73	27	-	-	-	1.8
2022	182	100	-	-	-	-	1.0
<b>Pinus ponderosa (ponderosa pine)</b>							
2018	14	-	-	-	40	60	24.0
2022	8	-	-	-	50	50	23.5
<b>Populus tremuloides (quaking aspen)</b>							
2018	4	-	-	100	-	-	2.0
<b>Pseudotsuga menziesii (Douglas-fir)</b>							
2018	69	12	41	-	-	47	24.9
2022	61	13	25	6	-	56	21.9

## ABOVE ELLIKER BASIN - STUDY NO. 28R-22



### Location Information

USGS 7.5 min Map Info  
GPS (0' Stake)

Flanigan Arch NW; Township 35S, Range 10W, Section 21  
NAD 83 UTM ZONE 12, 324805 East 4179601 North

### Transect Information

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

Not Available  
28° magnetic  
500ft  
Line 1 (11ft), Line 2 (34ft), Line 3 (59ft), Line 4 (71ft), Line 5 (95ft)  
Standard

### Directions to Site

From Exit #71 in Summit, drive south on the frontage road for 3.9 miles to a dirt road to the left (southeast). Turn left onto this road and drive for 0.7 miles, staying right at the first two forks. At the third fork, turn left (south), drive for approximately 0.3 miles, and park. Hike up the canyon for about 1 mile onto the top of the mountain and use a GPS to locate the transect.

**Site Information**

Land Ownership	State
Land Administrator	DWR
Allotment	WEST FORK
Elevation	7,300ft (2,225m)
Aspect	North-Northeast
Slope	8%
Sample Dates	09/05/2018, 08/10/2022

**Table 28R-22.1 Disturbance History.** Recorded history of major disturbances.

Treatment/Disturbance	Name	WRI DB#	Date	Size (acres)
Seeding - Aerial Before	Parowan Front Braffits Creek	4990	November 2019	1507
Mechanical - Bullhog	Parowan Front Braffits Creek	4990	November 2019-January 2020 and March-June 2020	1507

**Table 28R-22.2 Seed Mix.** List of known seeded plant species and rates (if available).

Mix Name			Application Type	Application Date	Acres
Parowan Front			Aerial	Nov 2019	1689
Type	Species	Common Name	Cultivar/Source ID	Bulk lbs/acre	PLS
G	Achnatherum hymenoides	Indian Ricegrass	Rimrock	0.81	0.75
G	Achnatherum hymenoides	Indian Ricegrass	Rimrock	0.06	0.06
G	Dactylis glomerata	Orchardgrass	Profile	0.50	0.40
G	Poa secunda	Big Bluegrass	Sherman	0.50	0.45
G	Pseudoroegneria spicata	Bluebunch Wheatgrass	Anatone	0.12	0.12
G	Pseudoroegneria spicata	Bluebunch Wheatgrass	Anatone	0.38	0.36
G	Sporobolus cryptandrus	Sand Dropseed		0.21	0.20
F	Astragalus cicer	Cicer Milkvetch	Lutana	0.27	0.26
F	Linum perenne	Blue Flax	Appar	0.24	0.20
F	Medicago sativa	Alfalfa	Ladak DL	0.08	0.07
F	Medicago sativa	Alfalfa	Ladak 65	0.41	0.40
F	Medicago sativa ssp. falcata	Yellow Alfalfa	Don	0.27	0.26
F	Melilotus officinalis	Yellow Sweetclover		0.50	0.49
F	Onobrychis viciifolia	Sainfoin	Shoshone	0.47	0.44
F	Sanguisorba minor	Small Burnet	Delar	1.01	0.89
F	Sphaeralcea munroana	Munro Globemallow	Eureka NV	0.06	0.05
S	Artemisia tridentata ssp. wyomingensis	Wyoming Big Sagebrush	Iron, UT	0.21	0.07
S	Atriplex canescens	Fourwing Saltbush	Kane UT	0.27	0.15
S	Bassia prostrata	Forage Kochia	Box Elder, UT	0.36	0.31
S	Purshia stansburiana	Mexican Cliffrose	Utah UT	0.18	0.15
S	Purshia stansburiana	Stansbury Cliffrose	Millard UT	0.01	0.01
S	Purshia tridentata	Antelope Bitterbrush	Iron UT	0.27	0.23

**Wildlife Habitat and Vegetation History**

**Table 28R-22.3 - Wildlife Seasonal Habitat.** DWR wildlife habitat and seasonality.

Species	Habitat	Season
Mule Deer	crucial	winter

**Table 28R-22.4 - Vegetation History.** The dominant vegetation type(s) and phase of woodland succession (Tausch, Miller, Roundy, & Chambers, 2009).

Year	Vegetation Type	Woodland Succession
2018	Pinyon-Juniper	Phase III
2022	Mixed Shrub/Annual Forb	Phase I

**Site Notes**

No Notes

**Site Potential**

1981 - 2010 Average Annual Precipitation	15 inches
NRCS Ecological Site	Mountain Stony Loam (Oak)
NRCS Ecological Site #	R047XB463UT
States and Transitions	No state and transition model is available for this ecological site.

Upon establishment in 2018, this study site was dominated by twoneedle pinyon (*Pinus edulis*) and Utah juniper (*Juniperus osteosperma*) and was considered to be within Phase III of woodland succession. Following treatment in 2019, however, pinyon and juniper trees were reduced significantly in both density and cover with most trees being considered as small and young; the community had transitioned to Phase I of woodland succession as of the 2022 sample year (Table 28R-22.4). Gambel oak (*Quercus gambelii*) contributed the most browse cover for both pre-disturbance and post-disturbance samplings, and both density and cover increasing following tree removal. The remaining browse component as a whole has remained lacking (Table 28R-22.12, Table 28R-22.13, Table 28R-22.14). The herbaceous understory prior to tree removal was depauperate in both diversity and quantity, with the annual forb pinyon groundsmoke (*Gayophytum ramosissimum*) as the most abundant herbaceous species. Diversity of this community increased following the bullhog treatment, although much of this increase was due to native annual forbs and the introduced annual species prickly lettuce (*Lactuca serriola*), which was sampled for the first time in 2022 (Table 28R-22.7, Table 28R-22.10, Table 28R-22.11).

**Trend Summary Tables**

**Table 28R-22.6 - Shrub/Tree Summary.** Average modified Daubenmire quadrat and line intercept cover by year for shrubs/trees

Year	Quadrat Cover (%)			Line-intercept Cover (%)		
	Preferred Shrub	Other Shrub	Tree	Preferred Shrub	Other Shrub	Tree
2018	7.8	0.5	14.6	8.4	0.8	64.0
2022	8.2	0.2	0.0	12.5	0.2	-

**Table 28R-22.7 - Herbaceous Summary.** Nested frequency and average modified Daubenmire quadrat cover by year for herbaceous functional groups

Year	Nested Frequency				Quadrat Cover (%)			
	Annual Grass	Perennial Grass	Annual/Biennial Forb	Perennial Forb	Annual Grass	Perennial Grass	Annual/Biennial Forb	Perennial Forb
2018	3	2	20	16	0.0	0.0	0.4	0.2
2022	48	84	325	62	2.2	4.6	20.7	2.1

**Table 28R-22.8 - Basic Ground Cover.** Average modified Daubenmire quadrat cover by year for basic ground cover types.

Year	Cover Type (%)					
	Bare Ground	Cryptogams	Litter	Pavement	Rock	Vegetation
2018	5.6	0.7	75.9	11.6	9.0	21.7
2022	1.7	0.0	75.3	1.3	6.1	30.8

**Table 28R-22.9 - Pellet Group Data.** Quadrat frequency and pellet group transect data for animal pellets. Rabbit pellet groups are not sampled in the pellet group transect.

Year	Mule Deer	Rocky Mountain Elk	Rabbit
	Quadrat Frequency		
2018	6	-	22
2022	11	-	4
Year	Days Use Per Acre (ha)		
2018	12.1 (29.8)	-	-
2022	36.2 (89.4)	3.4 (8.3)	-

**Table 28R-22.10 - Grass Species.** Nested frequency and modified Daubenmire average cover by year.

GRASS SPECIES	Achnatherum hymenoides (Indian ricegrass)	Agropyron cristatum <sup>i</sup> (crested wheatgrass)	Bromus tectorum <sup>ai</sup> (cheatgrass)	Carex geyeri (Geyer's sedge)	Dactylis glomerata <sup>i</sup> (orchardgrass)	Elymus elymoides (squirreltail)	Koeleria macrantha (prairie Junegrass)	Poa fendleriana (muttongrass)	Poa secunda (Sandberg bluegrass)	Pseudoroegneria spicata (bluebunch wheatgrass)	Sporobolus cryptandrus (sand dropseed)	Thinopyrum intermedium <sup>i</sup> (intermediate wheatgrass)
year	Nested Frequency											
2018	-	-	3	2	-	-	-	-	-	-	-	-
2022	11	1	48	4	2	20	3	11	13	15	21	2
year	Average Cover (%)											
2018	-	-	0.0	0.0	-	-	-	-	-	-	-	-
2022	0.7	0.0	2.2	0.2	0.2	0.8	0.0	0.4	0.6	0.9	0.5	0.2

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

**Table 28R-22.11 - Forb Species.** Nested frequency and modified Daubenmire average cover by year.

FORB SPECIES	Agoseris glauca (pale agoseris)	Ambrosia <sup>a</sup> (ragweed)	Arabis holboellii <sup>a</sup> (Holboell's rockcress)	Astragalus argophyllus (silverleaf milkvetch)	Astragalus cicer <sup>r</sup> (chickpea milkvetch)	Chaenactis douglasii (Douglas' dusty maiden)	Chenopodium atrovirens <sup>ai</sup> (pinyon goosefoot)	Cirsium vulgare <sup>ai</sup> (bull thistle)	Conyza canadensis <sup>ai</sup> (Canadian horseweed)	Descurainia pinnata <sup>a</sup> (western tansymustard)	Epilobium brachycarpum <sup>a</sup> (tall annual willowherb)	Erigeron eatonii (Eaton's fleabane)	Eriogonum racemosum (redroot buckwheat)	Gayophytum ramosissimum <sup>a</sup> (pinyon groundsmoke)	Heliomeris multiflora (showy goldeneye)	Lactuca scariola <sup>ai</sup> (prickly lettuce)	Lappula occidentalis <sup>ai</sup> (flatspine stickseed)
year	Nested Frequency																
2018	-	-	6	-	-	2	-	-	-	-	-	5	3	17	-	-	-
2022	2	6	-	0	12	4	1	0	27	15	20	3	-	17	0	307	6
year	Average Cover (%)																
2018	-	-	0.0	-	-	0.0	-	-	-	-	-	0.0	0.1	0.4	-	-	-
2022	0.0	0.0	-	0.0	0.4	0.0	0.0	0.1	1.5	0.2	0.2	0.0	-	0.1	0.0	17.7	0.2

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)	Penstemon (beardtongue)	Phlox longifolia (longleaf phlox)	Polygonum douglasii <sup>a</sup> (Douglas' knotweed)	Sanguisorba minor <sup>i</sup> (small burnet)	Sisymbrium altissimum <sup>at</sup> (tall tumblemustard)	Symphytotrichum (aster)	Taraxacum officinale (common dandelion)	Tragopogon dubius <sup>at</sup> (yellow salsify)	Verbascum thapsus <sup>at</sup> (common mullein)
year	Nested Frequency												
2018	-	-	-	-	-	3	-	-	1	3	-	-	-
2022	5	9	17	14	2	-	25	3	2	-	8	6	5
year	Average Cover (%)												
2018	-	-	-	-	-	0.0	-	-	0.0	0.0	-	-	-
2022	0.0	0.2	0.7	0.3	0.0	-	0.4	0.2	0.1	-	0.2	0.2	0.1

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

**Table 28R-22.12 - Shrub and Tree Species.** Average modified Daubenmire quadrat and line intercept cover by year.

SHRUB SPECIES	Artemisia tridentata ssp. vaseyana <sup>p</sup> (mountain big sagebrush)	Cercocarpus montanus var. montanus <sup>p</sup> (alderleaf mountain mahogany)	Juniperus osteosperma <sup>i</sup> (Utah juniper)	Opuntia polyacantha (plains pricklypear)	Pinus edulis <sup>i</sup> (twoneedle pinyon)	Purshia tridentata <sup>p</sup> (antelope bitterbrush)	Quercus gambelii <sup>p</sup> (Gambel oak)
year	Line Intercept Cover (%)						
2018	-	0.1	8.3	0.8	55.7	2.5	5.8
2022	-	-	-	0.2	-	5.3	7.2
year	Quadrat Cover (%)						
2018	0.1	0.4	1.2	0.5	13.3	1.5	5.8
2022	-	-	-	0.2	0.0	4.2	4.0

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

**Table 28R-22.13 - Shrub/Tree Characteristics.** Population characteristics of shrub/tree species populations including density reproduction (seedlings), age distribution, utilization, vigor and average size (height/crown) of plants.

Year	Density		Age Class Distribution			Utilization		Poor Vigor (%)	Average Height Crown (cm)
	Plants Per Acre		Excluding Seedlings			Moderate (%)	Heavy (%)		
	Excluding Seedlings	Seedling	Young (%)	Mature (%)	Decadent (%)				
<b>Amelanchier utahensis<sup>p</sup> -- (Utah serviceberry)</b>									
2018	40	-	100	0	0	0	0	0	77/93
2022	-	-	-	-	-	-	-	-	-/-
<b>Artemisia tridentata ssp. vaseyana<sup>p</sup> -- (mountain big sagebrush)</b>									
2018	100	-	0	0	100	0	0	100	22/18
2022	-	-	-	-	-	-	-	-	-/-
<b>Atriplex canescens<sup>p</sup> -- (fourwing saltbush)</b>									
2018	-	-	-	-	-	-	-	-	-/-
2022	20	-	100	0	0	100	0	0	-/-
<b>Cercocarpus montanus var. montanus<sup>p</sup> -- (alderleaf mountain mahogany)</b>									
2018	80	-	50	50	0	25	0	50	80/84
2022	-	-	-	-	-	-	-	-	-/-



Year	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>									
2018	100	-	40	60	0	0	0	0	- / -
2022	-	-	-	-	-	-	-	-	- / -
<b>Opuntia polyacantha -- (plains pricklypear)</b>									
2018	420	-	5	95	0	0	0	5	16/51
2022	540	-	0	100	0	0	0	0	- / -
<b>Pinus edulis<sup>t</sup> -- (twoneedle pinyon)</b>									
2018	720	100	22	78	0	0	0	0	- / -
2022	60	-	100	0	0	0	0	0	- / -
<b>Purshia tridentata<sup>p</sup> -- (antelope bitterbrush)</b>									
2018	560	-	0	64	36	46	18	21	35/72
2022	520	-	8	92	0	12	89	0	- / -
<b>Quercus gambelii<sup>p</sup> -- (Gambel oak)</b>									
2018	1880	-	46	53	1	0	0	6	69/56
2022	2620	20	1	99	1	0	0	1	- / -
<b>Ribes cereum<sup>p</sup> -- (wax currant)</b>									
2018	-	-	-	-	-	-	-	-	70/73
2022	-	-	-	-	-	-	-	-	- / -
<b>Ribes montigenum<sup>p</sup> -- (gooseberry currant)</b>									
2018	-	-	-	-	-	-	-	-	164/126
2022	-	-	-	-	-	-	-	-	- / -
<b>Ulmus pumila<sup>i</sup> -- (Siberian elm)</b>									
2018	-	-	-	-	-	-	-	-	- / -
2022	20	-	100	0	0	0	0	0	- / -

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

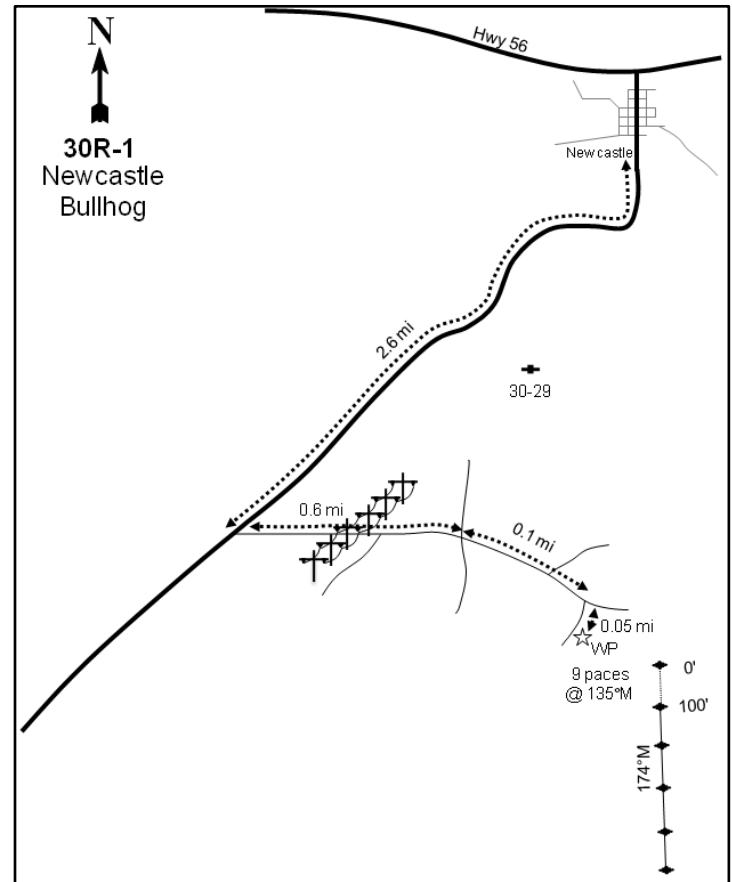
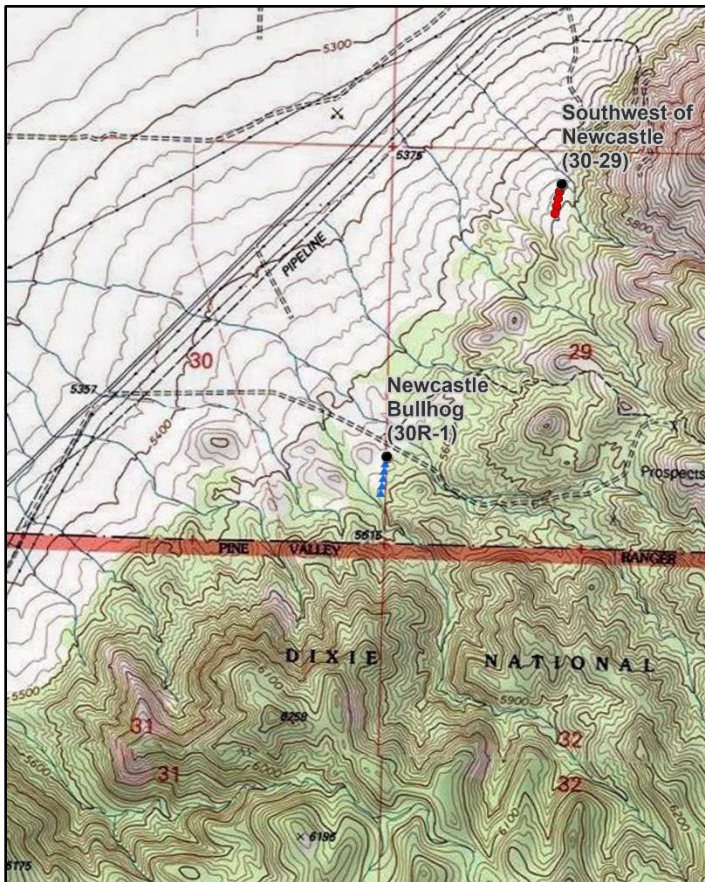
**Table 28R-22.14 - Tree Characteristics.** Point-quarter tree density, size class distribution, and average diameter.

Year	Density	Size Class Distribution					Average Diameter (cm)
	Trees per Acre	Seedling (%)	1-4' (%)	4-8' (%)	8-12' (%)	>12' (%)	
<b>Juniperus osteosperma (Utah juniper)</b>							
2018	87	11	16	5	26	42	20.6
2022	42	11	89	-	-	-	6.4
<b>Pinus edulis (twoneedle pinyon)</b>							
2018	799	5	10	15	25	45	14.7
2022	4	25	75	-	-	-	2.0

**Table 28R-22.15 - Deer Desirable Components Index: Mountain Potential Scale.**

Year	Preferred Browse Cover	Preferred Browse Decadence	Preferred Browse Young	Perennial Grass Cover	Annual Grass Cover	Perennial Forb Cover	Noxious Weeds	Total Score	Ranking
2018	9.7	11.6	15.0	0.1	0.0	0.4	0.0	36.8	Very Poor
2022	15.2	14.9	1.9	9.3	-1.7	4.2	0.0	43.7	Poor

## NEWCASTLE BULLHOG - STUDY NO. 30R-1

**Location Information**

USGS 7.5 min Map Info  
GPS (0' Stake)

Newcastle SW; Township 36S, Range 15W, Section 29  
NAD 83 UTM ZONE 12, 273527 East 4168514 North

**Transect Information**

Browse Tag # (0' Stake)	44
Transect Bearing	174° magnetic
Length	500ft
Belt Placement	Line 1 (11ft), Line 2 (34ft), Line 3 (59ft), Line 4 (71ft), Line 5 (95ft)
Belt Marker Placement	Standard

**Directions to Site**

From Pinto Canyon Road in Newcastle travel south on Main Street, which turns into Bench Road, for 2.6 miles to a road on the left (east). Turn left onto this road and drive for 0.6 miles to an intersection. Continue through the intersection to a road that comes in from the right (south). Turn right onto this road and drive 150 feet to a witness post on the left (east) side of the road. From the witness post, walk 9 paces at 135 degrees magnetic to the 0-foot stake that is marked with browse tag #44.

**Site Information**

Land Ownership	Federal
Land Administrator	BLM
Allotment	PINTO CREEK
Elevation	5,550ft (1,692m)
Aspect	Northwest
Slope	5-10%
Sample Dates	07/21/2004, 06/18/2007, 06/26/2012, 08/28/2017, 06/15/2022

**Table 30R-01.1 Disturbance History.** Recorded history of major disturbances.

Treatment/Disturbance	Name	WRI DB#	Date	Size (acres)
Mechanical - Bullhog	-	PDB	October 2004	900

**Wildlife Habitat and Vegetation History****Table 30R-01.3 - Wildlife Seasonal Habitat.** DWR wildlife habitat and seasonality.

Species	Habitat	Season
Mule Deer	crucial	winter

**Table 30R-01.4 - Vegetation History.** The dominant vegetation type(s) and phase of woodland succession (Tausch, Miller, Roundy, & Chambers, 2009).

Year	Vegetation Type	Woodland Succession
2004	Wyoming Big Sagebrush	Phase II
2007	Wyoming Big Sagebrush	Phase I
2012	Wyoming Big Sagebrush	Phase I
2017	Wyoming Big Sagebrush	Phase I
2022	Wyoming Big Sagebrush	Phase I

**Site Notes**

No Notes

**Soils****Table 30R-01.5 - Soil Analysis Data.** List of chemical and textural soil characteristics determined by laboratory analysis.

Texture	pH	%sand	%silt	%clay	%OM	PPM P	PPM K	ds/m	Sample Date
Sandy Loam	7.3	63.0	18.8	18.2	2.3	7.8	182.4	0.8	07/21/2004

**Site Potential**

1981 - 2010 Average Annual Precipitation	15 inches
NRCS Ecological Site	Upland Loam (Wyoming Big Sagebrush)
NRCS Ecological Site #	R028AY309UT
States and Transitions	No state and transition model is available for this ecological site.

At the time of study establishment in 2004, this site was a Wyoming big sagebrush (*Artemisia tridentata* ssp. *wyomingensis*) plant community in Phase II of encroachment by Utah juniper (*Juniperus osteosperma*) and twoneedle pinyon (*Pinus edulis*). A bullhog treatment later in 2004 (Table 30R-01.1) removed many of the trees, however, and the site has been considered to be in Phase I since the 2007 sample year (Table 30R-01.4, Table 30R-01.6, Table 30R-01.14). The browse component has remained dominated by Wyoming big sagebrush following treatment, with mormon tea (*Ephedra viridis*) and Stansbury cliffrose (*Purshia stansburiana*) also present to a lesser extent (Table 30R-01.12, Table 30R-01.13). Overall, the bullhog treatment effectively reduced tree cover and allowed for increases in sagebrush cover. Annual grasses, namely cheatgrass (*Bromus tectorum*), exhibited significant post-treatment increases in 2007, 2012 and 2022 in both frequency and cover. Perennial grasses have been present in moderate amounts throughout the duration of the study, with James' galleta (*Pleuraphis jamesii*) contributing a majority of the cover (Table 30R-01.10). Both perennial and annual forbs have remained rare, with little cover and diversity provided (Table 30R-01.11).

**Trend Summary Tables****Table 30R-01.6 - Shrub/Tree Summary.** Average modified Daubenmire quadrat and line intercept cover by year for shrubs/trees

Year	Quadrat Cover (%)			Line-intercept Cover (%)		
	Preferred Shrub	Other Shrub	Tree	Preferred Shrub	Other Shrub	Tree
2004	6.1	0.6	10.1	4.5	0.1	23.1
2007	7.9	-	0.7	8.8	-	5.3
2012	13.3	-	2.1	9.2	0.1	5.4
2017	11.5	0.5	1.2	12.7	1.1	5.6
2022	13.0	0.0	-	14.3	0.1	4.4

**Table 30R-01.7 - Herbaceous Summary.** Nested frequency and average modified Daubenmire quadrat cover by year for herbaceous functional groups

Year	Nested Frequency				Quadrat Cover (%)			
	Annual Grass	Perennial Grass	Annual/Biennial Forb	Perennial Forb	Annual Grass	Perennial Grass	Annual/Biennial Forb	Perennial Forb
2004	33	148	5	16	0.1	5.5	0.0	0.0
2007	416	187	46	45	16.3	8.8	0.3	0.6
2012	456	173	19	44	34.0	4.4	0.0	0.5
2017	248	226	4	41	5.1	5.3	0.0	0.2
2022	322	188	74	44	15.6	7.0	0.2	0.4

**Table 30R-01.8 - Basic Ground Cover.** Average modified Daubenmire quadrat cover by year for basic ground cover types.

Year	Cover Type (%)					
	Bare Ground	Cryptogams	Litter	Pavement	Rock	Vegetation
2004	18.1	0.7	32.5	38.1	3.1	21.5
2007	12.8	0.1	41.2	17.7	2.5	35.4
2012	12.3	0.0	55.3	8.6	2.8	50.8
2017	19.6	0.6	41.5	26.1	3.6	25.2
2022	24.1	0.1	40.7	26.2	5.7	32.5

**Table 30R-01.9 - Pellet Group Data.** Quadrat frequency and pellet group transect data for animal pellets. Rabbit pellet groups are not sampled in the pellet group transect.

Year	Cattle	Mule Deer	Rabbit
	Quadrat Frequency		
2004	-	23	47
2007	-	12	80
2012	1	9	9
2017	2	21	43
2022	3	16	8
Year	Days Use Per Acre (ha)		
2004	-	71.7 (177.1)	-
2007	-	22.8 (56.3)	-
2012	-	3.4 (8.3)	-
2017	2.2 (5.4)	16.8 (41.4)	-
2022	2.9 (7.2)	30.8 (76.1)	-

**Table 30R-01.10 - 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)	Pleuraphis jamesii (James' galleta)	Poa secunda (Sandberg bluegrass)	Sporobolus cryptandrus (sand dropseed)	Vulpia octiflora <sup>a</sup> (sixweeks fescue)
year	Nested Frequency							
2004	35	33	8	3	112	-	2	-
2007	58	415	26	3	135	-	-	59
2012	47	456	26	5	120	-	3	2
2017	32	248	39	46	148	1	-	-
2022	51	322	51	10	114	18	-	-
year	Average Cover (%)							
2004	1.6	0.1	0.0	0.0	3.9	-	0.0	-
2007	2.0	16.0	0.5	0.0	6.3	-	-	0.3
2012	1.7	34.0	0.7	0.0	2.0	-	0.0	0.0
2017	0.3	5.1	0.6	0.9	3.4	0.0	-	-
2022	1.4	15.6	1.5	0.8	3.1	0.1	-	-

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

**Table 30R-01.11 - Forb Species.** Nested frequency and modified Daubenmire average cover by year.

FORB SPECIES	Arabis (rockcress)	Asclepias asperula (spider milkweed)	Astragalus (milkvetch)	Castilleja (Indian paintbrush)	Ceratocephala testiculata <sup>ai</sup> (curvseed butterwort)	Chaenactis douglasii (Douglas' dustymaiden)	Chamaesyce (sandmat)	Collinsia parviflora <sup>a</sup> (maiden blue eyed Mary)	Cordylanthus <sup>a</sup> (bird's-beak)	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)	Erodium cicutarium <sup>ai</sup> (redstem stork's bill)	Frasera albomarginata (desert fraser)	Gilia inconspicua <sup>a</sup> (shy gilia)
year	Nested Frequency																
2004	1	-	-	-	-	-	-	-	-	-	-	-	-	5	-	1	-
2007	3	-	4	1	-	-	-	-	17	5	10	16	-	2	-	11	2
2012	-	-	1	-	4	2	1	3	4	7	-	-	-	-	-	26	-
2017	-	-	4	2	-	3	9	-	-	6	-	-	-	2	-	5	2
2022	1	2	-	-	-	3	6	-	-	5	13	-	4	2	5	9	57
year	Average Cover (%)																
2004	0.0	-	-	-	-	-	-	-	-	-	-	-	-	0.0	-	0.0	-
2007	0.0	-	0.0	0.0	-	-	-	-	0.1	0.0	0.1	0.0	-	0.0	-	0.4	0.0
2012	-	-	0.1	-	0.0	0.0	0.0	0.0	0.0	0.1	-	-	-	-	-	0.1	-
2017	-	-	0.0	0.0	-	0.0	0.0	-	-	0.0	-	-	-	0.0	-	0.0	0.0
2022	0.0	0.0	-	-	-	0.0	0.0	-	-	0.1	0.0	-	0.0	0.0	0.0	0.0	0.1

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

FORB SPECIES										
Lupinus (lupine)										
Penstemon (beardtongue)										
Penstemon confusus (Owens Valley beardtongue)										
Penstemon leiophyllus (smoothleaf beardtongue)										
Penstemon pachyphyllus (thickleaf beardtongue)										
Phlox hoodii (spiny phlox)										
Phlox longifolia (longleaf phlox)										
Silene antirrhina <sup>a</sup> (sleepy silene)										
Sisymbrium altissimum <sup>at</sup> (tall tumblemustard)										
Streptanthus cordatus (heartleaf twistflower)										
year	Nested Frequency									
2004	2	1	-	-	1	-	3	-	-	7
2007	-	3	-	-	-	-	7	1	4	14
2012	-	-	-	3	-	-	2	8	-	7
2017	-	-	6	-	-	-	3	-	-	9
2022	-	-	-	-	-	5	9	-	3	4
year	Average Cover (%)									
2004	0.0	0.0	-	-	0.0	-	0.0	-	-	0.0
2007	-	0.0	-	-	-	-	0.0	0.0	0.0	0.1
2012	-	-	-	0.1	-	-	0.0	0.0	-	0.0
2017	-	-	0.1	-	-	-	0.0	-	-	0.0
2022	-	-	-	-	-	0.0	0.0	-	0.0	0.0

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

**Table 30R-01.12 - Shrub and Tree Species.** Average modified Daubenmire quadrat and line intercept cover by year.

SHRUB SPECIES										
Artemisia nova <sup>p</sup> (black sagebrush)										
Artemisia tridentata ssp. wyomingensis <sup>p</sup> (Wyoming big sagebrush)										
Chrysothamnus viscidiflorus ssp. viscidiflorus var. stenophyllus (yellow rabbitbrush)										
Ephedra viridis <sup>p</sup> (mormon tea)										
Ericameria parryi (Parry's rabbitbrush)										
Gutierrezia sarothrae (broom snakeweed)										
Juniperus osteosperma <sup>t</sup> (Utah juniper)										
Opuntia (pricklypear)										
Pinus edulis <sup>t</sup> (twoneedle pinyon)										
Purshia stansburiana <sup>p</sup> (Stansbury cliffrose)										
year	Line Intercept Cover (%)									
2004	-	4.4	-	-	-	-	15.9	0.1	7.2	0.1
2007	-	8.3	-	0.3	-	-	4.4	-	0.9	0.2
2012	-	8.5	-	0.1	-	0.1	4.3	-	1.1	0.6
2017	-	12.1	-	0.2	-	1.1	4.5	-	1.1	0.4
2022	1.2	12.4	-	0.3	0	0.1	4.3	-	0.1	0.4
year	Quadrat Cover (%)									
2004	-	5.9	0.4	-	-	-	6.8	0.2	3.4	0.2
2007	-	7.2	-	0.5	-	-	0.1	-	0.6	0.2
2012	-	11.9	-	0.5	-	0.0	1.3	-	0.8	0.9
2017	0.0	10.6	-	0.8	-	0.5	0.2	-	1.0	0.2
2022	0.2	12.6	-	0.2	0.0	0.0	0.0	-	0.0	0.0

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

**Table 30R-01.13 - Shrub/Tree Characteristics.** Population characteristics of shrub/tree species populations including density reproduction (seedlings), age distribution, utilization, vigor and average size (height/crown) of plants.

Year	Density		Age Class Distribution			Utilization		Poor Vigor (%)	Average Height Crown (cm)
	Plants Per Acre		Excluding Seedlings			Moderate (%)	Heavy (%)		
	Excluding Seedlings	Seedling	Young (%)	Mature (%)	Decadent (%)				
<b>Artemisia nova<sup>P</sup> -- (black sagebrush)</b>									
2004	-	-	-	-	-	-	-	-	-/-
2007	-	-	-	-	-	-	-	-	-/-
2012	-	-	-	-	-	-	-	-	-/-
2017	100	-	20	80	0	20	80	0	18/56
2022	100	-	0	60	40	20	0	60	-/-
<b>Artemisia tridentata ssp. wyomingensis<sup>P</sup> -- (Wyoming big sagebrush)</b>									
2004	2580	-	0	61	40	41	26	29	41/62
2007	2480	1480	12	65	23	23	27	17	40/61
2012	3200	380	36	58	6	45	10	34	47/89
2017	3880	40	33	58	9	50	16	6	48/77
2022	3000	40	17	66	17	13	1	37	-/-
<b>Chrysothamnus viscidiflorus ssp. viscidiflorus var. stenophyllus -- (yellow rabbitbrush)</b>									
2004	120	-	0	100	0	17	33	0	23/26
2007	60	-	0	67	33	67	33	67	26/36
2012	60	-	0	100	0	0	0	33	24/33
2017	120	-	0	67	33	0	83	50	25/31
2022	-	-	-	-	-	-	-	-	-/-
<b>Ephedra viridis<sup>P</sup> -- (mormon tea)</b>									
2004	100	-	0	80	20	0	100	0	51/66
2007	160	-	13	63	25	13	13	25	40/65
2012	140	-	0	57	43	29	29	43	60/82
2017	140	-	0	100	0	0	100	57	44/68
2022	140	-	0	43	57	14	14	29	-/-
<b>Ericameria parryi -- (Parry's rabbitbrush)</b>									
2004	-	-	-	-	-	-	-	-	-/-
2007	-	-	-	-	-	-	-	-	-/-
2012	-	-	-	-	-	-	-	-	-/-
2017	-	-	-	-	-	-	-	-	-/-
2022	80	-	0	100	0	0	0	0	-/-
<b>Gutierrezia sarothrae -- (broom snakeweed)</b>									
2004	-	-	-	-	-	-	-	-	22/23
2007	40	-	0	100	0	0	0	0	30/45
2012	180	-	0	100	0	0	0	11	19/31
2017	860	-	2	98	0	0	0	0	20/32
2022	220	-	0	91	9	0	0	18	-/-
<b>Juniperus osteosperma<sup>1</sup> -- (Utah juniper)</b>									
2004	140	-	29	71	0	0	0	0	-/-
2007	40	40	50	50	0	0	0	0	-/-
2012	100	-	60	40	0	0	0	0	-/-
2017	120	-	100	0	0	0	0	0	-/-
2022	40	-	100	0	0	0	0	0	-/-
<b>Opuntia -- (pricklypear)</b>									
2004	80	-	0	100	0	0	0	0	11/25
2007	-	-	-	-	-	-	-	-	-/-
2012	-	-	-	-	-	-	-	-	-/-
2017	-	-	-	-	-	-	-	-	13/35
2022	-	-	-	-	-	-	-	-	-/-



Year	Density		Age Class Distribution			Utilization		Poor Vigor (%)	Average Height Crown (cm)
	Plants Per Acre		Excluding Seedlings			Moderate (%)	Heavy (%)		
	Excluding Seedlings	Seedling	Young (%)	Mature (%)	Decadent (%)				
<b>Pinus edulis<sup>t</sup> -- (twoneedle pinyon)</b>									
2004	140	-	57	43	0	0	0	0	- / -
2007	20	40	100	0	0	0	0	0	- / -
2012	-	-	-	-	-	-	-	-	- / -
2017	40	40	100	0	0	0	0	0	- / -
2022	20	-	100	0	0	0	0	0	- / -
<b>Polygala subspinosa -- (spiny milkwort)</b>									
2004	-	-	-	-	-	-	-	-	- / -
2007	-	-	-	-	-	-	-	-	- / -
2012	-	-	-	-	-	-	-	-	9/12
2017	-	-	-	-	-	-	-	-	- / -
2022	40	-	50	50	0	0	0	0	- / -
<b>Purshia stansburiana<sup>p</sup> -- (Stansbury cliffrose)</b>									
2004	20	-	0	0	100	0	100	0	180/192
2007	40	-	0	100	0	0	100	0	102/108
2012	40	-	0	100	0	0	0	0	98/117
2017	60	-	33	67	0	0	67	0	134/188
2022	60	-	33	0	67	0	0	67	- / -

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

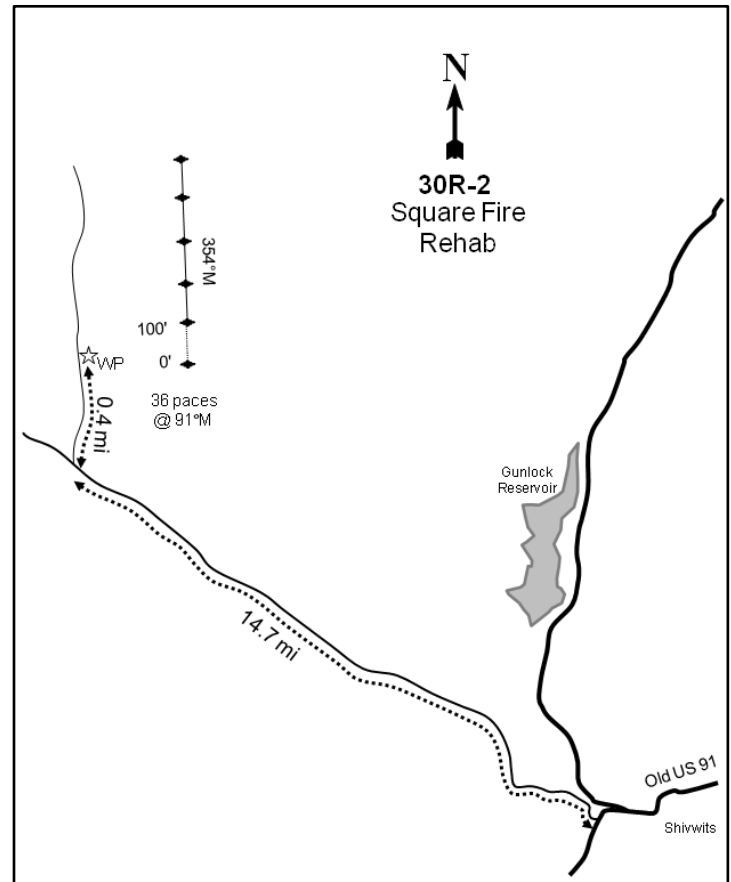
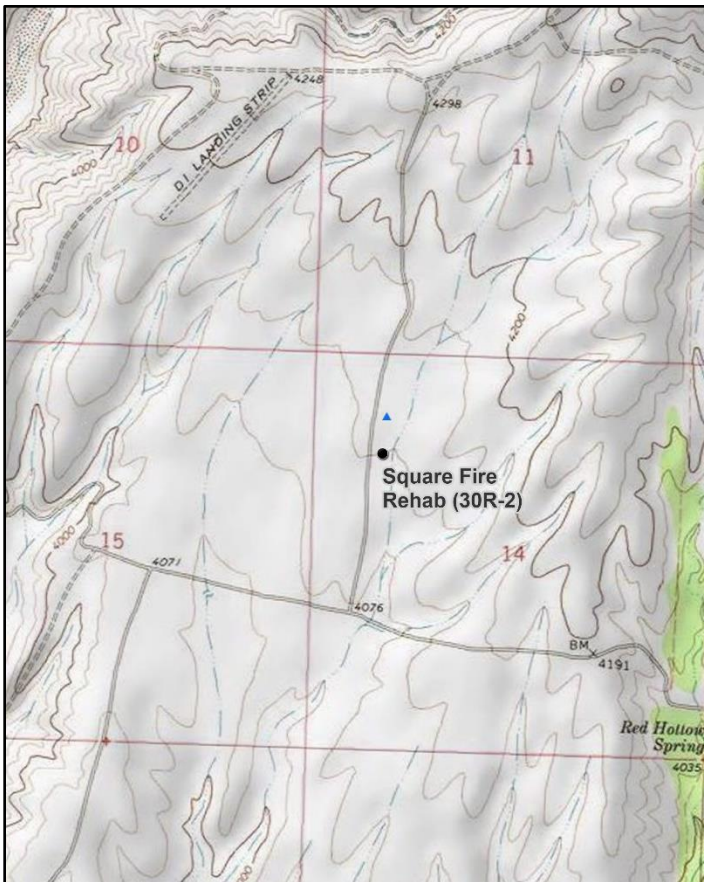
**Table 30R-01.14 - Tree Characteristics.** Point-quarter tree density, size class distribution, and average diameter.

Year	Density	Size Class Distribution					Average Diameter (cm)
	Trees per Acre	Seedling (%)	1-4' (%)	4-8' (%)	8-12' (%)	>12' (%)	
<b>Juniperus osteosperma (Utah juniper)</b>							
2004	122	16	32	11	21	21	21.7
2007	14	20	70	10	-	-	2.1
2012	16	18	82	-	-	-	3.1
2017	26	20	60	20	-	-	3.3
2022	9	13	75	-	-	13	11.0
<b>Pinus edulis (twoneedle pinyon)</b>							
2004	81	41	12	12	24	12	7.2
2007	15	10	80	10	-	-	2.5
2012	15	-	91	9	-	-	4.2
2017	21	8	67	25	-	-	4.3
2022	3	33	33	-	-	33	7.3

**Table 30R-01.15 - Deer Desirable Components Index: Upland 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
2004	5.7	0.0	0.0	11.1	-0.1	0.1	0.0	16.7	Very Poor
2007	11.1	8.1	5.9	17.6	-12.2	1.2	0.0	31.7	Very Poor
2012	11.7	13.1	15.0	8.8	-20.0	1.0	0.0	29.5	Very Poor
2017	16.0	12.3	15.0	10.6	-3.9	0.5	0.0	50.5	Poor-Fair
2022	18.0	8.7	8.0	13.9	-11.7	0.8	0.0	37.6	Poor

## SQUARE FIRE REHAB - STUDY NO. 30R-2

**Location Information**

USGS 7.5 min Map Info  
GPS (0' Stake)

Motoqua SW; Township 40S, Range 19W, Section 14  
NAD 83 UTM ZONE 12, 238660 East 4133535 North

**Transect Information**

Browse Tag # (0' Stake)	171
Transect Bearing	354° magnetic
Length	500ft
Belt Placement	Line 1 (11ft), Line 2 (34ft), Line 3 (59ft), Line 4 (71ft), Line 5 (95ft)
Belt Marker Placement	Standard

**Directions to Site**

From mile marker 20 on Old US-91, drive west for 4.3 miles to a fork. Turn left and continue for 0.9 miles to another fork. Proceed right and drive 14.7 miles to a road on the right. Turn here and drive 0.4 miles to a witness post on the right (east) side of the road. From the witness post, walk 36 paces at 91 degrees magnetic to the 0-foot stake which is marked with browse tag #171.

**Site Information**

Land Ownership	Federal
Land Administrator	BLM
Allotment	DESERT INN
Elevation	4,100ft (1,250m)
Aspect	Southeast
Slope	2%
Sample Dates	07/19/2006, 06/13/2011, 08/07/2017, 08/08/2022

**Table 30R-02.1 Disturbance History.** Recorded history of major disturbances.

Treatment/Disturbance	Name	WRI DB#	Date	Size (acres)
Fire - Wildfire	Square	-	2004	17146
Chaining - One-Way Unknown	Square Fire Rehab	PDB	Fall 2004	-
Seeding - Aerial Before	Square Fire Rehab	PDB	Fall 2004	6287
Seeding - Aerial After	Square Fire Rehab	PDB	February 2005	3000
Seeding - Aerial Before	Aerial Seeding	PDB	October-December 1981	1450
Chaining - One-Way Unknown	Soil Disturbance: Chaining	PDB	October-December 1981	660
Seeding - Dribbler	Ground Seeding: Dribble	PDB	October-December 1981	660

**Table 30R-02.2 Seed Mix.** List of known seeded plant species and rates (if available).

Mix Name			Application Type	Application Date	Acres
Square Fire Rehab			Aerial	Oct 2004	6287
Type	Species	Common Name	Cultivar/Source ID	Bulk lbs/acre	PLS
G	Achnatherum hymenoides	Indian Ricegrass	Rimrock	0.50	0.00
G	Agropyron cristatum	Crested Wheatgrass	Hycrest	2.50	0.00
G	Bouteloua curtipendula	Sideoats Grama		0.62	0.00
G	Bouteloua gracilis	Blue Grama		0.50	0.00
G	Elymus elymoides	Squirrel Tail		0.25	0.00
G	Pleuraphis jamesii	Galleta		0.50	0.00
G	Thinopyrum intermedium	Pubescent Wheatgrass		2.50	0.00
F	Cleome serrulata	Bee Plant		0.13	0.00
F	Linum perenne	Blue Flax		0.50	0.00
F	Medicago sativa	Alfalfa		0.50	0.00
F	Melilotus officinalis	Yellow Sweetclover		0.50	0.00
F	Sanguisorba minor	Small Burnet		0.50	0.00
S	Atriplex canescens	Fourwing Saltbush		0.25	0.00
S	Bassia prostrata	Forage Kochia		1.00	0.00
S	Krascheninnikovia lanata	Winterfat		0.25	0.00

Mix Name			Application Type	Application Date	Acres
Square Fire			Aerial	Feb 2005	3000
Type	Species	Common Name	Cultivar/Source ID	Bulk lbs/acre	PLS
S	Bassia prostrata	Forage Kochia	Beaver UT	0.83	0.62
S	Bassia prostrata	Forage Kochia	Beaver UT	0.17	0.12

**Wildlife Habitat and Vegetation History**

**Table 30R-02.3 - Wildlife Seasonal Habitat.** DWR wildlife habitat and seasonality.

Species	Habitat	Season
Mule Deer	crucial	winter

**Table 30R-02.4 - Vegetation History.** The dominant vegetation type(s) and phase of woodland succession (Tausch, Miller, Roundy, & Chambers, 2009).

Year	Vegetation Type	Woodland Succession
2006	Forage Kochia/Annual Grass	Phase I
2011	Forage Kochia	Phase I
2017	Broom Snakeweed	Phase I
2022	Broom Snakeweed	Phase I

**Site Notes**

No Notes

**Soils**

**Table 30R-02.5 - Soil Analysis Data.** List of chemical and textural soil characteristics determined by laboratory analysis.

Texture	pH	%sand	%silt	%clay	%OM	PPM P	PPM K	ds/m	Sample Date
Loam	7.5	49.0	28.1	22.9	0.7	19.1	236.8	0.5	07/19/2006

**Site Potential**

1981 - 2010 Average Annual Precipitation                      11 inches  
 NRCS Ecological Site    Semidesert Shallow Hardpan (Blackbrush)  
 NRCS Ecological Site #    R030XY230UT  
 States and Transitions    No state and transition model is available for this ecological site.

This study site was established in 2006 following the 2004 Square Fire to monitor a rehabilitation effort in the area (Table 30R-02.1). In the first two samplings following the fire, the site was a forage kochia (*Bassia prostrata*) dominated plant community. In the 2017 sampling, however, the site transitioned to one dominated by broom snakeweed (*Gutierrezia sarothrae*); other browse species present include desert almond (*Prunus fasciculata*), blackbrush (*Coleogyne ramosissima*) and Nevada jointfir (*Ephedra nevadensis*) (Table 30R-08.12, Table 30R-08.13). The primary grasses have been the introduced annual species red brome (*Bromus rubens*) and cheatgrass (*B. tectorum*) in all sample years. Perennial grasses cover has remained low, but purple threeawn (*Aristida purpurea*) provides the most cover of the perennial species as of 2022. Forbs have been rare and not diverse, but as of the most recent sampling, the native perennial whitemargin sandmat (*Chamaesyce albomarginata*) is the dominant species (Table 30R-02.7, 30R-02.10, Table 30R-02.11). Utah juniper (*Juniperus osteosperma*) was observed in 2017 and 2022 in low amounts; the site is currently considered to be within Phase I of woodland succession and it is possible that it will infill in the future (Table 30R-02.4, Table 30R-02.14). Overall, this site seems to be showing recovery from the fire and appears to be transitioning from an early seral to mid-seral state based on the species composition.

**Trend Summary Tables**

**Table 30R-02.6 - Shrub/Tree Summary.** Average modified Daubenmire quadrat and line intercept cover by year for shrubs/trees

Year	Quadrat Cover (%)			Line-intercept Cover (%)		
	Preferred Shrub	Other Shrub	Tree	Preferred Shrub	Other Shrub	Tree
2006	9.6	0.9	-	12.9	1.9	-
2011	14.5	6.0	-	15.2	6.9	-
2017	5.5	13.8	-	5.5	19.5	-
2022	2.6	17.4	-	3.9	20.9	-

**Table 30R-02.7 - Herbaceous Summary.** Nested frequency and average modified Daubenmire quadrat cover by year for herbaceous functional groups

Year	Nested Frequency				Quadrat Cover (%)			
	Annual Grass	Perennial Grass	Annual/Biennial Forb	Perennial Forb	Annual Grass	Perennial Grass	Annual/Biennial Forb	Perennial Forb
2006	406	38	378	116	7.4	0.2	4.3	1.1
2011	365	20	363	95	5.0	0.7	4.5	1.7
2017	226	82	55	19	4.2	1.9	1.2	0.3
2022	232	55	14	151	2.4	1.4	0.0	0.5

**Table 30R-02.8 - Basic Ground Cover.** Average modified Daubenmire quadrat cover by year for basic ground cover types.

Year	Cover Type (%)					
	Bare Ground	Cryptogams	Litter	Pavement	Rock	Vegetation
2006	40.3	0.0	28.8	13.9	4.6	22.8
2011	23.2	-	14.1	17.9	3.9	34.7
2017	47.7	0.4	20.9	18.2	4.3	24.3
2022	57.6	0.0	22.6	15.4	6.0	21.9

**Table 30R-02.9 - Pellet Group Data.** Quadrat frequency and pellet group transect data for animal pellets. Rabbit pellet groups are not sampled in the pellet group transect.

Year	Cattle	Mule Deer	Rabbit
	Quadrat Frequency		
2006	1	8	78
2011	-	2	11
2017	4	1	47
2022	1	5	5
Year	Days Use Per Acre (ha)		
2006	-	3.4 (8.3)	-
2011	2.2 (5.4)	-	-
2017	-	0.7 (1.7)	-
2022	4.4 (10.8)	6.0 (14.9)	-

**Table 30R-02.10 - Grass Species.** Nested frequency and modified Daubenmire average cover by year.

GRASS SPECIES	Agropyron cristatum <sup>i</sup> (crested wheatgrass)	Aristida purpurea (purple threeawn)	Bouteloua curtipendula (sideoats grama)	Bouteloua gracilis (blue grama)	Bromus rubens <sup>ai</sup> (red brome)	Bromus tectorum <sup>ai</sup> (cheatgrass)	Pascopyrum smithii (western wheatgrass)	Pleuraphis jamesii (James' galleta)	Sporobolus cryptandrus (sand dropseed)	Thinopyrum intermedium <sup>i</sup> (intermediate wheatgrass)	Vulpia octoflora <sup>a</sup> (sixweeks fescue)
year	Nested Frequency										
2006	-	-	36	-	113	399	-	-	3	-	11
2011	2	-	8	-	340	133	7	3	-	-	75
2017	1	46	4	16	159	124	4	4	5	3	-
2022	1	6	-	38	140	179	-	4	-	6	-
year	Average Cover (%)										
2006	-	-	0.2	-	0.4	7.0	-	-	0.0	-	0.0
2011	0.0	-	0.5	-	3.6	1.1	0.1	0.0	-	-	0.3
2017	0.0	0.9	0.2	0.4	2.3	1.9	0.2	0.2	0.0	0.0	-
2022	0.0	0.3	-	0.7	0.7	1.7	-	0.2	-	0.2	-

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

**Table 30R-02.11 - Forb Species.** Nested frequency and modified Daubenmire average cover by year.

FORB SPECIES	Alyssum desertorum <sup>ai</sup> (desert madwort)	Antheropeas wallacei <sup>a</sup> (woolly easterbonnets)	Astragalus (milkvetch)	Astragalus oophorus (egg milkvetch)	Calochortus flexuosus (winding mariposa lily)	Ceratocephala testiculata <sup>ai</sup> (curvseed butterwort)	Chamaesyce albomarginata (whitemargin sandmat)	Collinsia parviflora <sup>a</sup> (maiden blue eyed Mary)	Collomia linearis <sup>a</sup> (tiny trumpet)	Convolvulus arvensis <sup>ni</sup> (field bindweed)	Descurainia pinnata <sup>a</sup> (western tansymustard)	Draba <sup>a</sup> (draba)	Eriastrum sparsiflorum <sup>a</sup> (Great Basin woollystar)	Eriogonum cernuum <sup>a</sup> (nodding buckwheat)	Erodium cicutarium <sup>ni</sup> (redstem stork's bill)	Lappula occidentalis <sup>a</sup> (flatspine stickseed)	Layia glandulosa <sup>a</sup> (whitedaisy tidytops)
year	Nested Frequency																
2006	1	-	3	-	-	2	29	-	50	3	5	6	-	3	42	1	-
2011	12	5	68	1	10	-	4	4	-	-	-	49	98	-	304	-	1
2017	-	-	-	1	7	-	-	-	3	-	-	-	20	6	28	-	-
2022	-	-	-	-	4	-	144	-	-	-	-	-	-	-	13	-	-
year	Average Cover (%)																
2006	0.0	-	0.0	-	-	0.0	0.1	-	0.1	0.0	0.0	0.0	-	0.0	0.8	0.0	-
2011	0.0	0.0	1.0	0.0	0.0	-	0.2	0.0	-	-	-	0.1	0.4	-	2.8	-	0.0
2017	-	-	-	0.0	0.0	-	-	-	0.0	-	-	-	0.1	0.2	0.9	-	-
2022	-	-	-	-	0.0	-	0.5	-	-	-	-	-	-	-	0.0	-	-

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

FORB SPECIES	Lepidium <sup>a</sup> (pepperweed)	Linum lewisii (Lewis flax)	Lupinus brevicaulis <sup>ai</sup> (shortstem lupine)	Phlox (phlox)	Plantago patagonica <sup>a</sup> (woolly plantain)	Portulaca oleracea <sup>ai</sup> (little hogweed)	Salsola tragus <sup>ai</sup> (prickly Russian thistle)	Sanguisorba minor <sup>a</sup> (small burnet)	Sphaeralcea grossularifolia (gooseberryleaf globemallow)	unknown annual forb <sup>a</sup> (unknown forb)	Verbena bracteata (bigbract verbena)
year	Nested Frequency										
2006	78	60	-	-	372	-	4	32	5	3	0
2011	1	-	1	1	213	-	9	-	16	-	-
2017	1	-	-	-	1	-	-	-	11	-	-
2022	-	-	-	-	-	5	-	-	13	-	-
year	Average Cover (%)										
2006	0.2	0.3	-	-	3.0	-	0.0	0.4	0.2	0.0	0.0
2011	0.0	-	0.0	0.0	1.1	-	0.0	-	0.4	-	-
2017	0.0	-	-	-	0.0	-	-	-	0.2	-	-
2022	-	-	-	-	-	0.0	-	-	0.0	-	-

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

**Table 30R-02.12 - Shrub and Tree Species.** Average modified Daubenmire quadrat and line intercept cover by year.

SHRUB SPECIES	Line Intercept Cover (%)					
	year	2006	2011	2017	2022	
<i>Bassia prostrata</i> <sup>pt</sup> (forage kochia)	9.8	-	0.3	1.9	2.8	-
<i>Coleogyne ramosissima</i> <sup>p</sup> (blackbrush)	12	0	0.4	6.9	2.8	-
<i>Ephedra nevadensis</i> <sup>p</sup> (Nevada jointfir)	2	0.1	-	19.5	3.4	-
<i>Gutierrezia microcephala</i> (threadleaf snakeweed)	0.3	1.1	0.6	20.9	1.9	-
<i>Prunus fasciculata</i> <sup>p</sup> (desert almond)	Quadrat Cover (%)					
<i>Yucca baccata</i> (banana yucca)	year	2006	2011	2017	2022	
	8.4	0.0	0.0	0.9	1.1	-
	12.7	0.0	0.4	5.9	1.4	0.0
	2.4	0.3	0.4	13.6	2.5	0.1
	0.1	1.0	0.4	17.3	1.0	0.1

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

**Table 30R-02.13 - Shrub/Tree Characteristics.** Population characteristics of shrub/tree species populations including density reproduction (seedlings), age distribution, utilization, vigor and average size (height/crown) of plants.

Year	Density		Age Class Distribution			Utilization		Poor Vigor (%)	Average Height Crown (cm)
	Plants Per Acre		Excluding Seedlings			Moderate (%)	Heavy (%)		
	Excluding Seedlings	Seedling	Young (%)	Mature (%)	Decadent (%)				
<i>Bassia prostrata</i> <sup>pt</sup> -- (forage kochia)									
2006	60680	6140	81	19	0	0	0	0	19/24
2011	29060	960	9	90	0	23	0	0	12/20
2017	4700	-	7	93	0	25	9	3	12/17
2022	300	-	33	67	0	0	0	0	- / -
<i>Coleogyne ramosissima</i> <sup>p</sup> -- (blackbrush)									
2006	20	40	0	0	100	0	0	100	66/102
2011	20	-	100	0	0	0	0	0	60/93
2017	120	-	50	50	0	0	0	0	64/98
2022	60	-	33	67	0	33	0	0	- / -
<i>Ephedra nevadensis</i> <sup>p</sup> -- (Nevada jointfir)									
2006	140	-	29	71	0	0	0	86	48/67
2011	60	-	0	100	0	0	0	33	49/68
2017	-	-	-	-	-	-	-	-	41/47
2022	20	-	0	0	100	0	0	100	- / -
<i>Ericameria nauseosa</i> -- (rubber rabbitbrush)									
2006	-	-	-	-	-	-	-	-	- / -
2011	-	-	-	-	-	-	-	-	51/77
2017	-	-	-	-	-	-	-	-	- / -
2022	-	-	-	-	-	-	-	-	- / -
<i>Gutierrezia microcephala</i> -- (threadleaf snakeweed)									
2006	1680	100	7	93	0	4	0	0	25/29
2011	1840	860	24	76	0	0	0	1	36/56
2017	12080	-	6	93	1	1	0	4	32/42
2022	10680	20	5	82	14	0	0	29	- / -



Year	Density		Age Class Distribution			Utilization		Poor Vigor (%)	Average Height Crown (cm)
	Plants Per Acre		Excluding Seedlings			Moderate (%)	Heavy (%)		
	Excluding Seedlings	Seedling	Young (%)	Mature (%)	Decadent (%)				
<b>Opuntia -- (pricklypear)</b>									
2006	-	-	-	-	-	-	-	-	23/64
2011	-	-	-	-	-	-	-	-	23/64
2017	-	-	-	-	-	-	-	-	26/61
2022	-	-	-	-	-	-	-	-	-/-
<b>Prunus fasciculata<sup>p</sup> -- (desert almond)</b>									
2006	380	-	32	68	0	5	0	5	61/97
2011	500	-	12	88	0	8	0	8	60/99
2017	360	-	6	83	11	17	0	11	75/110
2022	320	20	6	63	31	6	0	50	-/-
<b>Purshia glandulosa<sup>p</sup> -- (desert bitterbrush)</b>									
2006	-	-	-	-	-	-	-	-	31/56
2011	-	-	-	-	-	-	-	-	66/143
2017	-	-	-	-	-	-	-	-	110/175
2022	-	-	-	-	-	-	-	-	-/-
<b>Ribes<sup>p</sup> -- (currant)</b>									
2006	60	-	0	100	0	0	0	0	-/-
2011	-	-	-	-	-	-	-	-	-/-
2017	-	-	-	-	-	-	-	-	-/-
2022	-	-	-	-	-	-	-	-	-/-
<b>Yucca baccata -- (banana yucca)</b>									
2006	20	-	0	100	0	0	0	0	34/69
2011	20	-	0	100	0	0	0	0	43/49
2017	20	-	0	100	0	0	0	0	69/94
2022	20	-	0	100	0	0	0	0	-/-

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

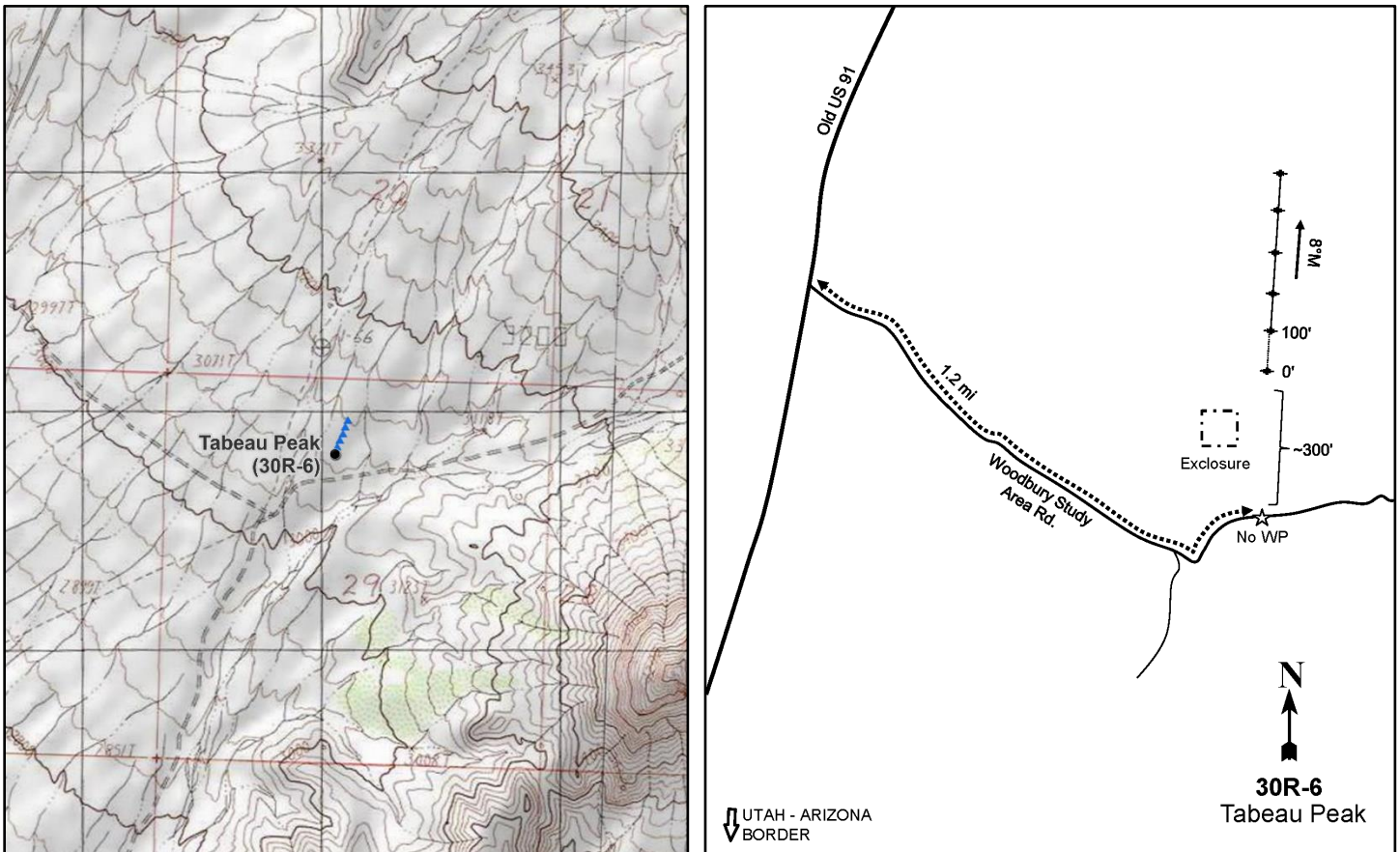
**Table 30R-02.14 - Tree Characteristics.** Point-quarter tree density, size class distribution, and average diameter.

Year	Density	Size Class Distribution					Average Diameter (cm)
	Trees per Acre	Seedling (%)	1-4' (%)	4-8' (%)	8-12' (%)	>12' (%)	
<b>Juniperus osteosperma (Utah juniper)</b>							
2017	7	-	100	-	-	-	2.5
2022	1	-	100	-	-	-	1.0

**Table 30R-02.15 - Deer Desirable Components Index: Semidesert 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	18.6	15.0	15.0	0.4	-5.5	2.1	-2.0	43.6	Fair-Good
2011	22.0	15.0	4.8	1.5	-3.8	3.4	0.0	42.8	Fair
2017	7.4	12.9	3.4	3.8	-3.2	0.6	0.0	24.9	Poor-Fair
2022	4.7	0.0	0.0	2.8	-1.8	1.1	0.0	6.7	Very Poor

## TABEAU PEAK - STUDY NO. 30R-6



### Location Information

USGS 7.5 min Map Info  
GPS (0' Stake)

Castle Cliff SE; Township 43S, Range 18W, Section 29  
NAD 83 UTM ZONE 12, 243004 East 4101015 North

### Transect Information

Browse Tag # (0' Stake)	1778
Transect Bearing	8° magnetic
Length	500ft
Belt Placement	Line 1 (11ft), Line 2 (34ft), Line 3 (59ft), Line 4 (71ft), Line 5 (95ft)
Belt Marker Placement	Standard

### Directions to Site

Traveling south on Old US-91, turn left (east) onto Woodbury Study Area Road. Continue for 1.2 miles, passing a fork in the road (stay left). There will be an exclusion on the left (north) side of the road; park on the shoulder of the road near this exclusion. The transect is about 300 feet north of the road and the 0-foot baseline stake is marked with browse tag #1778.

**Site Information**

Land Ownership	Federal
Land Administrator	BLM
Allotment	No data
Elevation	3,084ft (940m)
Aspect	Southwest
Slope	7%
Sample Dates	08/30/2016, 08/09/2022

**Table 30R-06.1 Disturbance History.** Recorded history of major disturbances.

Treatment/Disturbance	Name	WRI DB#	Date	Size (acres)
Seeding - Transplant	Desert Tortoise Habitat Restoration in Burned Areas within two National Conservation Areas in SW Utah	3284	November 2016-Fall 2017	200
Fire - Wildfire	Jarvis	-	June 2006	50702

**Table 30R-06.2 Seed Mix.** List of known seeded plant species and rates (if available).

Mix Name		Application Type	Application Date	Acres	
Native Plant Transplant (November 2016 & 2017)		Seedling Transplant	Nov 2016		
Type	Species	Common Name	Cultivar/Source ID	Bulk lbs/acre	PLS
G	Muhlenbergia porteri	Bush Muhly	Bend OR	NaN	NaN
G	Pleuraphis rigida	Big Galleta	Bend OR	NaN	NaN
F	Astragalus	Milkvetch	Bend OR	NaN	NaN
F	Sphaeralcea ambigua	Desert globemallow	DWR and BLM	NaN	NaN
S	Ambrosia dumosa	White bursage	USGS NV	NaN	NaN
S	Encelia farinosa	Brittlebush	Bend OR	NaN	NaN
S	Larrea tridentata var. tridentata	Creosote bush	USGS NV	NaN	NaN

**Wildlife Habitat and Vegetation History**

**Table 30R-06.3 - Wildlife Seasonal Habitat.** DWR wildlife habitat and seasonality.

Species	Habitat	Season	Brood/Young Rearing
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**Table 30R-06.4 - Vegetation History.** The dominant vegetation type(s) and phase of woodland succession (Tausch, Miller, Roundy, & Chambers, 2009).

Year	Vegetation Type
2016	Annual Forb
2022	Annual Forb

**Site Notes**

No Notes

**Site Potential**

1981 - 2010 Average Annual Precipitation	9 inches
NRCS Ecological Site	Desert Loam (Creosote Bush)
NRCS Ecological Site #	R030XY110UT
States and Transitions	No state and transition model is available for this ecological site.

This site was dominated by annual forbs when it was established in 2016, with most of the cover being contributed by woolly plantain (*Plantago patagonica*). In 2022, however, cover and frequency of woolly plantain was notably lower while red brome (*Bromus rubens*) increased significantly in both frequency and cover. The herbaceous understory has otherwise remained depauperate (Table 30R-06.7, Table 30R-06.10, Table 30R-06.11). Browse cover has remained limited, with the only preferred species being Nevada jointfir (*Ephedra nevadensis*) and winterfat (*Krascheninnikovia lanata*) (Table 30R-06.12, Table 30R-06.13).

**Trend Summary Tables**

**Table 30R-06.6 - Shrub/Tree Summary.** Average modified Daubenmire quadrat and line intercept cover by year for shrubs/trees

Year	Quadrat Cover (%)			Line-intercept Cover (%)		
	Preferred Shrub	Other Shrub	Tree	Preferred Shrub	Other Shrub	Tree
2016	0.3	0.8	-	0.7	0.5	-
2022	0.8	1.4	-	1.1	1.8	-

**Table 30R-06.7 - Herbaceous Summary.** Nested frequency and average modified Daubenmire quadrat cover by year for herbaceous functional groups

Year	Nested Frequency				Quadrat Cover (%)			
	Annual Grass	Perennial Grass	Annual/Biennial Forb	Perennial Forb	Annual Grass	Perennial Grass	Annual/Biennial Forb	Perennial Forb
2016	148	5	459	64	2.9	0.0	13.5	0.8
2022	429	57	226	80	13.3	1.1	2.9	0.5

**Table 30R-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	24.4	-	7.8	48.4	8.4	18.3
2022	26.1	0.9	19.6	45.7	13.4	19.7

**Table 30R-06.9 - Pellet Group Data.** Quadrat frequency and pellet group transect data for animal pellets. Rabbit pellet groups are not sampled in the pellet group transect.

Year	Mule Deer	Rabbit
	Quadrat Frequency	
2016	-	4
2022	-	11
Year	Days Use Per Acre (ha)	
	2016	-
2022	1.3 (3.3)	-

**Table 30R-06.10 - Grass Species.** Nested frequency and modified Daubenmire average cover by year.

GRASS SPECIES	Bromus arvensis <sup>ai</sup> (field brome)	Bromus rubens <sup>ai</sup> (red brome)	Dasyochloa pulchella (low woollygrass)	Schismus barbatus <sup>ai</sup> (common Mediterranean grass)
year	Nested Frequency			
2016	1	2	5	147
2022	36	404	57	8
year	Average Cover (%)			
2016	0.0	0.0	0.0	2.9
2022	0.6	12.5	1.1	0.2

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

**Table 30R-06.11 - Forb Species.** Nested frequency and modified Daubenmire average cover by year.

FORB SPECIES	Baileya multiradiata (desert marigold)	Chamaesyce (sandmat)	Draba <sup>a</sup> (draba)	Eriogonum inflatum (desert trumpet)	Erodium cicutarium <sup>ai</sup> (redstem stork's bill)	Lygodesmia (skeletonplant)	Penstemon pachyphyllus (thickleaf beardtongue)	Plantago patagonica <sup>a</sup> (woolly plantain)
year	Nested Frequency							
2016	49	13	-	-	-	1	5	459
2022	-	47	2	3	56	-	46	210
year	Average Cover (%)							
2016	0.6	0.1	-	-	-	0.0	0.1	13.5
2022	-	0.1	0.0	0.2	0.1	-	0.2	2.8

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

**Table 30R-06.12 - Shrub and Tree Species.** Average modified Daubenmire quadrat and line intercept cover by year.

SHRUB SPECIES	Ambrosia dumosa (burrobush)	Ephedra nevadensis <sup>p</sup> (Nevada jointfir)	Gutierrezia microcephala (threadleaf snakeweed)	Larrea tridentata (creosote bush)	Lycium andersonii (water jacket)	Tetradymia canescens (spineless horsebrush)
year	Line Intercept Cover (%)					
2016	0.2	0.7	-	0.3	-	-
2022	0.5	1.1	0.9	-	0.4	-
year	Quadrat Cover (%)					
2016	0.7	0.3	-	0.0	-	0.1
2022	0.4	0.8	0.3	0.1	0.5	-

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

**Table 30R-06.13 - Shrub/Tree Characteristics.** Population characteristics of shrub/tree species populations including density reproduction (seedlings), age distribution, utilization, vigor and average size (height/crown) of plants.

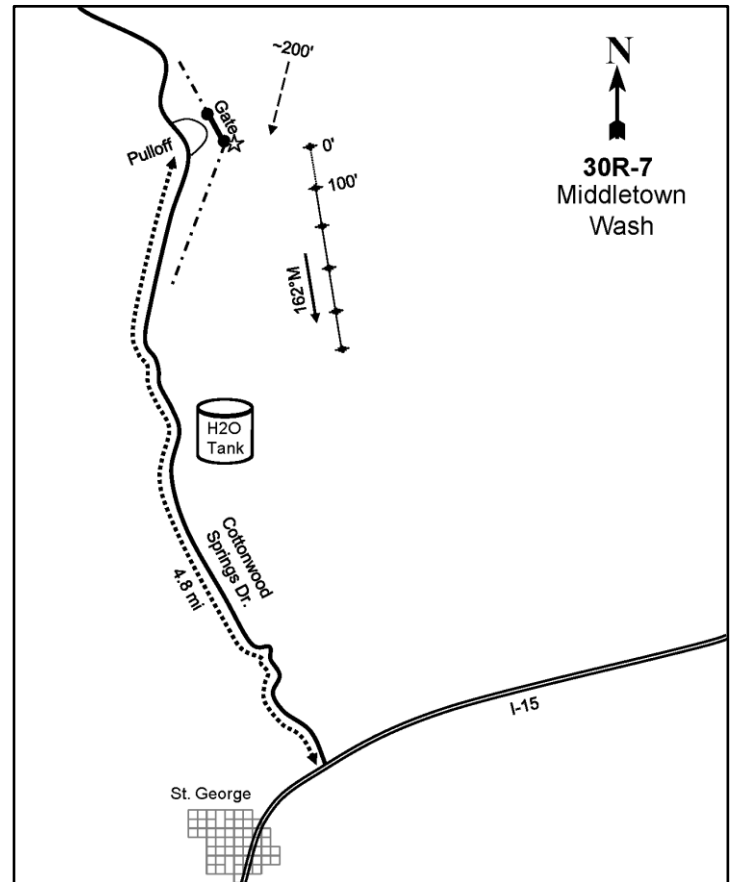
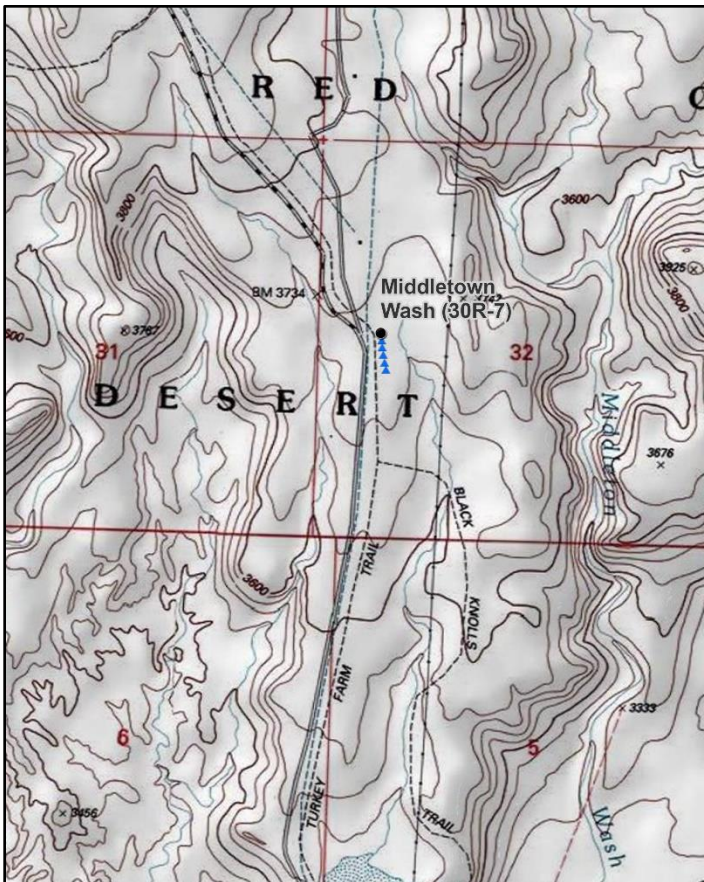
Year	Density		Age Class Distribution			Utilization		Poor Vigor (%)	Average Height Crown (cm)
	Plants Per Acre		Excluding Seedlings			Moderate (%)	Heavy (%)		
	Excluding Seedlings	Seedling	Young (%)	Mature (%)	Decadent (%)				
<b>Ambrosia dumosa -- (burrobush)</b>									
2016	180	-	44	22	33	0	0	11	38/93
2022	80	-	0	50	50	0	0	50	- / -
<b>Cylindropuntia -- (cholla)</b>									
2016	-	-	-	-	-	-	-	-	41/43
2022	-	-	-	-	-	-	-	-	- / -
<b>Ephedra nevadensis<sup>p</sup> -- (Nevada jointfir)</b>									
2016	80	-	25	75	0	25	0	0	48/94
2022	160	-	25	25	50	0	0	50	- / -

Year	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 microcephala -- (threadleaf snakeweed)</b>									
2016	-	-	-	-	-	-	-	-	32/48
2022	120	-	0	100	0	0	0	0	- / -
<b>Krameria -- (ratany)</b>									
2016	20	-	0	100	0	0	0	100	39/71
2022	-	-	-	-	-	-	-	-	- / -
<b>Krascheninnikovia lanata<sup>p</sup> -- (winterfat)</b>									
2016	-	-	-	-	-	-	-	-	46/94
2022	20	-	0	100	0	0	0	0	- / -
<b>Larrea tridentata -- (creosote bush)</b>									
2016	-	-	-	-	-	-	-	-	101/167
2022	-	-	-	-	-	-	-	-	- / -
<b>Lycium andersonii -- (water jacket)</b>									
2016	-	-	-	-	-	-	-	-	- / -
2022	160	-	0	50	50	0	0	50	- / -
<b>Opuntia -- (pricklypear)</b>									
2016	-	-	-	-	-	-	-	-	21/69
2022	20	-	0	100	0	0	0	0	- / -
<b>Thamnosma montana -- (turpentinebroom)</b>									
2016	-	-	-	-	-	-	-	-	36/83

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



## MIDDLETOWN WASH - STUDY NO. 30R-7

**Location Information**

USGS 7.5 min Map Info  
GPS (0' Stake)

Washington SW; Township 41S, Range 15W, Section 32  
NAD 83 UTM ZONE 12, 272128 East 4117576 North

**Transect Information**

Browse Tag # (0' Stake)	582
Transect Bearing	162° magnetic
Length	500ft
Belt Placement	Line 1 (11ft), Line 2 (34ft), Line 3 (59ft), Line 4 (71ft), Line 5 (95ft)
Belt Marker Placement	No Rebar

**Directions to Site**

Traveling southwest on East Red Hills Parkway (parallel to I-15) in Middletown, turn right (north) onto Cottonwood Springs Drive. Continue for 4.8 miles (passing a water tank on the east side of the road) to a pulloff next to a gate. Park in the pulloff and go through the gate (you may need to go over it). The 0-foot stake is about 200 feet southeast of the gate and is marked with browse tag #582.



**Site Information**

Land Ownership	Federal
Land Administrator	BLM
Allotment	No data
Elevation	3,701ft (1,128m)
Aspect	Northwest
Slope	2%
Sample Dates	08/30/2016, 08/09/2022

**Table 30R-07.1 Disturbance History.** Recorded history of major disturbances.

Treatment/Disturbance	Name	WRI DB#	Date	Size (acres)
Seeding - Transplant	Desert Tortoise Habitat Restoration in Burned Areas within two National Conservation Areas in SW Utah (Proposed)	3284	November 2016-Fall 2017	200
Fire - Wildfire	Plateau	-	June 2005	2986
Fire - Wildfire	Mill Creek	-	July 2005	7888
Fire - Wildfire	Turkey Farm Road	-	July 2020	11993
Seeding - Aerial	2020 Turkey Farm Road ESR (Proposed)	5499	February-March 2021	5686

**Table 30R-07.2 Seed Mix.** List of known seeded plant species and rates (if available).

Mix Name			Application Type	Application Date	Acres
Native Plant Transplant (November 2016 & 2017)			Seedling Transplant	Nov 2016	
Type	Species	Common Name	Cultivar/Source ID	Bulk lbs/acre	PLS
G	Muhlenbergia porteri	Bush Muhly	Bend OR	NaN	NaN
G	Pleuraphis rigida	Big Galleta	Bend OR	NaN	NaN
F	Astragalus	Milkvetch	Bend OR	NaN	NaN
F	Sphaeralcea ambigua	Desert globemallow	DWR and BLM	NaN	NaN
S	Ambrosia dumosa	White bursage	USGS NV	NaN	NaN
S	Encelia farinosa	Brittlebush	Bend OR	NaN	NaN
S	Larrea tridentata var. tridentata	Creosote bush	USGS NV	NaN	NaN

Mix Name			Application Type	Application Date	Acres
Turkey Farm Fire BLM			Aerial	Feb 2021	7577
Type	Species	Common Name	Cultivar/Source ID	Bulk lbs/acre	PLS
G	Achnatherum hymenoides	Indian Ricegrass	Nezpar	0.01	0.01
G	Achnatherum hymenoides	Indian Ricegrass	Nezpar	1.25	1.18
G	Achnatherum hymenoides	Indian Ricegrass	Paloma	0.13	0.12
G	Bouteloua curtipendula	Sideoats Grama	Niner	0.13	0.09
G	Bouteloua curtipendula	Sideoats Grama	Niner	0.26	0.20
G	Bouteloua curtipendula	Sideoats Grama	'Vaughn' NC	2.23	1.67
G	Bouteloua curtipendula	Sideoats Grama	'Vaughn' NC	1.46	1.16
G	Bouteloua gracilis	Blue Grama	Alma	0.02	0.02
G	Bouteloua gracilis	Blue Grama	Alma	0.07	0.05
G	Bouteloua gracilis	Blue Grama	Alma	0.42	0.30
G	Bouteloua gracilis	Blue Grama	Alma	0.30	0.20
G	Bouteloua gracilis	Blue Grama	'Hachita' NC	0.66	0.49
G	Bouteloua gracilis	Blue Grama	'Hachita' NC	0.15	0.11
G	Pleuraphis jamesii	Galleta	Viva	0.17	0.12
G	Pleuraphis jamesii	Galleta	'Viva' NC	0.03	0.02
G	Pleuraphis jamesii	Galleta	'Viva' NC	0.17	0.13
G	Pleuraphis jamesii	Galleta	Viva	0.09	0.06
G	Poa secunda	Sandberg Bluegrass	Hanford	0.19	0.17
G	Poa secunda	Sandberg Bluegrass	Mountain Home	0.26	0.23
G	Poa secunda	Sandberg Bluegrass	Mountain Home	0.05	0.04
G	Poa secunda	Sandberg Bluegrass	Reliable	0.43	0.40
G	Poa secunda	Sandberg Bluegrass	Reliable	0.07	0.06
F	Sphaeralcea ambigua	Desert Globemallow	NC	0.10	0.06

**Wildlife Habitat and Vegetation History****Table 30R-07.3 - Wildlife Seasonal Habitat.** DWR wildlife habitat and seasonality.

Species	Habitat	Season	Brood/Young Rearing
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**Table 30R-07.4 - Vegetation History.** The dominant vegetation type(s) and phase of woodland succession (Tausch, Miller, Roundy, & Chambers, 2009).

Year	Vegetation Type
2016	Annual Grass-Forb
2022	Annual Forb

**Site Notes**

No Notes

**Site Potential**

1981 - 2010 Average Annual Precipitation	10 inches
NRCS Ecological Site	Semidesert Shallow Hardpan (Blackbrush)
NRCS Ecological Site #	R029XY220UT
States and Transitions	No state and transition model is available for this ecological site.

This study site was established in 2016 and was dominated by annual grasses -- mainly the introduced species cheatgrass (*Bromus tectorum*) -- and forbs, namely prickly Russian thistle (*Salsola tragus*) (Table 30R-07.7, Table 30R-07.10, Table 30R-07.11). Browse was extremely limited, with only Nevada jointfir (*Ephedra nevadensis*) and greasewood (*Sarcobatus vermiculatus*) contributing any cover (Table 30R-07.6, Table 30R-07.12). A seeding (transplant) treatment occurred on this site between 2016 and 2017 with the expectation of improving the browse and herbaceous components. However, there was a wildfire in 2020 that appears to have reset the community back to a pre-seeded state, and any recovery was lost (Table 30R-07.1); the introduced annual forb species redstem stork's bill (*Erodium cicutarium*) provided a vast majority of the vegetation cover in 2022 (Table 30R-07.11).

**Trend Summary Tables****Table 30R-07.6 - Shrub/Tree Summary.** Average modified Daubenmire quadrat and line intercept cover by year for shrubs/trees

Year	Quadrat Cover (%)			Line-intercept Cover (%)		
	Preferred Shrub	Other Shrub	Tree	Preferred Shrub	Other Shrub	Tree
2016	0.0	0.0	-	0.3	-	-
2022	-	-	-	-	-	-

**Table 30R-07.7 - Herbaceous Summary.** Nested frequency and average modified Daubenmire quadrat cover by year for herbaceous functional groups

Year	Nested Frequency				Quadrat Cover (%)			
	Annual Grass	Perennial Grass	Annual/Biennial Forb	Perennial Forb	Annual Grass	Perennial Grass	Annual/Biennial Forb	Perennial Forb
2016	408	-	384	2	19.3	-	16.9	0.0
2022	162	-	409	20	0.6	-	19.5	0.5

**Table 30R-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
2016	11.1	-	46.5	20.4	1.8	33.5
2022	41.3	-	16.2	38.7	4.0	20.0

**Table 30R-07.9 - Pellet Group Data.** Quadrat frequency and pellet group transect data for animal pellets. Rabbit pellet groups are not sampled in the pellet group transect.

Year	Mule Deer	Rabbit
	Quadrat Frequency	
2016	11	1
2022	4	10
Year	Days Use Per Acre (ha)	
2016	12.1 (29.8)	-
2022	5.3 (13.2)	-

**Table 30R-07.10 - Grass Species.** Nested frequency and modified Daubenmire average cover by year.

GRASS SPECIES				
Bromus arvensis <sup>ai</sup> (field brome)				
Bromus rubens <sup>si</sup> (red brome)				
Bromus tectorum <sup>ai</sup> (cheatgrass)				
Schismus barbatus <sup>ai</sup> (common Mediterranean grass)				
year	Nested Frequency			
2016	144	28	371	15
2022	10	99	72	-
year	Average Cover (%)			
2016	2.2	0.2	16.9	0.1
2022	0.0	0.4	0.2	-

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

**Table 30R-07.11 - Forb Species.** Nested frequency and modified Daubenmire average cover by year.

FORB SPECIES						
Chamaesyce (sandmat)						
Descurainia sophia <sup>ai</sup> (herb sophia)						
Erodium cicutarium <sup>ai</sup> (redstem stork's bill)						
Salsola tragus <sup>si</sup> (prickly Russian thistle)						
Sisymbrium altissimum <sup>ai</sup> (tall tumblemustard)						
Sphaeralcea ambigua (desert globemallow)						
year	Nested Frequency					
2016	2	32	121	368	1	-
2022	17	-	407	49	5	3
year	Average Cover (%)					
2016	0.0	0.7	2.6	13.4	0.2	-
2022	0.0	-	17.4	2.0	0.0	0.4

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

**Table 30R-07.12 - Shrub and Tree Species.** Average modified Daubenmire quadrat and line intercept cover by year.

SHRUB SPECIES	Line Intercept	
	Ephedra nevadensis <sup>p</sup> (Nevada jointfir)	0.3
Sarcobatus vermiculatus (greasewood)	-	-
year	Quadrat Cover (%)	
	2016	0.0
2022	-	-

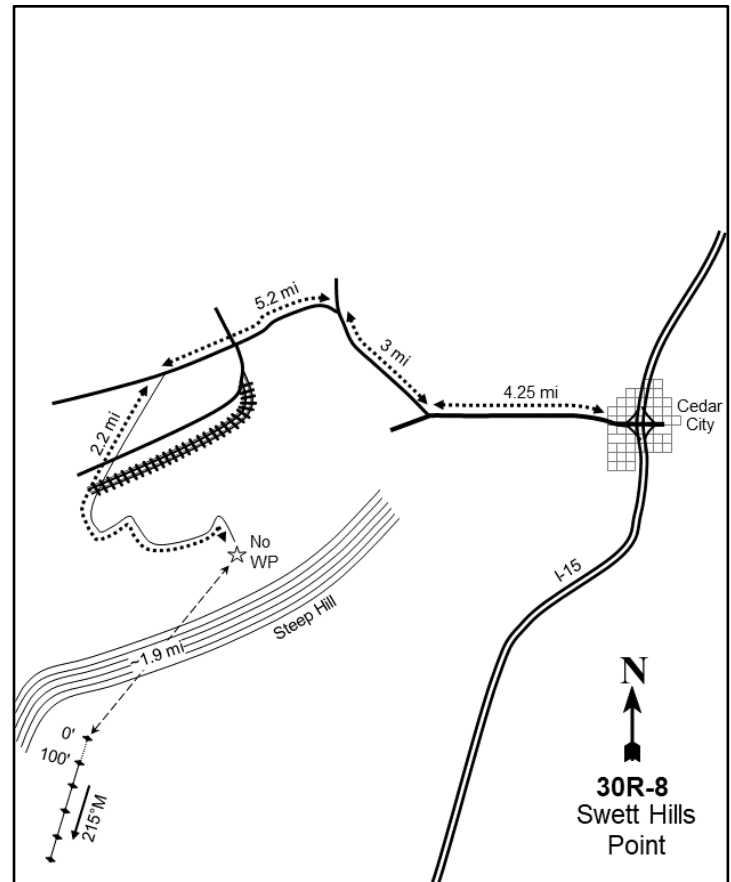
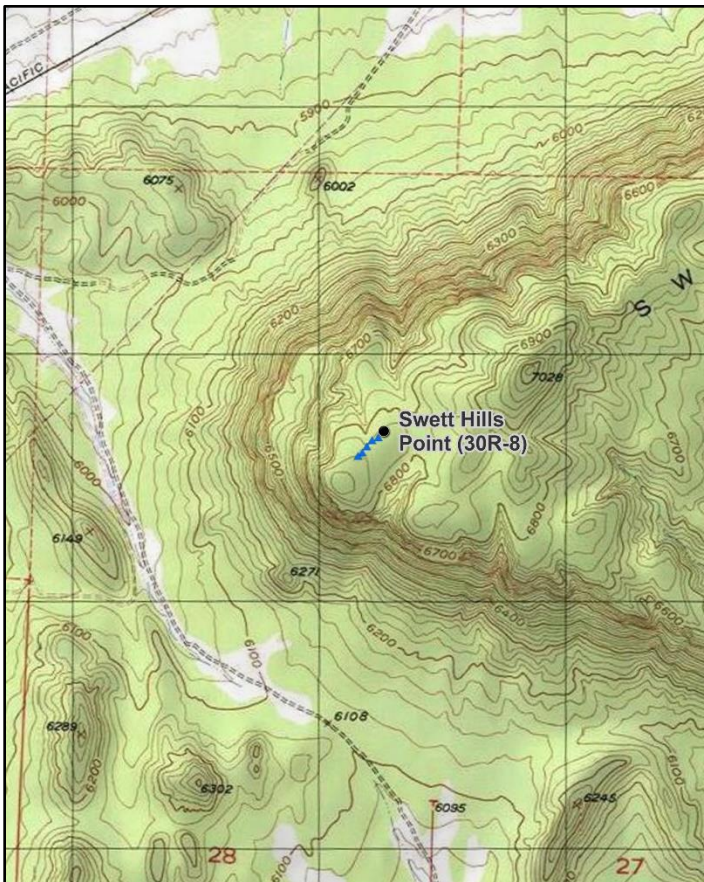
t - Tree Species; p - Preferred Browse; i - Introduced Species

**Table 30R-07.13 - Shrub/Tree Characteristics.** Population characteristics of shrub/tree species populations including density reproduction (seedlings), age distribution, utilization, vigor and average size (height/crown) of plants.

Year	Density		Age Class Distribution			Utilization		Poor Vigor (%)	Average Height Crown (cm)
	Plants Per Acre		Excluding Seedlings			Moderate (%)	Heavy (%)		
	Excluding Seedlings	Seedling	Young (%)	Mature (%)	Decadent (%)				
<b>Ambrosia dumosa -- (burrobush)</b>									
2016	-	-	-	-	-	-	-	-	42/61
2022	-	-	-	-	-	-	-	-	-/-
<b>Ephedra nevadensis<sup>p</sup> -- (Nevada jointfir)</b>									
2016	100	-	60	40	0	0	0	0	73/79
2022	-	-	-	-	-	-	-	-	-/-
<b>Gutierrezia microcephala -- (threadleaf snakeweed)</b>									
2016	-	-	-	-	-	-	-	-	37/47
2022	-	-	-	-	-	-	-	-	-/-
<b>Opuntia -- (pricklypear)</b>									
2016	-	-	-	-	-	-	-	-	29/101
2022	-	-	-	-	-	-	-	-	-/-
<b>Sarcobatus vermiculatus -- (greasewood)</b>									
2016	40	-	50	50	0	50	0	0	80/142
2022	-	-	-	-	-	-	-	-	-/-
<b>Tetradymia spinosa -- (shortspine horsebrush)</b>									
2016	-	-	-	-	-	-	-	-	-/-
2022	40	-	0	50	50	0	100	50	-/-
<b>Yucca -- (yucca)</b>									
2016	-	-	-	-	-	-	-	-	68/103

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

## 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)	540
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	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, 08/09/2022

**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.** DWR 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
2022	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.

At the time of study establishment in 2019 and during the 2022 sampling, this site was dominated by Gambel oak (*Quercus gambelii*) with a moderately robust perennial grass understory. Perennial grasses have been relatively abundant with muttongrass (*Poa fendleriana*) contributing the most cover (Table 30R-08.10). Although forbs are moderately diverse, they have not provided significant cover; the most common forbs have been maiden blue eyed Mary (*Collinsia parviflora*) and hairy false goldenaster (*Heterotheca villosa*) (Table 30R-08.7, Table 30R-08.11). The shrub component was dominated by Gambel oak with lesser amounts of curl-leaf mountain mahogany (*Cercocarpus ledifolius*) and slender buckwheat (*Eriogonum microthecum*) in 2019; oak increased in density and cover following the lop and scatter (Table 30R-08.12, Table 30R-08.13). Trees were not observed in cover data in 2019, but twoneedle pinyon (*Pinus edulis*) was observed in low amounts in 2022 (Photos, Table 30R-08.12). Both Utah juniper (*Juniperus osteosperma*) and twoneedle pinyon, however, were sampled in density measurements in low numbers with age classes shifting from more mature trees in 2019 to young trees in 2022 (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	-
2022	19.6	0.6	-	29.9	1.4	0.1

**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
2022	209	195	97	35	5.4	11.7	1.1	0.9

**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
2022	4.6	0.1	50.4	7.5	30.6	34.9

**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
2022	22	-	13
Year	Days Use Per Acre (ha)		
2019	45.6 (112.6)	-	-
2022	42.2 (104.3)	-	-

**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>a</sup> (cheatgrass)	Carex geyeri (Geyer's sedge)	Elymus elymoides (squirreltail)	Hesperosipa comata (needle and thread)	Poa fendleriana (muttongrass)	Poa pratensis <sup>i</sup> (Kentucky bluegrass)	Poa secunda (Sandberg bluegrass)
year	Nested Frequency								
2019	2	8	124	31	26	1	162	-	5
2022	2	4	209	6	20	5	173	1	-
year	Average Cover (%)								
2019	0.1	0.2	3.2	1.0	1.2	0.2	9.3	-	0.1
2022	0.0	0.1	5.4	0.0	0.8	0.2	10.5	0.0	-

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)	Chamaesyce albomarginata (whitemargin sandmat)	Collinsia parviflora <sup>a</sup> (maiden blue eyed Mary)	Cryptantha (cryptantha)	Cryptantha <sup>a</sup> (annual cryptantha)	Descourainia 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)	Ipomopsis aggregata (scarlet gilia)	Lappula occidentalis <sup>a</sup> (flatspine stickseed)	Lomatium (desertparsley)	Lygodesmia grandiflora (largeflower skeletonplant)	Melilotus officinalis <sup>i</sup> (sweetclover)	Microsteris gracilis <sup>a</sup> (slender phlox)
year	Nested Frequency																
2019	2	5	-	102	1	-	37	7	3	46	31	-	16	2	2	1	30
2022	-	-	21	53	-	11	23	13	-	2	11	2	-	-	-	-	1
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
2022	-	-	0.1	0.2	-	0.0	0.2	0.0	-	0.0	0.6	0.0	-	-	-	-	0.0

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

FORB SPECIES	Packera multilobata (lobeleaf groundsel)	Penstemon eatonii (firecracker penstemon)	Petroradia pumila (rock goldenrod)	Phlox longifolia (longleaf phlox)	Portulaca oleracea <sup>ai</sup> (little hogweed)	Sisymbrium altissimum <sup>ai</sup> (tall tumblemustard)
year	Nested Frequency					
2019	21	2	2	-	-	2
2022	3	-	5	3	24	-
year	Average Cover (%)					
2019	0.1	0.0	0.1	-	-	0.0
2022	0.0	-	0.1	0.0	0.6	-

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.

SHRUB SPECIES	Artemisia tridentata ssp. vaseyana <sup>p</sup> (mountain big sagebrush)	Cercocarpus ledifolius <sup>p</sup> (curl-leaf mountain mahogany)	Echinocereus (hedgehog cactus)	Ericameria nauseosa (rubber rabbitbrush)	Eriogonum microthecum <sup>p</sup> (slender buckwheat)	Gutierrezia sarothrae (broom snakeweed)	Opuntia polyacantha (plains pricklypear)	Pinus edulis <sup>t</sup> (twoneedle pinyon)	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
2022	0.3	1.8	-	-	0.6	0.2	1.2	0.1	27.2
year	Quadrat Cover (%)								
2019	0.0	1.0	0.0	0.0	1.3	0.2	0.8	-	16.9
2022	0.1	1.6	-	-	0.5	0.2	0.4	0.0	17.4

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 (%)				
<b>Artemisia tridentata ssp. vaseyana<sup>p</sup> -- (mountain big sagebrush)</b>									
2019	40	-	0	100	0	0	50	0	39/59
2022	120	-	0	100	0	67	17	0	-/-
<b>Cercocarpus ledifolius<sup>p</sup> -- (curl-leaf mountain mahogany)</b>									
2019	100	-	20	80	0	40	40	20	114/132
2022	100	-	40	40	20	20	60	0	-/-
<b>Echinocereus -- (hedgehog cactus)</b>									
2019	20	-	0	100	0	0	0	0	6/17
2022	40	-	0	100	0	0	0	0	-/-
<b>Eriogonum microthecum<sup>p</sup> -- (slender buckwheat)</b>									
2019	1100	-	0	100	0	47	11	0	12/28
2022	720	-	6	94	0	0	0	31	-/-
<b>Ericameria nauseosa -- (rubber rabbitbrush)</b>									
2019	-	-	-	-	-	-	-	-	95/103
2022	-	-	-	-	-	-	-	-	-/-
<b>Escobaria -- (foxtail cactus)</b>									
2019	40	-	0	100	0	0	0	0	13/30
2022	-	-	-	-	-	-	-	-	-/-
<b>Gutierrezia sarothrae -- (broom snakeweed)</b>									
2019	400	80	0	100	0	0	0	0	25/34
2022	500	-	52	48	0	8	0	0	-/-
<b>Opuntia polyacantha -- (plains pricklypear)</b>									
2019	840	-	0	95	5	2	0	5	10/37
2022	820	-	0	93	7	0	0	20	-/-
<b>Pinus edulis<sup>t</sup> -- (twoneedle pinyon)</b>									
2019	40	-	100	0	0	0	0	0	-/-
2022	20	-	100	0	0	0	0	0	-/-
<b>Quercus gambelii<sup>p</sup> -- (Gambel oak)</b>									
2019	4260	100	15	84	1	5	5	3	78/70
2022	5740	20	26	73	1	0	9	1	-/-

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

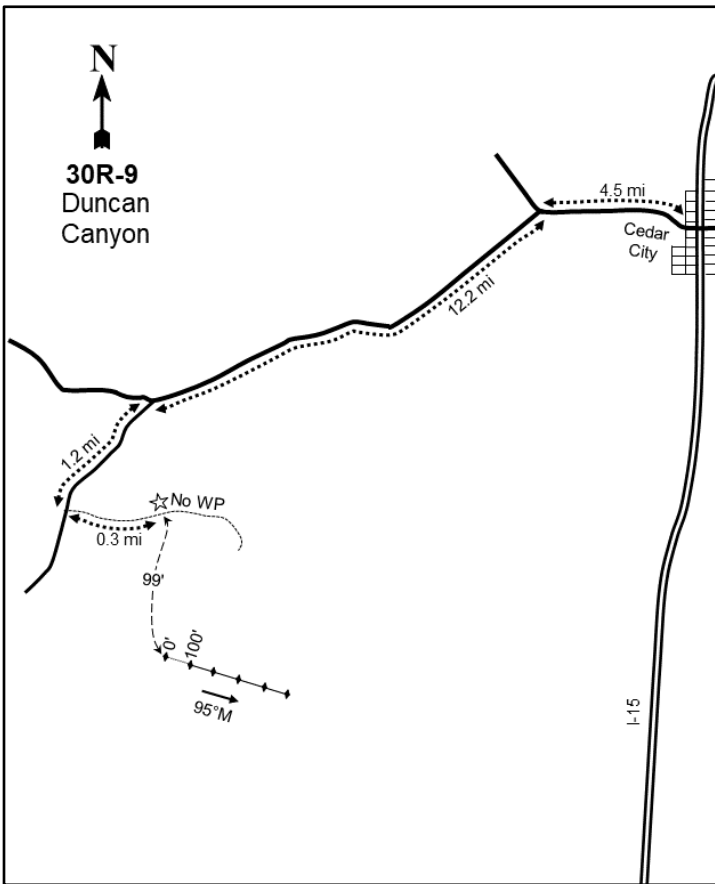
**Table 30R-08.14 - Tree Characteristics.** Point-quarter tree density, size class distribution, and average diameter.

Year	Density	Size Class Distribution					Average Diameter (cm)
	Trees per Acre	Seedling (%)	1-4' (%)	4-8' (%)	8-12' (%)	>12' (%)	
<b>Juniperus osteosperma (Utah juniper)</b>							
2019	4	50	-	50	-	-	11.0
2022	12	25	50	25	-	-	6.3
<b>Pinus edulis (twoneedle pinyon)</b>							
2019	40	33	67	-	-	-	1.8
2022	23	33	67	-	-	-	1.3

**Table 30R-08.15 - Deer Desirable Components Index: Mountain 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
2022	30.0	14.3	13.1	23.3	-4.0	1.7	0.0	78.4	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

73  
95° magnetic  
500ft  
Line 1 (11ft), Line 2 (34ft), Line 3 (59ft), Line 4 (71ft), Line 5 (95ft)  
Standard

### 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	3-5%
Sample Dates	08/14/2019, 06/16/2022

**Table 30R-09.1 Disturbance History.** Recorded history of major disturbances.

Treatment/Disturbance	Name	WRI DB#	Date	Size (acres)
Mechanical - Bullhog	Pinto Watershed and Defensible Fire Space Restoration Project Phase I	4779	Between 2020 and June 2022	1800
Seeding - Aerial Before	Pinto Watershed and Defensible Fire Space Restoration Project Phase I	4779	Between October 2019 and June 2022	1800

**Table 30R-09.2 Seed Mix.** List of known seeded plant species and rates (if available).

Mix Name			Application Type	Application Date	Acres
Pinto Aerial			Aerial	Nov 2019	1448
Type	Species	Common Name	Cultivar/Source ID	Bulk lbs/acre	PLS
G	Agropyron cristatum	Crested Wheatgrass	Kirk	1.52	1.43
G	Elymus elymoides	Bottlebrush Squirreltail	Pueblo	0.50	0.44
G	Pascopyrum smithii	Western Wheatgrass	Recovery	1.52	1.38
G	Poa secunda	Big Bluegrass	Sherman	0.26	0.23
G	Poa secunda	Sandberg Bluegrass	Reliable	0.26	0.21
G	Sporobolus cryptandrus	Sand Dropseed		0.05	0.05
F	Achillea millefolium	Western Yarrow	Eagle	0.10	0.09
F	Sanguisorba minor	Small Burnet	Delar	0.76	0.67

**Wildlife Habitat and Vegetation History****Table 30R-09.3 - Wildlife Seasonal Habitat.** DWR 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
2022	Perennial Grass/Mixed Shrub	Phase I

**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.

This site was a twoneedle pinyon (*Pinus edulis*) and Utah juniper (*Juniperus osteosperma*) dominated ecological site within Phase III of woodland succession upon study establishment in 2019. However, in 2022 the study had transitioned to a Phase I community following the bullhog treatment (Table 30R-09.1, Table 30R-09.4, Table 30R-09.12, Table 30R-09.14). The herbaceous understory was sparse and provided little cover in 2019, but cover increased significantly in 2022 with much of it being contributed by the perennial grass species foxtail barley (*Hordeum jubatum*), crested wheatgrass (*Agropyron cristatum*), and squirreltail (*Elymus elymoides*) (Table 30R-09.7, Table 30R-09.10). Forbs have remained moderately diverse. Cover and frequency were low prior to treatment, but diversity of forbs increased with much of the cover contributed by Leonard's beardtongue (*Penstemon leonardii*) and mountain phlox (*Phlox austromontana*) after the bullhog and seeding (Table 30R-09.11). Alderleaf mountain mahogany (*Cercocarpus montanus*) and Utah serviceberry (*Amelanchier utahensis*) have remained the most common browse species. Total shrub cover remained similar between 2019 and 2022, but wild crab apple (*Peraphyllum ramosissimum*) and antelope bitterbrush (*Purshia tridentata*) had notable increases in density (Table 30R-09.12, Table 30R-09.13). Without further disturbance, it is likely that this site will continue to recuperate and produce valuable forage for wildlife.

**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
2022	4.8	0.2	0.4	7.6	-	-

**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
2022	67	228	158	186	3.5	16.1	3.3	7.9

**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
2022	18.9	0.4	64.3	1.8	3.5	29.1

**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	Rocky Mountain Elk	Rabbit
	Quadrat Frequency			
2019	-	8	-	30
2022	-	9	2	1
Year	Days Use Per Acre (ha)			
2019	2.2 (5.4)	12.1 (29.8)	-	-
2022	0.7 (1.8)	20.1 (49.7)	2.7 (6.6)	-

**Table 30R-09.10 - 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)	Hordeum jubatum (foxtail barley)	Pascopyrum smithii (western wheatgrass)	Poa fendleriana (muttongrass)
year	Nested Frequency					
2019	-	5	32	-	-	5
2022	71	67	57	74	53	25
year	Average Cover (%)					
2019	-	0.0	0.2	-	-	0.2
2022	4.5	3.5	4.0	5.2	1.3	1.1

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	Achillea millefolium (Common yarrow)	Arabis (rockcress)	Arabis holboellii <sup>a</sup> (Holboell's rockcress)	Astragalus convallarius (lesser rushy milkvetch)	Calochortus nuttallii (sego lily)	Carduus nutans <sup>mi</sup> (nodding plumeless thistle)	Chaenactis douglasii (Douglas' dustymaiden)	Cirsium vulgare <sup>ai</sup> (bull thistle)	Collinsia parviflora <sup>a</sup> (maiden blue eyed Mary)	Collomia linearis <sup>a</sup> (tiny trumpet)	Cryptantha gracilis <sup>a</sup> (narrowstem cryptantha)	Descurainia incana <sup>a</sup> (mountain tansymustard)	Descurainia pinnata <sup>a</sup> (western tansymustard)	Draba <sup>a</sup> (draba)	Dracocephalum parviflorum (American dragonhead)	Erigeron eatonii (Eatons' fleabane)	Eriogonum umbellatum (sulphur-flower buckwheat)
year	Nested Frequency																
2019	-	-	22	-	-	-	2	-	144	7	-	-	52	4	-	7	10
2022	5	6	8	0	1	2	4	1	44	4	8	51	-	2	1	42	12
year	Average Cover (%)																
2019	-	-	0.1	-	-	-	0.0	-	0.7	0.0	-	-	0.3	0.0	-	0.1	0.3
2022	0.3	0.1	0.2	0.0	0.0	0.0	0.2	0.0	0.3	0.0	0.0	1.6	-	0.0	0.0	0.4	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)	Lesquerella (bladderpod)	Lomatium (desertparsley)	Lotus utahensis (Utah bird's-foot trefoil)	Microsteris gracilis <sup>a</sup> (slender phlox)	Packera multilobata (lobeleaf groundsel)	Pedicularis centranchera (dwarf lousewort)	Penstemon eatonii (firecracker penstemon)	Penstemon leonardii (Leonard's beardtongue)	Phlox austromontana (mountain phlox)	Polygonum douglasii <sup>a</sup> (Douglas' knotweed)	Sanguisorba minor <sup>a</sup> (small burnet)	Sphaeralcea grossularifolia (gooseberryleaf globemallow)	Streptanthus cordatus (heartleaf twistflower)
year	Nested Frequency																
2019	4	21	-	18	4	-	1	107	-	8	4	31	40	109	-	-	1
2022	-	-	23	9	6	9	1	84	11	11	1	58	69	11	11	2	2
year	Average Cover (%)																
2019	0.0	0.1	-	0.1	0.0	-	0.1	0.3	-	0.0	0.0	0.8	1.4	0.8	-	-	0.0
2022	-	-	0.3	0.1	0.1	0.0	0.0	0.8	0.6	0.1	0.0	2.9	2.4	0.0	0.3	0.1	0.0

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



FORB SPECIES		
	Trifolium (clover)	
		Trifolium gymnocarpon (hollyleaf clover)
year	Nested	
2019	4	-
2022	-	35
year	Average Cover (%)	
2019	0.0	-
2022	-	0.2

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)													
Artemisia tridentata ssp. vaseyana <sup>p</sup> (mountain big sagebrush)													
Cercocarpus montanus <sup>p</sup> (alderleaf mountain mahogany)													
Chrysothamnus viscidiflorus (yellow rabbitbrush)													
Juniperus osteosperma <sup>t</sup> (Utah juniper)													
Opuntia polyacantha (plains pricklypear)													
Peraphyllum ramosissimum <sup>p</sup> (wild crab apple)													
Pinus edulis <sup>t</sup> (twoneedle pinyon)													
Purshia tridentata <sup>p</sup> (antelope bitterbrush)													
Quercus gambelii <sup>p</sup> (Gambel oak)													
Symphoricarpos oreophilus <sup>p</sup> (mountain snowberry)													
year	Line Intercept Cover (%)												
2019	1.5	-	-	4.1	-	25.9	-	0.5	22.7	-	-	-	-
2022	1.5	0.4	0.4	3.8	-	-	-	0.6	0	0.8	-	0.1	-
year	Quadrat Cover (%)												
2019	2.4	0.1	-	3.8	-	2.9	0.1	0.2	11.1	-	0.1	-	-
2022	0.9	0.4	0.1	2.2	0.0	0.1	0.1	0.3	0.3	0.8	-	0.0	-

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 (%)				
<b>Amelanchier utahensis<sup>p</sup> -- (Utah serviceberry)</b>									
2019	880	120	21	80	0	14	9	0	54/64
2022	740	-	27	73	0	46	38	0	- / -
<b>Artemisia nova<sup>p</sup> -- (black sagebrush)</b>									
2019	40	-	0	100	0	0	0	0	42/53
2022	20	-	0	100	0	0	0	0	- / -
<b>Arctostaphylos pungens -- (pointleaf manzanita)</b>									
2019	-	-	-	-	-	-	-	-	33/134
2022	-	-	-	-	-	-	-	-	- / -

Year	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	-	-	-	-	-	-	-	-	54/65
2022	120	-	0	100	0	0	50	0	- / -
<b>Cercocarpus montanus<sup>p</sup> -- (alderleaf mountain mahogany)</b>									
2019	680	-	12	68	21	21	71	18	72/96
2022	540	-	15	78	7	7	70	7	- / -
<b>Chrysothamnus viscidiflorus -- (yellow rabbitbrush)</b>									
2019	-	-	-	-	-	-	-	-	- / -
2022	20	-	100	0	0	0	0	0	- / -
<b>Juniperus osteosperma<sup>i</sup> -- (Utah juniper)</b>									
2019	80	-	25	75	0	0	0	0	- / -
2022	60	-	67	33	0	0	0	0	- / -
<b>Opuntia polyacantha -- (plains pricklypear)</b>									
2019	60	-	0	100	0	0	0	0	14/40
2022	40	-	0	50	50	0	0	50	- / -
<b>Peraphyllum ramosissimum<sup>p</sup> -- (wild crab apple)</b>									
2019	340	-	35	53	12	12	0	12	41/45
2022	680	20	35	65	0	15	0	0	- / -
<b>Pinus edulis<sup>i</sup> -- (twoneedle pinyon)</b>									
2019	600	260	60	40	0	0	0	0	- / -
2022	140	-	86	0	14	0	0	14	- / -
<b>Pinus monophylla<sup>i</sup> -- (singleleaf pinyon)</b>									
2019	-	-	-	-	-	-	-	-	- / -
2022	20	-	100	0	0	0	0	0	- / -
<b>Purshia tridentata<sup>p</sup> -- (antelope bitterbrush)</b>									
2019	80	-	0	100	0	0	100	0	28/72
2022	340	-	47	53	0	6	53	0	- / -
<b>Quercus gambelii<sup>p</sup> -- (Gambel oak)</b>									
2019	180	20	100	0	0	0	0	0	74/73
2022	120	-	100	0	0	0	67	0	- / -
<b>Symphoricarpos oreophilus<sup>p</sup> -- (mountain snowberry)</b>									
2019	-	-	-	-	-	-	-	-	- / -
2022	160	-	0	100	0	0	100	0	- / -

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' (%)	
<b>Juniperus osteosperma (Utah juniper)</b>							
2019	196	-	5	15	-	80	30.4
2022	9	25	75	-	-	-	2.8
<b>Pinus edulis (twoneedle pinyon)</b>							
2019	459	-	5	15	5	75	20.9
2022	42	20	80	-	-	-	2.7

**Table 30R-09.15 - Deer Desirable Components Index: Mountain 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
2022	10.9	13.9	10.2	30.0	-2.6	10.0	-2.0	70.4	Fair-Good

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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		